2021 JOINT PLANNING DESIRED FUTURE CONDITIONS EXPLANATORY REPORT

Prepared by:
Groundwater Management Area 15
Joint Planning Committee

With Technical Assistance by:
Michael Keester, P.G.

Velma Danielson

Andrew Donnelly, P.G.

{DATE}

Geoscientist Seals and Contributors

Groundwater Management Area 15 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 geoscientists in the State of Texas:

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 15 in their development of desired future conditions for relevant aquifers. Mr. Keester is also the principal author of the explanatory report.

Signature　　　　Date

Velma Danielson

Ms. Danielson provided technical support associated with assessment of water management strategies, socioeconomic impacts, and private property rights relative to proposed desired future conditions. Ms. Danielson is also a co-author of the explanatory report.

Signature　　　　Date

Andrew C. A. Donnelly, P.G.

Mr. Donnelly provided technical support associated with modeling and in the development of relevant information for the discussion of factors relative to the proposed desired future conditions. Mr. Donnelly is also a co-author of the explanatory report.

Signature　　　　Date

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

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 15.

1.1 GROUNDWATER MANAGEMENT AREA 15

Figure 2 shows the location of the 13 Groundwater Conservation Districts (GCDs) that are contained wholly or in part within the boundary of GMA 15. These 13 GCDs are the Bee GCD, Calhoun County GCD, Coastal Bend GCD, Coastal Plains GCD, Colorado County GCD, Corpus Christi Aquifer Storage & Recovery Conservation District (ASRCD), Evergreen Underground Water Conservation District (UWCD), Fayette County GCD, Goliad County GCD, Pecan Valley GCD, Refugio GCD, Texana GCD, and Victoria County GCD. The Aransas County GCD was previously included in GMA 15. However, an election to confirm this GCD and their ad valorem tax rate failed on May 7, 2016. The following is an excerpt from an article in The Rockport Pilot on May 11, 2016 summarizing the results of this election (Martinez, 2016):

> "Aransas County voters said no to the creation of an Aransas County Groundwater Conservation District with an overwhelming majority by those who cast ballots. Only 10.71 percent of voters said yes to the district, while 89.29 percent voted no. The total number of voters, however, was only 11.37 percent of registered voters in the county."

Therefore, the Aransas County GCD did not participate in the 2021 joint planning cycle and is no longer a part of GMA 15.

In GMA 15, the TWDB recognizes two major aquifers and three minor aquifers. Figure 3 shows the footprints of the two major aquifers, namely, the Gulf Coast Aquifer System and the Carrizo-Wilcox Aquifer. The Carrizo-Wilcox occurs only as a subcrop in the four most up-dip counties, De Witt, Karnes, Lavaca, and Fayette counties. Figure 4 shows the footprints of the minor aquifers, which are the Yegua-Jackson, the Sparta, and the Queen City aquifers. These three minor aquifers only occur as subcrops in Fayette County. Table 1 provides the hydrogeologic units present within GMA 15 with the order representing each unit's position in the subsurface relative to the other units.

The Gulf Coast Aquifer System is divided into four major hydrogeologic units, which are shown in Table 1. These four units are, from youngest to oldest, the Chicot Aquifer, the Evangeline Aquifer, the Burkeville Confining Unit, and the Jasper Aquifer. There are fourteen counties in GMA 15. Table 2 lists the fourteen counties and their area and population projects. In 2010, the fourteen counties had a population of 369,500 people, and the county with the largest population was Victoria County with 86,800 people. The population of the fourteen counties is expected to grow to 473,000 people in 2070, with Victoria expanding to a population of 116,500 people. These population projections for GMA 15 remain unchanged from the 2016 joint planning.

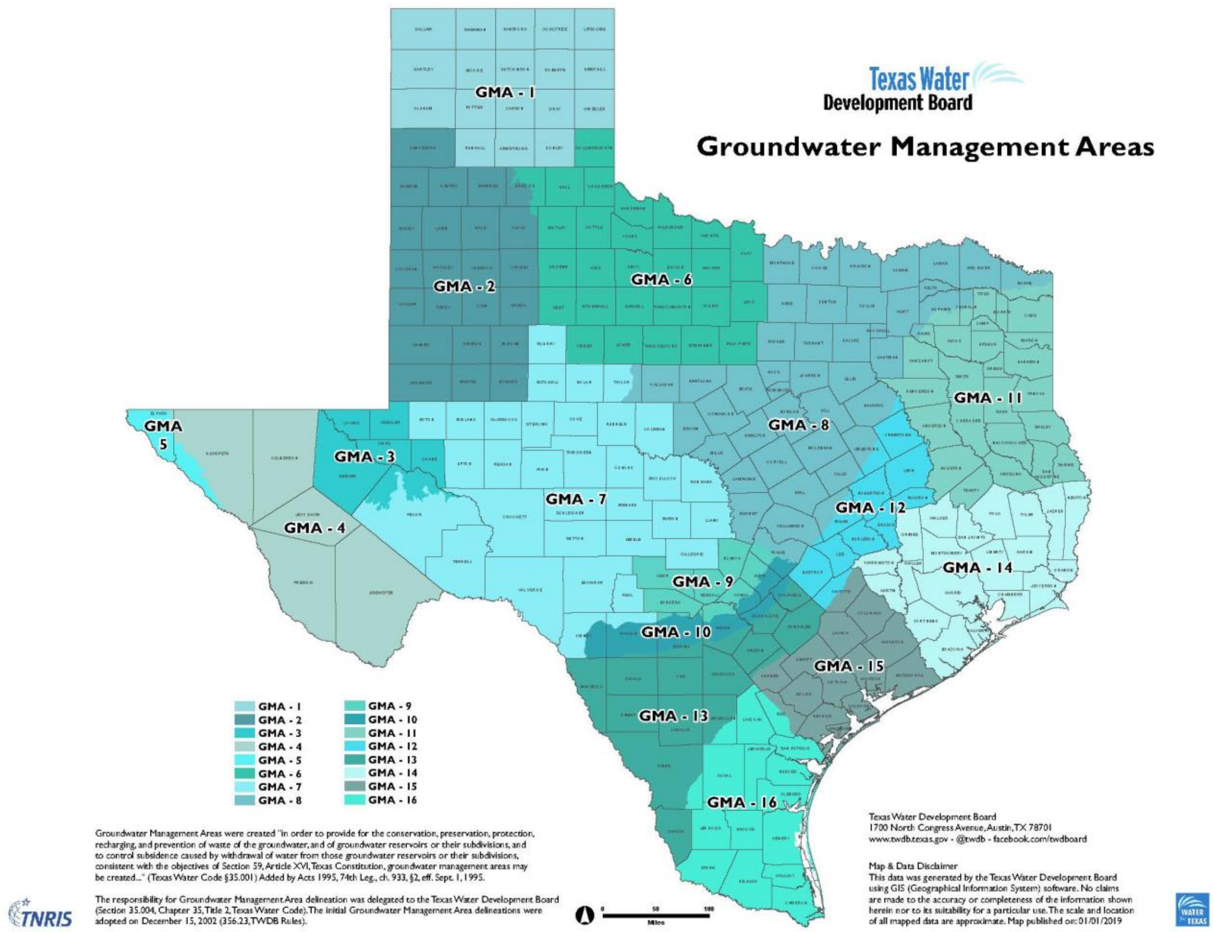


Figure 1. **Delineation of 16 groundwater management zones in Texas**
(obtained from https://www.tnris.org/maps/ on March 8, 2021).

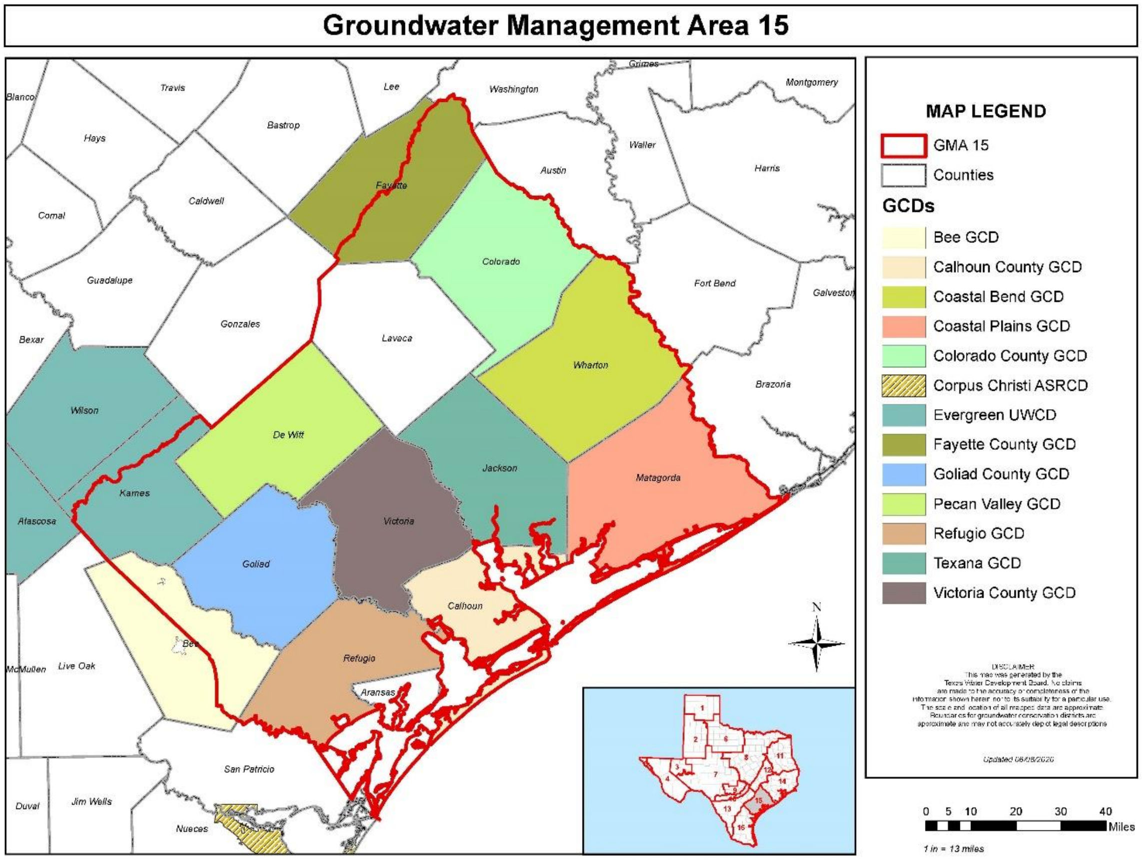


Figure 2. Delineation of GMA 15 showing locations of GCDs

(obtained from http://www.twdb.texas.gov/groundwater/management_areas/maps /GMA15_GCD.pdf).

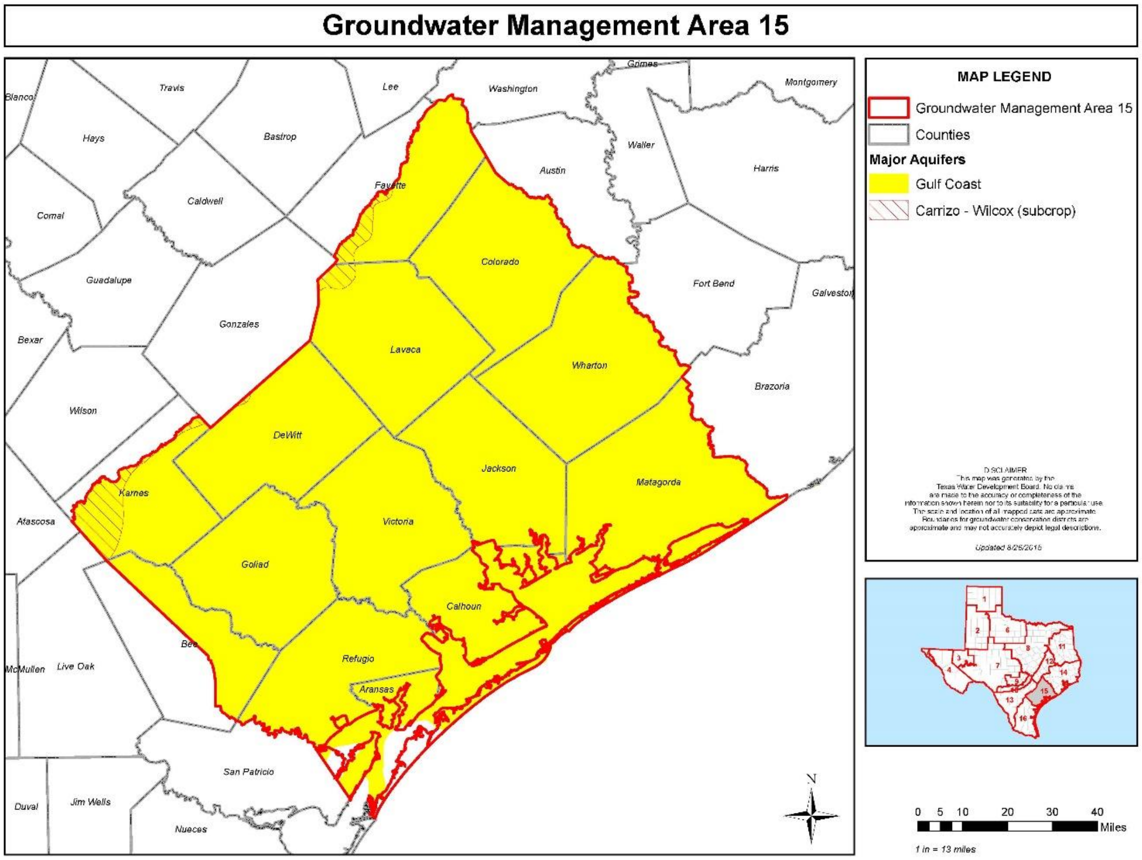


Figure 3. **Map of GMA 15 major aquifer boundaries.**
(obtained from http://www.twdb.texas.gov/groundwater/management_areas/maps/GMA15_MajorAquifer.pdf).

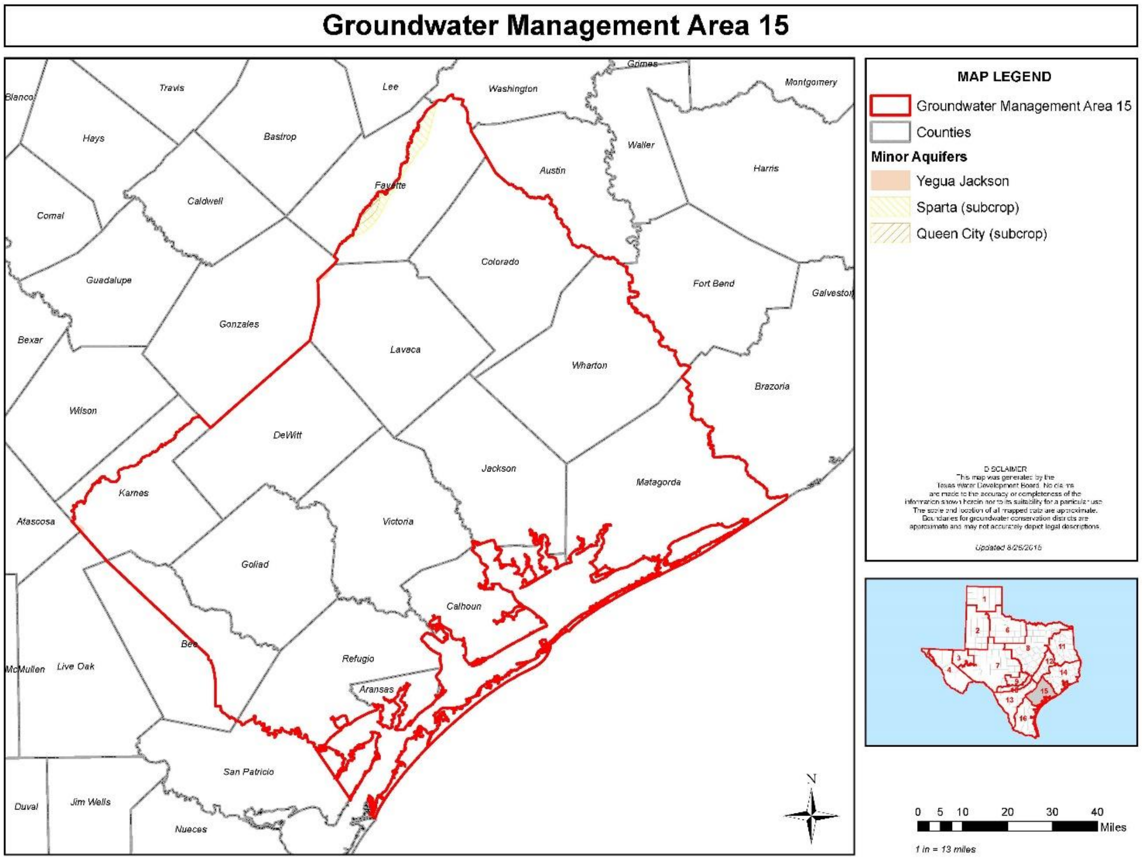


Figure 4. **Map of GMA 15 minor aquifer boundaries.**
(obtained from http://www.twdb.texas.gov/groundwater/management_areas/maps/GMA15_MinorAquifer.pdf).

Table 1. Hydrogeologic units in GMA 15.
Modified from Shi and others (2020), Deeds and others (2010), and Young and others (2018).

<table>
<tr><th colspan="2">Geologic Unit</th><th>Hydrogeologic Unit</th></tr>
<tr><td colspan="2">Alluvium and Eolian Sand</td><td>Alluvium/Eolian Aquifer</td></tr>
<tr><td colspan="2">Beaumont</td><td rowspan="3">Chicot Aquifer</td></tr>
<tr><td colspan="2">Lissie</td></tr>
<tr><td colspan="2">Willis</td></tr>
<tr><td colspan="2">Goliad</td><td rowspan="2">Evangeline Aquifer</td></tr>
<tr><td colspan="2">Upper Fleming</td></tr>
<tr><td colspan="2">Middle Fleming</td><td>Burkeville Confining Unit</td></tr>
<tr><td colspan="2">Lower Fleming</td><td rowspan="3">Jasper Aquifer</td></tr>
<tr><td colspan="2">Oakville</td></tr>
<tr><td colspan="2">Catahoula</td></tr>
<tr><td rowspan="4">Jackson Group</td><td>Whitsett</td><td rowspan="5">Yegua-Jackson Aquifer</td></tr>
<tr><td>Manning</td></tr>
<tr><td>Wellborn</td></tr>
<tr><td>Caddell</td></tr>
<tr><td rowspan="7">Claiborne Group</td><td>Yegua</td></tr>
<tr><td>Cook Mountain</td><td>Aquitard</td></tr>
<tr><td>Sparta</td><td>Sparta Aquifer</td></tr>
<tr><td>Weches</td><td>Aquitard</td></tr>
<tr><td>Queen City</td><td>Queen City Aquifer</td></tr>
<tr><td>Reklaw</td><td>Aquitard</td></tr>
<tr><td>Carrizo</td><td rowspan="4">Carrizo-Wilcox Aquifer</td></tr>
<tr><td rowspan="3">Wilcox Group</td><td>Upper</td></tr>
<tr><td>Middle</td></tr>
<tr><td>Lower</td></tr>
</table>

Table 2. Population projections from 2021 Regional Water Planning.

County	Area (mi²)*	2010**	2020	2030	2040	2050	2060	2070
Aransas	252	23,158	24,463	24,991	24,937	25,102	25,103	25,104
Bee***	880	31,861	33,478	34,879	35,487	35,545	35,579	35,590
Calhoun	506	21,381	24,037	26,866	29,622	32,276	34,906	37,454
Colorado	960	20,874	21,884	22,836	23,544	24,582	25,449	26,293
De Witt	909	20,097	20,855	21,555	21,900	22,216	22,425	22,572
Fayette***	950	24,554	28,373	32,384	35,108	37,351	39,119	40,476
Goliad	852	7,210	8,427	9,519	10,239	10,545	10,759	10,884
Jackson	829	14,075	14,606	15,119	15,336	15,515	15,627	15,699
Karnes***	747	14,824	15,456	15,938	15,968	15,968	15,968	15,968
Lavaca	970	19,263	19,263	19,263	19,263	19,263	19,263	19,263
Matagorda	1,100	36,702	39,166	41,226	42,548	43,570	44,296	44,815
Refugio	770	7,383	7,687	7,929	7,985	8,119	8,175	8,213
Victoria	882	86,793	93,857	100,260	105,298	109,785	113,470	116,522
Wharton	1,086	41,280	43,804	46,614	48,860	50,804	52,599	54,189
GMA 15* **		**369,455**	**395,356**	**419,379**	**436,095**	**450,641**	**462,738**	**473,042**

*Source of county areas is https://www.indexmundi.com/facts/united-states/quick-facts/texas/land-area#table
**2010 is based on the United States Census
***Values represent the populations projections for whole county and not just the portion within GMA 15

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 15 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 2017 to 2021, GMA 15 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 and included an invite to submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County GCD by mail at 2805 N. Navarro St. Suite 210, Victoria, TX 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863. Table 3 lists the dates and the major discussion topics of the GMA 15 joint planning meetings held during 2021 joint planning.

Table 3. List of meetings convened by GMA 15 from May 17, 2017 through ________, 2021.

Meeting	Quorum	Major Discussion Topics
May 11, 2017	Yes	Memorandum to GCDs regarding the sequence and timeline of DFC adoption. MAG values between draft GAM Run Report GR-16-025 and the baseline model. Joint planning, management plan review, the conservation and protection of groundwater, and the achievement of DFCs.
October 12, 2017	Yes	Water level study for Goliad County. Calhoun County GCD adoption of management plan and rules. Region P RWPG review of water demand projections. Joint planning, summary of permitting activities and a well field project in Goliad County GCD. Administrative and organizational matters for GMA 15.
January 11, 2018	Yes	Concerns over the GAM for Goliad County, new TWDB project improving GAM for Central and Southern Gulf Coast. Joint planning, and review of management, and joint planning committee officer election. Adopted draft revisions of administrative procedures, approved draft revisions of bylaws and cost sharing agreement.
April 12, 2018	Yes	Report by DBS&A on the groundwater resources of Goliad County. Passed motion to request that TWDB evaluate the "impact of erroneous recharge data used for Goliad County". Project to improve GAMS for Central/Southern Gulf coast and updates to rules in chapter 356 to reflect DFC adoption requirements.
July 12, 2018	Yes	Response from TWDB over request to review Goliad County GCD GAM report. Joint planning including proposals for professional services regarding the development and adoption of DFCs. LRE Water designated as preferred respondent to the proposal with INTERA as the alternate.

Table 3 (cont.). List of meetings convened by GMA 15 from May 17, 2017 through ________, 2021.

Meeting	Quorum	Major Discussion Topics
October 11, 2018	Yes	Agreement between LRE Water and Pecan Valley GCD (on behalf of GMA 15). Joint planning cost-sharing agreement. TWDB processing management plans. USGS study assessing groundwater availability in aquifers near the gulf, including those in GMA 15. Joint planning discussion included reviewing revised management plans from Calhoun, Goliad, Refugio and Victoria County GCDs. Determination that management plans have a positive impact on groundwater resources and result in the achievement of DFCs. LRE Water's pumping distribution maps and pumping charts from the GMA 15 MAG run.
January 10, 2019	Yes	Various studies including the Goliad GCDs recharge study, Victoria County's water level study, and the Brackish Characterization study. TWDB's plans to develop GAMs for irrelevant aquifers. Discussed joint planning schedule and the pumping distributions and amounts from previous round of joint planning and expectations for current round that was provided by LRE.
April 11, 2019	Yes	Report regarding recent/future activities of VCGCD. Development of activities at TWDB. LRE Water modeling results of two pumping scenarios. Approved management plans for Bee, Coastal Bend, Colorado, and Fayette County GCDs and determined their positive impact on water planning and the DFCs.
October 10, 2019	Yes	Financial report of joint planning funds. Refugio GCD notice of a petition filed on behalf of GCDs in GMA 16 to TCEQ regarding the failure of Starr County GCD to participate in joint planning and adopt DFCs. LRE Water's summary of memos sent earlier that covered uses and conditions, modeling results, and an updated schedule for the DFC adoption process.
November 14, 2019	Yes	Joint planning, future modeling efforts, the use of the baseline reference year for new DFCs. Pumping scenario to use as the baseline for evaluating the nine factors. GAM issues. Letter submitted by Goliad GCD.
January 9, 2020	Yes	Efforts of Goliad GCD to study groundwater recharge. Activities at TWDB. LRE Water memorandum regarding water supply needs and water management strategies to the members of GMA 15.

Table 3 (cont.). List of meetings convened by GMA 15 from May 17, 2017 through _________, 2021

Meeting	Quorum	Major Discussion Topics
June 11, 2020	Yes	TWDB's report with the initial projections of exempt use for each county within GMA 15. LRE Water's provided memos regarding hydrogeological conditions, environmental conditions, and subsidence impacts. Memos were accepted.
October 8, 2020	Yes	Groundwater joint planning including: TWDB's new guidance documents for desired future conditions. LRE Water's memos regarding socioeconomic impacts, impacts on private property, and DFC feasibility. Notification to GCDs within GMA 15 and GMA 16 of a stakeholder meeting regarding TWDB's effort to develop a new GAM for central/southern Gulf Coast Aquifer.
January 14, 2021	Yes	Additional discussion regarding socioeconomic impacts, impacts on private property, and DFC feasibility. Discussion and adoption of the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers as non-relevant for joint planning purposes. Summary of the modeling results.
April 8, 2021	Yes	Proposing of DFCs for adoption.

Appendix 1 contains the meeting notices and the minutes for the meetings. In July 2018, GMA 15 selected LRE Water, LLC, Daniel B. Stephens & Associates, Inc., and Blanton & Associates, Inc. (collectively referred to as the LRE Water Team) to be their technical consultant. The LRE Water Team performed the groundwater availability model (GAM) simulations for GMA 15, provided technical guidance, and supported the preparation of this explanatory report.

During the GMA 15 meeting on April 8, 2021, GMA 15 designated the draft Groundwater Management Area 15 Desired Future Conditions language, with modification, as the Proposed Desired Future Conditions of Groundwater Management Area 15. As required by Texas Water Code Section 36.108(d-2), the proposed DFCs were subsequently distributed to the individual districts in GMA 15. 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 15 proposed DFCs.

District	Public Hearing Date
Bee GCD	__________, 2021
Calhoun County GCD	__________, 2021
Coastal Bend GCD	__________, 2021
Coastal Plains GCD	__________, 2021
Colorado County GCD	__________, 2021
Corpus Christi ASRCD	__________, 2021
Evergreen UWCD	__________, 2021
Fayette County GCD	__________, 2021
Goliad County GCD	__________, 2021
Pecan Valley GCD	__________, 2021
Refugio GCD	__________, 2021
Texana GCD	__________, 2021
Victoria County GCD	__________, 2021

SECTION 2: GMA 15 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 15 members in accordance with Texas Water Code 36.108.

2.1 GULF COAST AQUIFER SYSTEM

For the Gulf Coast Aquifer System, the aquifers of interest are the Chicot, Evangeline, and Jasper. As shown in Table 1, the Burkeville Confining Unit separates the Evangeline and the Jasper aquifers. GMA 15 used the Central Gulf Coast Groundwater Availability Model (Chowdhury and others, 2004) to establish DFCs. GMA 15 used the zone delineations by Anaya and Hardwick (2020) to define the areas representing each of the counties and aquifers.

On ____________, GMA 15 Representatives approved resolution __________ titled Resolution to Adopt the Desired Future Conditions for Groundwater Management Area 15 (Appendix 2). The adopted DFCs are expressed as average drawdown for each county and the entire groundwater management area from January 1, 2000 through December 31, 2080. The DFC for GMA 15 shall not exceed an average drawdown of 13 feet (±3 feet) for the Gulf Coast Aquifer System. DFCs for each county within the groundwater management area shall not exceed the values specified in Table 5.

Table 5. Adopted DFCs for each county in GMA 15 expressed as average drawdown from January 1, 2000 through December 31, 2080.

County	Aquifer	DFC
Aransas	Gulf Coast Aquifer System	0 (±3 feet)
Bee	Gulf Coast Aquifer System	7 (±3 feet)
Calhoun	Gulf Coast Aquifer System	5 (±3 feet)
Colorado	Chicot & Evangeline	17 (±3 feet)
	Jasper	25 (±3 feet)
De Witt	Gulf Coast Aquifer System	17 (±3 feet)
Fayette	Gulf Coast Aquifer System	44 (±3 feet)
Goliad	Chicot	-4 (±5 feet)
	Evangeline	-2 (±5 feet)
	Burkeville	7 (±5 feet)
	Jasper	14 (±5 feet)
Jackson	Gulf Coast Aquifer System	15 (±3 feet)
Karnes	Gulf Coast Aquifer System	22 (±3 feet)
Lavaca	Gulf Coast Aquifer System	18 (±3 feet)
Matagorda	Chicot & Evangeline	11 (±3 feet)
Refugio	Gulf Coast Aquifer System	5 (±3 feet)
Victoria	Gulf Coast Aquifer System	5 (±3 feet)
Wharton	Chicot & Evangeline	15 (±3 feet)

2.2 CARRIZO-WILCOX AQUIFER

GMA 15 considers the portion of the Carrizo-Wilcox Aquifer within its boundary non-relevant for joint planning purposes. The Carrizo-Wilcox Aquifer footprint extends into Bee, De Witt, Fayette, Karnes, and Lavaca counties within GMA15. The portion of this aquifer within GMA 15 is relatively small and only present at great depths. Figure 3 illustrates the location of the aquifer within GMA 15.

As shown on Table 6, the Carrizo-Wilcox Aquifer is separated from the Gulf Coast Aquifer System by several aquitards making the hydraulic connection between the aquifers negligible. Use and projected demands from the Carrizo-Wilcox Aquifer within GMA 15 are negligible to non-existent. The total estimated recoverable storage (TERS) for the Carrizo-Wilcox Aquifer within GMA 15 is 69,900,000 acre-feet. Table 6 provides the TERS values for the aquifer within GMA 15 as calculated by Wade and Anaya (2014).

Table 6. Carrizo-Wilcox Aquifer total estimated recoverable storage within GMA 15 (Wade and Anaya, 2014).

County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
De Witt	1,200,000	300,000	900,000
Fayette	16,000,000	4,000,000	12,000,000
Karnes	43,000,000	10,750,000	32,250,000
Lavaca	9,700,000	2,425,000	7,275,000
GMA 15	69,900,000	17,475,000	52,425,000

The portion of the aquifer in Fayette and Karnes counties is managed by Fayette County Groundwater Conservation District and Evergreen Underground Water Conservation District, respectively. Each of these districts participate in joint planning within other groundwater management areas where the Carrizo-Wilcox Aquifer is more prevalent and where management of the resource is addressed. The limited extent and use of the Carrizo-Wilcox Aquifer within GMA 15, its hydraulic separation from the relevant aquifer system, and planning occurring for portions of the aquifer within other management areas, support GMA 15's decision to classify the aquifer as non-relevant for joint planning purposes within their boundary.

2.3 QUEEN CITY AQUIFER

GMA 15 considers the portion of the Queen City Aquifer within its boundary non-relevant for joint planning purposes. The Queen City Aquifer footprint extends into Fayette County within GMA15. The portion of this aquifer within GMA 15 is relatively small and only present at great depths. Figure 4 illustrates the location of the aquifer within GMA 15.

As shown on Table 7, the Queen City Aquifer is separated from the Gulf Coast Aquifer System by several geologic layers making the hydraulic connection between the aquifers negligible. Use and projected demands from the Queen City Aquifer within GMA 15 are negligible to non-existent. The TERS for the Queen City Aquifer within GMA 15 is 640,000 acre-feet. Table 6 provides the TERS values for the aquifer within GMA 15 as calculated by Wade and Anaya (2014).

Table 7. Queen City Aquifer total estimated recoverable storage within GMA 15 (Wade and Anaya, 2014).

County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Fayette	640,000	160,000	480,000
GMA 15	640,000	160,000	480,000

The portion of the aquifer in Fayette County is managed by Fayette County Groundwater Conservation District. Fayette County Groundwater Conservation District participates in joint planning within GMA 12 where the Queen City Aquifer is more prevalent and where management of the resource is addressed. The limited extent and use of the Queen City Aquifer within GMA 15, its hydraulic separation from the relevant aquifer system, and planning occurring for portions of the aquifer within other management areas, support GMA 15's decision to classify the aquifer as non-relevant for joint planning purposes within their boundary.

2.4 SPARTA AQUIFER

GMA 15 considers the portion of the Sparta Aquifer within its boundary non-relevant for joint planning purposes. The Sparta Aquifer footprint extends into Fayette County within GMA15. The portion of this aquifer within GMA 15 is relatively small and only present at great depths. Figure 4 illustrates the location of the aquifer within GMA 15.

As shown on Table 8, the Sparta Aquifer is separated from the Gulf Coast Aquifer System by several geologic layers making the hydraulic connection between the aquifers negligible. Use and projected demands from the Sparta Aquifer within GMA 15 are negligible to non-existent. The TERS for the Sparta Aquifer within GMA 15 is 2,900,000 acre-feet. Table 6 provides the TERS values for the aquifer within GMA 15 as calculated by Wade and Anaya (2014).

Table 8. Sparta Aquifer total estimated recoverable storage within GMA 15 (Wade and Anaya, 2014).

County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Fayette	2,900,000	725,000	2,175,000
GMA 15	2,900,000	725,000	2,175,000

The portion of the aquifer in Fayette County is managed by Fayette County Groundwater Conservation District. Fayette County Groundwater Conservation District participates in joint planning within GMA 12 where the Sparta Aquifer is more prevalent and where management of the resource is addressed. The limited extent and use of the Sparta Aquifer within GMA 15, its hydraulic separation from the relevant aquifer system, and planning occurring for portions of the aquifer within other management areas, support GMA 15's decision to classify the aquifer as non-relevant for joint planning purposes within their boundary.

2.5 YEGUA-JACKSON AQUIFER

GMA 15 considers the portion of the Yegua-Jackson Aquifer within its boundary non-relevant for joint planning purposes. The Yegua-Jackson Aquifer footprint extends into Karnes and Lavaca counties within GMA15. The portion of this aquifer within GMA 15 is relatively small. Figure 4 illustrates the location of the aquifer within GMA 15.

As shown on Table 9, the Yegua-Jackson Aquifer is separated from the Gulf Coast Aquifer System by an aquitard making the hydraulic connection between the aquifers negligible. Use and projected demands from the Yegua-Jackson Aquifer within GMA 15 are negligible to non-existent. The TERS for the Yegua-Jackson Aquifer within GMA 15 is 810,000 acre-feet. Table 6 provides the TERS values for the aquifer within GMA 15 as calculated by Wade and Anaya (2014).

Table 9. Yegua-Jackson Aquifer total estimated recoverable storage within GMA 15 (Wade and Anaya, 2014).

County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Lavaca	620,000	155,000	465,000
Karnes	190,000	47,500	142,500
GMA 15	810,000	202,500	607,500

The portion of the aquifer in Karnes County is managed by Evergreen Underground Water Conservation District. Evergreen Underground Water Conservation District participates in joint planning within GMA 13 where the Yegua-Jackson Aquifer is more prevalent and where management of the resource is addressed. The limited extent and use of the Yegua-Jackson Aquifer within GMA 15, its hydraulic separation from the relevant aquifer system, and planning occurring for portions of the aquifer within other management areas, support GMA 15's decision to classify the aquifer as non-relevant for joint planning purposes within their boundary.

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 15 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 15 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 15.

In evaluating the DFCs, GMA 15 and the individual GCDs recognize that: 1) the production capability of the relevant aquifer varies across GMA 15; 2) historical groundwater production is different across GMA 15; and 3) the importance of groundwater production to the socioeconomic livelihood of an area varies among the GCDs. As a result, a key GMA 15 policy decision was to allow districts to set different DFCs for portions of the aquifer or hydrostratigraphic units within their boundaries, as long as the different DFCs could be modeled with the TWDB-approved GAM.

The allowance of different DFCs among the districts is justified for several reasons. One reason is that Texas Water Code 36.108(d)(1) provides for the adoption of different DFCs for different geographic areas over the same aquifer based on the boundaries of political subdivisions. The statute expressly and specifically allows districts "to consider uses or conditions of an aquifer within the management area, including conditions that differ substantially from one geographic area to another" when developing and adopting DFCs for:

1. each aquifer, subdivision of an aquifer, or geologic strata located in whole or in part within the boundaries of the management area; or
2. each geographic area overlying an aquifer in whole or in part or subdivision of an aquifer within the boundaries of the management area.

The Legislature's addition of the phrase "in whole or in part" makes it clear that GCDs may establish a "different" DFC for a geographic area that does not cover the entire aquifer but only part of that aquifer. Moreover, the plain meaning of the term "geographic area" in this context clearly includes an area defined by political boundaries, such as those of a GCD or a county.

Each GCD in GMA 15 submitted a summary of the public comment period and public hearing regarding the proposed DFCs inclusive of all relevant comments received during the public comment period from April 29, 2021 through __________, 2021 (### days) regarding the proposed DFCs, any suggested revisions to the proposed DFCs, and the basis for the revisions. The summaries are provided in Appendix C. GMA 15 Representatives reviewed the summary submittals during a meeting held on ______________, 2021. The DFCs that GMA 15 considered and proposed for final adoption specify acceptable drawdown levels in the Gulf Coast Aquifer System on a county-by-county basis and across the entire GMA 15.

SECTION 4: TECHNICAL JUSTIFICATION

GMA 15 adopted DFCs based on evaluations conducted using the Central Gulf Coast Groundwater Availability Model (GAM) developed by Waterstone (2003) and Chowdhury and others (2004). The GAM represents the Gulf Coast Aquifer System with four layers representing, from top to bottom, the Chicot, Evangeline, Burkeville, and Jasper hydrostratigraphic units. Figure 5Figure 1 illustrates the extent of the GAM.

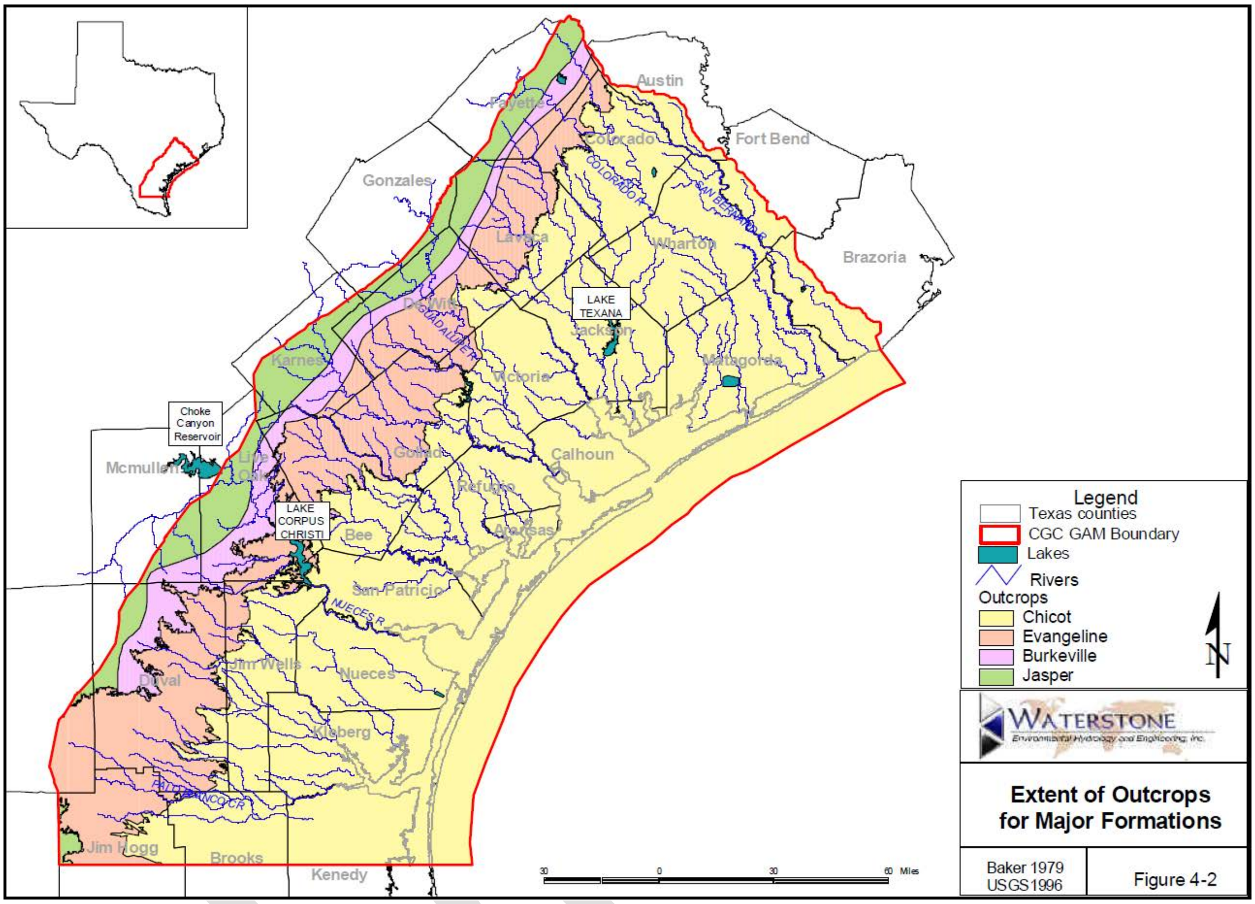


Figure 5. Extent of the Central Gulf Coast GAM (Waterstone, 2003).

Chowdhury and others (2004) calibrated the GAM through the end of 1999. The predictive period of the GAM begins with the year 2000 and extends through 2080. During 2016 joint planning, the predictive period ended in 2070 (Young, 2016) and GMA 15 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 15 updated the pumping input values for 2000-2016 to more accurately reflect estimated actual pumping during those years (see

Appendix 3).

Chowdhury and others (2004) calibrated the GAM with the objective of matching available data as best as possible. By matching the available data, they deemed the GAM to reasonable represent groundwater flow through the modeled hydrostratigraphic units. However, as discussed by Young (2016) there are several studies demonstrating the error and uncertainty with the GAM. During the 2021 joint planning, Goliad County Groundwater Conservation District added to the available research through projects focused on the improving the state of the science within Goliad County.

One project focused on improving their understanding of local recharge to the aquifer. Results of their investigations suggest the GAM inflow values are higher than data indicate (McLendon and others, 2016; Rainwater and Coldren, 2019; Rainwater and Coldren, 2020). Another project involved a local recalibration of the GAM to improve the ability of the model to simulate measured water levels. Observation of water levels over the last 15 years has shown the GAM is not capable of reasonably reflecting the measured water levels as the GAM predicts rising or relatively stable water levels, but the measured water levels are decline by one foot per year or more. Results of the recalibration demonstrated the uncertainty in the GAM results within Goliad County (Keester, 2020). Appendix 4 contains copies of the Rainwater and Coldren (2020) and Keester (2020) reports provided to GMA 15.

While there is uncertainty in the results from this GAM, it is important to remember that any model will have some level of uncertainty. One way GMA 15 considered uncertainty was through the evaluation of many model scenarios with variations in pumping and recharge. In addition, GMA 15 reviewed the results from the scenarios with varying baseline dates for calculating the average drawdown. Appendix 3 contains a technical memorandum summarizing the results from the various scenarios. After discussion and consideration of the various modeling scenarios, on November 15, 2019 GMA 15 selected the scenario titled “GMA15_2019_001_v1” as the baseline pumping file for moving forward through the joint planning process.

SECTION 5: FACTOR CONSIDERATION

Texas Water Code 36.108(d) identifies factors districts must consider before voting on proposed DFCs. GMA 15 considered each of the required factors during open meetings. Table 10 lists the factors in Texas Water Code 36.108(d) and the meeting during which GMA 15 members considered each factor.

Table 10. GMA 15 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	10/10/2019
(2)	Water needs/strategies	01/09/2020
(3)	Hydrological conditions	06/11/2020
(4)	Environmental conditions	06/11/2020
(5)	Subsidence	06/11/2020
(6)	Socioeconomic impacts	10/08/2020
(7)	Private property	10/08/2020
(8)	DFC feasibility	10/08/2020
(9)	Other information	01/14/2021

Consideration of each factor included the preparation of a technical memorandum and a presentation during the GMA 15 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 provides detailed information regarding GMA 15'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 from the Gulf Coast Aquifer System occurs in the northeast part of GMA 15. Total groundwater use in GMA 15 averaged just over 350,000 acre-feet per year from 2011 through 2016. Of the total use, irrigation was the dominant groundwater use within GMA 15 accounting for 83 percent of the average total annual use. Municipal or Public Supply was the second most common use followed by exempt use (combined domestic and livestock use).

5.2 WATER SUPPLY NEEDS AND WATER MANAGEMENT STRATEGIES

Appendix 5.3 provides detailed information regarding GMA 15'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 15 covers parts of Regional Water Planning Areas K, L, N, and P. According to the 2017 State Water Plan the projected demand for the counties (including the portion of Bee County in GMA 16) within GMA 15 is 1,225,528 acre-feet in 2020 and increases to 1,271,026 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 15 is 1,123,946 acre-feet in 2020 and decreases to 1,060,450 acre-feet in 2070. Most of the projected water demand is in the northeast portion of GMA 15 which is generally consistent with the distribution of pumping within the GMA.

5.3 HYDROLOGICAL CONDITIONS

Appendix 5.5 provides detailed information regarding GMA 15'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 Gulf Coast Aquifer System in GMA 15 is 368,800,000 acre-feet (Wade and Anaya, 2014). The most significant source of outflow from the aquifer 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. Scanlon and others (2012) calculated the average annual recharge to the Gulf Coast Aquifer System to be 0.51 inches per year within GMA 15 while the GAM uses a recharge value of 0.36 inches per year within GMA 15.

While the recharge values in the GAM are lower than the best estimates of actual recharge, based on review of the total estimated recoverable storage, inflows, and outflows it does not appear that pumping associated with the DFCs would have a negative impact on the overall hydrological conditions within GMA 15. The greatest simulated impact is an increase in captured streamflow, but the simulated impact should not be considered quantitative as the GAM was not designed to provide a robust simulation of the stream/aquifer interaction.

5.4 ENVIRONMENTAL IMPACTS

Appendix 5.7 provides detailed information regarding GMA 15'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)). The primary environmental factor of interest in GMA 15 is the impact of pumping on baseflows in rivers and streams. Anaya and others (2016) identified that for the for the counties in GMA 15, average annual groundwater discharge from the Gulf Coast Aquifer System to surface water is about 650,000 acre-feet; however, the GAM simulates water primarily inflowing from the streams. 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 provides detailed information regarding GMA 15's consideration of "impacts on subsidence" (Texas Water Code 36.108(d)(5)). Land subsidence has occurred within GMA 15 and will likely continue to occur. Young (2016) describes that much of GMA 15 has experienced at least two feet of subsidence since 1950. Ratzlaff (1982) documented regional subsidence of more than one foot in Jackson and Matagorda counties due to groundwater withdrawals for rice irrigation. With continued utilization of the groundwater resources, subsidence will likely continue to occur.

Clay thickness within the Gulf Coast Aquifer System commonly exceeds 300 feet and is characterized as an easily deformed plastic clay (Furnans and others, 2018). 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 15 has a medium to high risk for subsidence associated with groundwater pumping. However, based on historical subsidence, aquifer characteristics, and predicted water-level declines, expected future subsidence within GMA 15 is less than one foot through the end of 2080.

5.6 SOCIOECONOMIC IMPACTS

Appendix 5.11 provides detailed information regarding GMA 15'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 K, L, N, and P, the four regional water planning groups that cover some portion of GMA 15. However, these analyses **do not** evaluate socioeconomic impacts of DFCs at the GMA level.

During 2016 joint planning, GMA 15 had qualitative discussions to consider the impacts that may occur due to DFCs. The result of the discussion was that GMA 15 did not anticipate that the adoption of the DFCs would have adverse socioeconomic impacts in GMA 15 during the planning horizon. They also concluded that the DFCs would provide a balance between the highest practicable level of groundwater production and the conservation, preservation, protection, recharge and prevention of waste of groundwater, and control of subsidence in the management area. These qualitative considerations remain applicable during the 2021 joint planning.

5.7 PRIVATE PROPERTY RIGHTS

Appendix 5.13 provides detailed information regarding GMA 15'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 15 members recognize that the primary vehicle by which private property rights are protected is each GCD's Management Plan and Rules. With regard to private property rights and the ownership of groundwater, the DFCs adopted by GMA 15 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 includes projected demands, it does not appear that there would be any significant impact on private property rights.

5.8 ACHIEVEMENT FEASIBILITY

Appendix 5.15 provides detailed information regarding GMA 15'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 (Young, 2016). 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 measured water level trends compared to the modeled water level trends, since January 1, 2000, confirmed a variance on the model results is needed. To address the uncertainty in the GAM, GMA 15 adopted a variance of +/- 3.5 feet (+/- 5.0 feet for Goliad County) to be associated with the DFCs.

5.9 OTHER INFORMATION

As discussed in Section 4, Goliad County GCD submitted information to GMA 15 to support evaluation of the DFCs (see Appendix 4). The GMA 15 members considered the information provided and supported Goliad County GCD's approach for adopting DFCs for Goliad County that were consistent with other DFCs throughout the management area.

SECTION 6: OTHER DESIRED FUTURE CONDITIONS CONSIDERED

To be completed based on information received during the public comment period on the proposed DFCs.

SECTION 7: DISCUSSION OF OTHER RECOMMENDATIONS

To be completed based on information received during the public comment period on the proposed DFCs.

SECTION 8: 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.

Anaya, R. and Hardwick, D., 2020, Central Portion of the Gulf Coast Aquifer System Model Grid - As of June 26, 2020, Texas Water Development Board.

Chowdhury, A.H., Wade, S., Mace, R.E., and Ridgeway, C., 2004, Groundwater Availability Model of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999: Model Report, 108 p.

Deeds, N.E., Yan, T., Singh, A., Jones, T.L., Kelley, V.A., Knox, P.R., and Young, S.C., 2010, Groundwater availability model for the Yegua-Jackson Aquifer: Contract report for the Texas Water Development Board, 582 p.

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.

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.

Keester, M., 2020, GAM Recalibration Focusing on Goliad County: Technical Memorandum dated October 20,2020 to Ms. Heather Sumpter, General Manager, Goliad County Groundwater Conservation District, 159 p.

Martinez, N., 2016, Voters reject by 8-1 margin local Groundwater Conservation District: Article in The Rockport Pilot on May 11, 2016,

McLendon, T., Booker, J.D., Coldren, C.L., and Pappas, C.R., 2016, Development of an EDYS Ecological Model for Goliad County, Texas: Final report prepared for San Antonio River Authority and Texas State Soil and Water Conservation Board, 242 p.

Rainwater, K. and Coldren, C., 2019, Goliad County Recharge Evaluation Summary of Field Data Collection as of June 2019: Report submitted to Goliad County Groundwater Conservation District, 8 p.

Rainwater, K. and Coldren, C., 2020, Goliad County Recharge Evaluation - Summary of Field Data Collection for August 2020: Report submitted to Goliad County Groundwater Conservation District, 12 p.

Ratzlaff, K.W., 1982, Land-Surface Subsidence in the Texas Coastal Region: Report 272, 26 p.

Scanlon, B.R., Reedy, R., Strassberg, G., Huang, Y., and Senay, G., 2012, Estimation of Groundwater Recharge to the Gulf Coast Aquifer in Texas, USA: Contract Report (No. 0904831001) to the Texas Water Development Board, 64 p.

Shi, J.(., Boghici, R., and Anaya, R., 2020, Draft Conceptual Model Report: Gulf Coast Aquifer System in Groundwater Management Areas 15 and 16: Texas Water Development Board Draft GAM Conceptual Model, 614 p.

Wade, S. and Anaya, R., 2014, GAM Task 13-038: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 15: Texas Water Development Board GAM Task, 23 p.

Waterstone, 2003, Groundwater Availability of the Central Gulf Coast Aquifer: Numerical Simulations to 2050 Central Gulf Coast, Texas:

Young, S., 2016, Desired Future Condition Explanatory Report for Groundwater Management Area 15: Report prepared for Groundwater Management Area 15, 52 p.

Young, S., Jigamond, M., Jones, T., Ewing, T., Panday, S., Harden, R., and Lupton, D., 2018, Final Report: Groundwater Availability Model for the Central Portion of the Carrizo-Wilcox, Queen City, and Sparta Aquifers: GAM Report to the Texas Water Development Board, 372 p.

APPENDIX 1 —
2021 JOINT PLANNING MEETING NOTICES AND MINUTES

APPENDIX 2 — RESOLUTION TO ADOPT THE DESIRED FUTURE CONDITIONS FOR GROUNDWATER MANAGEMENT AREA 15

APPENDIX 3 —
SUMMARY OF MODELING AND PUMPING UPDATES

Appendix 3.1 —
January 10, 2019 Discussion of Modeling Updates

MEMORANDUM

TO: Groundwater Management Area 15

FROM: Michael R. Keester, P.G.

SUBJECT: Status Summary of Third Round of Joint Planning

DATE: January 10, 2019

During the previous GMA 15 meeting we discussed addressing the pumping file associated with the adopted DFCs and MAGs from the second round of joint planning. During the previous quarter, we have met or spoken with most of the GMA 15 members about the representation of pumping in the model. Generally, the questions we were seeking to address during these discussions were:

1. Is the horizontal and vertical distribution of modeled pumping reasonable?
2. Should there be any changes to the amount of pumping in the model?
3. Should there be any changes to the timing of the modeled pumping?

For the horizontal distribution of pumping, in general the response was that pumping should better reflect where wells are located. In most counties the modeled pumping is relatively evenly distributed with every model cell having the same amount of pumping. When compared to well locations from available databases, it is clear that the modeled horizontal distribution of pumping does not reasonably reflect the real-world horizontal distribution of pumping.

For the vertical distribution of pumping, in many cases the Gulf Coast Aquifer System is considered as a single unit rather than being broken out into the individual model layers of the Chicot, Evangeline, Burkeville, and Jasper. As such, the vertical pumping distribution, as provided in the MAG pumping file, is considered reasonable by many of the GMA 15 members. However, there are some areas where the vertical distribution will be adjusted to address some issues identified by District representatives.

The amount of pumping in the model relates to two different time periods. The first time period represents the historical period from 2000 through present (or as recent as possible). The calibration period of the model ends on December 31, 1999 and most GMA 15 members agree that updating the period beginning in the year 2000 with available pumping amounts is reasonable for establishing the baseline water level for predictive scenarios. For the subsequent predictive period, various scenarios were discussed that maintained or increased pumping.

For the timing of modeled pumping, we discussed whether pumping during the predictive period should remain steady as in the current MAG pumping file or be modified in some way. On way of modifying the modeled pumping would be to gradually increase it to meet the 2070 value. Based on feedback from GMA 15 members, both means of increasing the predictive pumping are being considered.

The following work is being conducted to address the responses we received during our various discussions:

- The period from 2000 through 2016 is being updated to reflect estimates of actual pumping that occurred
  - The period ends at 2016 because this year represents the last year with pumping estimates for all counties in GMA 15
  - The horizontal and vertical pumping amounts are being allocated to wells based on use, location, and year of well completion
  - For the amount of annual pumping, TWDB water use survey data are being used except where GCD specific data have been provided or identified
  - Horizontal distribution is based on well locations from the GCD and TWDB databases
  - Vertical distribution is matching the MAG pumping file unless otherwise directed by a District representative
- For predictive pumping (2017 through 2070), we are implementing the following adjustments based on feedback:
  - Coastal Bend GCD and Coastal Plains GCD – no changes to MAG pumping or distribution
  - Fayette County GCD
    - Increase pumping to approximately 9,000 acre-feet per year
    - Update vertical distribution to match District records
  - Victoria County GCD, Calhoun County GCD, Refugio GCD, and Texana GCD
    - Add some additional development, especially in brackish groundwater areas
    - Probable development (that is, pumping that is likely to occur)
  - Bee GCD
    - Adjust GMA 15 pumping to 8,000 acre-feet per year
    - Move lower part of GMA 16 pumping in Bee County to the Evangeline layer
  - Goliad County GCD
    - Adjust predictive pumping to more probable amount (Region L)
    - Adjust recharge amounts in the model
  - Pecan Valley GCD – To be determined
  - Evergreen UWCD – To be determined
  - Colorado County GCD – To be determined
  - Corpus Christi ASRCD – To be determined

Based on the changes to be implemented, we anticipate creating three pumping files. Each file will have an updated historical period. The predictive period for the files will be as follows:

1. Constant pumping amount with probable development or adjustments to modeled pumping as identified by District representatives.
2. Ramping pumping amount with probable development or adjustments to modeled pumping as identified by District representatives.
3. Ramping pumping amount with additional development or adjustments to modeled pumping as identified by District representatives.

For each pumping file, we will run the model with the modified recharge amounts to illustrate the difference in the modeled effects.

We anticipate completing the draft revision to the historical pumping by January 31, 2019 and will distribute to each District representative for review. The predictive periods will be prepared by the end of February and distributed to each District representative for review. Draft model results will be presented at the next GMA 15 meeting in April.

If you have any questions, please let me know.

Appendix 3.2 —
April 11, 2019 Discussion of Modeling Updates

MEMORANDUM

TO: Groundwater Management Area 15

FROM: Michael R. Keester, P.G. and Andrew Donnelly, P.G.

SUBJECT: Status Summary of Third Round of Joint Planning

DATE: April 11, 2019

Since the January meeting, work has focused primarily on modeling of the first two scenarios described in our last update. These first two scenarios were:

1. **Scenario ID: GMA15_2019_001 –** Constant pumping at the anticipated 2070 amount with probable development or adjustments to modeled pumping as identified by District representatives.
2. **Scenario ID: GMA15_2019_002 –** Ramping pumping from the end of 2016 up to the 2070 amount with probable development or adjustments to modeled pumping as identified by District representatives.

Based on feedback, we developed these two scenarios with predictive pumping amounts and appended it to the transition period pumping (1/1/2000 through 12/31/2016). Attached are charts illustrating the pumping applied for each scenario. We then prepared two versions of each scenario that each have the same pumping amount per aquifer layer but have a different areal distribution. The areal distributions are:

1. **Scenario version 1** – Areal distribution is the same as the 2nd round MAG pumping file
2. **Scenario version 2** – Areal distribution reflects the distribution of pumpage from the revised transition period pumping

For each scenario and version of the pumping distribution, we ran the model 8 times with recharge amounts ranging from 25 to 200 percent of the baseline amount. For the baseline amount, we used the recharge file from the 2nd round modeling. Changes to the recharge input were applied to the entire model domain to illustrate the regional effects of decreased inflow.

To illustrate the draft modeling results, we prepared charts illustrating the average drawdown at the end of year 2070 versus the percent of the baseline recharge amount. For the average drawdown, we performed the calculation using water levels from the end of the calibration period (1/1/2000) and from the end of the updated transition period pumping (12/31/2016). In addition, these charts illustrate the calculated average drawdown in each layer of the Gulf Coast Aquifer System as well as the Gulf Coast Aquifer System as a whole. Negative average drawdown values indicate water level rise from the baseline water level. Attached are the average drawdown charts for each county grouped by scenario and version. For Bee County, the charts reflect calculations for the entire county including the portion of the county within GMA 16.

For some counties, the difference in average drawdown calculation from 1/1/2000 or 12/31/2016 is relatively small. However, we do see several instances where the difference between the baseline dates is significant. One example is in Jackson County where the difference in average drawdown between the two baseline dates in the Evangeline is nearly 15 feet (Scenario GMA15_2019_001_v1).

With regard to the simulated recharge, the average drawdown typically decreases with the higher amounts of recharge. Some counties, such as Bee, are much more sensitive to changes in modeled recharge with the change in average drawdown being much greater between each percent of baseline recharge. In other areas, particularly those that are more downdip (that is, closer to the Gulf of Mexico), a relatively flat slope of the lines on the chart indicates the modeled recharge does not significantly affect the drawdown due to pumping.

The areal distribution of pumping in the model can be a significant factor in the calculation of average drawdown. One example of the significance is in Wharton County, using the 2nd round pumping distribution (v1), the calculated average drawdown in the Gulf Coast Aquifer System in both scenarios is more than 25 feet from 12/31/2016 water levels. However, using the transition pumping distribution (v2) the average drawdown is 10 to 15 feet less, and more than 30 feet less for the Evangeline.

Also attached are tables with the average drawdown values on 12/31/2070 under the baseline recharge scenario. These tables provide the exact values represented on the charts and provide an opportunity for direct comparison with the adopted DFCs. When looking at the DFC values compared to the current scenarios, we observe that the updated transition pumpage and a more recent baseline date would cause potentially significant changes to the DFCs (for example, see Victoria and Wharton counties).

The third scenario has not yet been completed. The third scenario is going to look at potential development of groundwater resources in addition to the amounts contemplated in the first two scenarios. We are working to implement that simulation and can continue to take input if there are changes anyone would like to make.

As the progress chart shows, we were anticipating having the GAM simulation report ready for you prior to the April 11, 2019 meeting. We anticipate completing that report and distributing a draft to you by mid-May. The report will address many of the questions from the DFC checklist regarding a model run but will not identify a specific run. During the next GMA 15 meeting in July we will present information on water supply needs and water management strategies. If time allows, we will then move on to discussing the aquifer uses and conditions. If needed, we can adjust the schedule to spread the presentations out further.

If you have any questions, please let us know.

Calculated Average Drawdown on 12/31/2070
(Baseline Recharge Amounts)

Pumping Scenario: 1 & 2

Pumping Distribution Version: 1 & 2

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Aransas	1	1	01/01/2000	0	6	0	N/A	N/A	0
			12/31/2016	0	7	0	N/A	N/A	0
		2	01/01/2000	0	1	0	N/A	N/A	0
			12/31/2016	0	2	0	N/A	N/A	0
	2	1	01/01/2000	0	5	0	N/A	N/A	0
			12/31/2016	0	7	0	N/A	N/A	0
		2	01/01/2000	0	1	0	N/A	N/A	0
			12/31/2016	0	2	0	N/A	N/A	0

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Bee	1	1	01/01/2000	7	15	13	10	3	9
			12/31/2016	13	19	17	9	1	10
		2	01/01/2000	4	18	13	24	35	23
			12/31/2016	10	22	18	23	33	24
	2	1	01/01/2000	4	10	8	3	-2	4
			12/31/2016	10	13	12	2	-4	5
		2	01/01/2000	9	51	37	29	32	33
			12/31/2016	11	48	36	25	29	31

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Calhoun	1	1	01/01/2000	-1	10	3	2	N/A	3
			12/31/2016	2	18	7	2	N/A	7
		2	01/01/2000	-1	1	0	2	N/A	0
			12/31/2016	2	9	5	2	N/A	5
	2	1	01/01/2000	-1	9	2	2	N/A	2
			12/31/2016	1	17	7	1	N/A	7
		2	01/01/2000	-1	0	-1	1	N/A	-1
			12/31/2016	2	8	4	1	N/A	4

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Colorado	1	1	01/01/2000	11	25	19	21	25	21
			12/31/2016	16	34	26	20	23	24
		2	01/01/2000	8	14	11	20	27	18
			12/31/2016	12	23	18	19	25	20
	2	1	01/01/2000	7	21	15	15	19	16
			12/31/2016	11	30	22	14	17	19
		2	01/01/2000	4	11	8	14	20	13
			12/31/2016	8	20	15	13	18	15

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
DeWitt	1	1	01/01/2000	0	5	4	18	32	20
			12/31/2016	6	7	7	16	23	16
		2	01/01/2000	-1	4	4	20	36	21
			12/31/2016	5	7	7	17	26	18
	2	1	01/01/2000	0	4	3	15	27	16
			12/31/2016	5	6	6	13	17	13
		2	01/01/2000	-1	4	3	17	30	18
			12/31/2016	4	6	6	14	20	14

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Fayette	1	1	01/01/2000	N/A	11	11	43	51	43
			12/31/2016	N/A	10	10	37	43	37
		2	01/01/2000	N/A	9	9	46	53	45
			12/31/2016	N/A	8	8	40	45	38
	2	1	01/01/2000	N/A	10	10	40	47	40
			12/31/2016	N/A	9	9	34	39	34
		2	01/01/2000	N/A	9	9	43	51	43
			12/31/2016	N/A	7	7	38	43	37

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Goliad	1	1	01/01/2000	-4	-2	-2	4	7	2
Goliad	1	1	12/31/2016	1	3	2	4	3	3
Goliad	1	2	01/01/2000	-5	-2	-2	7	18	6
Goliad	1	2	12/31/2016	1	3	2	6	13	7
Goliad	2	1	01/01/2000	-4	-2	-2	4	6	2
Goliad	2	1	12/31/2016	1	3	2	3	2	3
Goliad	2	2	01/01/2000	-5	-2	-2	6	15	5
Goliad	2	2	12/31/2016	1	3	2	5	11	6

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Jackson	1	1	01/01/2000	15	20	17	12	19	16
Jackson	1	1	12/31/2016	12	37	24	14	14	20
Jackson	1	2	01/01/2000	18	8	13	7	16	12
Jackson	1	2	12/31/2016	15	25	20	9	12	16
Jackson	2	1	01/01/2000	12	17	14	8	15	13
Jackson	2	1	12/31/2016	10	34	22	9	11	17
Jackson	2	2	01/01/2000	15	5	10	3	13	9
Jackson	2	2	12/31/2016	12	22	17	5	8	13

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Karnes	1	1	01/01/2000	N/A	-1	-1	21	24	21
Karnes	1	1	12/31/2016	N/A	3	3	13	14	13
Karnes	1	2	01/01/2000	N/A	0	0	33	34	30
Karnes	1	2	12/31/2016	N/A	5	5	25	25	23
Karnes	2	1	01/01/2000	N/A	-1	-1	21	23	20
Karnes	2	1	12/31/2016	N/A	3	3	12	14	12
Karnes	2	2	01/01/2000	N/A	0	0	31	32	29
Karnes	2	2	12/31/2016	N/A	4	4	22	23	21

Average Drawdown on 12/31/2070, Feet									
County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Lavaca	1	1	01/01/2000	6	6	6	15	30	17
			12/31/2016	9	8	9	12	21	14
		2	01/01/2000	4	7	6	21	38	21
			12/31/2016	6	9	8	18	29	18
	2	1	01/01/2000	3	5	4	11	24	13
			12/31/2016	6	7	7	8	15	10
		2	01/01/2000	1	6	5	16	31	17
			12/31/2016	4	8	7	13	22	14

Average Drawdown on 12/31/2070, Feet									
County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Matagorda	1	1	01/01/2000	5	17	9	13	N/A	9
			12/31/2016	1	39	14	13	N/A	14
		2	01/01/2000	6	-12	0	4	N/A	0
			12/31/2016	2	10	5	3	N/A	5
	2	1	01/01/2000	4	15	8	12	N/A	9
			12/31/2016	1	37	14	12	N/A	13
		2	01/01/2000	5	-13	-1	3	N/A	-1
			12/31/2016	2	9	4	2	N/A	4

Average Drawdown on 12/31/2070, Feet									
County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Refugio	1	1	01/01/2000	0	7	3	2	N/A	3
			12/31/2016	0	8	4	2	N/A	4
		2	01/01/2000	-1	2	1	1	N/A	1
			12/31/2016	0	3	2	1	N/A	2
	2	1	01/01/2000	-1	7	3	1	N/A	3
			12/31/2016	0	8	4	1	N/A	3
		2	01/01/2000	0	3	1	2	N/A	1
			12/31/2016	0	4	2	1	N/A	2

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Victoria	1	1	01/01/2000	-4	6	1	4	7	3
			12/31/2016	7	21	14	8	7	11
		2	01/01/2000	-7	10	2	9	11	5
			12/31/2016	4	25	15	12	11	14
	2	1	01/01/2000	-5	4	0	1	3	0
			12/31/2016	6	19	13	4	2	9
		2	01/01/2000	-8	9	1	4	5	2
			12/31/2016	3	24	14	8	5	11

Average Drawdown on 12/31/2070, Feet									
County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Wharton	1	1	01/01/2000	14	11	13	21	23	17
			12/31/2016	9	62	36	24	19	29
		2	01/01/2000	21	-30	-4	3	13	1
			12/31/2016	16	21	19	6	9	13
	2	1	01/01/2000	11	9	10	18	21	15
			12/31/2016	7	59	33	22	17	26
		2	01/01/2000	18	-32	-7	1	12	-1
			12/31/2016	14	19	16	4	7	11

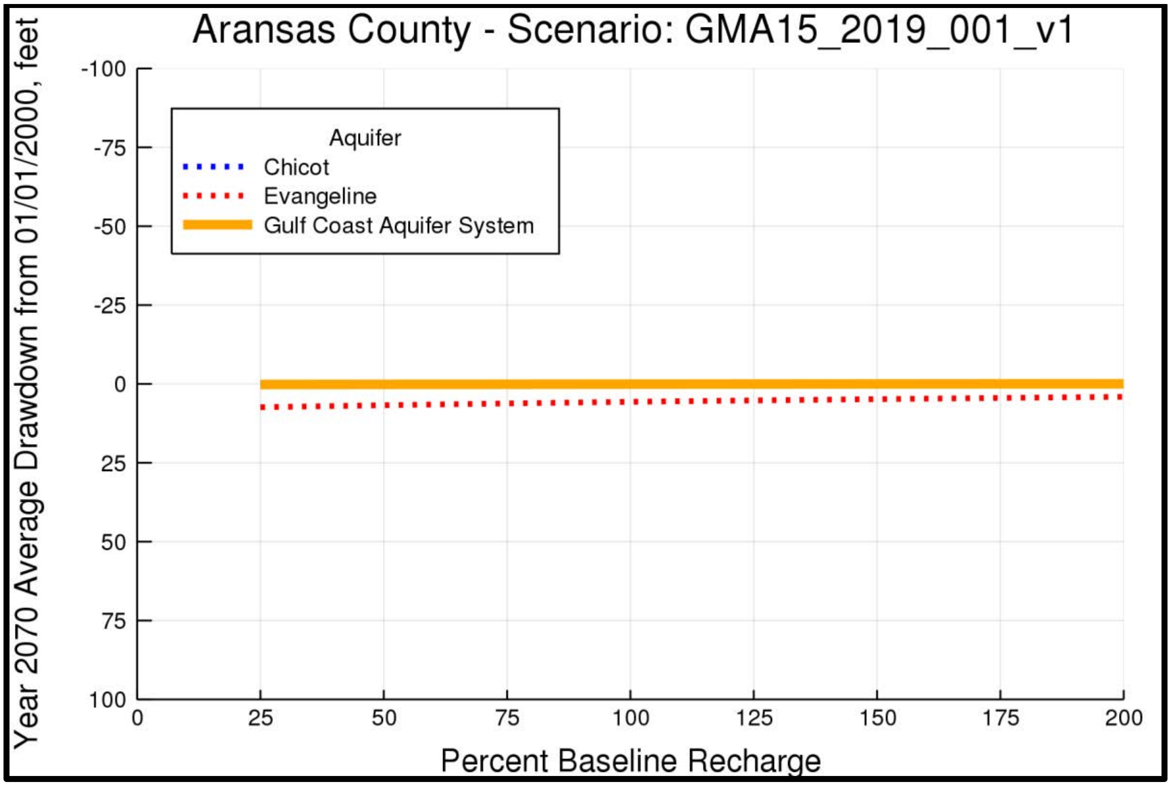
Adopted DFCs – Average Drawdown on 12/31/2069, Feet						
County	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Aransas	—	—	—	—	—	0
Bee	—	—	—	—	—	7
Calhoun	—	—	—	—	—	5
Colorado	—	—	17	—	23	—
DeWitt	—	—	—	—	—	17
Fayette	—	—	—	—	—	16
Goliad	—	—	—	—	—	10
Jackson	—	—	—	—	—	15
Karnes	—	—	—	—	—	22
Lavaca	—	—	—	—	—	18
Matagorda	—	—	11	—	—	—
Refugio	—	—	—	—	—	5
Victoria	—	—	—	—	—	5
Wharton	—	—	15	—	—	—

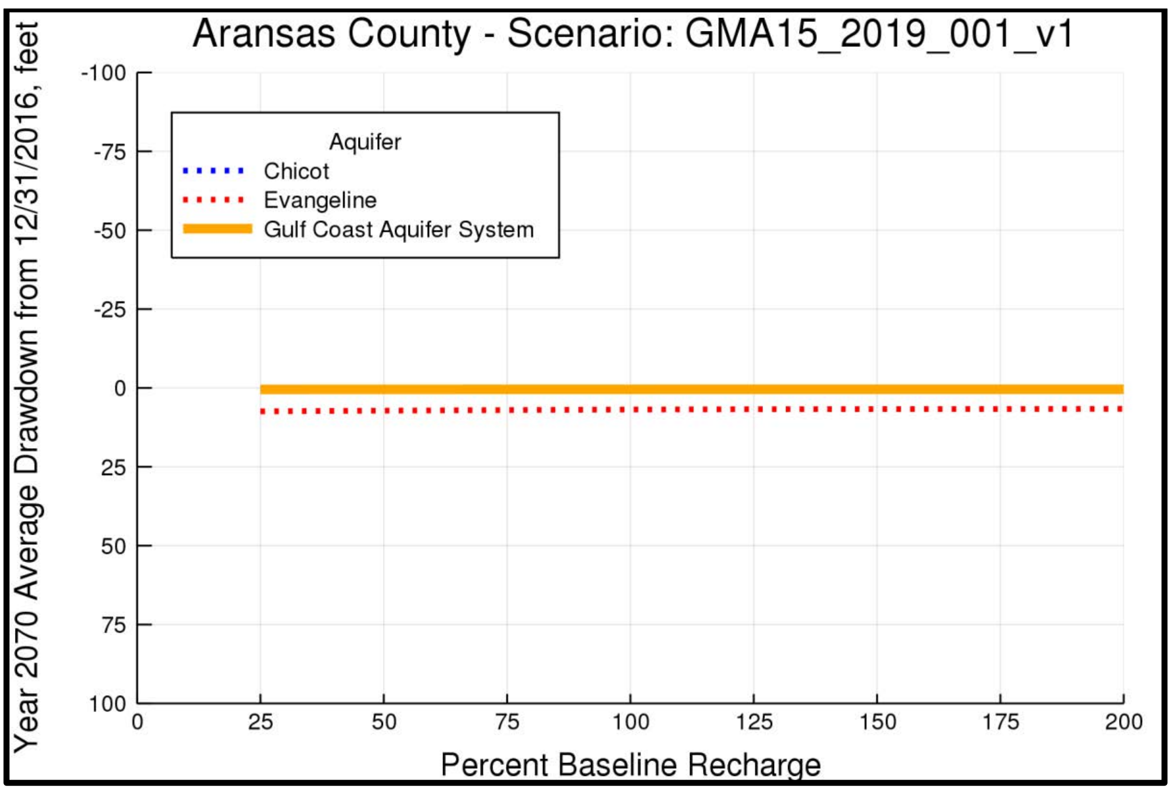
Average Drawdown versus Percent Baseline Recharge

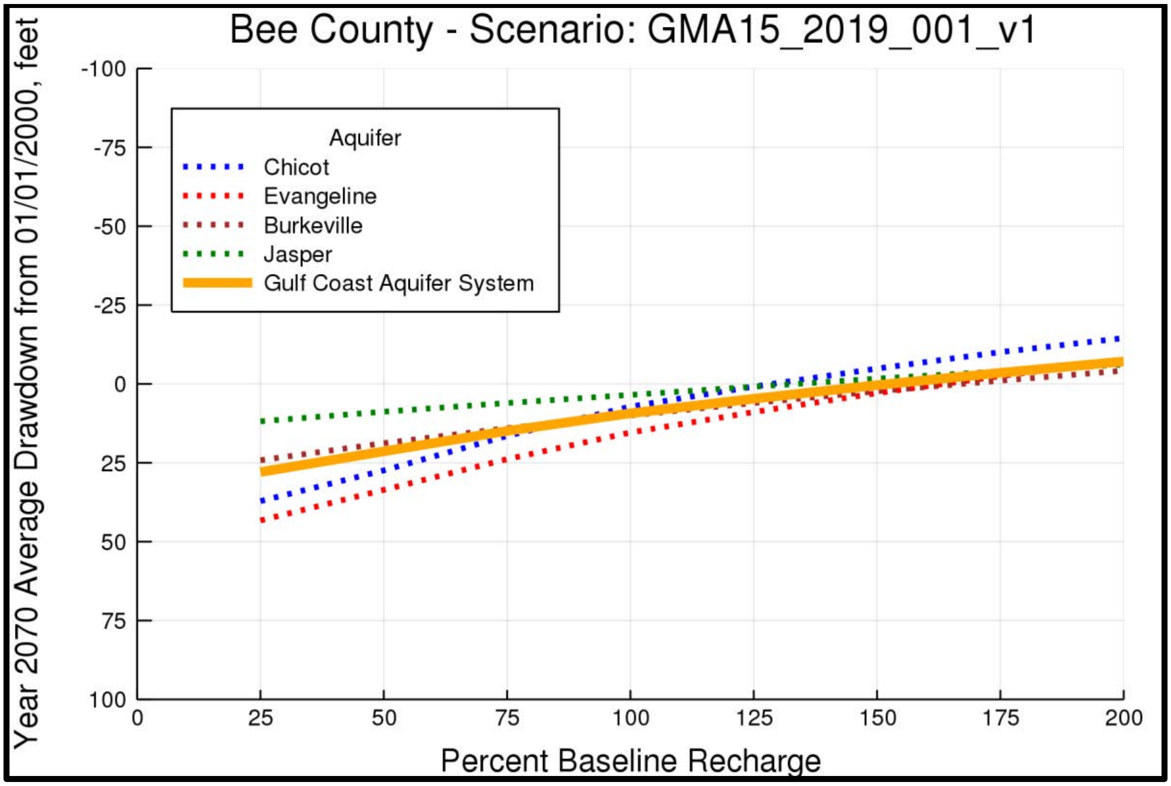
Pumping Scenario: 1

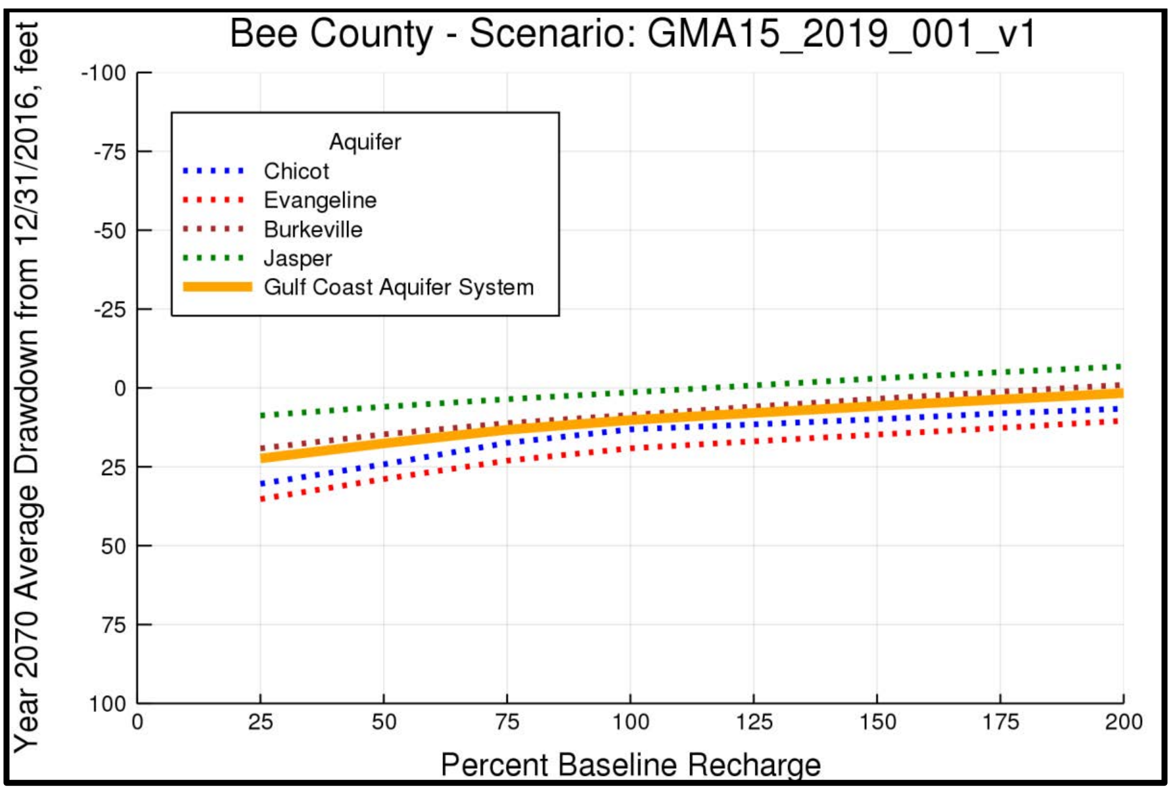
Pumping Distribution Version: 1

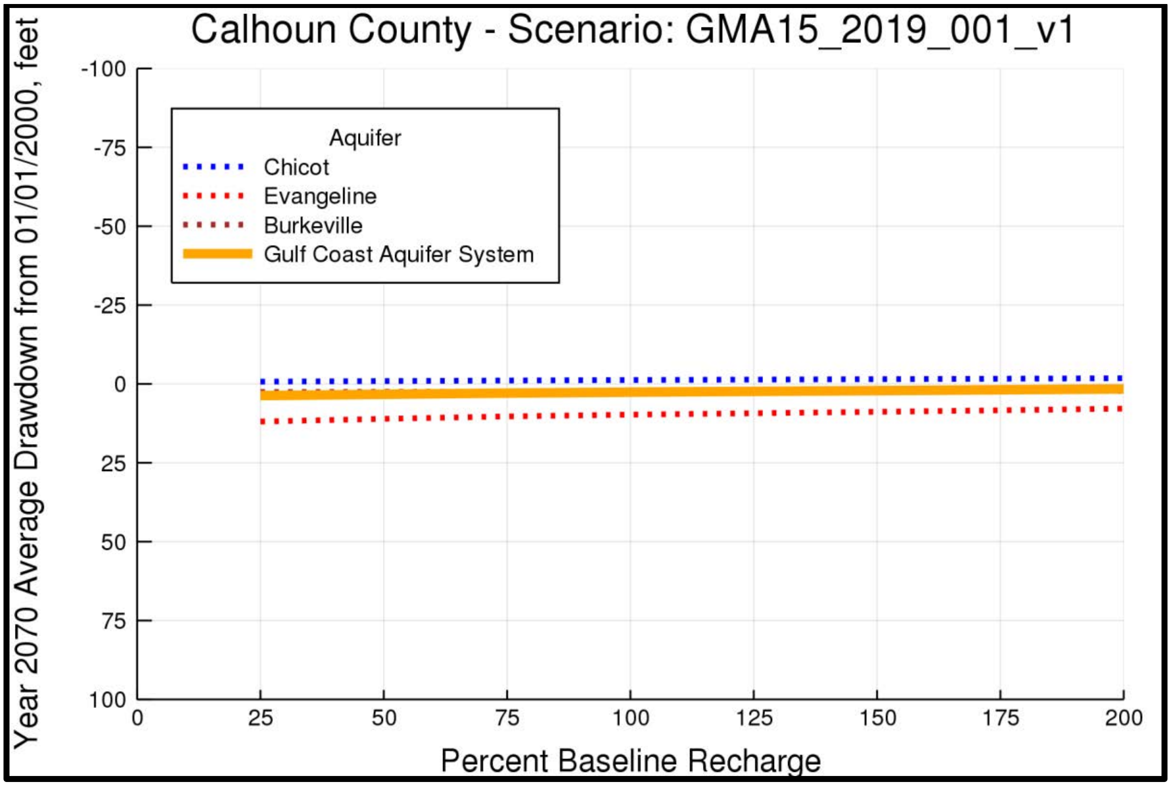
Scenario ID: GMA15_2019_001_v1

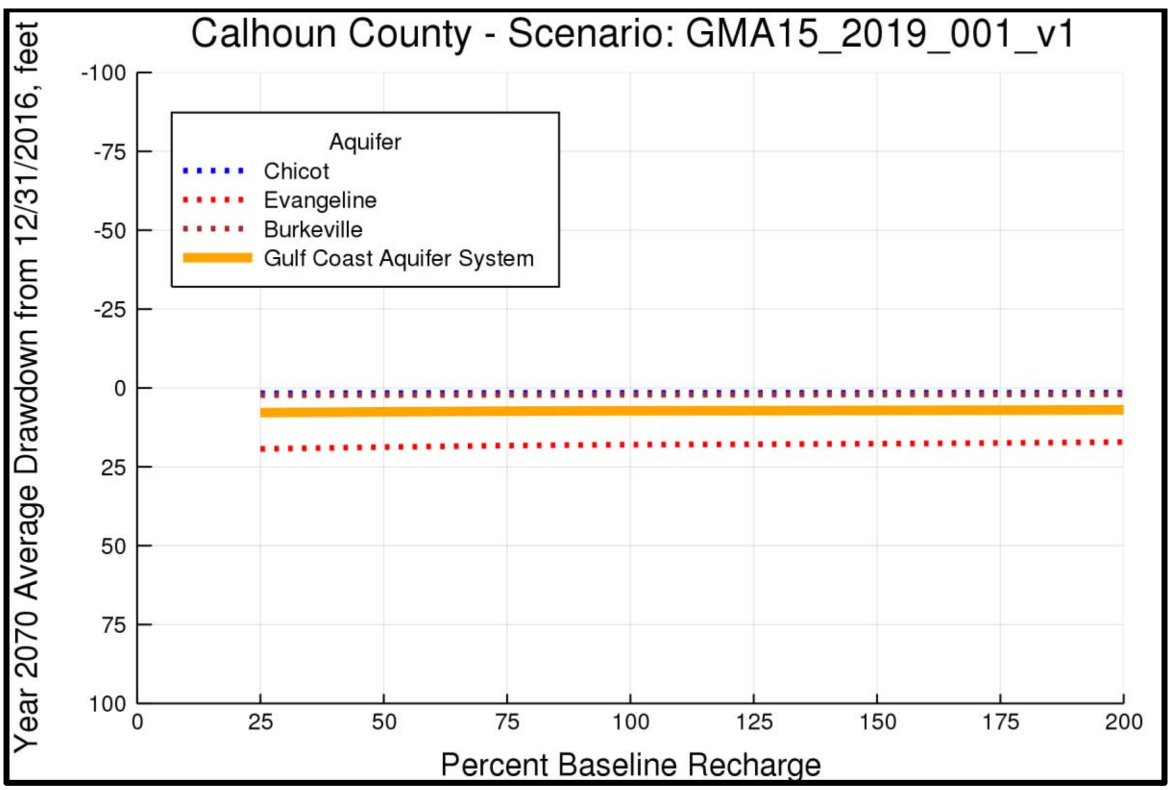

Aransas County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

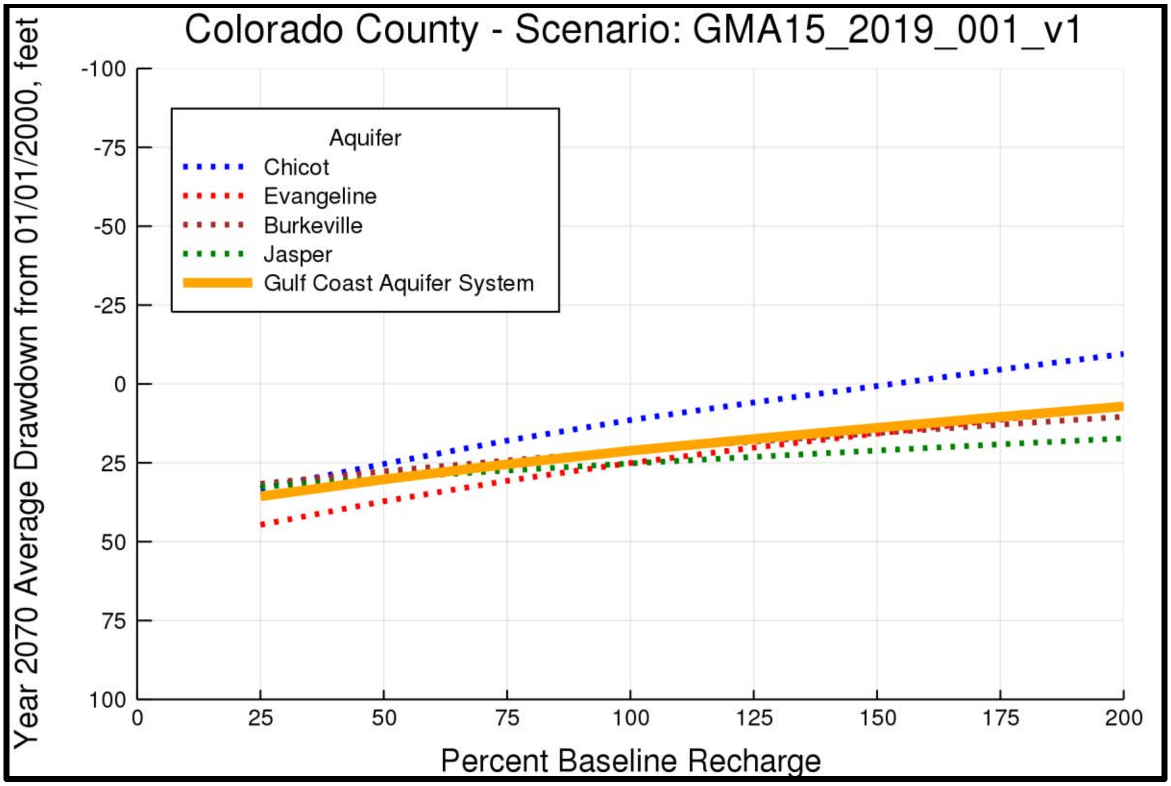

Aransas County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

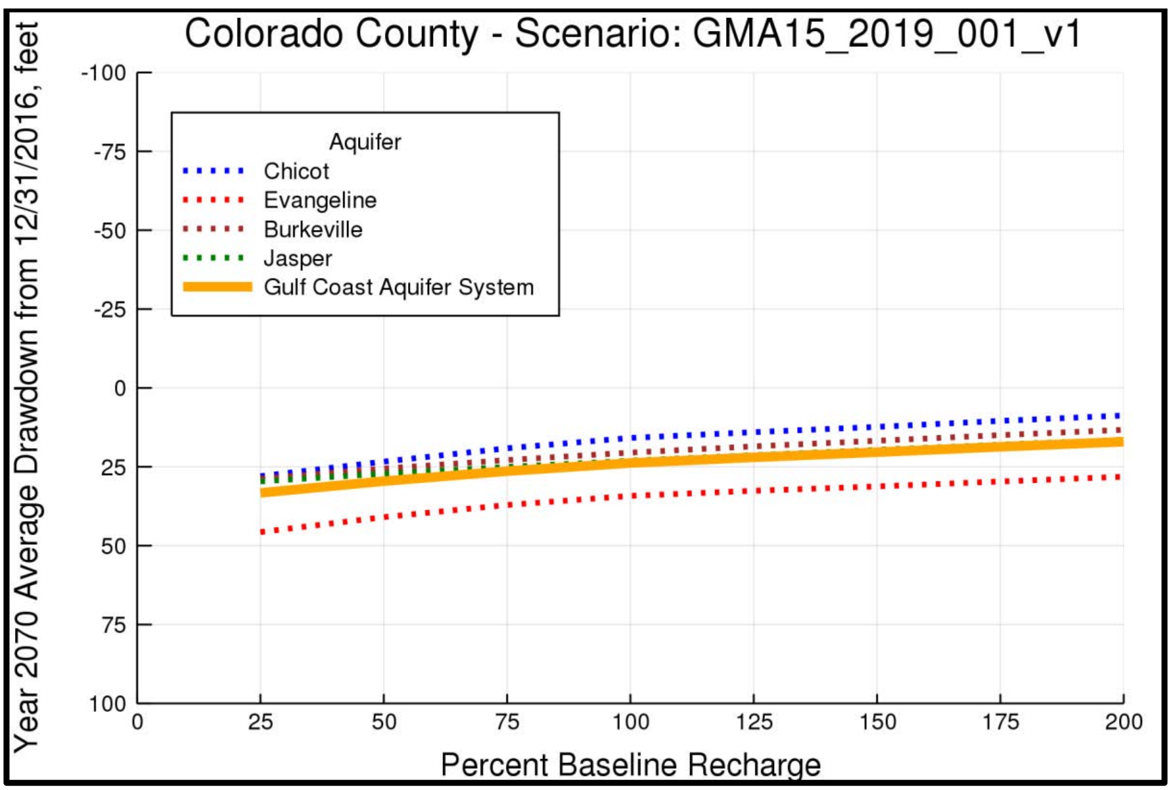

Bee County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

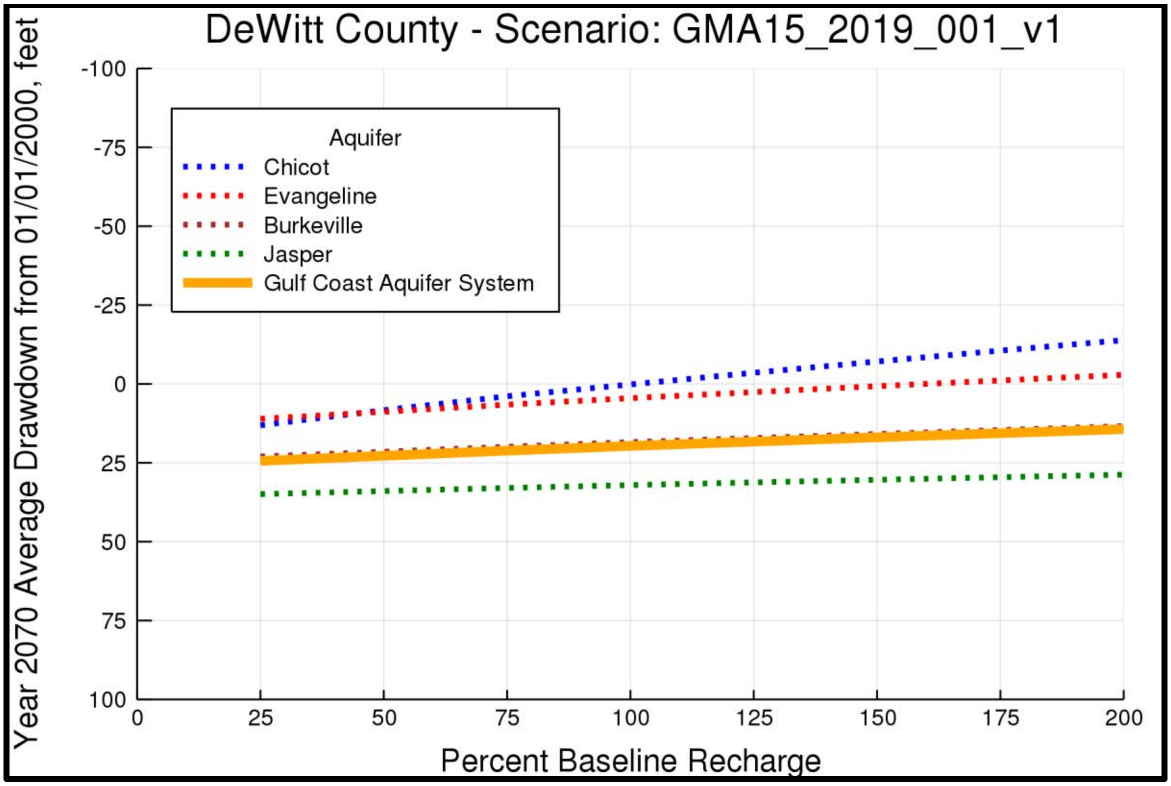

Bee County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

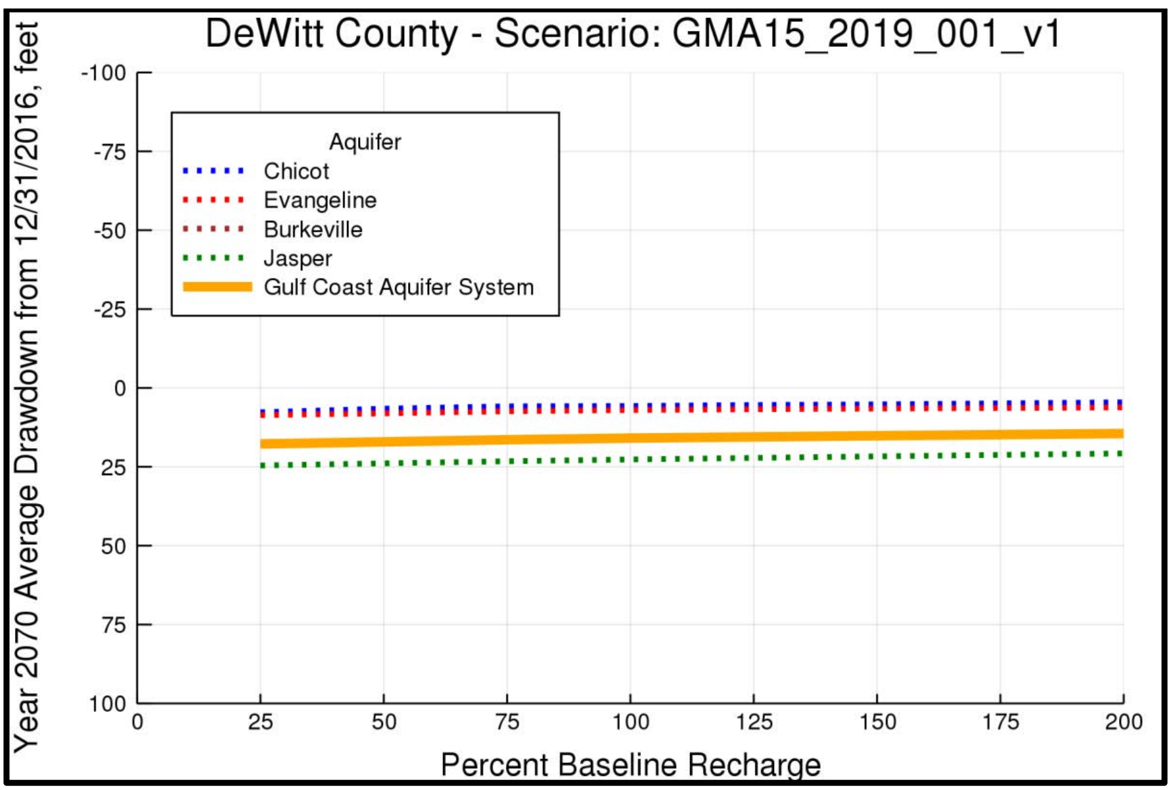

Calhoun County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System

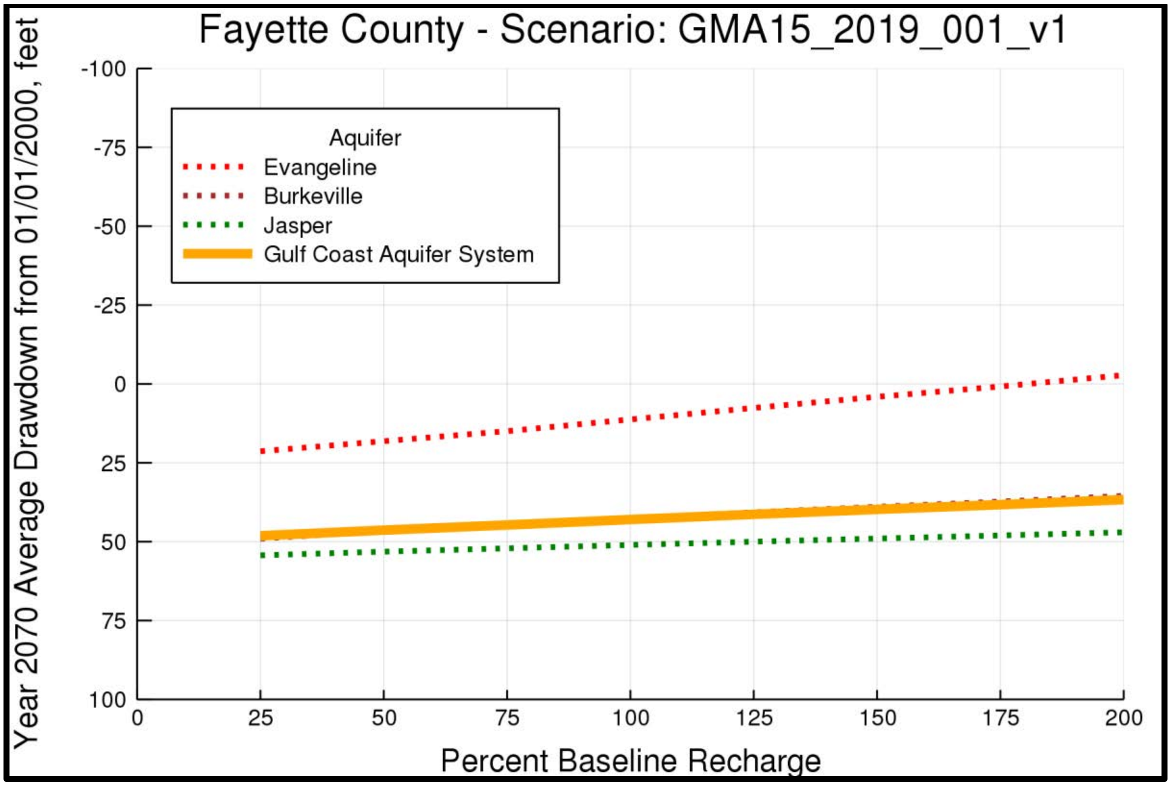

Calhoun County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System

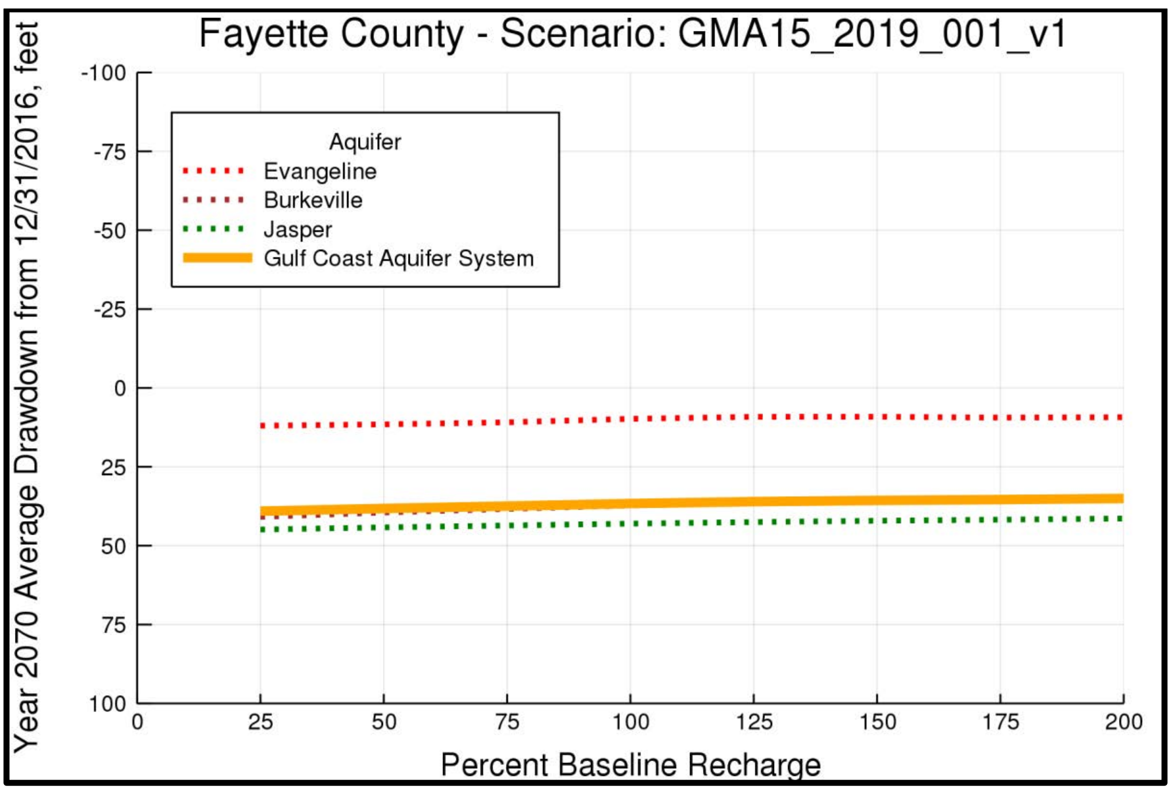

Colorado County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

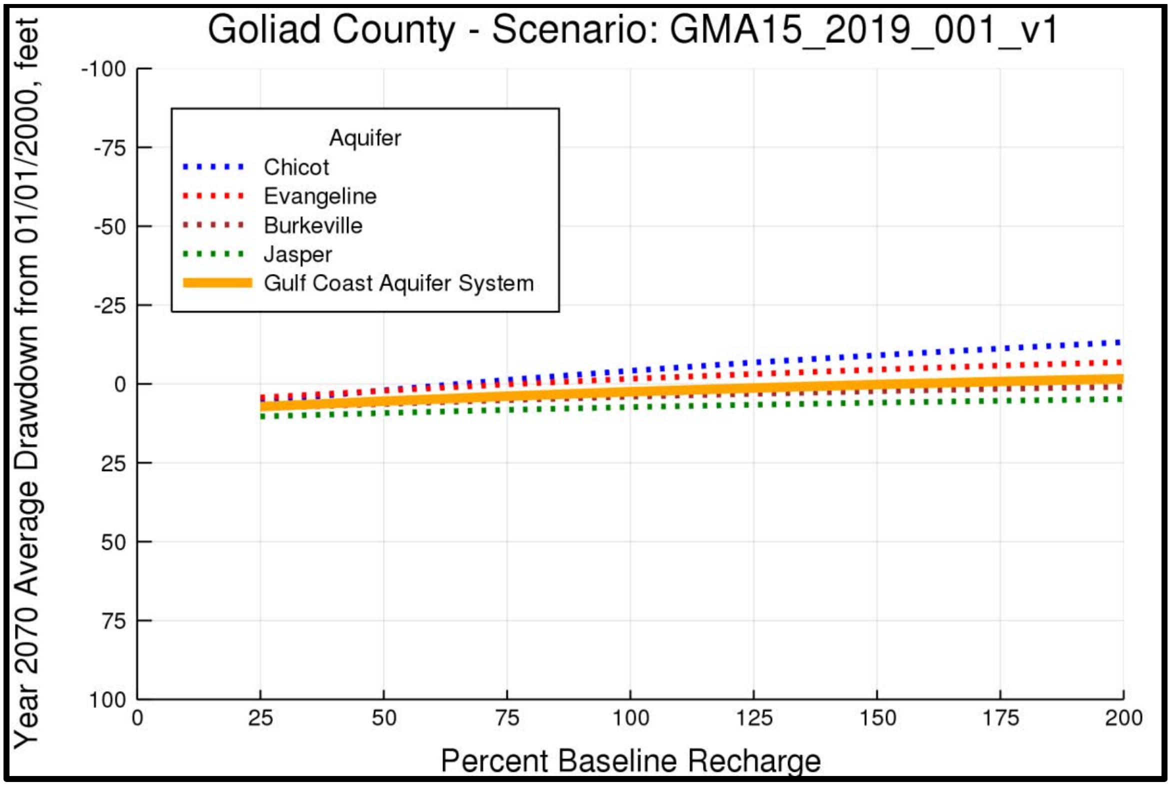

Colorado County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

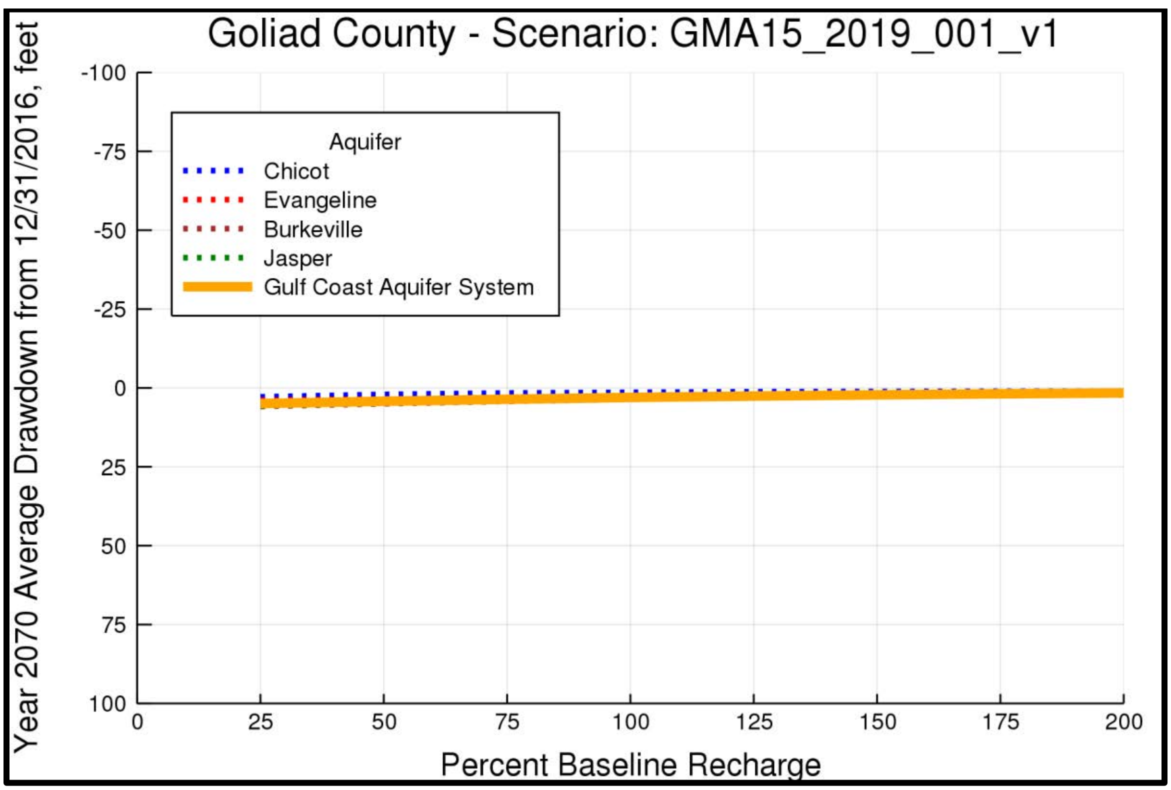

DeWitt County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

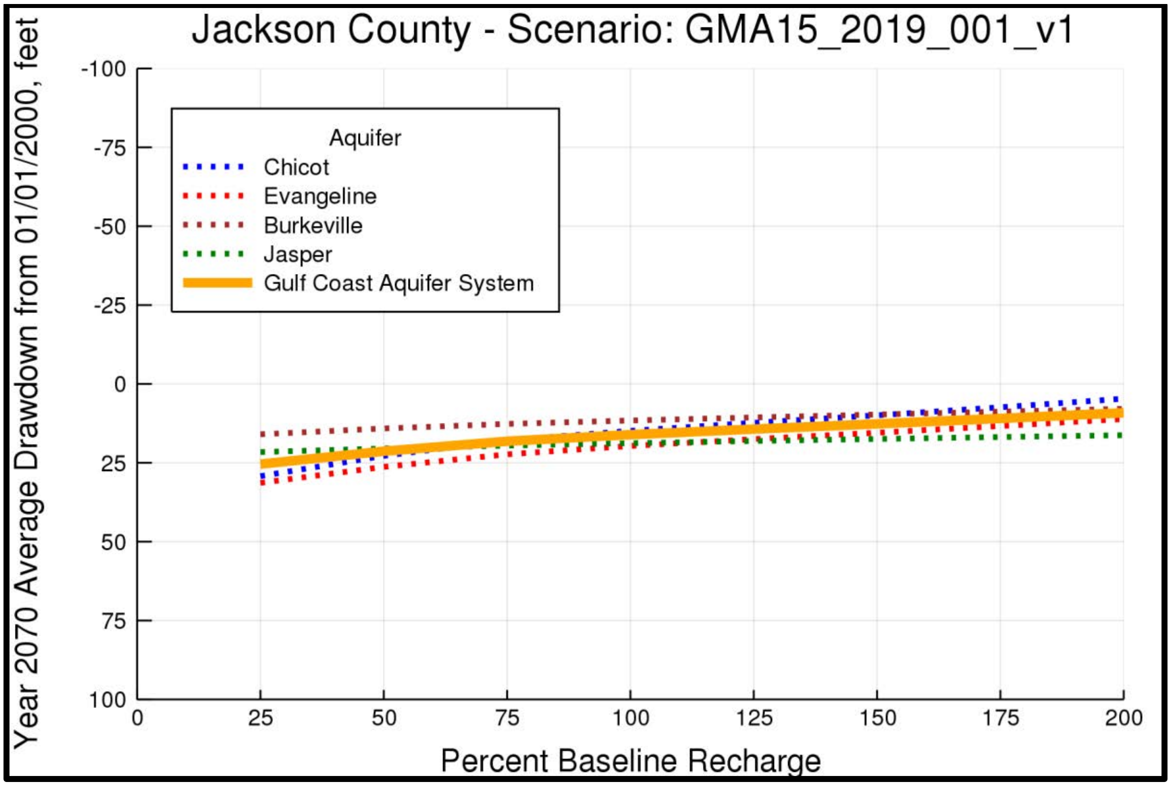

DeWitt County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

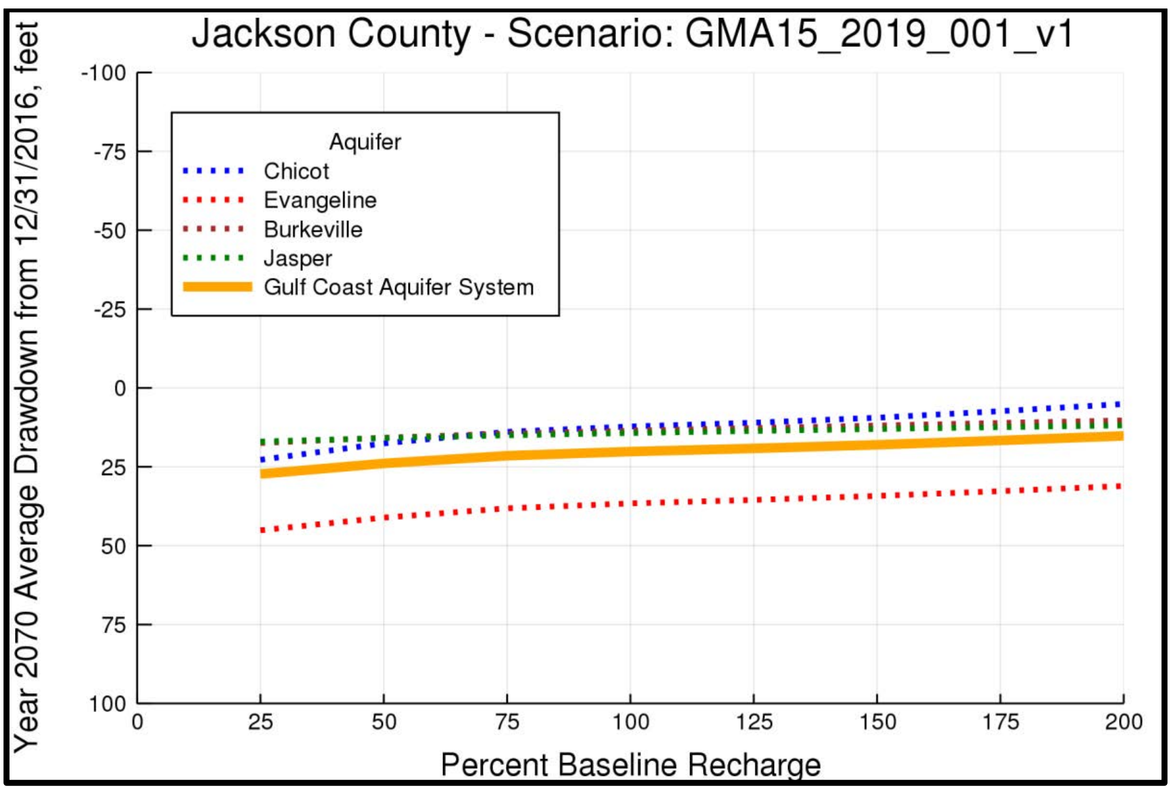

Fayette County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

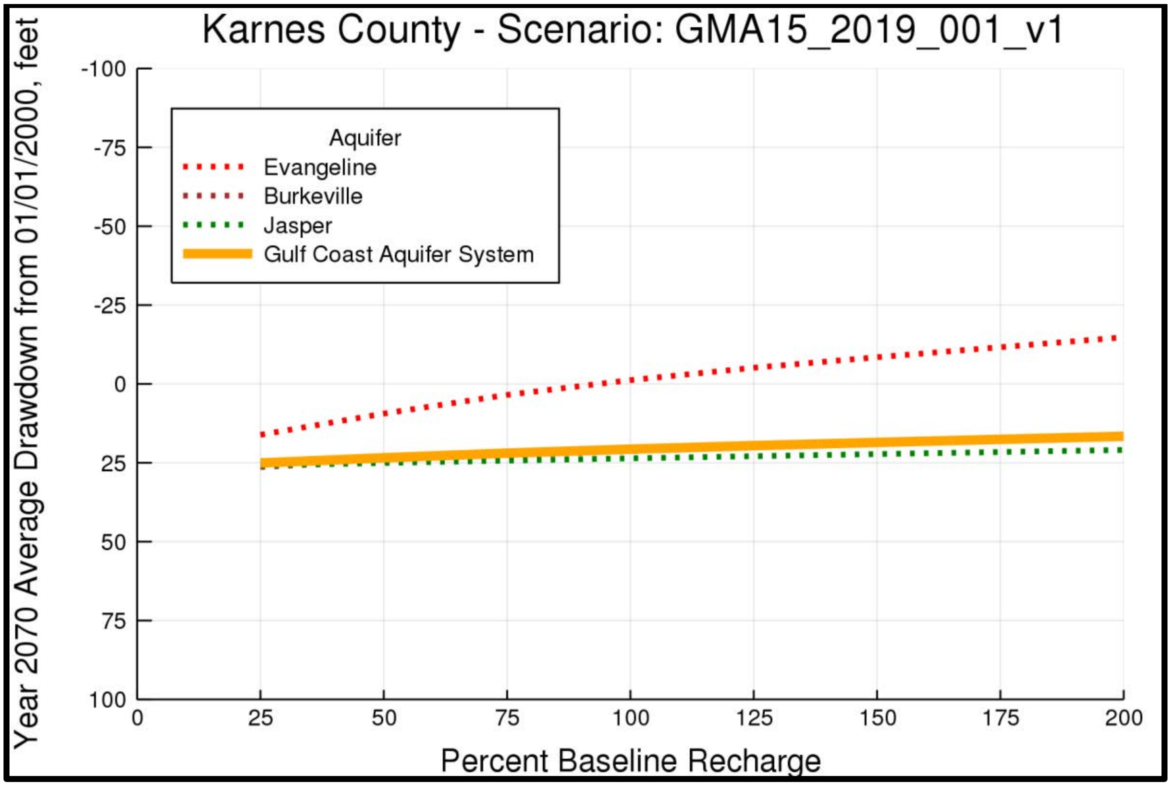

Fayette County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

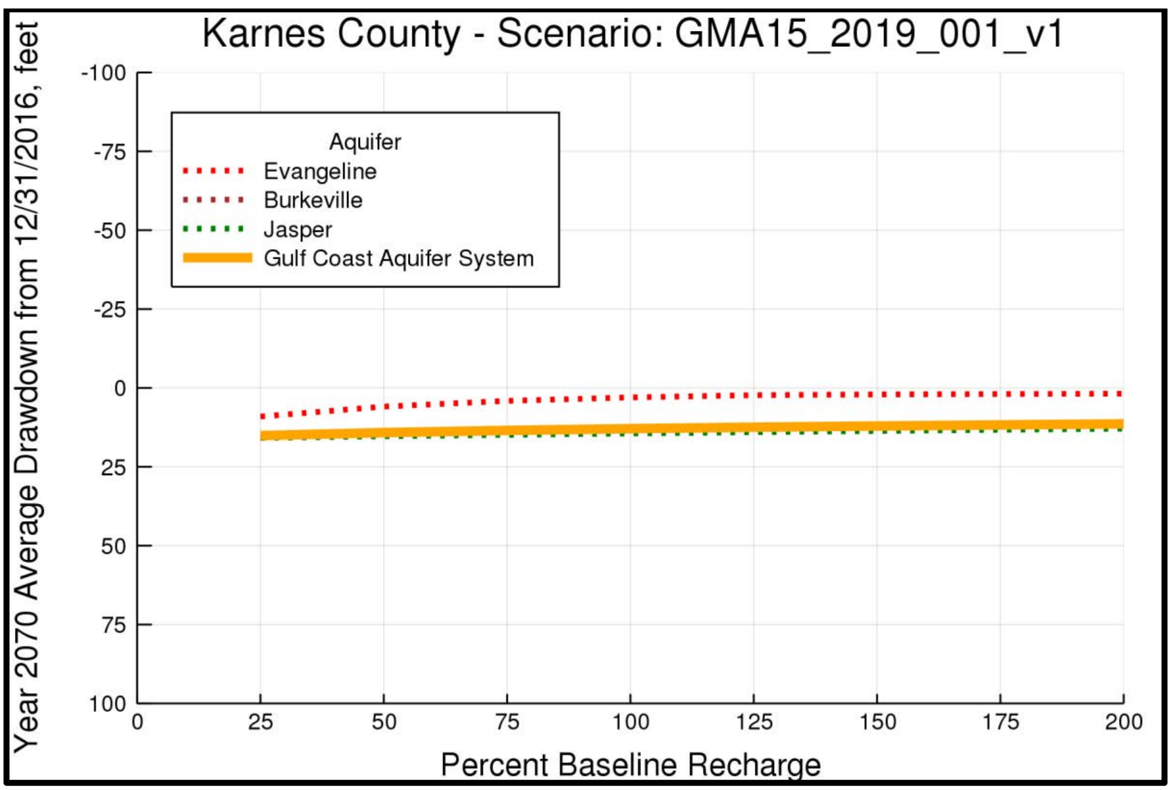

Goliad County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

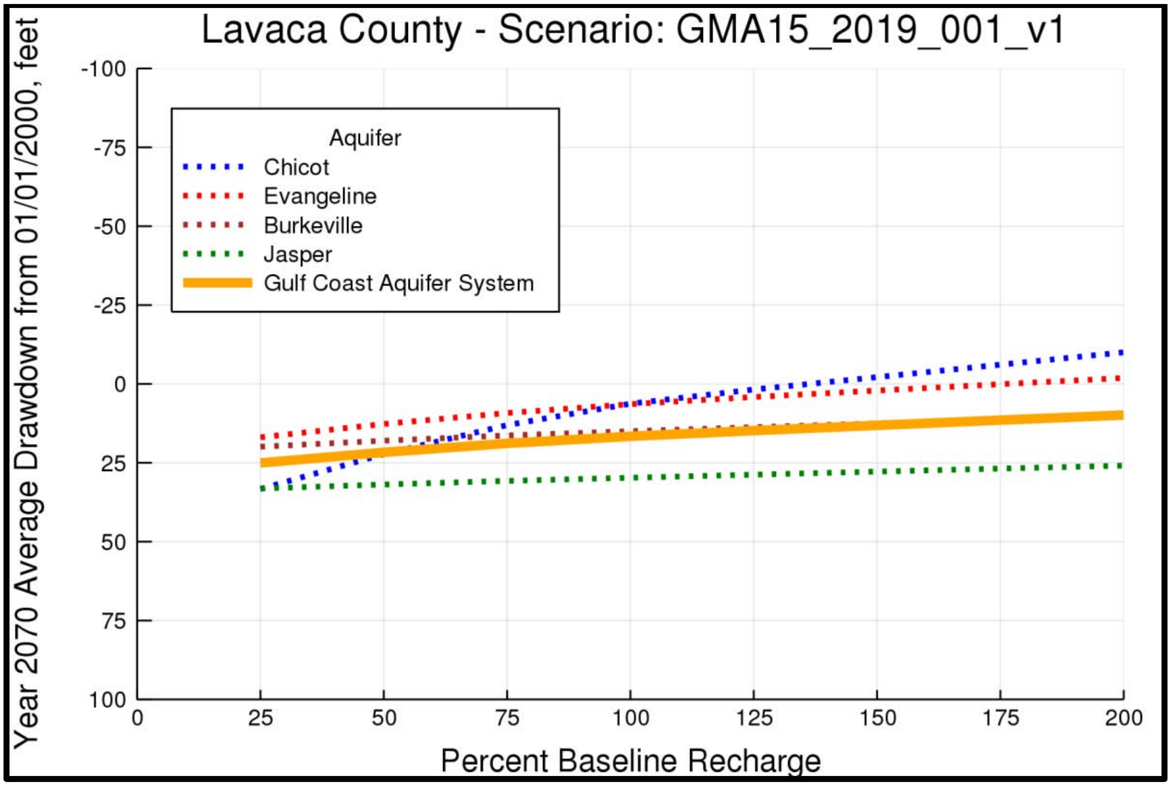

Goliad County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

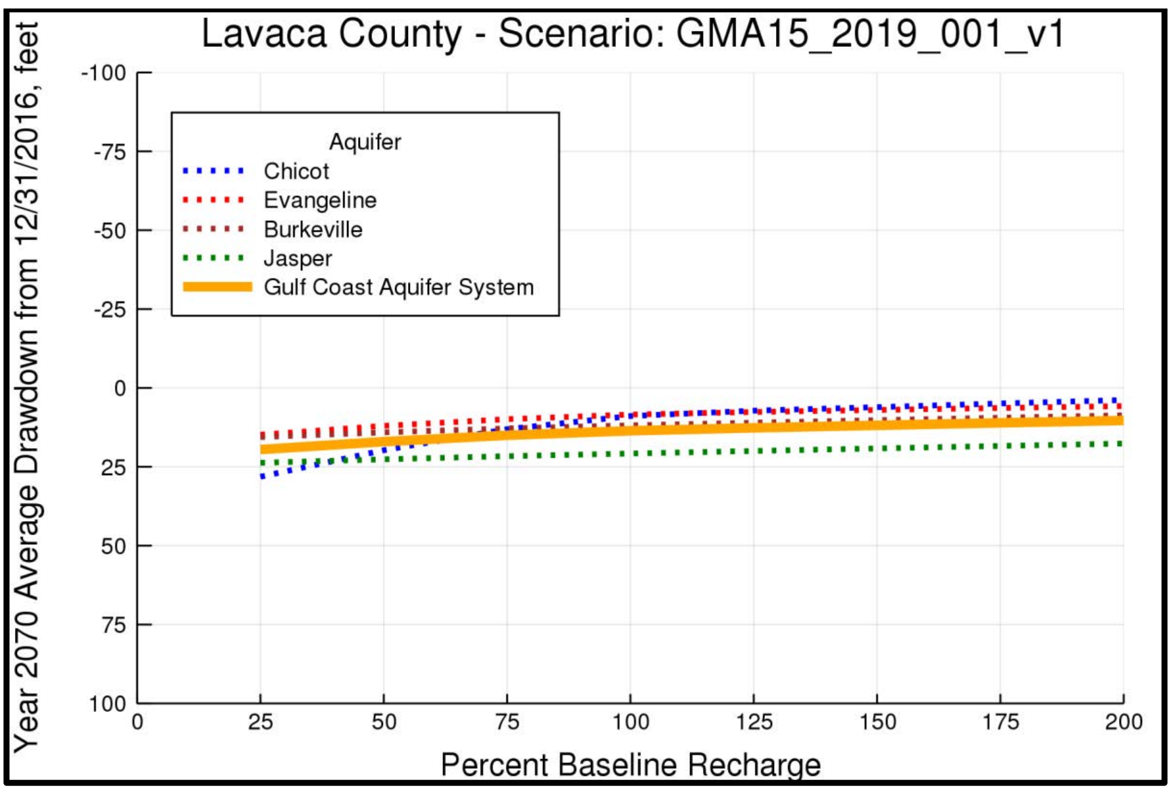

Jackson County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

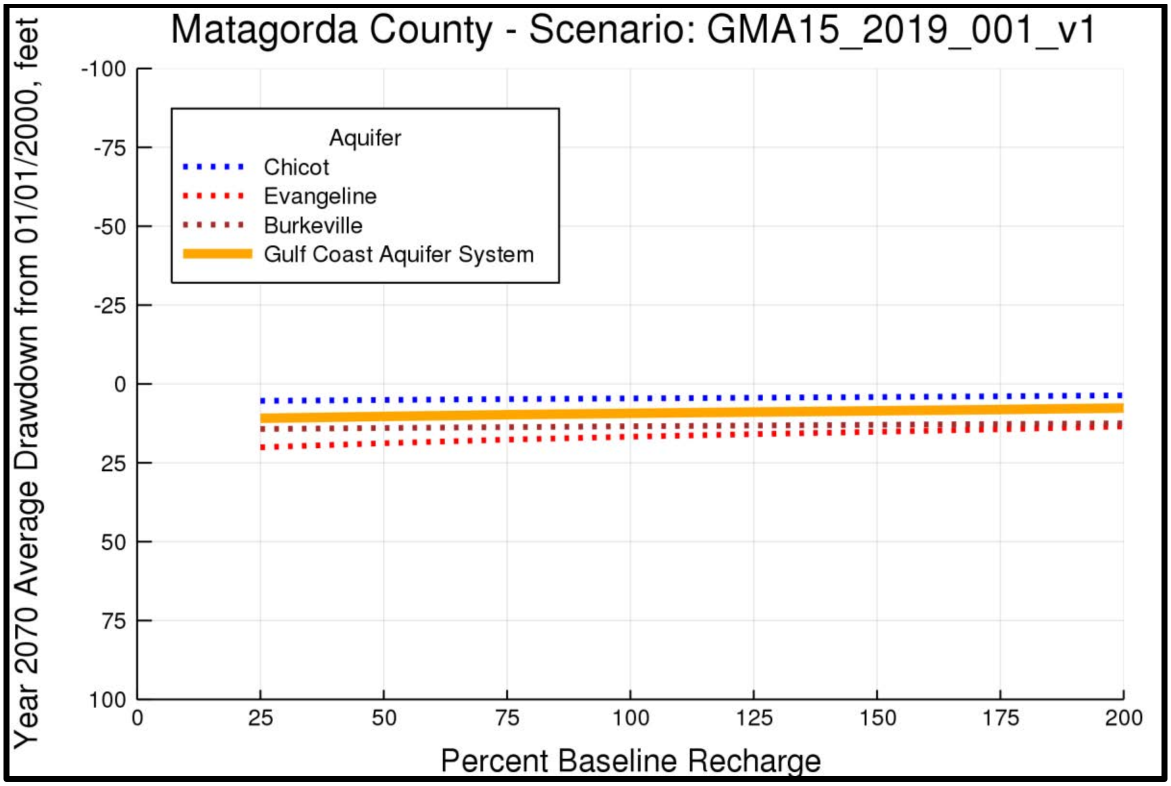

Jackson County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

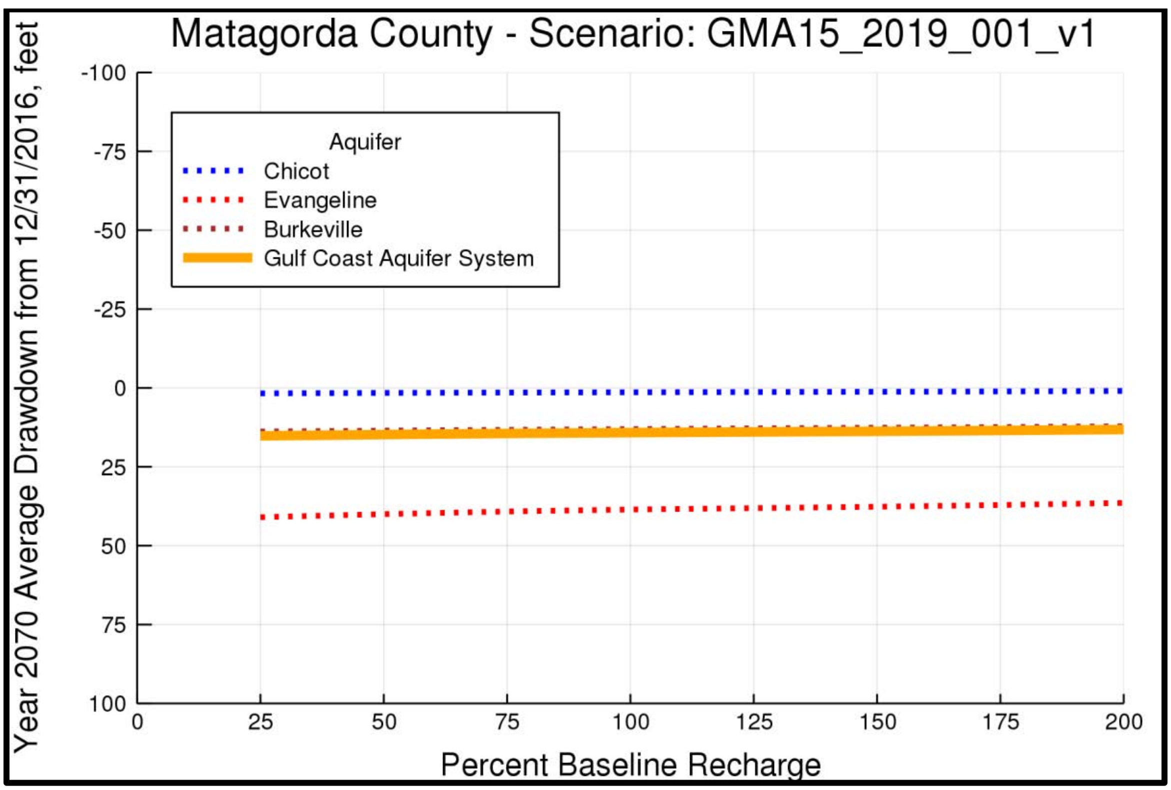

Karnes County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

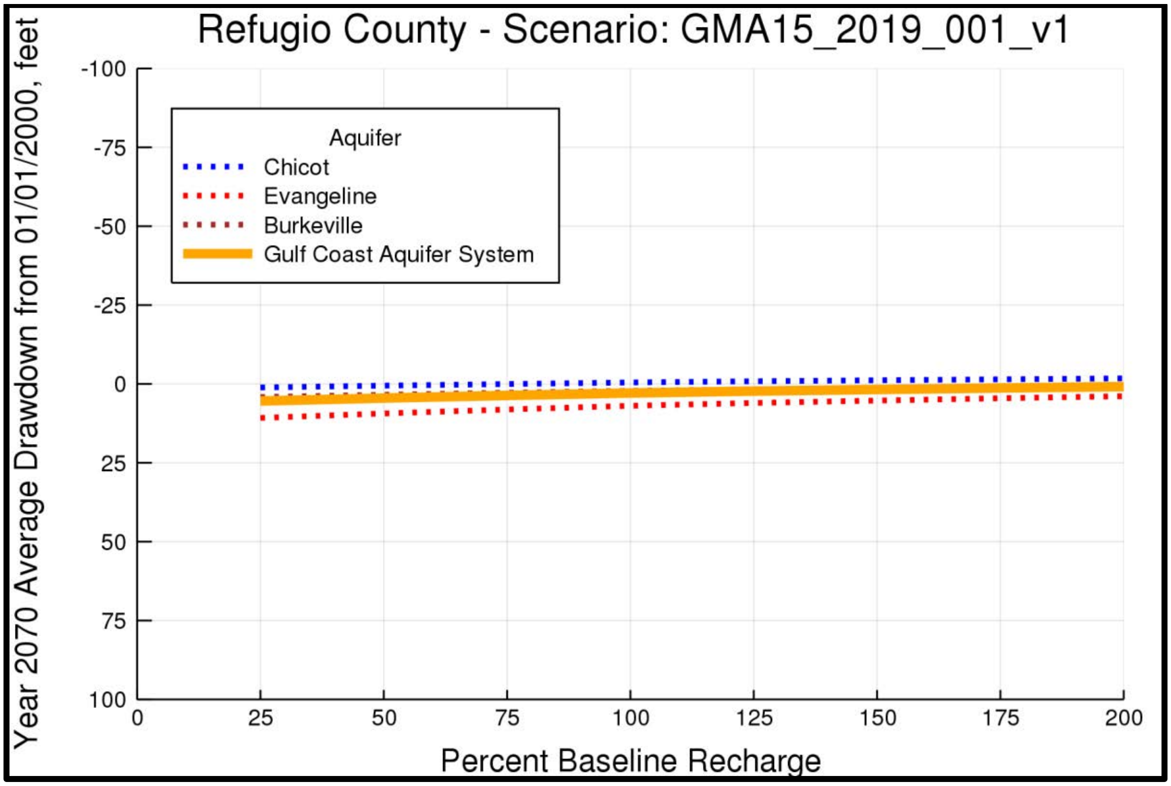

Karnes County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

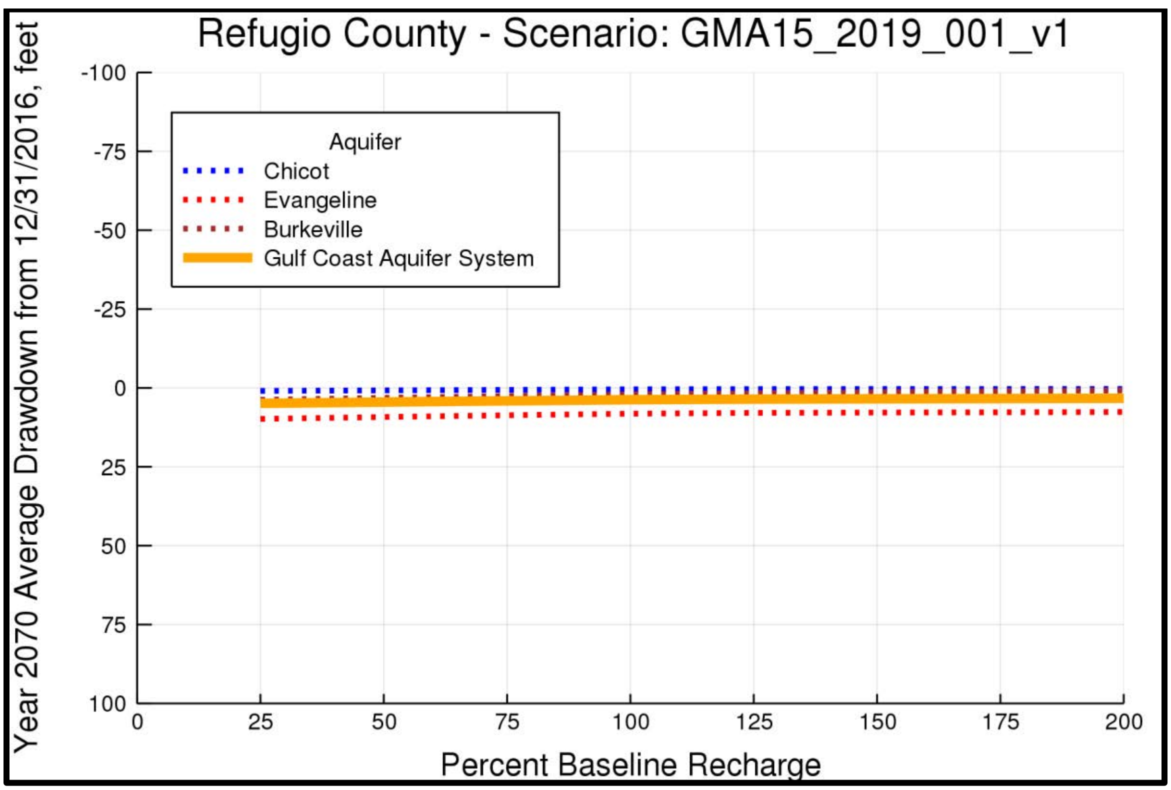

Lavaca County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

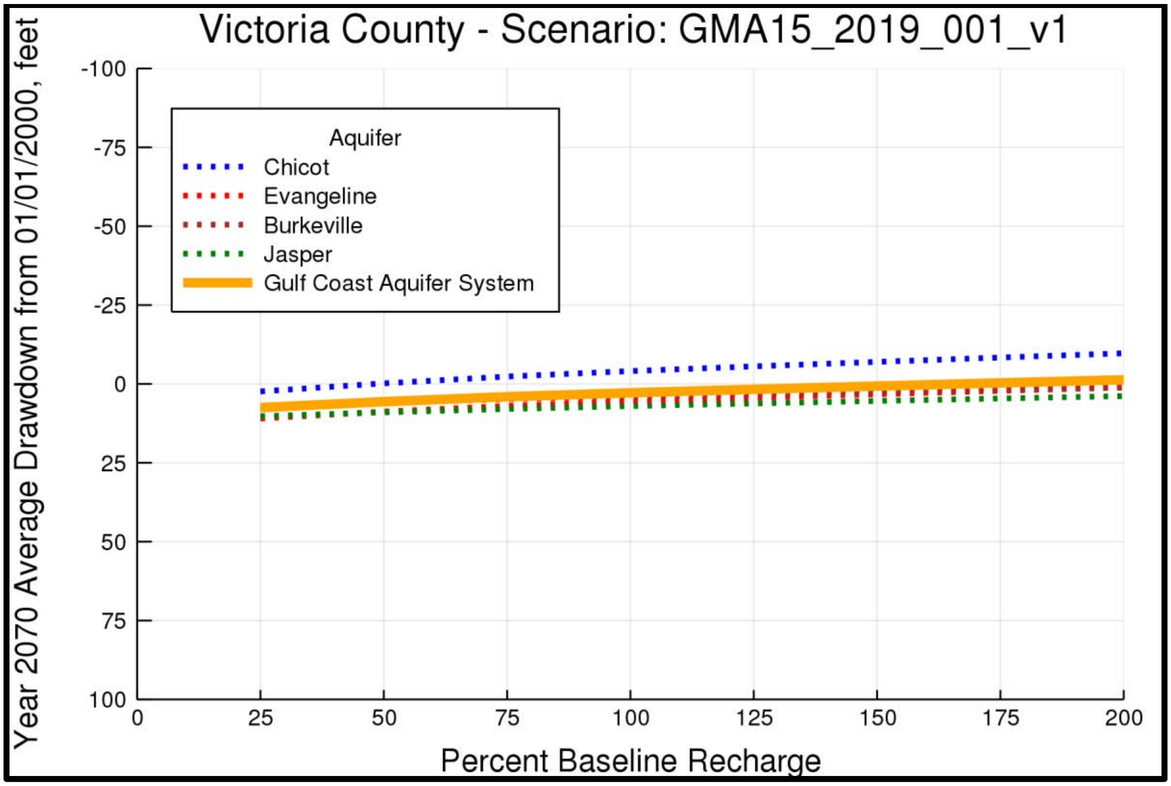

Lavaca County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

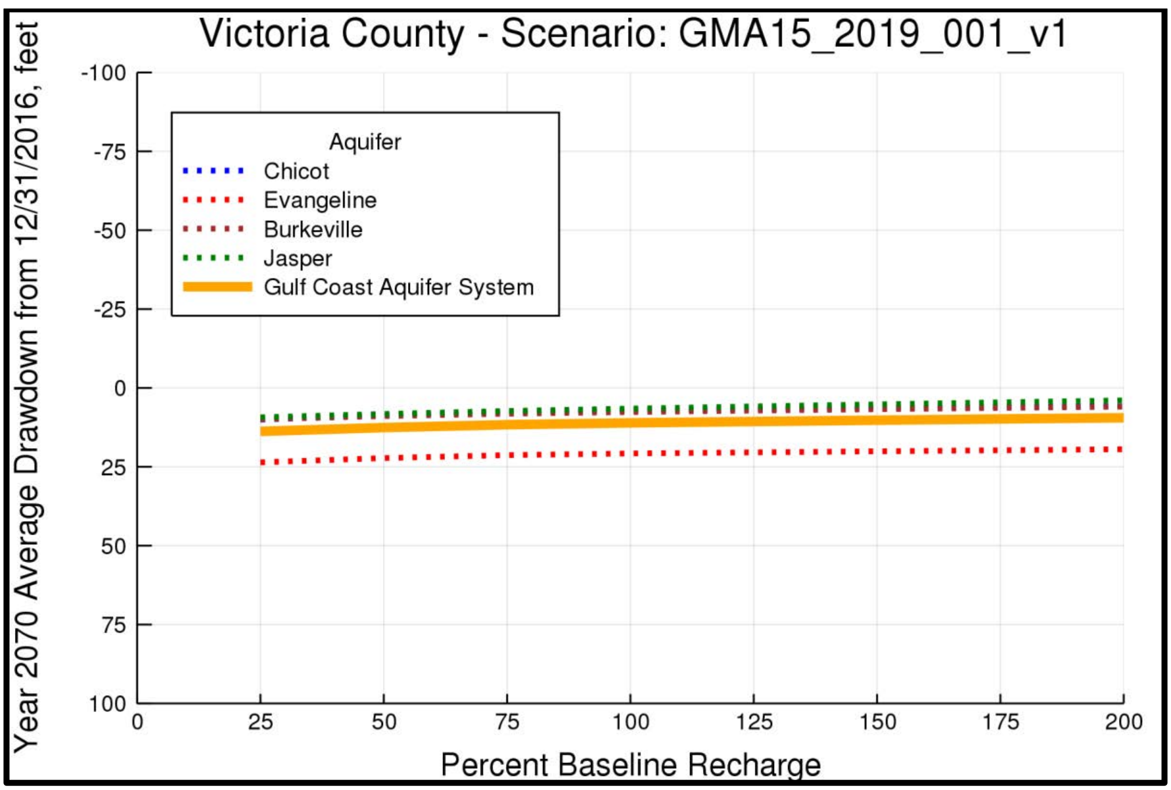

Matagorda County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

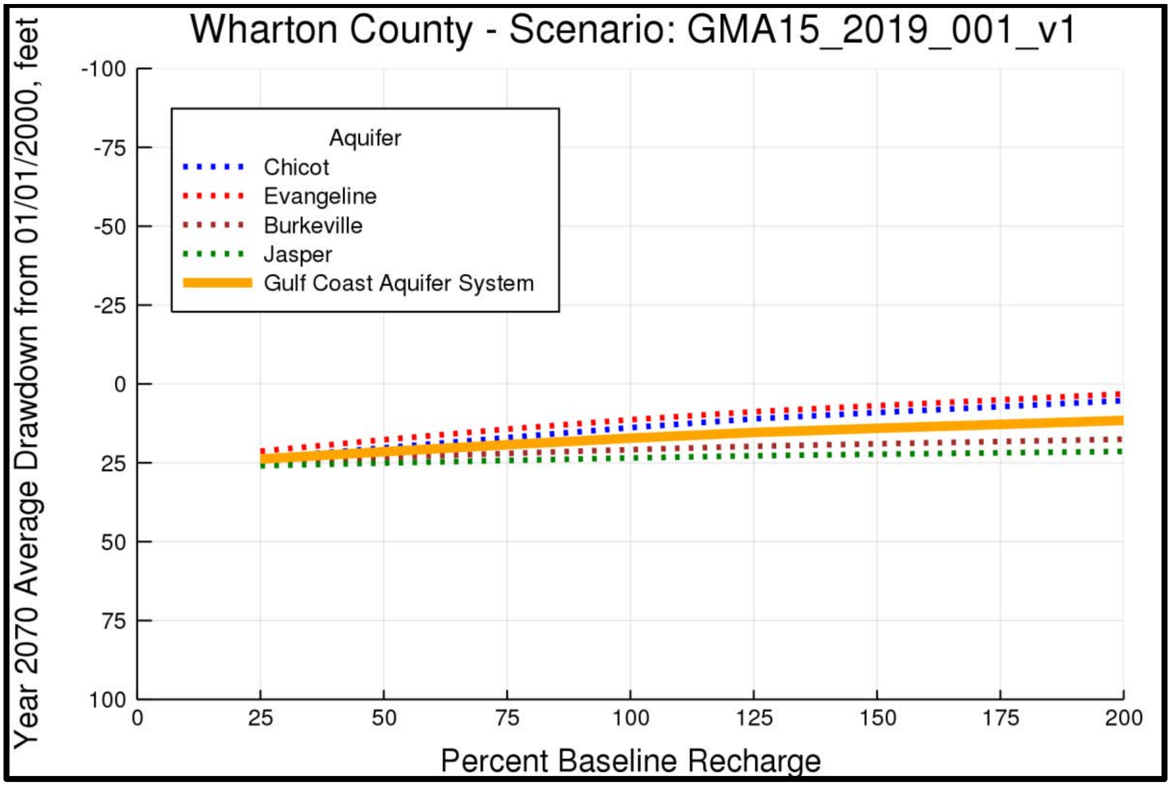

Matagorda County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

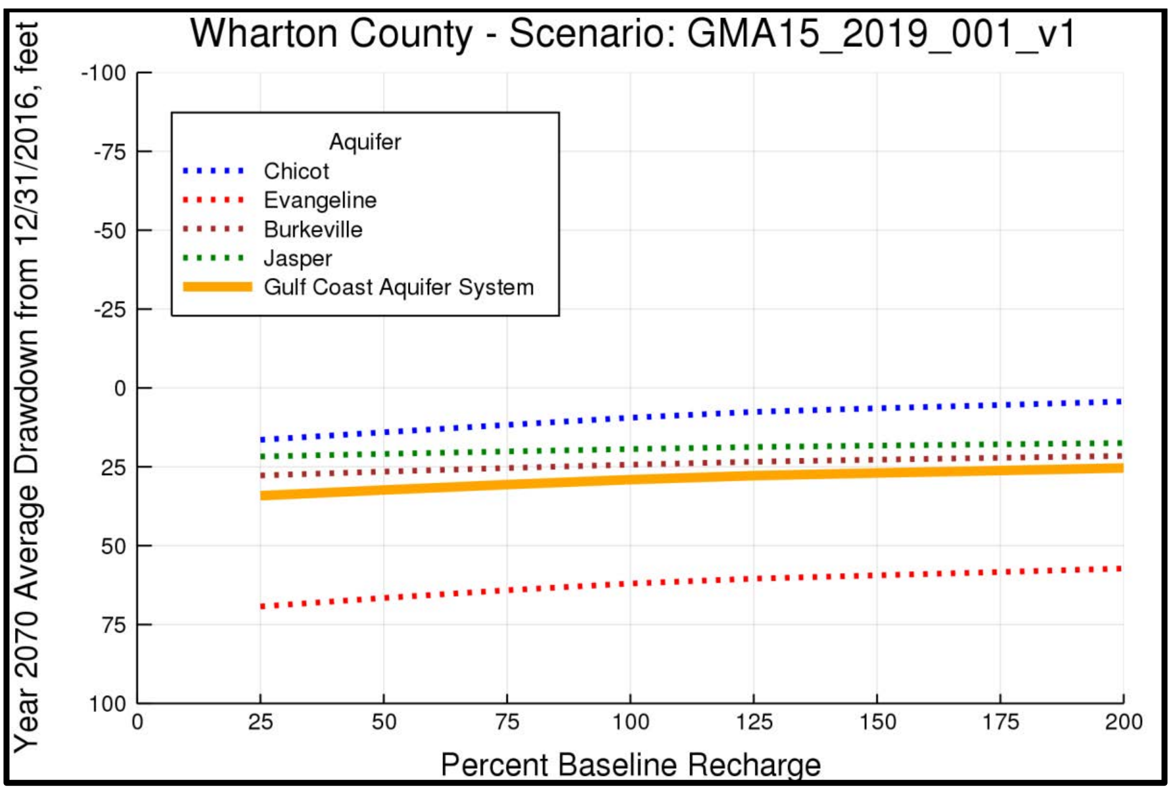

Refugio County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Refugio County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Victoria County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Victoria County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Wharton County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

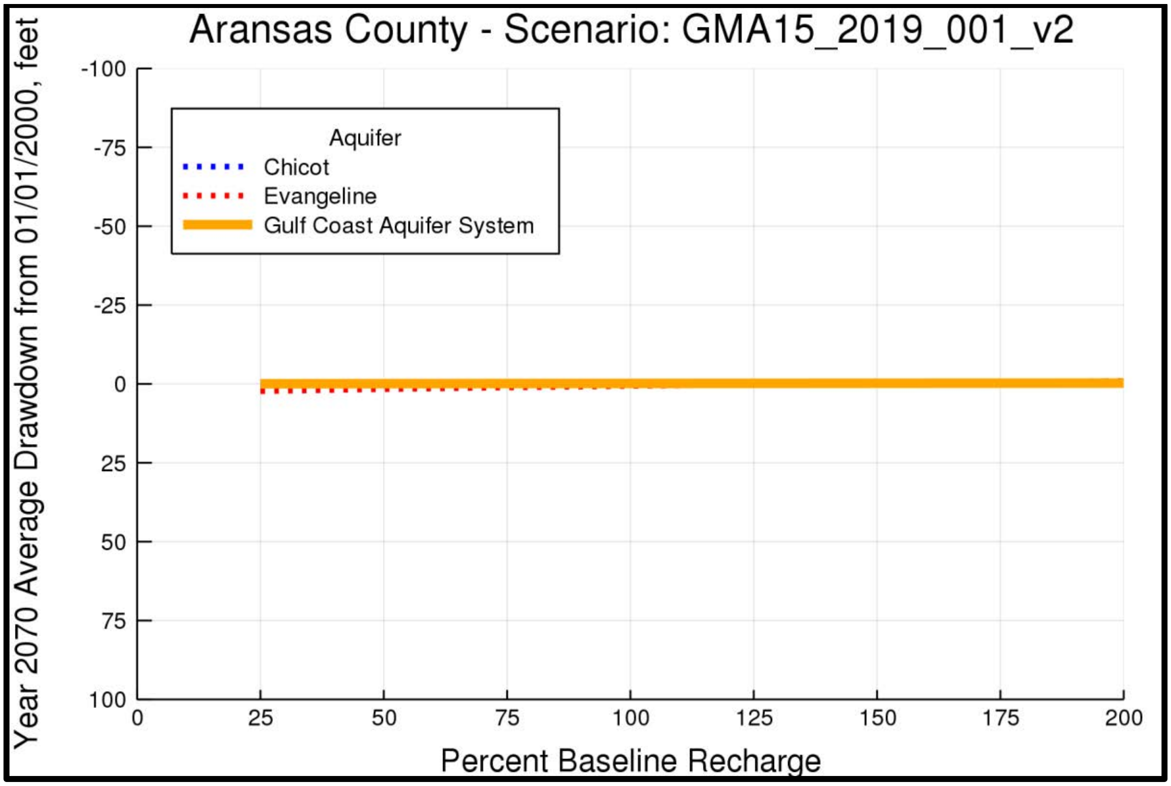

Wharton County - Scenario: GMA15_2019_001_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

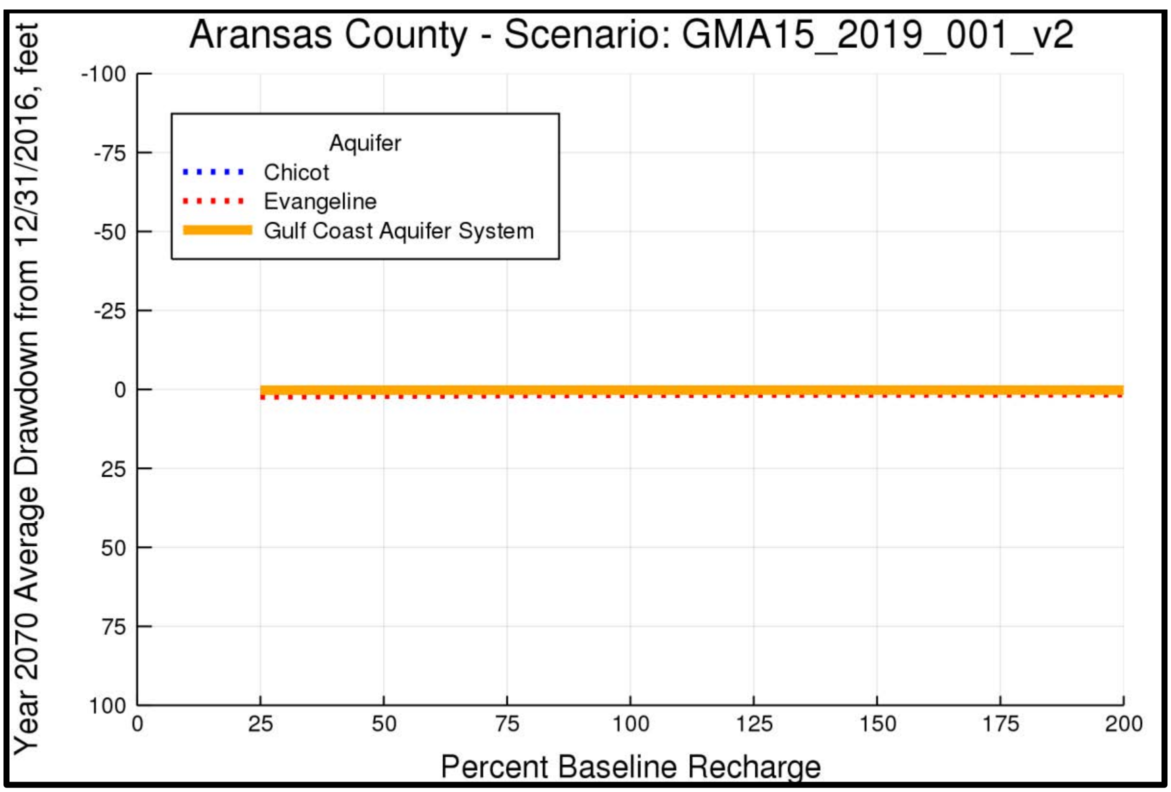
Average Drawdown versus Percent Baseline Recharge

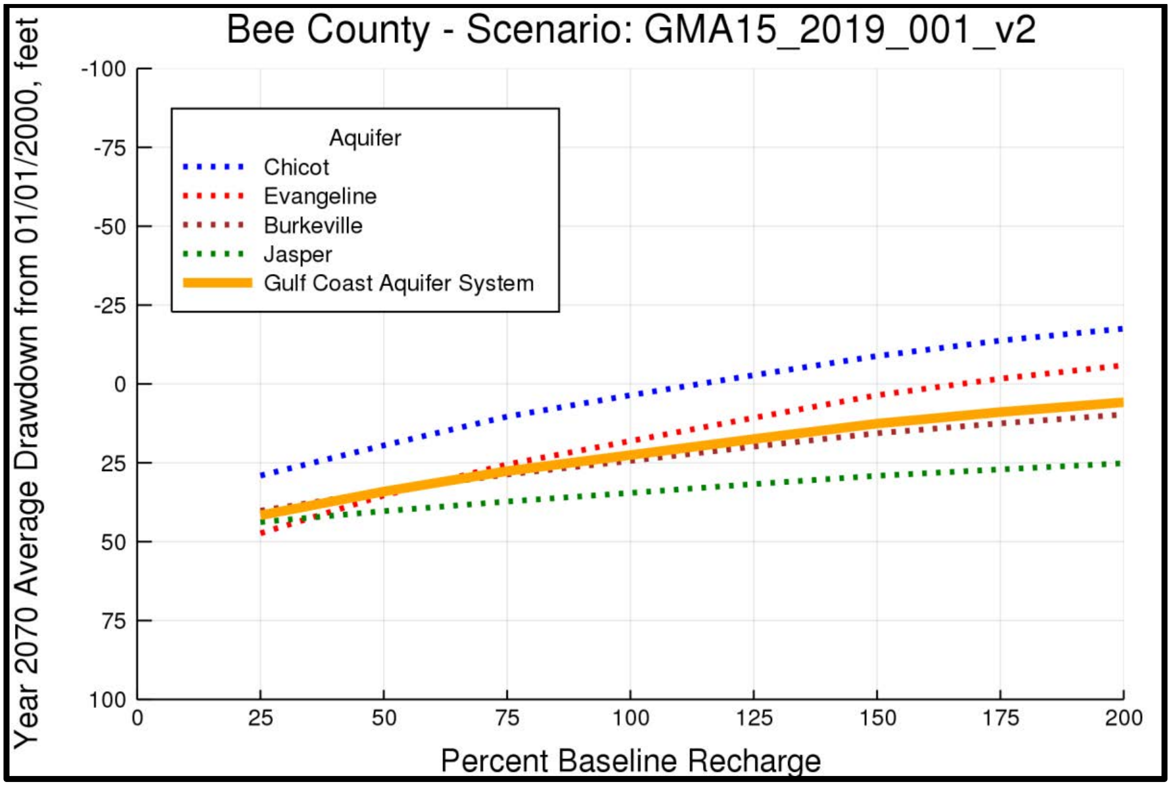
Pumping Scenario: 1

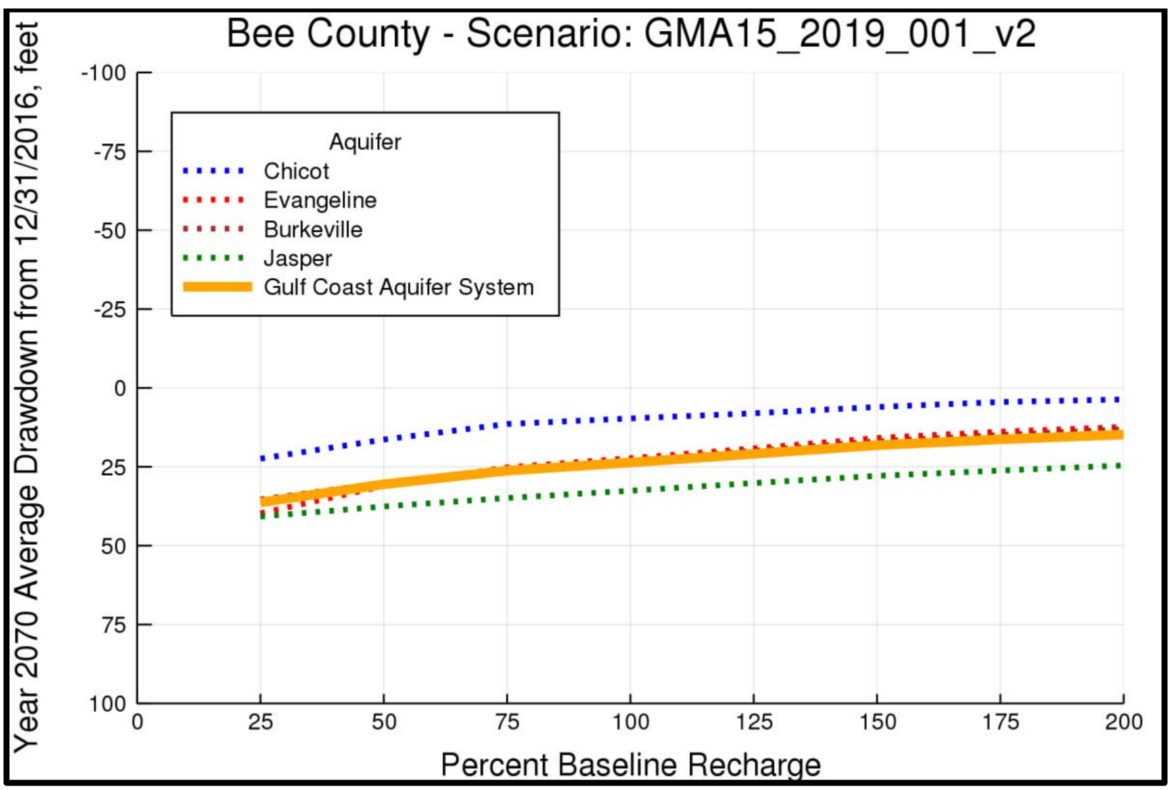
Pumping Distribution Version: 2

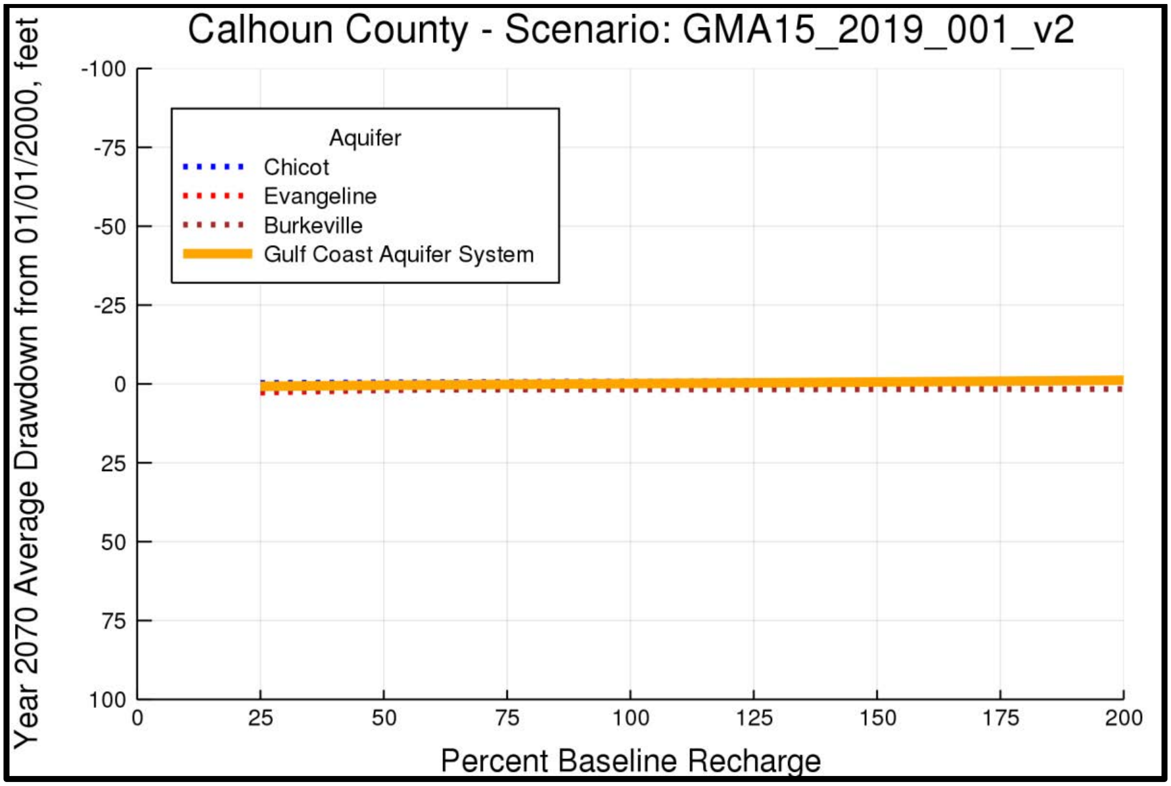
Scenario ID: GMA15_2019_001_v2

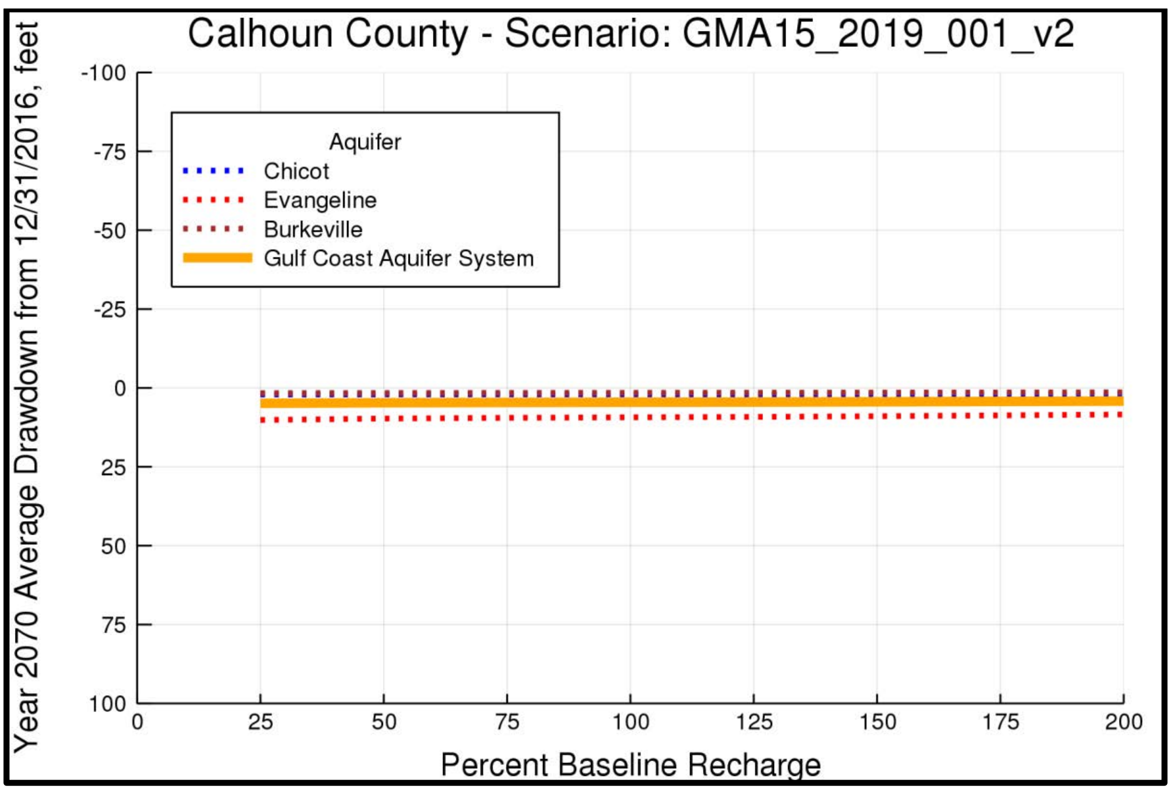

Aransas County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

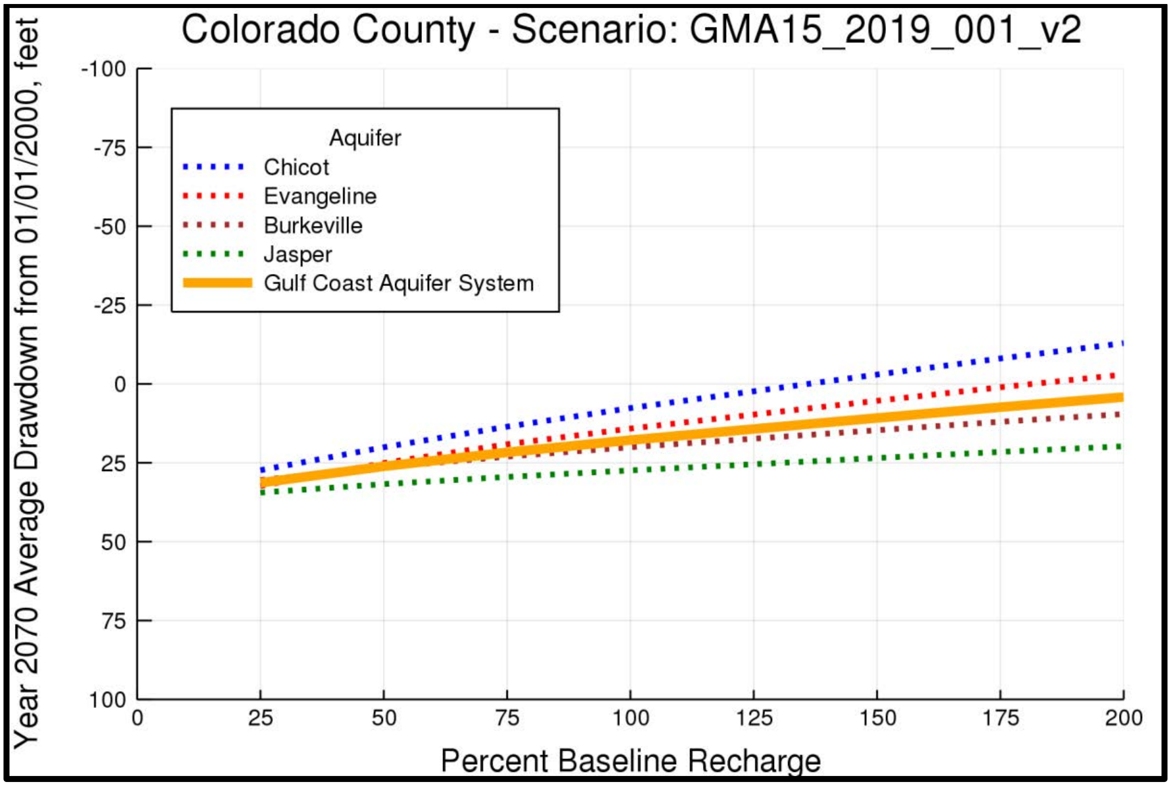

Aransas County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

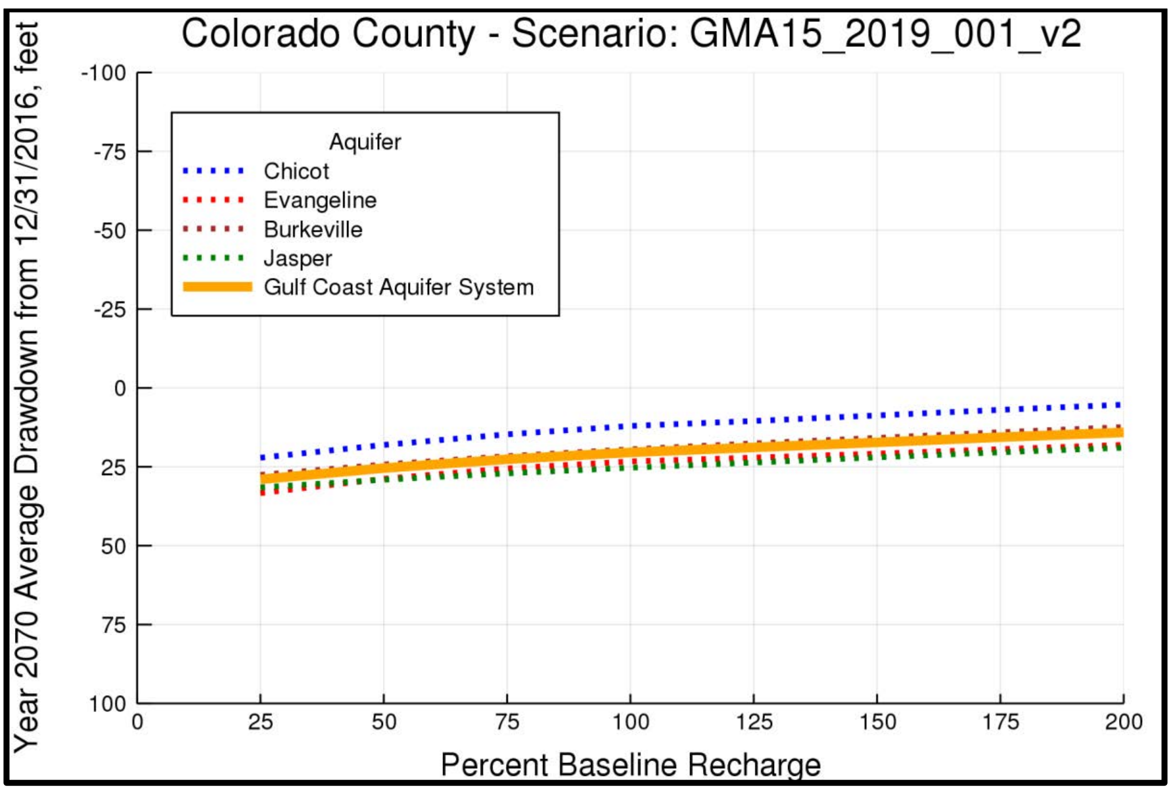

Bee County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

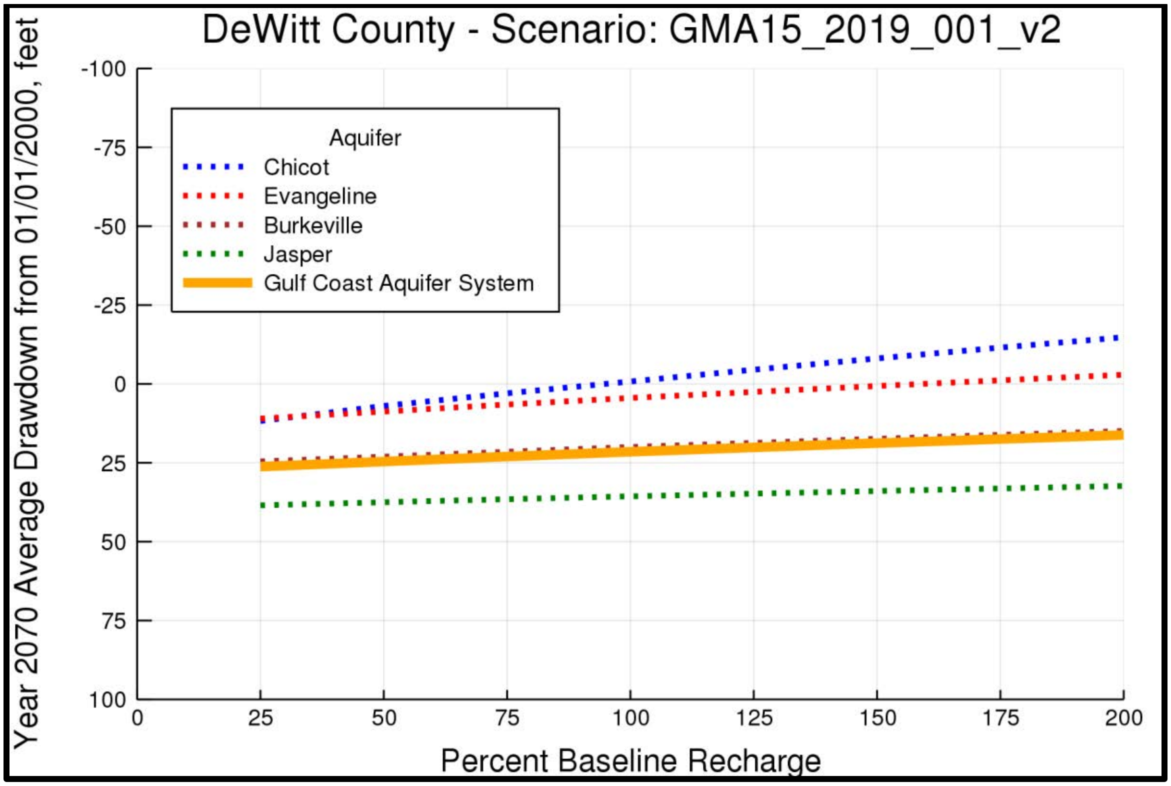

Bee County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

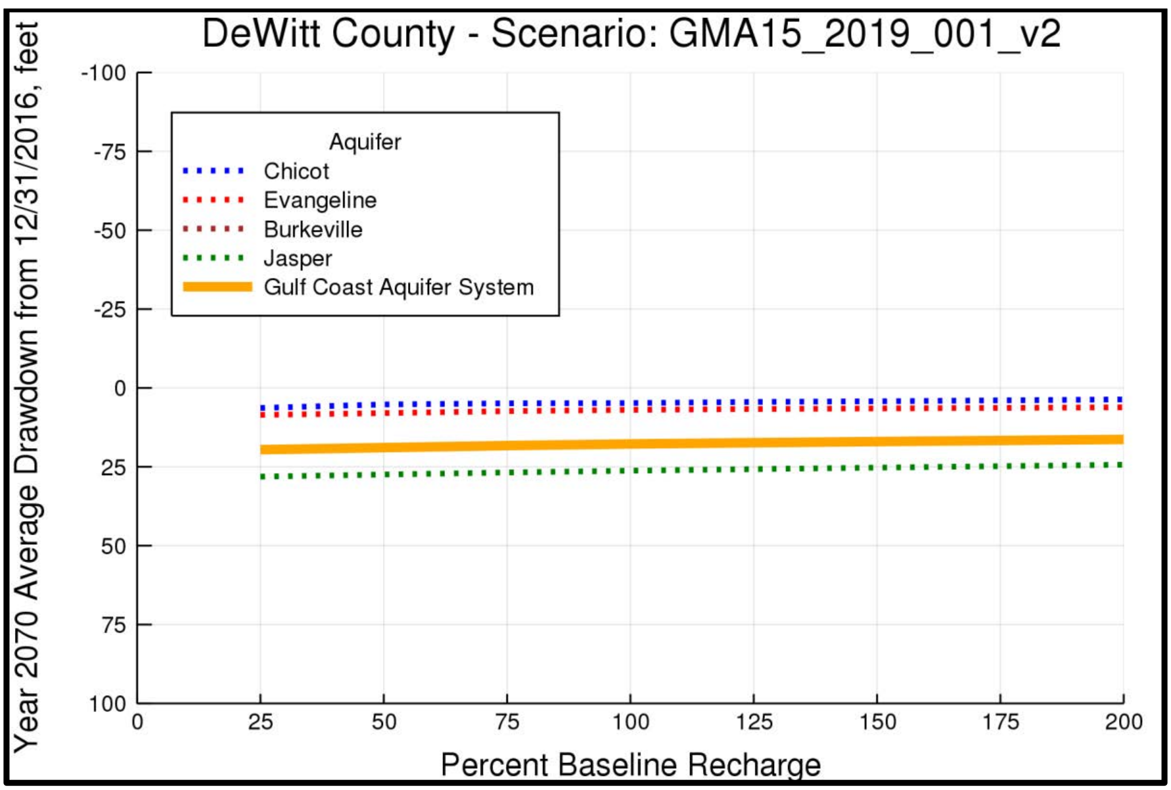

Calhoun County - Scenario: GMA15_2019_001_v2
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

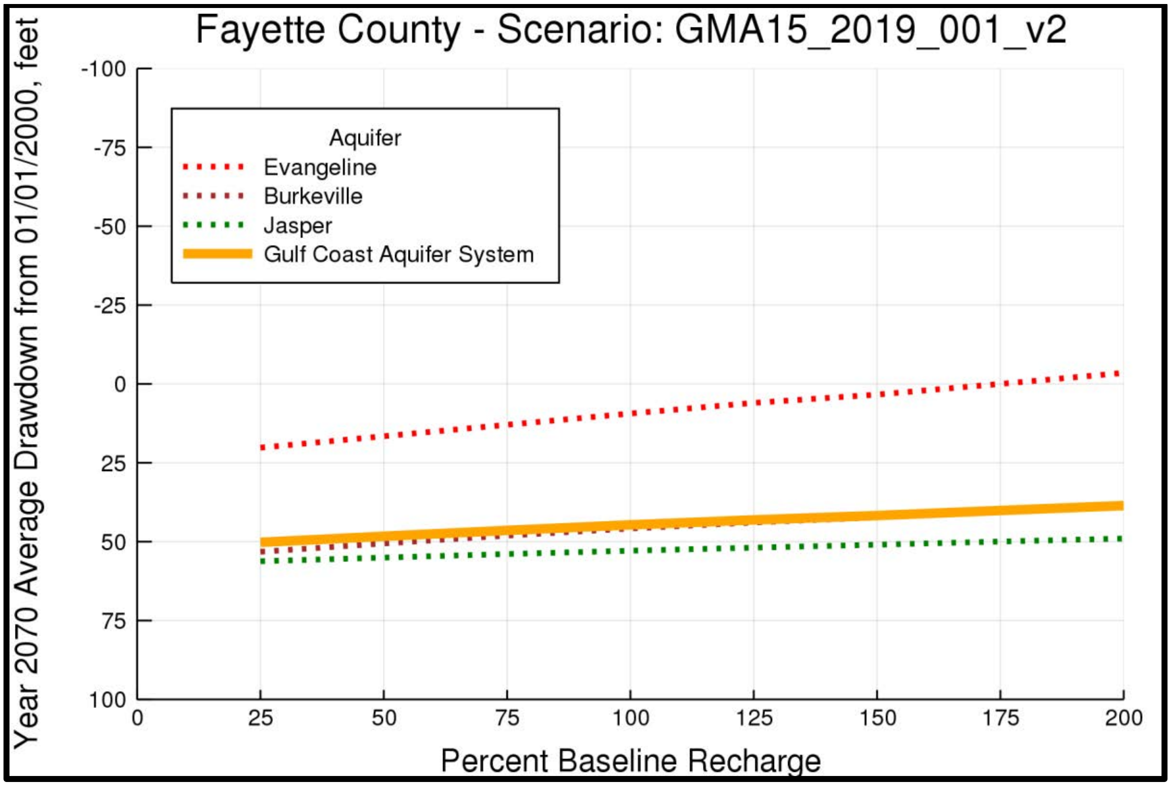

Calhoun County - Scenario: GMA15_2019_001_v2
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

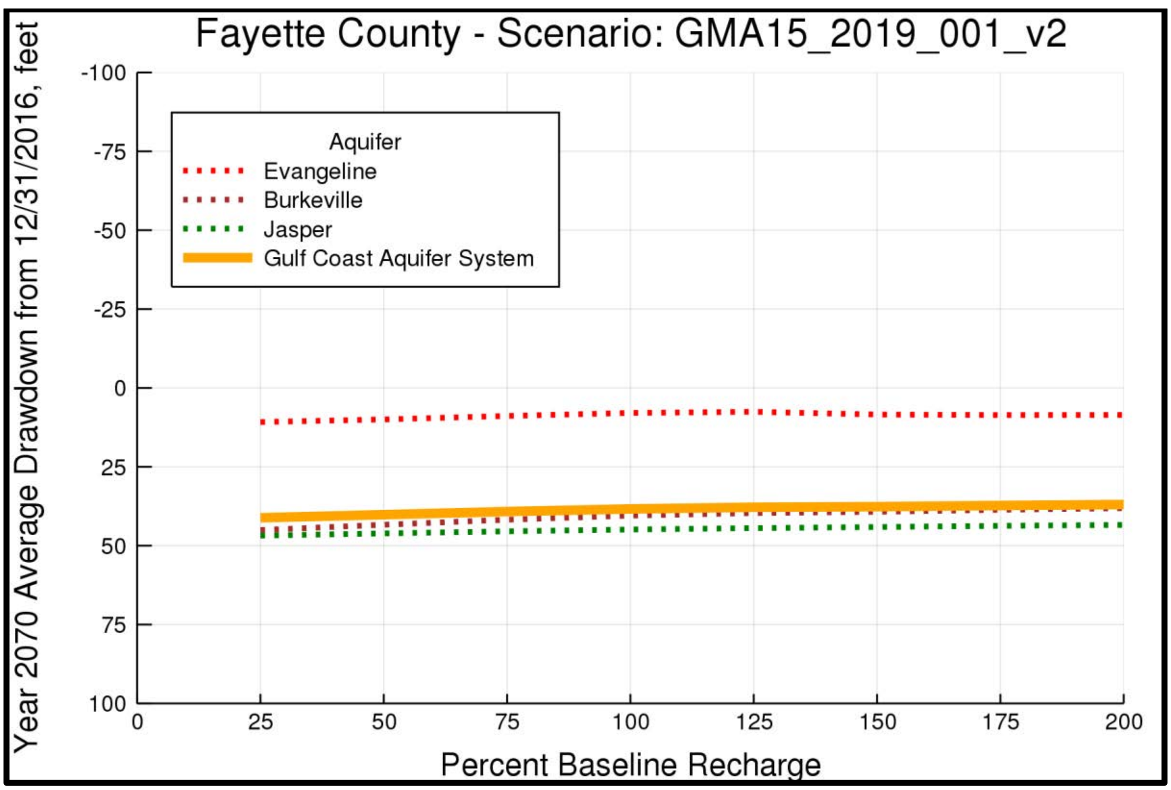

Colorado County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

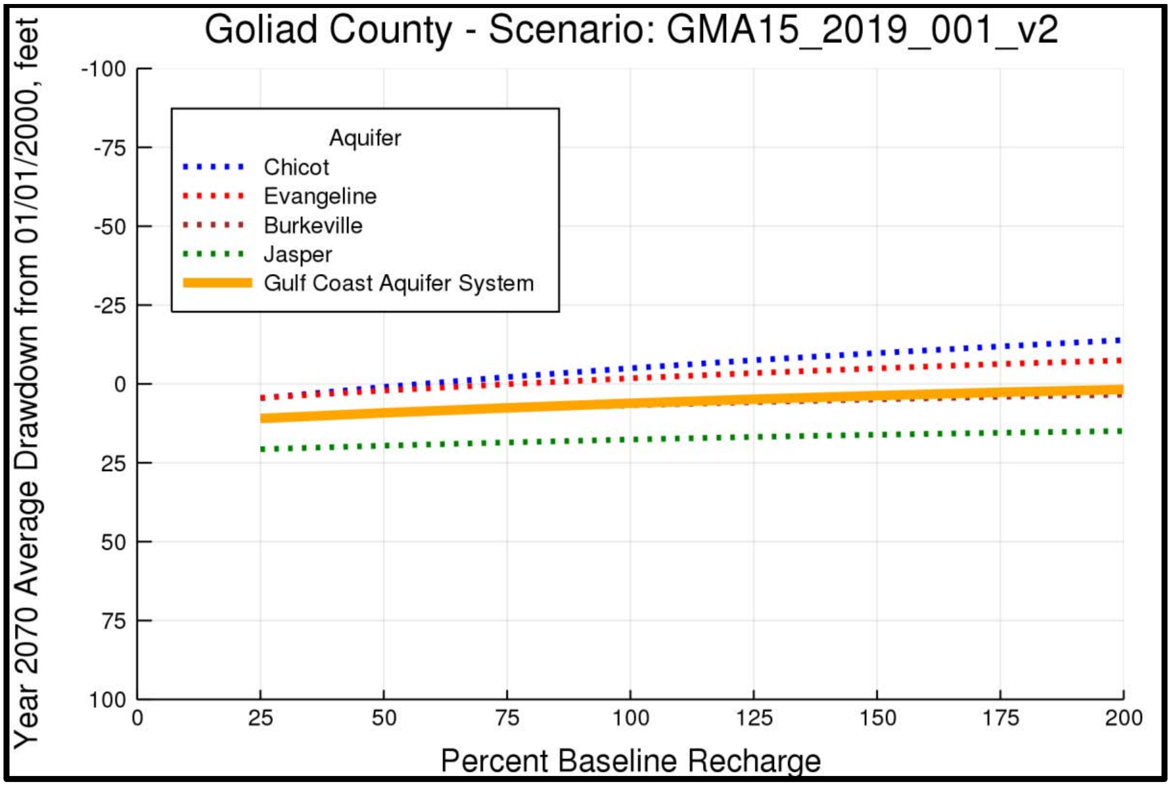

Colorado County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

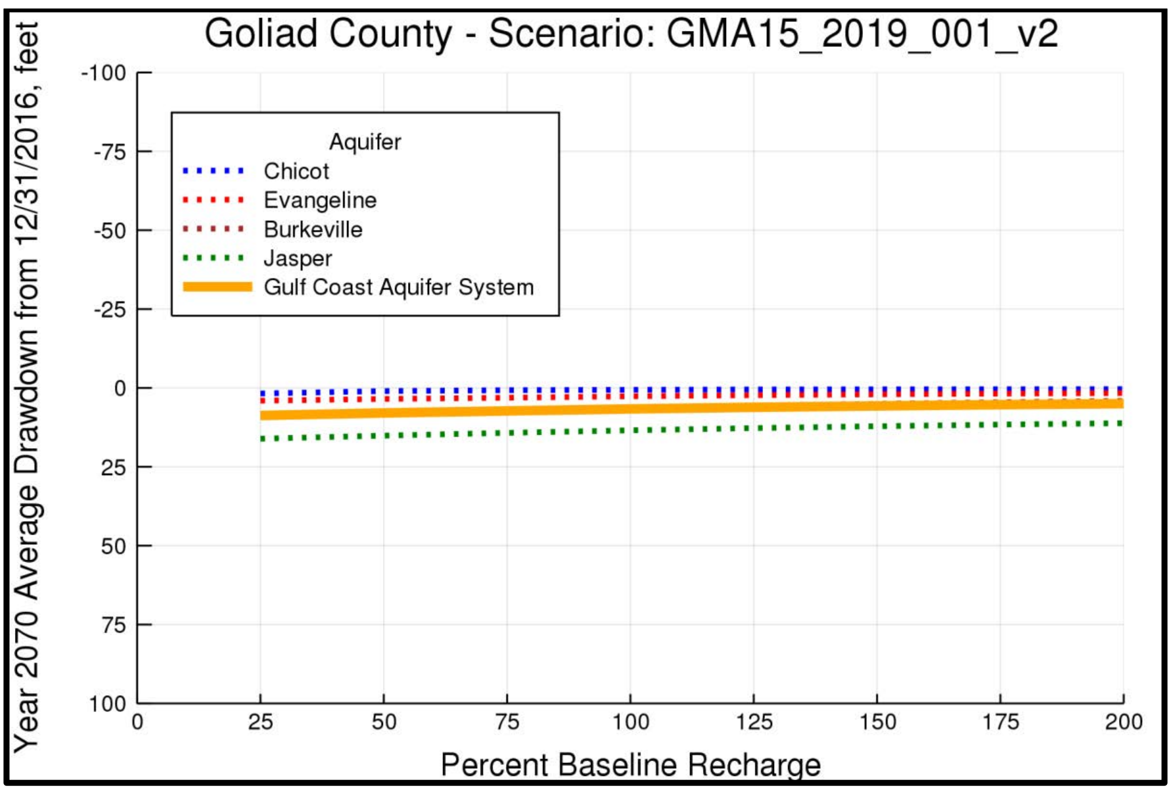

DeWitt County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

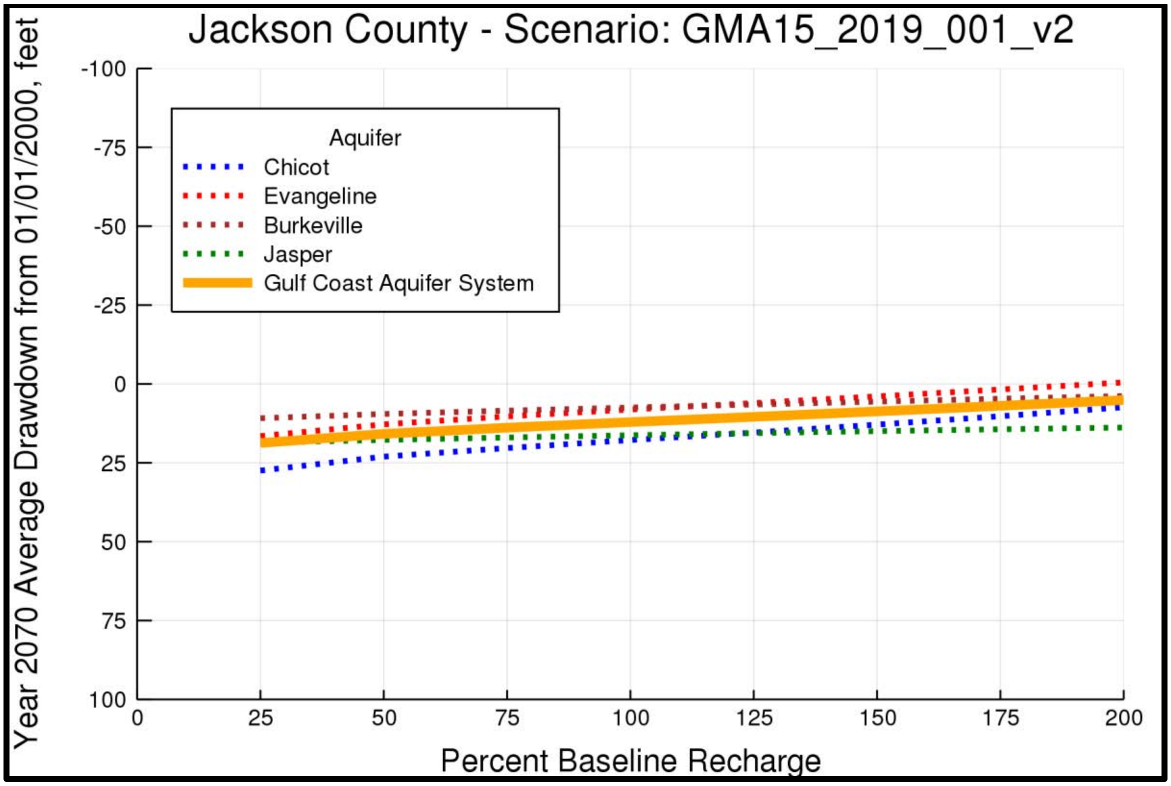

DeWitt County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

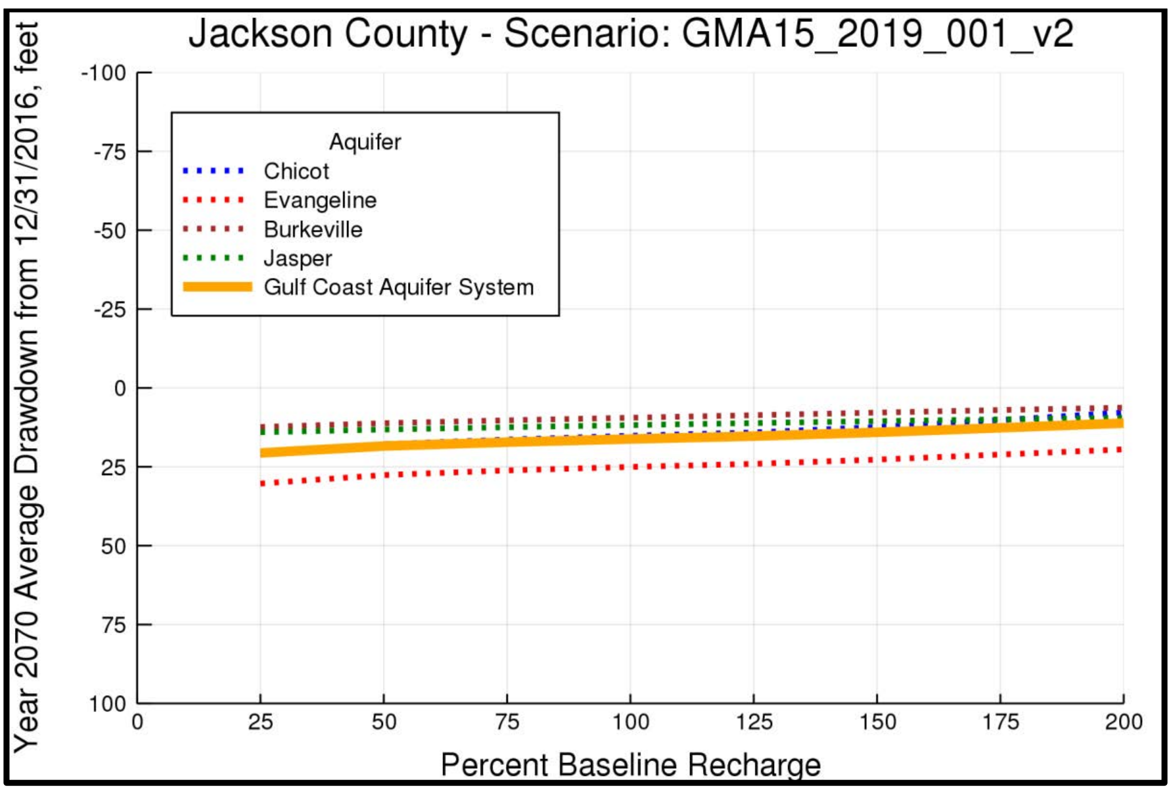

Fayette County - Scenario: GMA15_2019_001_v2
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

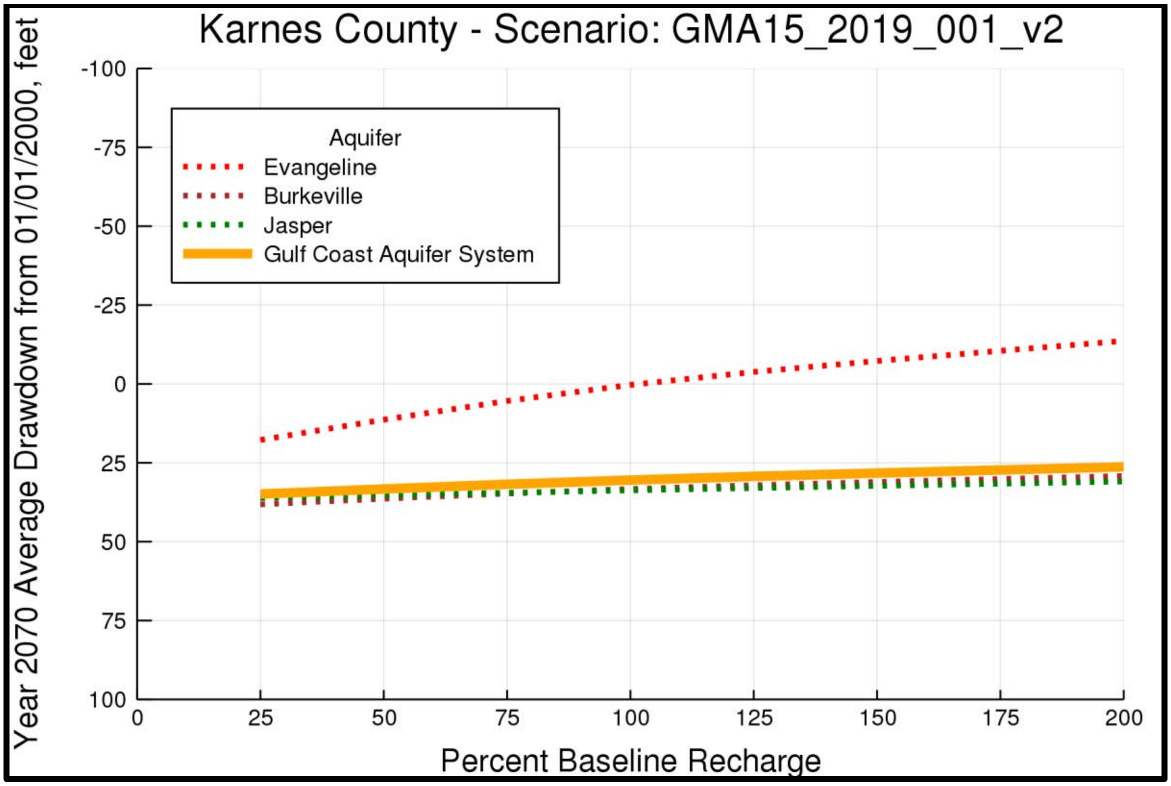

Fayette County - Scenario: GMA15_2019_001_v2
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

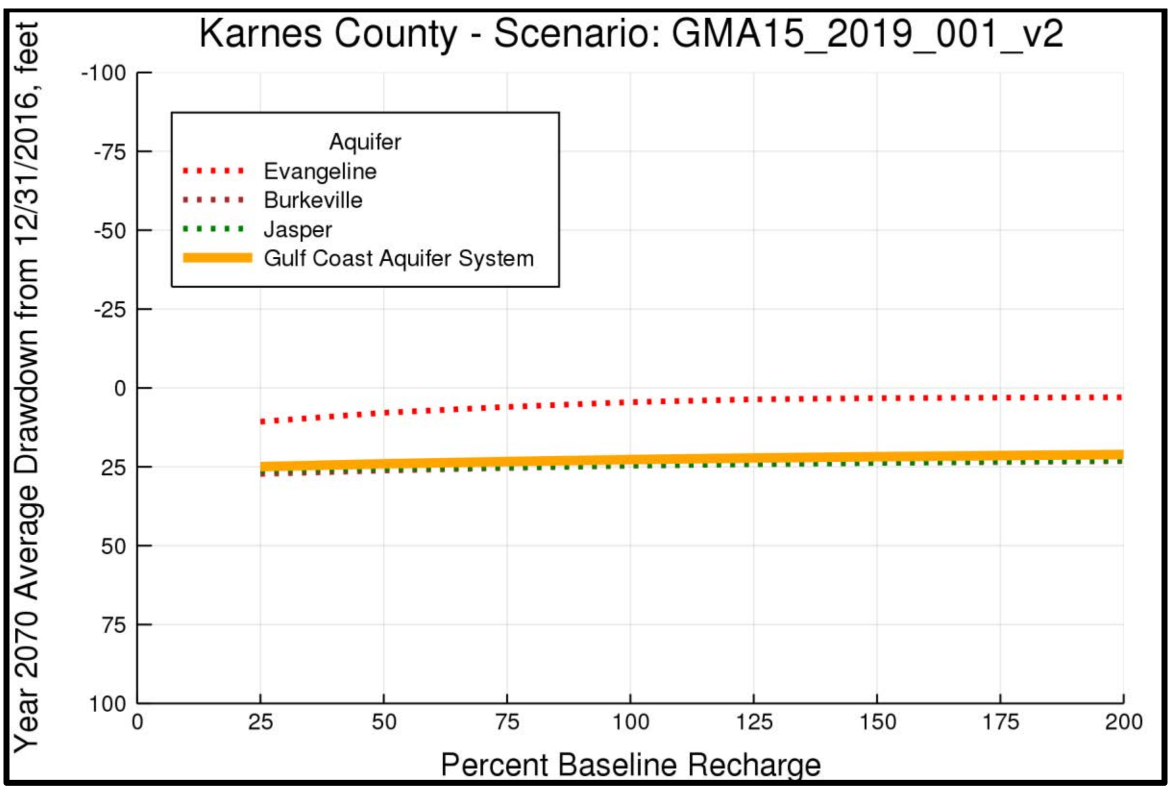

Goliad County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

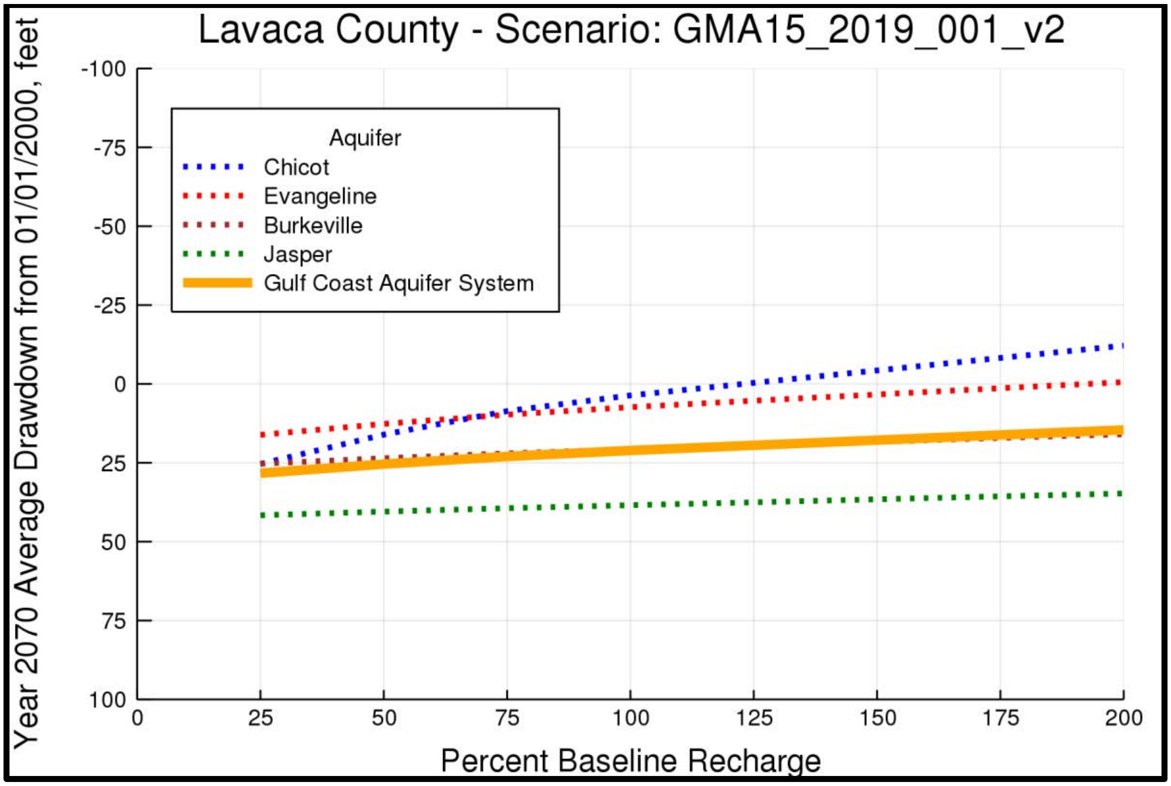

Goliad County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

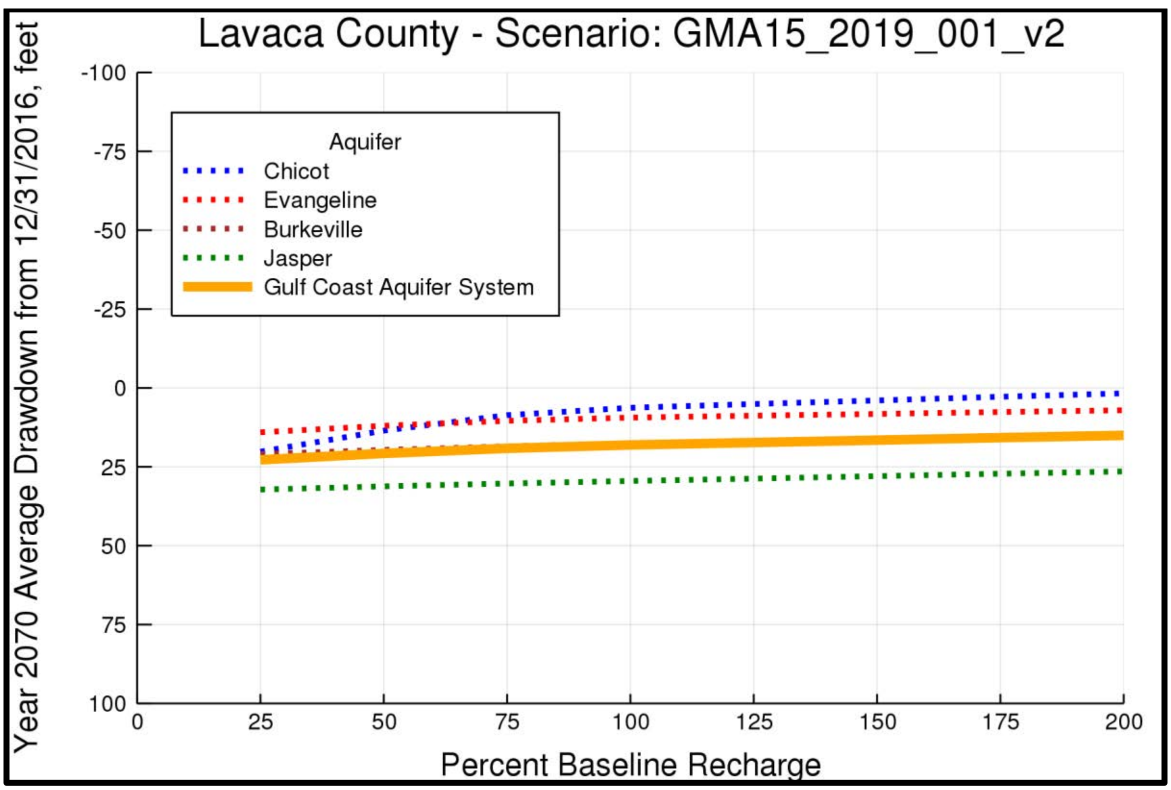

Jackson County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

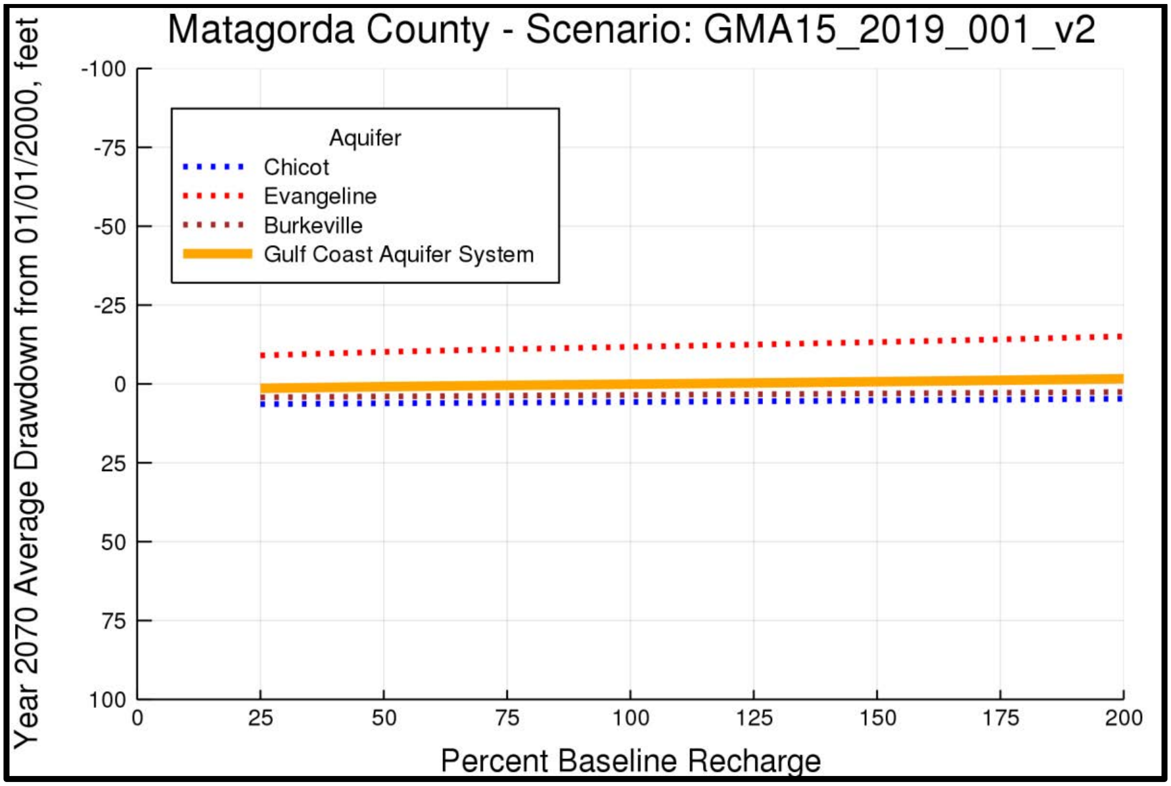

Jackson County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

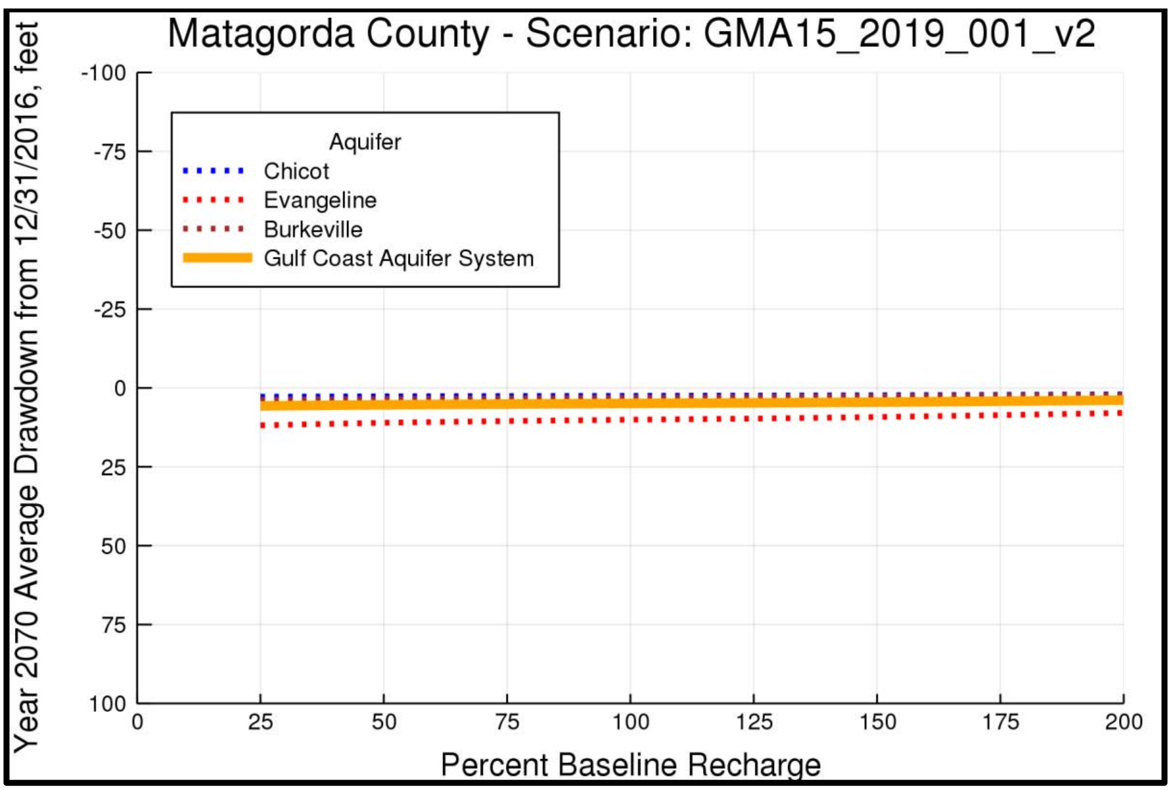

Karnes County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

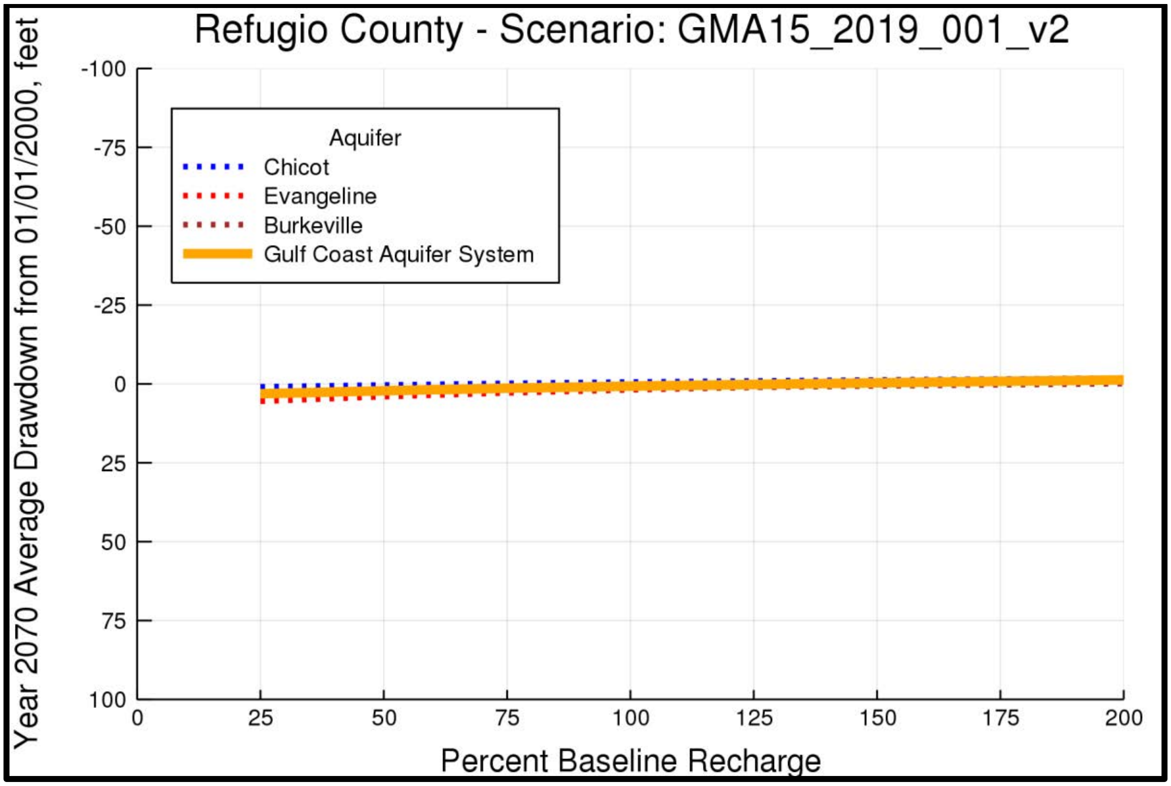

Karnes County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

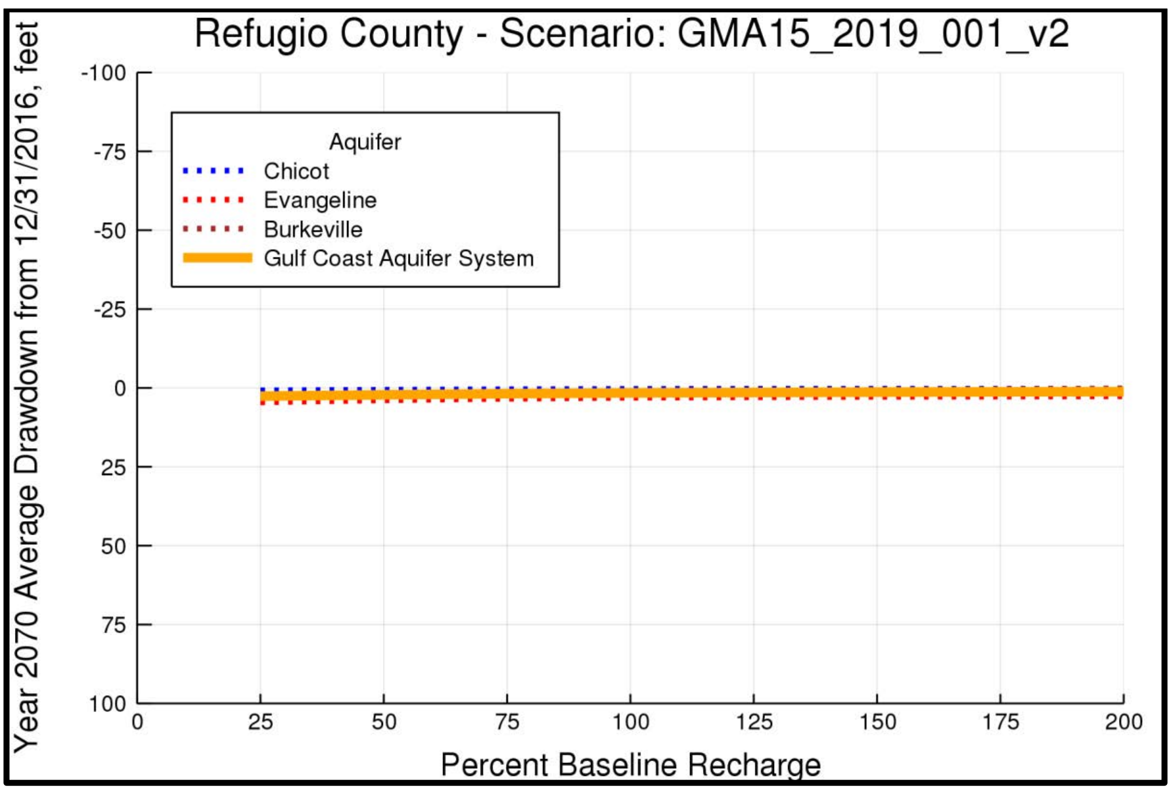

Lavaca County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

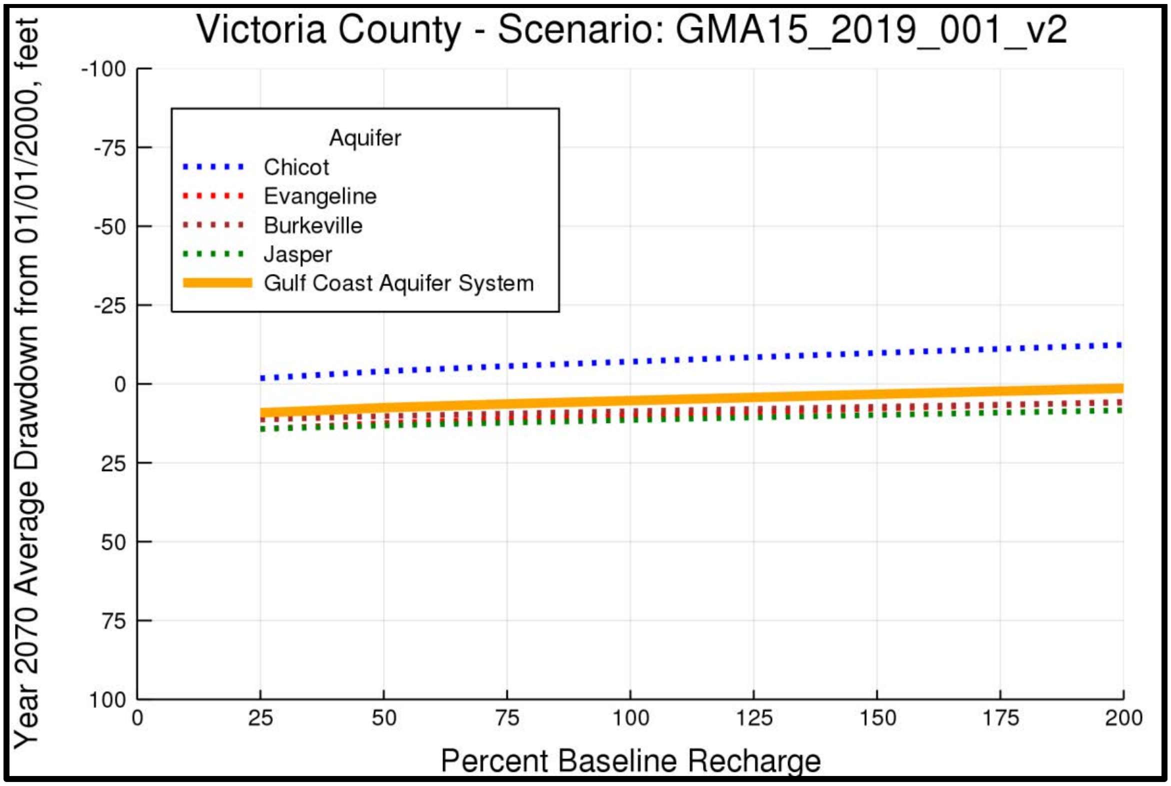

Lavaca County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

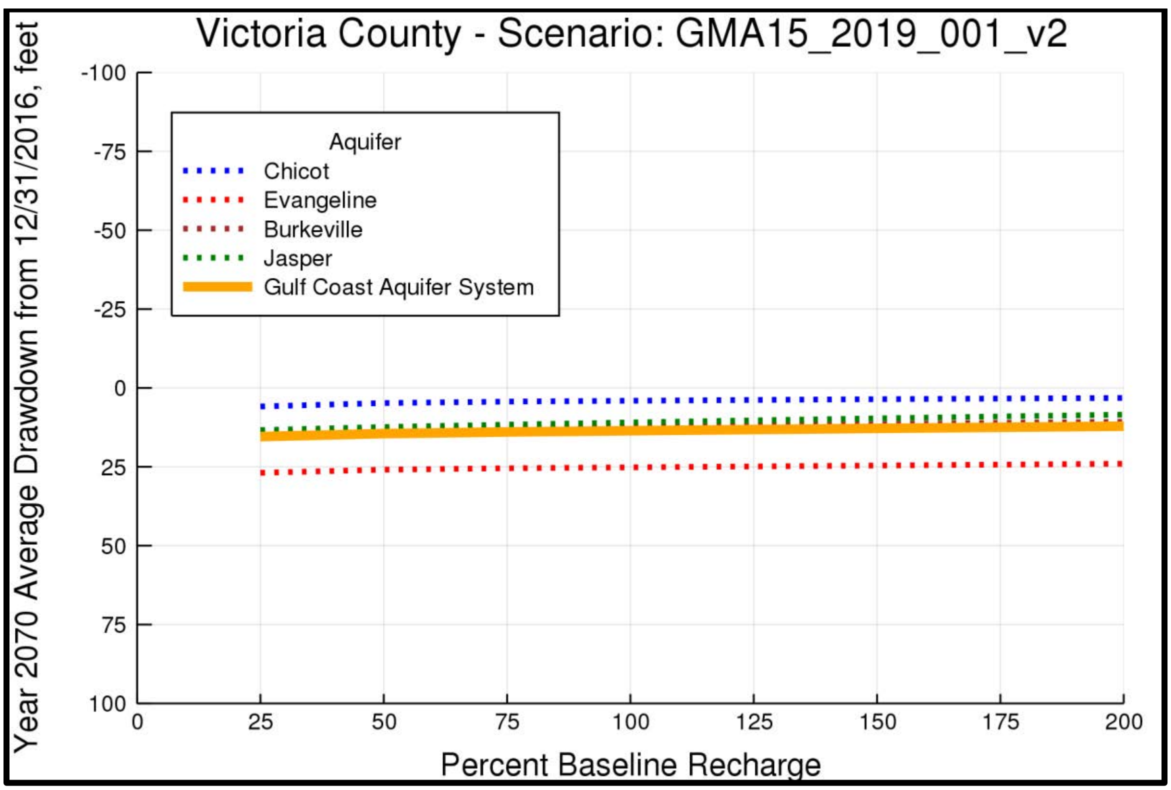

Matagorda County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

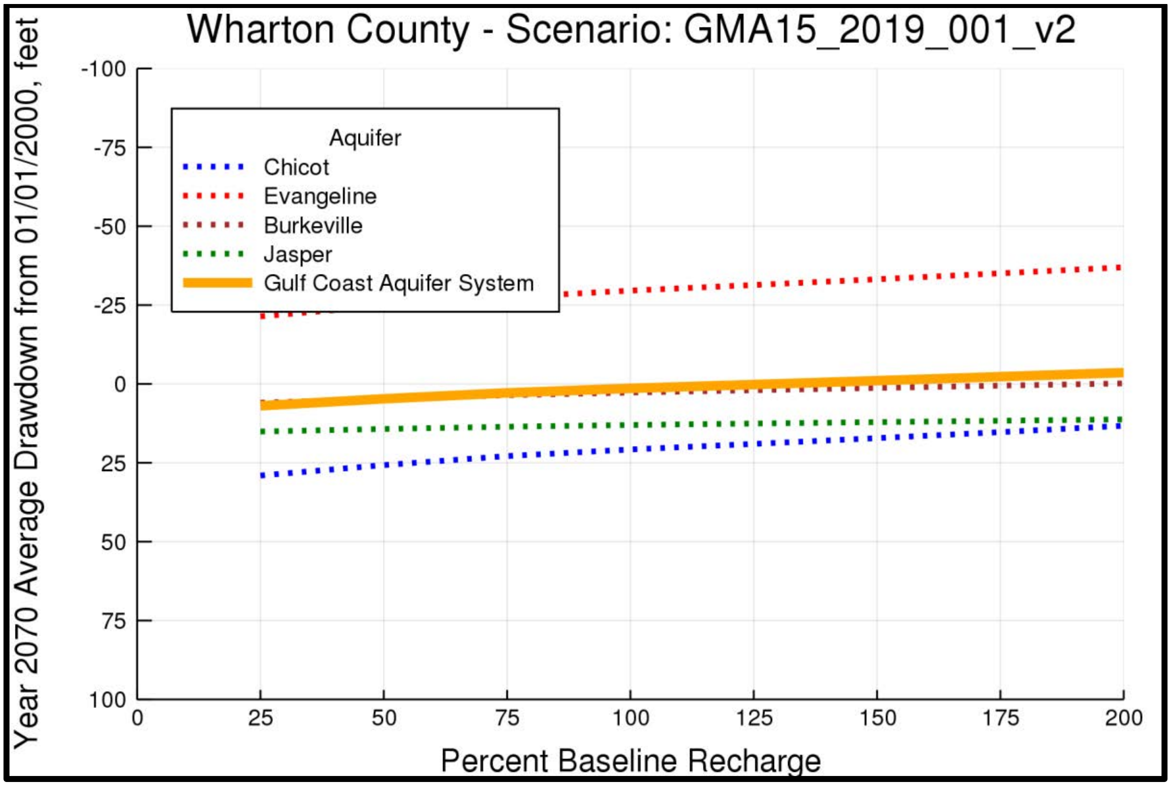

Matagorda County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

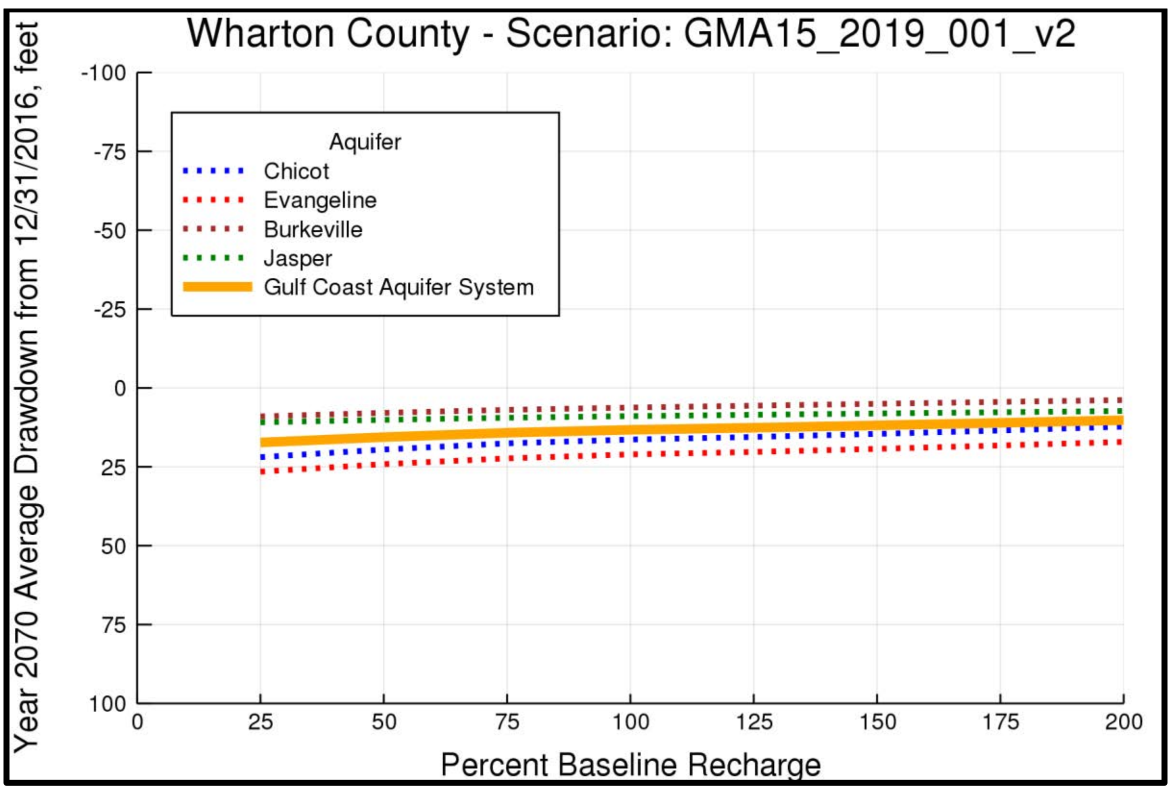

Refugio County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Refugio County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Victoria County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge


Victoria County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge


Wharton County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

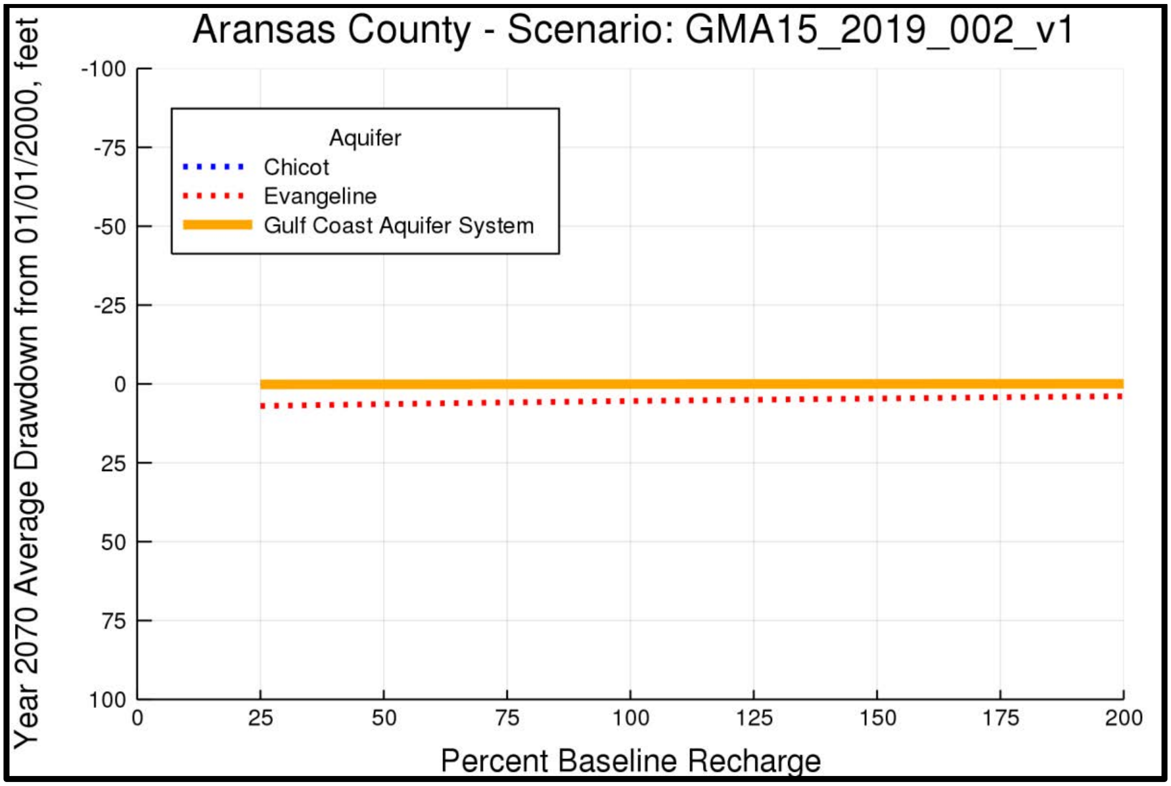

Wharton County - Scenario: GMA15_2019_001_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

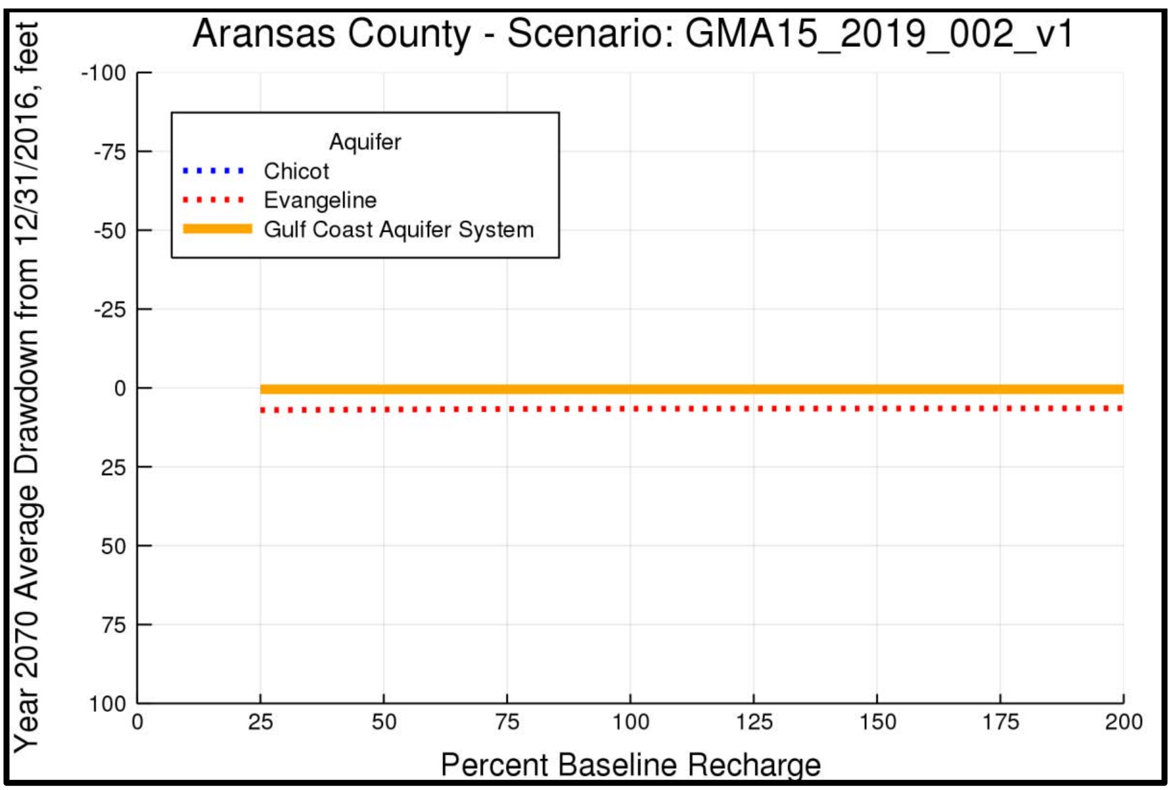
Average Drawdown versus Percent Baseline Recharge

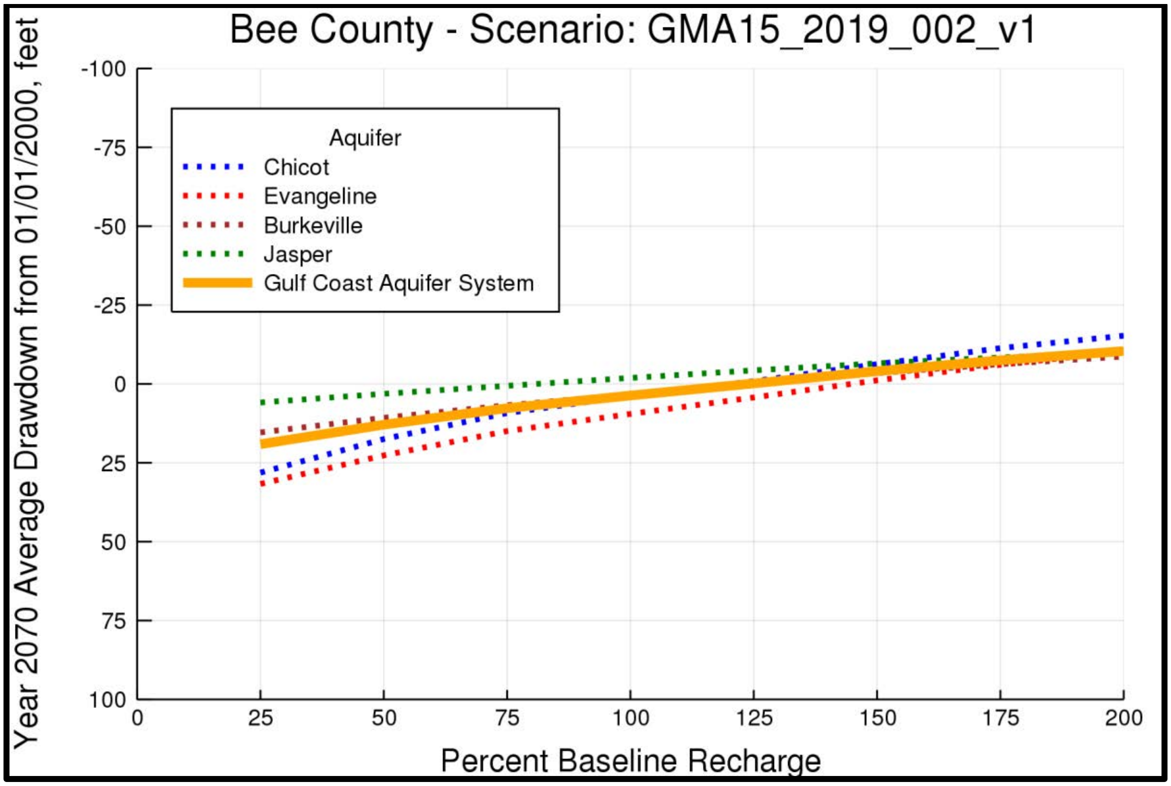
Pumping Scenario: 2

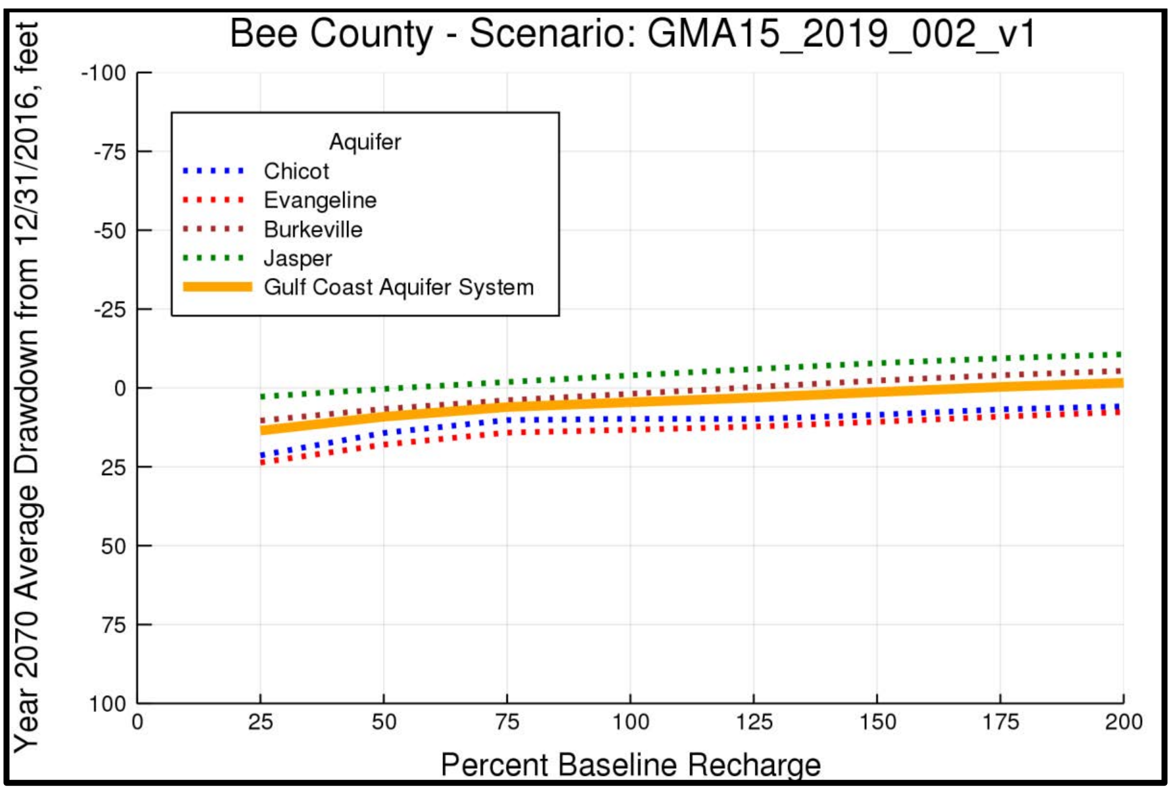
Pumping Distribution Version: 1

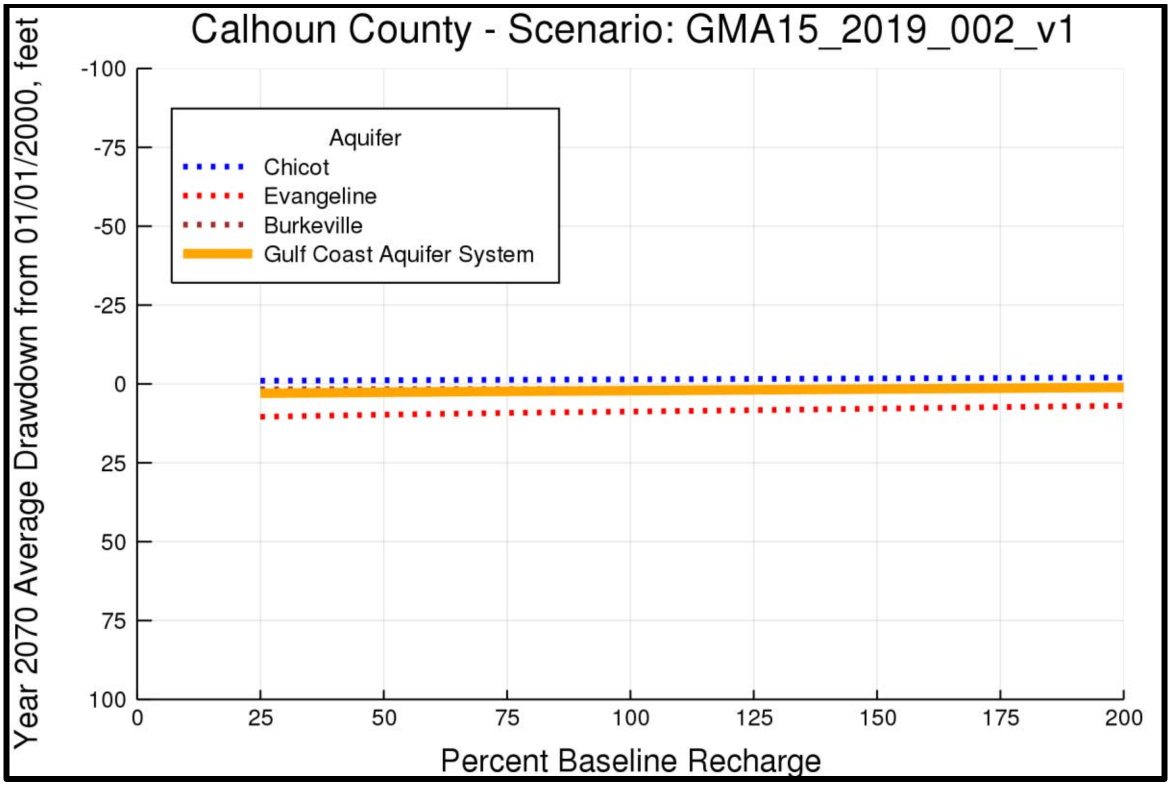
Scenario ID: GMA15_2019_002_v1

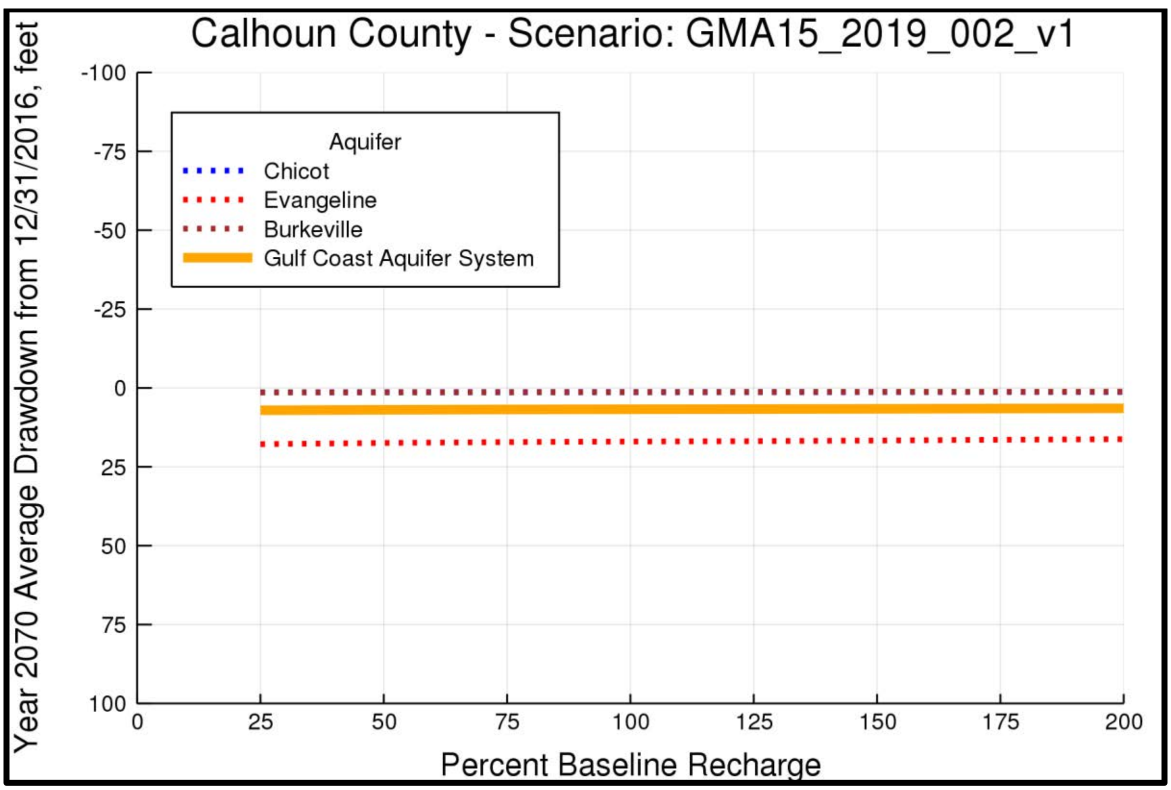

Aransas County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

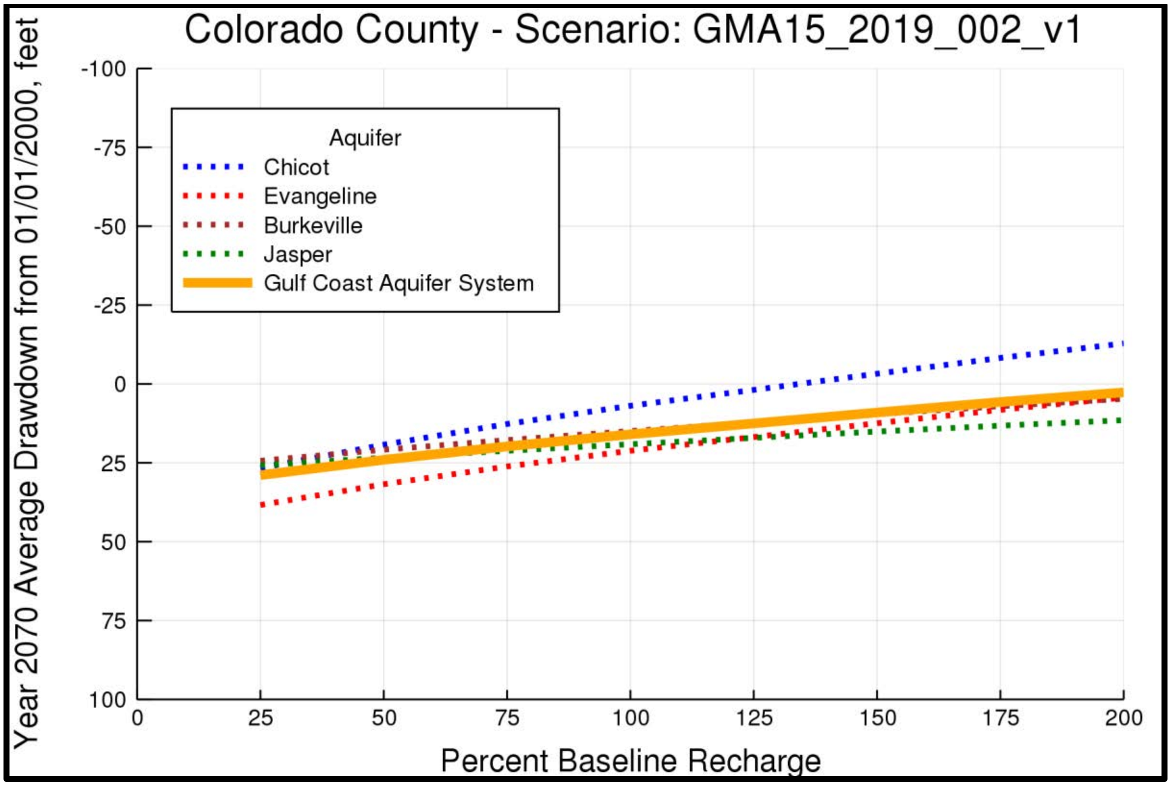

Aransas County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

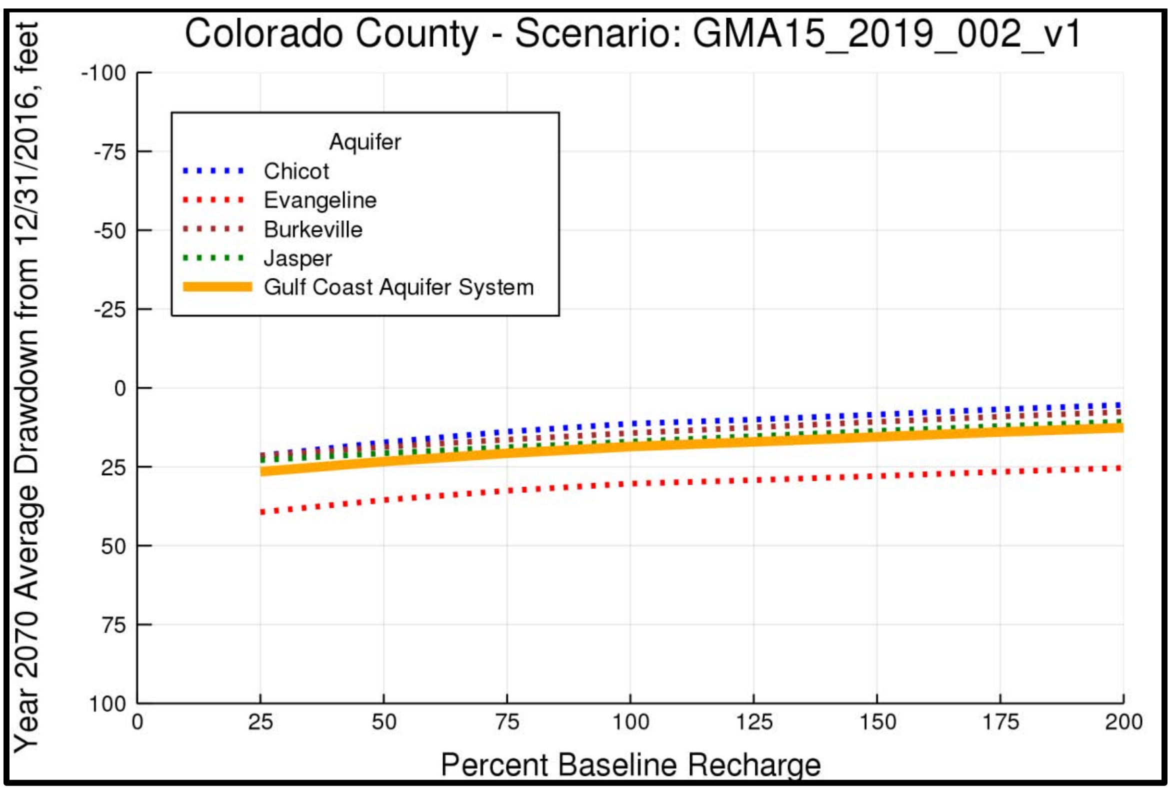

Bee County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

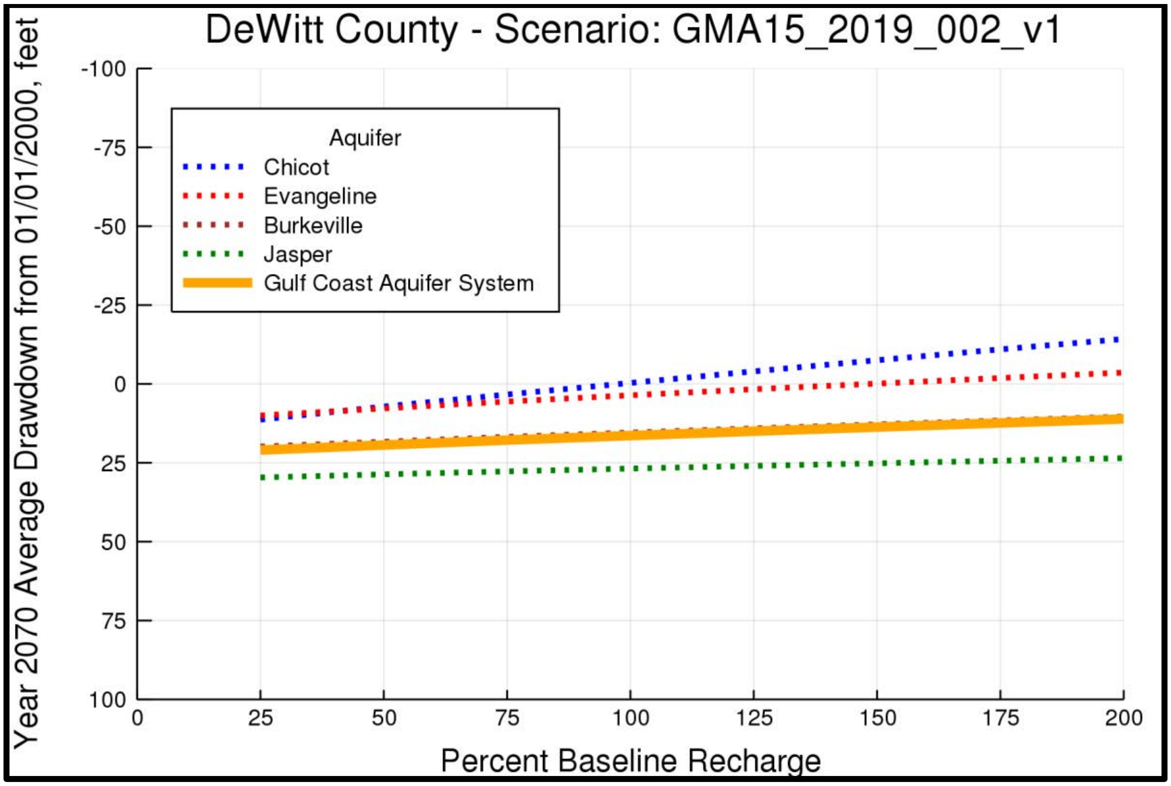

Bee County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

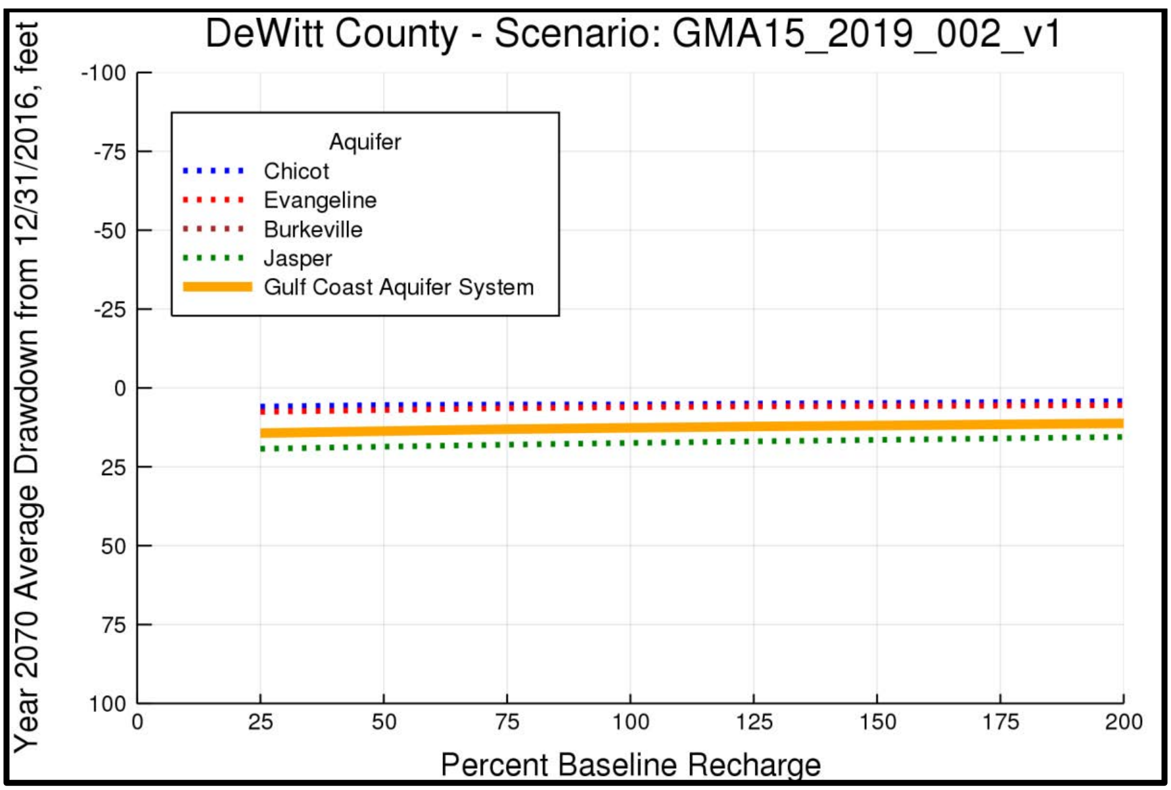

Calhoun County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

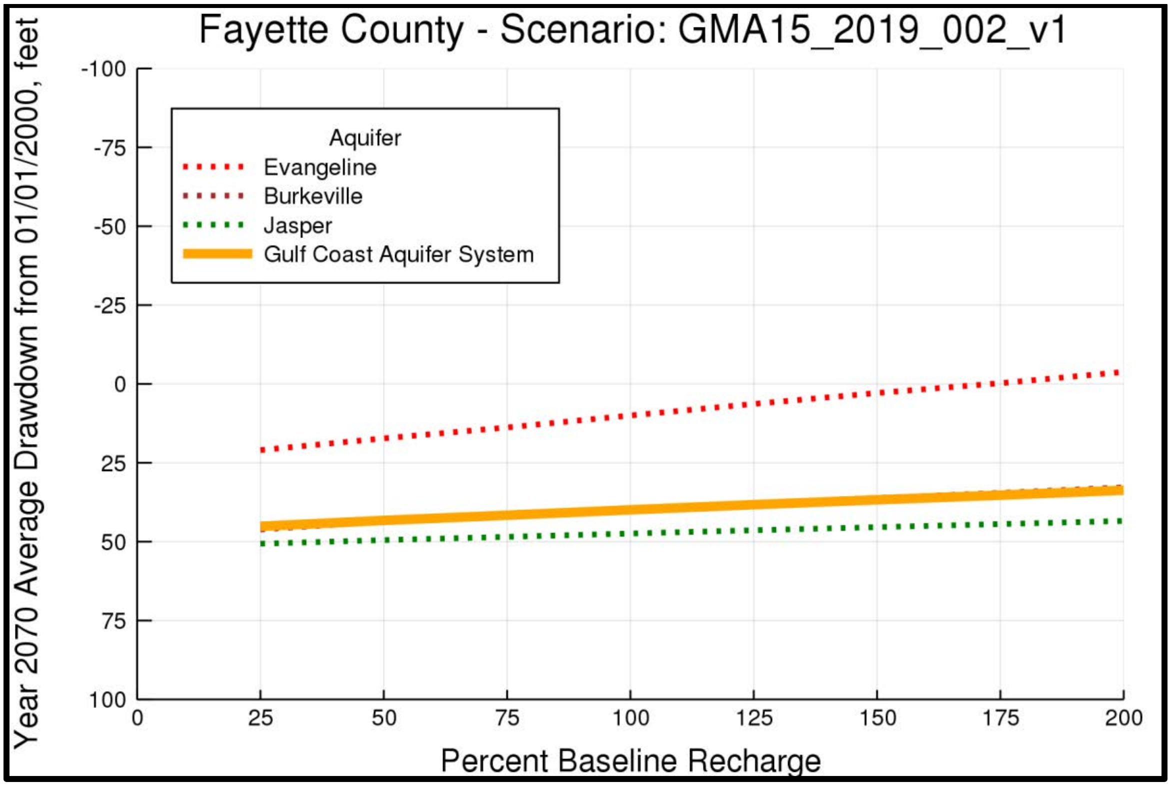

Calhoun County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

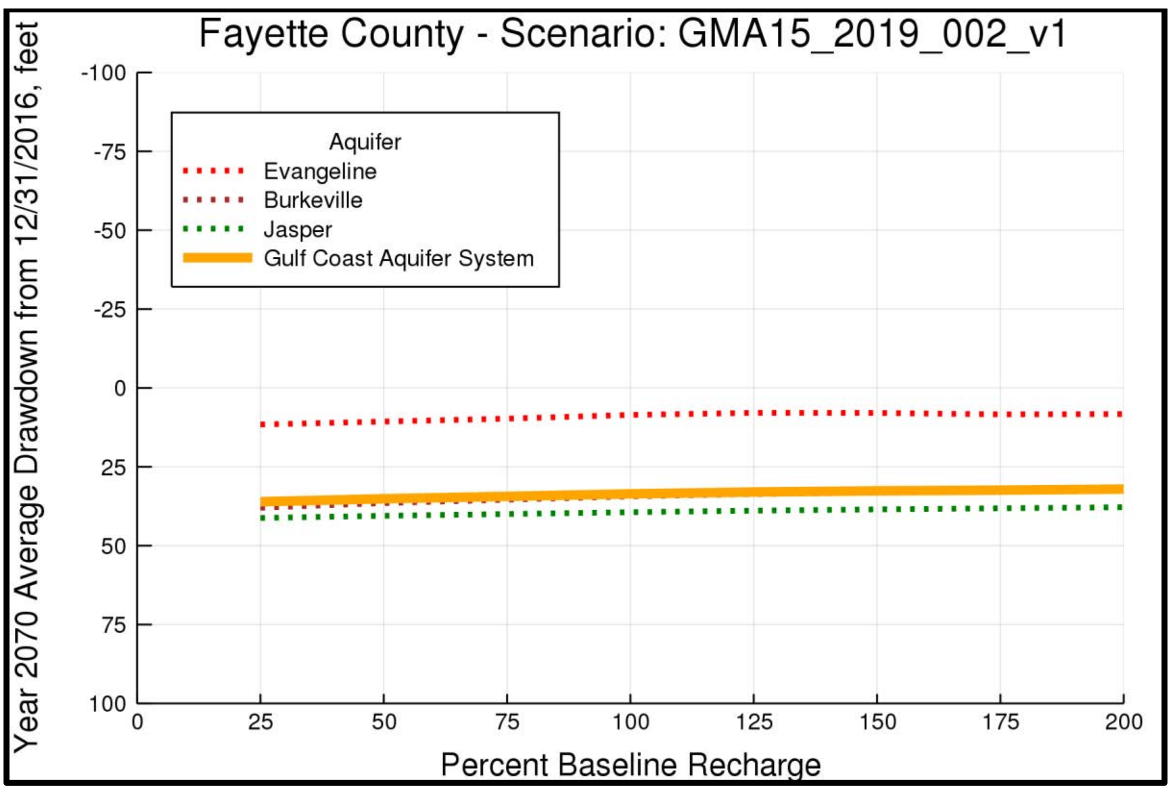

Colorado County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

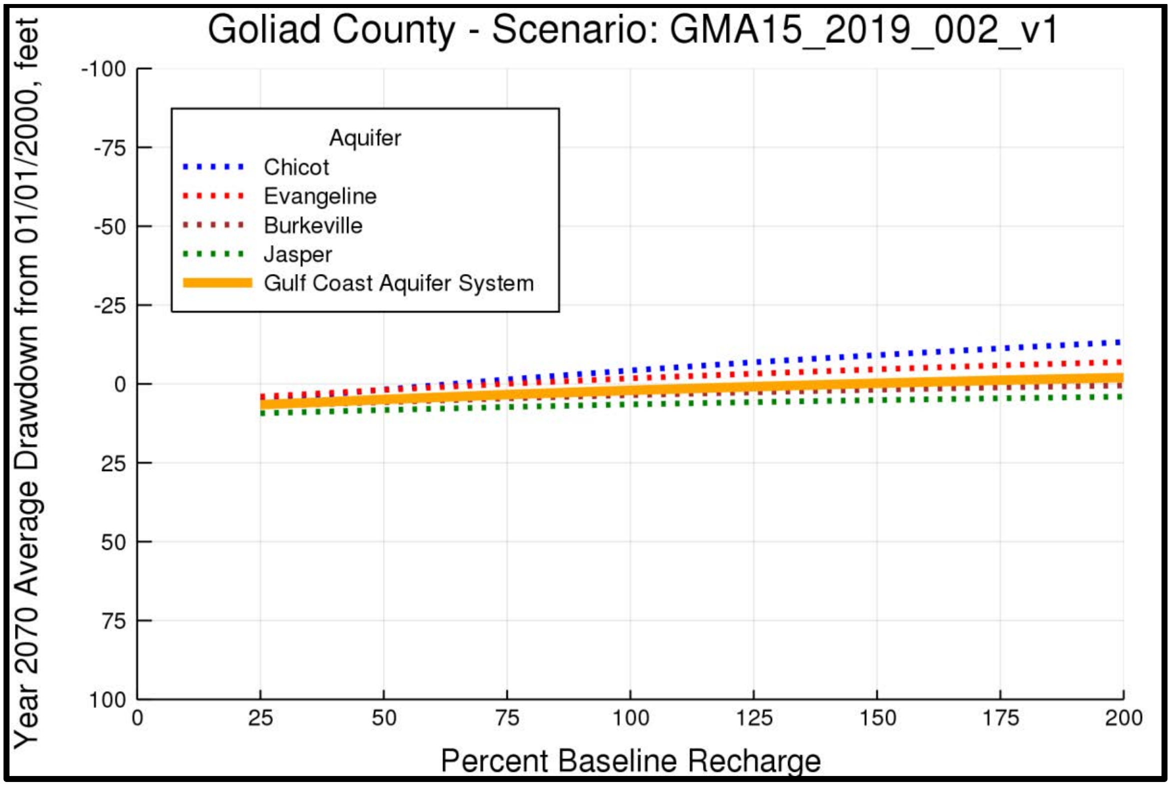

Colorado County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

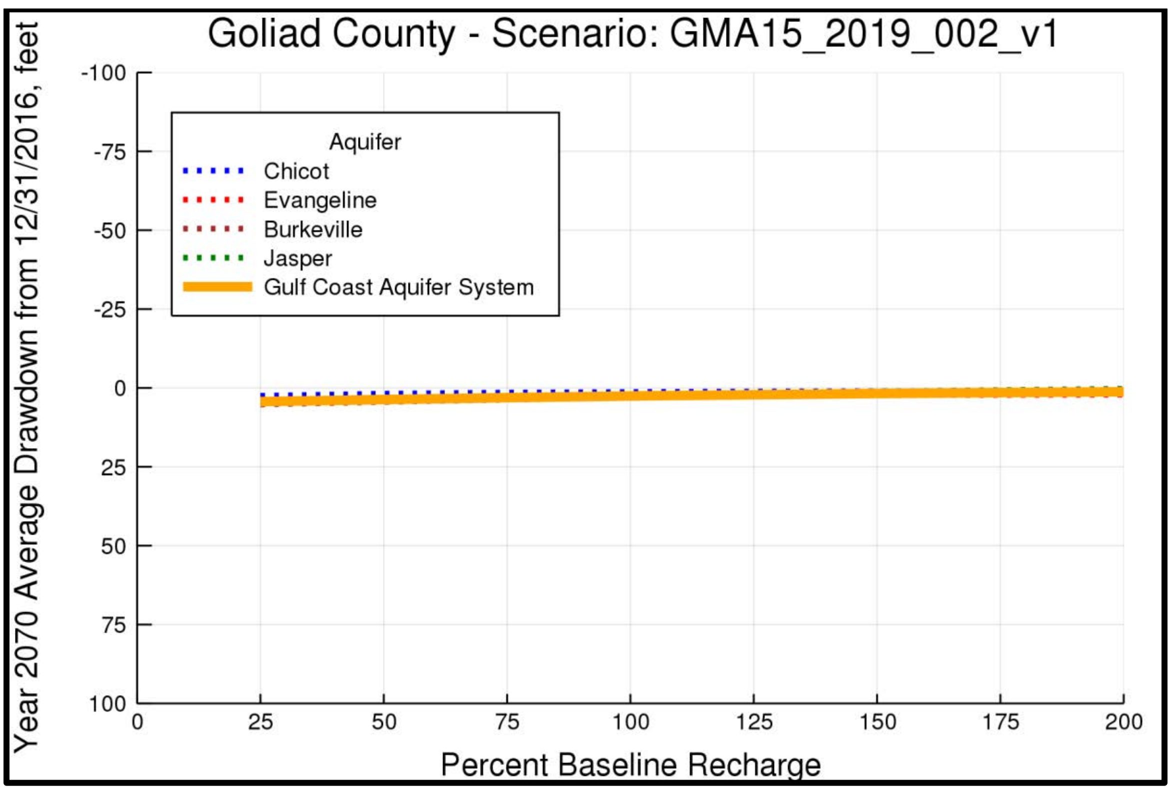

DeWitt County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

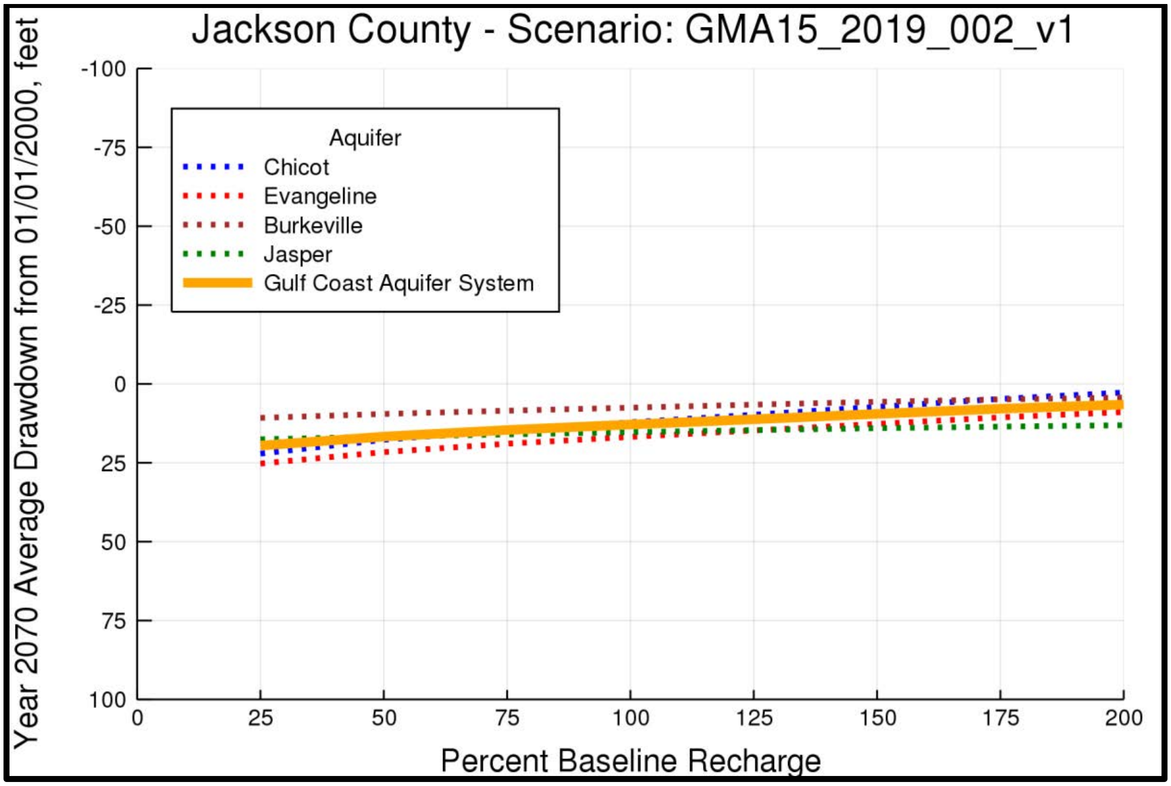

DeWitt County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

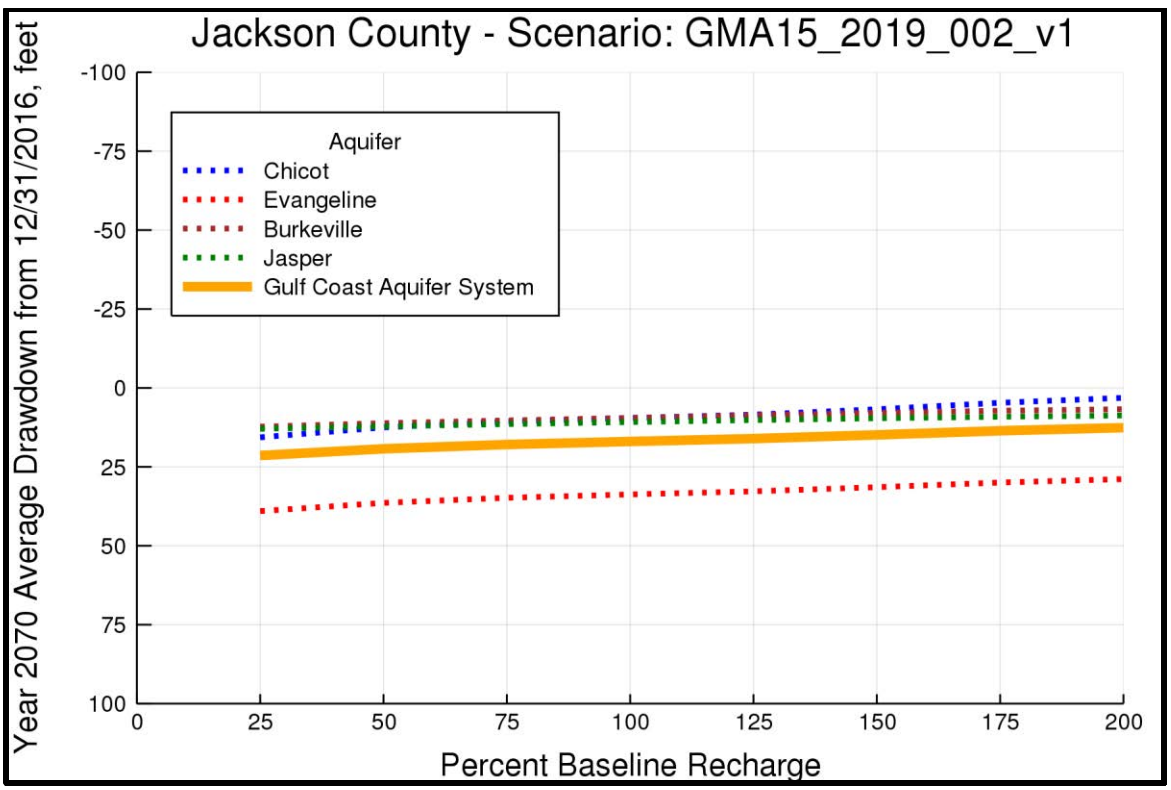

Fayette County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

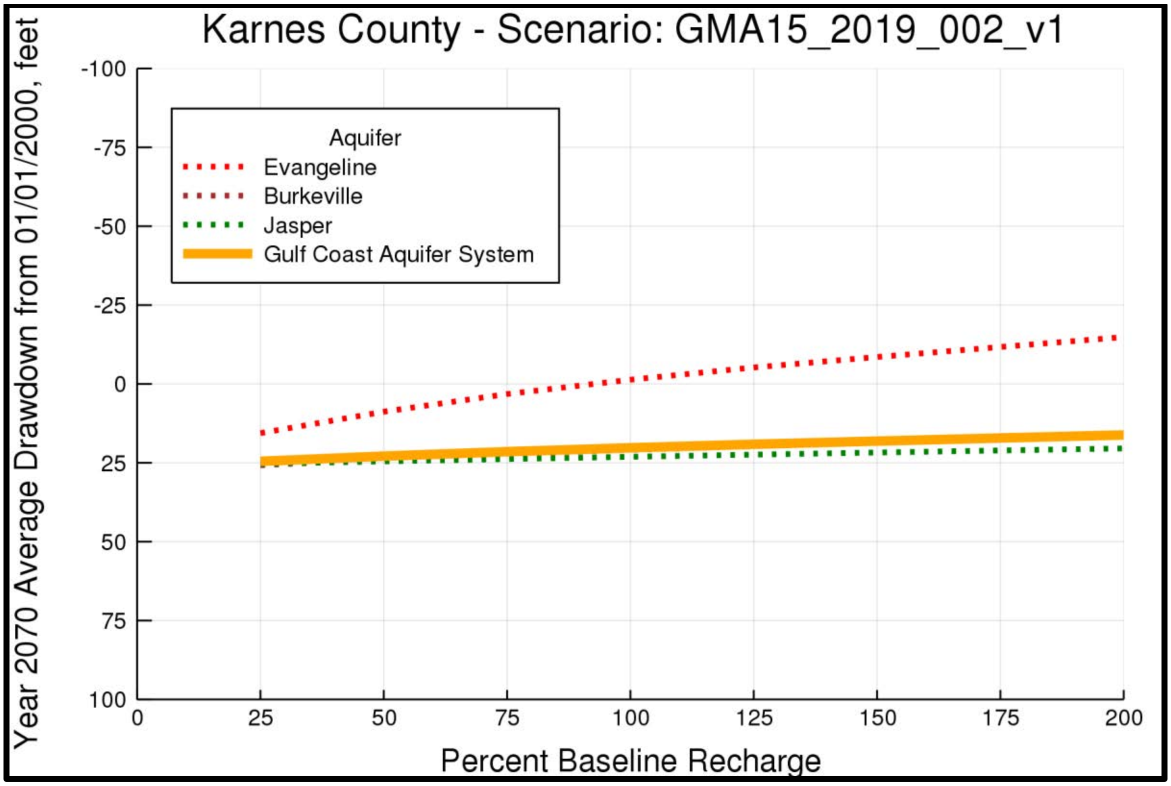

Fayette County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

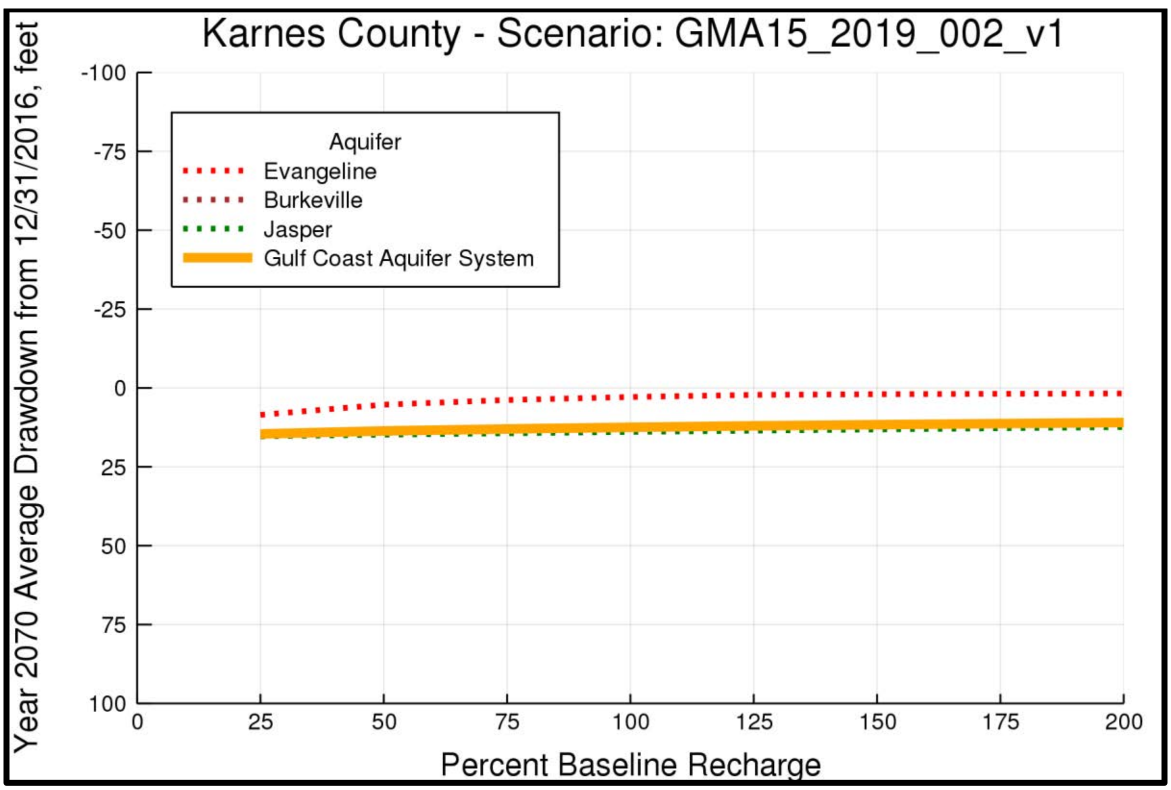

Goliad County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

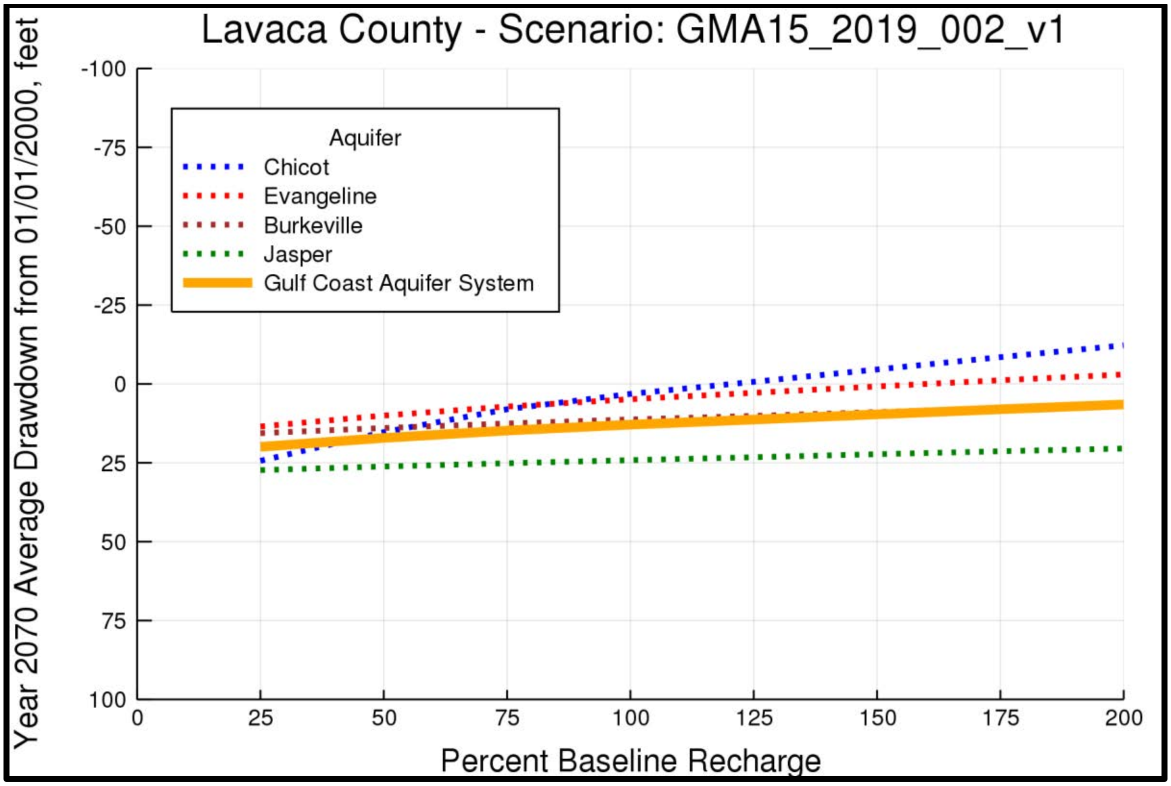

Goliad County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

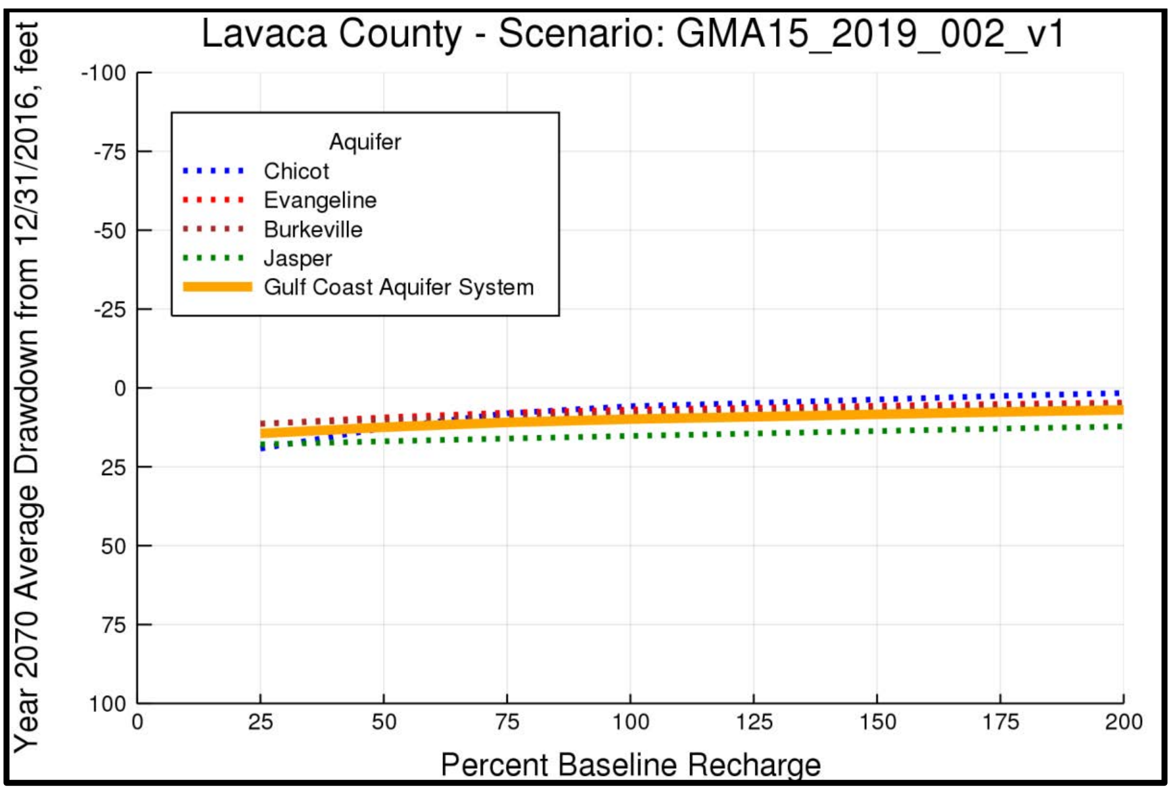

Jackson County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

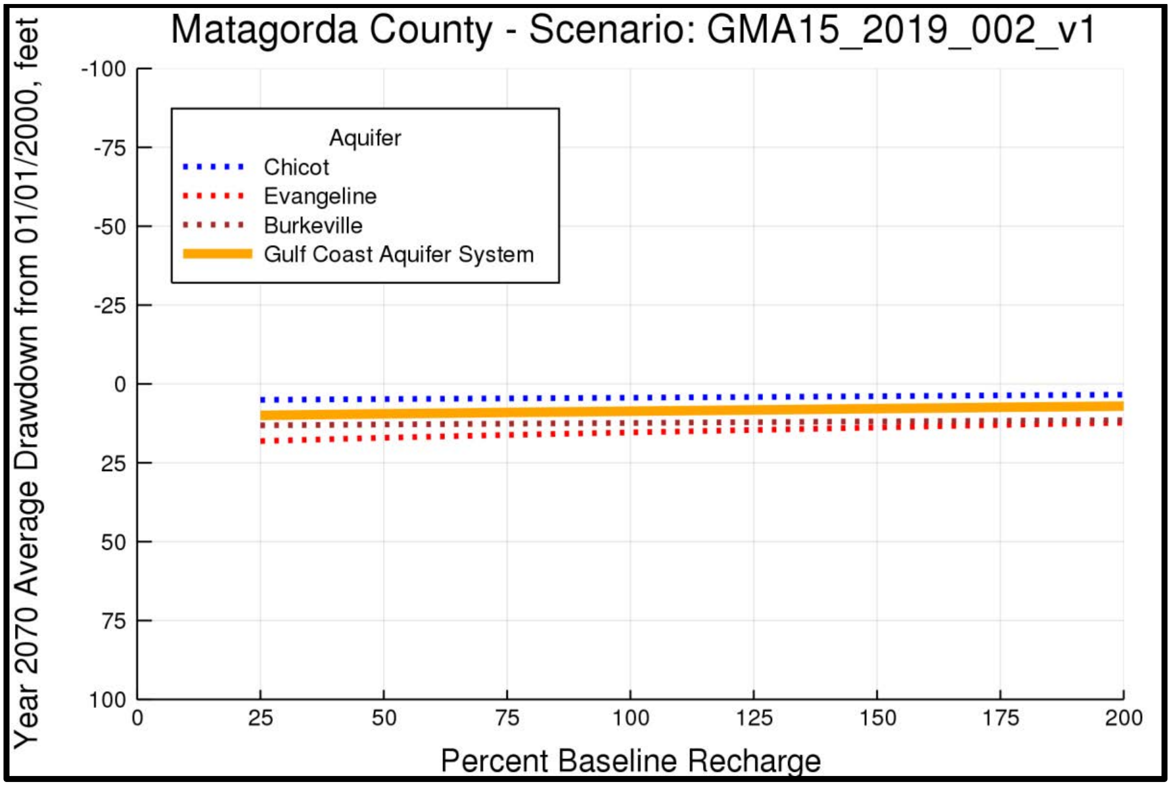

Jackson County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

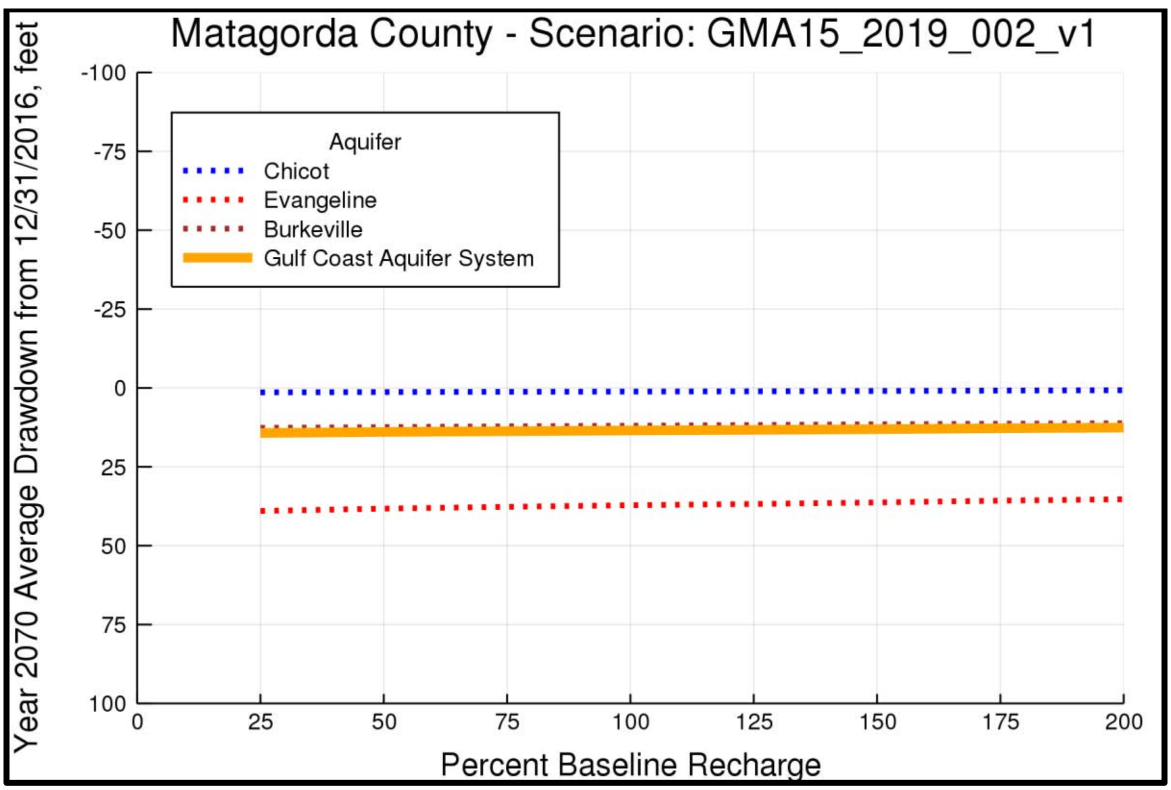

Karnes County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

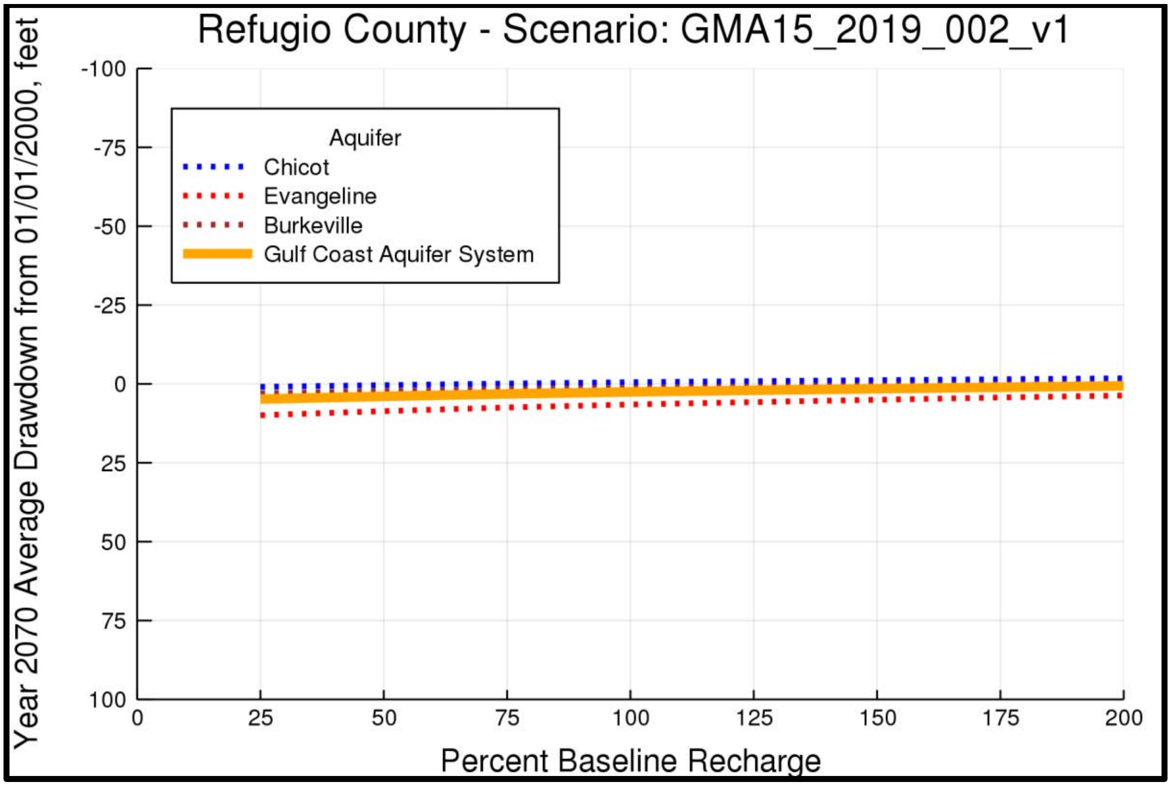

Karnes County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

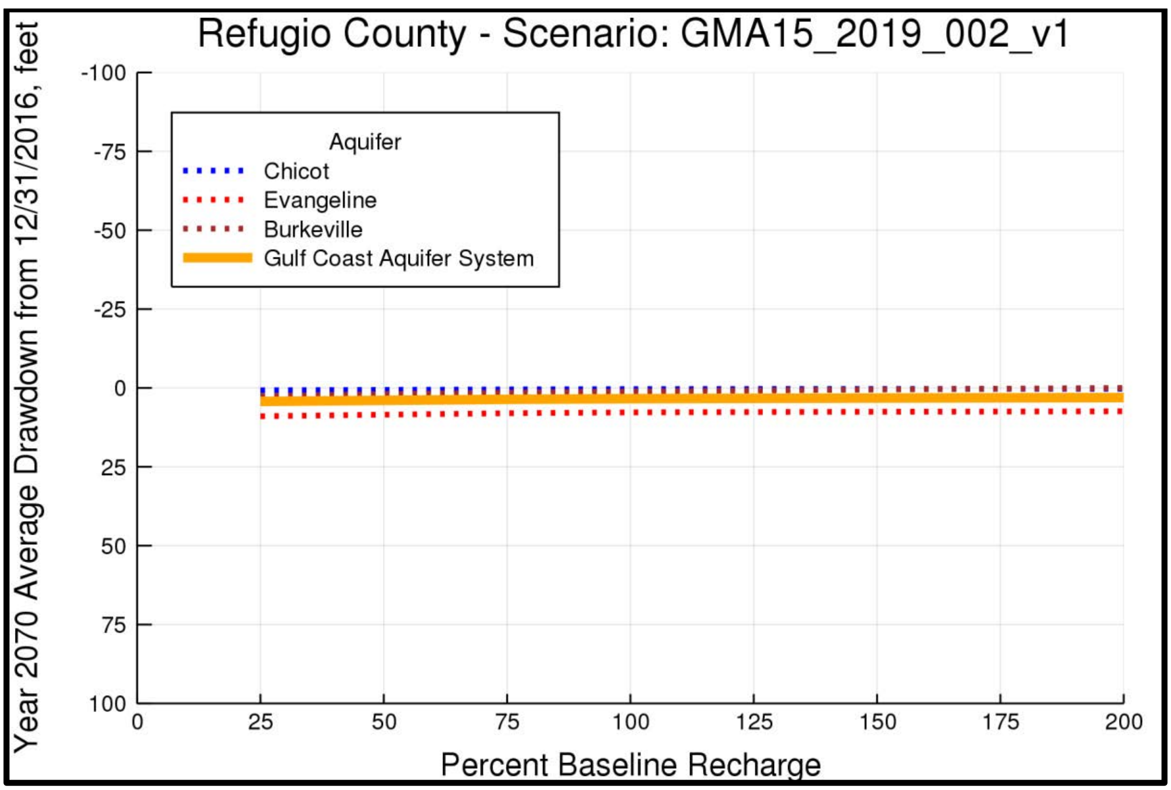

Lavaca County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

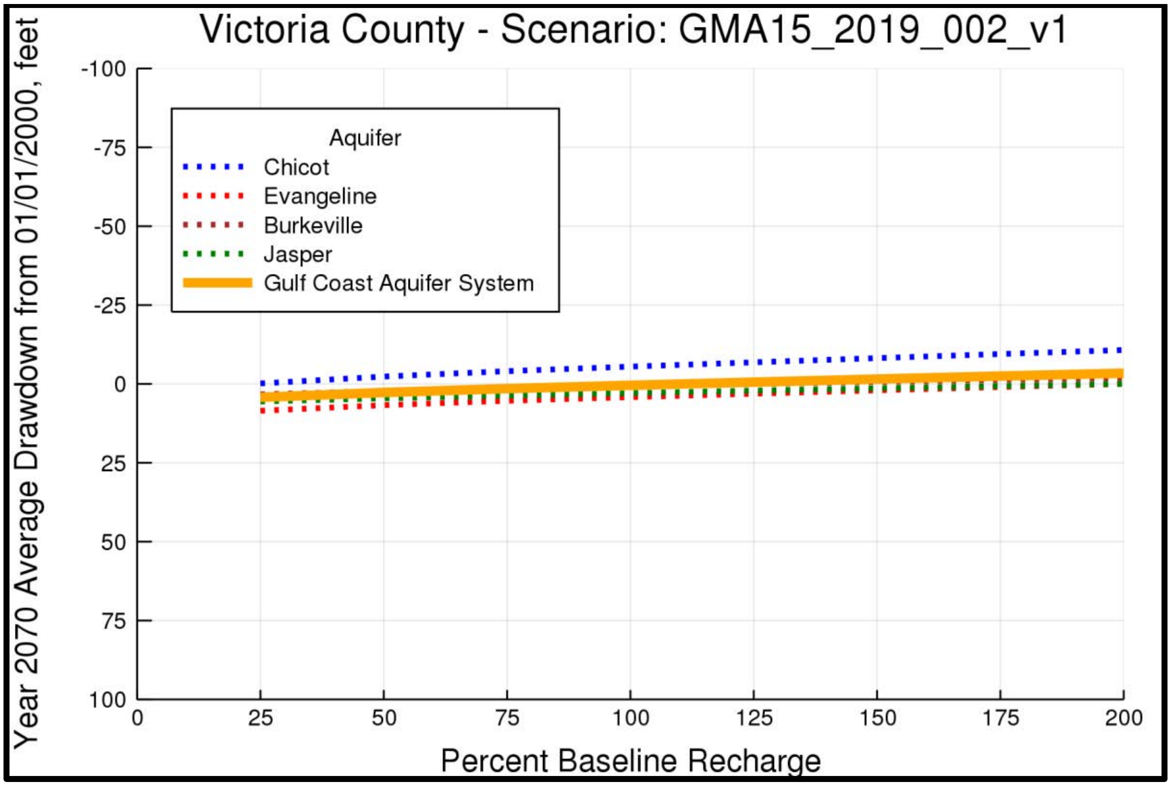

Lavaca County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

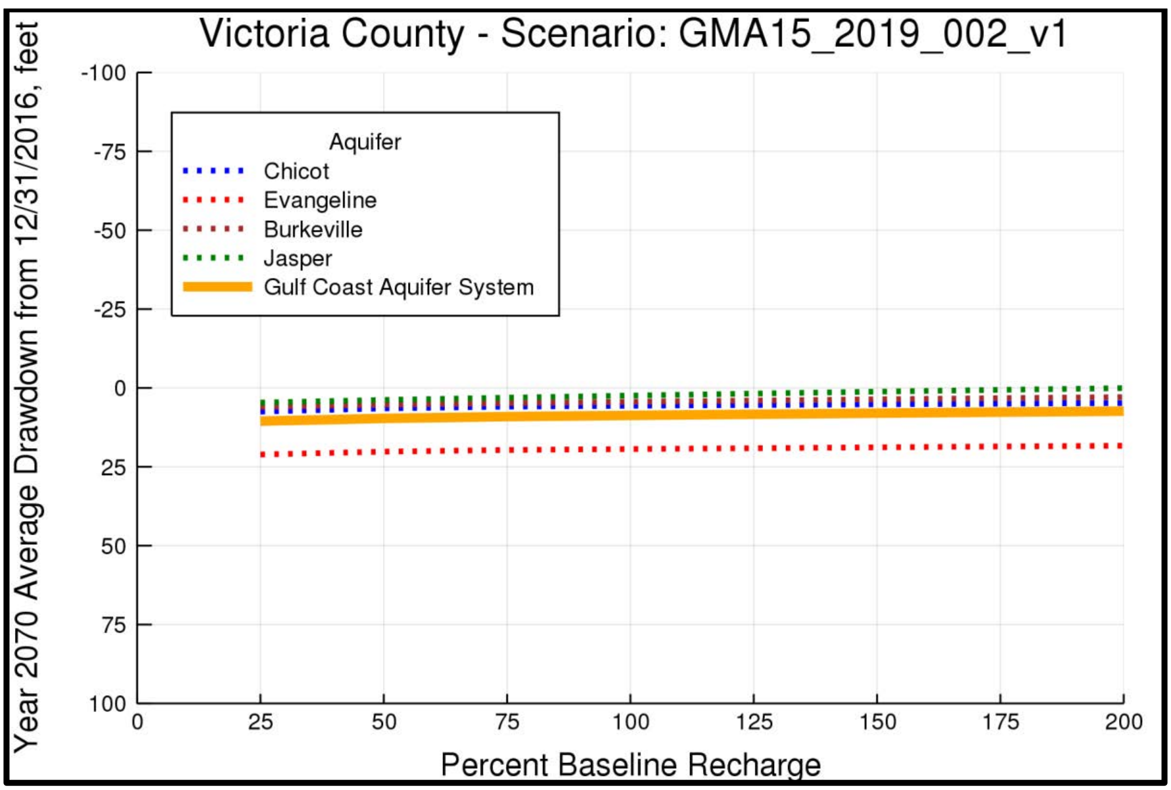

Matagorda County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

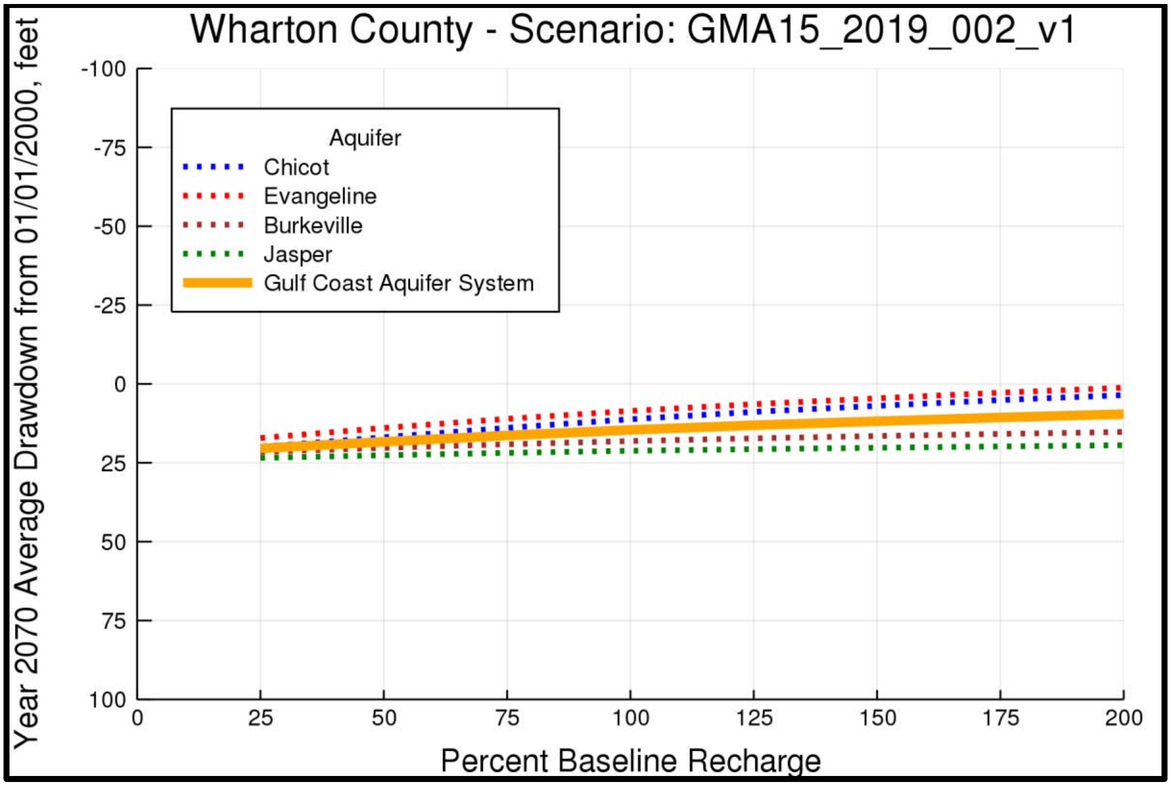

Matagorda County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

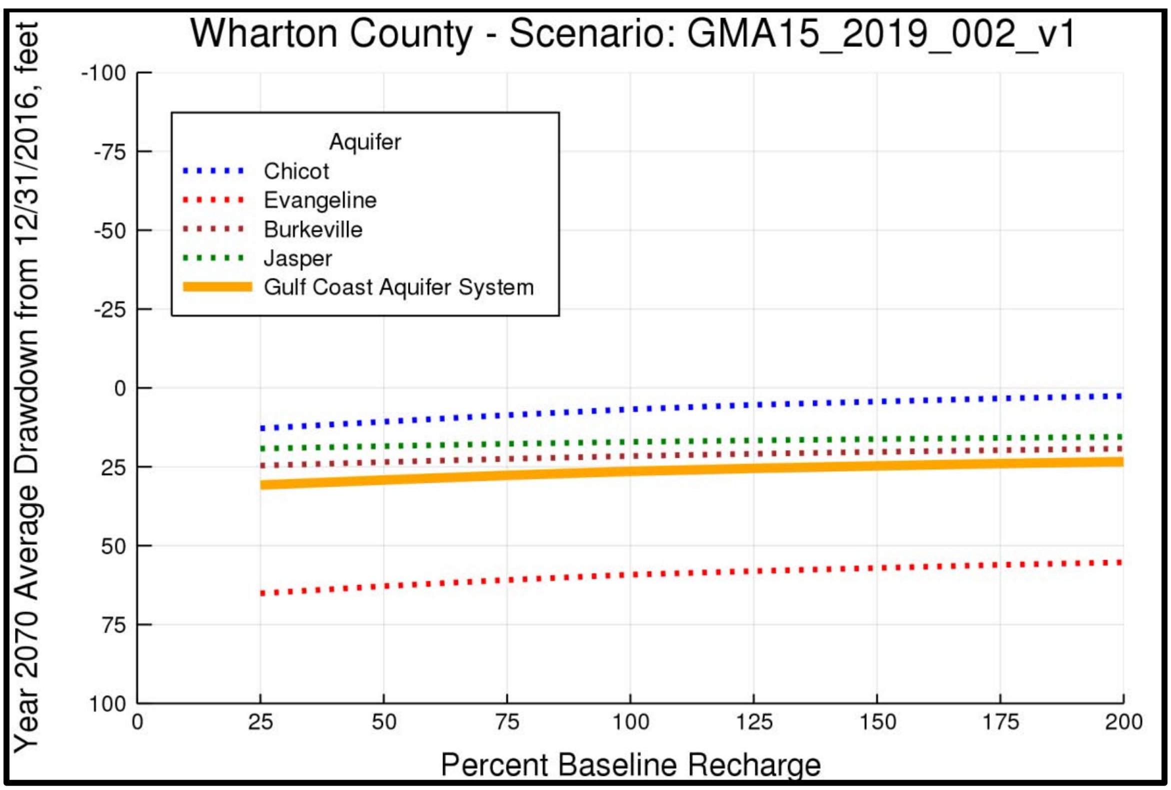

Refugio County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Refugio County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Victoria County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Victoria County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Wharton County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

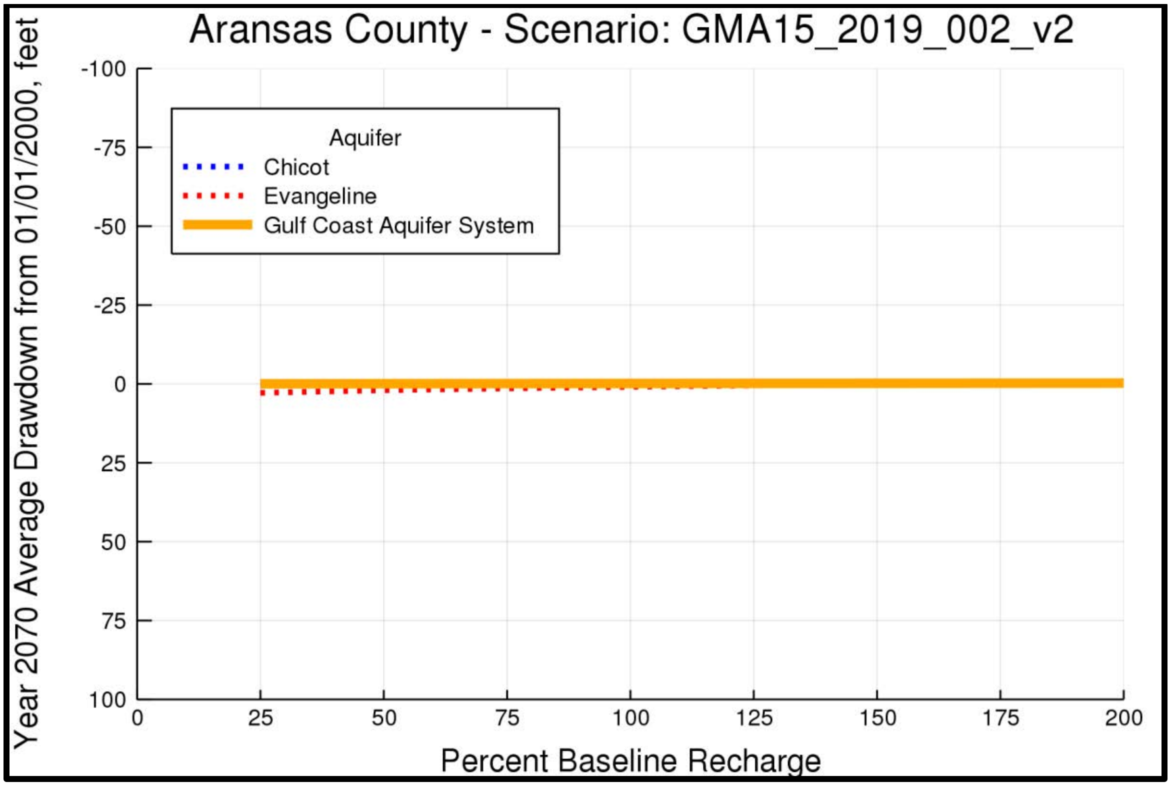

Wharton County - Scenario: GMA15_2019_002_v1
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

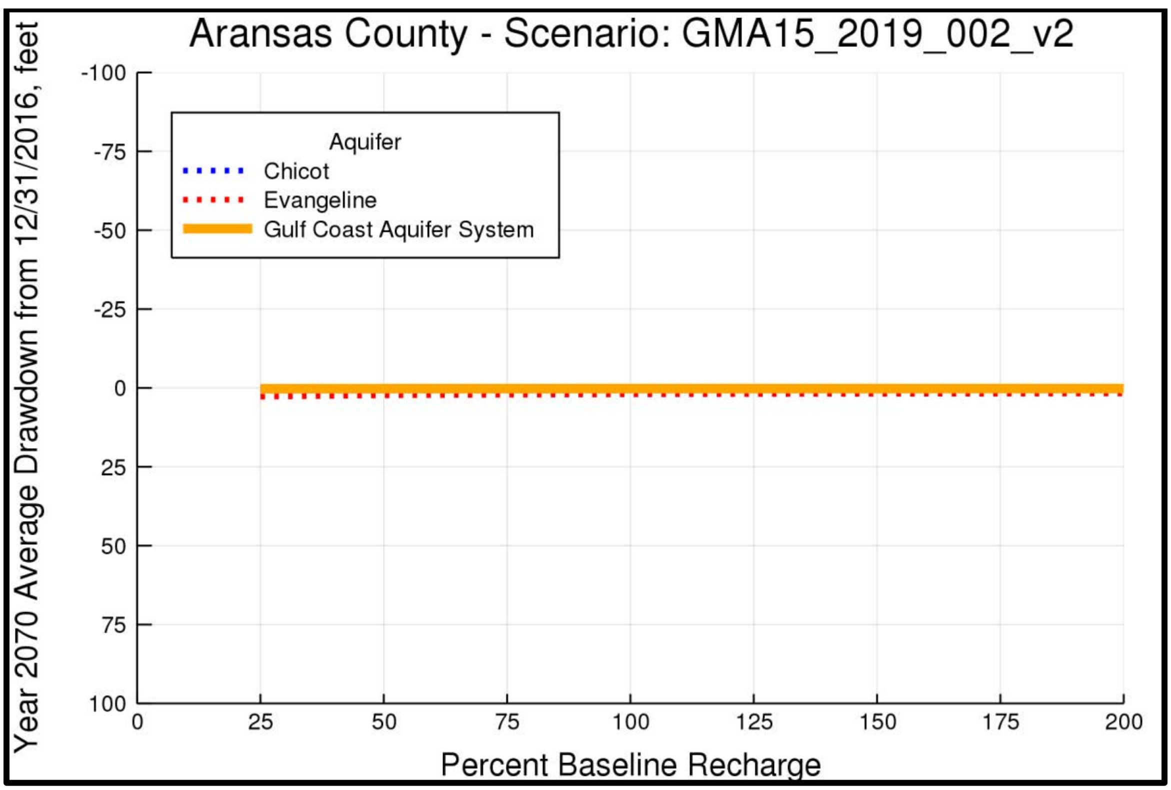
Average Drawdown versus Percent Baseline Recharge

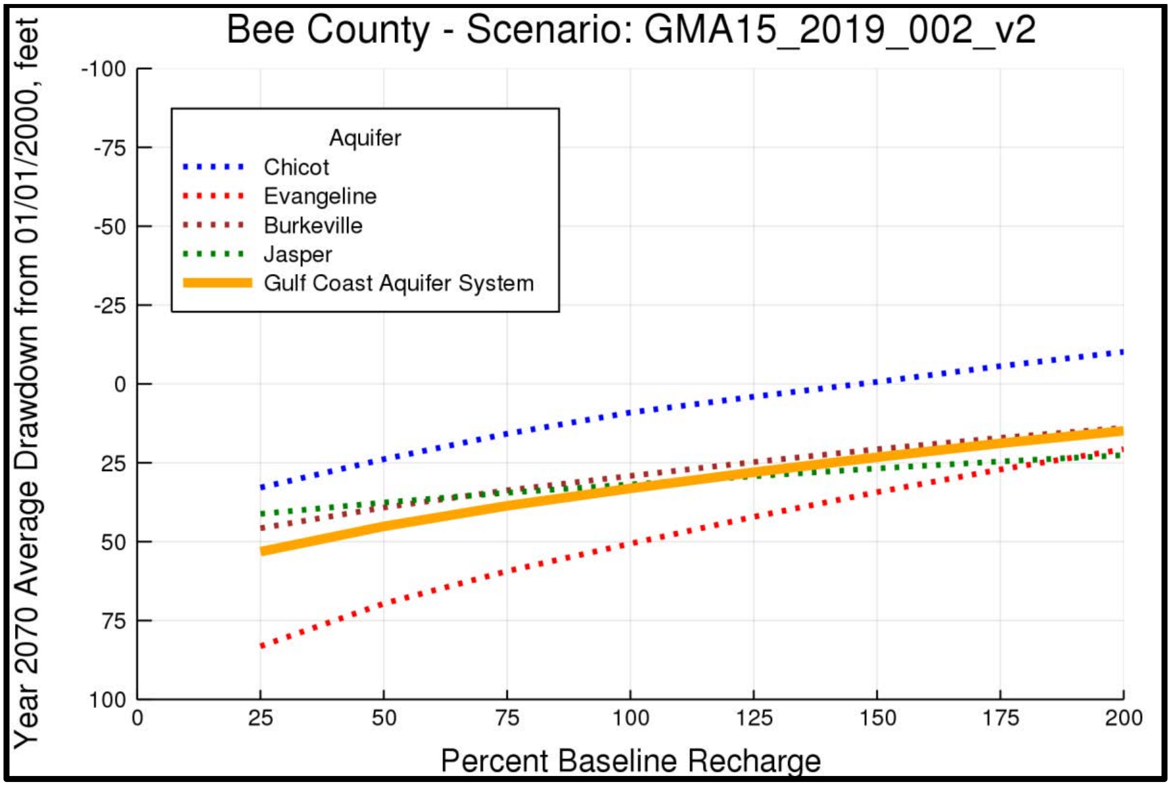
Pumping Scenario: 2

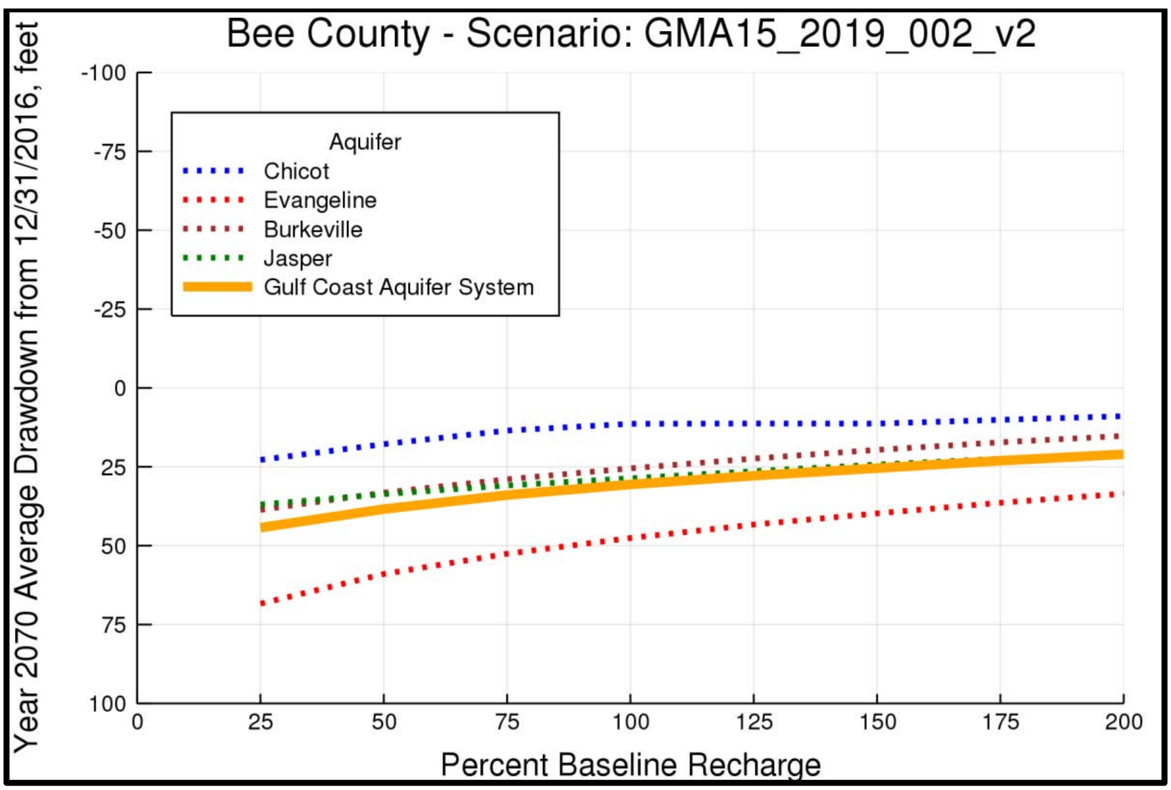
Pumping Distribution Version: 2

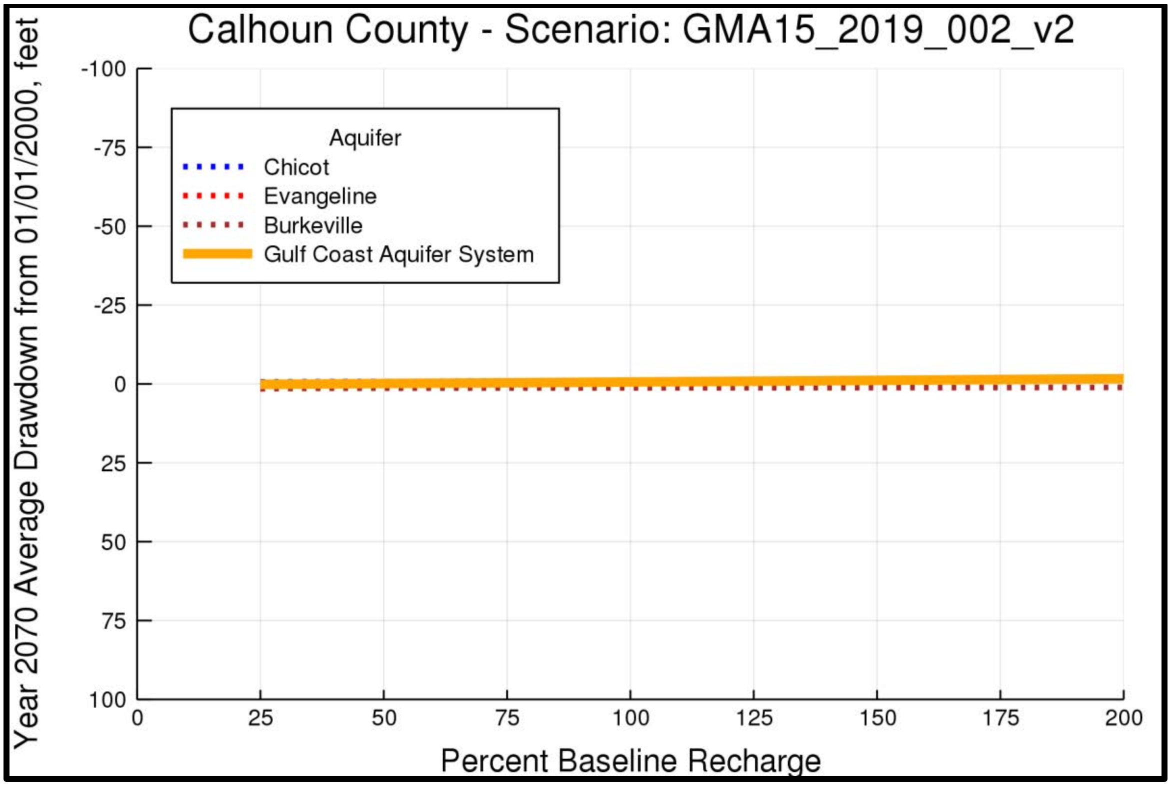
Scenario ID: GMA15_2019_002_v2

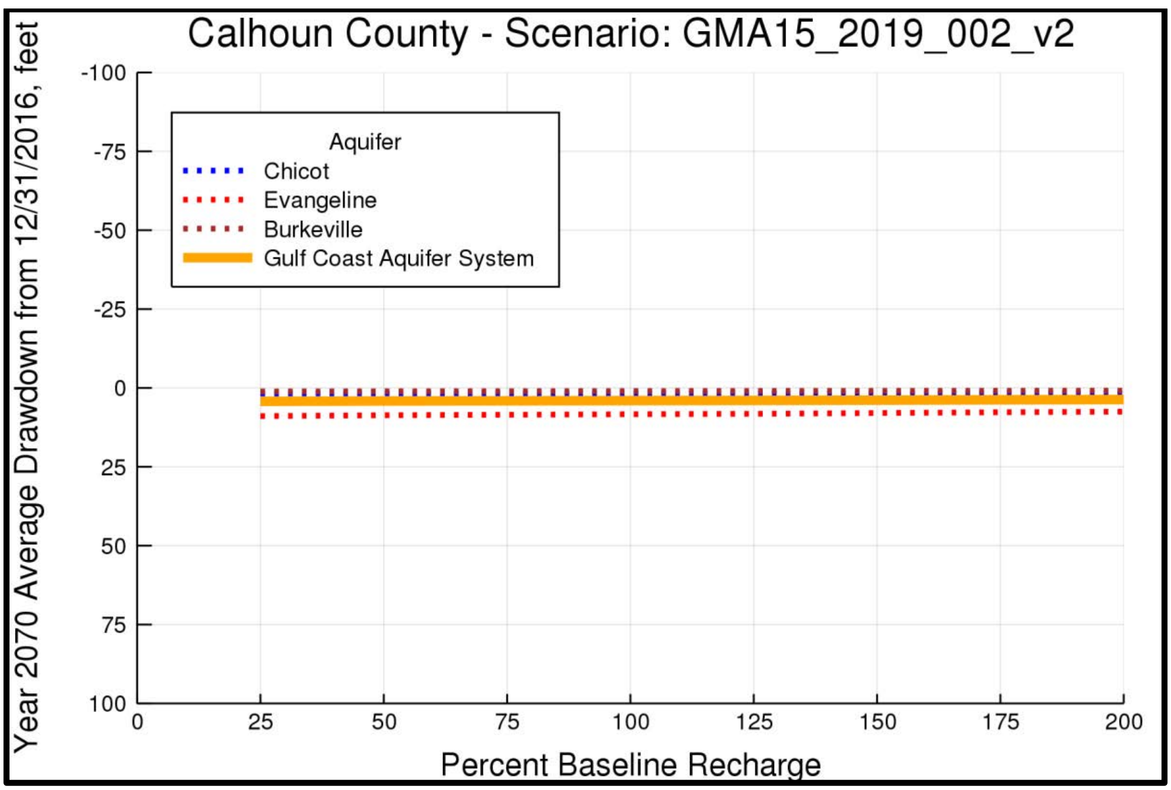

Aransas County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Aquifer
Chicot
Evangeline
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

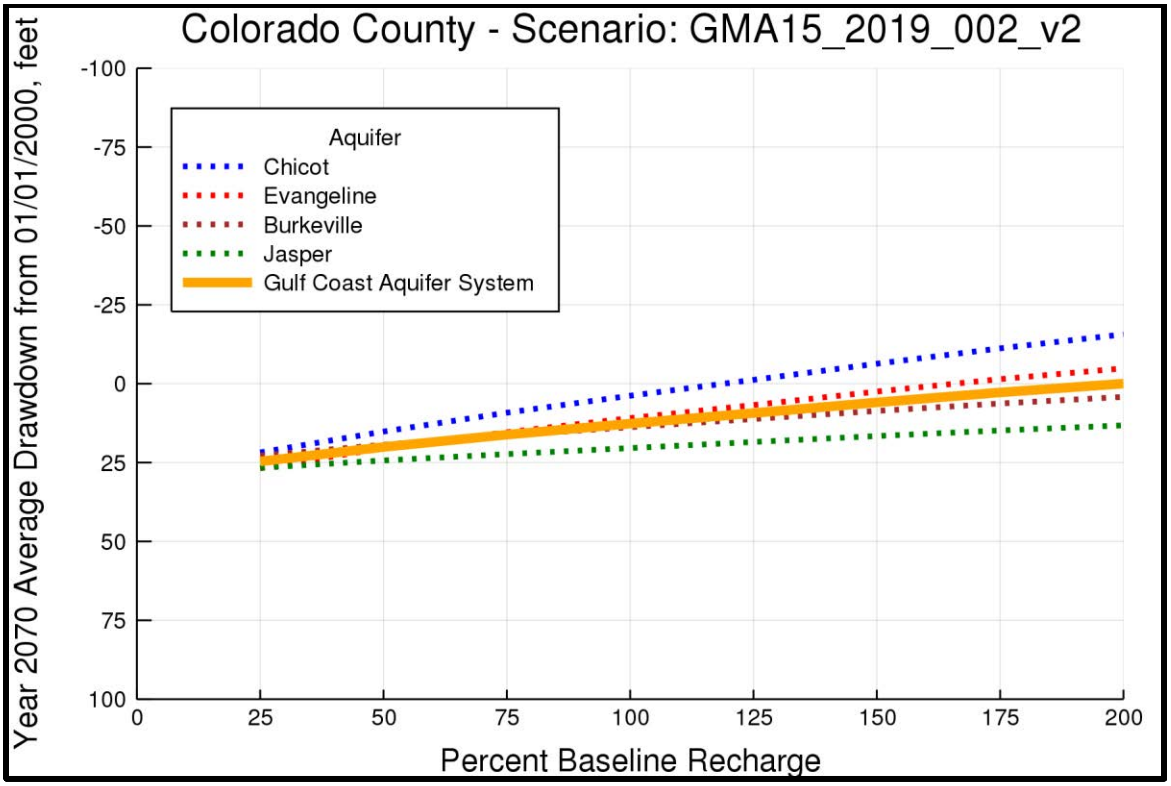

Aransas County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Aquifer
Chicot
Evangeline
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

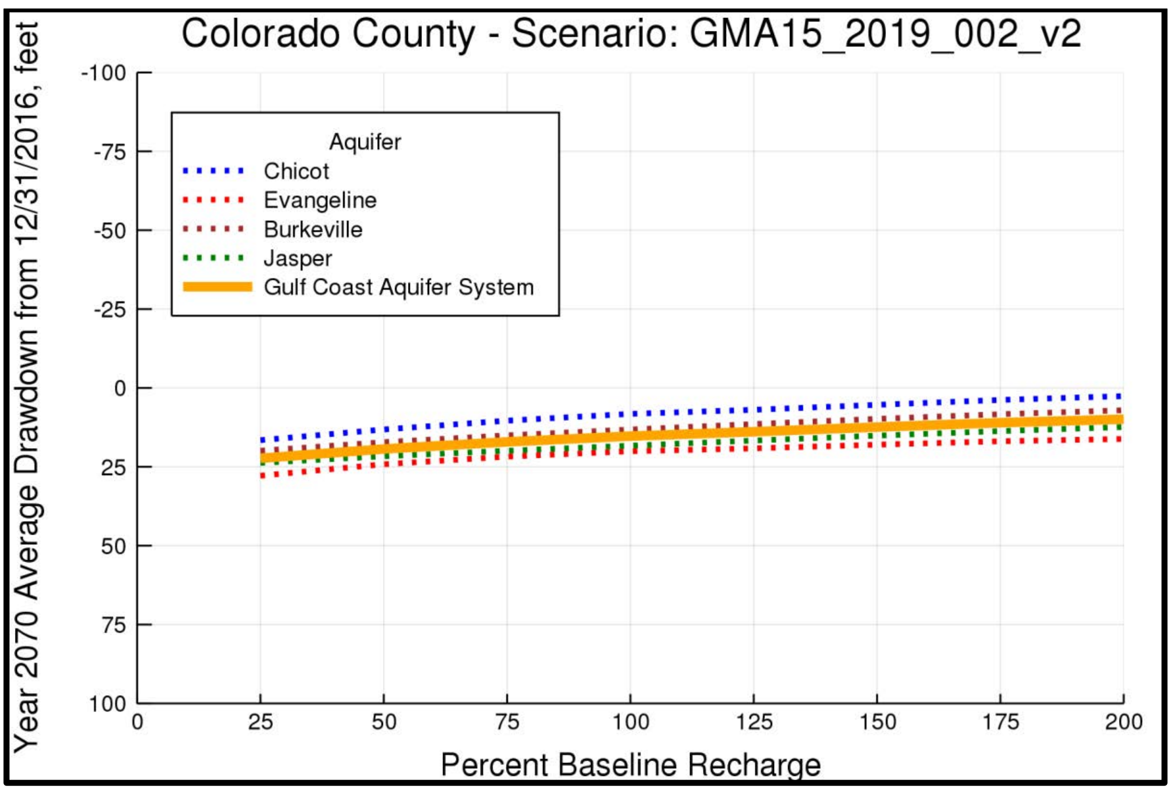

Bee County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

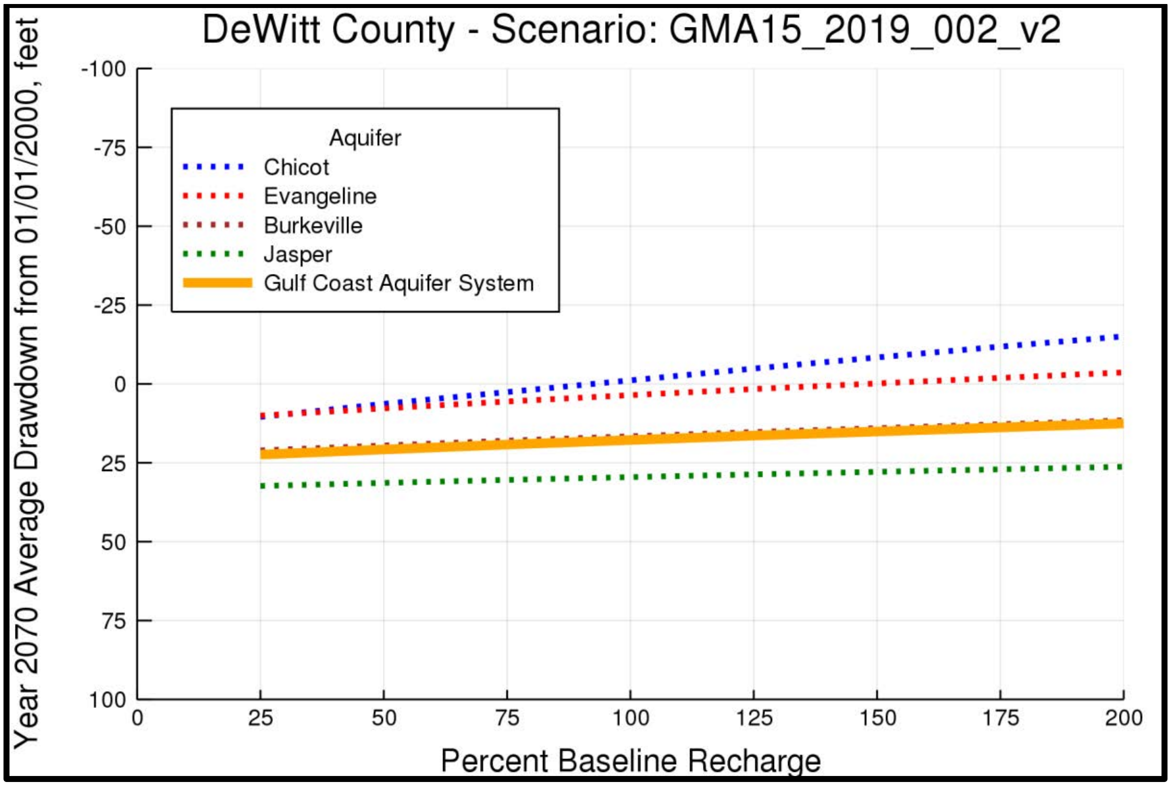

Bee County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

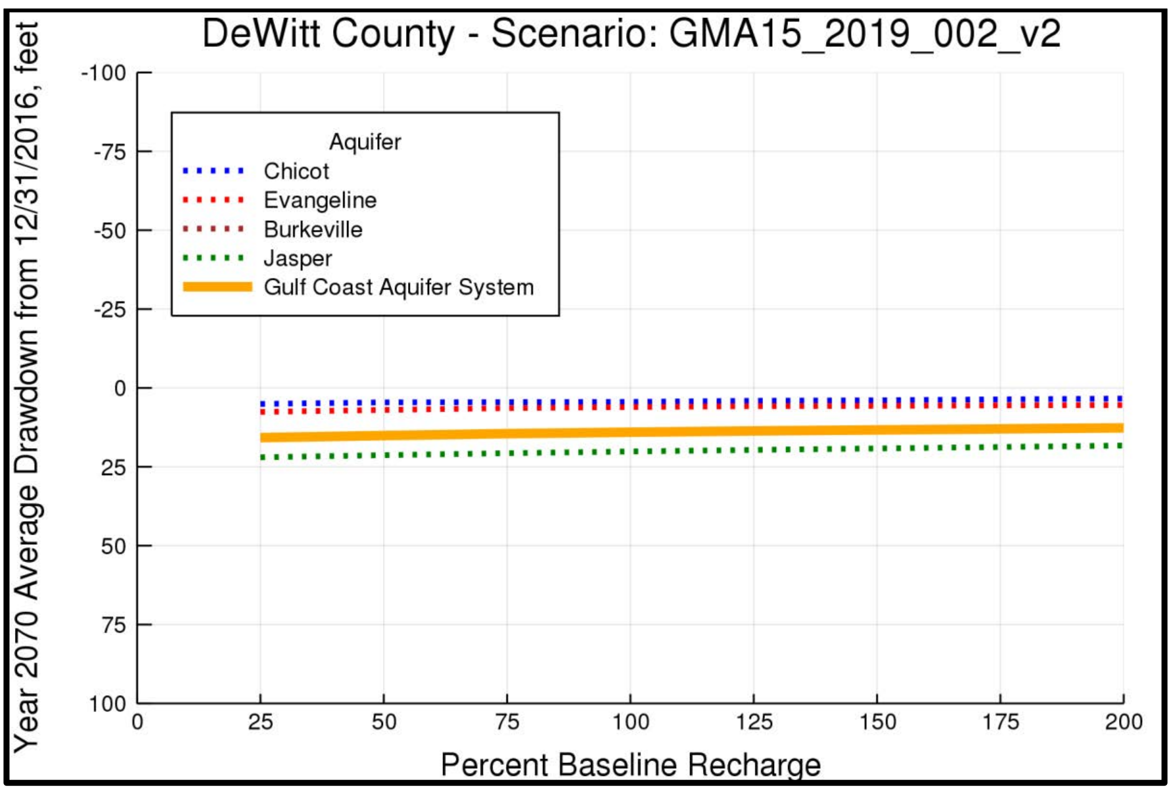

Calhoun County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

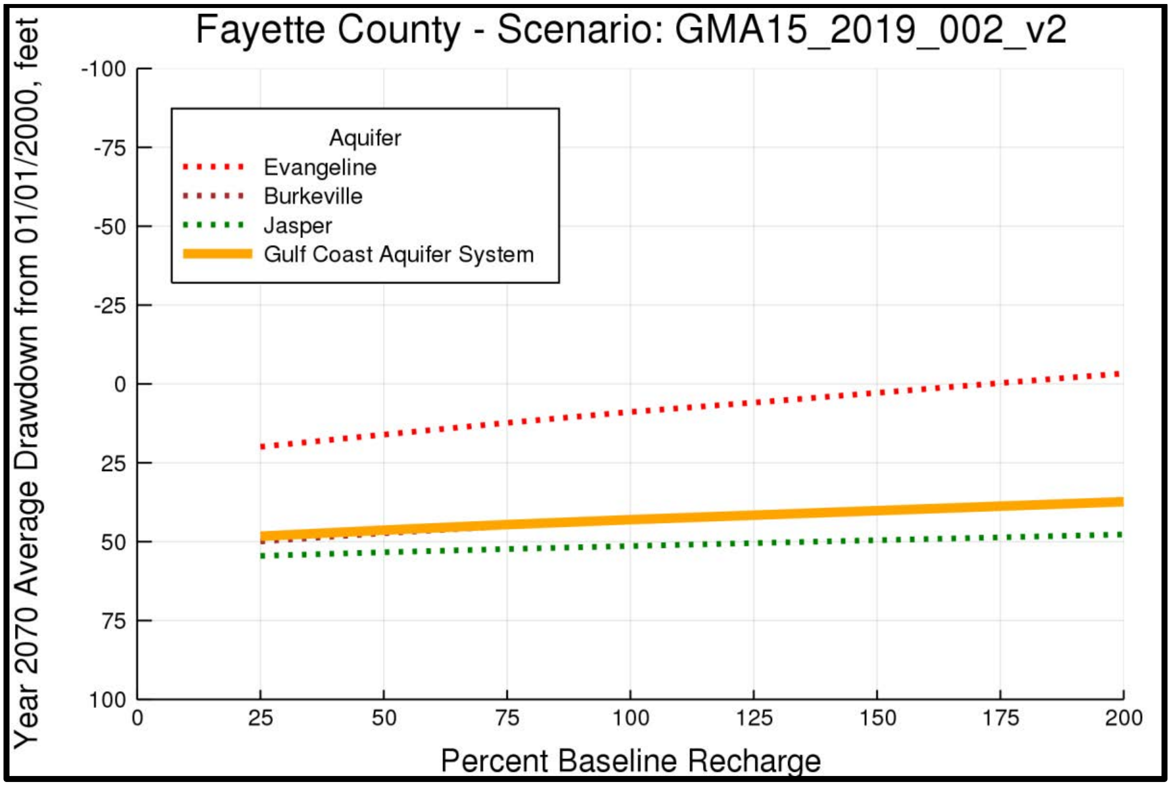

Calhoun County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

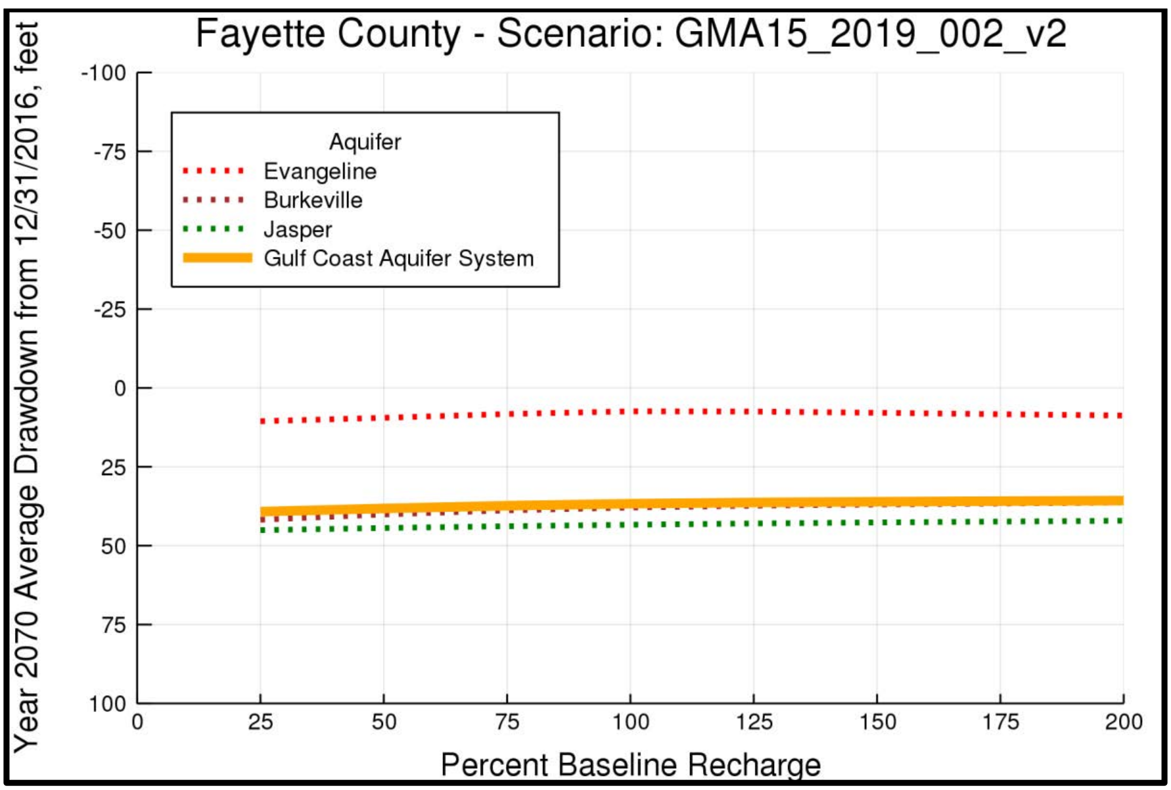

Colorado County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

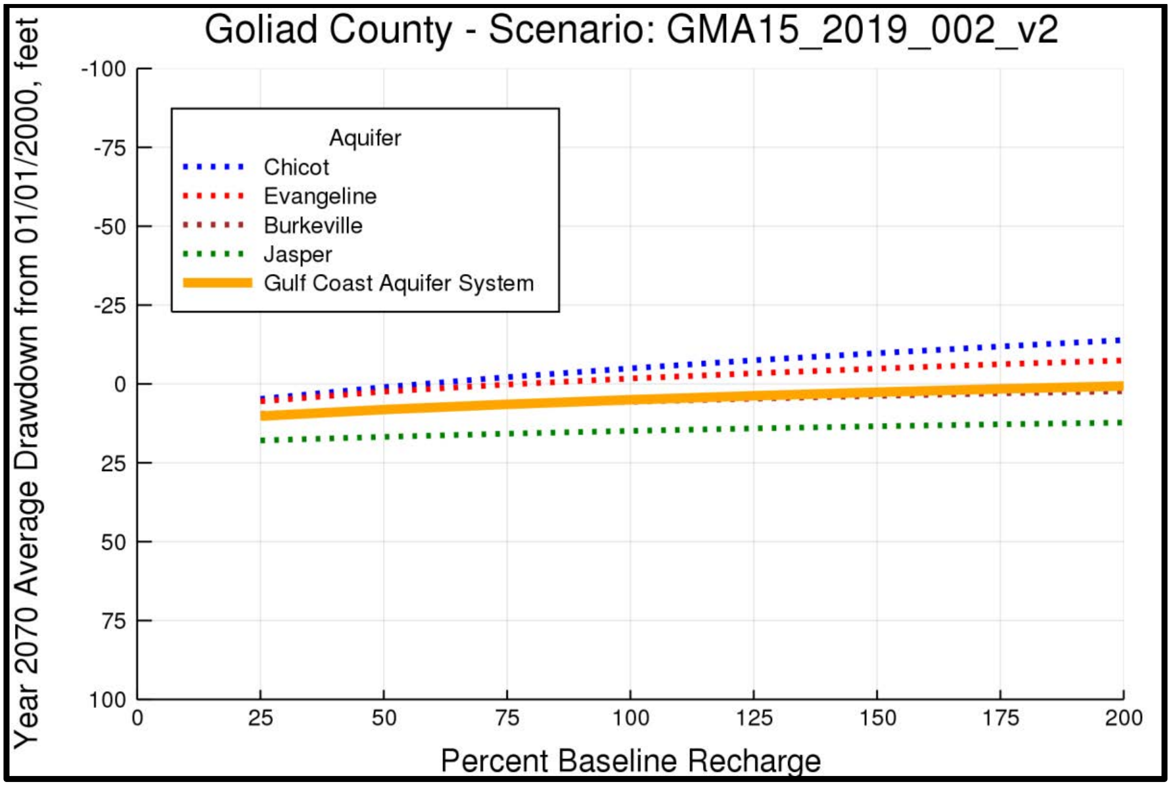

Colorado County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

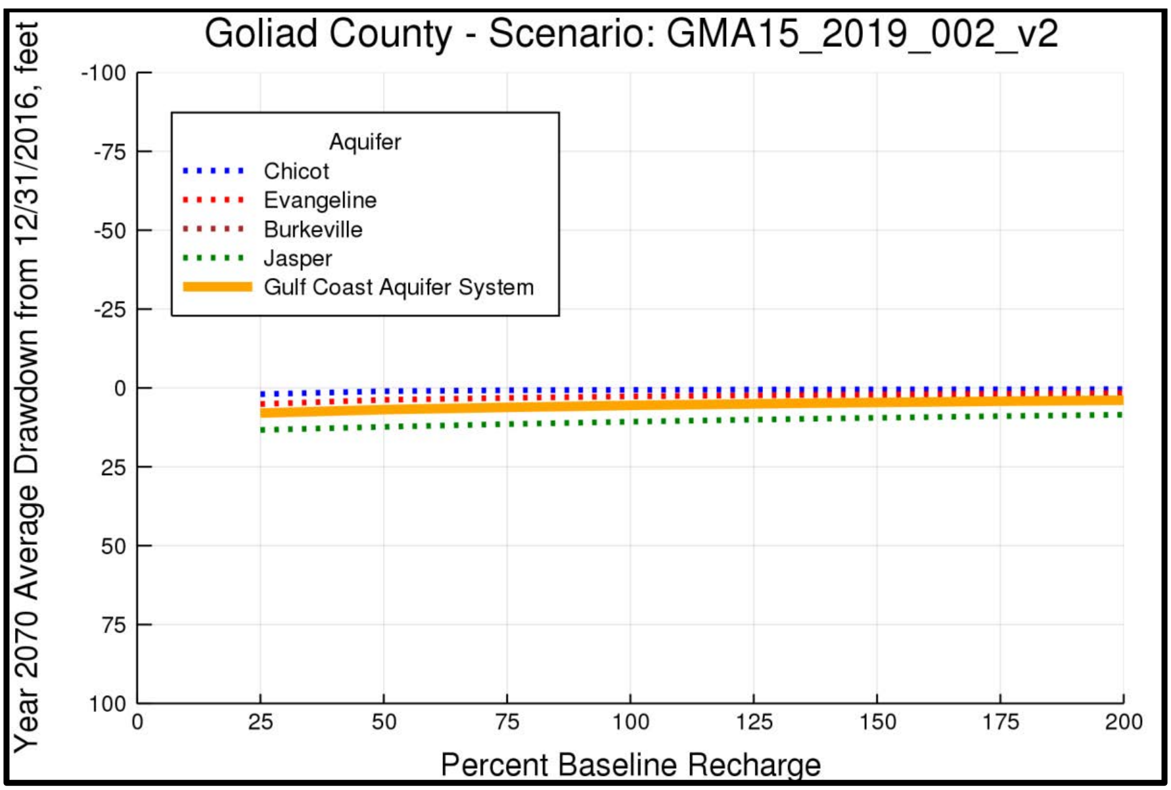

DeWitt County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

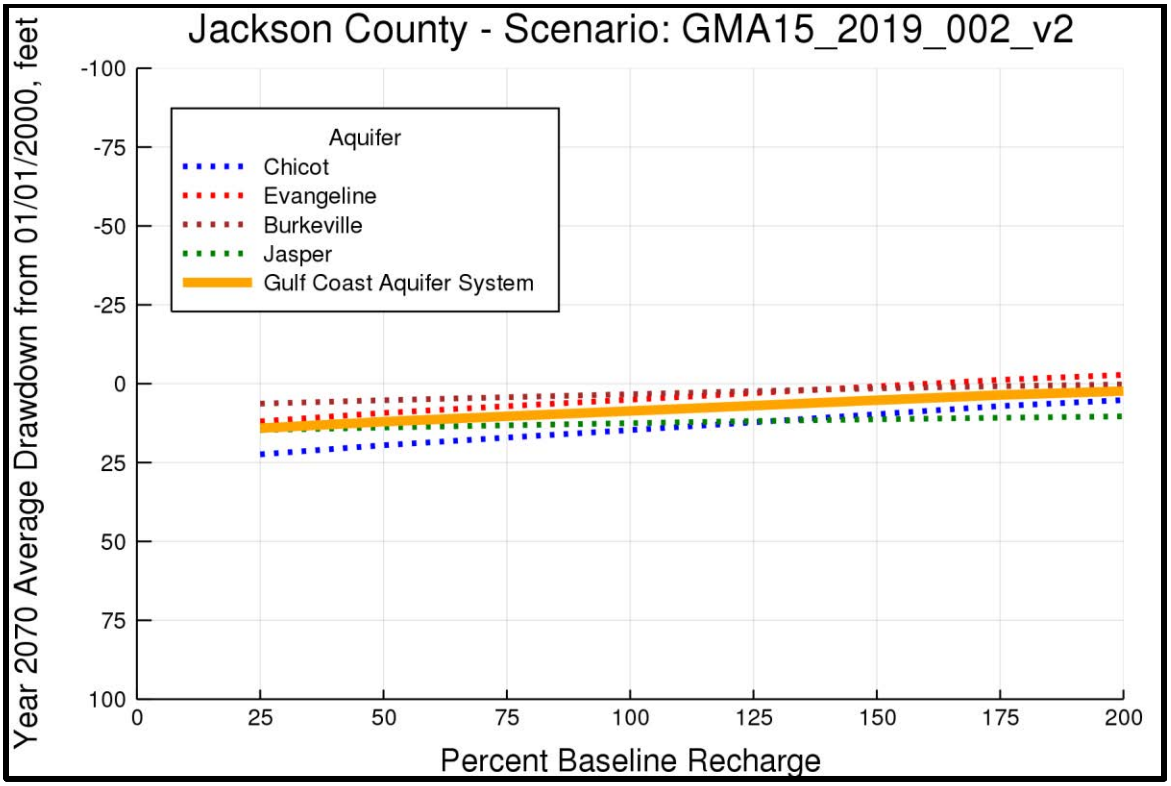

DeWitt County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

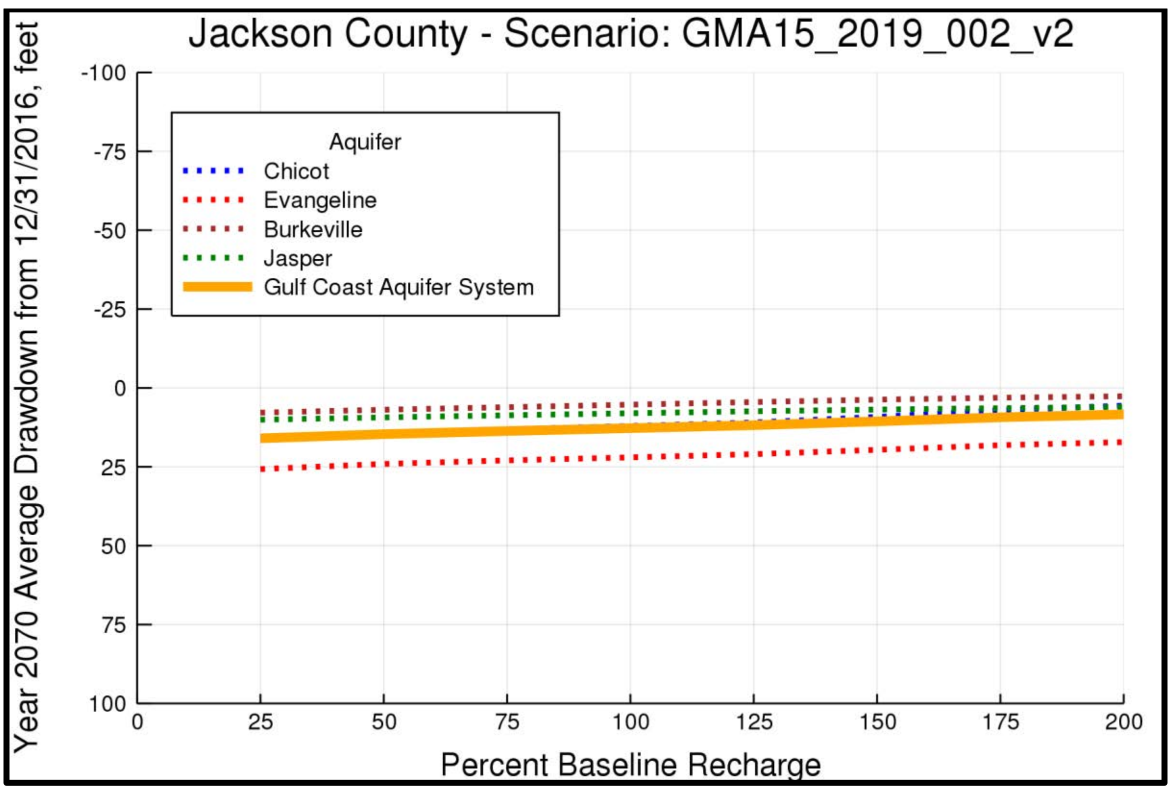

Fayette County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

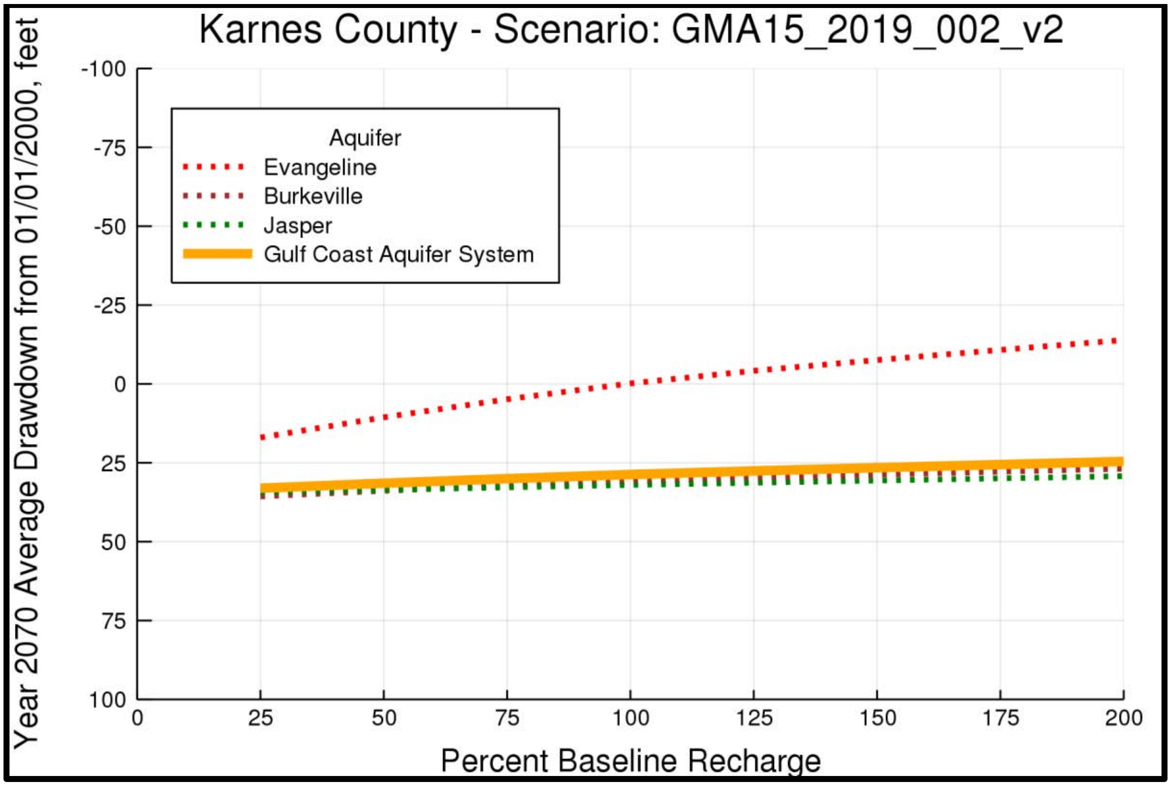

Fayette County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

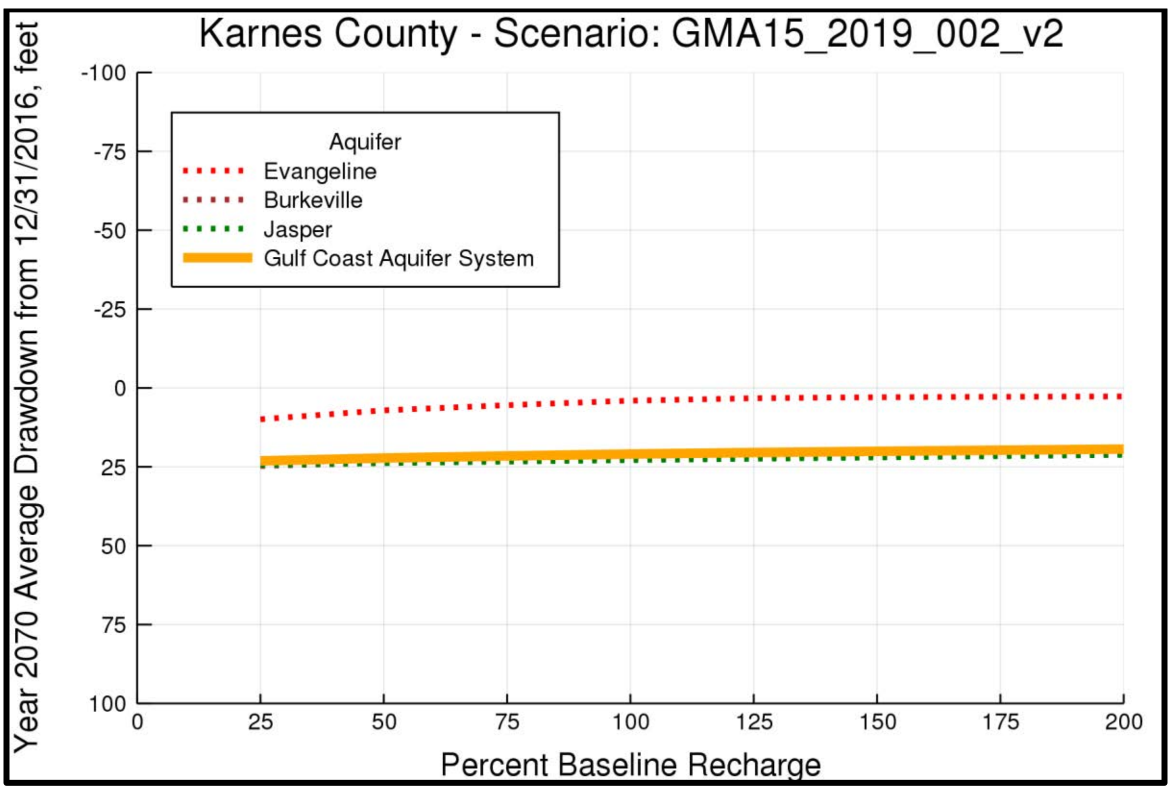

Goliad County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

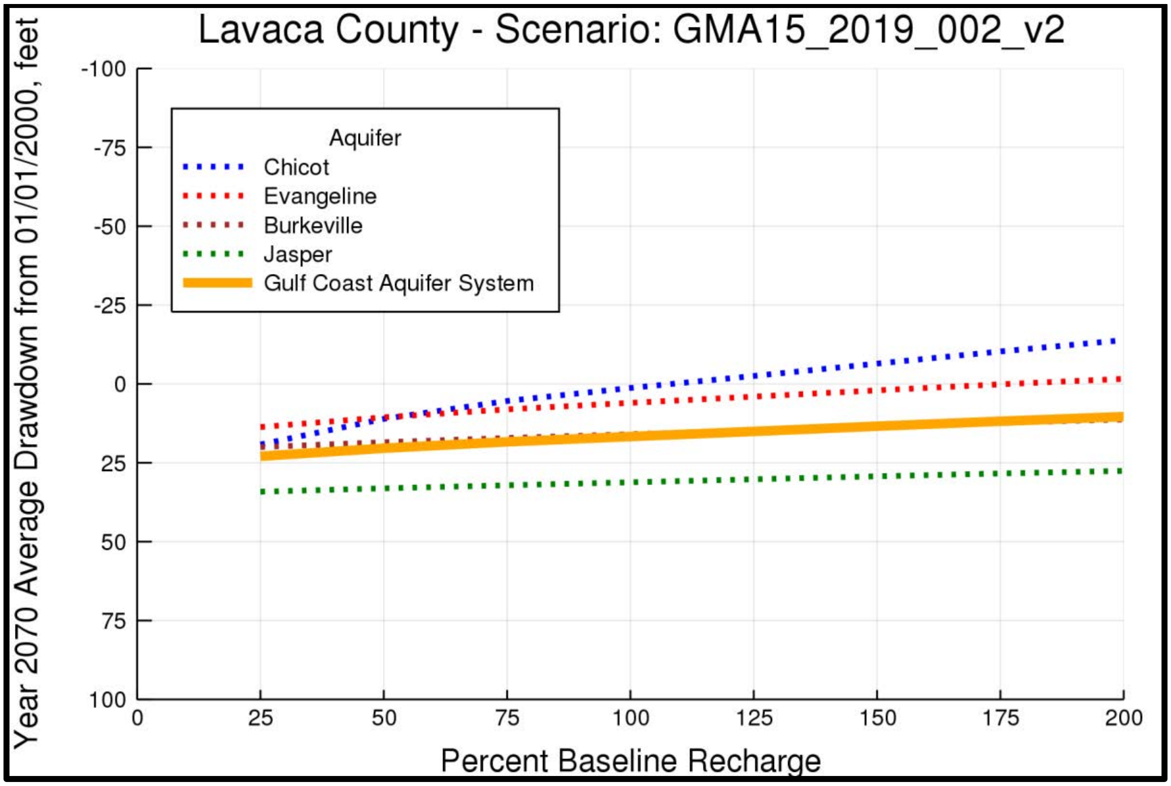

Goliad County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

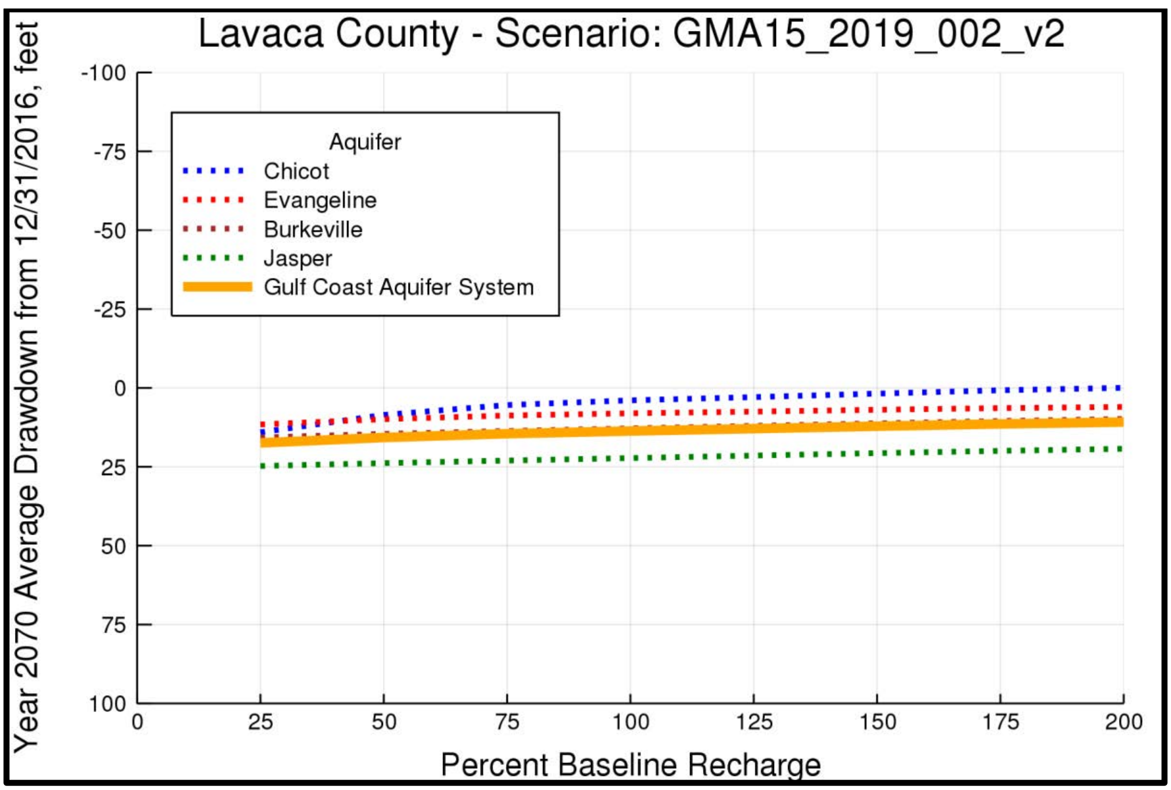

Jackson County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

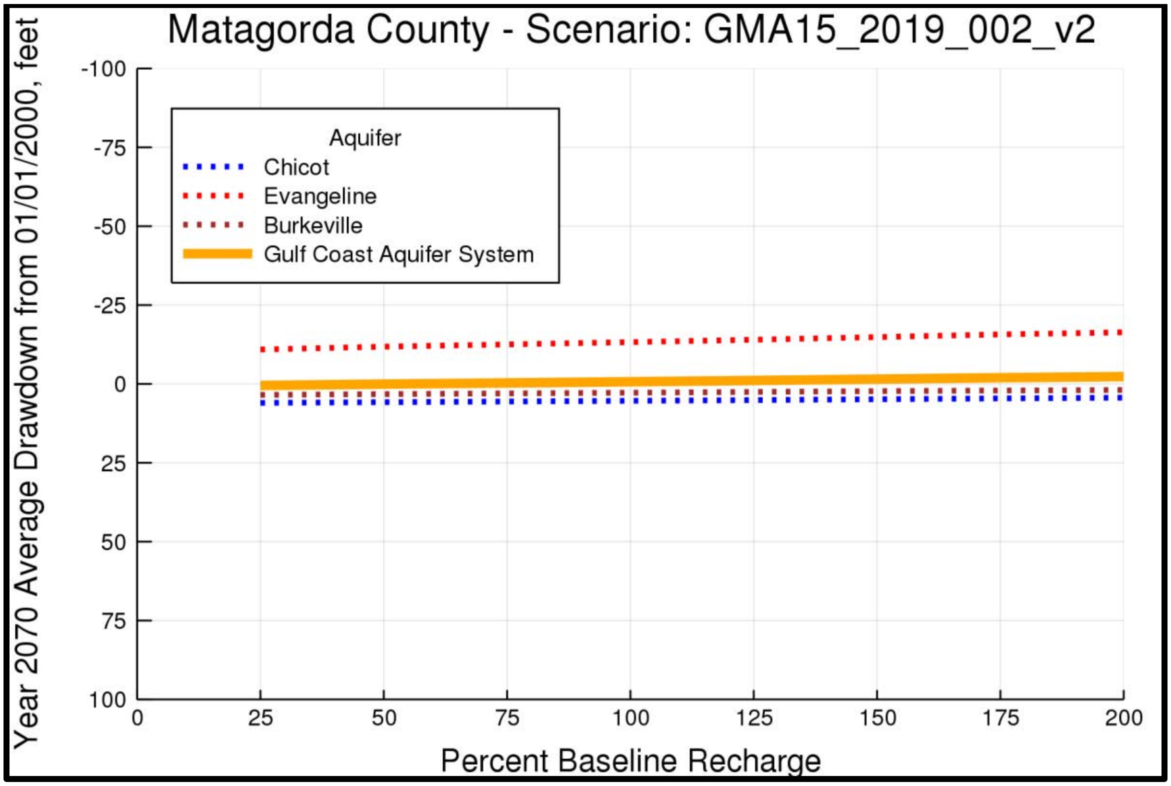

Jackson County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200

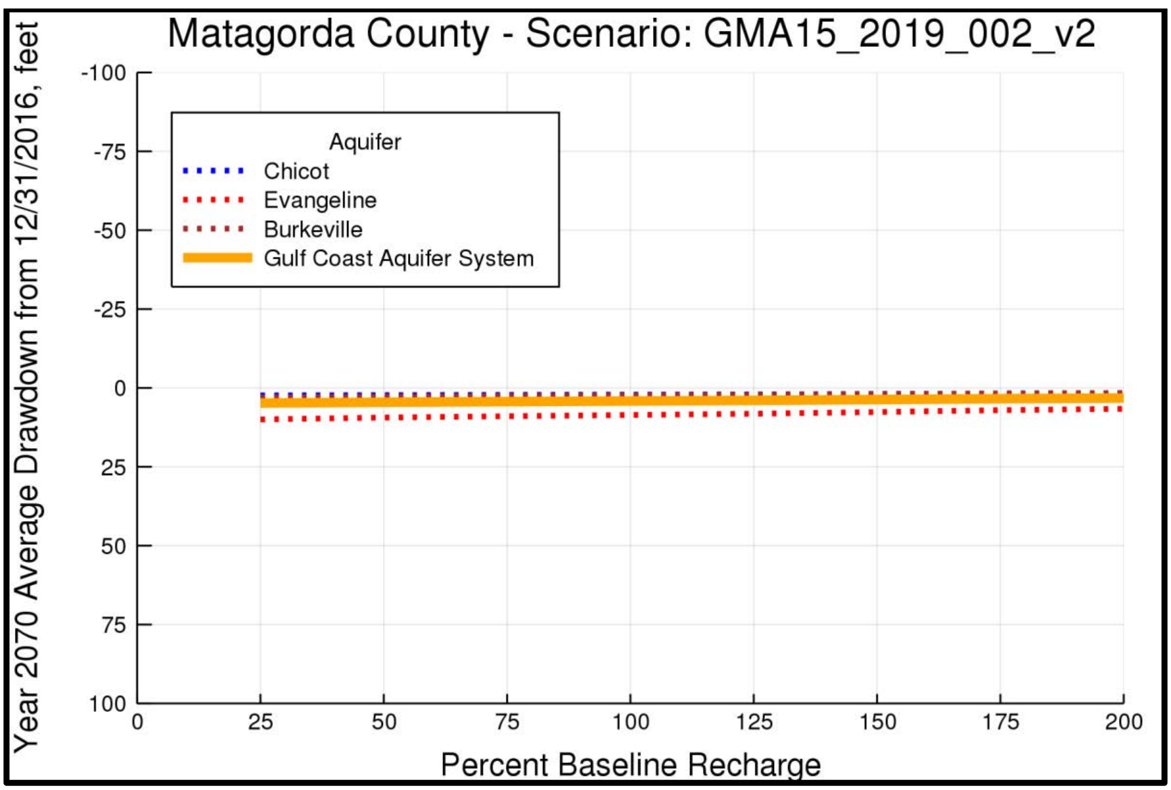

Karnes County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

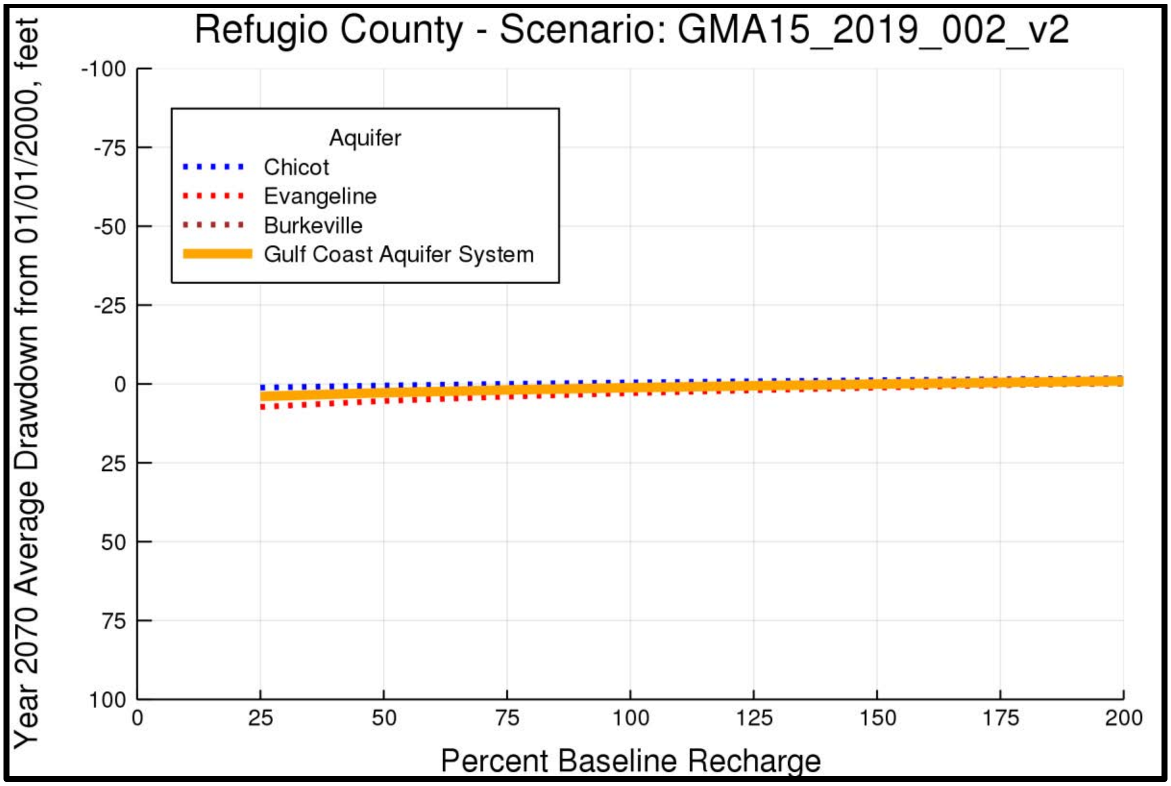

Karnes County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

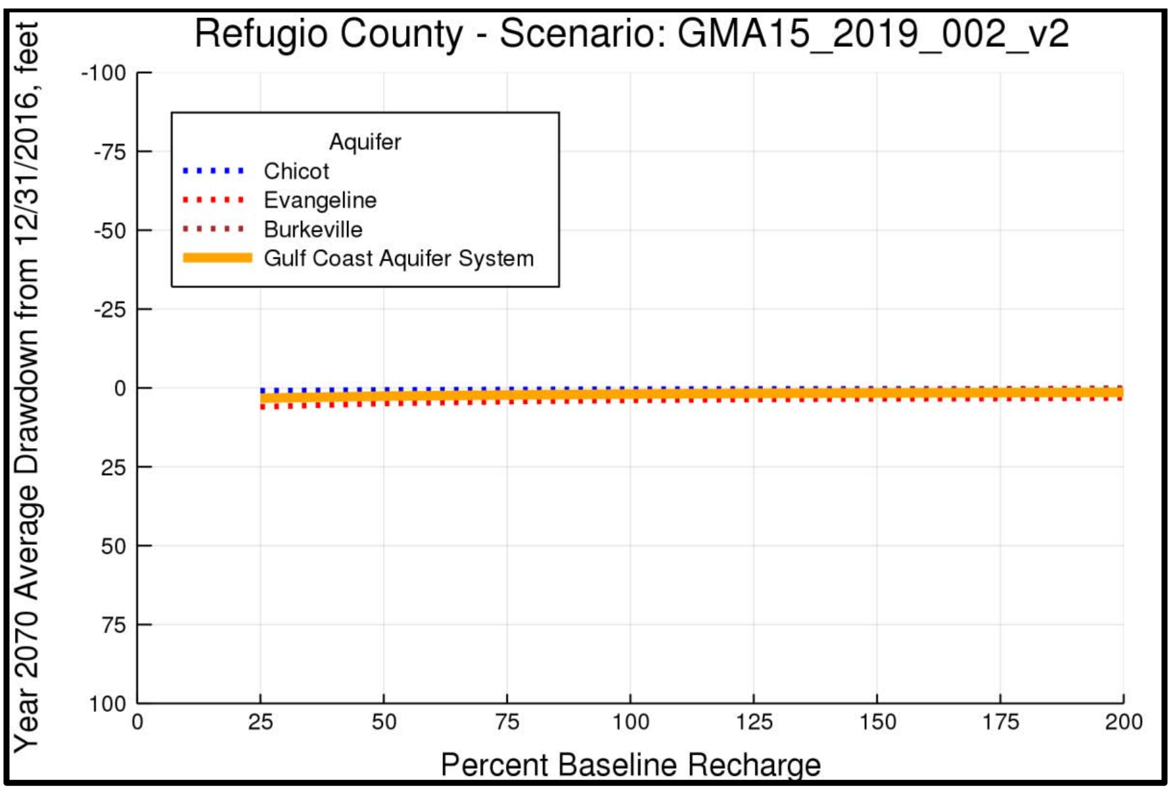

Lavaca County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

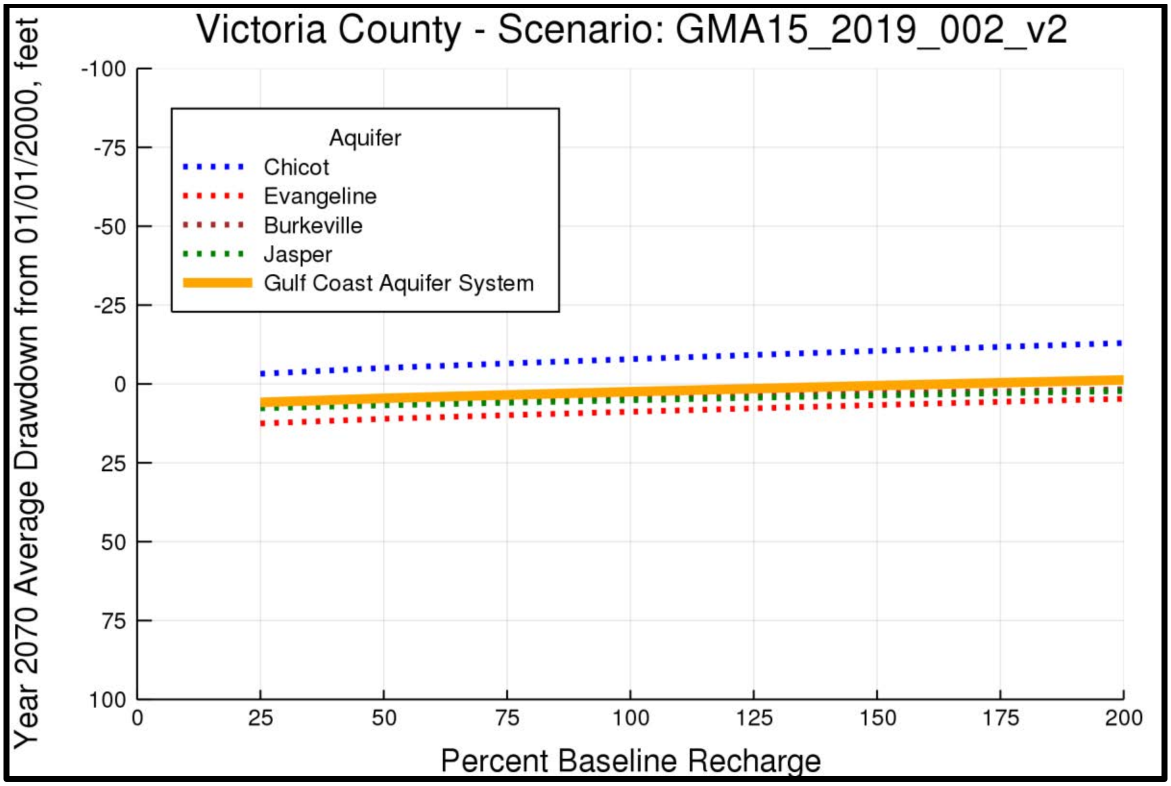

Lavaca County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System

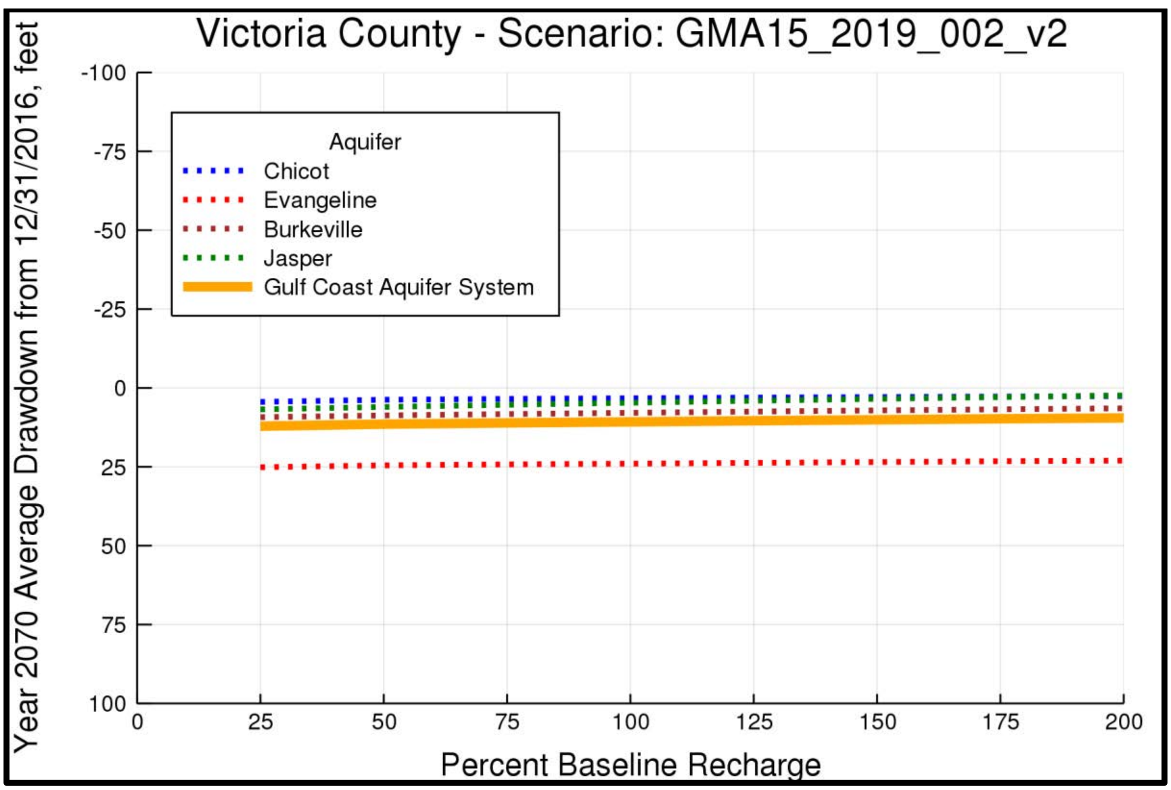

Matagorda County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

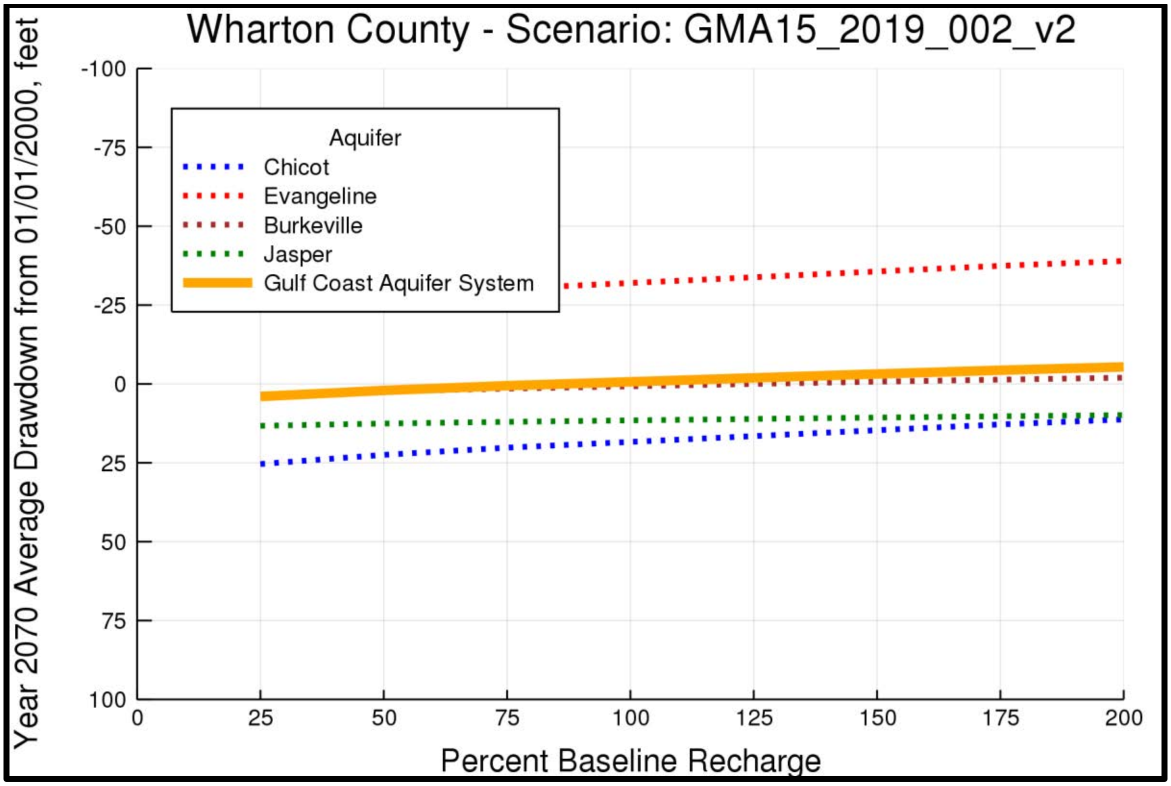

Matagorda County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

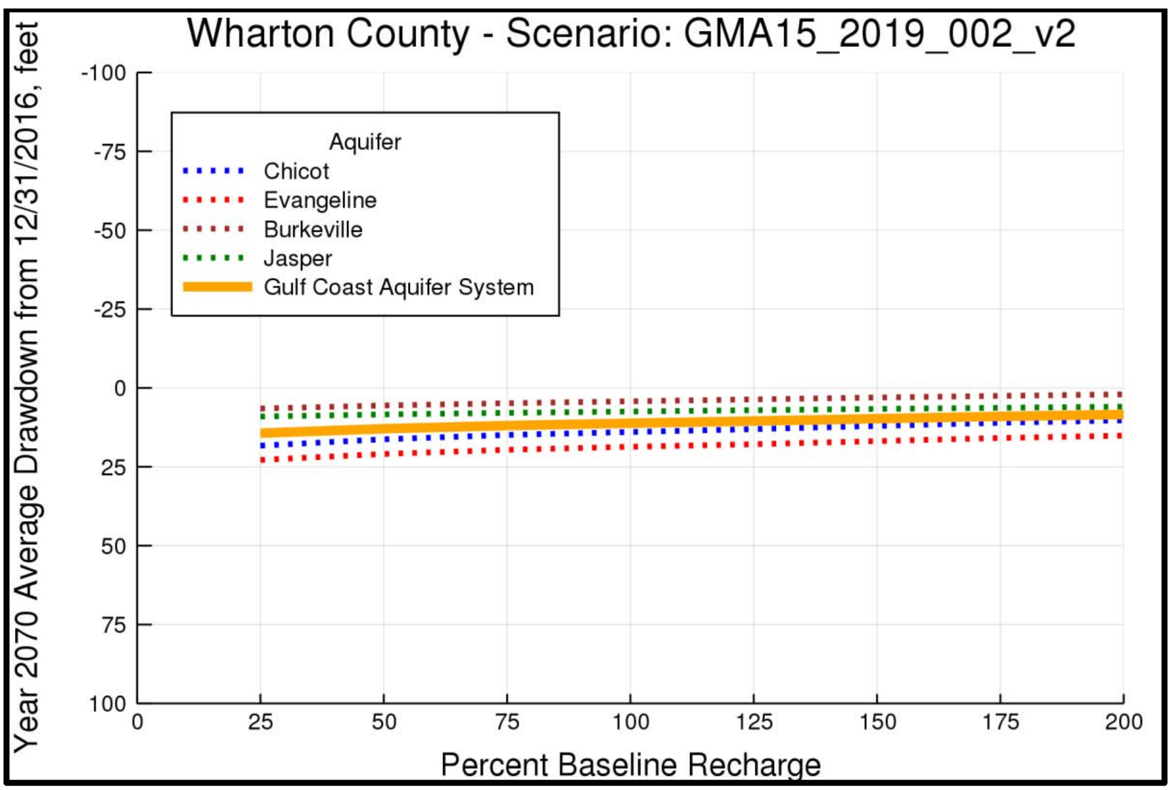

Refugio County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Refugio County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Victoria County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Victoria County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
Percent Baseline Recharge
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
-100
-75
-50
-25
0
25
50
75
100
0
25
50
75
100
125
150
175
200


Wharton County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

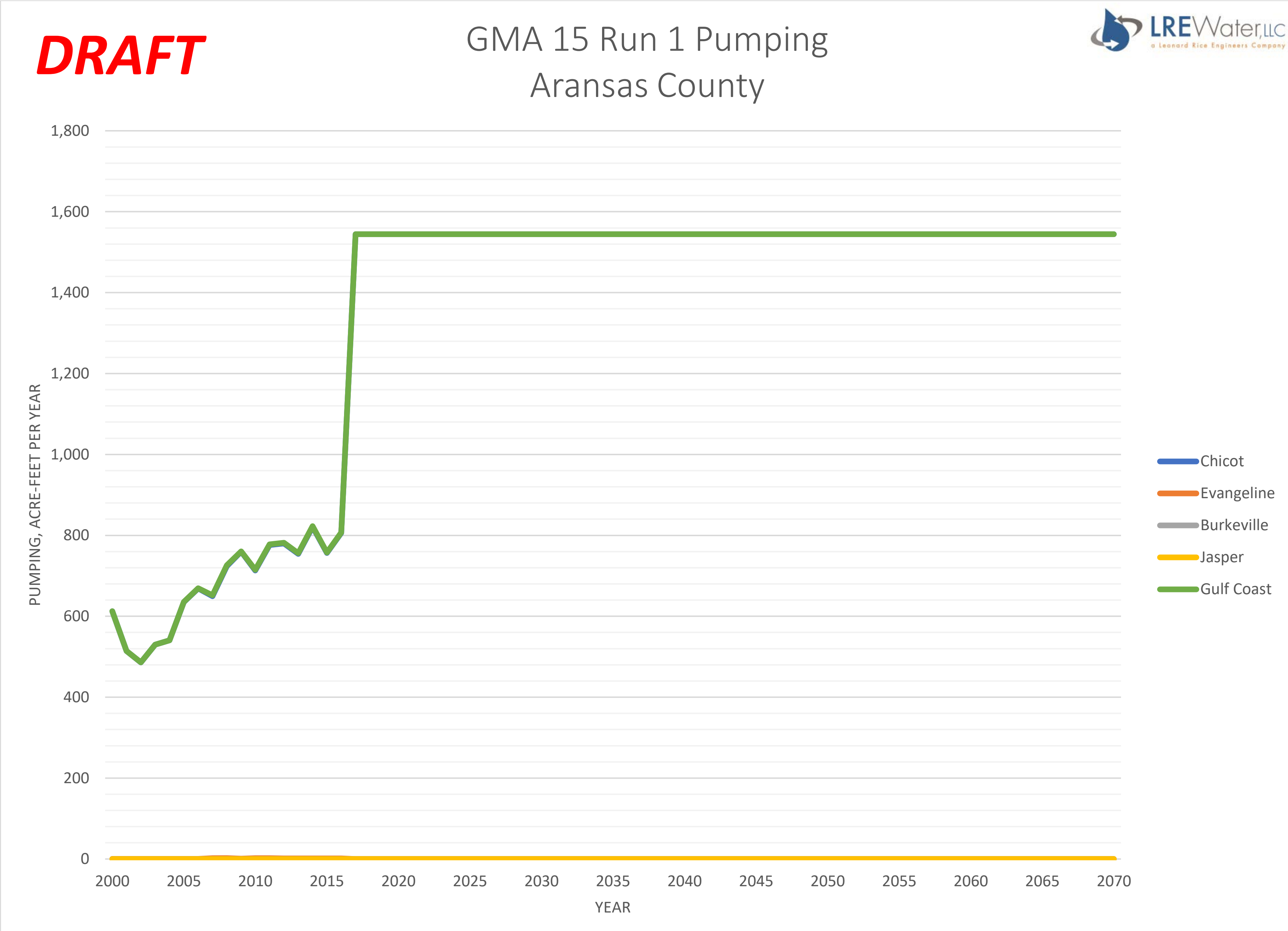

Wharton County - Scenario: GMA15_2019_002_v2
Year 2070 Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
Aquifer
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast Aquifer System
0
25
50
75
100
125
150
175
200
Percent Baseline Recharge

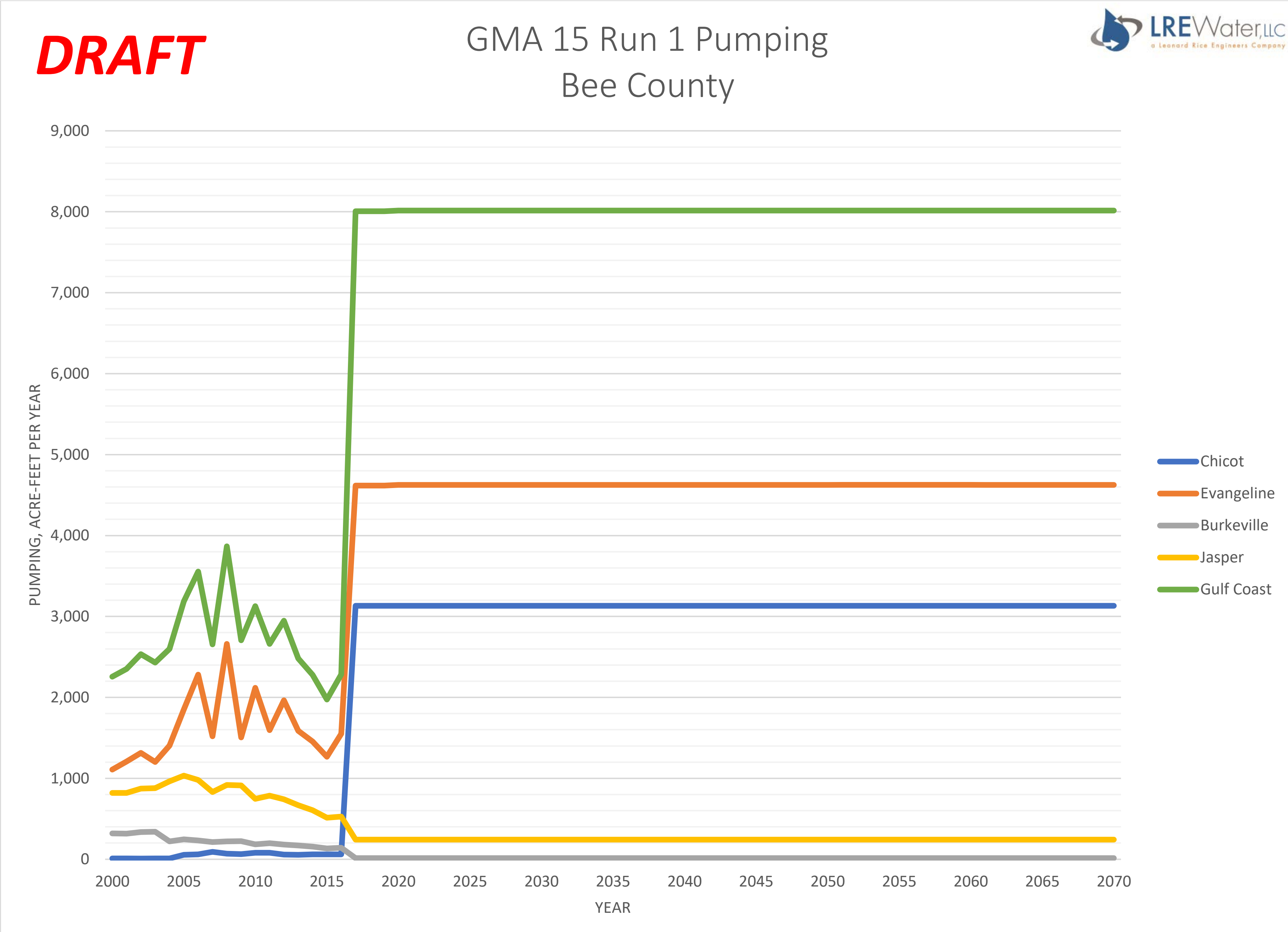
Pumping Amount versus Time

Pumping Scenario: 1

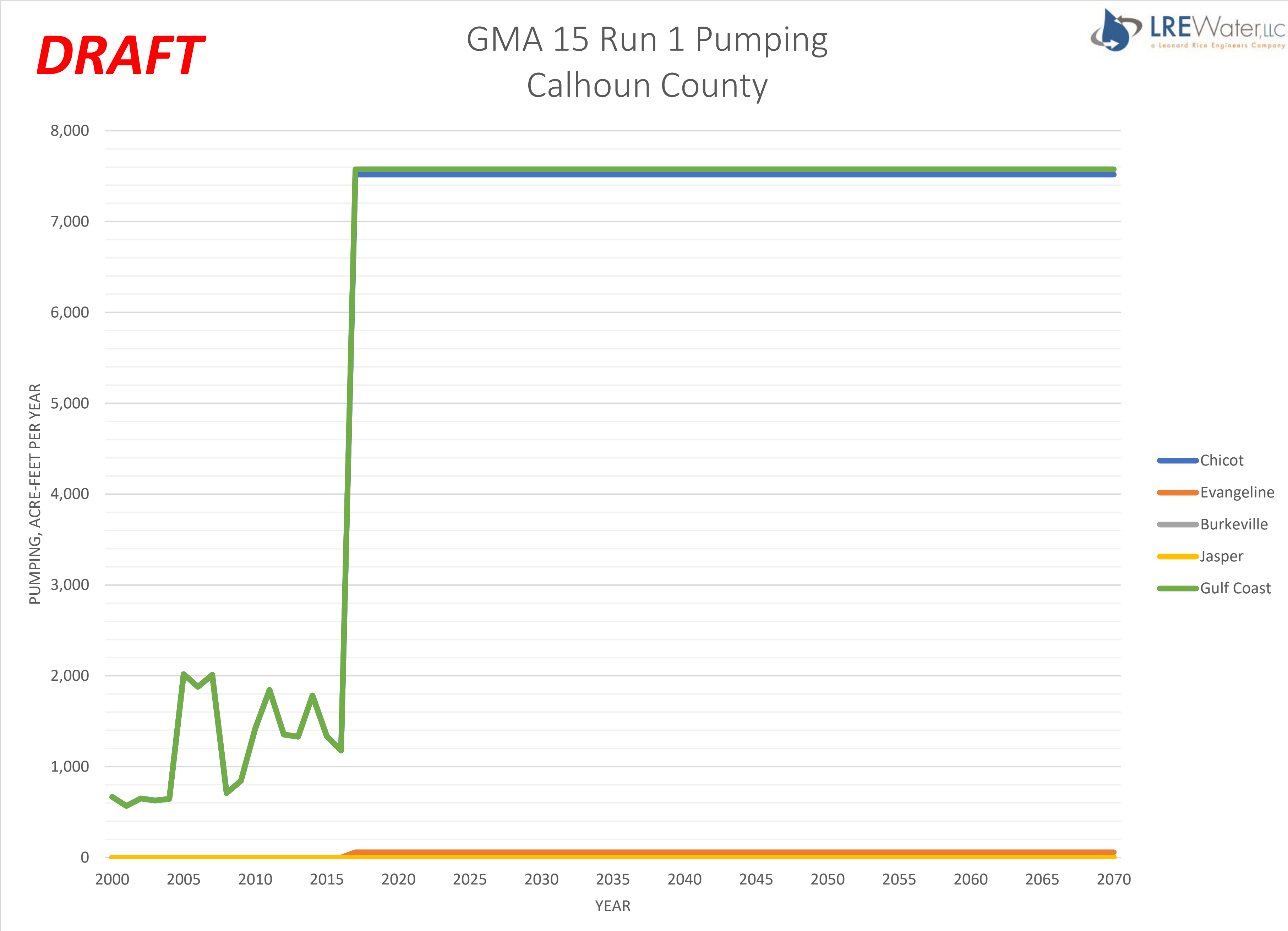
Pumping Distribution Version: 1 & 2

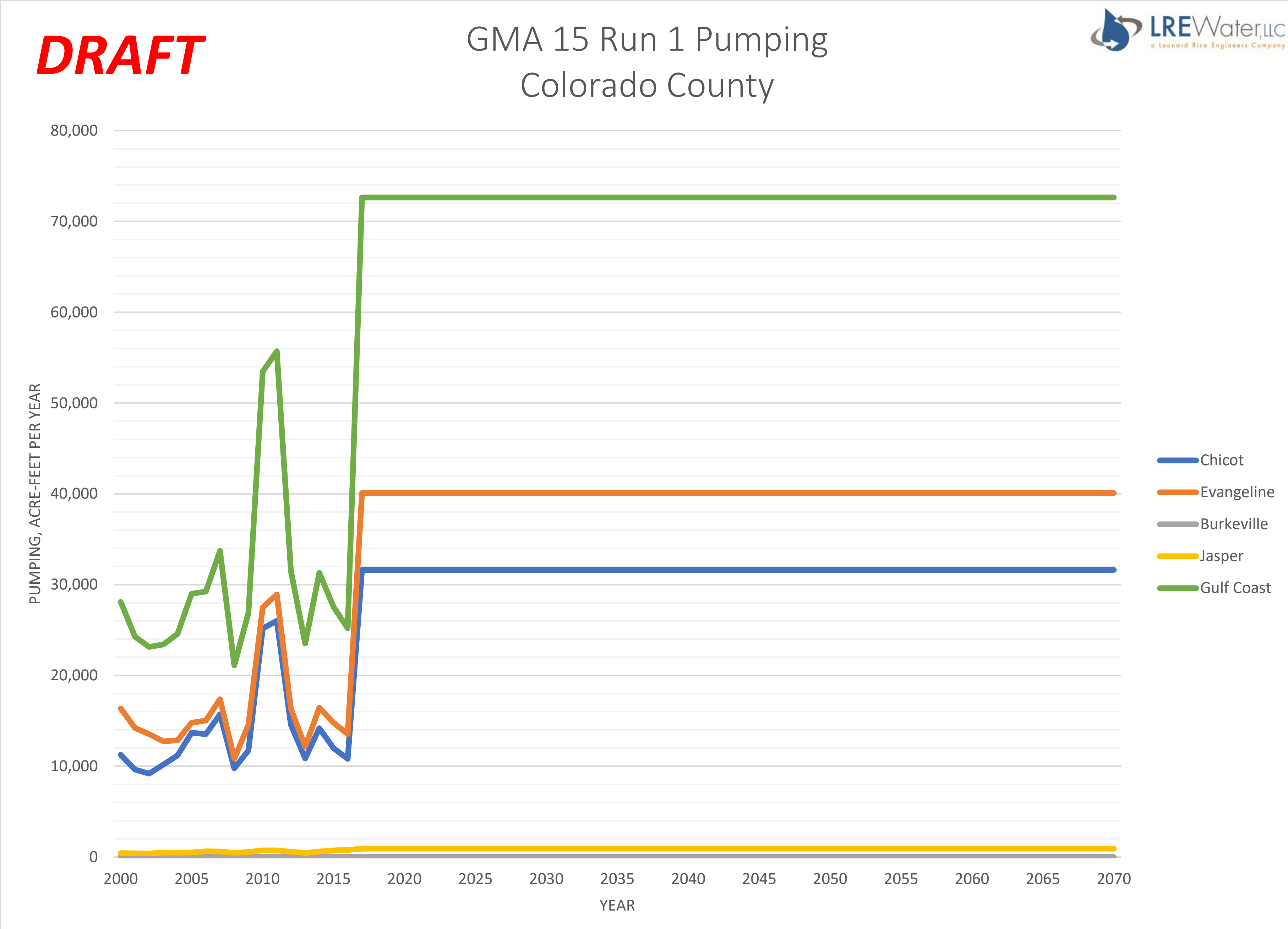
Scenario ID: GMA15_2019_001 (Run 1)

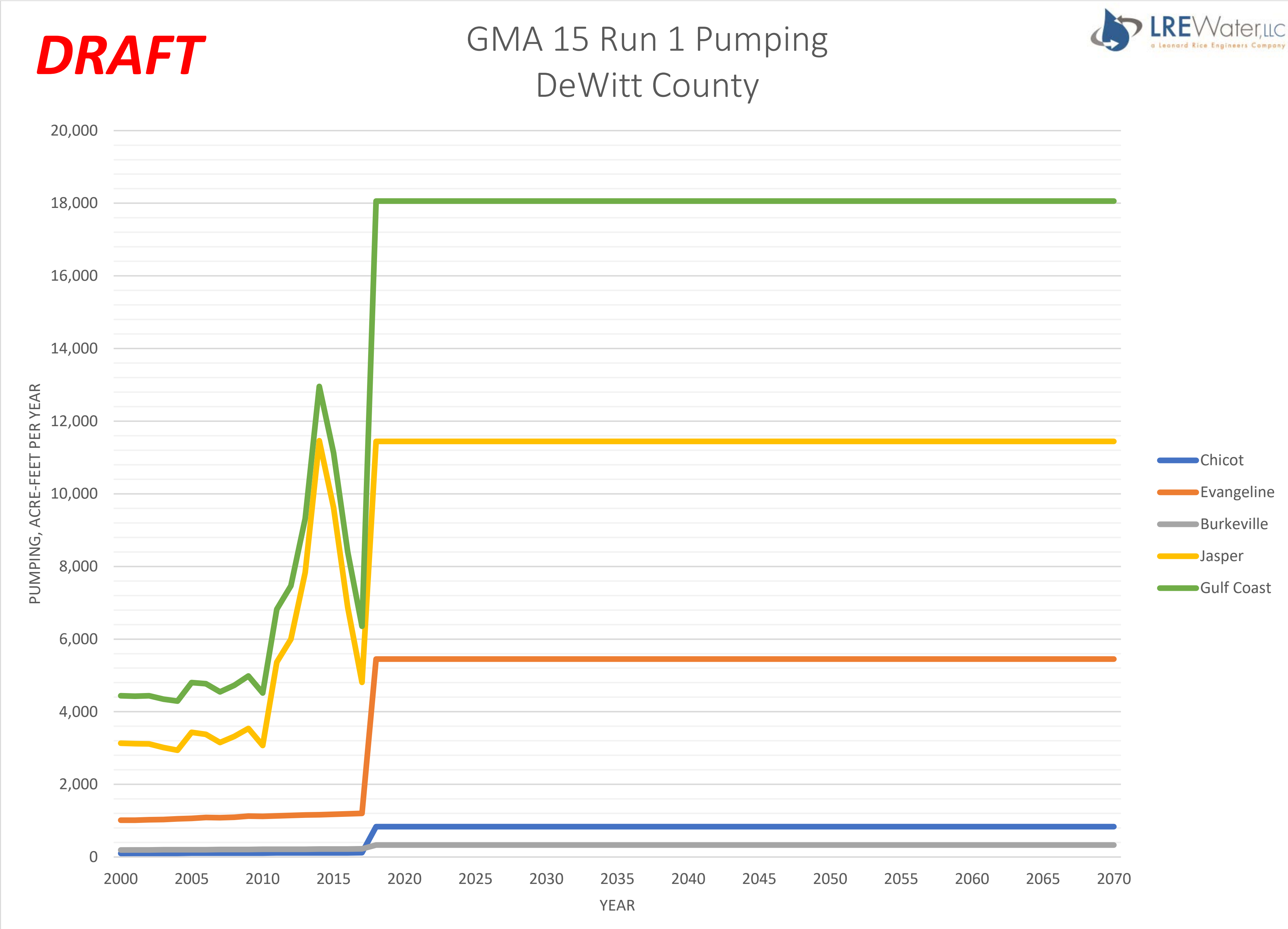

DRAFT
GMA 15 Run 1 Pumping
Aransas County
LREWater, LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

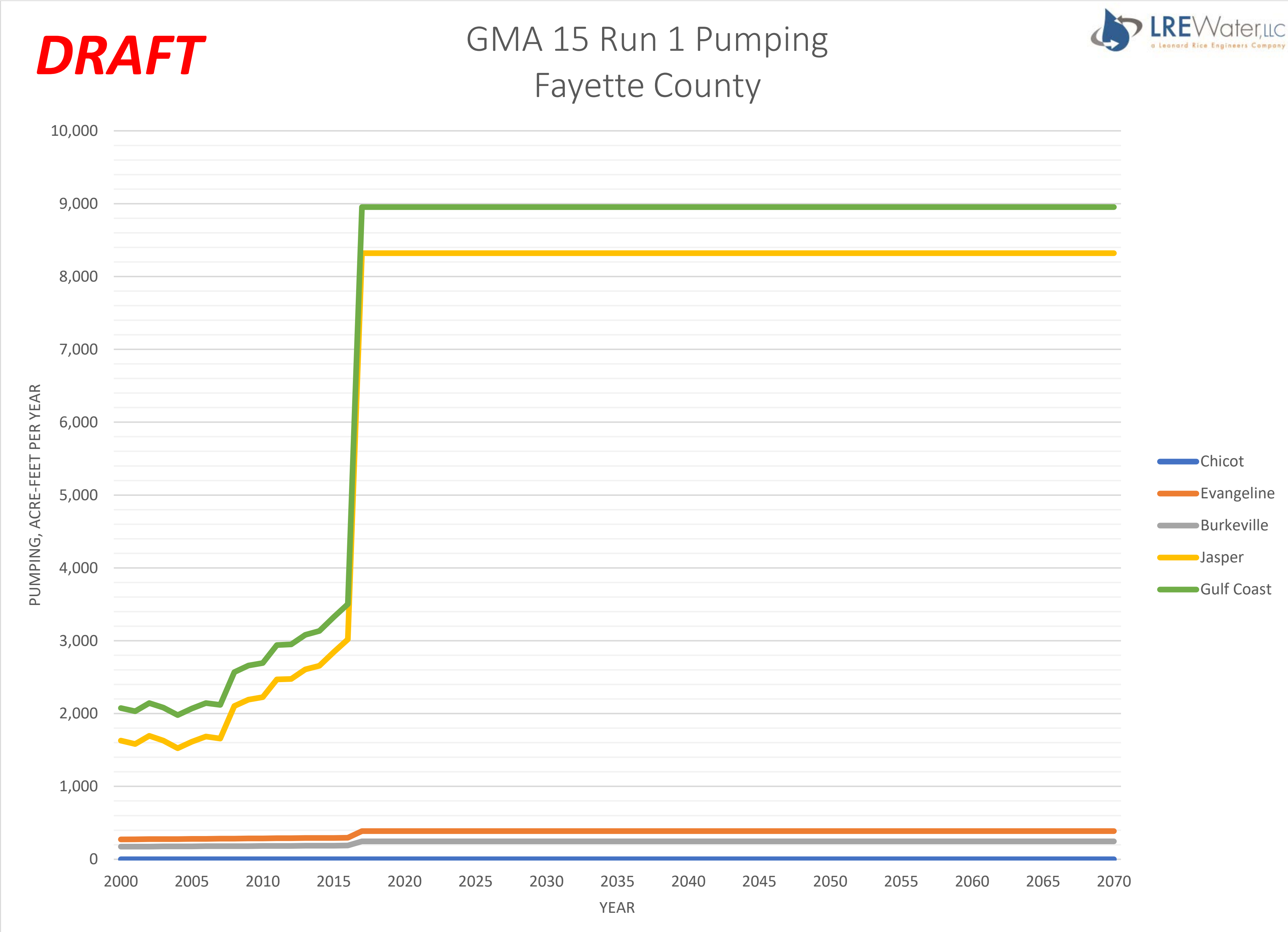


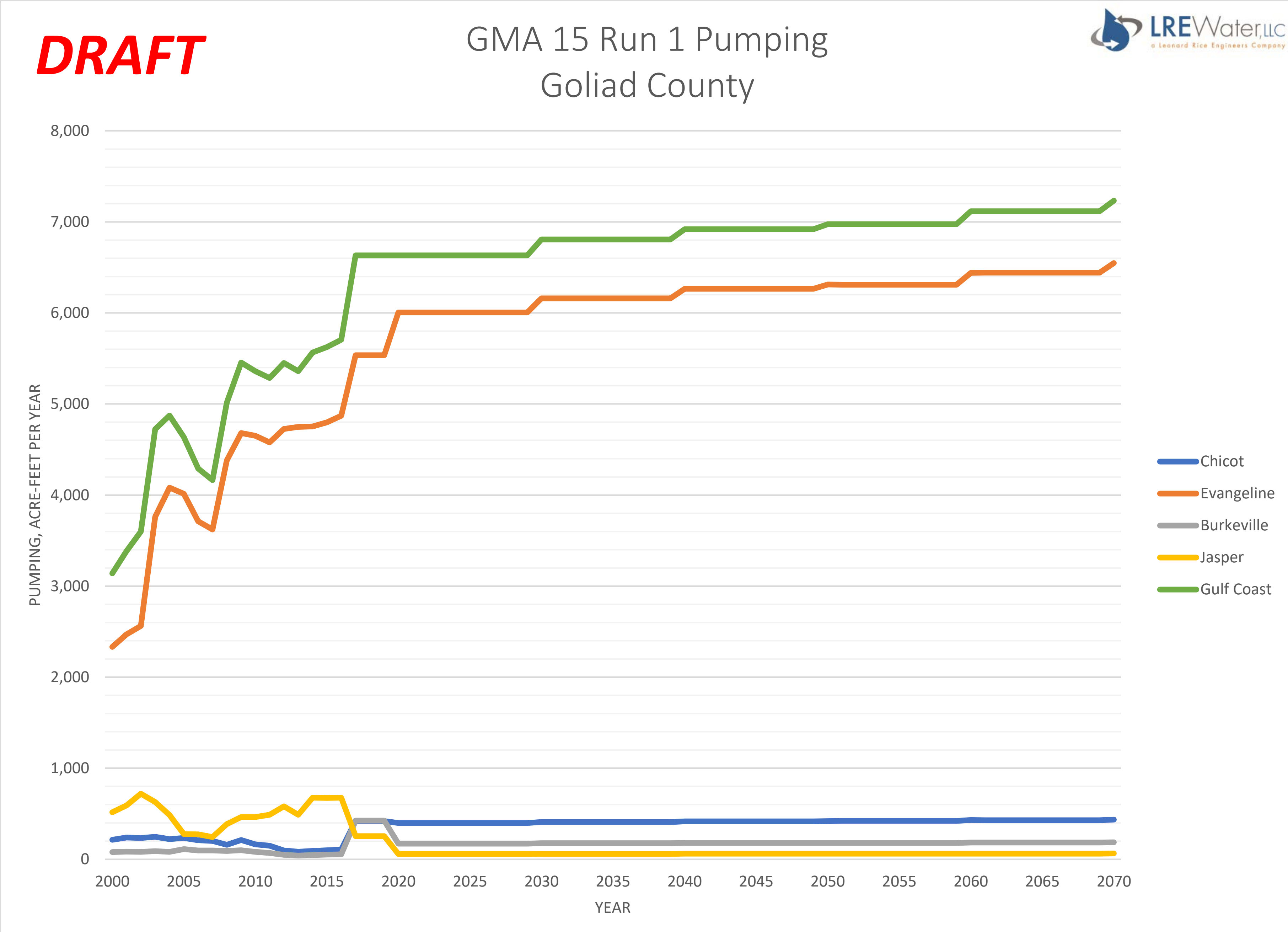
DRAFT
GMA 15 Run 1 Pumping
Bee County
LREWater, LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast


DRAFT
GMA 15 Run 1 Pumping
Calhoun County
LREWater,LLC
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

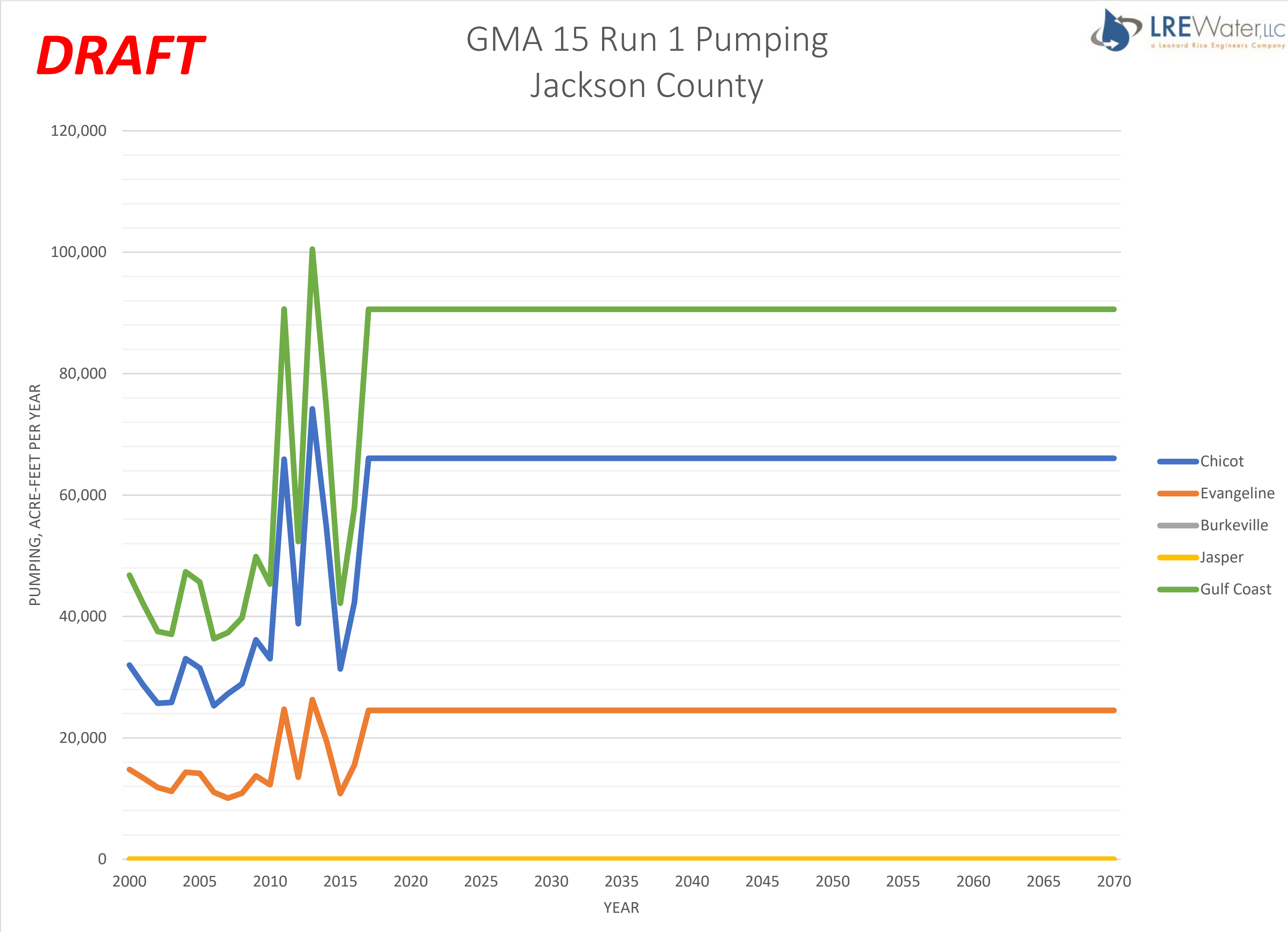

DRAFT
GMA 15 Run 1 Pumping
Colorado County
LREWater, LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast


DRAFT
GMA 15 Run 1 Pumping
DeWitt County
LREWater, LLC
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

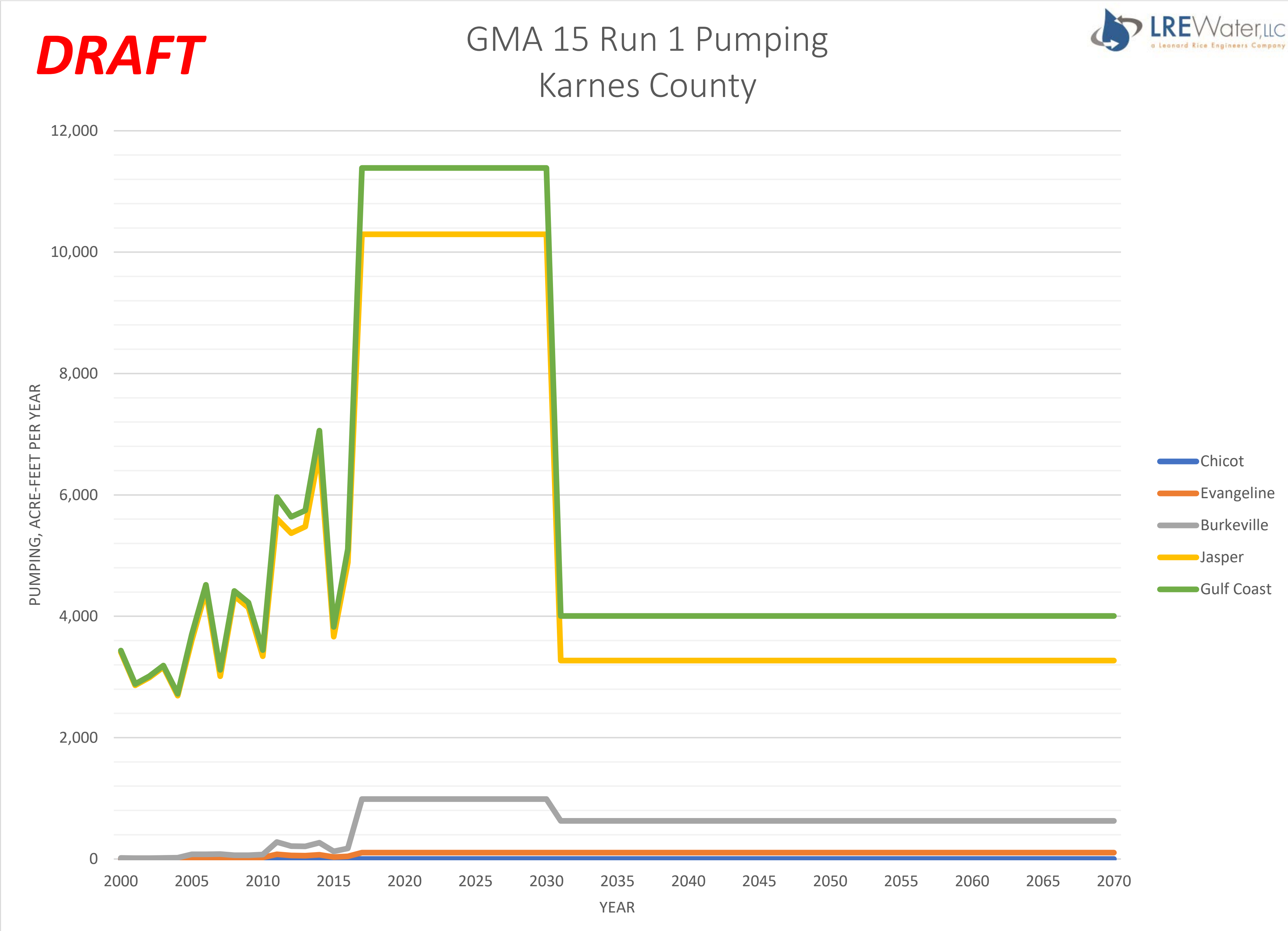

DRAFT
GMA 15 Run 1 Pumping
Fayette County
LREWater,LLC
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast



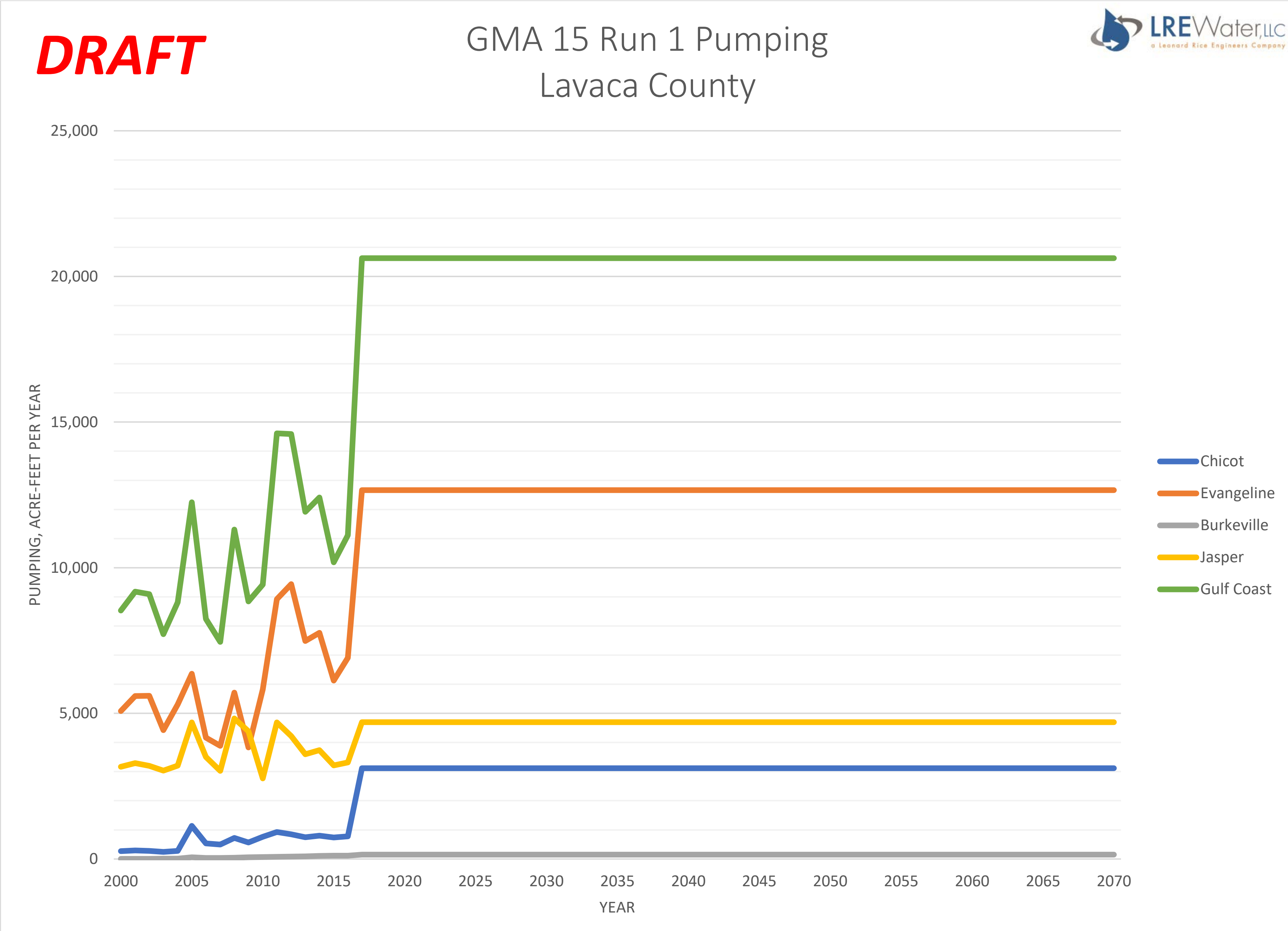
DRAFT
GMA 15 Run 1 Pumping
Goliad County
LREWater,LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast



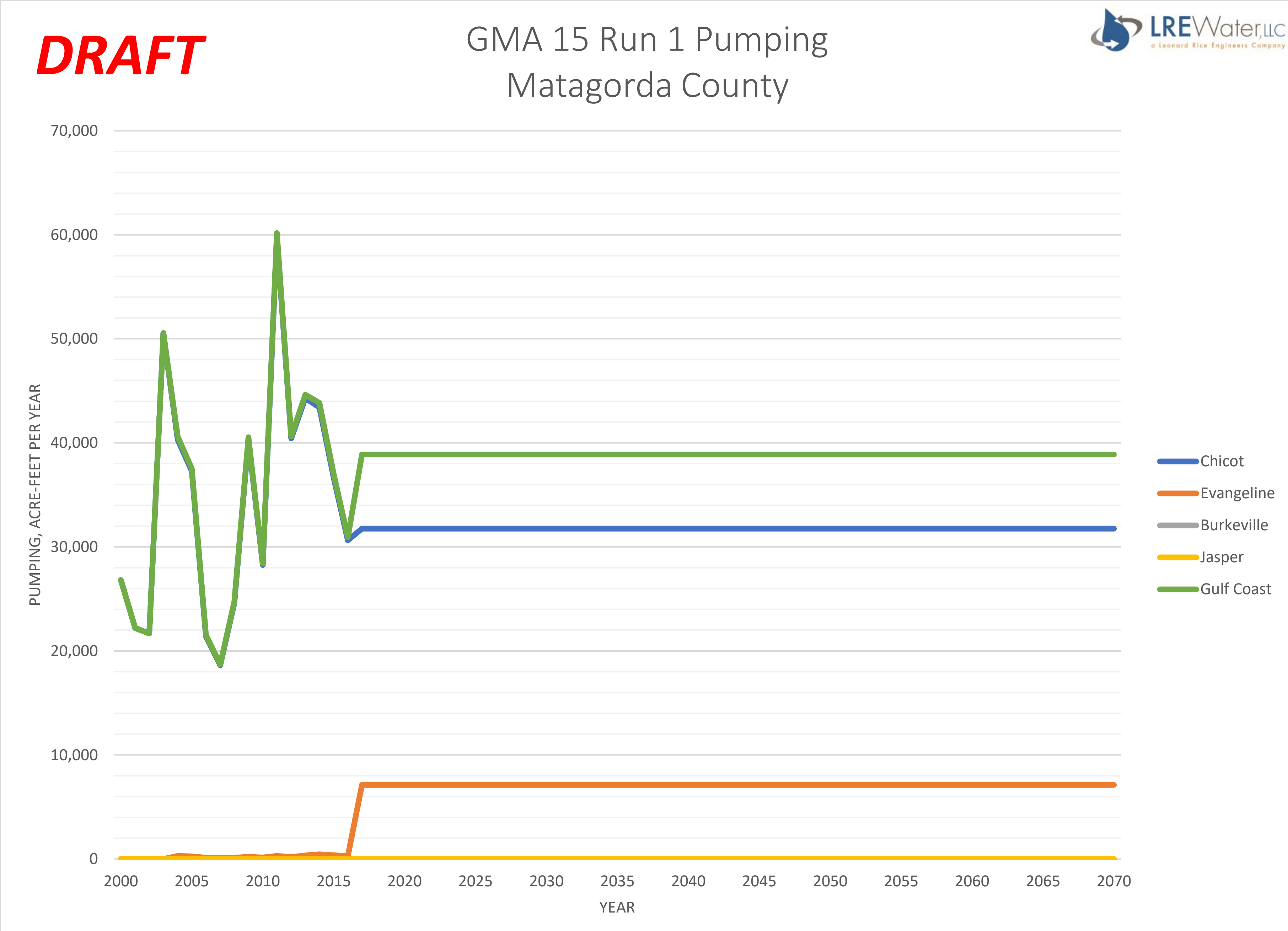
DRAFT
GMA 15 Run 1 Pumping
Jackson County
LREWater,LLC
120,000
100,000
80,000
60,000
40,000
20,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast



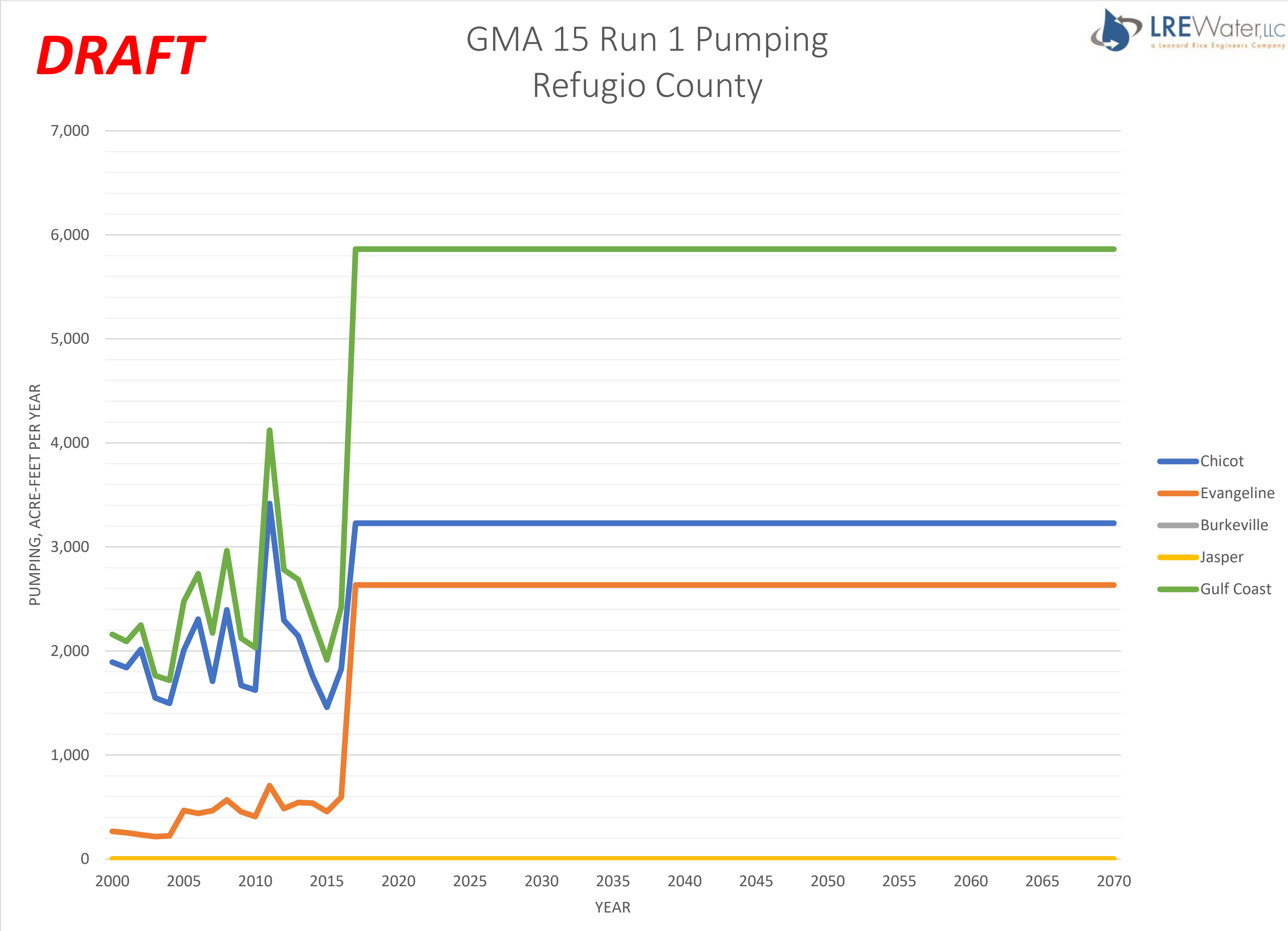
DRAFT
GMA 15 Run 1 Pumping
Karnes County
LREWater, LLC
12,000
10,000
8,000
6,000
4,000
2,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

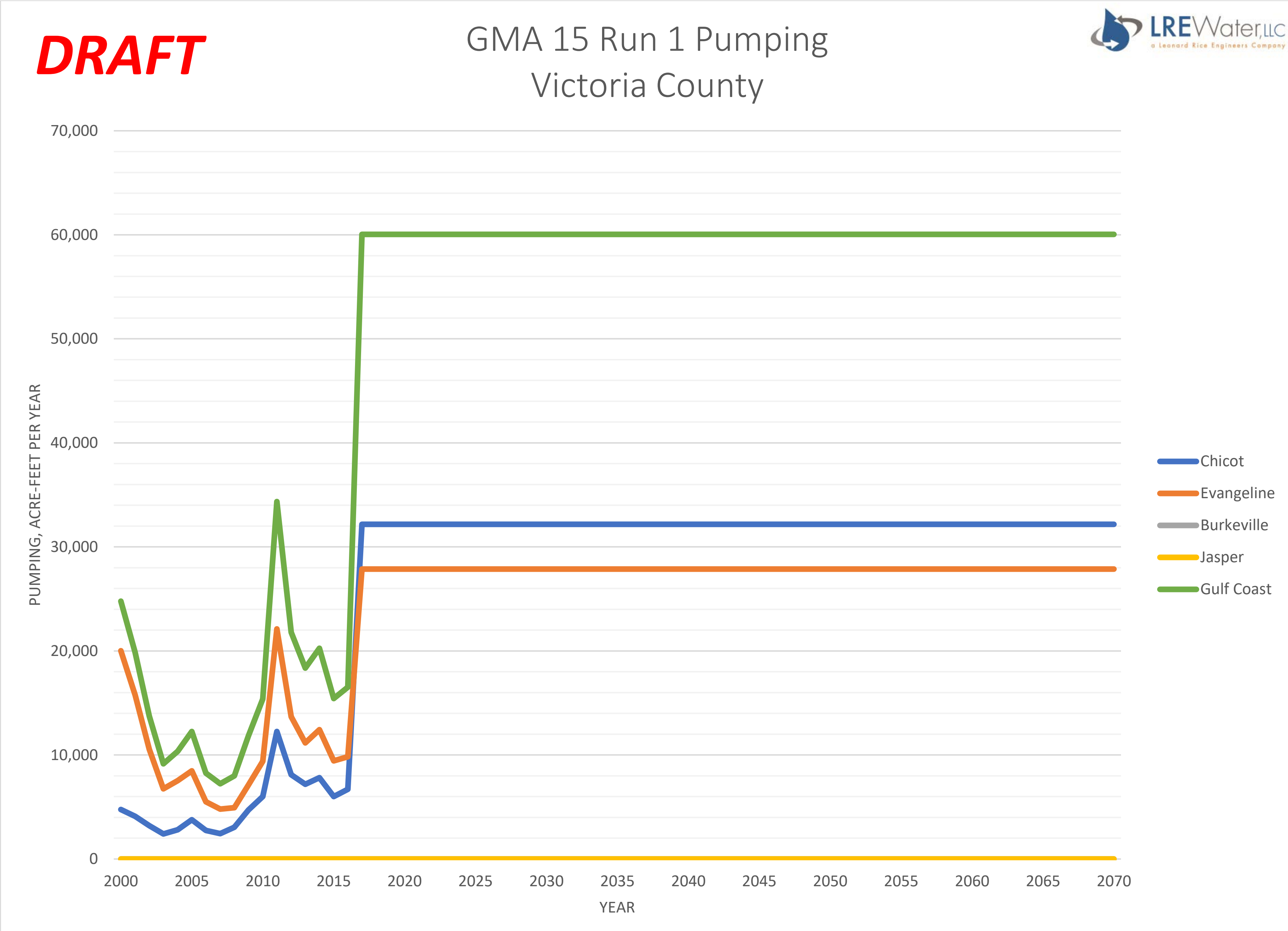


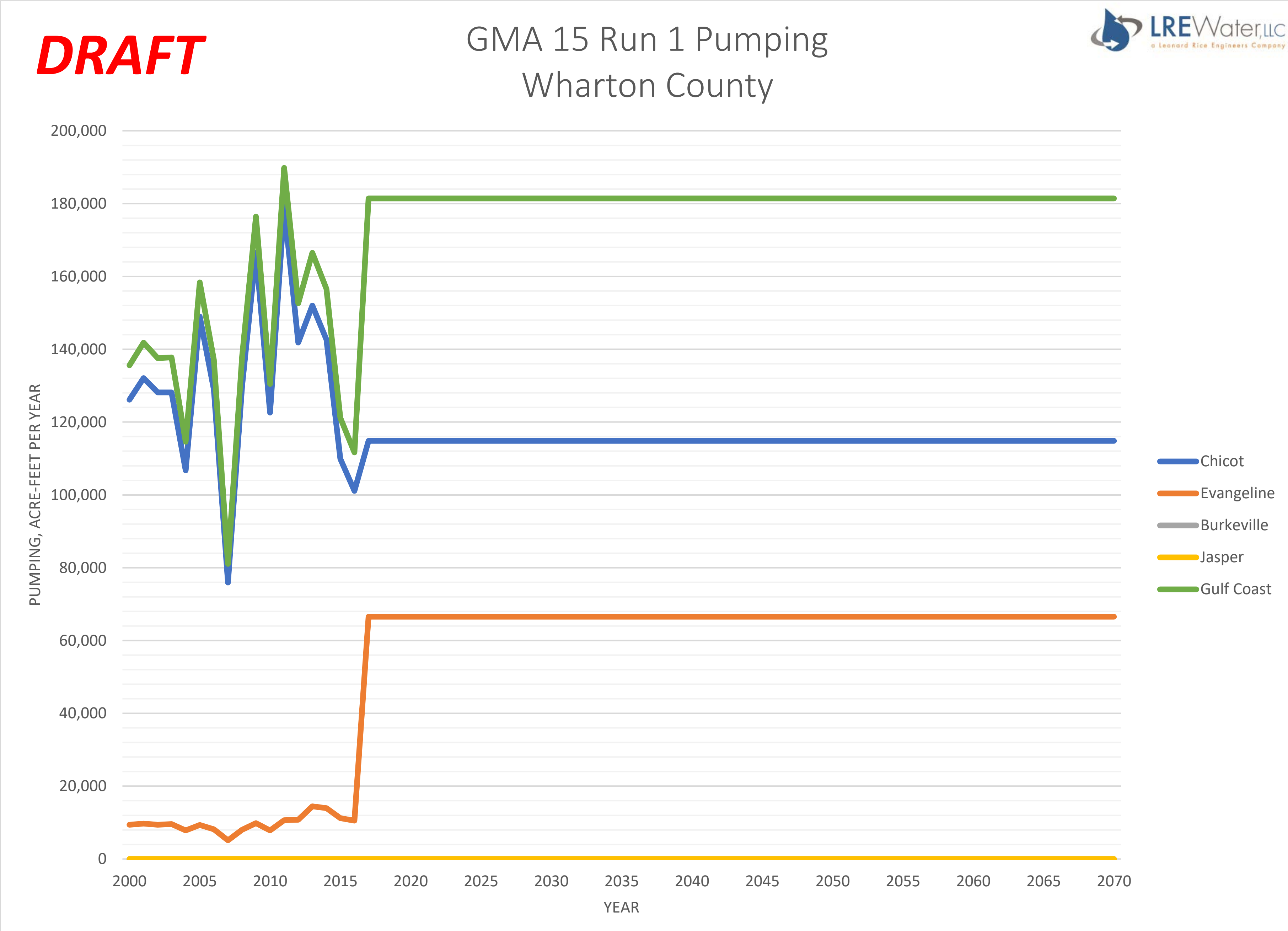
DRAFT
GMA 15 Run 1 Pumping
Lavaca County
LREWater,LLC
25,000
20,000
15,000
10,000
5,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast



DRAFT
GMA 15 Run 1 Pumping
Matagorda County
LREWater, LLC
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast


DRAFT
GMA 15 Run 1 Pumping
Refugio County
LREWater, LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast


DRAFT
GMA 15 Run 1 Pumping
Victoria County
LREWater, LLC
a Leonard Rice Engineers Company
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

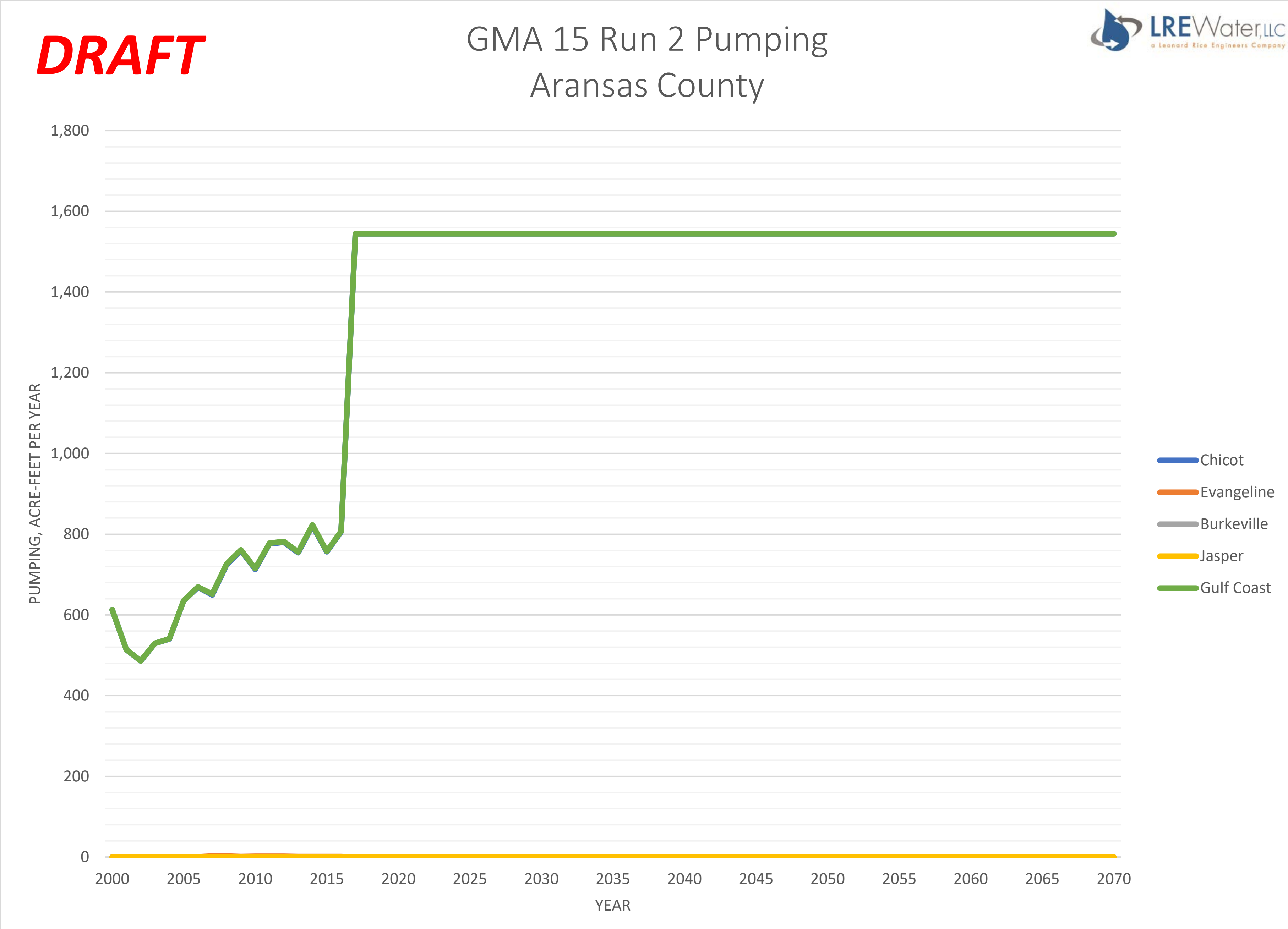

DRAFT
GMA 15 Run 1 Pumping
Wharton County
LREWater,LLC
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

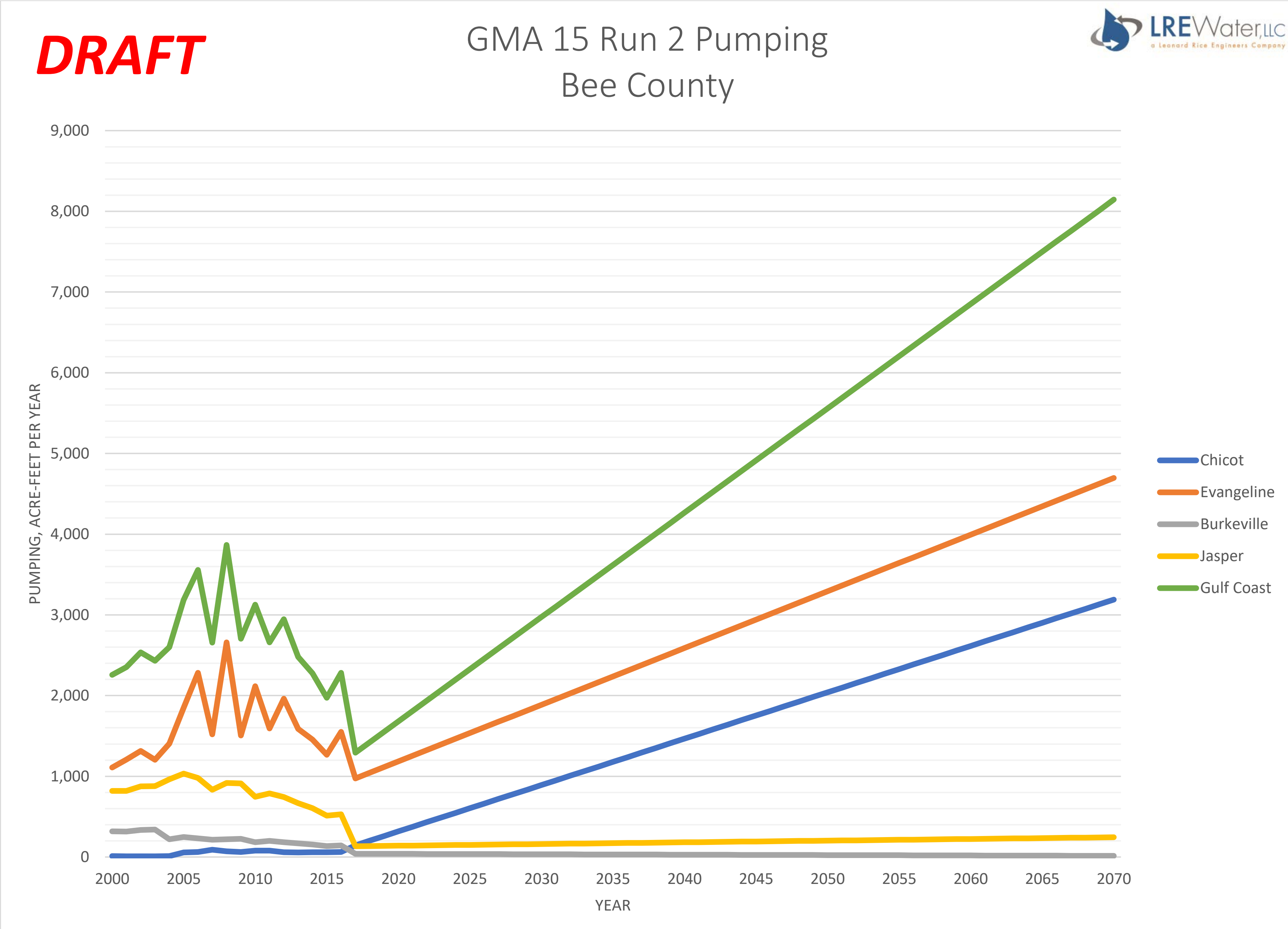
Pumping Amount versus Time

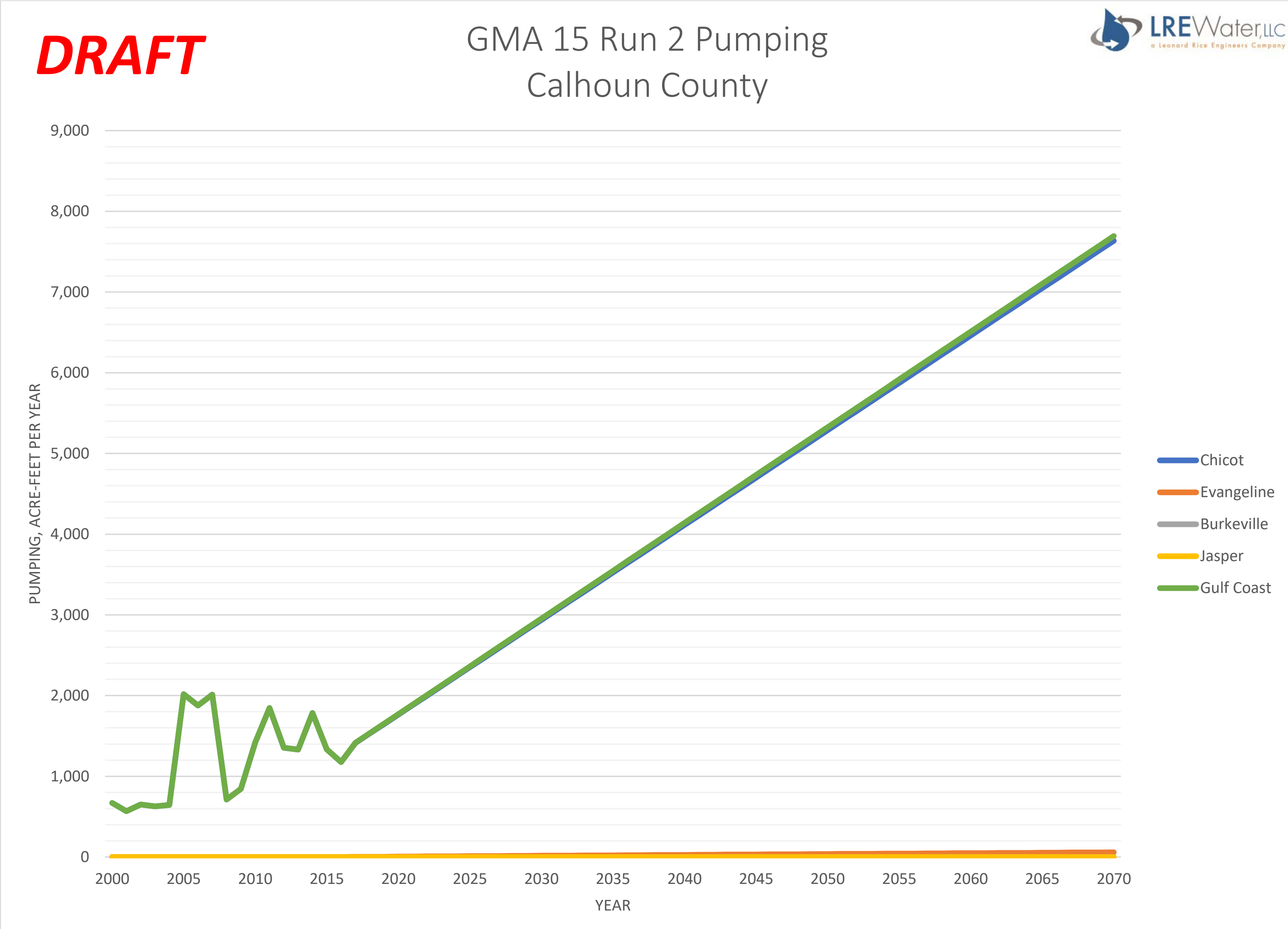
Pumping Scenario: 2

Pumping Distribution Version: 1 & 2

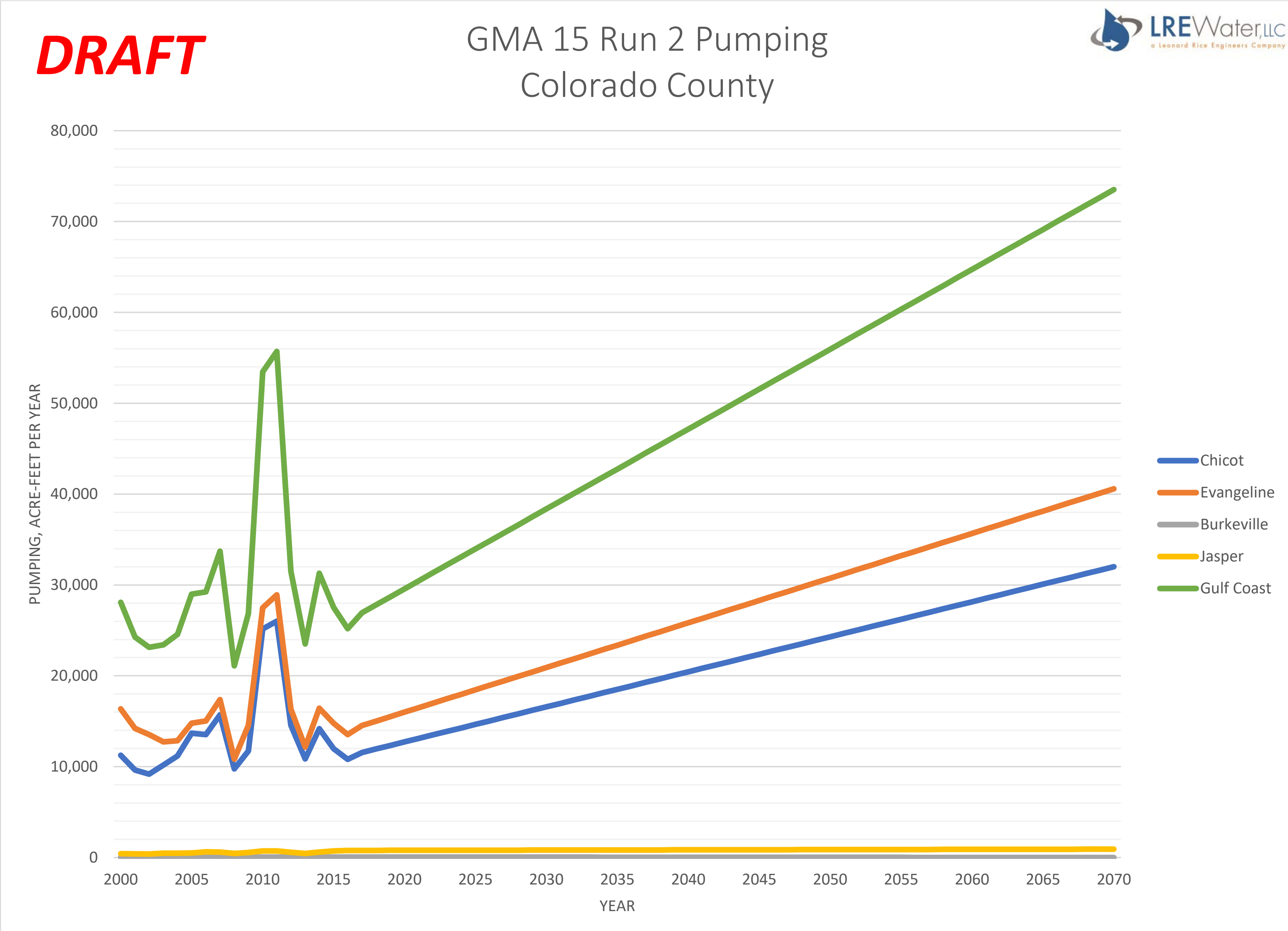
Scenario ID: GMA15_2019_002 (Run 2)

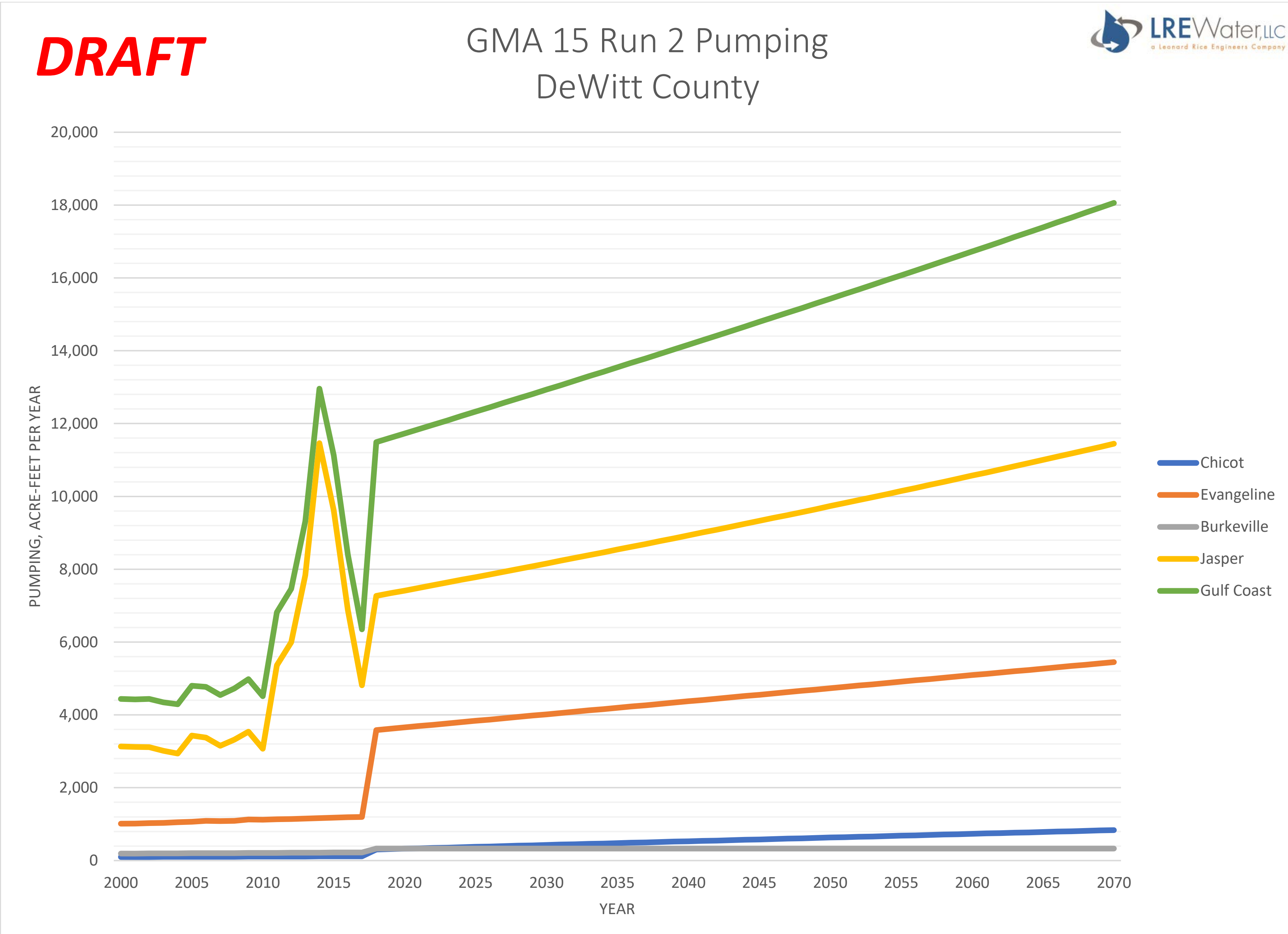

DRAFT
GMA 15 Run 2 Pumping
Aransas County
LREWater, LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast


DRAFT
GMA 15 Run 2 Pumping
Bee County
LREWater, LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

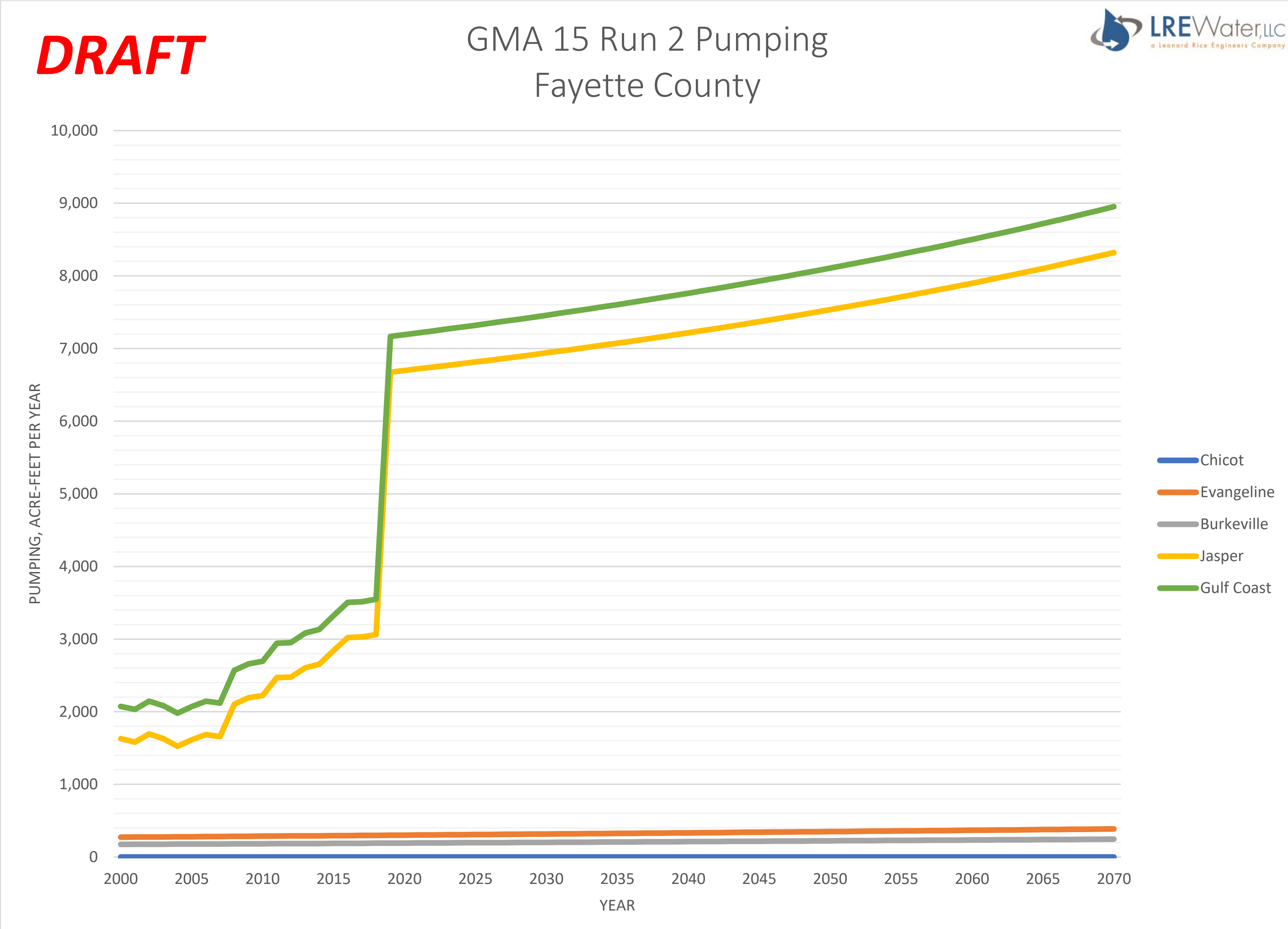


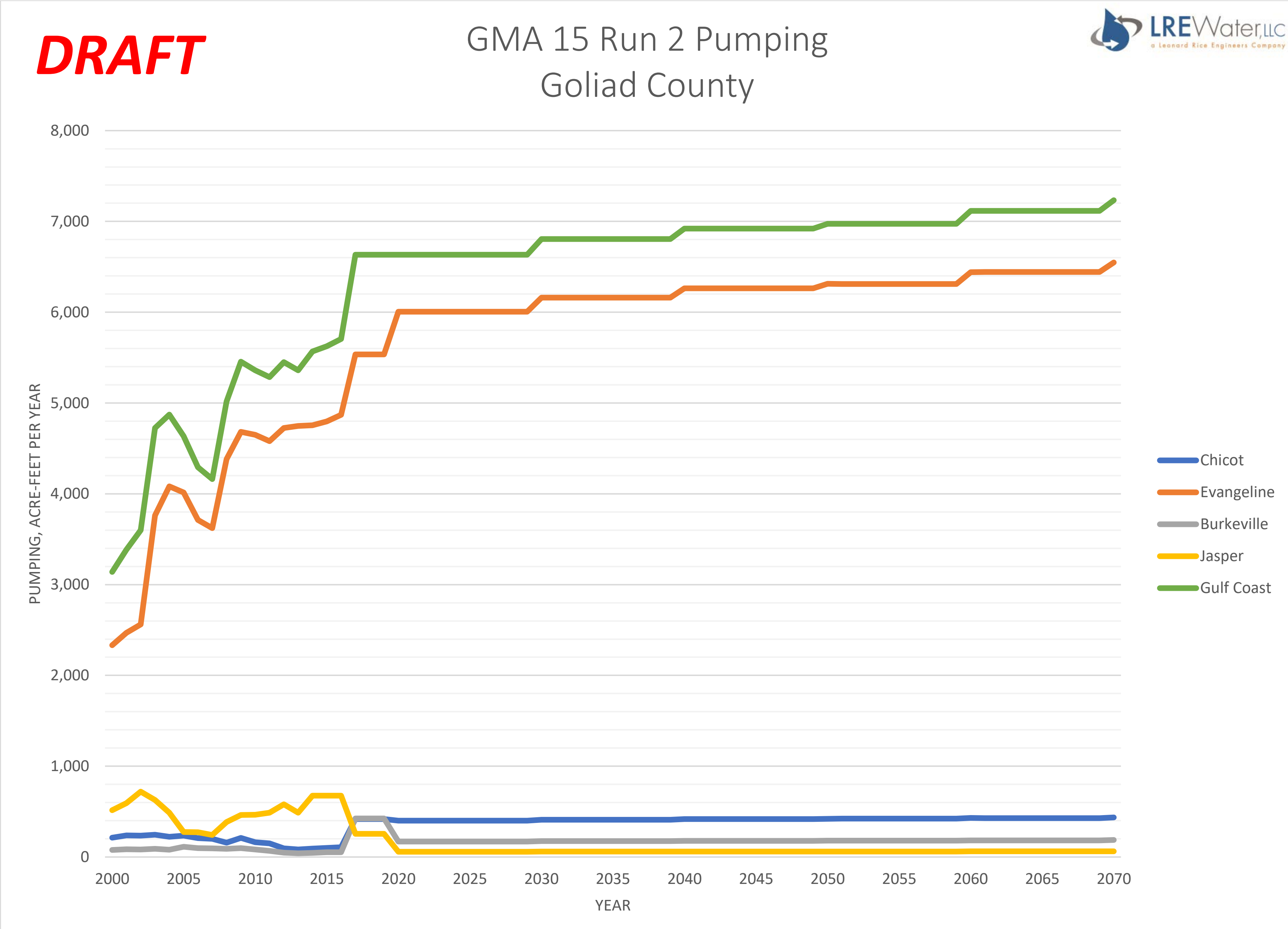
DRAFT
GMA 15 Run 2 Pumping
Calhoun County
LREWater,LLC
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

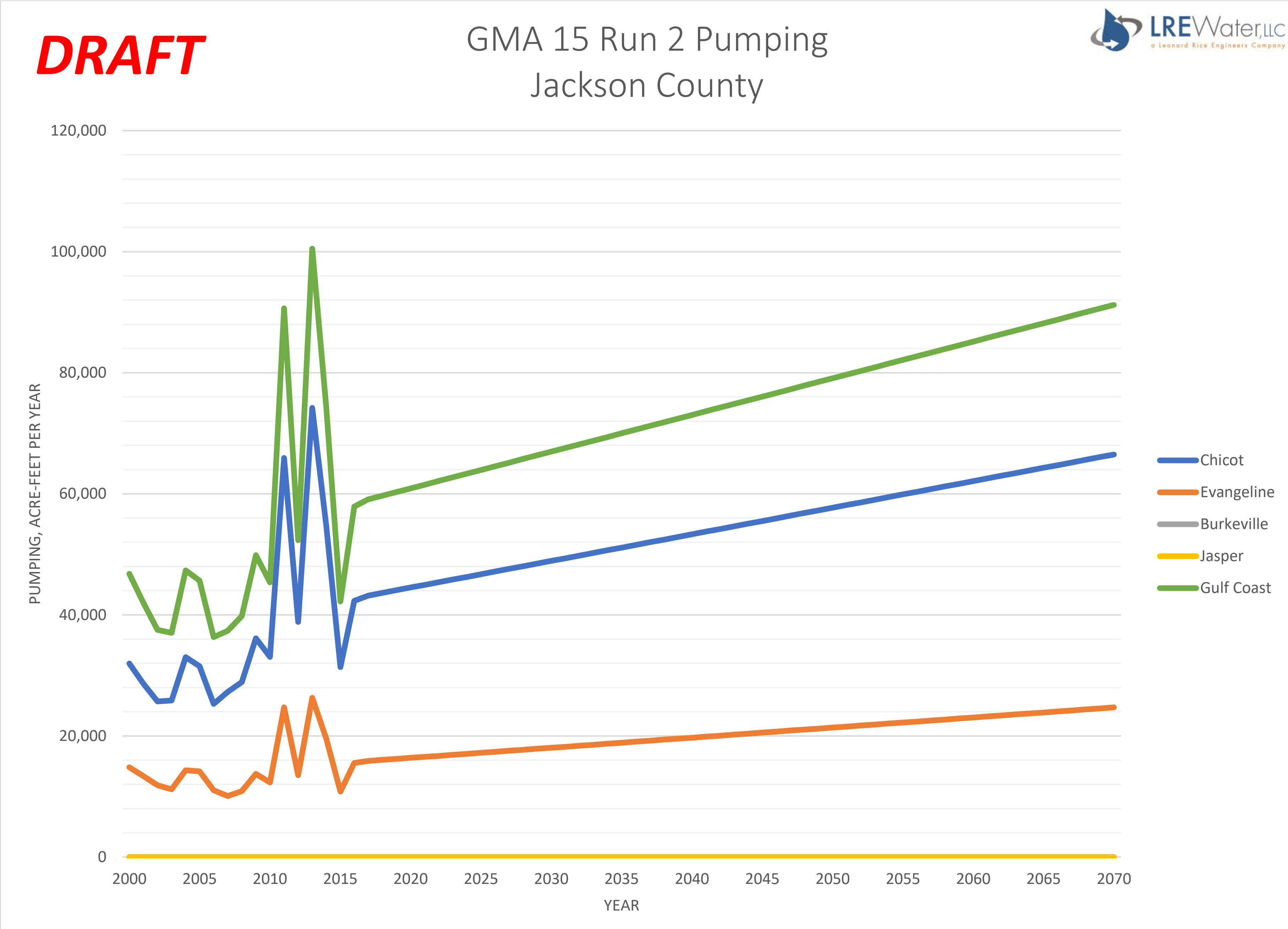

DRAFT
GMA 15 Run 2 Pumping
Colorado County
LREWater, LLC
a Leonard Rice Engineers Company
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

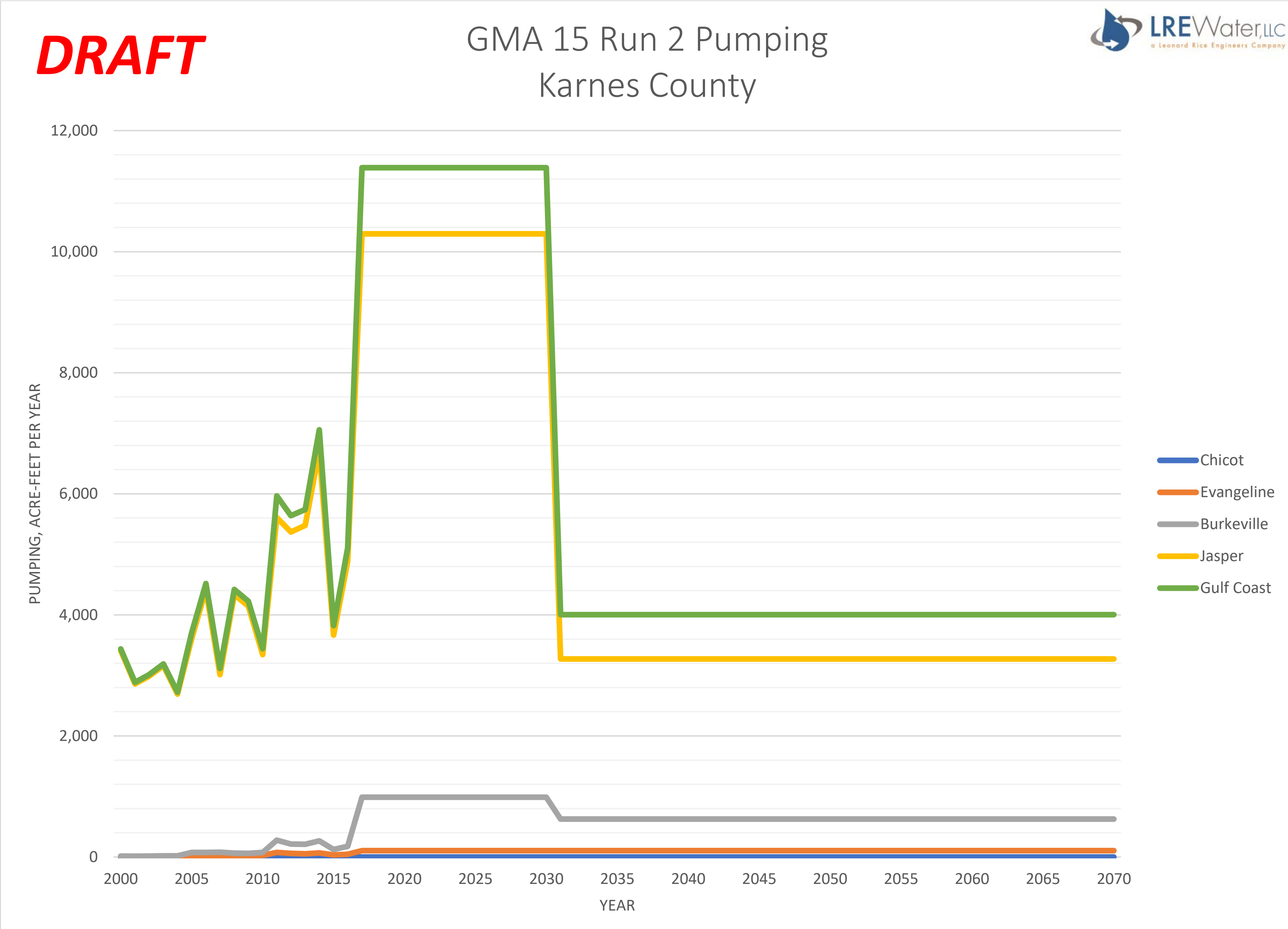


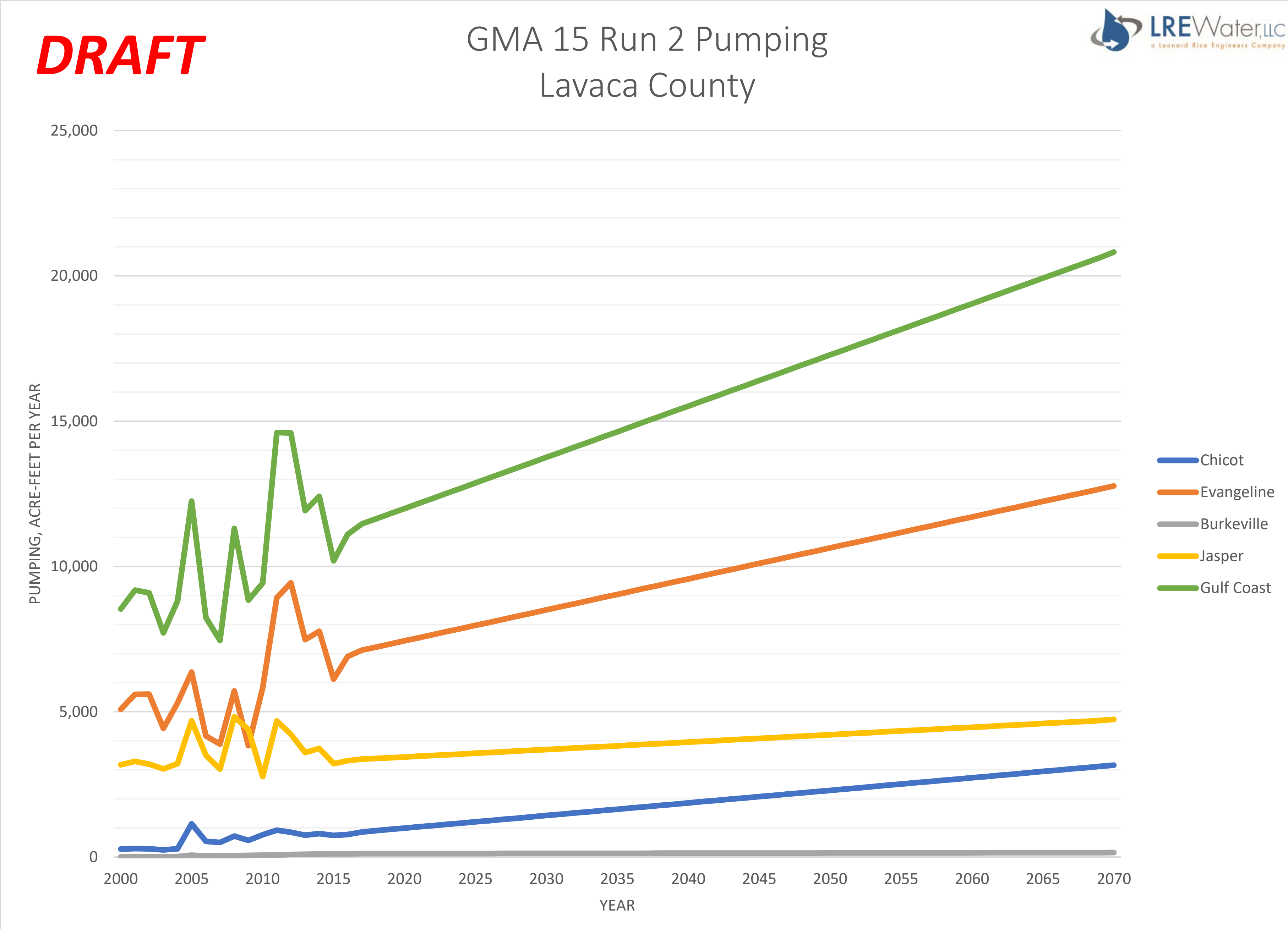
DRAFT
GMA 15 Run 2 Pumping
DeWitt County
LREWater, LLC
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast


DRAFT
GMA 15 Run 2 Pumping
Fayette County
LREWater,LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

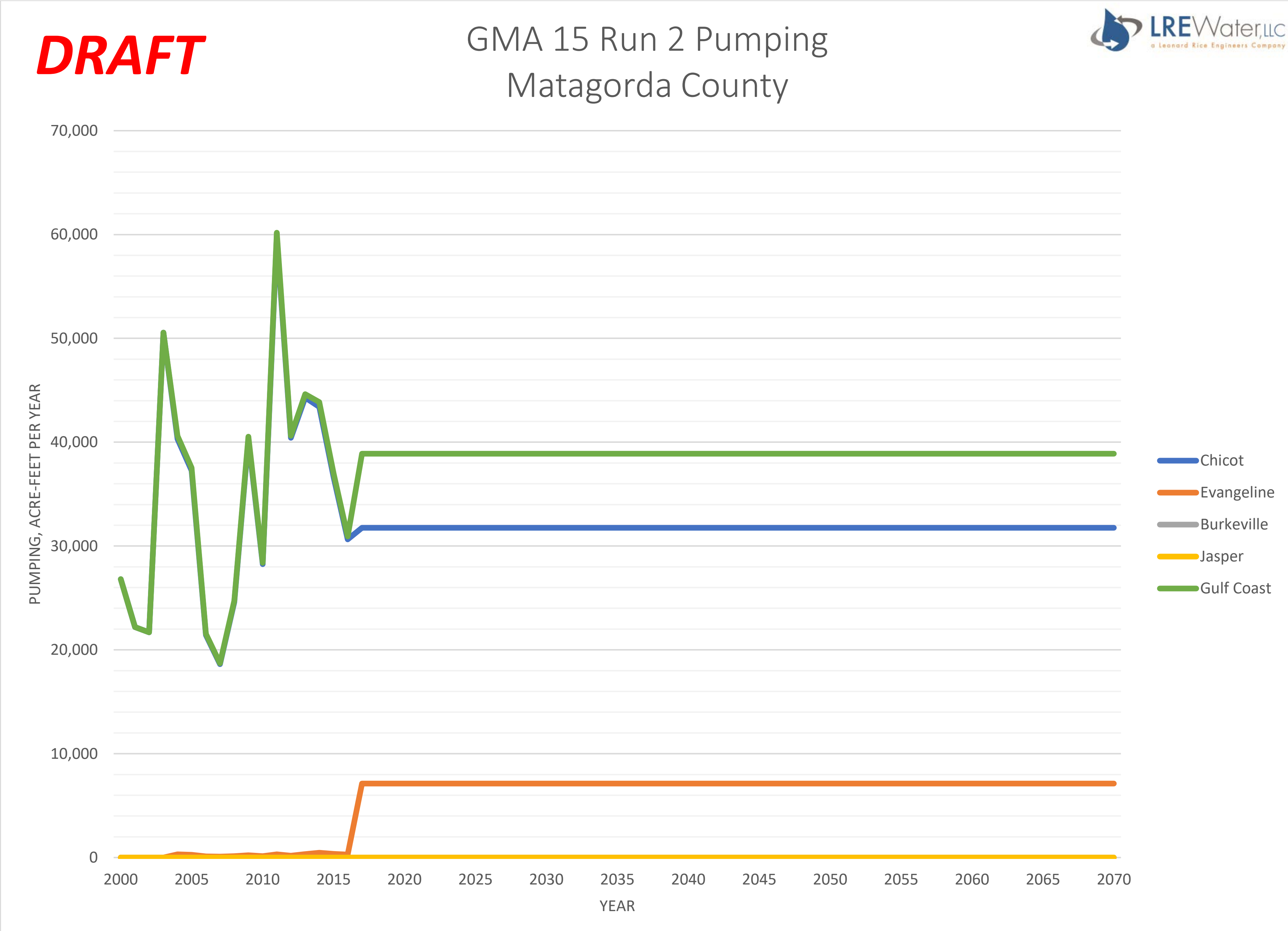

DRAFT
GMA 15 Run 2 Pumping
Goliad County
LREWater, LLC
a Leonard Rice Engineers Company
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast


DRAFT
GMA 15 Run 2 Pumping
Jackson County
LREWater, LLC
a Leonard Rice Engineers Company
120,000
100,000
80,000
60,000
40,000
20,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

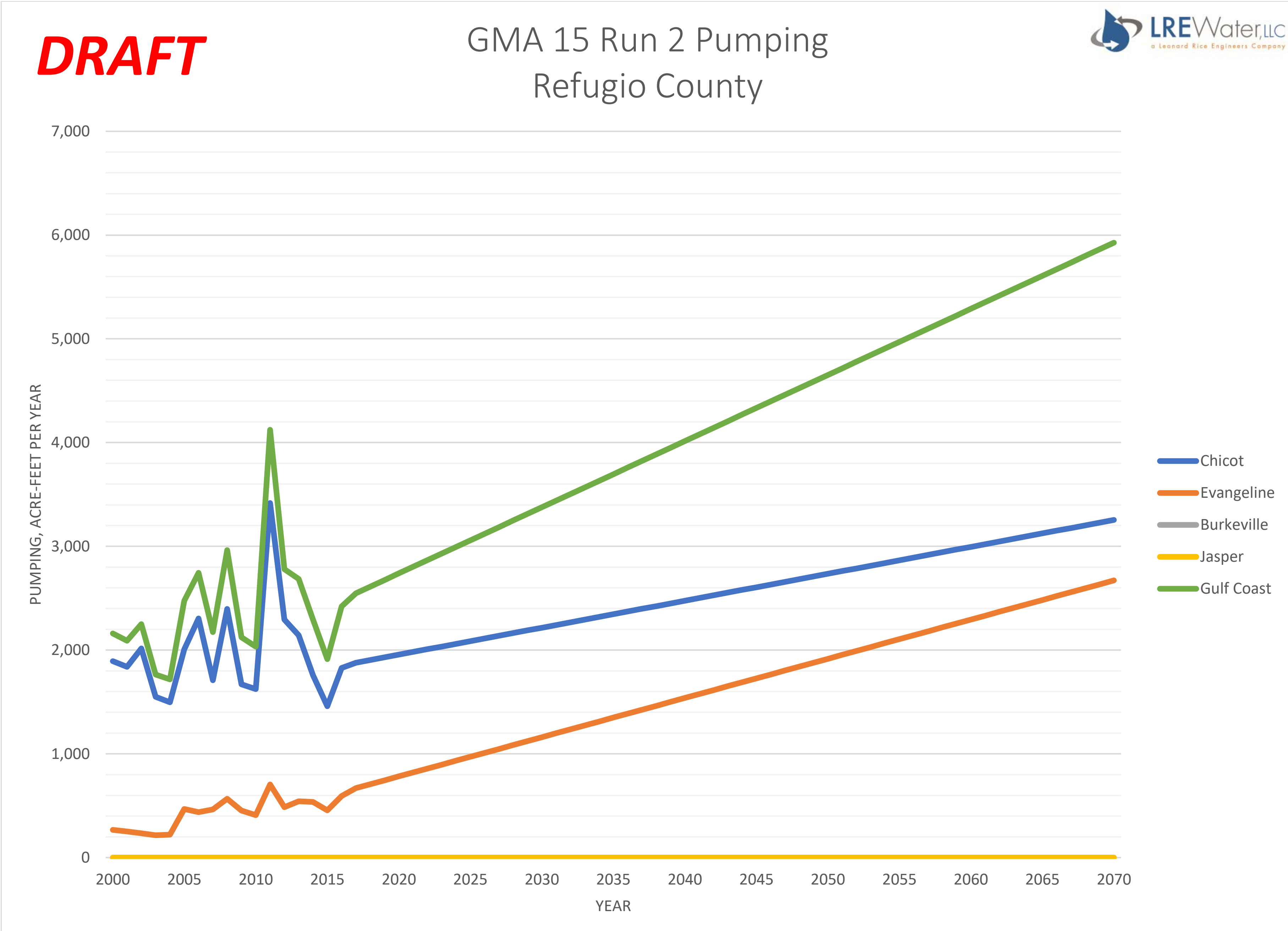

DRAFT
GMA 15 Run 2 Pumping
Karnes County
LREWater,LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
12,000
10,000
8,000
6,000
4,000
2,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast



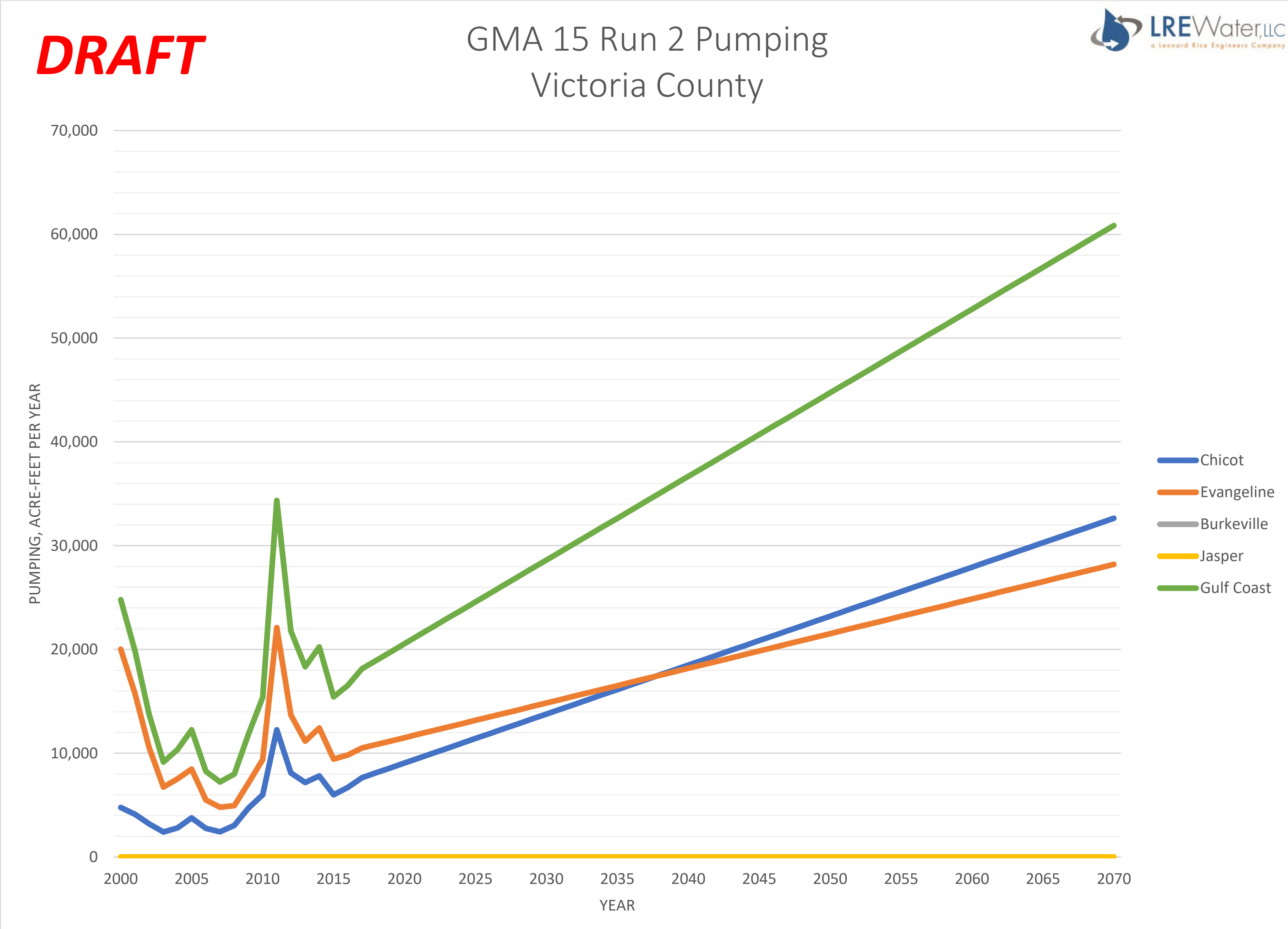
DRAFT
GMA 15 Run 2 Pumping
Lavaca County
LREWater, LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
25,000
20,000
15,000
10,000
5,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

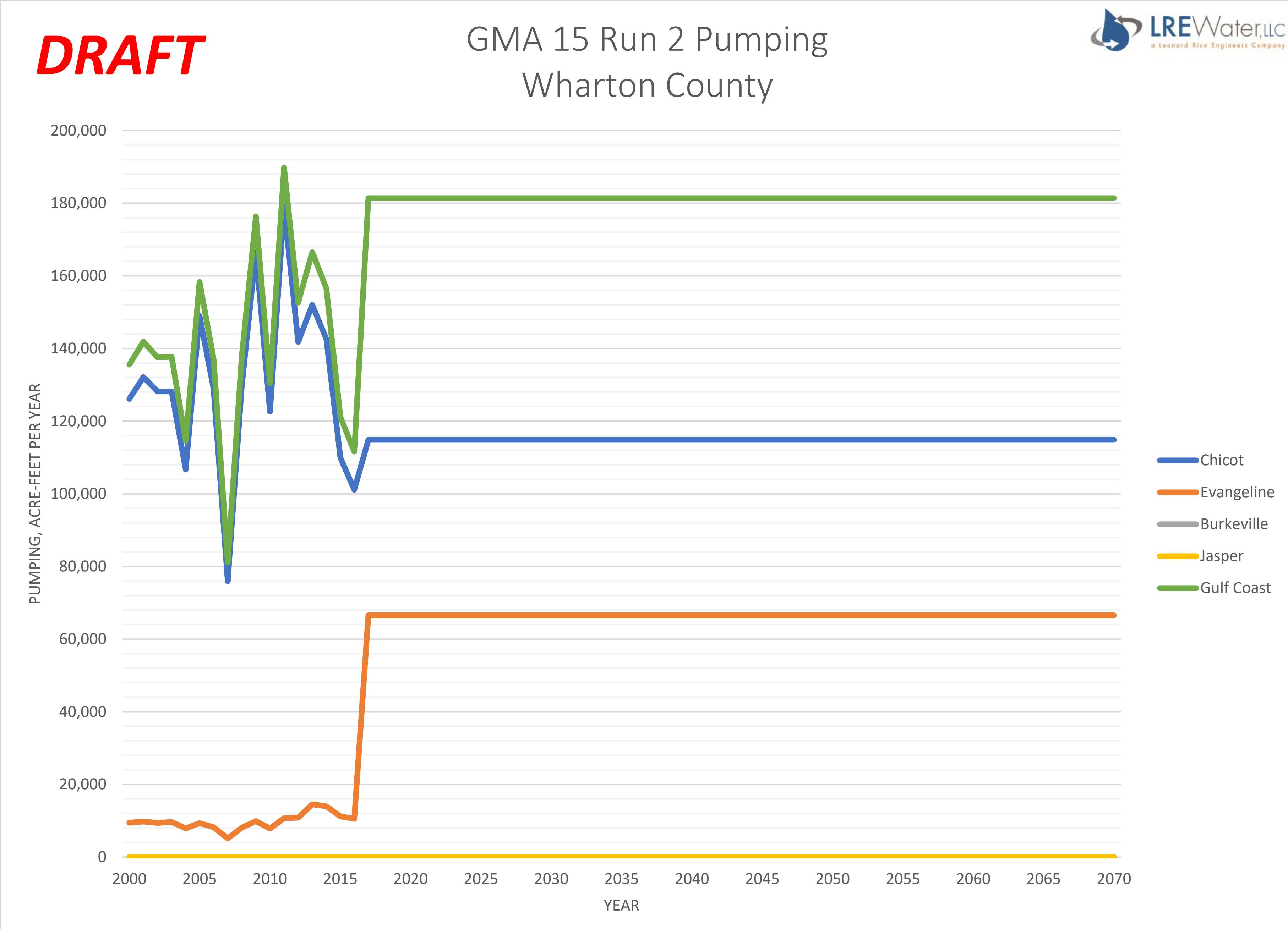


DRAFT
GMA 15 Run 2 Pumping
Matagorda County
LREWater, LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast



DRAFT
GMA 15 Run 2 Pumping
Refugio County
LREWater,LLC
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

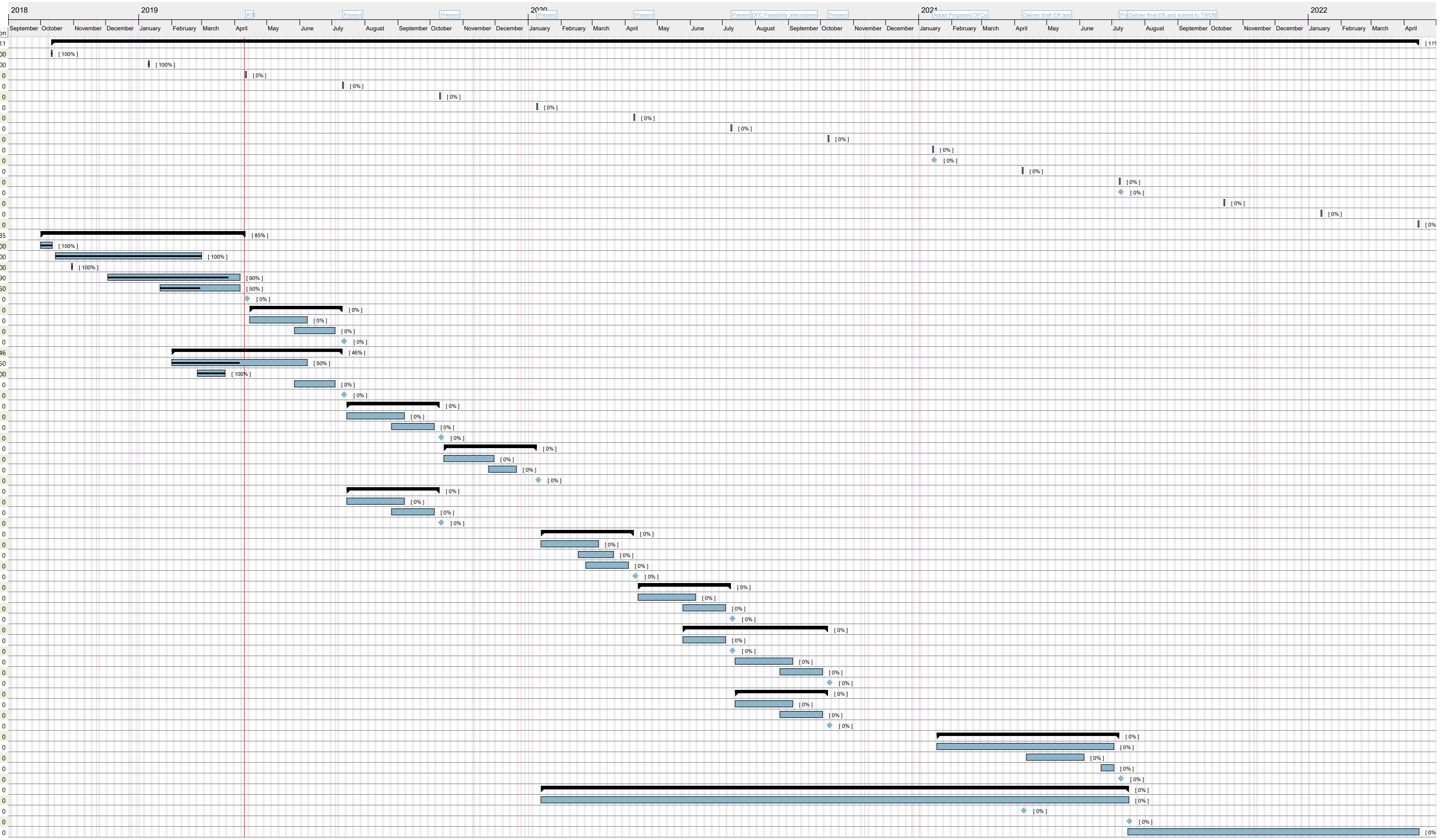

DRAFT
GMA 15 Run 2 Pumping
Victoria County
LREWater,LLC
a Leonard Rice Engineers Company
PUMPING, ACRE-FEET PER YEAR
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast



DRAFT
GMA 15 Run 2 Pumping
Wharton County
LREWater,LLC
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
PUMPING, ACRE-FEET PER YEAR
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
YEAR
Chicot
Evangeline
Burkeville
Jasper
Gulf Coast

Gantt Chart

Outline ...	Name	Begin date	End date	Completion
1	GMA 15 Meetings	10/11/18	4/14/22	11
1.1	Meeting	10/11/18	10/11/18	100
1.2	Meeting	1/10/19	1/10/19	100
1.3	Meeting	4/11/19	4/11/19	0
1.4	Meeting	7/11/19	7/11/19	0
1.5	Meeting	10/10/19	10/10/19	0
1.6	Meeting	1/9/20	1/9/20	0
1.7	Meeting	4/9/20	4/9/20	0
1.8	Meeting	7/9/20	7/9/20	0
1.9	Meeting	10/8/20	10/8/20	0
1.10	Meeting	1/14/21	1/14/21	0
1.11	Adopt Proposed DFCs	1/14/21	1/14/21	0
1.12	Meeting	4/8/21	4/8/21	0
1.13	Meeting	7/8/21	7/8/21	0
1.14	Adopt Final DFCs	7/8/21	7/8/21	0
1.15	Meeting	10/14/21	10/14/21	0
1.16	Meeting	1/13/22	1/13/22	0
1.17	Meeting	4/14/22	4/14/22	0
2	Model Groundwater Availability	10/1/18	4/10/19	85
2.1	Kickoff and summarize current MAG distribution	10/1/18	10/11/18	100
2.2	Update pumping distributions	10/15/18	2/28/19	100
2.3	Meet with TWDB to discuss 3rd Rnd	10/30/18	10/30/18	100
2.4	Perform modeling	12/3/18	4/5/19	90
2.5	Prepare GAM Simulation Report	1/21/19	4/5/19	50
2.6	Present GAM Simulation Report and completed DFC checklist	4/11/19	4/11/19	0
3	Document aquifer uses and conditions	4/15/19	7/10/19	0
3.1	Discuss with members	4/15/19	6/7/19	0
3.2	Prepare Tech Memo	5/27/19	7/3/19	0
3.3	Present	7/11/19	7/11/19	0
4	Document water supply needs & water management strategies	2/1/19	7/10/19	46
4.1	Summarize Existing and New WMSs	2/1/19	6/7/19	50
4.2	Review WMSs representation in Pumping File	2/25/19	3/22/19	100
4.3	Prepare Tech Memo	5/27/19	7/3/19	0
4.4	Present	7/11/19	7/11/19	0
5	Document hydrological conditions	7/15/19	10/9/19	0
5.1	Data collection and summary	7/15/19	9/6/19	0
5.2	Prepare Tech Memo	8/26/19	10/4/19	0
5.3	Present	10/10/19	10/10/19	0
6	Document environmental conditions	10/14/19	1/8/20	0
6.1	Data collection and summary	10/14/19	11/29/19	0
6.2	Prepare Tech Memo	11/25/19	12/20/19	0
6.3	Present	1/9/20	1/9/20	0
7	Document impacts on subsidence	7/15/19	10/9/19	0
7.1	Data collection and summary	7/15/19	9/6/19	0
7.2	Prepare Tech Memo	8/26/19	10/4/19	0
7.3	Present	10/10/19	10/10/19	0
8	Document socioeconomic impacts	1/13/20	4/8/20	0
8.1	Data collection and summary	1/13/20	3/6/20	0
8.2	Calculate change in pumping cost	2/17/20	3/20/20	0
8.3	Prepare Tech Memo	2/24/20	4/3/20	0
8.4	Present	4/9/20	4/9/20	0
9	Document impacts on private property	4/13/20	7/8/20	0
9.1	Data collection and summary	4/13/20	6/5/20	0
9.2	Prepare Tech Memo	5/25/20	7/3/20	0
9.3	Present	7/9/20	7/9/20	0
10	Document DFC feasibility	5/25/20	10/7/20	0
10.1	Data collection for alternatives	5/25/20	7/3/20	0
10.2	Present DFC Feasibility alternatives	7/9/20	7/9/20	0
10.3	DFC Feasibilty Evaluation	7/13/20	9/4/20	0
10.4	Prepare Tech Memo	8/24/20	10/2/20	0
10.5	Present	10/8/20	10/8/20	0
11	Document other relevant information	7/13/20	10/7/20	0
11.1	Data collection and summary	7/13/20	9/4/20	0
11.2	Prepare Tech Memo	8/24/20	10/2/20	0
11.3	Present	10/8/20	10/8/20	0
12	Document relevant comments on proposed DFCs	1/18/21	7/7/21	0
12.1	Support member GCDs	1/18/21	7/2/21	0
12.2	Prepare draft memo of comments	4/12/21	6/4/21	0
12.3	Prepare final memo of comments and proposed revisions	6/21/21	7/2/21	0
12.4	Present	7/8/21	7/8/21	0
13	Explantory Report	1/13/20	7/16/21	0
13.1	Prepare explanatory report	1/13/20	7/16/21	0
13.2	Deliver draft ER text	4/8/21	4/8/21	0
13.3	Deliver final ER and submit to TWDB	7/16/21	7/16/21	0
14	Provide DFC technical support	7/16/21	4/14/22	0



Tasks

Outline number	Name	Begin date	End date	Completion
1	GMA 15 Meetings	10/11/18	4/14/22	11
1.1	Meeting	10/11/18	10/11/18	100
1.2	Meeting	1/10/19	1/10/19	100
1.3	Meeting	4/11/19	4/11/19	0
1.4	Meeting	7/11/19	7/11/19	0
1.5	Meeting	10/10/19	10/10/19	0
1.6	Meeting	1/9/20	1/9/20	0
1.7	Meeting	4/9/20	4/9/20	0
1.8	Meeting	7/9/20	7/9/20	0
1.9	Meeting	10/8/20	10/8/20	0
1.10	Meeting	1/14/21	1/14/21	0
1.11	Adopt Proposed DFCs	1/14/21	1/14/21	0
1.12	Meeting	4/8/21	4/8/21	0
1.13	Meeting	7/8/21	7/8/21	0
1.14	Adopt Final DFCs	7/8/21	7/8/21	0
1.15	Meeting	10/14/21	10/14/21	0
1.16	Meeting	1/13/22	1/13/22	0
1.17	Meeting	4/14/22	4/14/22	0
2	Model Groundwater Availability	10/1/18	4/10/19	85
2.1	Kickoff and summarize current MAG distribution	10/1/18	10/11/18	100
2.2	Update pumping distributions	10/15/18	2/28/19	100
2.3	Meet with TWDB to discuss 3rd Rnd	10/30/18	10/30/18	100
2.4	Perform modeling	12/3/18	4/5/19	90
2.5	Prepare GAM Simulation Report	1/21/19	4/5/19	50
2.6	Present GAM Simulation Report and completed DFC checklist	4/11/19	4/11/19	0
3	Document aquifer uses and conditions	4/15/19	7/10/19	0
3.1	Discuss with members	4/15/19	6/7/19	0
3.2	Prepare Tech Memo	5/27/19	7/3/19	0
3.3	Present	7/11/19	7/11/19	0
4	Document water supply needs & water management strategies	2/1/19	7/10/19	46
4.1	Summarize Existing and New WMSs	2/1/19	6/7/19	50
4.2	Review WMSs representation in Pumping File	2/25/19	3/22/19	100
4.3	Prepare Tech Memo	5/27/19	7/3/19	0
4.4	Present	7/11/19	7/11/19	0
5	Document hydrological conditions	7/15/19	10/9/19	0
5.1	Data collection and summary	7/15/19	9/6/19	0
5.2	Prepare Tech Memo	8/26/19	10/4/19	0

Tasks

Outline number	Name	Begin date	End date	Completion
5.3	Present	10/10/19	10/10/19	0
6	Document environmental conditions	10/14/19	1/8/20	0
6.1	Data collection and summary	10/14/19	11/29/19	0
6.2	Prepare Tech Memo	11/25/19	12/20/19	0
6.3	Present	1/9/20	1/9/20	0
7	Document impacts on subsidence	7/15/19	10/9/19	0
7.1	Data collection and summary	7/15/19	9/6/19	0
7.2	Prepare Tech Memo	8/26/19	10/4/19	0
7.3	Present	10/10/19	10/10/19	0
8	Document socioeconomic impacts	1/13/20	4/8/20	0
8.1	Data collection and summary	1/13/20	3/6/20	0
8.2	Calculate change in pumping cost	2/17/20	3/20/20	0
8.3	Prepare Tech Memo	2/24/20	4/3/20	0
8.4	Present	4/9/20	4/9/20	0
9	Document impacts on private property	4/13/20	7/8/20	0
9.1	Data collection and summary	4/13/20	6/5/20	0
9.2	Prepare Tech Memo	5/25/20	7/3/20	0
9.3	Present	7/9/20	7/9/20	0
10	Document DFC feasibility	5/25/20	10/7/20	0
10.1	Data collection for alternatives	5/25/20	7/3/20	0
10.2	Present DFC Feasibility alternatives	7/9/20	7/9/20	0
10.3	DFC Feasibilty Evaluation	7/13/20	9/4/20	0
10.4	Prepare Tech Memo	8/24/20	10/2/20	0
10.5	Present	10/8/20	10/8/20	0
11	Document other relevant information	7/13/20	10/7/20	0
11.1	Data collection and summary	7/13/20	9/4/20	0
11.2	Prepare Tech Memo	8/24/20	10/2/20	0
11.3	Present	10/8/20	10/8/20	0
12	Document relevant comments on proposed DFCs	1/18/21	7/7/21	0
12.1	Support member GCDs	1/18/21	7/2/21	0
12.2	Prepare draft memo of comments	4/12/21	6/4/21	0
12.3	Prepare final memo of comments and proposed revisions	6/21/21	7/2/21	0
12.4	Present	7/8/21	7/8/21	0
13	Explantory Report	1/13/20	7/16/21	0

Tasks

Outline number	Name	Begin date	End date	Completion
13.1	Prepare explanatory report	1/13/20	7/16/21	0
13.2	Deliver draft ER text	4/8/21	4/8/21	0
13.3	Deliver final ER and submit to TWDB	7/16/21	7/16/21	0
14	Provide DFC technical support	7/16/21	4/14/22	0

Appendix 3.3 — October 8, 2019 Discussion of Modeling Updates

TECHNICAL MEMORANDUM

TO:	Groundwater Management Area 15
FROM:	Michael R. Keester, P.G.
SUBJECT:	Summary of Third Round of Joint Planning Modeling to Date
DATE:	October 8, 2019

To-date we have performed three predictive modeling scenarios. These scenarios are:

1. **Scenario ID: GMA15_2019_001 –** Constant pumping at the anticipated 2070 amount with probable development or adjustments to modeled pumping as identified by District representatives.
2. **Scenario ID: GMA15_2019_002 –** Ramping pumping from the end of 2016 up to the 2070 amount with probable development or adjustments to modeled pumping as identified by District representatives.
3. **Scenario ID: GMA15_2019_003 –** Adding potential new pumping at locations designated by GCD representatives. We added the additional pumping to both of the first two scenarios to evaluate how it would affect the calculated drawdown. This simulation added a total of 75,000 acre-feet per year of pumping to the model by 2070 as designated on the attached map.

Based on feedback, we developed these scenarios with predictive pumping amounts and appended the predictive pumping to the transition period pumping (1/1/2000 through 12/31/2016 as discussed in our January 10, 2019 update). The transition period pumping amounts are based on data from the districts and the Texas Water Development Board (TWDB, 2019b). Using the aquifer code, depth, and/or completion data for each well in the TWDB databases (TWDB, 2019a; TWDB, 2019c) along with the structure of the aquifer layers (Waterstone, 2003; Chowdhury and others, 2004), we determined the layer of the Gulf Coast Aquifer System in which each well was likely producing. Using the location and completion information from the wells we developed a revised areal distribution of pumping reflecting actual known well locations. We then prepared two predictive versions of each scenario to reflect differing areal distributions of pumping. The areal distributions are:

1. **Scenario version 1** – Areal and vertical distribution is the same as the 2nd round MAG pumping file
2. **Scenario version 2** – Areal and vertical distribution reflects the distribution of pumpage from the revised transition period pumping

The simulations and versions resulted in a total of 8 different pumping scenarios. Table 1 summarizes the primary differences between the simulations and provides a general description of the pumping distribution in each scenario. The actual distribution of pumping in each scenario varies due to well locations, pumping amounts per aquifer layer, and district input on how pumping should occur.

Table 1. Predictive modeling scenarios and a general description of the pumping distribution for the scenario.

Scenario ID	General Pumping Distribution Description*
GMA15_2019_001_v1	• Constant pumping rate • 2nd round MAG areal distribution
GMA15_2019_001_v2	• Constant pumping rate • Revised transition period areal distribution
GMA15_2019_002_v1	• Ramped pumping rate • 2nd round MAG areal distribution
GMA15_2019_002_v2	• Ramped pumping rate • Revised transition period areal distribution
GMA15_2019_003_001_v1	• Constant pumping rate • 2nd round MAG areal distribution • Adding potential new pumping at GCD designated locations
GMA15_2019_003_001_v2	• Constant pumping rate • Revised transition period areal distribution • Adding potential new pumping at GCD designated locations
GMA15_2019_003_002_v1	• Ramped pumping rate • 2nd round MAG areal distribution • Adding potential new pumping at GCD designated locations
GMA15_2019_003_002_v2	• Ramped pumping rate • Revised transition period areal distribution • Adding potential new pumping at GCD designated locations

*The general description does not apply in all cases. For example, pumping may not be ramped up in all cases.

Simulated Pumping

In the model, the Gulf Coast Aquifer System is divided into four layers representing the Chicot, Evangeline, Burkeville, and Jasper. After developing the pumping file, we examined it to determine the input pumping values per aquifer layer along with the combined Chicot and Evangeline and the Gulf Coast Aquifer System as a whole. The latter two distributions reflect the Modeled Available Groundwater determinations from the previous round of joint planning. Attached are charts and tables of the pumping input for each scenario per the pumping file for each district and county within GMA 15.

Comparing scenario version 2 to version 1 of each simulation, we found that the redistribution of pumping created some variances from the amount of pumping in the 2nd round MAG pumping file. Most of the identified variances are attributed to how the pumping was redistributed. For example, pumping from a well near a county line may get assigned to a model cell that is assigned to a neighboring county. Nonetheless, the 2070 total Gulf Coast Aquifer System amounts are similar between the two versions and can be reassigned as needed for a final simulation to be adopted. We did find that despite the small variances in pumping amounts, the simulation results are very useful for considering the differences in the pumping configurations.

Importantly, the values presented in the results only reflect the portion of the district or county that is within GMA 15. Model cells that the TWDB has designated outside of the GMA were not included in the calculations. This caveat primarily affects Bee County and Bee GCD which are only partially located within GMA 15.

After performing the simulations, we also evaluated the model budget file to verify that the pumping input amounts were fully realized in the simulations. We found that the pumping output was less than the pumping input in some cases. Typically, the difference between the pumping input and the pumping output was a decrease of less than 1,000 acre-feet per year. The decreases in pumping occur due to model cells going dry which typically occurs in the shallower parts of the aquifers. Attached are tables showing the pumping input, pumping output, difference between the pumping input and output, and the percent difference between the pumping input and output for each district and county within GMA 15.

Simulation Results

As discussed during the GMA 15 meeting on April 11, 2019, for the first two scenarios, we ran the model 8 times with recharge amounts ranging from 25 to 200 percent of the baseline amount. For the baseline amount, we used the recharge file from the 2nd round modeling. Changes to the recharge input were applied to the entire model domain to illustrate the regional effects of decreased inflow. Regarding the simulated recharge, the average drawdown typically decreases with the higher amounts of recharge. Some counties, such as Bee, are much more sensitive to changes in modeled recharge with the change in average drawdown being much greater between each percent of baseline recharge. In other areas, particularly those that are more downdip (that is, closer to the Gulf of Mexico), the modeled recharge does not significantly affect the drawdown due to pumping. Since the modeled results are not typically very sensitive to changes in the simulated recharge, our current analysis is limited to simulations with the baseline recharge amount.

To illustrate the draft modeling results, we prepared charts and tables of the simulated average drawdown in each district and county within GMA 15. 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 the Gulf Coast Aquifer System 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 15, 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 using water levels from the end of the calibration period (1/1/2000) and from the end of the updated transition period pumping (12/31/2016). In addition, these charts illustrate the calculated average drawdown in each layer of the Gulf Coast Aquifer System, the combined Chicot and Evangeline aquifers, and the Gulf Coast Aquifer System as a whole. Negative average drawdown values indicate water level rise from the baseline water level.

As previously discussed, for some counties, the difference in average drawdown calculation from 1/1/2000 or 12/31/2016 is relatively small. However, we do see several instances where the difference between the baseline dates is significant. One example is in Jackson County where the difference in average drawdown between the two baseline dates in the Evangeline is more than 15 feet in most of the scenarios. The distribution of pumping in the model can be a significant factor in the calculation of average drawdown. One example of the significance is in Coastal Bend GCD/Wharton County where the revised transition period pumping along with well locations and depths resulted in about 50,000 acre-feet per year of pumping moving from the Evangeline to the Chicot.

Attached are tables with the average drawdown values on 12/31/2070 under the baseline recharge scenario. These tables provide the exact values represented on the average drawdown charts and provide an opportunity for direct comparison with the adopted DFCs. When looking at the DFC values compared to the current scenarios, we observe that the updated transition pumpage and a more recent baseline date would cause potentially significant changes to the DFCs in some GCDs.

Recommendations

One source of the changes to the DFCs when using a more recent baseline date is that simulated water levels in some areas rose when updating the transition period pumping. That is, actual pumping in some areas was less than the previously simulated pumping and updating the transition period to better reflect actual pumping caused the water levels to rise until simulated pumping increased in 2017. Despite the potential change, we recommend using the end of 2016 simulated water level as the baseline simulated water level for this round of planning.

We also recommend using one of the constant pumping scenarios (GMA15_2019_001 or GMA15_2019_003_001) for the predictive simulations. The constant pumping amount will provide consistency throughout the planning period. In addition, there is typically a small difference in the average drawdown results between the ramped-up pumping and the constant pumping.

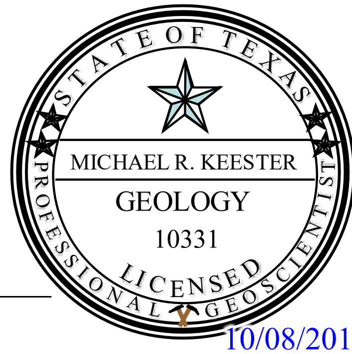
For the distribution of pumping, we recommend using the revised transition period pumping. The revised transition period distribution was developed using well locations, well completion information, aquifer designations for wells, and aquifer structure data from District and TWDB databases. The revised pumping distribution is more reflective of the available data and should also better reflect the distribution of pumping in the new GAM being developed for the Gulf Coast Aquifer System.

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).

Pocket Seal



10/08/2019

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

References

Chowdhury, A.H., Wade, S., Mace, R.E., and Ridgeway, C., 2004, Groundwater Availability Model of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999: Model Report, 108 p.

Texas Water Development Board, 2019a, Groundwater Database Reports, http://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp, accessed February 2019.

Texas Water Development Board, 2019b, Historical Groundwater Pumpage - SumFinal_CountySumPumpage, http://www.twdb.texas.gov/waterplanning/waterusesurvey/historical-pumpage.asp, accessed February 2019.

Texas Water Development Board, 2019c, Submitted Drillers Reports Database Download, http://www.twdb.state.tx.us/groundwater/data/drillersdb.asp, accessed February 2019.

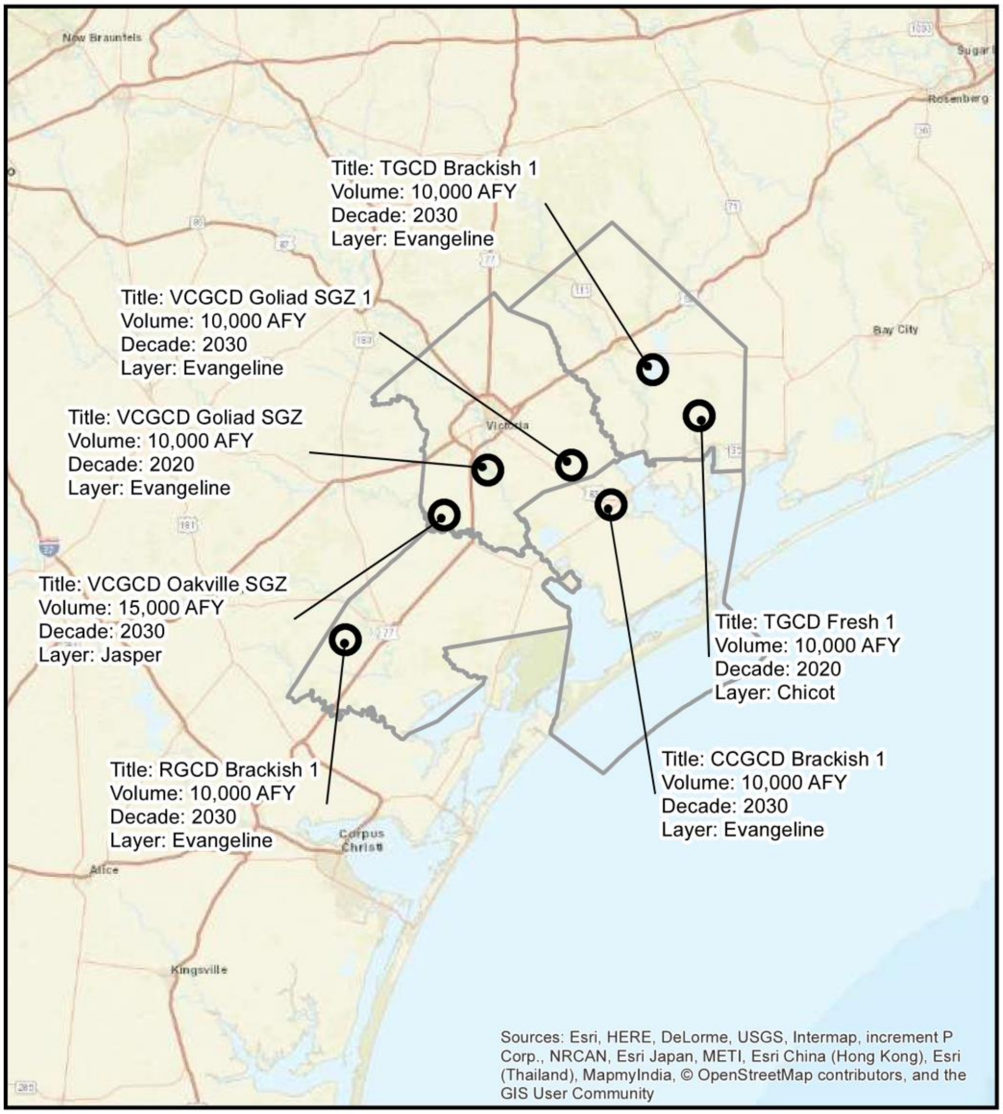
Waterstone, 2003, Groundwater Availability of the Central Gulf Coast Aquifer: Numerical Simulations to 2050 Central Gulf Coast, Texas:

Attachment 1 –
Map from Victoria County Groundwater Conservation District of Added Pumping for Scenario GMA15_2019_003

Details of Potential Pumping Sites for Use with the 3rd Cycle of DFC Development in GMA 15

1 inch = 125,000 feet

Date: 2/7/2019



Disclaimer:The records, files, and documents maintained by the Victoria County Groundwater Conservation District (District) contain data and information from many sources. The District can not guarantee the accuracy or validity of such data and information. The District specifically disclaims any warranty or guarantee relating to the accuracy or validity of any such data and information. All users of such data and information should conduct such investigation and review as necessary to independently determine the accuracy or validity of such data and information.

Attachment 2 –
Scenario Pumping Tables

Attachment 2a –
Scenario Pumping Input Tables

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Aransas County GCD/ Aransas County	001	1	12/31/2020	1,544	0	1,544	0	0	1,544
			12/31/2030	1,544	0	1,544	0	0	1,544
			12/31/2040	1,544	0	1,544	0	0	1,544
			12/31/2050	1,544	0	1,544	0	0	1,544
			12/31/2060	1,544	0	1,544	0	0	1,544
			12/31/2070	1,544	0	1,544	0	0	1,544
		2	12/31/2020	1,372	2	1,374	0	0	1,374
			12/31/2030	1,674	2	1,676	0	0	1,676
			12/31/2040	1,674	2	1,676	0	0	1,676
			12/31/2050	1,675	2	1,677	0	0	1,677
			12/31/2060	1,675	2	1,677	0	0	1,677
			12/31/2070	1,675	2	1,677	0	0	1,677
	002	1	12/31/2020	1,544	0	1,544	0	0	1,544
			12/31/2030	1,544	0	1,544	0	0	1,544
			12/31/2040	1,544	0	1,544	0	0	1,544
			12/31/2050	1,544	0	1,544	0	0	1,544
			12/31/2060	1,544	0	1,544	0	0	1,544
			12/31/2070	1,544	0	1,544	0	0	1,544
		2	12/31/2020	1,372	2	1,374	0	0	1,374
			12/31/2030	1,674	2	1,676	0	0	1,676
			12/31/2040	1,674	2	1,676	0	0	1,676
			12/31/2050	1,675	2	1,677	0	0	1,677
			12/31/2060	1,675	2	1,677	0	0	1,677
			12/31/2070	1,675	2	1,677	0	0	1,677
	003_001	1	12/31/2020	1,544	0	1,544	0	0	1,544
			12/31/2030	1,544	0	1,544	0	0	1,544
			12/31/2040	1,544	0	1,544	0	0	1,544
			12/31/2050	1,544	0	1,544	0	0	1,544
			12/31/2060	1,544	0	1,544	0	0	1,544
			12/31/2070	1,544	0	1,544	0	0	1,544
		2	12/31/2020	1,372	2	1,374	0	0	1,374
			12/31/2030	1,674	2	1,676	0	0	1,676
			12/31/2040	1,674	2	1,676	0	0	1,676
			12/31/2050	1,675	2	1,677	0	0	1,677
			12/31/2060	1,675	2	1,677	0	0	1,677
			12/31/2070	1,675	2	1,677	0	0	1,677
	003_002	1	12/31/2020	1,544	0	1,544	0	0	1,544
			12/31/2030	1,544	0	1,544	0	0	1,544
			12/31/2040	1,544	0	1,544	0	0	1,544
			12/31/2050	1,544	0	1,544	0	0	1,544
			12/31/2060	1,544	0	1,544	0	0	1,544
			12/31/2070	1,544	0	1,544	0	0	1,544
		2	12/31/2020	1,372	2	1,374	0	0	1,374
			12/31/2030	1,674	2	1,676	0	0	1,676
			12/31/2040	1,674	2	1,676	0	0	1,676
			12/31/2050	1,675	2	1,677	0	0	1,677
			12/31/2060	1,675	2	1,677	0	0	1,677
			12/31/2070	1,675	2	1,677	0	0	1,677

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Bee GCD/ Bee County	001	1	12/31/2020	3,132	4,617	7,749	14	243	8,006
			12/31/2030	3,132	4,617	7,749	14	243	8,006
			12/31/2040	3,132	4,617	7,749	14	243	8,006
			12/31/2050	3,132	4,617	7,749	14	243	8,006
			12/31/2060	3,132	4,617	7,749	14	243	8,006
			12/31/2070	3,132	4,617	7,749	14	243	8,006
		2	12/31/2020	98	4,452	4,550	342	1,190	6,082
			12/31/2030	103	4,491	4,594	344	1,192	6,130
			12/31/2040	103	4,491	4,594	344	1,192	6,130
			12/31/2050	103	4,491	4,594	344	1,192	6,130
			12/31/2060	103	4,491	4,594	344	1,192	6,130
			12/31/2070	103	4,492	4,595	344	1,192	6,131
	002	1	12/31/2020	317	1,183	1,500	29	91	1,620
			12/31/2030	892	1,884	2,776	26	122	2,924
			12/31/2040	1,466	2,585	4,051	23	153	4,227
			12/31/2050	2,040	3,286	5,326	20	184	5,530
			12/31/2060	2,615	3,987	6,602	17	215	6,834
			12/31/2070	3,189	4,687	7,876	15	246	8,137
		2	12/31/2020	39	1,106	1,145	79	262	1,486
			12/31/2030	55	1,828	1,883	135	454	2,472
			12/31/2040	67	2,511	2,578	188	643	3,409
			12/31/2050	80	3,194	3,274	242	832	4,348
			12/31/2060	92	3,877	3,969	296	1,022	5,287
			12/31/2070	104	4,560	4,664	349	1,211	6,224
	003_001	1	12/31/2020	3,132	4,617	7,749	14	243	8,006
			12/31/2030	3,132	4,617	7,749	14	243	8,006
			12/31/2040	3,132	4,617	7,749	14	243	8,006
			12/31/2050	3,132	4,617	7,749	14	243	8,006
			12/31/2060	3,132	4,617	7,749	14	243	8,006
			12/31/2070	3,132	4,617	7,749	14	243	8,006
		2	12/31/2020	98	4,452	4,550	342	1,190	6,082
			12/31/2030	103	4,491	4,594	344	1,192	6,130
			12/31/2040	103	4,491	4,594	344	1,192	6,130
			12/31/2050	103	4,491	4,594	344	1,192	6,130
			12/31/2060	103	4,491	4,594	344	1,192	6,130
			12/31/2070	103	4,492	4,595	344	1,192	6,131
	003_002	1	12/31/2020	317	1,183	1,500	29	91	1,620
			12/31/2030	892	1,884	2,776	26	122	2,924
			12/31/2040	1,466	2,585	4,051	23	153	4,227
			12/31/2050	2,040	3,286	5,326	20	184	5,530
			12/31/2060	2,615	3,987	6,602	17	215	6,834
			12/31/2070	3,189	4,687	7,876	15	246	8,137
		2	12/31/2020	39	1,106	1,145	79	262	1,486
			12/31/2030	55	1,828	1,883	135	454	2,472
			12/31/2040	67	2,511	2,578	188	643	3,409
			12/31/2050	80	3,194	3,274	242	832	4,348
			12/31/2060	92	3,877	3,969	296	1,022	5,287
			12/31/2070	104	4,560	4,664	349	1,211	6,224

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Calhoun County GCD/ Calhoun County	001	1	12/31/2020	7,518	58	7,576	0	0	7,576
			12/31/2030	7,518	58	7,576	0	0	7,576
			12/31/2040	7,518	58	7,576	0	0	7,576
			12/31/2050	7,518	58	7,576	0	0	7,576
			12/31/2060	7,518	58	7,576	0	0	7,576
			12/31/2070	7,518	58	7,576	0	0	7,576
		2	12/31/2020	6,080	0	6,080	0	0	6,080
			12/31/2030	6,080	0	6,080	0	0	6,080
			12/31/2040	6,080	0	6,080	0	0	6,080
			12/31/2050	6,080	0	6,080	0	0	6,080
			12/31/2060	6,081	0	6,081	0	0	6,081
			12/31/2070	6,081	0	6,081	0	0	6,081
	002	1	12/31/2020	1,764	5	1,769	0	0	1,769
			12/31/2030	2,939	16	2,955	0	0	2,955
			12/31/2040	4,113	27	4,140	0	0	4,140
			12/31/2050	5,287	37	5,324	0	0	5,324
			12/31/2060	6,461	48	6,509	0	0	6,509
			12/31/2070	7,635	59	7,694	0	0	7,694
		2	12/31/2020	1,737	0	1,737	0	0	1,737
			12/31/2030	2,623	0	2,623	0	0	2,623
			12/31/2040	3,510	0	3,510	0	0	3,510
			12/31/2050	4,396	0	4,396	0	0	4,396
			12/31/2060	5,283	0	5,283	0	0	5,283
			12/31/2070	6,169	0	6,169	0	0	6,169
	003_001	1	12/31/2020	7,518	58	7,576	0	0	7,576
			12/31/2030	7,518	10,064	17,582	0	0	17,582
			12/31/2040	7,518	10,064	17,582	0	0	17,582
			12/31/2050	7,518	10,064	17,582	0	0	17,582
			12/31/2060	7,518	10,064	17,582	0	0	17,582
			12/31/2070	7,518	10,064	17,582	0	0	17,582
		2	12/31/2020	6,080	0	6,080	0	0	6,080
			12/31/2030	6,080	10,007	16,087	0	0	16,087
			12/31/2040	6,080	10,007	16,087	0	0	16,087
			12/31/2050	6,080	10,007	16,087	0	0	16,087
			12/31/2060	6,081	10,007	16,088	0	0	16,088
			12/31/2070	6,081	10,007	16,088	0	0	16,088
	003_002	1	12/31/2020	1,764	5	1,769	0	0	1,769
			12/31/2030	2,939	10,023	12,962	0	0	12,962
			12/31/2040	4,113	10,033	14,146	0	0	14,146
			12/31/2050	5,287	10,044	15,331	0	0	15,331
			12/31/2060	6,461	10,055	16,516	0	0	16,516
			12/31/2070	7,635	10,065	17,700	0	0	17,700
		2	12/31/2020	1,737	0	1,737	0	0	1,737
			12/31/2030	2,623	10,007	12,630	0	0	12,630
			12/31/2040	3,510	10,007	13,517	0	0	13,517
			12/31/2050	4,396	10,007	14,403	0	0	14,403
			12/31/2060	5,283	10,007	15,290	0	0	15,290
			12/31/2070	6,169	10,007	16,176	0	0	16,176

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Coastal Bend GCD/ Wharton County	001	1	12/31/2020	114,866	66,547	181,413	0	0	181,413
			12/31/2030	114,866	66,547	181,413	0	0	181,413
			12/31/2040	114,866	66,547	181,413	0	0	181,413
			12/31/2050	114,866	66,547	181,413	0	0	181,413
			12/31/2060	114,866	66,547	181,413	0	0	181,413
			12/31/2070	114,866	66,547	181,413	0	0	181,413
		2	12/31/2020	166,067	16,383	182,450	0	0	182,450
			12/31/2030	166,081	16,383	182,464	0	0	182,464
			12/31/2040	166,088	16,383	182,471	0	0	182,471
			12/31/2050	166,090	16,383	182,473	0	0	182,473
			12/31/2060	166,091	16,383	182,474	0	0	182,474
			12/31/2070	166,093	16,383	182,476	0	0	182,476
	002	1	12/31/2020	114,866	66,547	181,413	0	0	181,413
			12/31/2030	114,866	66,547	181,413	0	0	181,413
			12/31/2040	114,866	66,547	181,413	0	0	181,413
			12/31/2050	114,866	66,547	181,413	0	0	181,413
			12/31/2060	114,866	66,547	181,413	0	0	181,413
			12/31/2070	114,866	66,547	181,413	0	0	181,413
		2	12/31/2020	166,067	16,383	182,450	0	0	182,450
			12/31/2030	166,081	16,383	182,464	0	0	182,464
			12/31/2040	166,088	16,383	182,471	0	0	182,471
			12/31/2050	166,090	16,383	182,473	0	0	182,473
			12/31/2060	166,091	16,383	182,474	0	0	182,474
			12/31/2070	166,093	16,383	182,476	0	0	182,476
	003_001	1	12/31/2020	114,866	66,547	181,413	0	0	181,413
			12/31/2030	114,866	66,547	181,413	0	0	181,413
			12/31/2040	114,866	66,547	181,413	0	0	181,413
			12/31/2050	114,866	66,547	181,413	0	0	181,413
			12/31/2060	114,866	66,547	181,413	0	0	181,413
			12/31/2070	114,866	66,547	181,413	0	0	181,413
		2	12/31/2020	166,067	16,383	182,450	0	0	182,450
			12/31/2030	166,081	16,383	182,464	0	0	182,464
			12/31/2040	166,088	16,383	182,471	0	0	182,471
			12/31/2050	166,090	16,383	182,473	0	0	182,473
			12/31/2060	166,091	16,383	182,474	0	0	182,474
			12/31/2070	166,093	16,383	182,476	0	0	182,476
	003_002	1	12/31/2020	114,866	66,547	181,413	0	0	181,413
			12/31/2030	114,866	66,547	181,413	0	0	181,413
			12/31/2040	114,866	66,547	181,413	0	0	181,413
			12/31/2050	114,866	66,547	181,413	0	0	181,413
			12/31/2060	114,866	66,547	181,413	0	0	181,413
			12/31/2070	114,866	66,547	181,413	0	0	181,413
		2	12/31/2020	166,067	16,383	182,450	0	0	182,450
			12/31/2030	166,081	16,383	182,464	0	0	182,464
			12/31/2040	166,088	16,383	182,471	0	0	182,471
			12/31/2050	166,090	16,383	182,473	0	0	182,473
			12/31/2060	166,091	16,383	182,474	0	0	182,474
			12/31/2070	166,093	16,383	182,476	0	0	182,476

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Coastal Plains GCD/ Matagorda County	001	1	12/31/2020	31,755	7,126	38,881	0	0	38,881
			12/31/2030	31,755	7,126	38,881	0	0	38,881
			12/31/2040	31,755	7,126	38,881	0	0	38,881
			12/31/2050	31,755	7,126	38,881	0	0	38,881
			12/31/2060	31,755	7,126	38,881	0	0	38,881
			12/31/2070	31,755	7,126	38,881	0	0	38,881
		2	12/31/2020	39,051	353	39,404	0	0	39,404
			12/31/2030	39,055	353	39,408	0	0	39,408
			12/31/2040	39,060	353	39,413	0	0	39,413
			12/31/2050	39,064	353	39,417	0	0	39,417
			12/31/2060	39,068	353	39,421	0	0	39,421
			12/31/2070	39,070	353	39,423	0	0	39,423
	002	1	12/31/2020	31,755	7,126	38,881	0	0	38,881
			12/31/2030	31,755	7,126	38,881	0	0	38,881
			12/31/2040	31,755	7,126	38,881	0	0	38,881
			12/31/2050	31,755	7,126	38,881	0	0	38,881
			12/31/2060	31,755	7,126	38,881	0	0	38,881
			12/31/2070	31,755	7,126	38,881	0	0	38,881
		2	12/31/2020	39,051	353	39,404	0	0	39,404
			12/31/2030	39,055	353	39,408	0	0	39,408
			12/31/2040	39,060	353	39,413	0	0	39,413
			12/31/2050	39,064	353	39,417	0	0	39,417
			12/31/2060	39,068	353	39,421	0	0	39,421
			12/31/2070	39,070	353	39,423	0	0	39,423
	003_001	1	12/31/2020	31,755	7,126	38,881	0	0	38,881
			12/31/2030	31,755	7,126	38,881	0	0	38,881
			12/31/2040	31,755	7,126	38,881	0	0	38,881
			12/31/2050	31,755	7,126	38,881	0	0	38,881
			12/31/2060	31,755	7,126	38,881	0	0	38,881
			12/31/2070	31,755	7,126	38,881	0	0	38,881
		2	12/31/2020	39,051	353	39,404	0	0	39,404
			12/31/2030	39,055	353	39,408	0	0	39,408
			12/31/2040	39,060	353	39,413	0	0	39,413
			12/31/2050	39,064	353	39,417	0	0	39,417
			12/31/2060	39,068	353	39,421	0	0	39,421
			12/31/2070	39,070	353	39,423	0	0	39,423
	003_002	1	12/31/2020	31,755	7,126	38,881	0	0	38,881
			12/31/2030	31,755	7,126	38,881	0	0	38,881
			12/31/2040	31,755	7,126	38,881	0	0	38,881
			12/31/2050	31,755	7,126	38,881	0	0	38,881
			12/31/2060	31,755	7,126	38,881	0	0	38,881
			12/31/2070	31,755	7,126	38,881	0	0	38,881
		2	12/31/2020	39,051	353	39,404	0	0	39,404
			12/31/2030	39,055	353	39,408	0	0	39,408
			12/31/2040	39,060	353	39,413	0	0	39,413
			12/31/2050	39,064	353	39,417	0	0	39,417
			12/31/2060	39,068	353	39,421	0	0	39,421
			12/31/2070	39,070	353	39,423	0	0	39,423

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Colorado County GCD/ Colorado County	001	1	12/31/2020	31,623	40,093	71,716	0	919	72,635
			12/31/2030	31,623	40,093	71,716	0	919	72,635
			12/31/2040	31,623	40,093	71,716	0	919	72,635
			12/31/2050	31,623	40,093	71,716	0	919	72,635
			12/31/2060	31,623	40,093	71,716	0	919	72,635
			12/31/2070	31,623	40,093	71,716	0	919	72,635
		2	12/31/2020	31,727	37,991	69,718	206	2,071	71,995
			12/31/2030	31,924	38,303	70,227	218	2,075	72,520
			12/31/2040	31,996	38,415	70,411	223	2,077	72,711
			12/31/2050	31,996	38,416	70,412	223	2,077	72,712
			12/31/2060	31,997	38,417	70,414	223	2,077	72,714
			12/31/2070	31,997	38,418	70,415	223	2,077	72,715
	002	1	12/31/2020	12,727	15,998	28,725	55	794	29,574
			12/31/2030	16,583	20,915	37,498	44	819	38,361
			12/31/2040	20,439	25,833	46,272	33	845	47,150
			12/31/2050	24,296	30,750	55,046	21	871	55,938
			12/31/2060	28,152	35,667	63,819	10	896	64,725
			12/31/2070	32,009	40,585	72,594	0	924	73,518
		2	12/31/2020	13,162	15,854	29,016	99	849	29,964
			12/31/2030	17,148	20,684	37,832	133	1,102	39,067
			12/31/2040	21,008	25,314	46,322	160	1,353	47,835
			12/31/2050	24,798	29,833	54,631	182	1,603	56,416
			12/31/2060	28,587	34,351	62,938	203	1,853	64,994
			12/31/2070	32,376	38,869	71,245	225	2,102	73,572
	003_001	1	12/31/2020	31,623	40,093	71,716	0	919	72,635
			12/31/2030	31,623	40,093	71,716	0	919	72,635
			12/31/2040	31,623	40,093	71,716	0	919	72,635
			12/31/2050	31,623	40,093	71,716	0	919	72,635
			12/31/2060	31,623	40,093	71,716	0	919	72,635
			12/31/2070	31,623	40,093	71,716	0	919	72,635
		2	12/31/2020	31,727	37,991	69,718	206	2,071	71,995
			12/31/2030	31,924	38,303	70,227	218	2,075	72,520
			12/31/2040	31,996	38,415	70,411	223	2,077	72,711
			12/31/2050	31,996	38,416	70,412	223	2,077	72,712
			12/31/2060	31,997	38,417	70,414	223	2,077	72,714
			12/31/2070	31,997	38,418	70,415	223	2,077	72,715
	003_002	1	12/31/2020	12,727	15,998	28,725	55	794	29,574
			12/31/2030	16,583	20,915	37,498	44	819	38,361
			12/31/2040	20,439	25,833	46,272	33	845	47,150
			12/31/2050	24,296	30,750	55,046	21	871	55,938
			12/31/2060	28,152	35,667	63,819	10	896	64,725
			12/31/2070	32,009	40,585	72,594	0	924	73,518
		2	12/31/2020	13,162	15,854	29,016	99	849	29,964
			12/31/2030	17,148	20,684	37,832	133	1,102	39,067
			12/31/2040	21,008	25,314	46,322	160	1,353	47,835
			12/31/2050	24,798	29,833	54,631	182	1,603	56,416
			12/31/2060	28,587	34,351	62,938	203	1,853	64,994
			12/31/2070	32,376	38,869	71,245	225	2,102	73,572

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Evergreen UWCD/ Karnes County	001	1	12/31/2020	0	105	105	988	10,295	11,388
			12/31/2030	0	105	105	988	10,295	11,388
			12/31/2040	0	105	105	628	3,270	4,003
			12/31/2050	0	105	105	628	3,270	4,003
			12/31/2060	0	105	105	628	3,270	4,003
			12/31/2070	0	105	105	628	3,270	4,003
		2	12/31/2020	0	47	47	220	10,876	11,143
			12/31/2030	0	50	50	226	10,913	11,189
			12/31/2040	0	29	29	108	3,989	4,126
			12/31/2050	0	29	29	108	3,989	4,126
			12/31/2060	0	29	29	108	3,989	4,126
			12/31/2070	0	29	29	108	3,989	4,126
	002	1	12/31/2020	0	105	105	988	10,295	11,388
			12/31/2030	0	105	105	988	10,295	11,388
			12/31/2040	0	105	105	628	3,270	4,003
			12/31/2050	0	105	105	628	3,270	4,003
			12/31/2060	0	105	105	628	3,270	4,003
			12/31/2070	0	105	105	628	3,270	4,003
		2	12/31/2020	0	47	47	220	10,876	11,143
			12/31/2030	0	50	50	226	10,913	11,189
			12/31/2040	0	29	29	108	3,989	4,126
			12/31/2050	0	29	29	108	3,989	4,126
			12/31/2060	0	29	29	108	3,989	4,126
			12/31/2070	0	29	29	108	3,989	4,126
	003_001	1	12/31/2020	0	105	105	988	10,295	11,388
			12/31/2030	0	105	105	988	10,295	11,388
			12/31/2040	0	105	105	628	3,270	4,003
			12/31/2050	0	105	105	628	3,270	4,003
			12/31/2060	0	105	105	628	3,270	4,003
			12/31/2070	0	105	105	628	3,270	4,003
		2	12/31/2020	0	47	47	220	10,876	11,143
			12/31/2030	0	50	50	226	10,913	11,189
			12/31/2040	0	29	29	108	3,989	4,126
			12/31/2050	0	29	29	108	3,989	4,126
			12/31/2060	0	29	29	108	3,989	4,126
			12/31/2070	0	29	29	108	3,989	4,126
	003_002	1	12/31/2020	0	105	105	988	10,295	11,388
			12/31/2030	0	105	105	988	10,295	11,388
			12/31/2040	0	105	105	628	3,270	4,003
			12/31/2050	0	105	105	628	3,270	4,003
			12/31/2060	0	105	105	628	3,270	4,003
			12/31/2070	0	105	105	628	3,270	4,003
		2	12/31/2020	0	47	47	220	10,876	11,143
			12/31/2030	0	50	50	226	10,913	11,189
			12/31/2040	0	29	29	108	3,989	4,126
			12/31/2050	0	29	29	108	3,989	4,126
			12/31/2060	0	29	29	108	3,989	4,126
			12/31/2070	0	29	29	108	3,989	4,126

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Fayette County GCD/ Fayette County	001	1	12/31/2020	0	387	387	246	8,320	8,953
			12/31/2030	0	387	387	246	8,320	8,953
			12/31/2040	0	387	387	246	8,320	8,953
			12/31/2050	0	387	387	246	8,320	8,953
			12/31/2060	0	387	387	246	8,320	8,953
			12/31/2070	0	387	387	246	8,320	8,953
		2	12/31/2020	0	301	301	192	6,698	7,191
			12/31/2030	0	317	317	202	6,940	7,459
			12/31/2040	0	333	333	212	7,216	7,761
			12/31/2050	0	350	350	223	7,534	8,107
			12/31/2060	0	368	368	234	7,899	8,501
			12/31/2070	0	387	387	246	8,320	8,953
	002	1	12/31/2020	0	301	301	192	6,698	7,191
			12/31/2030	0	317	317	202	6,940	7,459
			12/31/2040	0	333	333	212	7,216	7,761
			12/31/2050	0	350	350	223	7,534	8,107
			12/31/2060	0	368	368	234	7,899	8,501
			12/31/2070	0	387	387	246	8,320	8,953
		2	12/31/2020	0	301	301	192	6,698	7,191
			12/31/2030	0	317	317	202	6,940	7,459
			12/31/2040	0	333	333	212	7,216	7,761
			12/31/2050	0	350	350	223	7,534	8,107
			12/31/2060	0	368	368	234	7,899	8,501
			12/31/2070	0	387	387	246	8,320	8,953
	003_001	1	12/31/2020	0	387	387	246	8,320	8,953
			12/31/2030	0	387	387	246	8,320	8,953
			12/31/2040	0	387	387	246	8,320	8,953
			12/31/2050	0	387	387	246	8,320	8,953
			12/31/2060	0	387	387	246	8,320	8,953
			12/31/2070	0	387	387	246	8,320	8,953
		2	12/31/2020	0	301	301	192	6,698	7,191
			12/31/2030	0	317	317	202	6,940	7,459
			12/31/2040	0	333	333	212	7,216	7,761
			12/31/2050	0	350	350	223	7,534	8,107
			12/31/2060	0	368	368	234	7,899	8,501
			12/31/2070	0	387	387	246	8,320	8,953
	003_002	1	12/31/2020	0	301	301	192	6,698	7,191
			12/31/2030	0	317	317	202	6,940	7,459
			12/31/2040	0	333	333	212	7,216	7,761
			12/31/2050	0	350	350	223	7,534	8,107
			12/31/2060	0	368	368	234	7,899	8,501
			12/31/2070	0	387	387	246	8,320	8,953
		2	12/31/2020	0	301	301	192	6,698	7,191
			12/31/2030	0	317	317	202	6,940	7,459
			12/31/2040	0	333	333	212	7,216	7,761
			12/31/2050	0	350	350	223	7,534	8,107
			12/31/2060	0	368	368	234	7,899	8,501
			12/31/2070	0	387	387	246	8,320	8,953

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Goliad County GCD/ Goliad County	001	1	12/31/2020	400	6,004	6,404	171	58	6,633
			12/31/2030	410	6,161	6,571	176	59	6,806
			12/31/2040	417	6,264	6,681	179	60	6,920
			12/31/2050	420	6,312	6,732	180	61	6,973
			12/31/2060	431	6,440	6,871	184	62	7,117
			12/31/2070	436	6,548	6,984	187	63	7,234
		2	12/31/2020	161	5,799	5,960	107	553	6,620
			12/31/2030	167	6,174	6,341	111	568	7,020
			12/31/2040	172	6,502	6,674	115	578	7,367
			12/31/2050	173	6,578	6,751	116	582	7,449
			12/31/2060	177	6,693	6,870	118	594	7,582
			12/31/2070	180	6,786	6,966	120	604	7,690
	002	1	12/31/2020	400	6,004	6,404	171	58	6,633
			12/31/2030	410	6,161	6,571	176	59	6,806
			12/31/2040	417	6,264	6,681	179	60	6,920
			12/31/2050	420	6,312	6,732	180	61	6,973
			12/31/2060	431	6,440	6,871	184	62	7,117
			12/31/2070	436	6,548	6,984	187	63	7,234
		2	12/31/2020	161	5,799	5,960	107	553	6,620
			12/31/2030	167	6,174	6,341	111	568	7,020
			12/31/2040	172	6,502	6,674	115	578	7,367
			12/31/2050	173	6,578	6,751	116	582	7,449
			12/31/2060	177	6,693	6,870	118	594	7,582
			12/31/2070	180	6,786	6,966	120	604	7,690
	003_001	1	12/31/2020	400	6,004	6,404	171	58	6,633
			12/31/2030	410	6,161	6,571	176	59	6,806
			12/31/2040	417	6,264	6,681	179	60	6,920
			12/31/2050	420	6,312	6,732	180	61	6,973
			12/31/2060	431	6,440	6,871	184	62	7,117
			12/31/2070	436	6,548	6,984	187	63	7,234
		2	12/31/2020	161	5,799	5,960	107	553	6,620
			12/31/2030	167	6,174	6,341	111	568	7,020
			12/31/2040	172	6,502	6,674	115	578	7,367
			12/31/2050	173	6,578	6,751	116	582	7,449
			12/31/2060	177	6,693	6,870	118	594	7,582
			12/31/2070	180	6,786	6,966	120	604	7,690
	003_002	1	12/31/2020	400	6,004	6,404	171	58	6,633
			12/31/2030	410	6,161	6,571	176	59	6,806
			12/31/2040	417	6,264	6,681	179	60	6,920
			12/31/2050	420	6,312	6,732	180	61	6,973
			12/31/2060	431	6,440	6,871	184	62	7,117
			12/31/2070	436	6,548	6,984	187	63	7,234
		2	12/31/2020	161	5,799	5,960	107	553	6,620
			12/31/2030	167	6,174	6,341	111	568	7,020
			12/31/2040	172	6,502	6,674	115	578	7,367
			12/31/2050	173	6,578	6,751	116	582	7,449
			12/31/2060	177	6,693	6,870	118	594	7,582
			12/31/2070	180	6,786	6,966	120	604	7,690

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
ND Bee/ Bee County	001	1	12/31/2020	0	9	9	0	0	9
			12/31/2030	0	9	9	0	0	9
			12/31/2040	0	9	9	0	0	9
			12/31/2050	0	9	9	0	0	9
			12/31/2060	0	9	9	0	0	9
			12/31/2070	0	9	9	0	0	9
		2	12/31/2020	0	0	0	276	1,284	1,560
			12/31/2030	0	0	0	276	1,284	1,560
			12/31/2040	0	0	0	276	1,284	1,560
			12/31/2050	0	0	0	276	1,284	1,560
			12/31/2060	0	0	0	276	1,284	1,560
			12/31/2070	0	0	0	276	1,284	1,560
	002	1	12/31/2020	0	1	1	10	48	59
			12/31/2030	0	2	2	8	38	48
			12/31/2040	0	4	4	6	29	39
			12/31/2050	0	6	6	4	19	29
			12/31/2060	0	7	7	2	9	18
			12/31/2070	0	9	9	0	0	9
		2	12/31/2020	0	0	0	58	269	327
			12/31/2030	0	0	0	102	476	578
			12/31/2040	0	0	0	147	683	830
			12/31/2050	0	0	0	191	890	1,081
			12/31/2060	0	0	0	236	1,097	1,333
			12/31/2070	0	0	0	280	1,304	1,584
	003_001	1	12/31/2020	0	9	9	0	0	9
			12/31/2030	0	9	9	0	0	9
			12/31/2040	0	9	9	0	0	9
			12/31/2050	0	9	9	0	0	9
			12/31/2060	0	9	9	0	0	9
			12/31/2070	0	9	9	0	0	9
		2	12/31/2020	0	0	0	276	1,284	1,560
			12/31/2030	0	0	0	276	1,284	1,560
			12/31/2040	0	0	0	276	1,284	1,560
			12/31/2050	0	0	0	276	1,284	1,560
			12/31/2060	0	0	0	276	1,284	1,560
			12/31/2070	0	0	0	276	1,284	1,560
	003_002	1	12/31/2020	0	1	1	10	48	59
			12/31/2030	0	2	2	8	38	48
			12/31/2040	0	4	4	6	29	39
			12/31/2050	0	6	6	4	19	29
			12/31/2060	0	7	7	2	9	18
			12/31/2070	0	9	9	0	0	9
		2	12/31/2020	0	0	0	58	269	327
			12/31/2030	0	0	0	102	476	578
			12/31/2040	0	0	0	147	683	830
			12/31/2050	0	0	0	191	890	1,081
			12/31/2060	0	0	0	236	1,097	1,333
			12/31/2070	0	0	0	280	1,304	1,584

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
ND Lavaca/ Lavaca County	001	1	12/31/2020	3,117	12,664	15,781	151	4,695	20,627
			12/31/2030	3,117	12,664	15,781	151	4,695	20,627
			12/31/2040	3,117	12,664	15,781	151	4,695	20,627
			12/31/2050	3,117	12,664	15,781	151	4,695	20,627
			12/31/2060	3,117	12,664	15,781	151	4,695	20,627
			12/31/2070	3,117	12,664	15,781	151	4,695	20,627
		2	12/31/2020	1,233	12,234	13,467	154	6,854	20,475
			12/31/2030	1,279	12,537	13,816	204	7,012	21,032
			12/31/2040	1,279	12,538	13,817	204	7,013	21,034
			12/31/2050	1,279	12,538	13,817	204	7,013	21,034
			12/31/2060	1,279	12,538	13,817	204	7,013	21,034
			12/31/2070	1,279	12,539	13,818	204	7,013	21,035
	002	1	12/31/2020	994	7,438	8,432	117	3,442	11,991
			12/31/2030	1,428	8,505	9,933	124	3,698	13,755
			12/31/2040	1,861	9,571	11,432	131	3,954	15,517
			12/31/2050	2,294	10,638	12,932	138	4,209	17,279
			12/31/2060	2,727	11,704	14,431	145	4,465	19,041
			12/31/2070	3,161	12,770	15,931	154	4,735	20,820
		2	12/31/2020	774	7,491	8,265	150	4,184	12,599
			12/31/2030	914	8,762	9,676	201	4,886	14,763
			12/31/2040	1,008	9,731	10,739	202	5,432	16,373
			12/31/2050	1,101	10,699	11,800	203	5,977	17,980
			12/31/2060	1,195	11,667	12,862	204	6,522	19,588
			12/31/2070	1,289	12,635	13,924	204	7,067	21,195
	003_001	1	12/31/2020	3,117	12,664	15,781	151	4,695	20,627
			12/31/2030	3,117	12,664	15,781	151	4,695	20,627
			12/31/2040	3,117	12,664	15,781	151	4,695	20,627
			12/31/2050	3,117	12,664	15,781	151	4,695	20,627
			12/31/2060	3,117	12,664	15,781	151	4,695	20,627
			12/31/2070	3,117	12,664	15,781	151	4,695	20,627
		2	12/31/2020	1,233	12,234	13,467	154	6,854	20,475
			12/31/2030	1,279	12,537	13,816	204	7,012	21,032
			12/31/2040	1,279	12,538	13,817	204	7,013	21,034
			12/31/2050	1,279	12,538	13,817	204	7,013	21,034
			12/31/2060	1,279	12,538	13,817	204	7,013	21,034
			12/31/2070	1,279	12,539	13,818	204	7,013	21,035
	003_002	1	12/31/2020	994	7,438	8,432	117	3,442	11,991
			12/31/2030	1,428	8,505	9,933	124	3,698	13,755
			12/31/2040	1,861	9,571	11,432	131	3,954	15,517
			12/31/2050	2,294	10,638	12,932	138	4,209	17,279
			12/31/2060	2,727	11,704	14,431	145	4,465	19,041
			12/31/2070	3,161	12,770	15,931	154	4,735	20,820
		2	12/31/2020	774	7,491	8,265	150	4,184	12,599
			12/31/2030	914	8,762	9,676	201	4,886	14,763
			12/31/2040	1,008	9,731	10,739	202	5,432	16,373
			12/31/2050	1,101	10,699	11,800	203	5,977	17,980
			12/31/2060	1,195	11,667	12,862	204	6,522	19,588
			12/31/2070	1,289	12,635	13,924	204	7,067	21,195

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Pecan Valley GCD/ DeWitt County	001	1	12/31/2020	836	5,450	6,286	330	11,444	18,060
			12/31/2030	836	5,450	6,286	330	11,444	18,060
			12/31/2040	836	5,450	6,286	330	11,444	18,060
			12/31/2050	836	5,450	6,286	330	11,444	18,060
			12/31/2060	836	5,450	6,286	330	11,444	18,060
			12/31/2070	836	5,450	6,286	330	11,444	18,060
		2	12/31/2020	836	5,450	6,286	330	11,444	18,060
			12/31/2030	836	5,450	6,286	330	11,444	18,060
			12/31/2040	836	5,450	6,286	330	11,444	18,060
			12/31/2050	836	5,450	6,286	330	11,444	18,060
			12/31/2060	836	5,450	6,286	330	11,444	18,060
			12/31/2070	836	5,450	6,286	330	11,444	18,060
	002	1	12/31/2020	326	3,657	3,983	330	7,414	11,727
			12/31/2030	428	4,016	4,444	330	8,158	12,932
			12/31/2040	530	4,374	4,904	330	8,930	14,164
			12/31/2050	632	4,733	5,365	330	9,732	15,427
			12/31/2060	734	5,092	5,826	330	10,569	16,725
			12/31/2070	836	5,450	6,286	330	11,444	18,060
		2	12/31/2020	326	3,657	3,983	330	7,414	11,727
			12/31/2030	428	4,016	4,444	330	8,158	12,932
			12/31/2040	530	4,374	4,904	330	8,930	14,164
			12/31/2050	632	4,733	5,365	330	9,732	15,427
			12/31/2060	734	5,092	5,826	330	10,569	16,725
			12/31/2070	836	5,450	6,286	330	11,444	18,060
	003_001	1	12/31/2020	836	5,450	6,286	330	11,444	18,060
			12/31/2030	836	5,450	6,286	330	11,444	18,060
			12/31/2040	836	5,450	6,286	330	11,444	18,060
			12/31/2050	836	5,450	6,286	330	11,444	18,060
			12/31/2060	836	5,450	6,286	330	11,444	18,060
			12/31/2070	836	5,450	6,286	330	11,444	18,060
		2	12/31/2020	836	5,450	6,286	330	11,444	18,060
			12/31/2030	836	5,450	6,286	330	11,444	18,060
			12/31/2040	836	5,450	6,286	330	11,444	18,060
			12/31/2050	836	5,450	6,286	330	11,444	18,060
			12/31/2060	836	5,450	6,286	330	11,444	18,060
			12/31/2070	836	5,450	6,286	330	11,444	18,060
	003_002	1	12/31/2020	326	3,657	3,983	330	7,414	11,727
			12/31/2030	428	4,016	4,444	330	8,158	12,932
			12/31/2040	530	4,374	4,904	330	8,930	14,164
			12/31/2050	632	4,733	5,365	330	9,732	15,427
			12/31/2060	734	5,092	5,826	330	10,569	16,725
			12/31/2070	836	5,450	6,286	330	11,444	18,060
		2	12/31/2020	326	3,657	3,983	330	7,414	11,727
			12/31/2030	428	4,016	4,444	330	8,158	12,932
			12/31/2040	530	4,374	4,904	330	8,930	14,164
			12/31/2050	632	4,733	5,365	330	9,732	15,427
			12/31/2060	734	5,092	5,826	330	10,569	16,725
			12/31/2070	836	5,450	6,286	330	11,444	18,060

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Refugio GCD/ Refugio County	001	1	12/31/2020	3,229	2,634	5,863	0	0	5,863
			12/31/2030	3,229	2,634	5,863	0	0	5,863
			12/31/2040	3,229	2,634	5,863	0	0	5,863
			12/31/2050	3,229	2,634	5,863	0	0	5,863
			12/31/2060	3,229	2,634	5,863	0	0	5,863
			12/31/2070	3,229	2,634	5,863	0	0	5,863
		2	12/31/2020	4,271	1,364	5,635	0	0	5,635
			12/31/2030	4,331	1,369	5,700	0	0	5,700
			12/31/2040	4,331	1,369	5,700	0	0	5,700
			12/31/2050	4,331	1,369	5,700	0	0	5,700
			12/31/2060	4,331	1,369	5,700	0	0	5,700
			12/31/2070	4,331	1,369	5,700	0	0	5,700
	002	1	12/31/2020	1,956	783	2,739	0	0	2,739
			12/31/2030	2,216	1,161	3,377	0	0	3,377
			12/31/2040	2,476	1,538	4,014	0	0	4,014
			12/31/2050	2,735	1,916	4,651	0	0	4,651
			12/31/2060	2,995	2,294	5,289	0	0	5,289
			12/31/2070	3,255	2,672	5,927	0	0	5,927
		2	12/31/2020	2,153	652	2,805	0	0	2,805
			12/31/2030	2,646	803	3,449	0	0	3,449
			12/31/2040	3,078	948	4,026	0	0	4,026
			12/31/2050	3,510	1,093	4,603	0	0	4,603
			12/31/2060	3,942	1,238	5,180	0	0	5,180
			12/31/2070	4,374	1,384	5,758	0	0	5,758
	003_001	1	12/31/2020	3,229	2,634	5,863	0	0	5,863
			12/31/2030	3,229	12,641	15,870	0	0	15,870
			12/31/2040	3,229	12,641	15,870	0	0	15,870
			12/31/2050	3,229	12,641	15,870	0	0	15,870
			12/31/2060	3,229	12,641	15,870	0	0	15,870
			12/31/2070	3,229	12,641	15,870	0	0	15,870
		2	12/31/2020	4,271	1,364	5,635	0	0	5,635
			12/31/2030	4,331	11,376	15,707	0	0	15,707
			12/31/2040	4,331	11,376	15,707	0	0	15,707
			12/31/2050	4,331	11,376	15,707	0	0	15,707
			12/31/2060	4,331	11,376	15,707	0	0	15,707
			12/31/2070	4,331	11,376	15,707	0	0	15,707
	003_002	1	12/31/2020	1,956	783	2,739	0	0	2,739
			12/31/2030	2,216	11,167	13,383	0	0	13,383
			12/31/2040	2,476	11,545	14,021	0	0	14,021
			12/31/2050	2,735	11,923	14,658	0	0	14,658
			12/31/2060	2,995	12,301	15,296	0	0	15,296
			12/31/2070	3,255	12,678	15,933	0	0	15,933
		2	12/31/2020	2,153	652	2,805	0	0	2,805
			12/31/2030	2,646	10,809	13,455	0	0	13,455
			12/31/2040	3,078	10,955	14,033	0	0	14,033
			12/31/2050	3,510	11,100	14,610	0	0	14,610
			12/31/2060	3,942	11,245	15,187	0	0	15,187
			12/31/2070	4,374	11,390	15,764	0	0	15,764

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Texana GCD/ Jackson County	001	1	12/31/2020	66,055	24,549	90,604	0	0	90,604
			12/31/2030	66,055	24,549	90,604	0	0	90,604
			12/31/2040	66,055	24,549	90,604	0	0	90,604
			12/31/2050	66,055	24,549	90,604	0	0	90,604
			12/31/2060	66,055	24,549	90,604	0	0	90,604
			12/31/2070	66,055	24,549	90,604	0	0	90,604
		2	12/31/2020	66,502	24,767	91,269	0	0	91,269
			12/31/2030	66,502	24,767	91,269	0	0	91,269
			12/31/2040	66,502	24,767	91,269	0	0	91,269
			12/31/2050	66,502	24,767	91,269	0	0	91,269
			12/31/2060	66,502	24,767	91,269	0	0	91,269
			12/31/2070	66,502	24,767	91,269	0	0	91,269
	002	1	12/31/2020	44,523	16,382	60,905	0	0	60,905
			12/31/2030	48,917	18,049	66,966	0	0	66,966
			12/31/2040	53,311	19,715	73,026	0	0	73,026
			12/31/2050	57,706	21,382	79,088	0	0	79,088
			12/31/2060	62,100	23,049	85,149	0	0	85,149
			12/31/2070	66,495	24,715	91,210	0	0	91,210
		2	12/31/2020	44,930	16,649	61,579	0	0	61,579
			12/31/2030	49,333	18,306	67,639	0	0	67,639
			12/31/2040	53,735	19,963	73,698	0	0	73,698
			12/31/2050	58,138	21,619	79,757	0	0	79,757
			12/31/2060	62,540	23,276	85,816	0	0	85,816
			12/31/2070	66,943	24,933	91,876	0	0	91,876
	003_001	1	12/31/2020	76,062	24,549	100,611	0	0	100,611
			12/31/2030	76,062	34,555	110,617	0	0	110,617
			12/31/2040	76,062	34,555	110,617	0	0	110,617
			12/31/2050	76,062	34,555	110,617	0	0	110,617
			12/31/2060	76,062	34,555	110,617	0	0	110,617
			12/31/2070	76,062	34,555	110,617	0	0	110,617
		2	12/31/2020	76,509	24,767	101,276	0	0	101,276
			12/31/2030	76,509	34,774	111,283	0	0	111,283
			12/31/2040	76,509	34,774	111,283	0	0	111,283
			12/31/2050	76,509	34,774	111,283	0	0	111,283
			12/31/2060	76,509	34,774	111,283	0	0	111,283
			12/31/2070	76,509	34,774	111,283	0	0	111,283
	003_002	1	12/31/2020	54,529	16,382	70,911	0	0	70,911
			12/31/2030	58,924	28,056	86,980	0	0	86,980
			12/31/2040	63,318	29,722	93,040	0	0	93,040
			12/31/2050	67,712	31,389	99,101	0	0	99,101
			12/31/2060	72,107	33,055	105,162	0	0	105,162
			12/31/2070	76,501	34,722	111,223	0	0	111,223
		2	12/31/2020	54,937	16,649	71,586	0	0	71,586
			12/31/2030	59,339	28,313	87,652	0	0	87,652
			12/31/2040	63,742	29,969	93,711	0	0	93,711
			12/31/2050	68,144	31,626	99,770	0	0	99,770
			12/31/2060	72,547	33,283	105,830	0	0	105,830
			12/31/2070	76,949	34,940	111,889	0	0	111,889

Pumping Input (i.e.,Well File), Acre-Feet per Year									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Victoria County GCD/ Victoria County	001	1	12/31/2020	32,173	27,871	60,044	0	0	60,044
			12/31/2030	32,173	27,871	60,044	0	0	60,044
			12/31/2040	32,173	27,871	60,044	0	0	60,044
			12/31/2050	32,173	27,871	60,044	0	0	60,044
			12/31/2060	32,173	27,871	60,044	0	0	60,044
			12/31/2070	32,173	27,871	60,044	0	0	60,044
		2	12/31/2020	20,634	34,678	55,312	0	0	55,312
			12/31/2030	20,634	34,678	55,312	0	0	55,312
			12/31/2040	20,634	34,678	55,312	0	0	55,312
			12/31/2050	20,634	34,678	55,312	0	0	55,312
			12/31/2060	20,634	34,678	55,312	0	0	55,312
			12/31/2070	20,634	34,678	55,312	0	0	55,312
	002	1	12/31/2020	9,056	11,498	20,554	0	0	20,554
			12/31/2030	13,774	14,840	28,614	0	0	28,614
			12/31/2040	18,492	18,181	36,673	0	0	36,673
			12/31/2050	23,209	21,523	44,732	0	0	44,732
			12/31/2060	27,927	24,864	52,791	0	0	52,791
			12/31/2070	32,645	28,205	60,850	0	0	60,850
		2	12/31/2020	7,911	12,482	20,393	0	0	20,393
			12/31/2030	10,508	17,012	27,520	0	0	27,520
			12/31/2040	13,104	21,542	34,646	0	0	34,646
			12/31/2050	15,701	26,071	41,772	0	0	41,772
			12/31/2060	18,297	30,601	48,898	0	0	48,898
			12/31/2070	20,894	35,131	56,025	0	0	56,025
	003_001	1	12/31/2020	32,173	37,878	70,051	0	0	70,051
			12/31/2030	32,173	47,884	80,057	0	0	80,057
			12/31/2040	32,173	47,884	80,057	0	0	80,057
			12/31/2050	32,173	47,884	80,057	0	0	80,057
			12/31/2060	32,173	47,884	80,057	0	0	80,057
			12/31/2070	32,173	47,884	80,057	0	0	80,057
		2	12/31/2020	20,634	44,684	65,318	0	0	65,318
			12/31/2030	20,634	54,691	75,325	0	0	75,325
			12/31/2040	20,634	54,691	75,325	0	0	75,325
			12/31/2050	20,634	54,691	75,325	0	0	75,325
			12/31/2060	20,634	54,691	75,325	0	0	75,325
			12/31/2070	20,634	54,691	75,325	0	0	75,325
	003_002	1	12/31/2020	9,056	21,505	30,561	0	0	30,561
			12/31/2030	13,774	34,853	48,627	0	0	48,627
			12/31/2040	18,492	38,194	56,686	0	0	56,686
			12/31/2050	23,209	41,536	64,745	0	0	64,745
			12/31/2060	27,927	44,877	72,804	0	0	72,804
			12/31/2070	32,645	48,219	80,864	0	0	80,864
		2	12/31/2020	7,911	22,489	30,400	0	0	30,400
			12/31/2030	10,508	37,025	47,533	0	0	47,533
			12/31/2040	13,104	41,555	54,659	0	0	54,659
			12/31/2050	15,701	46,085	61,786	0	0	61,786
			12/31/2060	18,297	50,614	68,911	0	0	68,911
			12/31/2070	20,894	55,144	76,038	0	0	76,038

Attachment 2b –
Scenario Pumping Output Tables

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**	**GCAS MAG Diff.**
Aransas County GCD/ Aransas County	001	1	12/31/2020	1,544	0	1,544	0	0	1,544	2
			12/31/2030	1,544	0	1,544	0	0	1,544	2
			12/31/2040	1,544	0	1,544	0	0	1,544	2
			12/31/2050	1,544	0	1,544	0	0	1,544	2
			12/31/2060	1,544	0	1,544	0	0	1,544	2
			12/31/2070	1,544	0	1,544	0	0	1,544	2
		2	12/31/2020	1,390	2	1,392	0	0	1,392	-150
			12/31/2030	1,698	2	1,700	0	0	1,700	158
			12/31/2040	1,698	2	1,700	0	0	1,700	158
			12/31/2050	1,699	2	1,701	0	0	1,701	159
			12/31/2060	1,699	2	1,701	0	0	1,701	159
			12/31/2070	1,699	2	1,701	0	0	1,701	159
	002	1	12/31/2020	1,544	0	1,544	0	0	1,544	2
			12/31/2030	1,544	0	1,544	0	0	1,544	2
			12/31/2040	1,544	0	1,544	0	0	1,544	2
			12/31/2050	1,544	0	1,544	0	0	1,544	2
			12/31/2060	1,544	0	1,544	0	0	1,544	2
			12/31/2070	1,544	0	1,544	0	0	1,544	2
		2	12/31/2020	1,390	2	1,392	0	0	1,392	-150
			12/31/2030	1,698	2	1,700	0	0	1,700	158
			12/31/2040	1,698	2	1,700	0	0	1,700	158
			12/31/2050	1,699	2	1,701	0	0	1,701	159
			12/31/2060	1,699	2	1,701	0	0	1,701	159
			12/31/2070	1,699	2	1,701	0	0	1,701	159
	003_001	1	12/31/2020	1,544	0	1,544	0	0	1,544	2
			12/31/2030	1,544	0	1,544	0	0	1,544	2
			12/31/2040	1,544	0	1,544	0	0	1,544	2
			12/31/2050	1,544	0	1,544	0	0	1,544	2
			12/31/2060	1,544	0	1,544	0	0	1,544	2
			12/31/2070	1,544	0	1,544	0	0	1,544	2
		2	12/31/2020	1,390	2	1,392	0	0	1,392	-150
			12/31/2030	1,698	2	1,700	0	0	1,700	158
			12/31/2040	1,698	2	1,700	0	0	1,700	158
			12/31/2050	1,699	2	1,701	0	0	1,701	159
			12/31/2060	1,699	2	1,701	0	0	1,701	159
			12/31/2070	1,699	2	1,701	0	0	1,701	159
	003_002	1	12/31/2020	1,544	0	1,544	0	0	1,544	2
			12/31/2030	1,544	0	1,544	0	0	1,544	2
			12/31/2040	1,544	0	1,544	0	0	1,544	2
			12/31/2050	1,544	0	1,544	0	0	1,544	2
			12/31/2060	1,544	0	1,544	0	0	1,544	2
			12/31/2070	1,544	0	1,544	0	0	1,544	2
		2	12/31/2020	1,390	2	1,392	0	0	1,392	-150
			12/31/2030	1,698	2	1,700	0	0	1,700	158
			12/31/2040	1,698	2	1,700	0	0	1,700	158
			12/31/2050	1,699	2	1,701	0	0	1,701	159
			12/31/2060	1,699	2	1,701	0	0	1,701	159
			12/31/2070	1,699	2	1,701	0	0	1,701	159

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
Bee GCD/ Bee County	001	1	12/31/2020	3,132	4,617	7,749	14	243	8,006	-1,450
			12/31/2030	3,132	4,617	7,749	14	243	8,006	-1,425
			12/31/2040	3,132	4,617	7,749	14	243	8,006	-1,425
			12/31/2050	3,132	4,597	7,729	14	243	7,986	-1,393
			12/31/2060	3,132	4,597	7,729	14	243	7,986	-1,393
			12/31/2070	3,132	4,597	7,729	14	243	7,986	-1,375
		2	12/31/2020	98	4,452	4,550	342	1,190	6,082	-3,374
			12/31/2030	103	4,491	4,594	68	1,192	5,854	-3,577
			12/31/2040	103	4,491	4,594	68	1,192	5,854	-3,577
			12/31/2050	103	4,491	4,594	68	1,192	5,854	-3,525
			12/31/2060	103	4,491	4,594	68	1,192	5,854	-3,525
			12/31/2070	103	4,492	4,595	68	1,192	5,855	-3,506
	002	1	12/31/2020	317	1,183	1,500	29	91	1,620	-7,836
			12/31/2030	892	1,884	2,776	26	122	2,924	-6,507
			12/31/2040	1,466	2,585	4,051	23	153	4,227	-5,204
			12/31/2050	2,040	3,286	5,326	20	184	5,530	-3,849
			12/31/2060	2,615	3,987	6,602	17	215	6,834	-2,545
			12/31/2070	3,189	4,687	7,876	15	246	8,137	-1,224
		2	12/31/2020	39	1,106	1,145	79	262	1,486	-7,970
			12/31/2030	55	1,828	1,883	135	454	2,472	-6,959
			12/31/2040	67	2,511	2,578	188	643	3,409	-6,022
			12/31/2050	80	3,194	3,274	242	832	4,348	-5,031
			12/31/2060	92	3,877	3,969	296	1,022	5,287	-4,092
			12/31/2070	104	4,560	4,664	69	1,211	5,944	-3,417
	003_001	1	12/31/2020	3,132	4,617	7,749	14	243	8,006	-1,450
			12/31/2030	3,132	4,617	7,749	14	243	8,006	-1,425
			12/31/2040	3,132	4,617	7,749	14	243	8,006	-1,425
			12/31/2050	3,132	4,597	7,729	14	243	7,986	-1,393
			12/31/2060	3,132	4,597	7,729	14	243	7,986	-1,393
			12/31/2070	3,132	4,597	7,729	14	243	7,986	-1,375
		2	12/31/2020	98	4,452	4,550	342	1,190	6,082	-3,374
			12/31/2030	103	4,491	4,594	68	1,192	5,854	-3,577
			12/31/2040	103	4,491	4,594	68	1,192	5,854	-3,577
			12/31/2050	103	4,491	4,594	68	1,192	5,854	-3,525
			12/31/2060	103	4,491	4,594	68	1,192	5,854	-3,525
			12/31/2070	103	4,492	4,595	68	1,192	5,855	-3,506
	003_002	1	12/31/2020	317	1,183	1,500	29	91	1,620	-7,836
			12/31/2030	892	1,884	2,776	26	122	2,924	-6,507
			12/31/2040	1,466	2,585	4,051	23	153	4,227	-5,204
			12/31/2050	2,040	3,286	5,326	20	184	5,530	-3,849
			12/31/2060	2,615	3,987	6,602	17	215	6,834	-2,545
			12/31/2070	3,189	4,687	7,876	15	246	8,137	-1,224
		2	12/31/2020	39	1,106	1,145	79	262	1,486	-7,970
			12/31/2030	55	1,828	1,883	135	454	2,472	-6,959
			12/31/2040	67	2,511	2,578	188	643	3,409	-6,022
			12/31/2050	80	3,194	3,274	242	832	4,348	-5,031
			12/31/2060	92	3,877	3,969	296	1,022	5,287	-4,092
			12/31/2070	104	4,560	4,664	69	1,211	5,944	-3,417

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
Calhoun County GCD/ Calhoun County	001	1	12/31/2020	7,518	58	7,576	0	0	7,576	11
			12/31/2030	7,518	58	7,576	0	0	7,576	11
			12/31/2040	7,518	58	7,576	0	0	7,576	11
			12/31/2050	7,518	58	7,576	0	0	7,576	11
			12/31/2060	7,518	58	7,576	0	0	7,576	11
			12/31/2070	7,518	58	7,576	0	0	7,576	11
		2	12/31/2020	6,080	0	6,080	0	0	6,080	-1,485
			12/31/2030	6,080	0	6,080	0	0	6,080	-1,485
			12/31/2040	6,080	0	6,080	0	0	6,080	-1,485
			12/31/2050	6,080	0	6,080	0	0	6,080	-1,485
			12/31/2060	6,081	0	6,081	0	0	6,081	-1,484
			12/31/2070	6,081	0	6,081	0	0	6,081	-1,484
	002	1	12/31/2020	1,764	5	1,769	0	0	1,769	-5,796
			12/31/2030	2,939	16	2,955	0	0	2,955	-4,610
			12/31/2040	4,113	27	4,140	0	0	4,140	-3,425
			12/31/2050	5,287	37	5,324	0	0	5,324	-2,241
			12/31/2060	6,461	48	6,509	0	0	6,509	-1,056
			12/31/2070	7,635	59	7,694	0	0	7,694	129
		2	12/31/2020	1,737	0	1,737	0	0	1,737	-5,828
			12/31/2030	2,623	0	2,623	0	0	2,623	-4,942
			12/31/2040	3,510	0	3,510	0	0	3,510	-4,055
			12/31/2050	4,396	0	4,396	0	0	4,396	-3,169
			12/31/2060	5,283	0	5,283	0	0	5,283	-2,282
			12/31/2070	6,169	0	6,169	0	0	6,169	-1,396
	003_001	1	12/31/2020	7,518	58	7,576	0	0	7,576	11
			12/31/2030	7,518	10,064	17,582	0	0	17,582	10,017
			12/31/2040	7,518	10,064	17,582	0	0	17,582	10,017
			12/31/2050	7,518	10,064	17,582	0	0	17,582	10,017
			12/31/2060	7,518	10,064	17,582	0	0	17,582	10,017
			12/31/2070	7,518	10,064	17,582	0	0	17,582	10,017
		2	12/31/2020	6,080	0	6,080	0	0	6,080	-1,485
			12/31/2030	6,080	10,007	16,087	0	0	16,087	8,522
			12/31/2040	6,080	10,007	16,087	0	0	16,087	8,522
			12/31/2050	6,080	10,007	16,087	0	0	16,087	8,522
			12/31/2060	6,081	10,007	16,088	0	0	16,088	8,523
			12/31/2070	6,081	10,007	16,088	0	0	16,088	8,523
	003_002	1	12/31/2020	1,764	5	1,769	0	0	1,769	-5,796
			12/31/2030	2,939	10,023	12,962	0	0	12,962	5,397
			12/31/2040	4,113	10,033	14,146	0	0	14,146	6,581
			12/31/2050	5,287	10,044	15,331	0	0	15,331	7,766
			12/31/2060	6,461	10,055	16,516	0	0	16,516	8,951
			12/31/2070	7,635	10,065	17,700	0	0	17,700	10,135
		2	12/31/2020	1,737	0	1,737	0	0	1,737	-5,828
			12/31/2030	2,623	10,007	12,630	0	0	12,630	5,065
			12/31/2040	3,510	10,007	13,517	0	0	13,517	5,952
			12/31/2050	4,396	10,007	14,403	0	0	14,403	6,838
			12/31/2060	5,283	10,007	15,290	0	0	15,290	7,725
			12/31/2070	6,169	10,007	16,176	0	0	16,176	8,611

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**	**GCAS MAG Diff.**
Coastal Bend GCD/ Wharton County	001	1	12/31/2020	114,866	66,547	181,413	0	0	181,413	245
			12/31/2030	114,866	66,547	181,413	0	0	181,413	245
			12/31/2040	114,866	66,547	181,413	0	0	181,413	245
			12/31/2050	114,866	66,547	181,413	0	0	181,413	245
			12/31/2060	114,866	66,547	181,413	0	0	181,413	245
			12/31/2070	114,866	66,547	181,413	0	0	181,413	245
		2	12/31/2020	166,067	16,383	182,450	0	0	182,450	1,282
			12/31/2030	166,081	16,383	182,464	0	0	182,464	1,296
			12/31/2040	166,088	16,383	182,471	0	0	182,471	1,303
			12/31/2050	166,089	16,383	182,472	0	0	182,472	1,304
			12/31/2060	166,091	16,383	182,474	0	0	182,474	1,306
			12/31/2070	166,093	16,383	182,476	0	0	182,476	1,308
	002	1	12/31/2020	114,866	66,547	181,413	0	0	181,413	245
			12/31/2030	114,866	66,547	181,413	0	0	181,413	245
			12/31/2040	114,866	66,547	181,413	0	0	181,413	245
			12/31/2050	114,866	66,547	181,413	0	0	181,413	245
			12/31/2060	114,866	66,547	181,413	0	0	181,413	245
			12/31/2070	114,866	66,547	181,413	0	0	181,413	245
		2	12/31/2020	166,067	16,383	182,450	0	0	182,450	1,282
			12/31/2030	166,081	16,383	182,464	0	0	182,464	1,296
			12/31/2040	166,088	16,383	182,471	0	0	182,471	1,303
			12/31/2050	166,089	16,383	182,472	0	0	182,472	1,304
			12/31/2060	166,091	16,383	182,474	0	0	182,474	1,306
			12/31/2070	166,093	16,383	182,476	0	0	182,476	1,308
	003_001	1	12/31/2020	114,866	66,547	181,413	0	0	181,413	245
			12/31/2030	114,866	66,547	181,413	0	0	181,413	245
			12/31/2040	114,866	66,547	181,413	0	0	181,413	245
			12/31/2050	114,866	66,547	181,413	0	0	181,413	245
			12/31/2060	114,866	66,547	181,413	0	0	181,413	245
			12/31/2070	114,866	66,547	181,413	0	0	181,413	245
		2	12/31/2020	166,067	16,383	182,450	0	0	182,450	1,282
			12/31/2030	166,081	16,383	182,464	0	0	182,464	1,296
			12/31/2040	166,088	16,383	182,471	0	0	182,471	1,303
			12/31/2050	166,089	16,383	182,472	0	0	182,472	1,304
			12/31/2060	166,091	16,383	182,474	0	0	182,474	1,306
			12/31/2070	166,093	16,383	182,476	0	0	182,476	1,308
	003_002	1	12/31/2020	114,866	66,547	181,413	0	0	181,413	245
			12/31/2030	114,866	66,547	181,413	0	0	181,413	245
			12/31/2040	114,866	66,547	181,413	0	0	181,413	245
			12/31/2050	114,866	66,547	181,413	0	0	181,413	245
			12/31/2060	114,866	66,547	181,413	0	0	181,413	245
			12/31/2070	114,866	66,547	181,413	0	0	181,413	245
		2	12/31/2020	166,067	16,383	182,450	0	0	182,450	1,282
			12/31/2030	166,081	16,383	182,464	0	0	182,464	1,296
			12/31/2040	166,088	16,383	182,471	0	0	182,471	1,303
			12/31/2050	166,089	16,383	182,472	0	0	182,472	1,304
			12/31/2060	166,091	16,383	182,474	0	0	182,474	1,306
			12/31/2070	166,093	16,383	182,476	0	0	182,476	1,308

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
Coastal Plains GCD/ Matagorda County	001	1	12/31/2020	31,755	7,126	38,881	0	0	38,881	53
			12/31/2030	31,755	7,126	38,881	0	0	38,881	53
			12/31/2040	31,755	7,126	38,881	0	0	38,881	53
			12/31/2050	31,755	7,126	38,881	0	0	38,881	53
			12/31/2060	31,755	7,126	38,881	0	0	38,881	53
			12/31/2070	31,755	7,126	38,881	0	0	38,881	53
		2	12/31/2020	39,051	353	39,404	0	0	39,404	576
			12/31/2030	39,055	353	39,408	0	0	39,408	580
			12/31/2040	39,060	353	39,413	0	0	39,413	585
			12/31/2050	39,064	353	39,417	0	0	39,417	589
			12/31/2060	39,068	353	39,421	0	0	39,421	593
			12/31/2070	39,070	353	39,423	0	0	39,423	595
	002	1	12/31/2020	31,755	7,126	38,881	0	0	38,881	53
			12/31/2030	31,755	7,126	38,881	0	0	38,881	53
			12/31/2040	31,755	7,126	38,881	0	0	38,881	53
			12/31/2050	31,755	7,126	38,881	0	0	38,881	53
			12/31/2060	31,755	7,126	38,881	0	0	38,881	53
			12/31/2070	31,755	7,126	38,881	0	0	38,881	53
		2	12/31/2020	39,051	353	39,404	0	0	39,404	576
			12/31/2030	39,055	353	39,408	0	0	39,408	580
			12/31/2040	39,060	353	39,413	0	0	39,413	585
			12/31/2050	39,064	353	39,417	0	0	39,417	589
			12/31/2060	39,068	353	39,421	0	0	39,421	593
			12/31/2070	39,070	353	39,423	0	0	39,423	595
	003_001	1	12/31/2020	31,755	7,126	38,881	0	0	38,881	53
			12/31/2030	31,755	7,126	38,881	0	0	38,881	53
			12/31/2040	31,755	7,126	38,881	0	0	38,881	53
			12/31/2050	31,755	7,126	38,881	0	0	38,881	53
			12/31/2060	31,755	7,126	38,881	0	0	38,881	53
			12/31/2070	31,755	7,126	38,881	0	0	38,881	53
		2	12/31/2020	39,051	353	39,404	0	0	39,404	576
			12/31/2030	39,055	353	39,408	0	0	39,408	580
			12/31/2040	39,060	353	39,413	0	0	39,413	585
			12/31/2050	39,064	353	39,417	0	0	39,417	589
			12/31/2060	39,068	353	39,421	0	0	39,421	593
			12/31/2070	39,070	353	39,423	0	0	39,423	595
	003_002	1	12/31/2020	31,755	7,126	38,881	0	0	38,881	53
			12/31/2030	31,755	7,126	38,881	0	0	38,881	53
			12/31/2040	31,755	7,126	38,881	0	0	38,881	53
			12/31/2050	31,755	7,126	38,881	0	0	38,881	53
			12/31/2060	31,755	7,126	38,881	0	0	38,881	53
			12/31/2070	31,755	7,126	38,881	0	0	38,881	53
		2	12/31/2020	39,051	353	39,404	0	0	39,404	576
			12/31/2030	39,055	353	39,408	0	0	39,408	580
			12/31/2040	39,060	353	39,413	0	0	39,413	585
			12/31/2050	39,064	353	39,417	0	0	39,417	589
			12/31/2060	39,068	353	39,421	0	0	39,421	593
			12/31/2070	39,070	353	39,423	0	0	39,423	595

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
Colorado County GCD/ Colorado County	001	1	12/31/2020	31,623	40,093	71,716	0	919	72,635	-3,247
			12/31/2030	31,623	40,093	71,716	0	919	72,635	-3,247
			12/31/2040	31,623	40,093	71,716	0	919	72,635	-1,048
			12/31/2050	31,623	40,093	71,716	0	919	72,635	-1,048
			12/31/2060	31,623	40,093	71,716	0	919	72,635	99
			12/31/2070	31,623	40,093	71,716	0	919	72,635	99
		2	12/31/2020	31,727	36,557	68,284	206	2,071	70,561	-5,321
			12/31/2030	31,924	36,728	68,652	218	2,075	70,945	-4,937
			12/31/2040	31,996	36,838	68,834	223	2,077	71,134	-2,549
			12/31/2050	31,996	36,839	68,835	223	2,077	71,135	-2,548
			12/31/2060	31,997	36,840	68,837	223	2,077	71,137	-1,399
			12/31/2070	31,997	36,840	68,837	223	2,077	71,137	-1,399
	002	1	12/31/2020	12,727	15,998	28,725	55	794	29,574	-46,308
			12/31/2030	16,583	20,915	37,498	44	819	38,361	-37,521
			12/31/2040	20,439	25,833	46,272	33	845	47,150	-26,533
			12/31/2050	24,296	30,750	55,046	21	871	55,938	-17,745
			12/31/2060	28,152	35,667	63,819	10	896	64,725	-7,811
			12/31/2070	32,009	40,585	72,594	0	924	73,518	982
		2	12/31/2020	13,162	15,854	29,016	99	849	29,964	-45,918
			12/31/2030	17,148	20,684	37,832	133	1,102	39,067	-36,815
			12/31/2040	21,008	25,183	46,191	160	1,353	47,704	-25,979
			12/31/2050	24,798	28,720	53,518	182	1,603	55,303	-18,380
			12/31/2060	28,587	32,944	61,531	203	1,853	63,587	-8,949
			12/31/2070	32,376	37,273	69,649	225	2,102	71,976	-560
	003_001	1	12/31/2020	31,623	40,093	71,716	0	919	72,635	-3,247
			12/31/2030	31,623	40,093	71,716	0	919	72,635	-3,247
			12/31/2040	31,623	40,093	71,716	0	919	72,635	-1,048
			12/31/2050	31,623	40,093	71,716	0	919	72,635	-1,048
			12/31/2060	31,623	40,093	71,716	0	919	72,635	99
			12/31/2070	31,623	40,093	71,716	0	919	72,635	99
		2	12/31/2020	31,727	36,557	68,284	206	2,071	70,561	-5,321
			12/31/2030	31,924	36,728	68,652	218	2,075	70,945	-4,937
			12/31/2040	31,996	36,838	68,834	223	2,077	71,134	-2,549
			12/31/2050	31,996	36,839	68,835	223	2,077	71,135	-2,548
			12/31/2060	31,997	36,840	68,837	223	2,077	71,137	-1,399
			12/31/2070	31,997	36,840	68,837	223	2,077	71,137	-1,399
	003_002	1	12/31/2020	12,727	15,998	28,725	55	794	29,574	-46,308
			12/31/2030	16,583	20,915	37,498	44	819	38,361	-37,521
			12/31/2040	20,439	25,833	46,272	33	845	47,150	-26,533
			12/31/2050	24,296	30,750	55,046	21	871	55,938	-17,745
			12/31/2060	28,152	35,667	63,819	10	896	64,725	-7,811
			12/31/2070	32,009	40,585	72,594	0	924	73,518	982
		2	12/31/2020	13,162	15,854	29,016	99	849	29,964	-45,918
			12/31/2030	17,148	20,684	37,832	133	1,102	39,067	-36,815
			12/31/2040	21,008	25,183	46,191	160	1,353	47,704	-25,979
			12/31/2050	24,798	28,720	53,518	182	1,603	55,303	-18,380
			12/31/2060	28,587	32,944	61,531	203	1,853	63,587	-8,949
			12/31/2070	32,376	37,273	69,649	225	2,102	71,976	-560

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
Evergreen UWCD/ Karnes County	001	1	12/31/2020	0	105	105	529	10,104	10,738	542
			12/31/2030	0	105	105	345	10,104	10,554	358
			12/31/2040	0	105	105	222	3,080	3,407	392
			12/31/2050	0	105	105	217	3,080	3,402	485
			12/31/2060	0	105	105	212	2,913	3,230	479
			12/31/2070	0	105	105	202	2,649	2,956	205
		2	12/31/2020	0	47	47	220	10,876	11,143	947
			12/31/2030	0	50	50	222	10,913	11,185	989
			12/31/2040	0	29	29	104	3,989	4,122	1,107
			12/31/2050	0	29	29	104	3,989	4,122	1,205
			12/31/2060	0	29	29	103	3,989	4,121	1,370
			12/31/2070	0	29	29	102	3,989	4,120	1,369
	002	1	12/31/2020	0	105	105	529	10,104	10,738	542
			12/31/2030	0	105	105	345	10,104	10,554	358
			12/31/2040	0	105	105	222	3,080	3,407	392
			12/31/2050	0	105	105	217	3,080	3,402	485
			12/31/2060	0	105	105	214	2,913	3,232	481
			12/31/2070	0	105	105	206	2,649	2,960	209
		2	12/31/2020	0	47	47	220	10,876	11,143	947
			12/31/2030	0	50	50	222	10,913	11,185	989
			12/31/2040	0	29	29	104	3,989	4,122	1,107
			12/31/2050	0	29	29	104	3,989	4,122	1,205
			12/31/2060	0	29	29	103	3,989	4,121	1,370
			12/31/2070	0	29	29	102	3,989	4,120	1,369
	003_001	1	12/31/2020	0	105	105	529	10,104	10,738	542
			12/31/2030	0	105	105	345	10,104	10,554	358
			12/31/2040	0	105	105	222	3,080	3,407	392
			12/31/2050	0	105	105	217	3,080	3,402	485
			12/31/2060	0	105	105	212	2,913	3,230	479
			12/31/2070	0	105	105	202	2,649	2,956	205
		2	12/31/2020	0	47	47	220	10,876	11,143	947
			12/31/2030	0	50	50	222	10,913	11,185	989
			12/31/2040	0	29	29	104	3,989	4,122	1,107
			12/31/2050	0	29	29	104	3,989	4,122	1,205
			12/31/2060	0	29	29	103	3,989	4,121	1,370
			12/31/2070	0	29	29	102	3,989	4,120	1,369
	003_002	1	12/31/2020	0	105	105	529	10,104	10,738	542
			12/31/2030	0	105	105	345	10,104	10,554	358
			12/31/2040	0	105	105	222	3,080	3,407	392
			12/31/2050	0	105	105	217	3,080	3,402	485
			12/31/2060	0	105	105	214	2,913	3,232	481
			12/31/2070	0	105	105	206	2,649	2,960	209
		2	12/31/2020	0	47	47	220	10,876	11,143	947
			12/31/2030	0	50	50	222	10,913	11,185	989
			12/31/2040	0	29	29	104	3,989	4,122	1,107
			12/31/2050	0	29	29	104	3,989	4,122	1,205
			12/31/2060	0	29	29	103	3,989	4,121	1,370
			12/31/2070	0	29	29	102	3,989	4,120	1,369

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**	**GCAS MAG Diff.**
Fayette County GCD/ Fayette County	001	1	12/31/2020	0	387	387	246	8,120	8,753	6,900
			12/31/2030	0	387	387	237	8,120	8,744	6,891
			12/31/2040	0	387	387	216	7,849	8,452	6,599
			12/31/2050	0	387	387	208	7,849	8,444	6,591
			12/31/2060	0	387	387	195	7,678	8,260	6,407
			12/31/2070	0	387	387	175	7,608	8,170	6,467
		2	12/31/2020	0	301	301	192	6,571	7,064	5,211
			12/31/2030	0	317	317	202	6,801	7,320	5,467
			12/31/2040	0	333	333	197	7,064	7,594	5,741
			12/31/2050	0	350	350	189	7,144	7,683	5,830
			12/31/2060	0	368	368	187	7,300	7,855	6,002
			12/31/2070	0	387	387	171	7,678	8,236	6,533
	002	1	12/31/2020	0	301	301	192	6,571	7,064	5,211
			12/31/2030	0	317	317	202	6,801	7,320	5,467
			12/31/2040	0	333	333	202	7,064	7,599	5,746
			12/31/2050	0	350	350	200	7,144	7,694	5,841
			12/31/2060	0	368	368	198	7,300	7,866	6,013
			12/31/2070	0	387	387	192	7,678	8,257	6,554
		2	12/31/2020	0	301	301	192	6,571	7,064	5,211
			12/31/2030	0	317	317	202	6,801	7,320	5,467
			12/31/2040	0	333	333	202	7,064	7,599	5,746
			12/31/2050	0	350	350	200	7,144	7,694	5,841
			12/31/2060	0	368	368	193	7,300	7,861	6,008
			12/31/2070	0	387	387	184	7,678	8,249	6,546
	003_001	1	12/31/2020	0	387	387	246	8,120	8,753	6,900
			12/31/2030	0	387	387	237	8,120	8,744	6,891
			12/31/2040	0	387	387	216	7,849	8,452	6,599
			12/31/2050	0	387	387	208	7,849	8,444	6,591
			12/31/2060	0	387	387	195	7,678	8,260	6,407
			12/31/2070	0	387	387	175	7,608	8,170	6,467
		2	12/31/2020	0	301	301	192	6,571	7,064	5,211
			12/31/2030	0	317	317	202	6,801	7,320	5,467
			12/31/2040	0	333	333	197	7,064	7,594	5,741
			12/31/2050	0	350	350	189	7,144	7,683	5,830
			12/31/2060	0	368	368	187	7,300	7,855	6,002
			12/31/2070	0	387	387	171	7,678	8,236	6,533
	003_002	1	12/31/2020	0	301	301	192	6,571	7,064	5,211
			12/31/2030	0	317	317	202	6,801	7,320	5,467
			12/31/2040	0	333	333	202	7,064	7,599	5,746
			12/31/2050	0	350	350	200	7,144	7,694	5,841
			12/31/2060	0	368	368	198	7,300	7,866	6,013
			12/31/2070	0	387	387	192	7,678	8,257	6,554
		2	12/31/2020	0	301	301	192	6,571	7,064	5,211
			12/31/2030	0	317	317	202	6,801	7,320	5,467
			12/31/2040	0	333	333	202	7,064	7,599	5,746
			12/31/2050	0	350	350	200	7,144	7,694	5,841
			12/31/2060	0	368	368	193	7,300	7,861	6,008
			12/31/2070	0	387	387	184	7,678	8,249	6,546

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
Goliad County GCD/ Goliad County	001	1	12/31/2020	400	6,004	6,404	171	58	6,633	-4,906
			12/31/2030	410	6,161	6,571	176	59	6,806	-4,733
			12/31/2040	417	6,264	6,681	179	60	6,920	-4,619
			12/31/2050	420	6,312	6,732	180	61	6,973	-4,566
			12/31/2060	431	6,440	6,871	184	62	7,117	-4,422
			12/31/2070	436	6,548	6,984	187	63	7,234	-4,305
		2	12/31/2020	161	5,799	5,960	107	553	6,620	-4,919
			12/31/2030	167	6,174	6,341	111	568	7,020	-4,519
			12/31/2040	172	6,502	6,674	115	578	7,367	-4,172
			12/31/2050	173	6,578	6,751	116	582	7,449	-4,090
			12/31/2060	177	6,693	6,870	118	594	7,582	-3,957
			12/31/2070	180	6,786	6,966	120	604	7,690	-3,849
	002	1	12/31/2020	400	6,004	6,404	171	58	6,633	-4,906
			12/31/2030	410	6,161	6,571	176	59	6,806	-4,733
			12/31/2040	417	6,264	6,681	179	60	6,920	-4,619
			12/31/2050	420	6,312	6,732	180	61	6,973	-4,566
			12/31/2060	431	6,440	6,871	184	62	7,117	-4,422
			12/31/2070	436	6,548	6,984	187	63	7,234	-4,305
		2	12/31/2020	161	5,799	5,960	107	553	6,620	-4,919
			12/31/2030	167	6,174	6,341	111	568	7,020	-4,519
			12/31/2040	172	6,502	6,674	115	578	7,367	-4,172
			12/31/2050	173	6,578	6,751	116	582	7,449	-4,090
			12/31/2060	177	6,693	6,870	118	594	7,582	-3,957
			12/31/2070	180	6,786	6,966	120	604	7,690	-3,849
	003_001	1	12/31/2020	400	6,004	6,404	171	58	6,633	-4,906
			12/31/2030	410	6,161	6,571	176	59	6,806	-4,733
			12/31/2040	417	6,264	6,681	179	60	6,920	-4,619
			12/31/2050	420	6,312	6,732	180	61	6,973	-4,566
			12/31/2060	431	6,440	6,871	184	62	7,117	-4,422
			12/31/2070	436	6,548	6,984	187	63	7,234	-4,305
		2	12/31/2020	161	5,799	5,960	107	553	6,620	-4,919
			12/31/2030	167	6,174	6,341	111	568	7,020	-4,519
			12/31/2040	172	6,502	6,674	115	578	7,367	-4,172
			12/31/2050	173	6,578	6,751	116	582	7,449	-4,090
			12/31/2060	177	6,693	6,870	118	594	7,582	-3,957
			12/31/2070	180	6,786	6,966	120	604	7,690	-3,849
	003_002	1	12/31/2020	400	6,004	6,404	171	58	6,633	-4,906
			12/31/2030	410	6,161	6,571	176	59	6,806	-4,733
			12/31/2040	417	6,264	6,681	179	60	6,920	-4,619
			12/31/2050	420	6,312	6,732	180	61	6,973	-4,566
			12/31/2060	431	6,440	6,871	184	62	7,117	-4,422
			12/31/2070	436	6,548	6,984	187	63	7,234	-4,305
		2	12/31/2020	161	5,799	5,960	107	553	6,620	-4,919
			12/31/2030	167	6,174	6,341	111	568	7,020	-4,519
			12/31/2040	172	6,502	6,674	115	578	7,367	-4,172
			12/31/2050	173	6,578	6,751	116	582	7,449	-4,090
			12/31/2060	177	6,693	6,870	118	594	7,582	-3,957
			12/31/2070	180	6,786	6,966	120	604	7,690	-3,849

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
ND Bee/ Bee County	001	1	12/31/2020	0	9	9	0	0	9	-1
			12/31/2030	0	9	9	0	0	9	-1
			12/31/2040	0	9	9	0	0	9	-1
			12/31/2050	0	9	9	0	0	9	-1
			12/31/2060	0	9	9	0	0	9	-1
			12/31/2070	0	9	9	0	0	9	-1
		2	12/31/2020	0	0	0	276	1,284	1,560	1,550
			12/31/2030	0	0	0	0	1,284	1,284	1,274
			12/31/2040	0	0	0	0	1,284	1,284	1,274
			12/31/2050	0	0	0	0	1,284	1,284	1,274
			12/31/2060	0	0	0	0	1,284	1,284	1,274
			12/31/2070	0	0	0	0	1,284	1,284	1,274
	002	1	12/31/2020	0	1	1	10	48	59	49
			12/31/2030	0	2	2	8	38	48	38
			12/31/2040	0	4	4	6	29	39	29
			12/31/2050	0	6	6	4	19	29	19
			12/31/2060	0	7	7	2	9	18	8
			12/31/2070	0	9	9	0	0	9	-1
		2	12/31/2020	0	0	0	58	269	327	317
			12/31/2030	0	0	0	102	476	578	568
			12/31/2040	0	0	0	147	683	830	820
			12/31/2050	0	0	0	0	890	890	880
			12/31/2060	0	0	0	0	1,097	1,097	1,087
			12/31/2070	0	0	0	0	1,304	1,304	1,294
	003_001	1	12/31/2020	0	9	9	0	0	9	-1
			12/31/2030	0	9	9	0	0	9	-1
			12/31/2040	0	9	9	0	0	9	-1
			12/31/2050	0	9	9	0	0	9	-1
			12/31/2060	0	9	9	0	0	9	-1
			12/31/2070	0	9	9	0	0	9	-1
		2	12/31/2020	0	0	0	276	1,284	1,560	1,550
			12/31/2030	0	0	0	0	1,284	1,284	1,274
			12/31/2040	0	0	0	0	1,284	1,284	1,274
			12/31/2050	0	0	0	0	1,284	1,284	1,274
			12/31/2060	0	0	0	0	1,284	1,284	1,274
			12/31/2070	0	0	0	0	1,284	1,284	1,274
	003_002	1	12/31/2020	0	1	1	10	48	59	49
			12/31/2030	0	2	2	8	38	48	38
			12/31/2040	0	4	4	6	29	39	29
			12/31/2050	0	6	6	4	19	29	19
			12/31/2060	0	7	7	2	9	18	8
			12/31/2070	0	9	9	0	0	9	-1
		2	12/31/2020	0	0	0	58	269	327	317
			12/31/2030	0	0	0	102	476	578	568
			12/31/2040	0	0	0	147	683	830	820
			12/31/2050	0	0	0	0	890	890	880
			12/31/2060	0	0	0	0	1,097	1,097	1,087
			12/31/2070	0	0	0	0	1,304	1,304	1,294

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
ND Lavaca/ Lavaca County	001	1	12/31/2020	3,117	12,664	15,781	146	4,500	20,427	174
			12/31/2030	3,117	12,664	15,781	146	4,500	20,427	174
			12/31/2040	3,117	12,664	15,781	142	4,500	20,423	170
			12/31/2050	3,117	12,664	15,781	142	4,500	20,423	170
			12/31/2060	3,117	12,664	15,781	134	4,500	20,415	162
			12/31/2070	3,117	12,664	15,781	131	4,500	20,412	173
		2	12/31/2020	1,233	11,605	12,838	154	6,837	19,829	-424
			12/31/2030	1,279	11,907	13,186	202	6,993	20,381	128
			12/31/2040	1,279	11,784	13,063	196	6,874	20,133	-120
			12/31/2050	1,279	11,784	13,063	194	6,874	20,131	-122
			12/31/2060	1,279	11,784	13,063	192	6,874	20,129	-124
			12/31/2070	1,279	11,784	13,063	190	6,874	20,127	-112
	002	1	12/31/2020	994	7,354	8,348	117	3,412	11,877	-8,376
			12/31/2030	1,428	8,435	9,863	121	3,634	13,618	-6,635
			12/31/2040	1,861	9,516	11,377	125	3,856	15,358	-4,895
			12/31/2050	2,294	10,597	12,891	130	4,078	17,099	-3,154
			12/31/2060	2,727	11,677	14,404	130	4,300	18,834	-1,419
			12/31/2070	3,161	12,758	15,919	136	4,536	20,591	352
		2	12/31/2020	774	7,123	7,897	150	4,172	12,219	-8,034
			12/31/2030	914	8,339	9,253	199	4,872	14,324	-5,929
			12/31/2040	1,008	9,255	10,263	194	5,416	15,873	-4,380
			12/31/2050	1,101	10,170	11,271	194	5,960	17,425	-2,828
			12/31/2060	1,195	11,085	12,280	195	6,393	18,868	-1,385
			12/31/2070	1,289	11,875	13,164	193	6,927	20,284	45
	003_001	1	12/31/2020	3,117	12,664	15,781	146	4,500	20,427	174
			12/31/2030	3,117	12,664	15,781	146	4,500	20,427	174
			12/31/2040	3,117	12,664	15,781	142	4,500	20,423	170
			12/31/2050	3,117	12,664	15,781	142	4,500	20,423	170
			12/31/2060	3,117	12,664	15,781	134	4,500	20,415	162
			12/31/2070	3,117	12,664	15,781	131	4,500	20,412	173
		2	12/31/2020	1,233	11,605	12,838	154	6,837	19,829	-424
			12/31/2030	1,279	11,907	13,186	202	6,993	20,381	128
			12/31/2040	1,279	11,784	13,063	196	6,874	20,133	-120
			12/31/2050	1,279	11,784	13,063	194	6,874	20,131	-122
			12/31/2060	1,279	11,784	13,063	192	6,874	20,129	-124
			12/31/2070	1,279	11,784	13,063	190	6,874	20,127	-112
	003_002	1	12/31/2020	994	7,354	8,348	117	3,412	11,877	-8,376
			12/31/2030	1,428	8,435	9,863	121	3,634	13,618	-6,635
			12/31/2040	1,861	9,516	11,377	125	3,856	15,358	-4,895
			12/31/2050	2,294	10,597	12,891	130	4,078	17,099	-3,154
			12/31/2060	2,727	11,677	14,404	130	4,300	18,834	-1,419
			12/31/2070	3,161	12,758	15,919	136	4,536	20,591	352
		2	12/31/2020	774	7,123	7,897	150	4,172	12,219	-8,034
			12/31/2030	914	8,339	9,253	199	4,872	14,324	-5,929
			12/31/2040	1,008	9,255	10,263	194	5,416	15,873	-4,380
			12/31/2050	1,101	10,170	11,271	194	5,960	17,425	-2,828
			12/31/2060	1,195	11,085	12,280	195	6,393	18,868	-1,385
			12/31/2070	1,289	11,875	13,164	193	6,927	20,284	45

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
Pecan Valley GCD/ DeWitt County	001	1	12/31/2020	836	5,431	6,267	257	11,444	17,968	2,492
			12/31/2030	836	5,431	6,267	237	11,444	17,948	2,472
			12/31/2040	836	5,431	6,267	212	11,444	17,923	3,438
			12/31/2050	836	5,381	6,217	178	11,444	17,839	3,354
			12/31/2060	836	5,381	6,217	157	11,444	17,818	3,333
			12/31/2070	836	5,381	6,217	134	11,444	17,795	3,310
		2	12/31/2020	836	5,431	6,267	257	11,444	17,968	2,492
			12/31/2030	836	5,431	6,267	237	11,444	17,948	2,472
			12/31/2040	836	5,431	6,267	205	11,444	17,916	3,431
			12/31/2050	836	5,381	6,217	178	11,444	17,839	3,354
			12/31/2060	836	5,381	6,217	147	11,444	17,808	3,323
			12/31/2070	836	5,381	6,217	124	11,444	17,785	3,300
	002	1	12/31/2020	326	3,645	3,971	257	7,414	11,642	-3,834
			12/31/2030	428	4,002	4,430	241	8,158	12,829	-2,647
			12/31/2040	530	4,359	4,889	225	8,930	14,044	-441
			12/31/2050	632	4,716	5,348	208	9,732	15,288	803
			12/31/2060	734	5,074	5,808	188	10,569	16,565	2,080
			12/31/2070	836	5,431	6,267	170	11,444	17,881	3,396
		2	12/31/2020	326	3,645	3,971	257	7,414	11,642	-3,834
			12/31/2030	428	4,002	4,430	241	8,158	12,829	-2,647
			12/31/2040	530	4,359	4,889	219	8,930	14,038	-447
			12/31/2050	632	4,716	5,348	203	9,732	15,283	798
			12/31/2060	734	5,074	5,808	187	10,569	16,564	2,079
			12/31/2070	836	5,431	6,267	156	11,444	17,867	3,382
	003_001	1	12/31/2020	836	5,431	6,267	257	11,444	17,968	2,492
			12/31/2030	836	5,431	6,267	237	11,444	17,948	2,472
			12/31/2040	836	5,431	6,267	212	11,444	17,923	3,438
			12/31/2050	836	5,381	6,217	178	11,444	17,839	3,354
			12/31/2060	836	5,381	6,217	157	11,444	17,818	3,333
			12/31/2070	836	5,381	6,217	134	11,444	17,795	3,310
		2	12/31/2020	836	5,431	6,267	257	11,444	17,968	2,492
			12/31/2030	836	5,431	6,267	237	11,444	17,948	2,472
			12/31/2040	836	5,431	6,267	205	11,444	17,916	3,431
			12/31/2050	836	5,381	6,217	178	11,444	17,839	3,354
			12/31/2060	836	5,381	6,217	147	11,444	17,808	3,323
			12/31/2070	836	5,381	6,217	124	11,444	17,785	3,300
	003_002	1	12/31/2020	326	3,645	3,971	257	7,414	11,642	-3,834
			12/31/2030	428	4,002	4,430	241	8,158	12,829	-2,647
			12/31/2040	530	4,359	4,889	225	8,930	14,044	-441
			12/31/2050	632	4,716	5,348	208	9,732	15,288	803
			12/31/2060	734	5,074	5,808	188	10,569	16,565	2,080
			12/31/2070	836	5,431	6,267	170	11,444	17,881	3,396
		2	12/31/2020	326	3,645	3,971	257	7,414	11,642	-3,834
			12/31/2030	428	4,002	4,430	241	8,158	12,829	-2,647
			12/31/2040	530	4,359	4,889	219	8,930	14,038	-447
			12/31/2050	632	4,716	5,348	203	9,732	15,283	798
			12/31/2060	734	5,074	5,808	187	10,569	16,564	2,079
			12/31/2070	836	5,431	6,267	156	11,444	17,867	3,382

Pumping Output (i.e., Model Budget File), Acre-Feet per Year

GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
Refugio GCD/ Refugio County	001	1	12/31/2020	3,229	2,634	5,863	0	0	5,863	16
			12/31/2030	3,229	2,634	5,863	0	0	5,863	16
			12/31/2040	3,229	2,634	5,863	0	0	5,863	16
			12/31/2050	3,229	2,634	5,863	0	0	5,863	16
			12/31/2060	3,229	2,634	5,863	0	0	5,863	16
			12/31/2070	3,229	2,634	5,863	0	0	5,863	16
		2	12/31/2020	4,271	1,364	5,635	0	0	5,635	-212
			12/31/2030	4,331	1,369	5,700	0	0	5,700	-147
			12/31/2040	4,331	1,369	5,700	0	0	5,700	-147
			12/31/2050	4,331	1,369	5,700	0	0	5,700	-147
			12/31/2060	4,331	1,369	5,700	0	0	5,700	-147
			12/31/2070	4,331	1,369	5,700	0	0	5,700	-147
	002	1	12/31/2020	1,956	783	2,739	0	0	2,739	-3,108
			12/31/2030	2,216	1,161	3,377	0	0	3,377	-2,470
			12/31/2040	2,476	1,538	4,014	0	0	4,014	-1,833
			12/31/2050	2,735	1,916	4,651	0	0	4,651	-1,196
			12/31/2060	2,995	2,294	5,289	0	0	5,289	-558
			12/31/2070	3,255	2,672	5,927	0	0	5,927	80
		2	12/31/2020	2,153	652	2,805	0	0	2,805	-3,042
			12/31/2030	2,646	803	3,449	0	0	3,449	-2,398
			12/31/2040	3,078	948	4,026	0	0	4,026	-1,821
			12/31/2050	3,510	1,093	4,603	0	0	4,603	-1,244
			12/31/2060	3,942	1,238	5,180	0	0	5,180	-667
			12/31/2070	4,374	1,384	5,758	0	0	5,758	-89
	003_001	1	12/31/2020	3,229	2,634	5,863	0	0	5,863	16
			12/31/2030	3,229	12,641	15,870	0	0	15,870	10,023
			12/31/2040	3,229	12,641	15,870	0	0	15,870	10,023
			12/31/2050	3,229	12,641	15,870	0	0	15,870	10,023
			12/31/2060	3,229	12,641	15,870	0	0	15,870	10,023
			12/31/2070	3,229	12,641	15,870	0	0	15,870	10,023
		2	12/31/2020	4,271	1,364	5,635	0	0	5,635	-212
			12/31/2030	4,331	11,376	15,707	0	0	15,707	9,860
			12/31/2040	4,331	11,376	15,707	0	0	15,707	9,860
			12/31/2050	4,331	11,376	15,707	0	0	15,707	9,860
			12/31/2060	4,331	11,376	15,707	0	0	15,707	9,860
			12/31/2070	4,331	11,376	15,707	0	0	15,707	9,860
	003_002	1	12/31/2020	1,956	783	2,739	0	0	2,739	-3,108
			12/31/2030	2,216	11,167	13,383	0	0	13,383	7,536
			12/31/2040	2,476	11,545	14,021	0	0	14,021	8,174
			12/31/2050	2,735	11,923	14,658	0	0	14,658	8,811
			12/31/2060	2,995	12,301	15,296	0	0	15,296	9,449
			12/31/2070	3,255	12,678	15,933	0	0	15,933	10,086
		2	12/31/2020	2,153	652	2,805	0	0	2,805	-3,042
			12/31/2030	2,646	10,809	13,455	0	0	13,455	7,608
			12/31/2040	3,078	10,955	14,033	0	0	14,033	8,186
			12/31/2050	3,510	11,100	14,610	0	0	14,610	8,763
			12/31/2060	3,942	11,245	15,187	0	0	15,187	9,340
			12/31/2070	4,374	11,390	15,764	0	0	15,764	9,917

LREWater, LLC
a Leonard Rice Engineers Company

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS	GCAS MAG Diff.
Texana GCD/ Jackson County	001	1	12/31/2020	66,055	24,549	90,604	0	0	90,604	122
			12/31/2030	66,055	24,549	90,604	0	0	90,604	122
			12/31/2040	66,055	24,549	90,604	0	0	90,604	122
			12/31/2050	66,055	24,549	90,604	0	0	90,604	122
			12/31/2060	66,055	24,549	90,604	0	0	90,604	122
			12/31/2070	66,055	24,549	90,604	0	0	90,604	122
		2	12/31/2020	66,502	24,767	91,269	0	0	91,269	787
			12/31/2030	66,502	24,767	91,269	0	0	91,269	787
			12/31/2040	66,502	24,767	91,269	0	0	91,269	787
			12/31/2050	66,502	24,767	91,269	0	0	91,269	787
			12/31/2060	66,502	24,767	91,269	0	0	91,269	787
			12/31/2070	66,502	24,767	91,269	0	0	91,269	787
	002	1	12/31/2020	44,523	16,382	60,905	0	0	60,905	-29,577
			12/31/2030	48,917	18,049	66,966	0	0	66,966	-23,516
			12/31/2040	53,311	19,715	73,026	0	0	73,026	-17,456
			12/31/2050	57,706	21,382	79,088	0	0	79,088	-11,394
			12/31/2060	62,100	23,049	85,149	0	0	85,149	-5,333
			12/31/2070	66,495	24,715	91,210	0	0	91,210	728
		2	12/31/2020	44,930	16,649	61,579	0	0	61,579	-28,903
			12/31/2030	49,333	18,306	67,639	0	0	67,639	-22,843
			12/31/2040	53,735	19,963	73,698	0	0	73,698	-16,784
			12/31/2050	58,138	21,619	79,757	0	0	79,757	-10,725
			12/31/2060	62,540	23,276	85,816	0	0	85,816	-4,666
			12/31/2070	66,943	24,933	91,876	0	0	91,876	1,394
	003_001	1	12/31/2020	76,062	24,549	100,611	0	0	100,611	10,129
			12/31/2030	76,062	34,555	110,617	0	0	110,617	20,135
			12/31/2040	76,062	34,555	110,617	0	0	110,617	20,135
			12/31/2050	76,062	34,555	110,617	0	0	110,617	20,135
			12/31/2060	76,062	34,555	110,617	0	0	110,617	20,135
			12/31/2070	76,062	34,555	110,617	0	0	110,617	20,135
		2	12/31/2020	76,509	24,767	101,276	0	0	101,276	10,794
			12/31/2030	76,509	34,774	111,283	0	0	111,283	20,801
			12/31/2040	76,509	34,774	111,283	0	0	111,283	20,801
			12/31/2050	76,509	34,774	111,283	0	0	111,283	20,801
			12/31/2060	76,509	34,774	111,283	0	0	111,283	20,801
			12/31/2070	76,509	34,774	111,283	0	0	111,283	20,801
	003_002	1	12/31/2020	54,529	16,382	70,911	0	0	70,911	-19,571
			12/31/2030	58,924	28,056	86,980	0	0	86,980	-3,502
			12/31/2040	63,318	29,722	93,040	0	0	93,040	2,558
			12/31/2050	67,712	31,389	99,101	0	0	99,101	8,619
			12/31/2060	72,107	33,055	105,162	0	0	105,162	14,680
			12/31/2070	76,501	34,722	111,223	0	0	111,223	20,741
		2	12/31/2020	54,937	16,649	71,586	0	0	71,586	-18,896
			12/31/2030	59,339	28,313	87,652	0	0	87,652	-2,830
			12/31/2040	63,742	29,969	93,711	0	0	93,711	3,229
			12/31/2050	68,144	31,626	99,770	0	0	99,770	9,288
			12/31/2060	72,547	33,283	105,830	0	0	105,830	15,348
			12/31/2070	76,949	34,940	111,889	0	0	111,889	21,407

Pumping Output (i.e., Model Budget File), Acre-Feet per Year										
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**	**GCAS MAG Diff.**
Victoria County GCD/ Victoria County	001	1	12/31/2020	32,173	27,871	60,044	0	0	60,044	15,070
			12/31/2030	32,173	27,871	60,044	0	0	60,044	10,074
			12/31/2040	32,173	27,871	60,044	0	0	60,044	5,078
			12/31/2050	32,173	27,871	60,044	0	0	60,044	5,078
			12/31/2060	32,173	27,871	60,044	0	0	60,044	81
			12/31/2070	32,173	27,871	60,044	0	0	60,044	81
		2	12/31/2020	20,634	34,678	55,312	0	0	55,312	10,338
			12/31/2030	20,634	34,678	55,312	0	0	55,312	5,342
			12/31/2040	20,634	34,678	55,312	0	0	55,312	346
			12/31/2050	20,634	34,678	55,312	0	0	55,312	346
			12/31/2060	20,634	34,678	55,312	0	0	55,312	-4,651
			12/31/2070	20,634	34,678	55,312	0	0	55,312	-4,651
	002	1	12/31/2020	9,056	11,498	20,554	0	0	20,554	-24,420
			12/31/2030	13,774	14,840	28,614	0	0	28,614	-21,356
			12/31/2040	18,492	18,181	36,673	0	0	36,673	-18,293
			12/31/2050	23,209	21,523	44,732	0	0	44,732	-10,234
			12/31/2060	27,927	24,864	52,791	0	0	52,791	-7,172
			12/31/2070	32,645	28,205	60,850	0	0	60,850	887
		2	12/31/2020	7,911	12,482	20,393	0	0	20,393	-24,581
			12/31/2030	10,508	17,012	27,520	0	0	27,520	-22,450
			12/31/2040	13,104	21,542	34,646	0	0	34,646	-20,320
			12/31/2050	15,701	26,071	41,772	0	0	41,772	-13,194
			12/31/2060	18,297	30,601	48,898	0	0	48,898	-11,065
			12/31/2070	20,894	35,131	56,025	0	0	56,025	-3,938
	003_001	1	12/31/2020	32,173	37,878	70,051	0	0	70,051	25,077
			12/31/2030	32,173	47,884	80,057	0	0	80,057	30,087
			12/31/2040	32,173	47,884	80,057	0	0	80,057	25,091
			12/31/2050	32,173	47,884	80,057	0	0	80,057	25,091
			12/31/2060	32,173	47,884	80,057	0	0	80,057	20,094
			12/31/2070	32,173	47,884	80,057	0	0	80,057	20,094
		2	12/31/2020	20,634	44,684	65,318	0	0	65,318	20,344
			12/31/2030	20,634	54,691	75,325	0	0	75,325	25,355
			12/31/2040	20,634	54,691	75,325	0	0	75,325	20,359
			12/31/2050	20,634	54,691	75,325	0	0	75,325	20,359
			12/31/2060	20,634	54,691	75,325	0	0	75,325	15,362
			12/31/2070	20,634	54,691	75,325	0	0	75,325	15,362
	003_002	1	12/31/2020	9,056	21,505	30,561	0	0	30,561	-14,413
			12/31/2030	13,774	34,853	48,627	0	0	48,627	-1,343
			12/31/2040	18,492	38,194	56,686	0	0	56,686	1,720
			12/31/2050	23,209	41,536	64,745	0	0	64,745	9,779
			12/31/2060	27,927	44,877	72,804	0	0	72,804	12,841
			12/31/2070	32,645	48,219	80,864	0	0	80,864	20,901
		2	12/31/2020	7,911	22,489	30,400	0	0	30,400	-14,574
			12/31/2030	10,508	37,025	47,533	0	0	47,533	-2,437
			12/31/2040	13,104	41,555	54,659	0	0	54,659	-307
			12/31/2050	15,701	46,085	61,786	0	0	61,786	6,820
			12/31/2060	18,297	50,614	68,911	0	0	68,911	8,948
			12/31/2070	20,894	55,144	76,038	0	0	76,038	16,075

Attachment 2c –
Difference between Pumping Input and Output

Pumping Output minus Pumping Input, Acre-Feet per Year										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Aransas County GCD/ Aransas County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	18	0	18	0	0	18
			12/31/2030	24	0	24	0	0	24
			12/31/2040	24	0	24	0	0	24
			12/31/2050	24	0	24	0	0	24
			12/31/2060	24	0	24	0	0	24
			12/31/2070	24	0	24	0	0	24
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	18	0	18	0	0	18
			12/31/2030	24	0	24	0	0	24
			12/31/2040	24	0	24	0	0	24
			12/31/2050	24	0	24	0	0	24
			12/31/2060	24	0	24	0	0	24
			12/31/2070	24	0	24	0	0	24
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	18	0	18	0	0	18
			12/31/2030	24	0	24	0	0	24
			12/31/2040	24	0	24	0	0	24
			12/31/2050	24	0	24	0	0	24
			12/31/2060	24	0	24	0	0	24
			12/31/2070	24	0	24	0	0	24
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	18	0	18	0	0	18
			12/31/2030	24	0	24	0	0	24
			12/31/2040	24	0	24	0	0	24
			12/31/2050	24	0	24	0	0	24
			12/31/2060	24	0	24	0	0	24
			12/31/2070	24	0	24	0	0	24

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Aransas County GCD/ Aransas County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	1%	0%	1%	0%	0%	1%
			12/31/2030	1%	0%	1%	0%	0%	1%
			12/31/2040	1%	0%	1%	0%	0%	1%
			12/31/2050	1%	0%	1%	0%	0%	1%
			12/31/2060	1%	0%	1%	0%	0%	1%
			12/31/2070	1%	0%	1%	0%	0%	1%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	1%	0%	1%	0%	0%	1%
			12/31/2030	1%	0%	1%	0%	0%	1%
			12/31/2040	1%	0%	1%	0%	0%	1%
			12/31/2050	1%	0%	1%	0%	0%	1%
			12/31/2060	1%	0%	1%	0%	0%	1%
			12/31/2070	1%	0%	1%	0%	0%	1%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	1%	0%	1%	0%	0%	1%
			12/31/2030	1%	0%	1%	0%	0%	1%
			12/31/2040	1%	0%	1%	0%	0%	1%
			12/31/2050	1%	0%	1%	0%	0%	1%
			12/31/2060	1%	0%	1%	0%	0%	1%
			12/31/2070	1%	0%	1%	0%	0%	1%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	1%	0%	1%	0%	0%	1%
			12/31/2030	1%	0%	1%	0%	0%	1%
			12/31/2040	1%	0%	1%	0%	0%	1%
			12/31/2050	1%	0%	1%	0%	0%	1%
			12/31/2060	1%	0%	1%	0%	0%	1%
			12/31/2070	1%	0%	1%	0%	0%	1%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Bee GCD/ Bee County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	-20	-20	0	0	-20
			12/31/2060	0	-20	-20	0	0	-20
			12/31/2070	0	-20	-20	0	0	-20
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	-276	0	-276
			12/31/2040	0	0	0	-276	0	-276
			12/31/2050	0	0	0	-276	0	-276
			12/31/2060	0	0	0	-276	0	-276
			12/31/2070	0	0	0	-276	0	-276
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	-280	0	-280
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	-20	-20	0	0	-20
			12/31/2060	0	-20	-20	0	0	-20
			12/31/2070	0	-20	-20	0	0	-20
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	-276	0	-276
			12/31/2040	0	0	0	-276	0	-276
			12/31/2050	0	0	0	-276	0	-276
			12/31/2060	0	0	0	-276	0	-276
			12/31/2070	0	0	0	-276	0	-276
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	-280	0	-280

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Bee GCD/ Bee County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	134%	0%	5%
			12/31/2040	0%	0%	0%	134%	0%	5%
			12/31/2050	0%	0%	0%	134%	0%	5%
			12/31/2060	0%	0%	0%	134%	0%	5%
			12/31/2070	0%	0%	0%	134%	0%	5%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	134%	0%	5%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	134%	0%	5%
			12/31/2040	0%	0%	0%	134%	0%	5%
			12/31/2050	0%	0%	0%	134%	0%	5%
			12/31/2060	0%	0%	0%	134%	0%	5%
			12/31/2070	0%	0%	0%	134%	0%	5%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	134%	0%	5%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Calhoun County GCD/ Calhoun County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Calhoun County GCD/ Calhoun County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Coastal Bend GCD/ Wharton County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	-1	0	-1	0	0	-1
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	-1	0	-1	0	0	-1
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	-1	0	-1	0	0	-1
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	-1	0	-1	0	0	-1
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0

Percent Difference Between Pumping Output and Pumping Input										
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Coastal Bend GCD/ Wharton County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Coastal Plains GCD/ Matagorda County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Coastal Plains GCD/ Matagorda County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Colorado County GCD/ Colorado County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	-1,434	-1,434	0	0	-1,434
			12/31/2030	0	-1,575	-1,575	0	0	-1,575
			12/31/2040	0	-1,577	-1,577	0	0	-1,577
			12/31/2050	0	-1,577	-1,577	0	0	-1,577
			12/31/2060	0	-1,577	-1,577	0	0	-1,577
			12/31/2070	0	-1,578	-1,578	0	0	-1,578
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	-131	-131	0	0	-131
			12/31/2050	0	-1,113	-1,113	0	0	-1,113
			12/31/2060	0	-1,407	-1,407	0	0	-1,407
			12/31/2070	0	-1,596	-1,596	0	0	-1,596
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	-1,434	-1,434	0	0	-1,434
			12/31/2030	0	-1,575	-1,575	0	0	-1,575
			12/31/2040	0	-1,577	-1,577	0	0	-1,577
			12/31/2050	0	-1,577	-1,577	0	0	-1,577
			12/31/2060	0	-1,577	-1,577	0	0	-1,577
			12/31/2070	0	-1,578	-1,578	0	0	-1,578
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	-131	-131	0	0	-131
			12/31/2050	0	-1,113	-1,113	0	0	-1,113
			12/31/2060	0	-1,407	-1,407	0	0	-1,407
			12/31/2070	0	-1,596	-1,596	0	0	-1,596

Percent Difference Between Pumping Output and Pumping Input

GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Colorado County GCD/ Colorado County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	4%	2%	0%	0%	2%
			12/31/2030	0%	4%	2%	0%	0%	2%
			12/31/2040	0%	4%	2%	0%	0%	2%
			12/31/2050	0%	4%	2%	0%	0%	2%
			12/31/2060	0%	4%	2%	0%	0%	2%
			12/31/2070	0%	4%	2%	0%	0%	2%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	1%	0%	0%	0%	0%
			12/31/2050	0%	4%	2%	0%	0%	2%
			12/31/2060	0%	4%	2%	0%	0%	2%
			12/31/2070	0%	4%	2%	0%	0%	2%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	4%	2%	0%	0%	2%
			12/31/2030	0%	4%	2%	0%	0%	2%
			12/31/2040	0%	4%	2%	0%	0%	2%
			12/31/2050	0%	4%	2%	0%	0%	2%
			12/31/2060	0%	4%	2%	0%	0%	2%
			12/31/2070	0%	4%	2%	0%	0%	2%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	1%	0%	0%	0%	0%
			12/31/2050	0%	4%	2%	0%	0%	2%
			12/31/2060	0%	4%	2%	0%	0%	2%
			12/31/2070	0%	4%	2%	0%	0%	2%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Evergreen UWCD/ Karnes County	001	1	12/31/2020	0	0	0	-459	-191	-650
			12/31/2030	0	0	0	-643	-191	-834
			12/31/2040	0	0	0	-406	-190	-596
			12/31/2050	0	0	0	-411	-190	-601
			12/31/2060	0	0	0	-416	-357	-773
			12/31/2070	0	0	0	-426	-621	-1,047
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	-4	0	-4
			12/31/2040	0	0	0	-4	0	-4
			12/31/2050	0	0	0	-4	0	-4
			12/31/2060	0	0	0	-5	0	-5
			12/31/2070	0	0	0	-6	0	-6
	002	1	12/31/2020	0	0	0	-459	-191	-650
			12/31/2030	0	0	0	-643	-191	-834
			12/31/2040	0	0	0	-406	-190	-596
			12/31/2050	0	0	0	-411	-190	-601
			12/31/2060	0	0	0	-414	-357	-771
			12/31/2070	0	0	0	-422	-621	-1,043
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	-4	0	-4
			12/31/2040	0	0	0	-4	0	-4
			12/31/2050	0	0	0	-4	0	-4
			12/31/2060	0	0	0	-5	0	-5
			12/31/2070	0	0	0	-6	0	-6
	003_001	1	12/31/2020	0	0	0	-459	-191	-650
			12/31/2030	0	0	0	-643	-191	-834
			12/31/2040	0	0	0	-406	-190	-596
			12/31/2050	0	0	0	-411	-190	-601
			12/31/2060	0	0	0	-416	-357	-773
			12/31/2070	0	0	0	-426	-621	-1,047
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	-4	0	-4
			12/31/2040	0	0	0	-4	0	-4
			12/31/2050	0	0	0	-4	0	-4
			12/31/2060	0	0	0	-5	0	-5
			12/31/2070	0	0	0	-6	0	-6
	003_002	1	12/31/2020	0	0	0	-459	-191	-650
			12/31/2030	0	0	0	-643	-191	-834
			12/31/2040	0	0	0	-406	-190	-596
			12/31/2050	0	0	0	-411	-190	-601
			12/31/2060	0	0	0	-414	-357	-771
			12/31/2070	0	0	0	-422	-621	-1,043
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	-4	0	-4
			12/31/2040	0	0	0	-4	0	-4
			12/31/2050	0	0	0	-4	0	-4
			12/31/2060	0	0	0	-5	0	-5
			12/31/2070	0	0	0	-6	0	-6

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Evergreen UWCD/ Karnes County	001	1	12/31/2020	0%	0%	0%	61%	2%	6%
			12/31/2030	0%	0%	0%	96%	2%	8%
			12/31/2040	0%	0%	0%	96%	6%	16%
			12/31/2050	0%	0%	0%	97%	6%	16%
			12/31/2060	0%	0%	0%	99%	12%	21%
			12/31/2070	0%	0%	0%	103%	21%	30%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	2%	0%	0%
			12/31/2040	0%	0%	0%	4%	0%	0%
			12/31/2050	0%	0%	0%	4%	0%	0%
			12/31/2060	0%	0%	0%	5%	0%	0%
			12/31/2070	0%	0%	0%	6%	0%	0%
	002	1	12/31/2020	0%	0%	0%	61%	2%	6%
			12/31/2030	0%	0%	0%	96%	2%	8%
			12/31/2040	0%	0%	0%	96%	6%	16%
			12/31/2050	0%	0%	0%	97%	6%	16%
			12/31/2060	0%	0%	0%	98%	12%	21%
			12/31/2070	0%	0%	0%	101%	21%	30%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	2%	0%	0%
			12/31/2040	0%	0%	0%	4%	0%	0%
			12/31/2050	0%	0%	0%	4%	0%	0%
			12/31/2060	0%	0%	0%	5%	0%	0%
			12/31/2070	0%	0%	0%	6%	0%	0%
	003_001	1	12/31/2020	0%	0%	0%	61%	2%	6%
			12/31/2030	0%	0%	0%	96%	2%	8%
			12/31/2040	0%	0%	0%	96%	6%	16%
			12/31/2050	0%	0%	0%	97%	6%	16%
			12/31/2060	0%	0%	0%	99%	12%	21%
			12/31/2070	0%	0%	0%	103%	21%	30%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	2%	0%	0%
			12/31/2040	0%	0%	0%	4%	0%	0%
			12/31/2050	0%	0%	0%	4%	0%	0%
			12/31/2060	0%	0%	0%	5%	0%	0%
			12/31/2070	0%	0%	0%	6%	0%	0%
	003_002	1	12/31/2020	0%	0%	0%	61%	2%	6%
			12/31/2030	0%	0%	0%	96%	2%	8%
			12/31/2040	0%	0%	0%	96%	6%	16%
			12/31/2050	0%	0%	0%	97%	6%	16%
			12/31/2060	0%	0%	0%	98%	12%	21%
			12/31/2070	0%	0%	0%	101%	21%	30%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	2%	0%	0%
			12/31/2040	0%	0%	0%	4%	0%	0%
			12/31/2050	0%	0%	0%	4%	0%	0%
			12/31/2060	0%	0%	0%	5%	0%	0%
			12/31/2070	0%	0%	0%	6%	0%	0%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Fayette County GCD/ Fayette County	001	1	12/31/2020	0	0	0	0	-200	-200
			12/31/2030	0	0	0	-9	-200	-209
			12/31/2040	0	0	0	-30	-471	-501
			12/31/2050	0	0	0	-38	-471	-509
			12/31/2060	0	0	0	-51	-642	-693
			12/31/2070	0	0	0	-71	-712	-783
		2	12/31/2020	0	0	0	0	-127	-127
			12/31/2030	0	0	0	0	-139	-139
			12/31/2040	0	0	0	-15	-152	-167
			12/31/2050	0	0	0	-34	-390	-424
			12/31/2060	0	0	0	-47	-599	-646
			12/31/2070	0	0	0	-75	-642	-717
	002	1	12/31/2020	0	0	0	0	-127	-127
			12/31/2030	0	0	0	0	-139	-139
			12/31/2040	0	0	0	-10	-152	-162
			12/31/2050	0	0	0	-23	-390	-413
			12/31/2060	0	0	0	-36	-599	-635
			12/31/2070	0	0	0	-54	-642	-696
		2	12/31/2020	0	0	0	0	-127	-127
			12/31/2030	0	0	0	0	-139	-139
			12/31/2040	0	0	0	-10	-152	-162
			12/31/2050	0	0	0	-23	-390	-413
			12/31/2060	0	0	0	-41	-599	-640
			12/31/2070	0	0	0	-62	-642	-704
	003_001	1	12/31/2020	0	0	0	0	-200	-200
			12/31/2030	0	0	0	-9	-200	-209
			12/31/2040	0	0	0	-30	-471	-501
			12/31/2050	0	0	0	-38	-471	-509
			12/31/2060	0	0	0	-51	-642	-693
			12/31/2070	0	0	0	-71	-712	-783
		2	12/31/2020	0	0	0	0	-127	-127
			12/31/2030	0	0	0	0	-139	-139
			12/31/2040	0	0	0	-15	-152	-167
			12/31/2050	0	0	0	-34	-390	-424
			12/31/2060	0	0	0	-47	-599	-646
			12/31/2070	0	0	0	-75	-642	-717
	003_002	1	12/31/2020	0	0	0	0	-127	-127
			12/31/2030	0	0	0	0	-139	-139
			12/31/2040	0	0	0	-10	-152	-162
			12/31/2050	0	0	0	-23	-390	-413
			12/31/2060	0	0	0	-36	-599	-635
			12/31/2070	0	0	0	-54	-642	-696
		2	12/31/2020	0	0	0	0	-127	-127
			12/31/2030	0	0	0	0	-139	-139
			12/31/2040	0	0	0	-10	-152	-162
			12/31/2050	0	0	0	-23	-390	-413
			12/31/2060	0	0	0	-41	-599	-640
			12/31/2070	0	0	0	-62	-642	-704

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Fayette County GCD/ Fayette County	001	1	12/31/2020	0%	0%	0%	0%	2%	2%
			12/31/2030	0%	0%	0%	4%	2%	2%
			12/31/2040	0%	0%	0%	13%	6%	6%
			12/31/2050	0%	0%	0%	17%	6%	6%
			12/31/2060	0%	0%	0%	23%	8%	8%
			12/31/2070	0%	0%	0%	34%	9%	9%
		2	12/31/2020	0%	0%	0%	0%	2%	2%
			12/31/2030	0%	0%	0%	0%	2%	2%
			12/31/2040	0%	0%	0%	7%	2%	2%
			12/31/2050	0%	0%	0%	17%	5%	5%
			12/31/2060	0%	0%	0%	22%	8%	8%
			12/31/2070	0%	0%	0%	36%	8%	8%
	002	1	12/31/2020	0%	0%	0%	0%	2%	2%
			12/31/2030	0%	0%	0%	0%	2%	2%
			12/31/2040	0%	0%	0%	5%	2%	2%
			12/31/2050	0%	0%	0%	11%	5%	5%
			12/31/2060	0%	0%	0%	17%	8%	8%
			12/31/2070	0%	0%	0%	25%	8%	8%
		2	12/31/2020	0%	0%	0%	0%	2%	2%
			12/31/2030	0%	0%	0%	0%	2%	2%
			12/31/2040	0%	0%	0%	5%	2%	2%
			12/31/2050	0%	0%	0%	11%	5%	5%
			12/31/2060	0%	0%	0%	19%	8%	8%
			12/31/2070	0%	0%	0%	29%	8%	8%
	003_001	1	12/31/2020	0%	0%	0%	0%	2%	2%
			12/31/2030	0%	0%	0%	4%	2%	2%
			12/31/2040	0%	0%	0%	13%	6%	6%
			12/31/2050	0%	0%	0%	17%	6%	6%
			12/31/2060	0%	0%	0%	23%	8%	8%
			12/31/2070	0%	0%	0%	34%	9%	9%
		2	12/31/2020	0%	0%	0%	0%	2%	2%
			12/31/2030	0%	0%	0%	0%	2%	2%
			12/31/2040	0%	0%	0%	7%	2%	2%
			12/31/2050	0%	0%	0%	17%	5%	5%
			12/31/2060	0%	0%	0%	22%	8%	8%
			12/31/2070	0%	0%	0%	36%	8%	8%
	003_002	1	12/31/2020	0%	0%	0%	0%	2%	2%
			12/31/2030	0%	0%	0%	0%	2%	2%
			12/31/2040	0%	0%	0%	5%	2%	2%
			12/31/2050	0%	0%	0%	11%	5%	5%
			12/31/2060	0%	0%	0%	17%	8%	8%
			12/31/2070	0%	0%	0%	25%	8%	8%
		2	12/31/2020	0%	0%	0%	0%	2%	2%
			12/31/2030	0%	0%	0%	0%	2%	2%
			12/31/2040	0%	0%	0%	5%	2%	2%
			12/31/2050	0%	0%	0%	11%	5%	5%
			12/31/2060	0%	0%	0%	19%	8%	8%
			12/31/2070	0%	0%	0%	29%	8%	8%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Goliad County GCD/ Goliad County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Goliad County GCD/ Goliad County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
ND Bee/ Bee County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	-276	0	-276
			12/31/2040	0	0	0	-276	0	-276
			12/31/2050	0	0	0	-276	0	-276
			12/31/2060	0	0	0	-276	0	-276
			12/31/2070	0	0	0	-276	0	-276
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	-191	0	-191
			12/31/2060	0	0	0	-236	0	-236
			12/31/2070	0	0	0	-280	0	-280
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	-276	0	-276
			12/31/2040	0	0	0	-276	0	-276
			12/31/2050	0	0	0	-276	0	-276
			12/31/2060	0	0	0	-276	0	-276
			12/31/2070	0	0	0	-276	0	-276
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	-191	0	-191
			12/31/2060	0	0	0	-236	0	-236
			12/31/2070	0	0	0	-280	0	-280

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
ND Bee/ Bee County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	200%	0%	19%
			12/31/2040	0%	0%	0%	200%	0%	19%
			12/31/2050	0%	0%	0%	200%	0%	19%
			12/31/2060	0%	0%	0%	200%	0%	19%
			12/31/2070	0%	0%	0%	200%	0%	19%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	200%	0%	19%
			12/31/2060	0%	0%	0%	200%	0%	19%
			12/31/2070	0%	0%	0%	200%	0%	19%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	200%	0%	19%
			12/31/2040	0%	0%	0%	200%	0%	19%
			12/31/2050	0%	0%	0%	200%	0%	19%
			12/31/2060	0%	0%	0%	200%	0%	19%
			12/31/2070	0%	0%	0%	200%	0%	19%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	200%	0%	19%
			12/31/2060	0%	0%	0%	200%	0%	19%
			12/31/2070	0%	0%	0%	200%	0%	19%

LREWater, LLC
a Leonard Rice Engineers Company

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
ND Lavaca/ Lavaca County	001	1	12/31/2020	0	0	0	-5	-195	-200
			12/31/2030	0	0	0	-5	-195	-200
			12/31/2040	0	0	0	-9	-195	-204
			12/31/2050	0	0	0	-9	-195	-204
			12/31/2060	0	0	0	-17	-195	-212
			12/31/2070	0	0	0	-20	-195	-215
		2	12/31/2020	0	-629	-629	0	-17	-646
			12/31/2030	0	-630	-630	-2	-19	-651
			12/31/2040	0	-754	-754	-8	-139	-901
			12/31/2050	0	-754	-754	-10	-139	-903
			12/31/2060	0	-754	-754	-12	-139	-905
			12/31/2070	0	-755	-755	-14	-139	-908
	002	1	12/31/2020	0	-84	-84	0	-30	-114
			12/31/2030	0	-70	-70	-3	-64	-137
			12/31/2040	0	-55	-55	-6	-98	-159
			12/31/2050	0	-41	-41	-8	-131	-180
			12/31/2060	0	-27	-27	-15	-165	-207
			12/31/2070	0	-12	-12	-18	-199	-229
		2	12/31/2020	0	-368	-368	0	-12	-380
			12/31/2030	0	-423	-423	-2	-14	-439
			12/31/2040	0	-476	-476	-8	-16	-500
			12/31/2050	0	-529	-529	-9	-17	-555
			12/31/2060	0	-582	-582	-9	-129	-720
			12/31/2070	0	-760	-760	-11	-140	-911
	003_001	1	12/31/2020	0	0	0	-5	-195	-200
			12/31/2030	0	0	0	-5	-195	-200
			12/31/2040	0	0	0	-9	-195	-204
			12/31/2050	0	0	0	-9	-195	-204
			12/31/2060	0	0	0	-17	-195	-212
			12/31/2070	0	0	0	-20	-195	-215
		2	12/31/2020	0	-629	-629	0	-17	-646
			12/31/2030	0	-630	-630	-2	-19	-651
			12/31/2040	0	-754	-754	-8	-139	-901
			12/31/2050	0	-754	-754	-10	-139	-903
			12/31/2060	0	-754	-754	-12	-139	-905
			12/31/2070	0	-755	-755	-14	-139	-908
	003_002	1	12/31/2020	0	-84	-84	0	-30	-114
			12/31/2030	0	-70	-70	-3	-64	-137
			12/31/2040	0	-55	-55	-6	-98	-159
			12/31/2050	0	-41	-41	-8	-131	-180
			12/31/2060	0	-27	-27	-15	-165	-207
			12/31/2070	0	-12	-12	-18	-199	-229
		2	12/31/2020	0	-368	-368	0	-12	-380
			12/31/2030	0	-423	-423	-2	-14	-439
			12/31/2040	0	-476	-476	-8	-16	-500
			12/31/2050	0	-529	-529	-9	-17	-555
			12/31/2060	0	-582	-582	-9	-129	-720
			12/31/2070	0	-760	-760	-11	-140	-911

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
ND Lavaca/ Lavaca County	001	1	12/31/2020	0%	0%	0%	3%	4%	1%
			12/31/2030	0%	0%	0%	3%	4%	1%
			12/31/2040	0%	0%	0%	6%	4%	1%
			12/31/2050	0%	0%	0%	6%	4%	1%
			12/31/2060	0%	0%	0%	12%	4%	1%
			12/31/2070	0%	0%	0%	14%	4%	1%
		2	12/31/2020	0%	5%	5%	0%	0%	3%
			12/31/2030	0%	5%	5%	1%	0%	3%
			12/31/2040	0%	6%	6%	4%	2%	4%
			12/31/2050	0%	6%	6%	5%	2%	4%
			12/31/2060	0%	6%	6%	6%	2%	4%
			12/31/2070	0%	6%	6%	7%	2%	4%
	002	1	12/31/2020	0%	1%	1%	0%	1%	1%
			12/31/2030	0%	1%	1%	2%	2%	1%
			12/31/2040	0%	1%	0%	5%	3%	1%
			12/31/2050	0%	0%	0%	6%	3%	1%
			12/31/2060	0%	0%	0%	11%	4%	1%
			12/31/2070	0%	0%	0%	12%	4%	1%
		2	12/31/2020	0%	5%	5%	0%	0%	3%
			12/31/2030	0%	5%	4%	1%	0%	3%
			12/31/2040	0%	5%	5%	4%	0%	3%
			12/31/2050	0%	5%	5%	5%	0%	3%
			12/31/2060	0%	5%	5%	5%	2%	4%
			12/31/2070	0%	6%	6%	6%	2%	4%
	003_001	1	12/31/2020	0%	0%	0%	3%	4%	1%
			12/31/2030	0%	0%	0%	3%	4%	1%
			12/31/2040	0%	0%	0%	6%	4%	1%
			12/31/2050	0%	0%	0%	6%	4%	1%
			12/31/2060	0%	0%	0%	12%	4%	1%
			12/31/2070	0%	0%	0%	14%	4%	1%
		2	12/31/2020	0%	5%	5%	0%	0%	3%
			12/31/2030	0%	5%	5%	1%	0%	3%
			12/31/2040	0%	6%	6%	4%	2%	4%
			12/31/2050	0%	6%	6%	5%	2%	4%
			12/31/2060	0%	6%	6%	6%	2%	4%
			12/31/2070	0%	6%	6%	7%	2%	4%
	003_002	1	12/31/2020	0%	1%	1%	0%	1%	1%
			12/31/2030	0%	1%	1%	2%	2%	1%
			12/31/2040	0%	1%	0%	5%	3%	1%
			12/31/2050	0%	0%	0%	6%	3%	1%
			12/31/2060	0%	0%	0%	11%	4%	1%
			12/31/2070	0%	0%	0%	12%	4%	1%
		2	12/31/2020	0%	5%	5%	0%	0%	3%
			12/31/2030	0%	5%	4%	1%	0%	3%
			12/31/2040	0%	5%	5%	4%	0%	3%
			12/31/2050	0%	5%	5%	5%	0%	3%
			12/31/2060	0%	5%	5%	5%	2%	4%
			12/31/2070	0%	6%	6%	6%	2%	4%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Pecan Valley GCD/ DeWitt County	001	1	12/31/2020	0	-19	-19	-73	0	-92
			12/31/2030	0	-19	-19	-93	0	-112
			12/31/2040	0	-19	-19	-118	0	-137
			12/31/2050	0	-69	-69	-152	0	-221
			12/31/2060	0	-69	-69	-173	0	-242
			12/31/2070	0	-69	-69	-196	0	-265
		2	12/31/2020	0	-19	-19	-73	0	-92
			12/31/2030	0	-19	-19	-93	0	-112
			12/31/2040	0	-19	-19	-125	0	-144
			12/31/2050	0	-69	-69	-152	0	-221
			12/31/2060	0	-69	-69	-183	0	-252
			12/31/2070	0	-69	-69	-206	0	-275
	002	1	12/31/2020	0	-12	-12	-73	0	-85
			12/31/2030	0	-14	-14	-89	0	-103
			12/31/2040	0	-15	-15	-105	0	-120
			12/31/2050	0	-17	-17	-122	0	-139
			12/31/2060	0	-18	-18	-142	0	-160
			12/31/2070	0	-19	-19	-160	0	-179
		2	12/31/2020	0	-12	-12	-73	0	-85
			12/31/2030	0	-14	-14	-89	0	-103
			12/31/2040	0	-15	-15	-111	0	-126
			12/31/2050	0	-17	-17	-127	0	-144
			12/31/2060	0	-18	-18	-143	0	-161
			12/31/2070	0	-19	-19	-174	0	-193
	003_001	1	12/31/2020	0	-19	-19	-73	0	-92
			12/31/2030	0	-19	-19	-93	0	-112
			12/31/2040	0	-19	-19	-118	0	-137
			12/31/2050	0	-69	-69	-152	0	-221
			12/31/2060	0	-69	-69	-173	0	-242
			12/31/2070	0	-69	-69	-196	0	-265
		2	12/31/2020	0	-19	-19	-73	0	-92
			12/31/2030	0	-19	-19	-93	0	-112
			12/31/2040	0	-19	-19	-125	0	-144
			12/31/2050	0	-69	-69	-152	0	-221
			12/31/2060	0	-69	-69	-183	0	-252
			12/31/2070	0	-69	-69	-206	0	-275
	003_002	1	12/31/2020	0	-12	-12	-73	0	-85
			12/31/2030	0	-14	-14	-89	0	-103
			12/31/2040	0	-15	-15	-105	0	-120
			12/31/2050	0	-17	-17	-122	0	-139
			12/31/2060	0	-18	-18	-142	0	-160
			12/31/2070	0	-19	-19	-160	0	-179
		2	12/31/2020	0	-12	-12	-73	0	-85
			12/31/2030	0	-14	-14	-89	0	-103
			12/31/2040	0	-15	-15	-111	0	-126
			12/31/2050	0	-17	-17	-127	0	-144
			12/31/2060	0	-18	-18	-143	0	-161
			12/31/2070	0	-19	-19	-174	0	-193

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Pecan Valley GCD/ DeWitt County	001	1	12/31/2020	0%	0%	0%	25%	0%	1%
			12/31/2030	0%	0%	0%	33%	0%	1%
			12/31/2040	0%	0%	0%	44%	0%	1%
			12/31/2050	0%	1%	1%	60%	0%	1%
			12/31/2060	0%	1%	1%	71%	0%	1%
			12/31/2070	0%	1%	1%	84%	0%	1%
		2	12/31/2020	0%	0%	0%	25%	0%	1%
			12/31/2030	0%	0%	0%	33%	0%	1%
			12/31/2040	0%	0%	0%	47%	0%	1%
			12/31/2050	0%	1%	1%	60%	0%	1%
			12/31/2060	0%	1%	1%	77%	0%	1%
			12/31/2070	0%	1%	1%	91%	0%	2%
	002	1	12/31/2020	0%	0%	0%	25%	0%	1%
			12/31/2030	0%	0%	0%	31%	0%	1%
			12/31/2040	0%	0%	0%	38%	0%	1%
			12/31/2050	0%	0%	0%	45%	0%	1%
			12/31/2060	0%	0%	0%	55%	0%	1%
			12/31/2070	0%	0%	0%	64%	0%	1%
		2	12/31/2020	0%	0%	0%	25%	0%	1%
			12/31/2030	0%	0%	0%	31%	0%	1%
			12/31/2040	0%	0%	0%	40%	0%	1%
			12/31/2050	0%	0%	0%	48%	0%	1%
			12/31/2060	0%	0%	0%	55%	0%	1%
			12/31/2070	0%	0%	0%	72%	0%	1%
	003_001	1	12/31/2020	0%	0%	0%	25%	0%	1%
			12/31/2030	0%	0%	0%	33%	0%	1%
			12/31/2040	0%	0%	0%	44%	0%	1%
			12/31/2050	0%	1%	1%	60%	0%	1%
			12/31/2060	0%	1%	1%	71%	0%	1%
			12/31/2070	0%	1%	1%	84%	0%	1%
		2	12/31/2020	0%	0%	0%	25%	0%	1%
			12/31/2030	0%	0%	0%	33%	0%	1%
			12/31/2040	0%	0%	0%	47%	0%	1%
			12/31/2050	0%	1%	1%	60%	0%	1%
			12/31/2060	0%	1%	1%	77%	0%	1%
			12/31/2070	0%	1%	1%	91%	0%	2%
	003_002	1	12/31/2020	0%	0%	0%	25%	0%	1%
			12/31/2030	0%	0%	0%	31%	0%	1%
			12/31/2040	0%	0%	0%	38%	0%	1%
			12/31/2050	0%	0%	0%	45%	0%	1%
			12/31/2060	0%	0%	0%	55%	0%	1%
			12/31/2070	0%	0%	0%	64%	0%	1%
		2	12/31/2020	0%	0%	0%	25%	0%	1%
			12/31/2030	0%	0%	0%	31%	0%	1%
			12/31/2040	0%	0%	0%	40%	0%	1%
			12/31/2050	0%	0%	0%	48%	0%	1%
			12/31/2060	0%	0%	0%	55%	0%	1%
			12/31/2070	0%	0%	0%	72%	0%	1%

Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Refugio GCD/ Refugio County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0

Percent Difference Between Pumping Output and Pumping Input									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Refugio GCD/ Refugio County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%

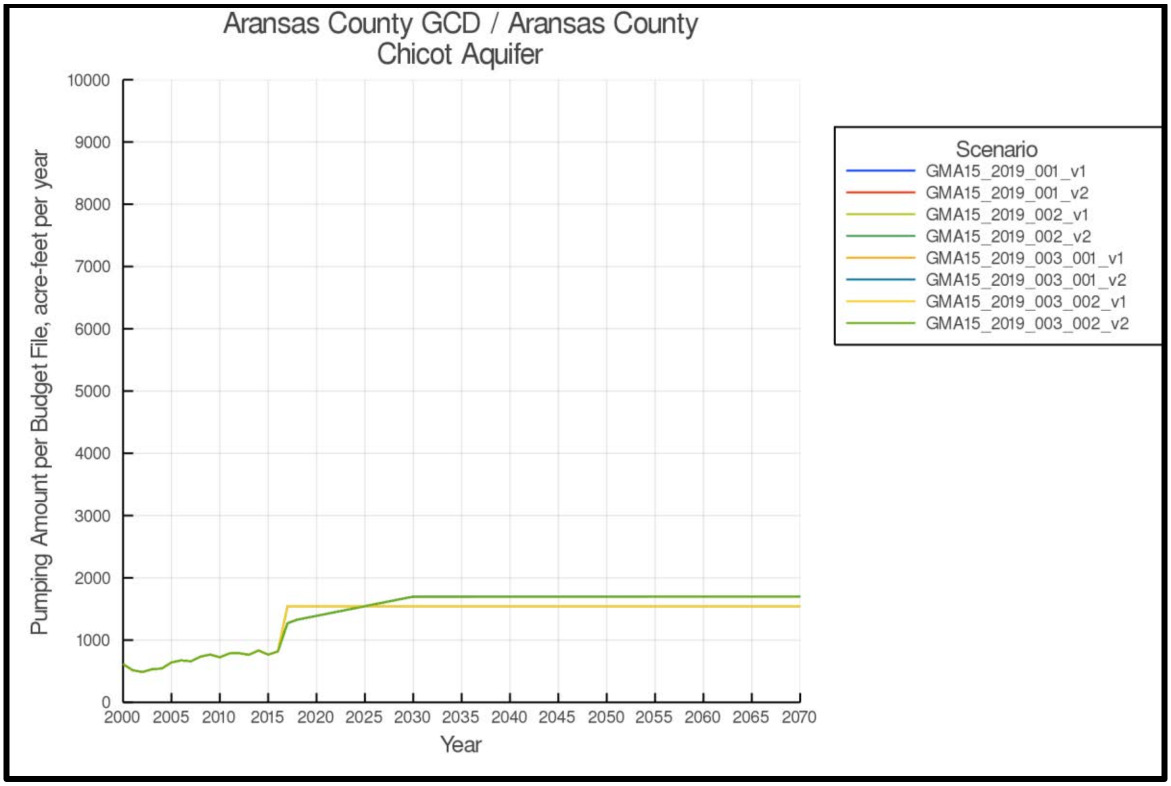
Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Texana GCD/ Jackson County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0

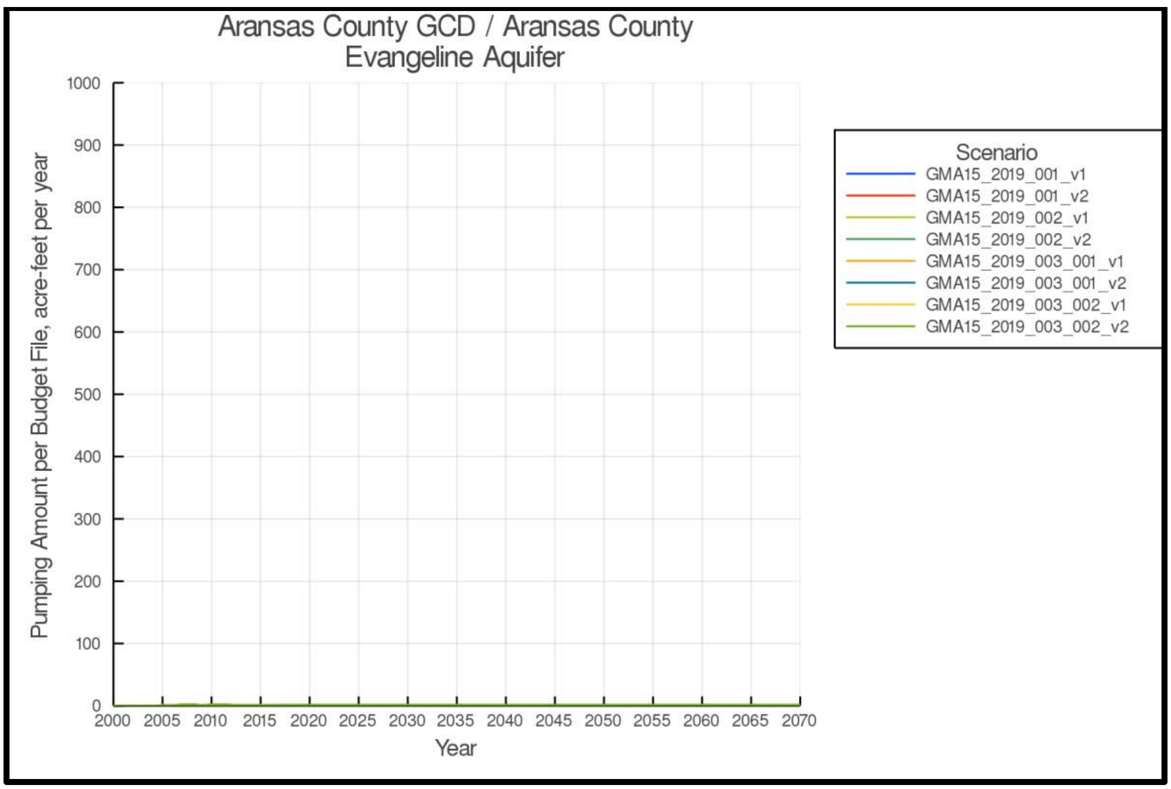
Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Texana GCD/ Jackson County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%

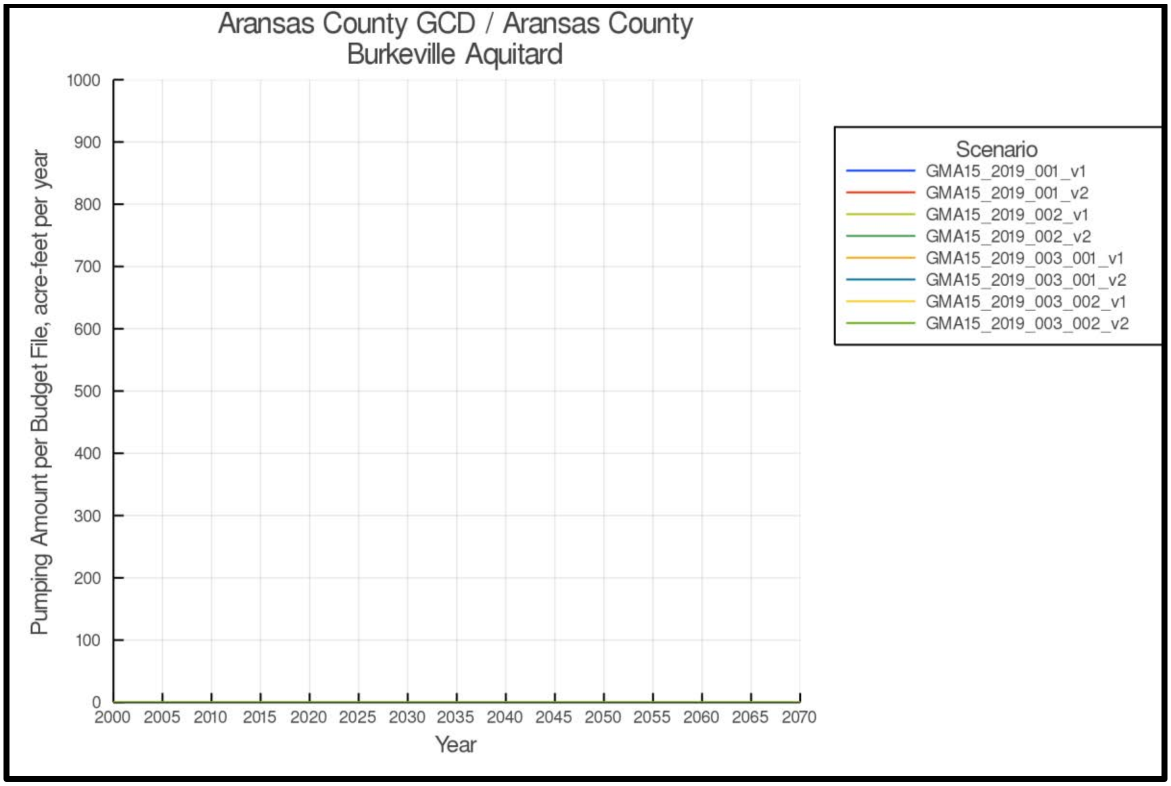
Pumping Output minus Pumping Input, Acre-Feet per Year									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Victoria County GCD/ Victoria County	001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_001	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
	003_002	1	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0
		2	12/31/2020	0	0	0	0	0	0
			12/31/2030	0	0	0	0	0	0
			12/31/2040	0	0	0	0	0	0
			12/31/2050	0	0	0	0	0	0
			12/31/2060	0	0	0	0	0	0
			12/31/2070	0	0	0	0	0	0

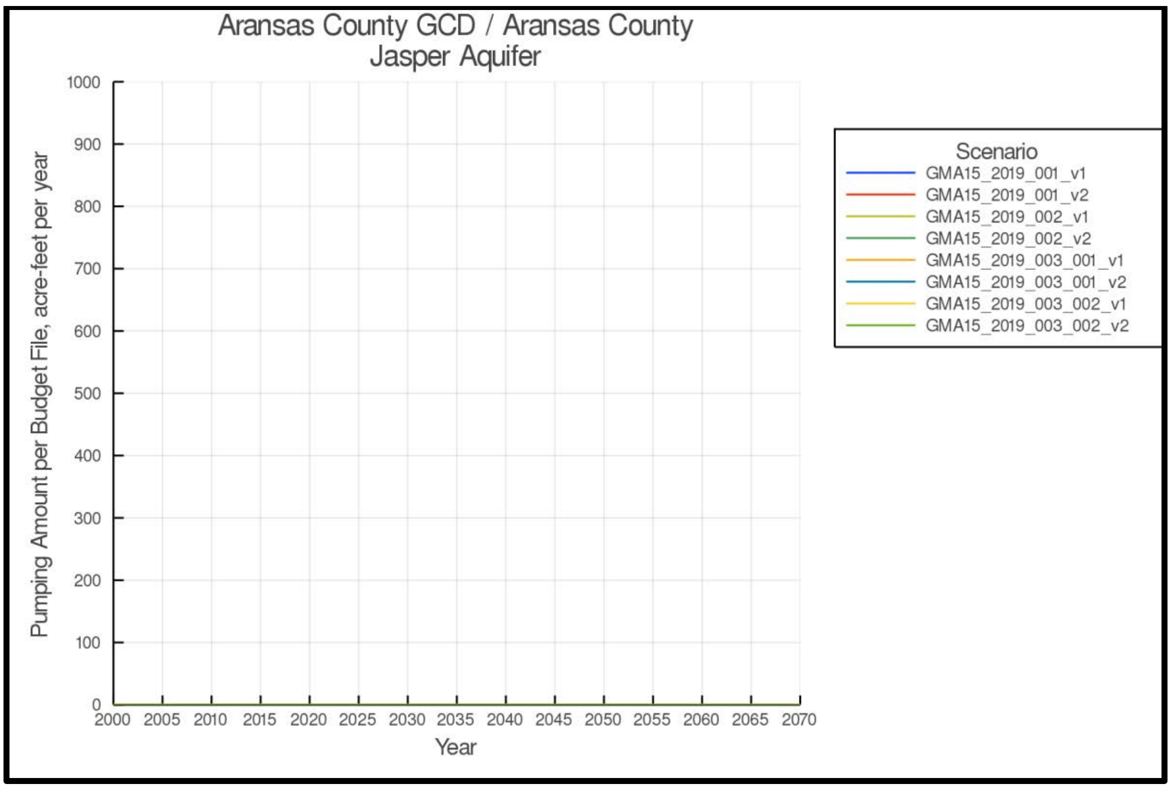
Percent Difference Between Pumping Output and Pumping Input									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Victoria County GCD/ Victoria County	001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_001	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
	003_002	1	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%
		2	12/31/2020	0%	0%	0%	0%	0%	0%
			12/31/2030	0%	0%	0%	0%	0%	0%
			12/31/2040	0%	0%	0%	0%	0%	0%
			12/31/2050	0%	0%	0%	0%	0%	0%
			12/31/2060	0%	0%	0%	0%	0%	0%
			12/31/2070	0%	0%	0%	0%	0%	0%

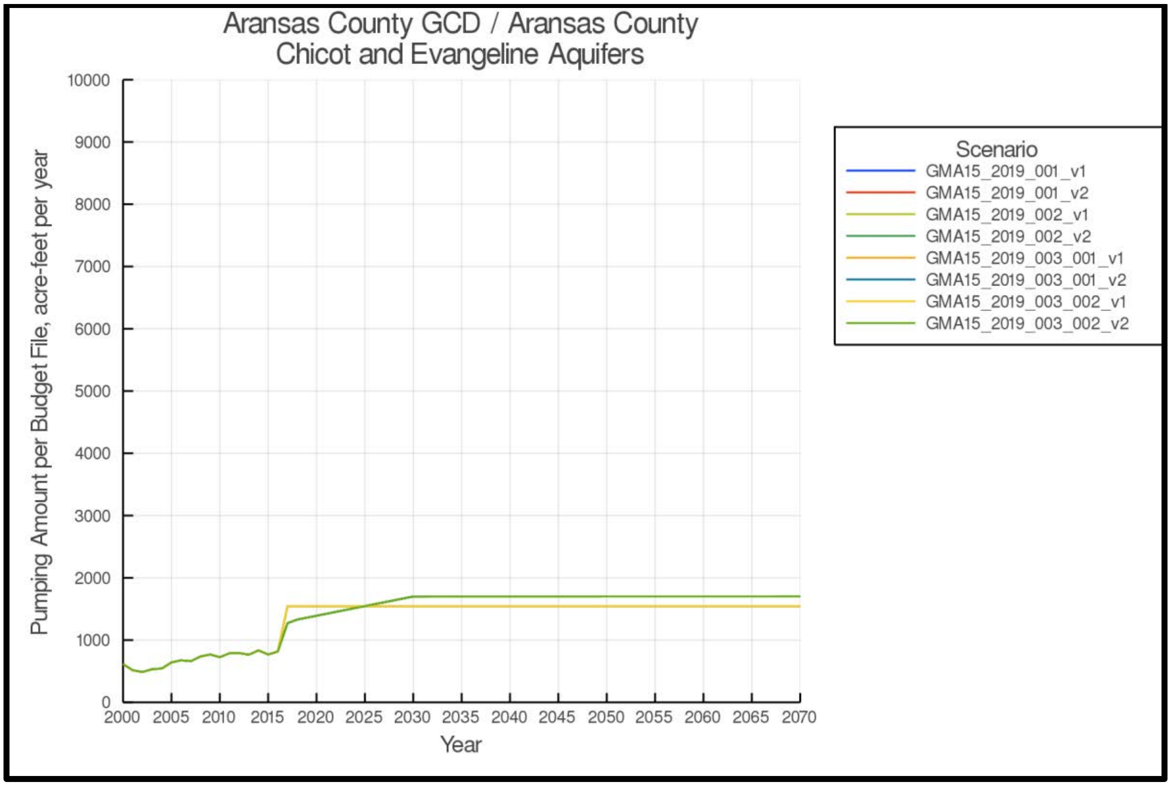
Attachment 3 –
Scenario Pumping Output Charts

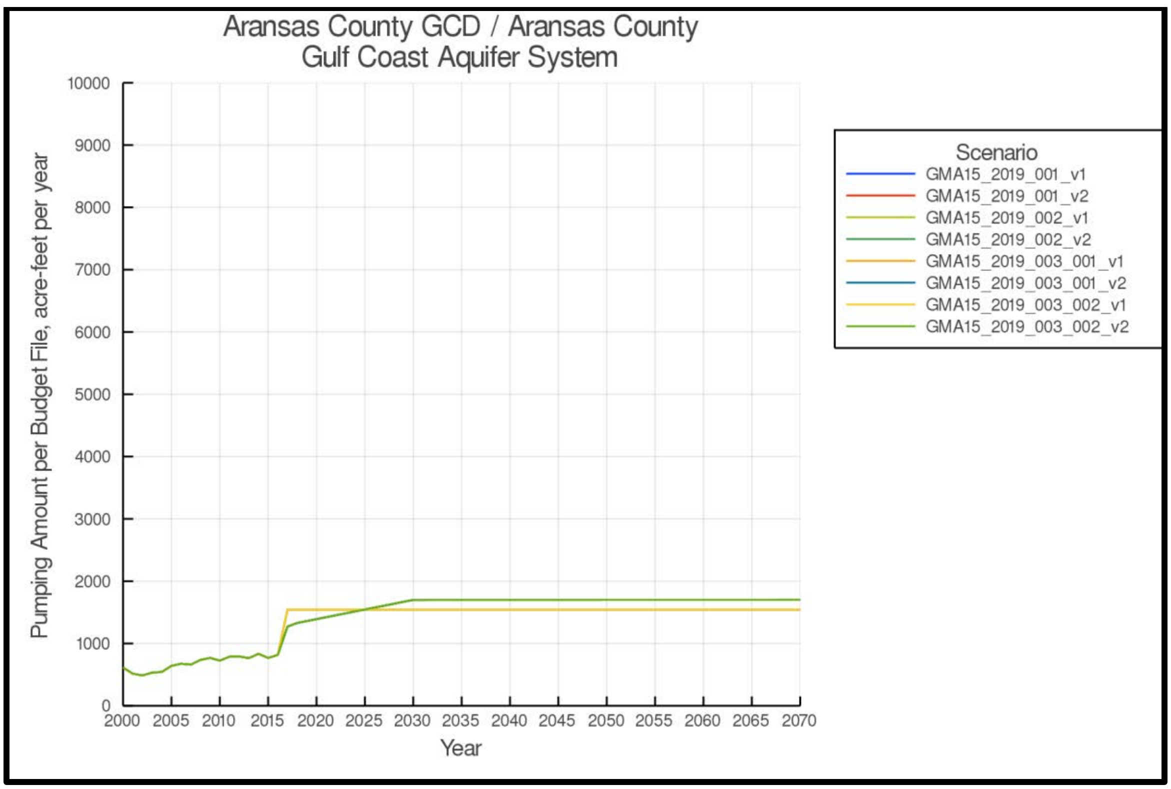

Aransas County GCD / Aransas County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

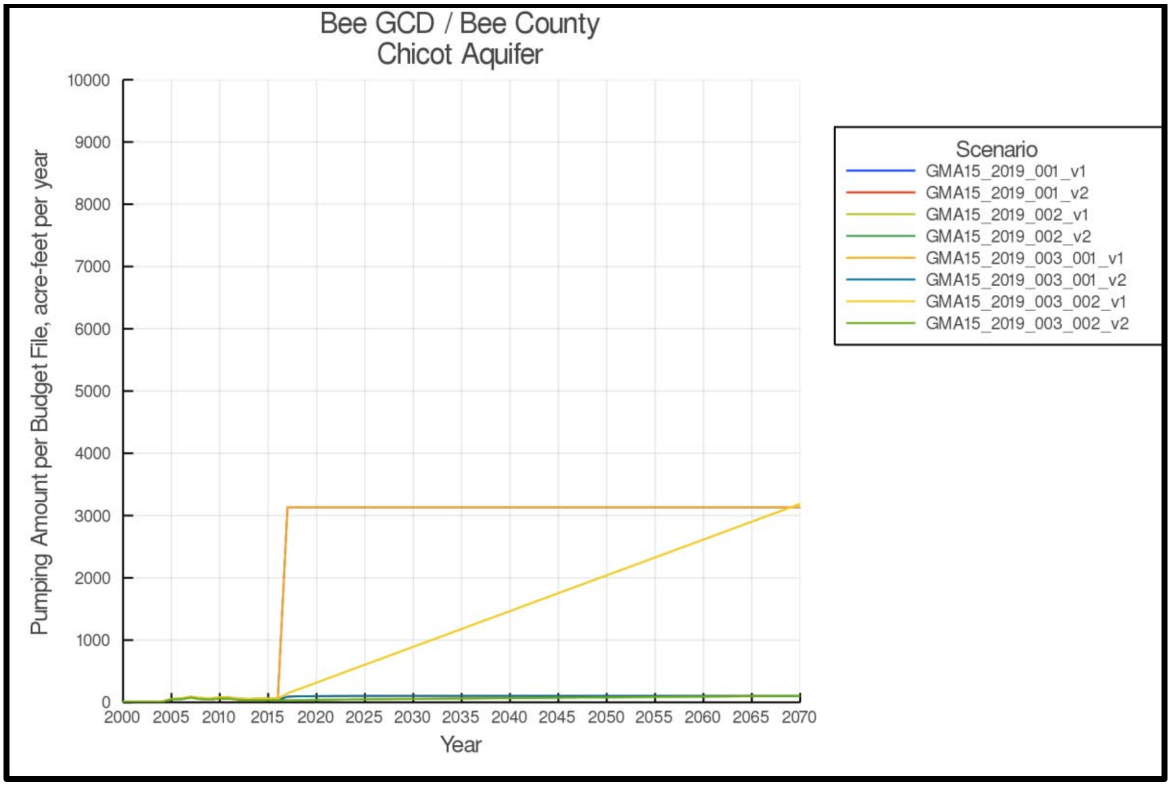

Aransas County GCD / Aransas County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

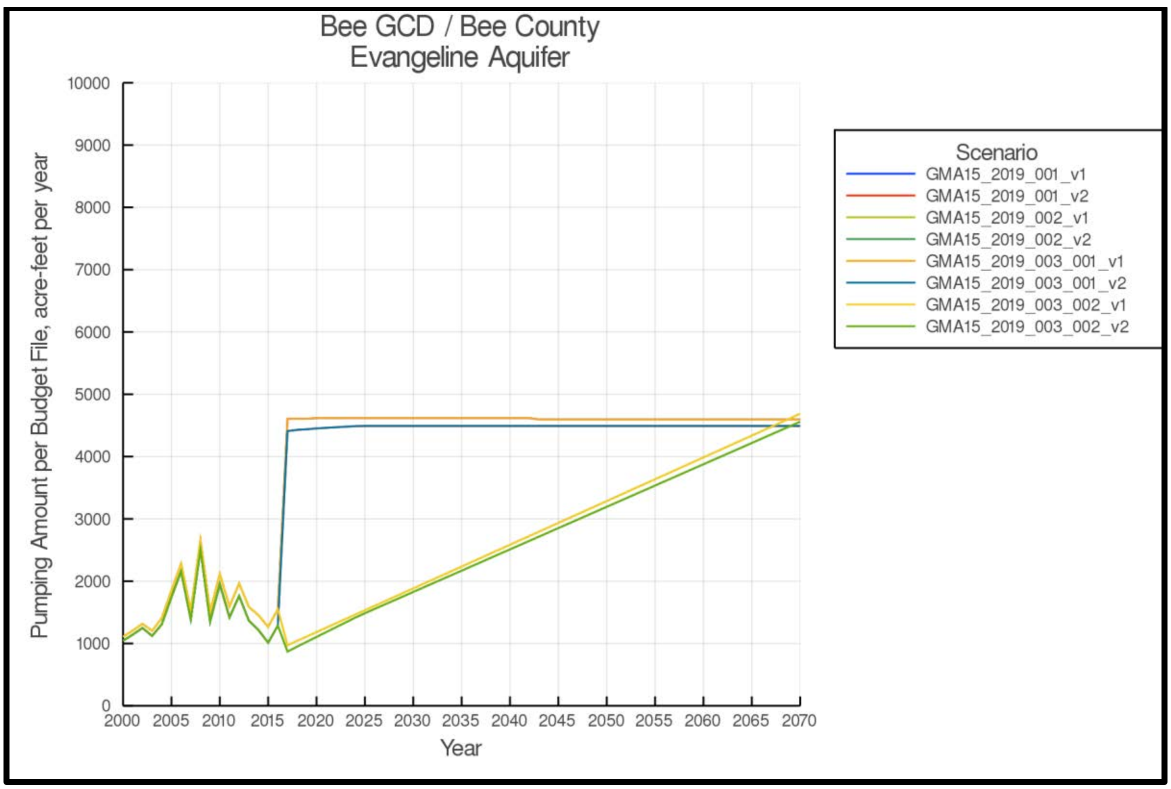

Aransas County GCD / Aransas County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
1000
900
800
700
600
500
400
300
200
100
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

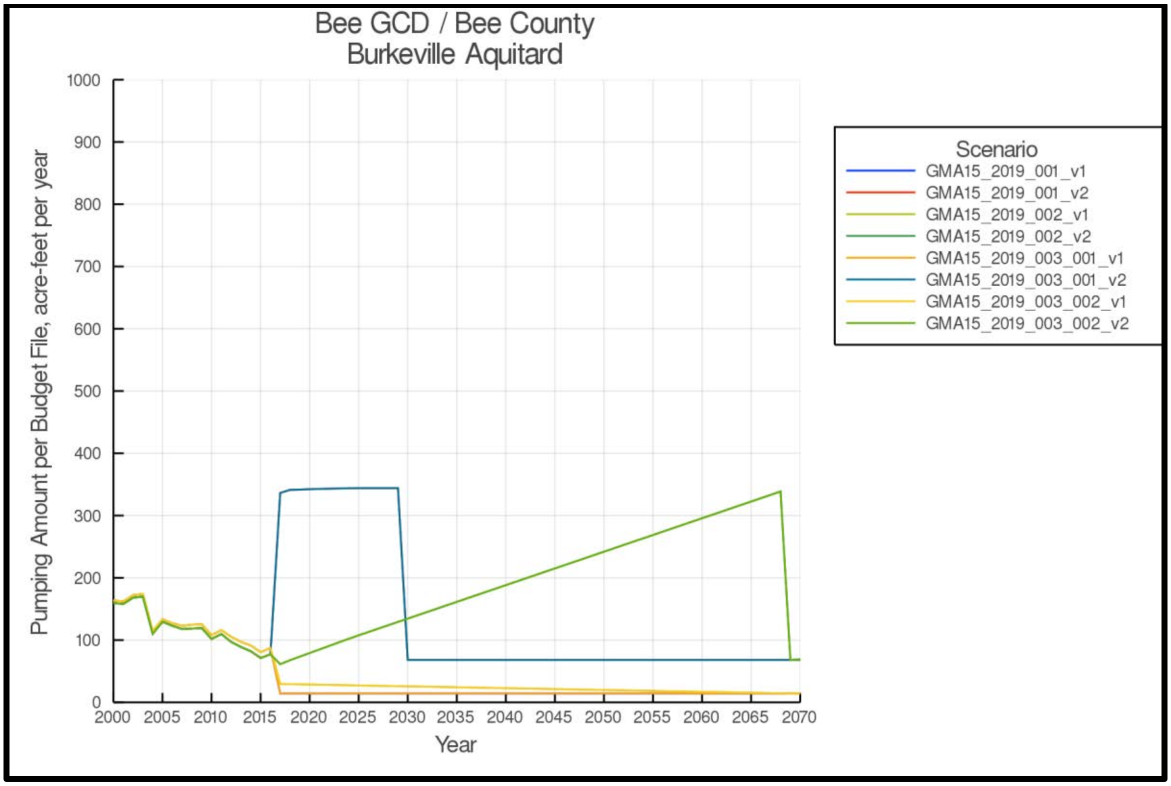

Aransas County GCD / Aransas County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
1000
900
800
700
600
500
400
300
200
100
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

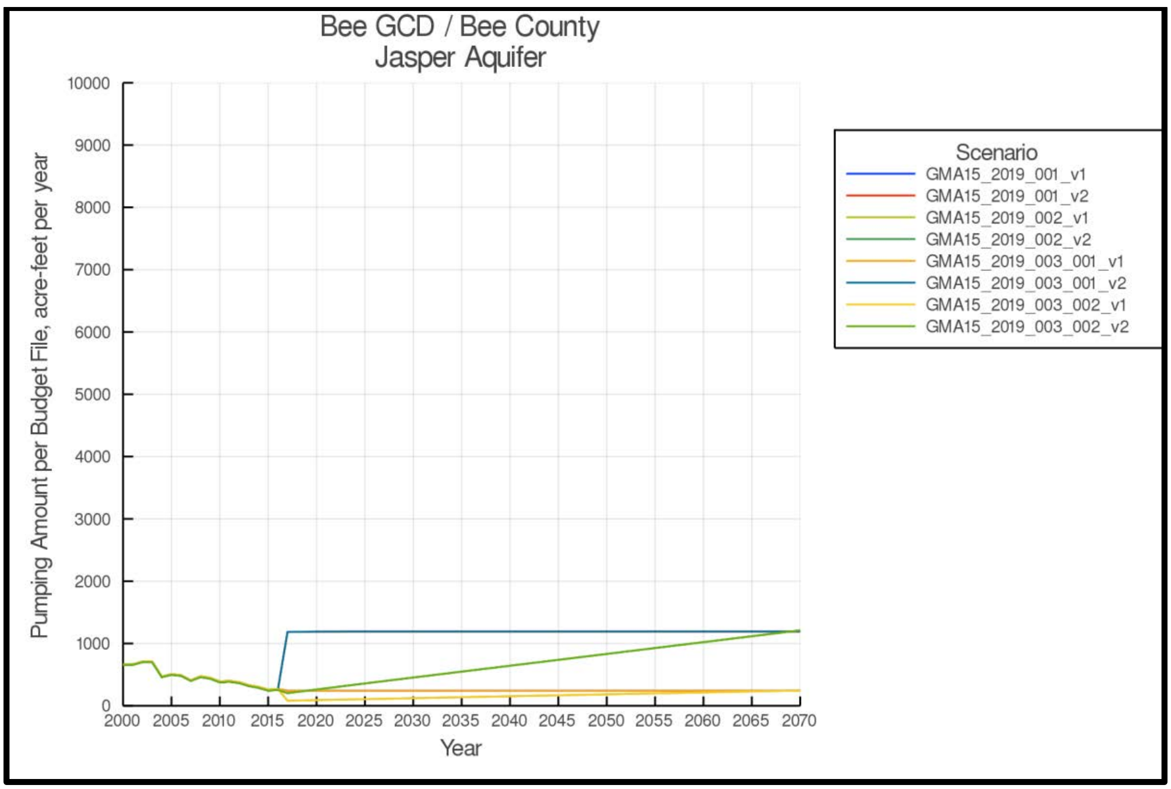

Aransas County GCD / Aransas County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

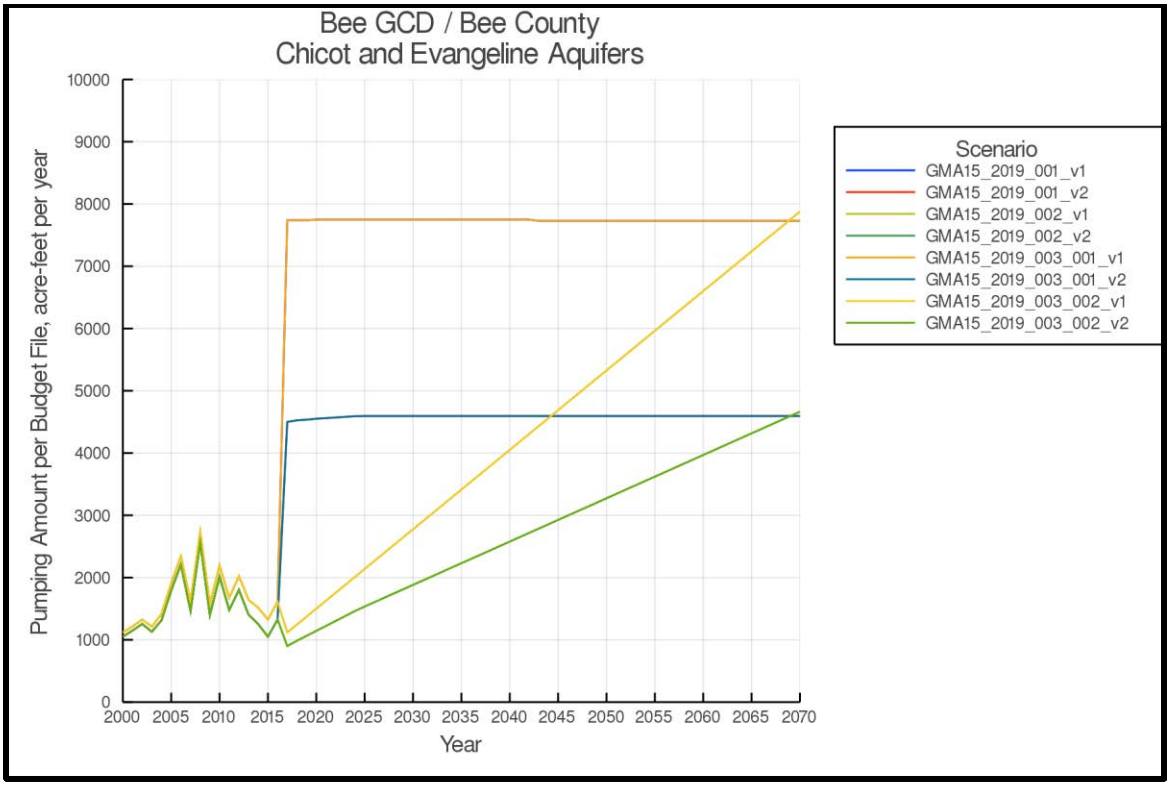

Aransas County GCD / Aransas County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

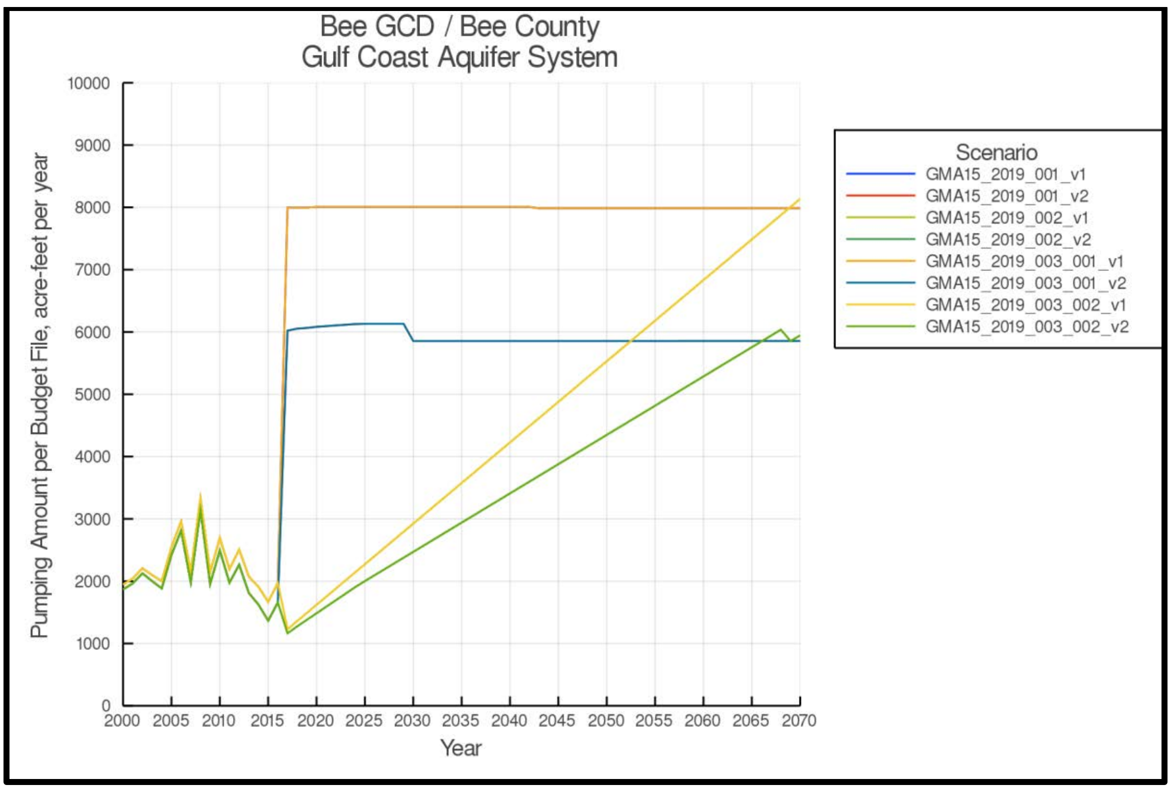

Bee GCD / Bee County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

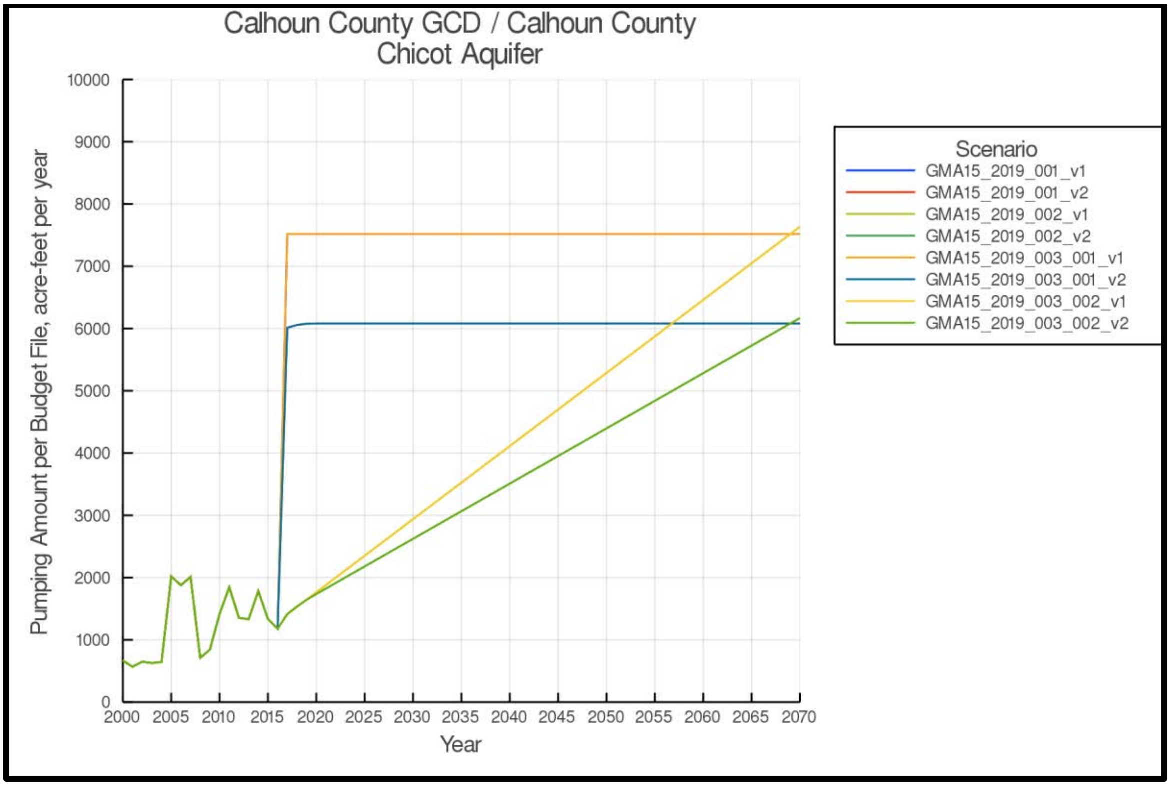

Bee GCD / Bee County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

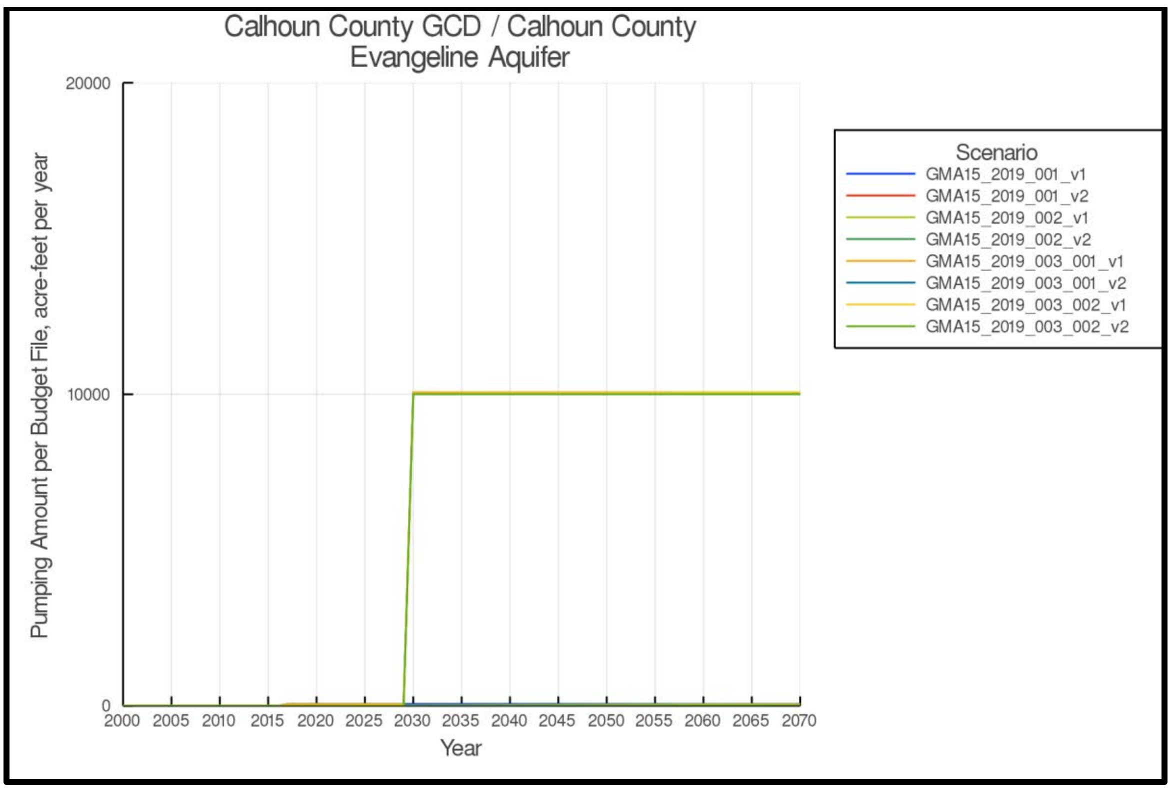

Bee GCD / Bee County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

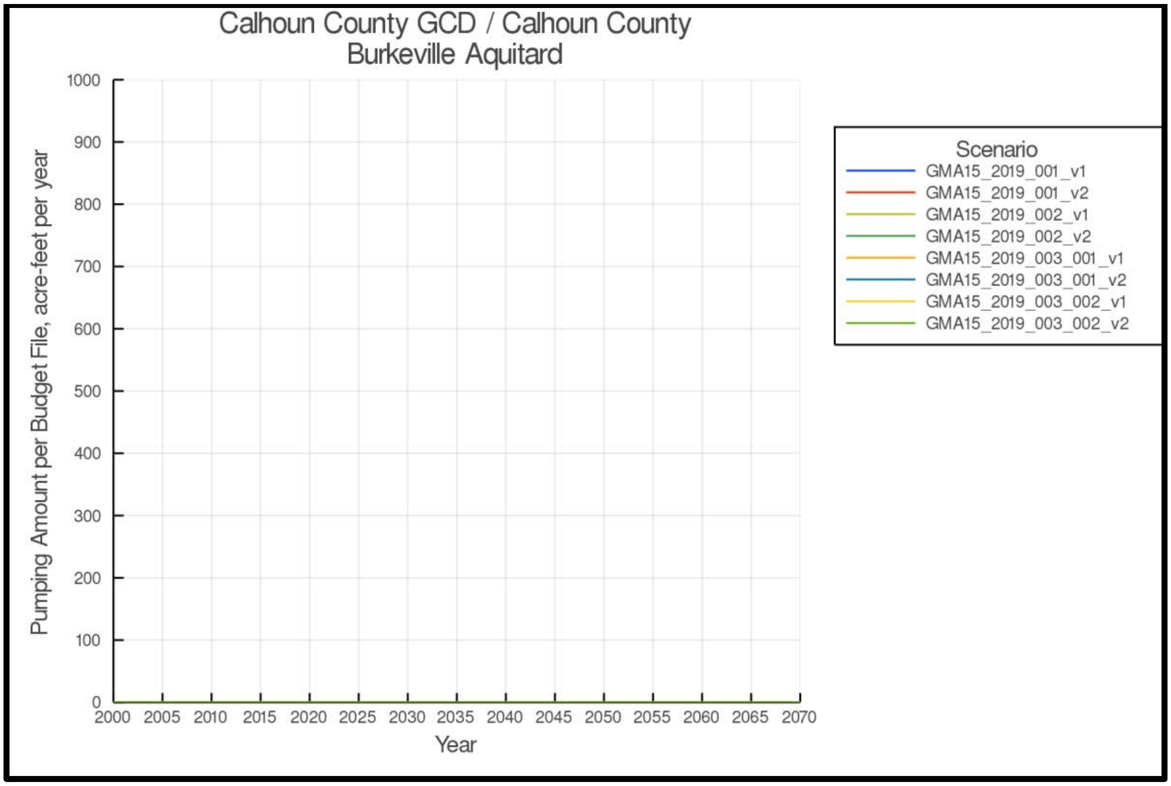

Bee GCD / Bee County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

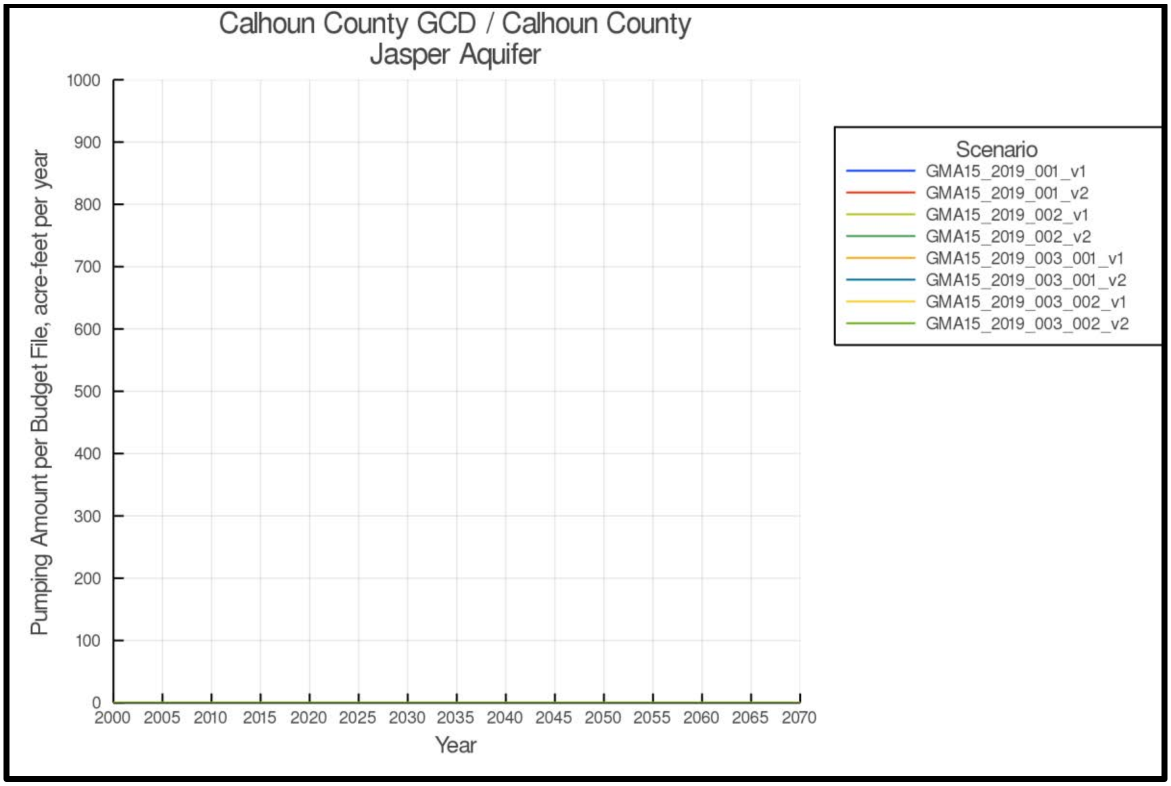

Bee GCD / Bee County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

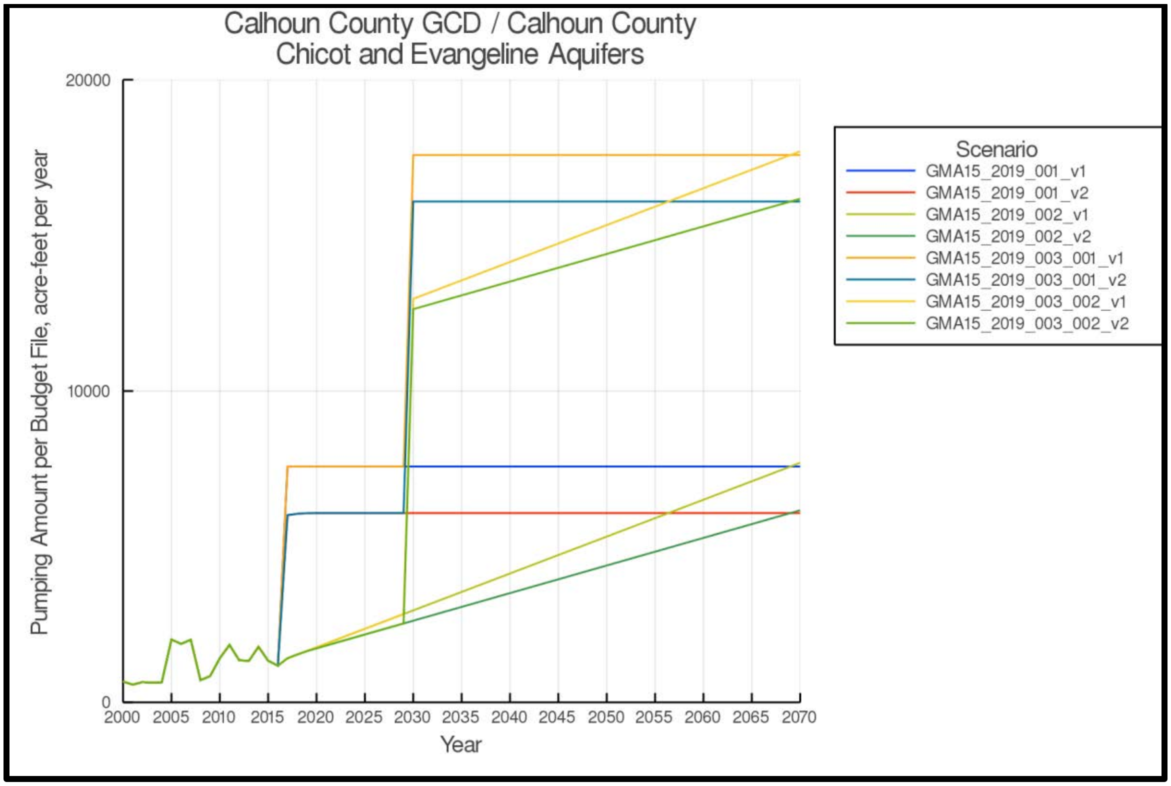

Bee GCD / Bee County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

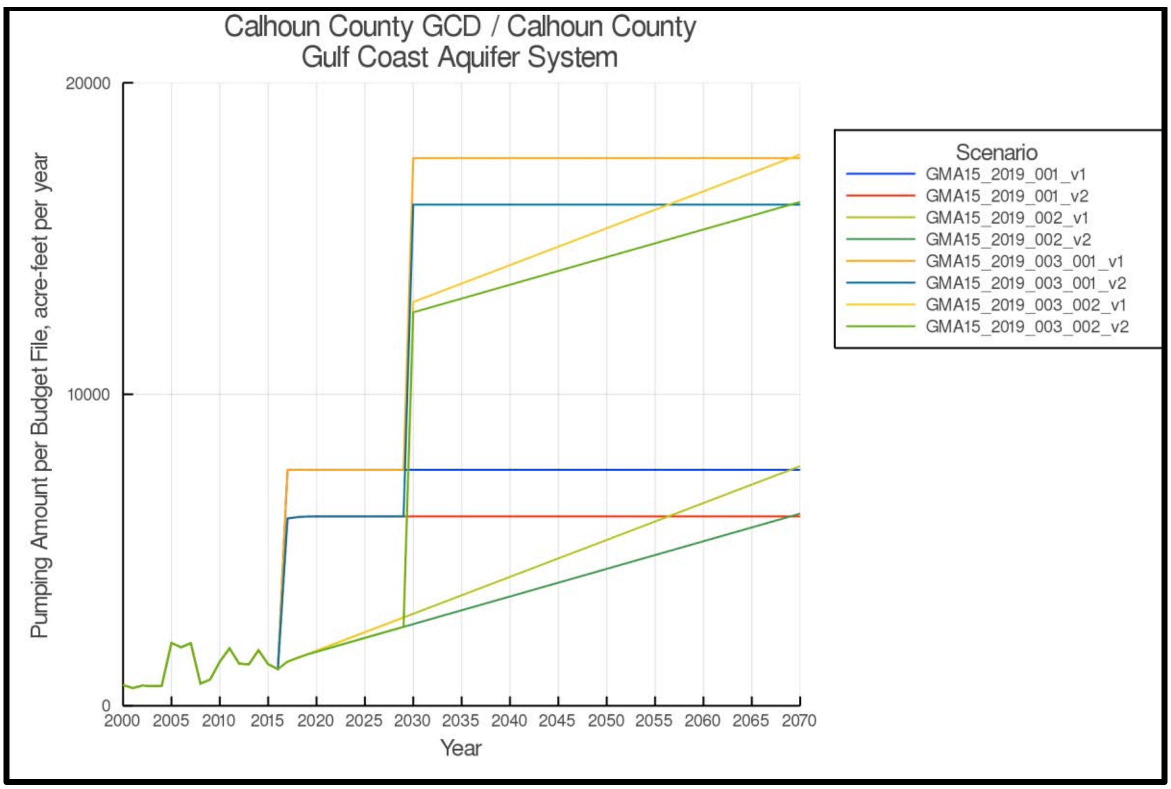

Calhoun County GCD / Calhoun County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

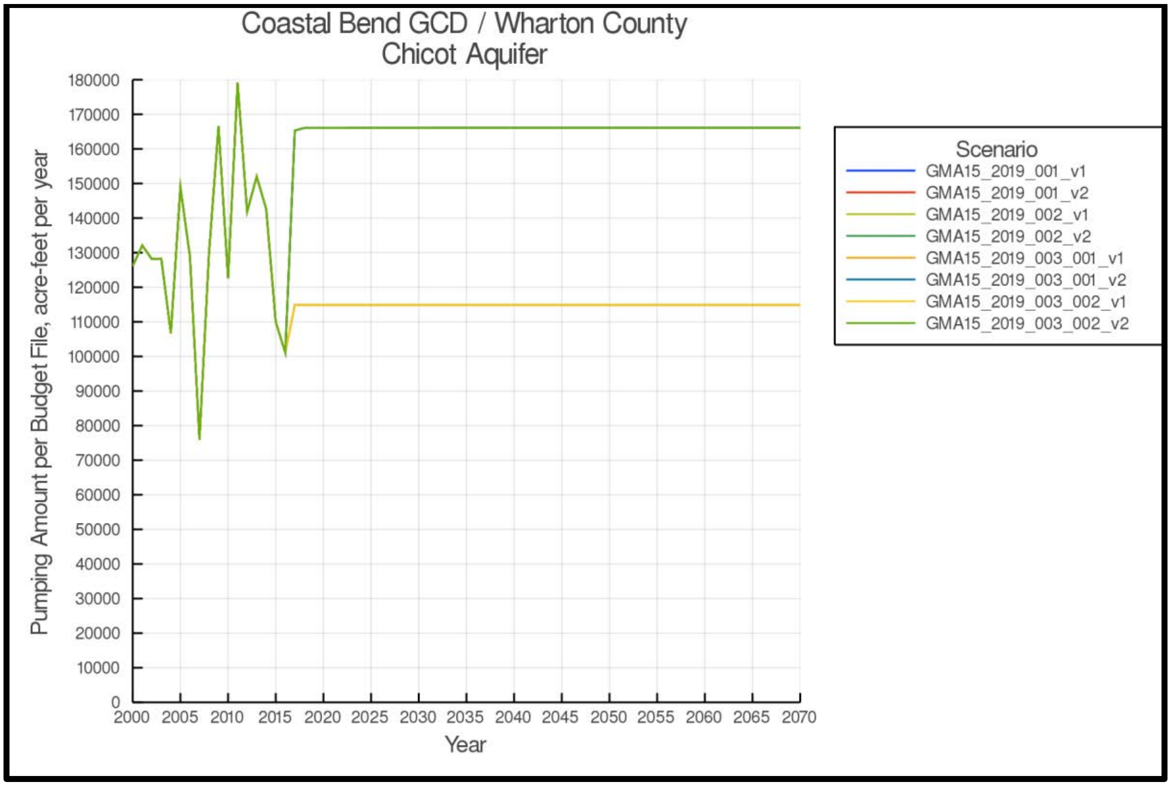

Calhoun County GCD / Calhoun County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

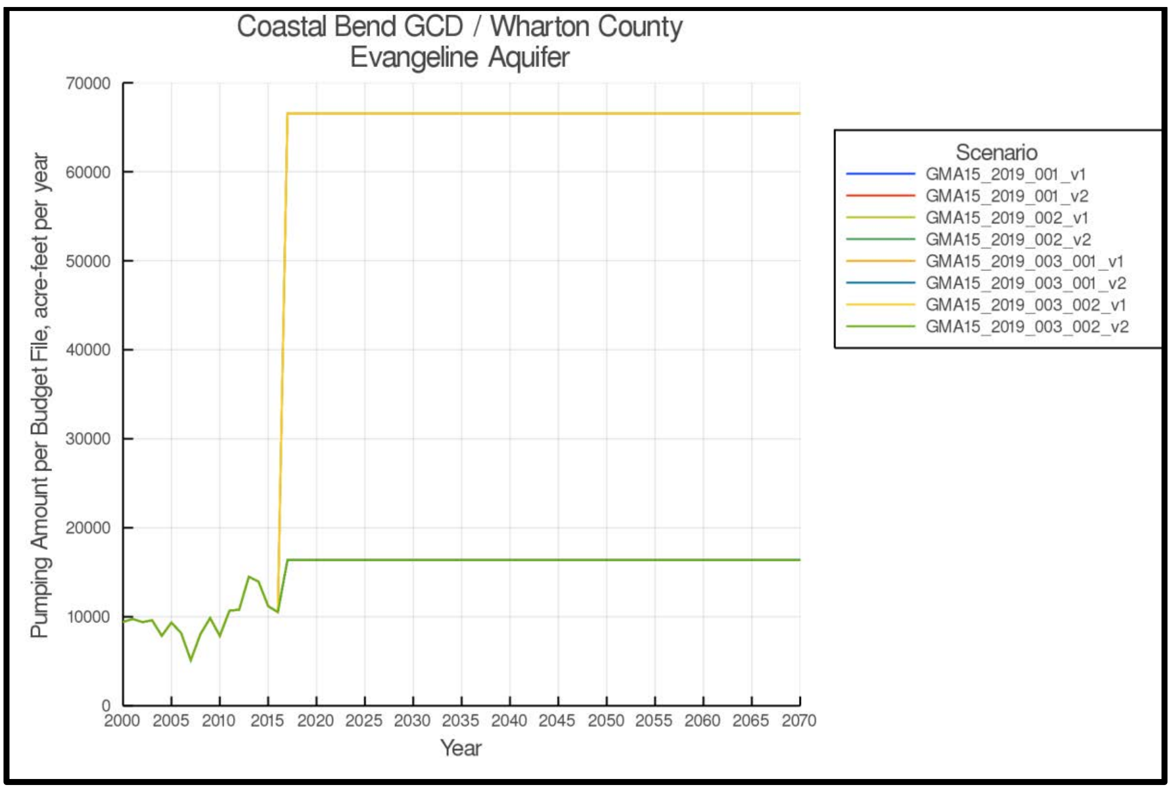

Calhoun County GCD / Calhoun County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
1000
900
800
700
600
500
400
300
200
100
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

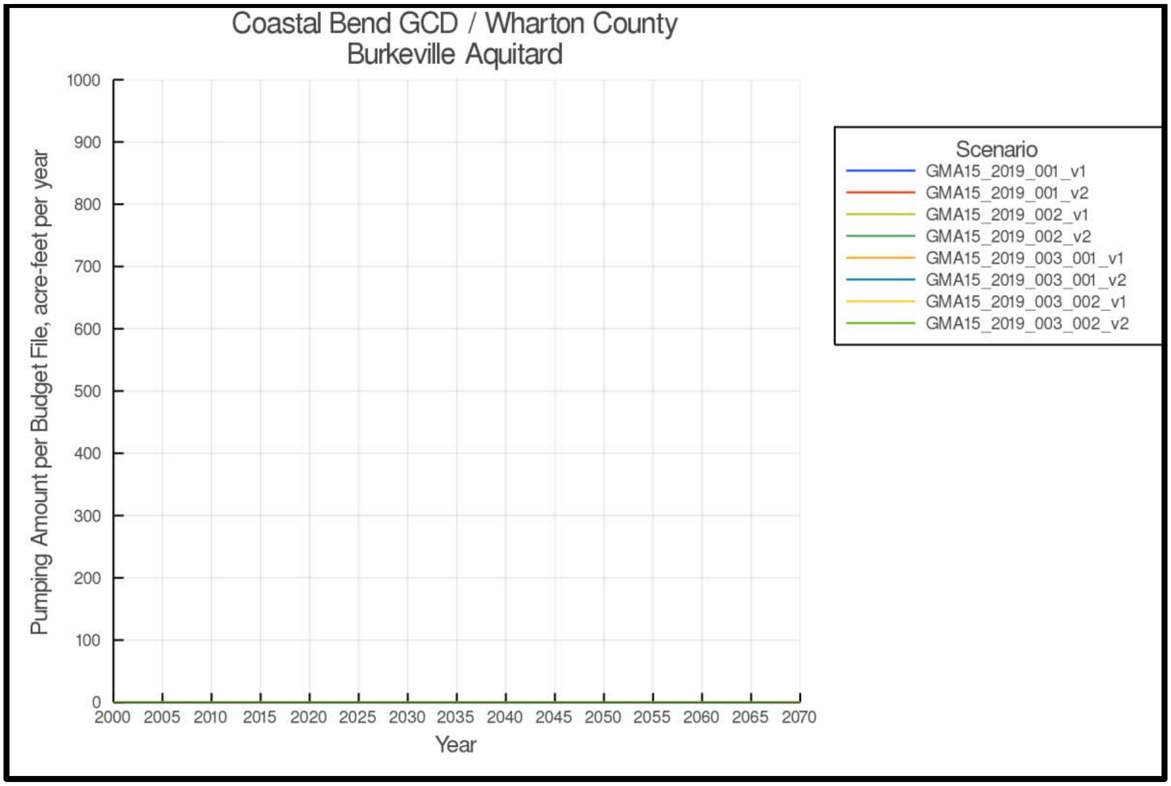

Calhoun County GCD / Calhoun County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
1000
900
800
700
600
500
400
300
200
100
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

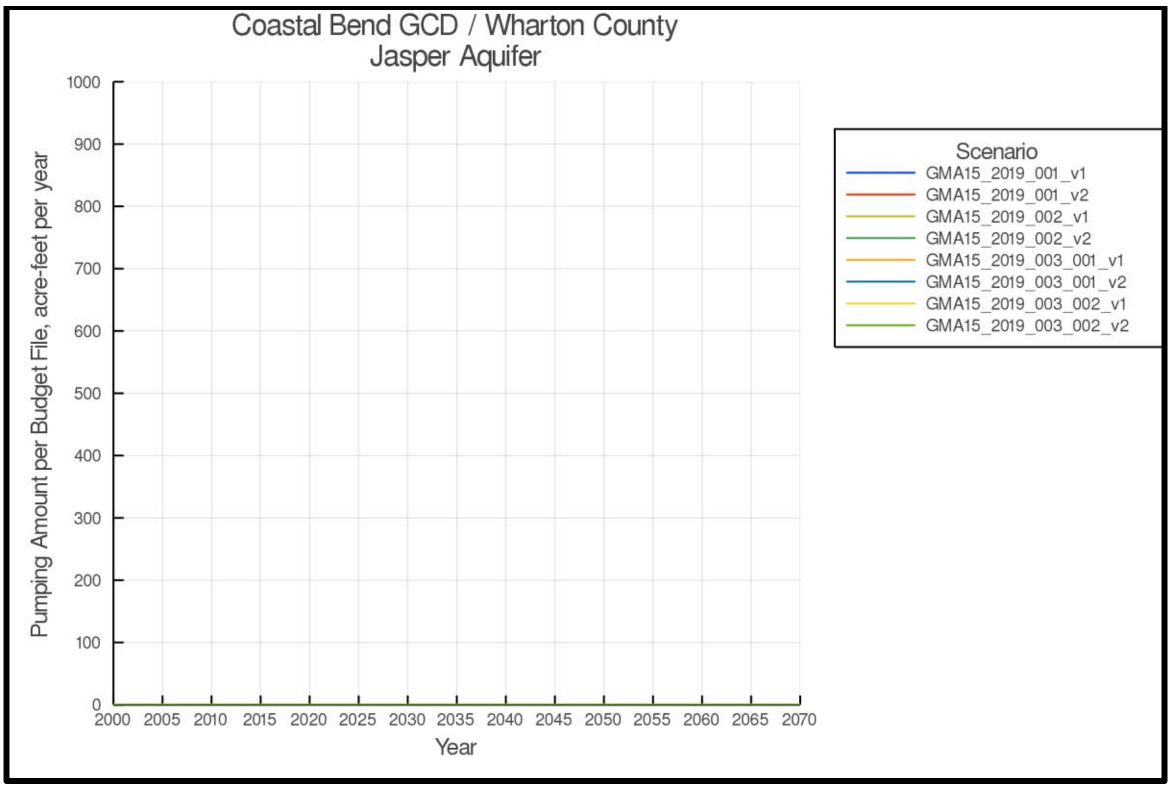

Calhoun County GCD / Calhoun County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
20000
10000
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

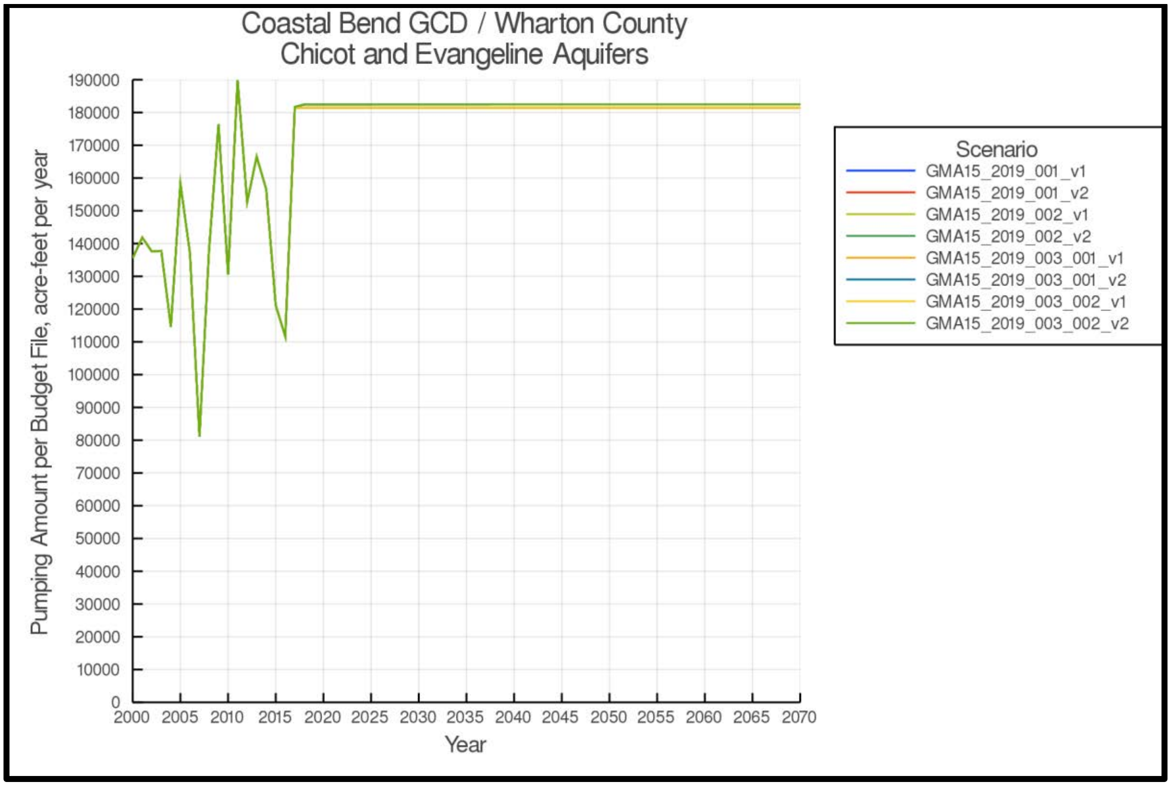

Calhoun County GCD / Calhoun County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
20000
10000
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

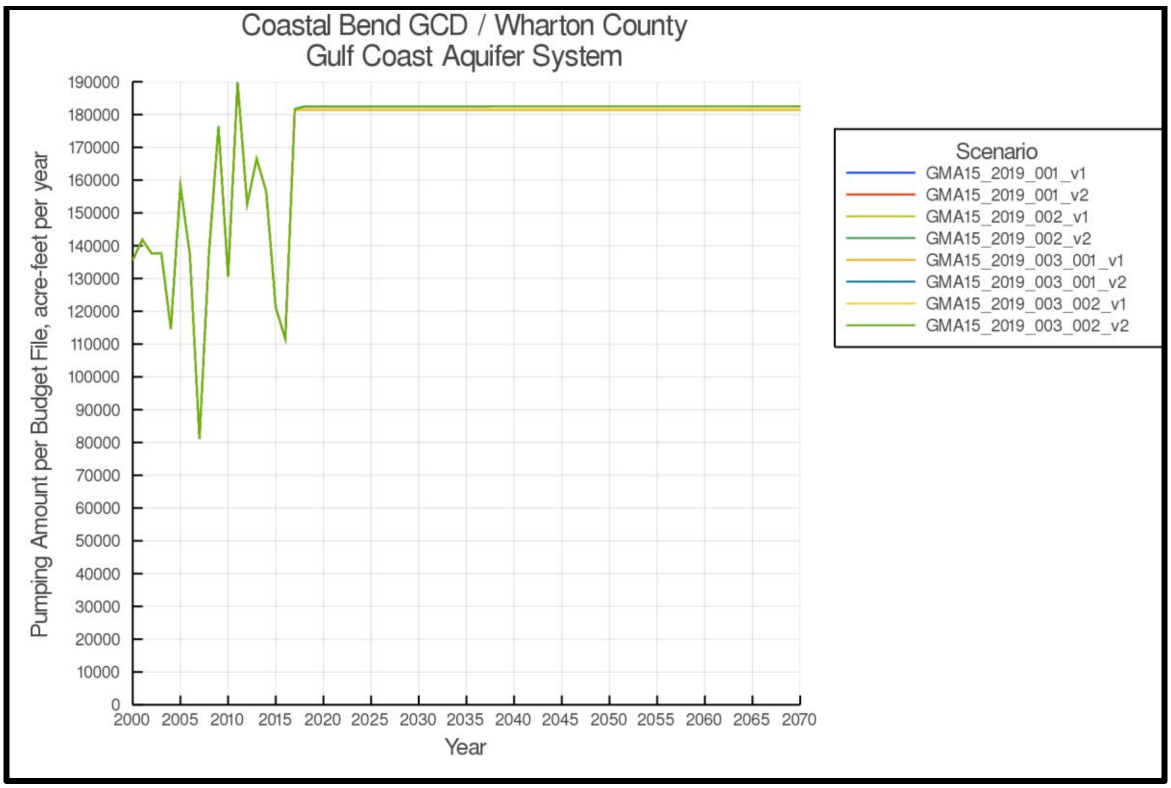

Coastal Bend GCD / Wharton County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

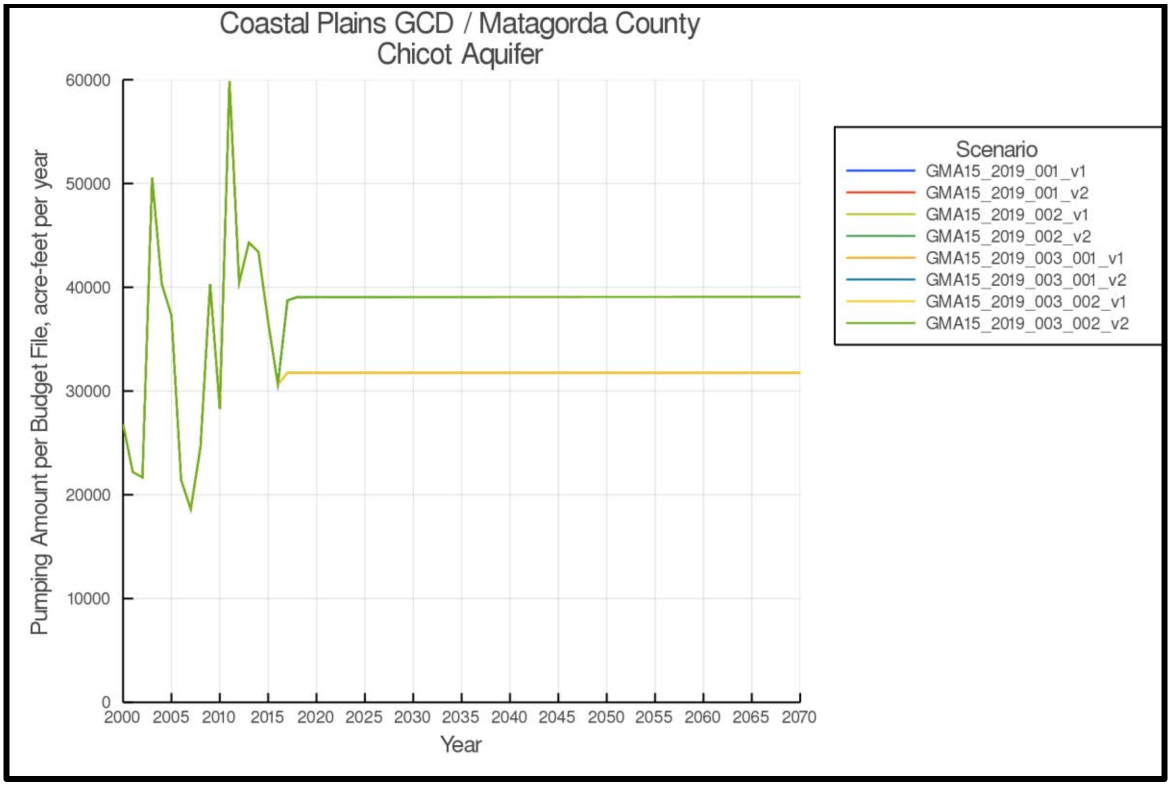

Coastal Bend GCD / Wharton County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

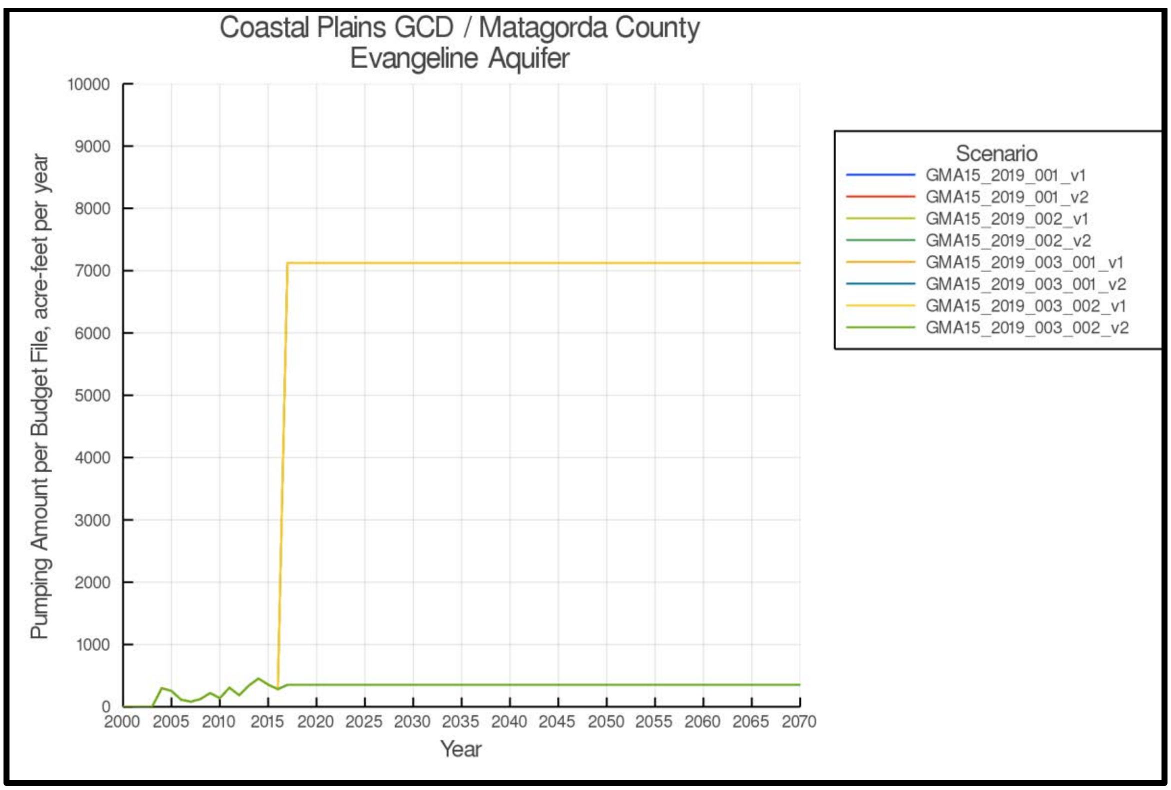

Coastal Bend GCD / Wharton County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
0
100
200
300
400
500
600
700
800
900
1000
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

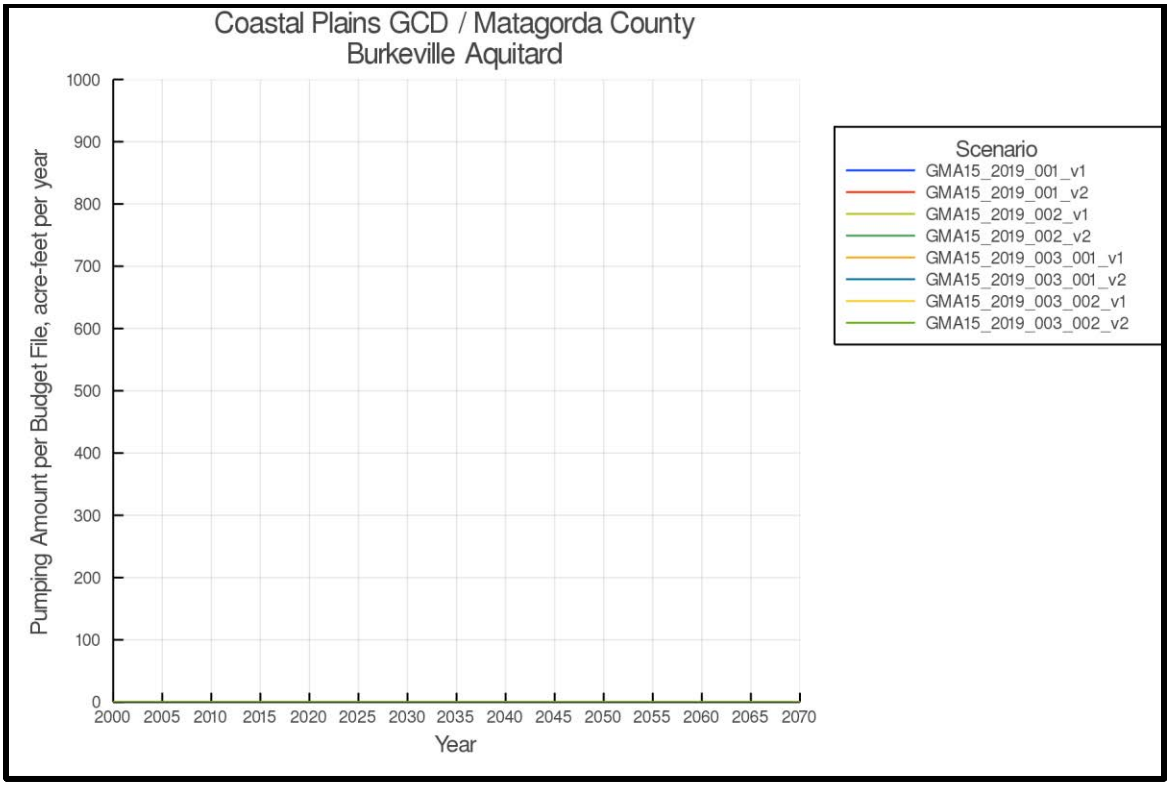

Coastal Bend GCD / Wharton County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
0
100
200
300
400
500
600
700
800
900
1000
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

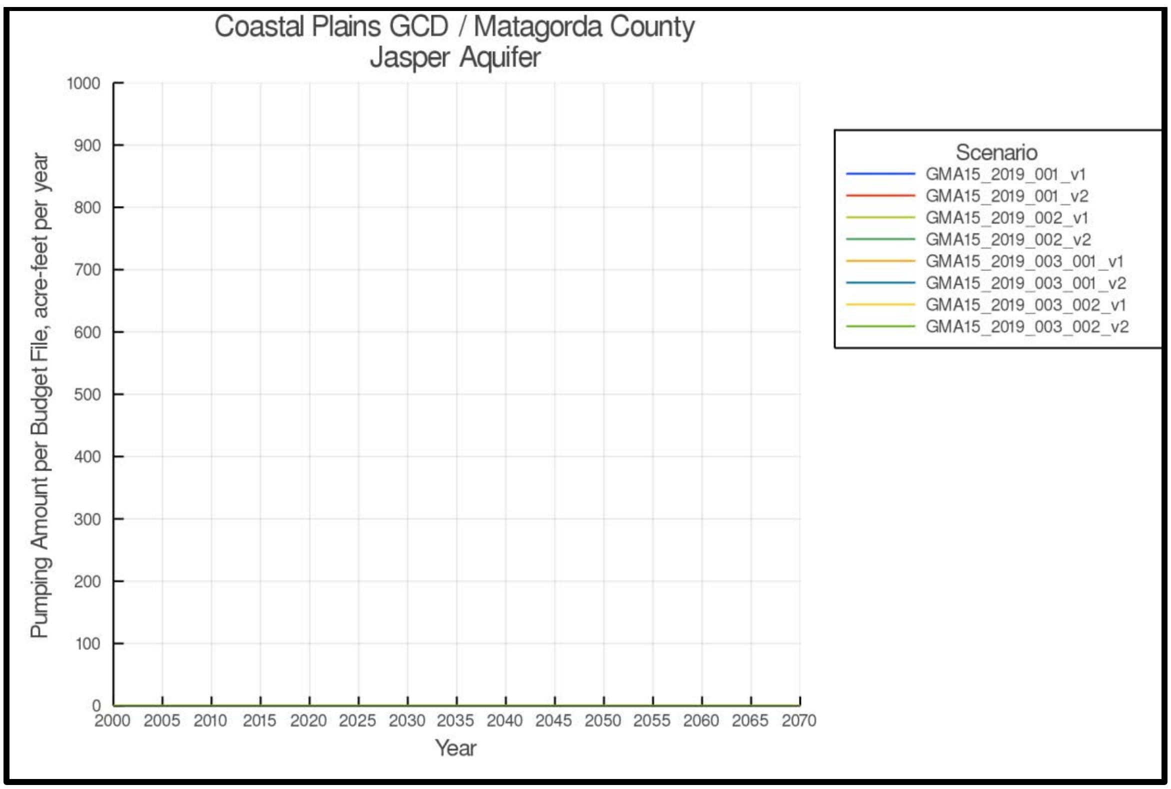

Coastal Bend GCD / Wharton County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

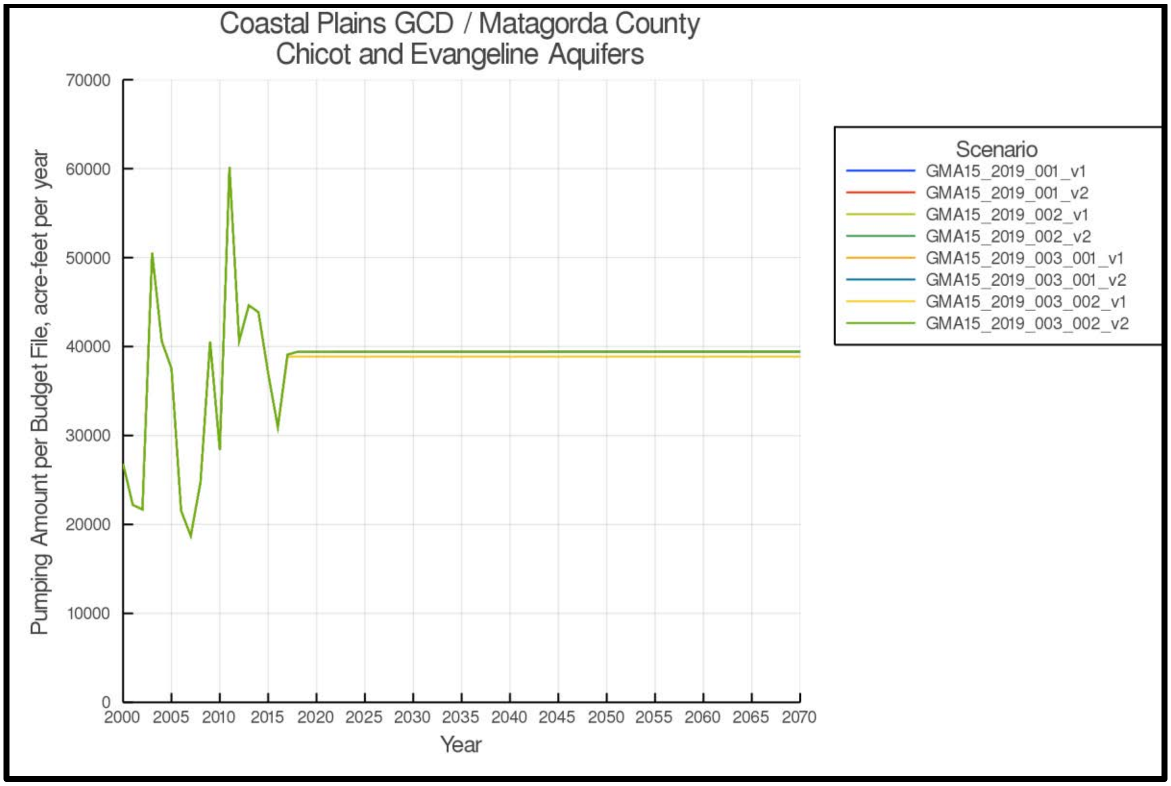

Coastal Bend GCD / Wharton County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

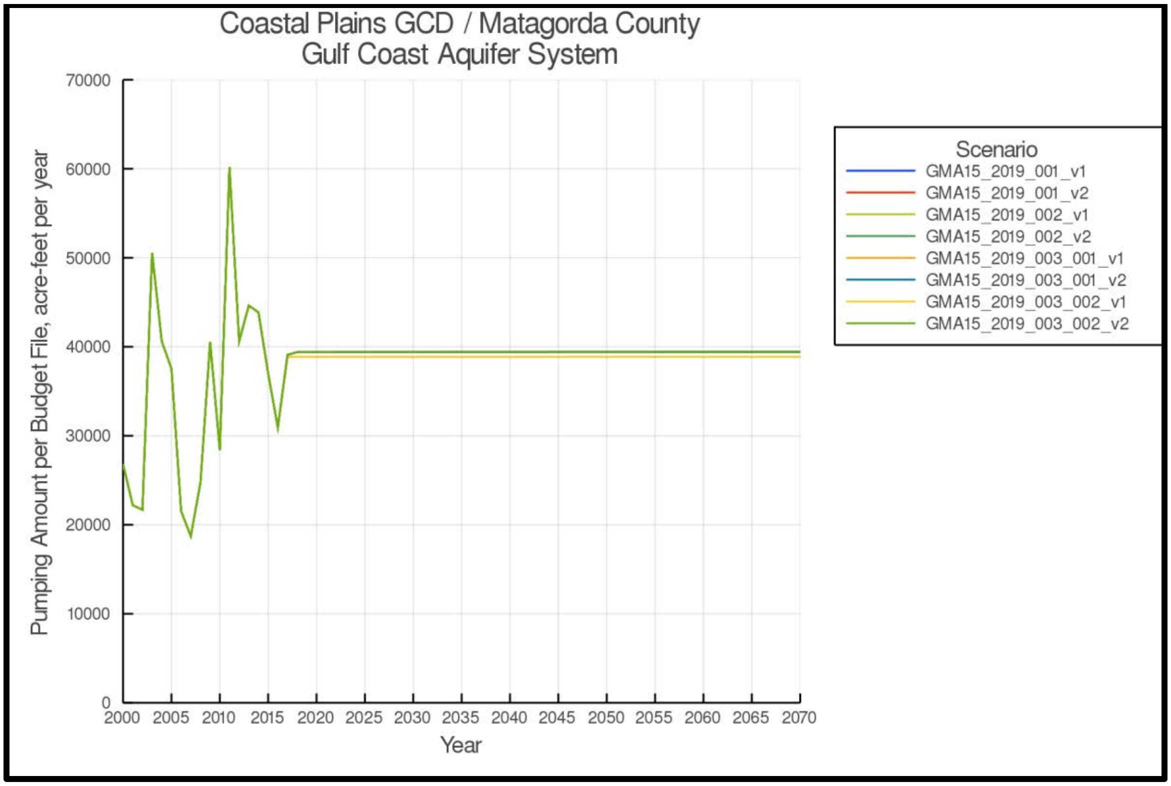

Coastal Plains GCD / Matagorda County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

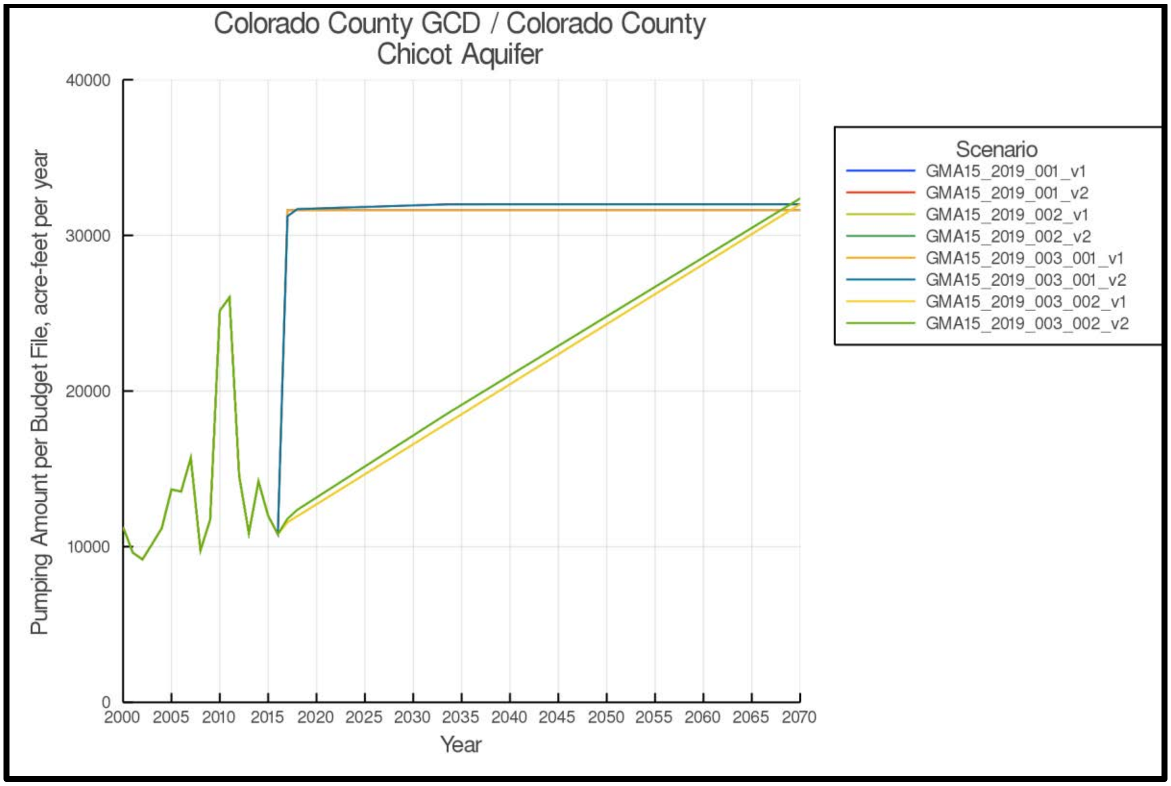

Coastal Plains GCD / Matagorda County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

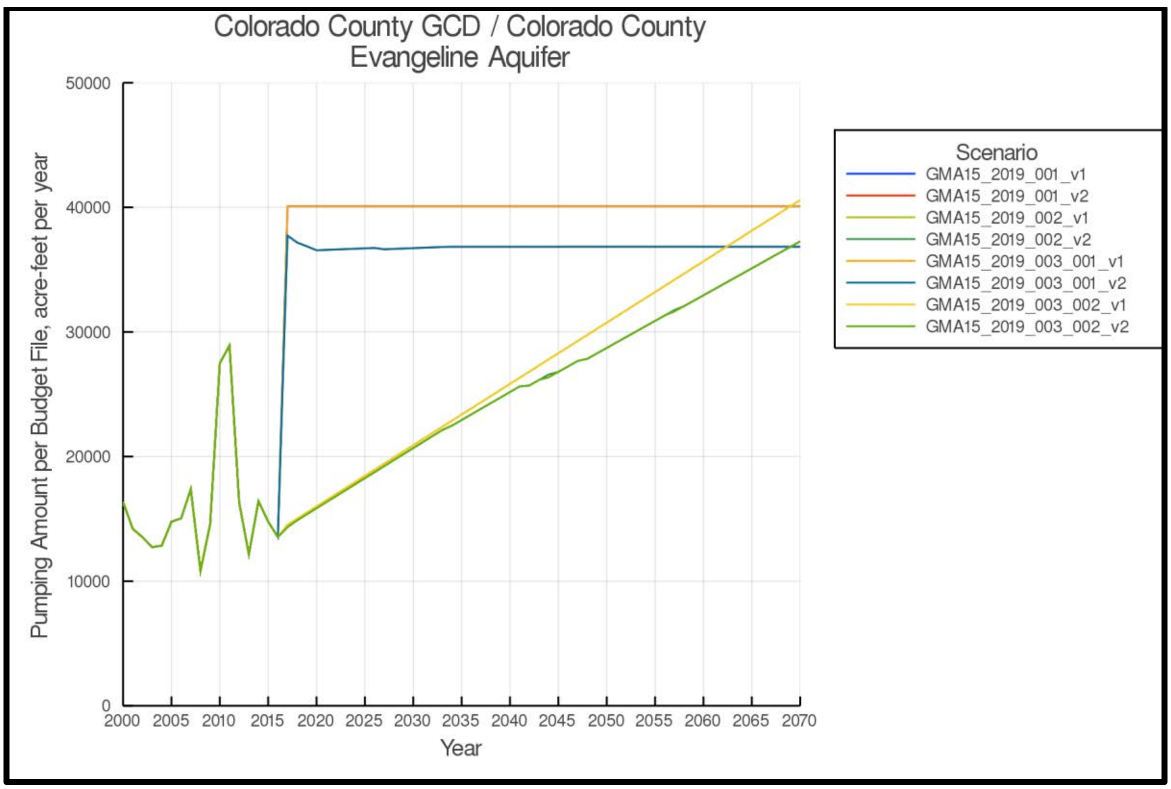

Coastal Plains GCD / Matagorda County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

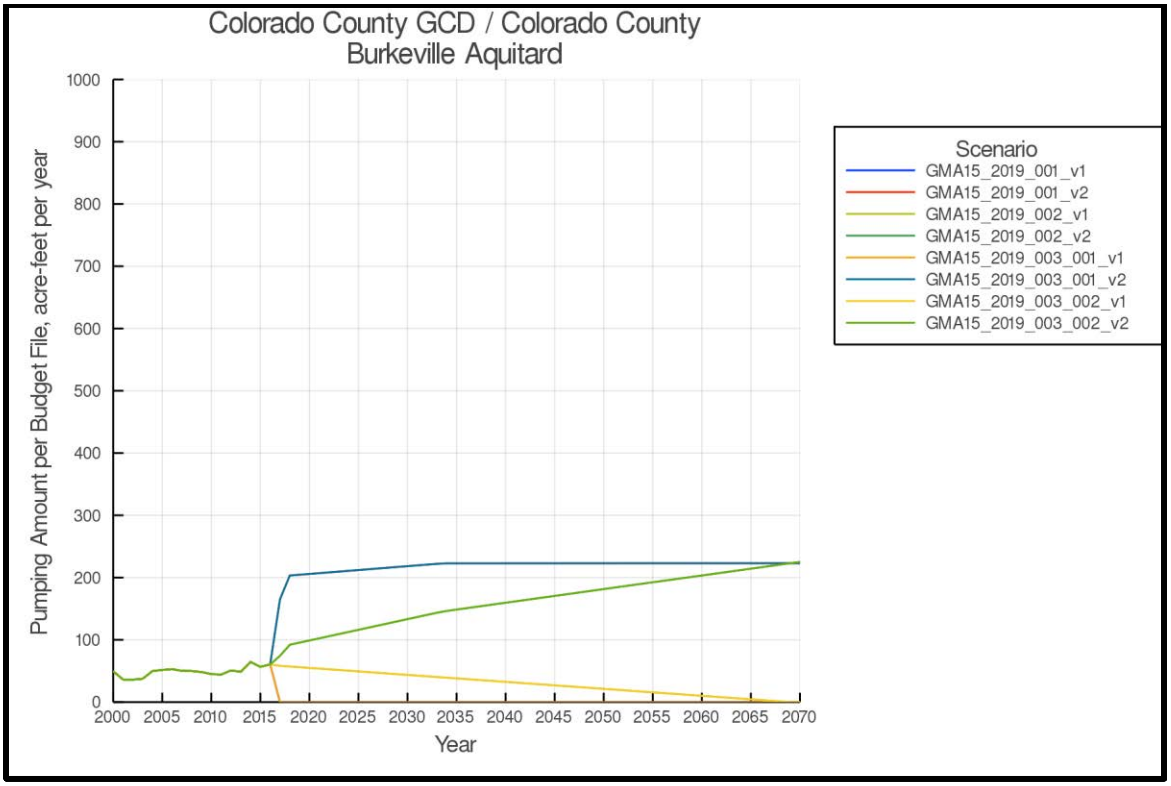

Coastal Plains GCD / Matagorda County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

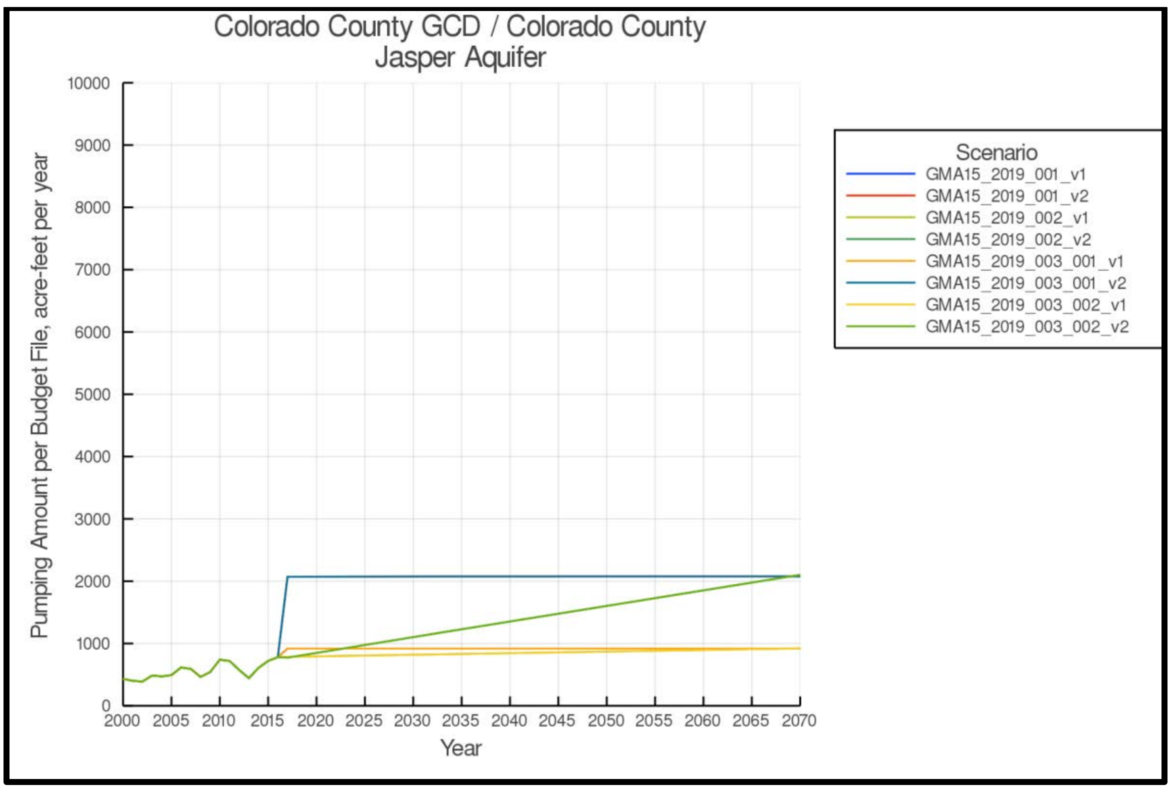

Coastal Plains GCD / Matagorda County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

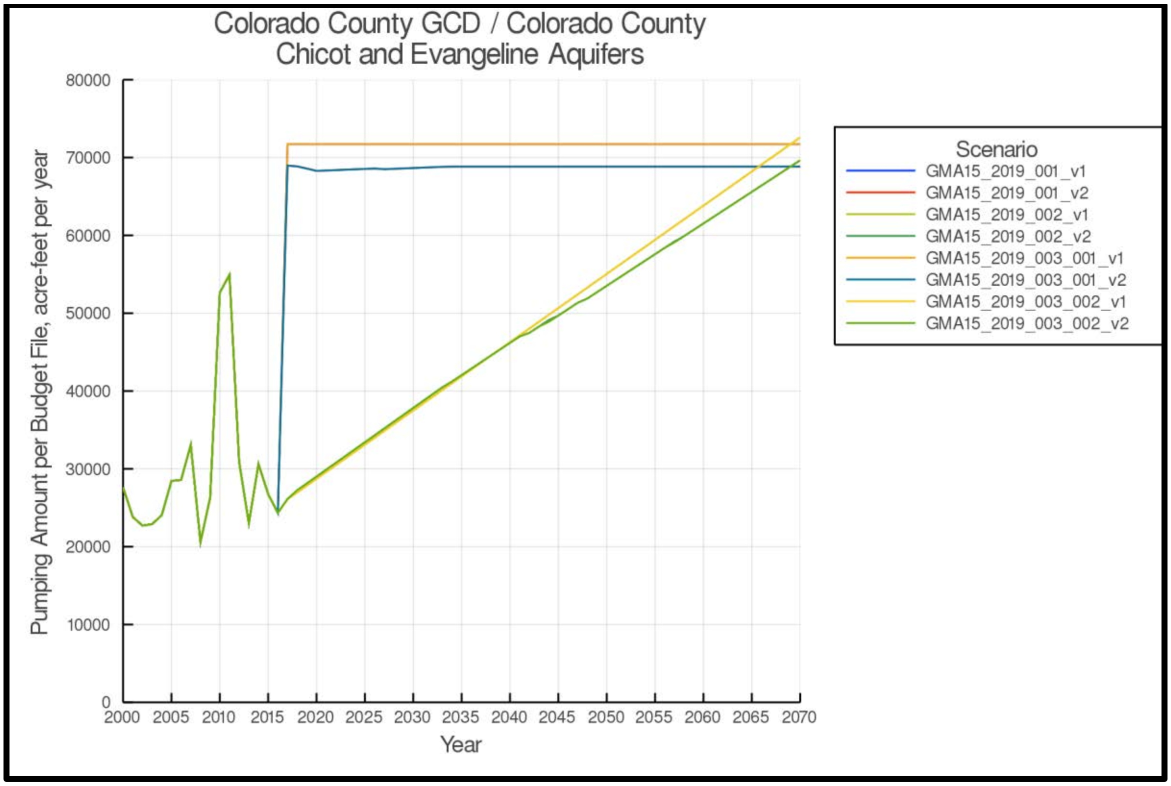

Coastal Plains GCD / Matagorda County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

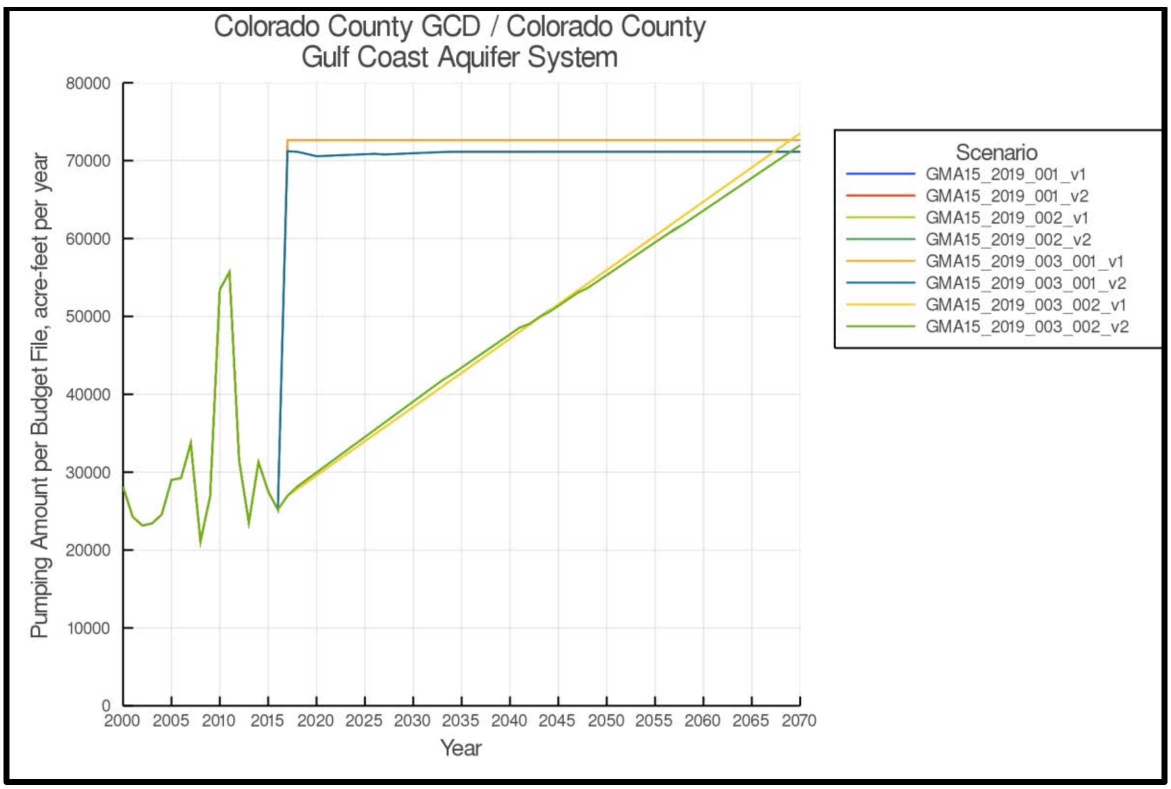

Colorado County GCD / Colorado County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
0
10000
20000
30000
40000
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

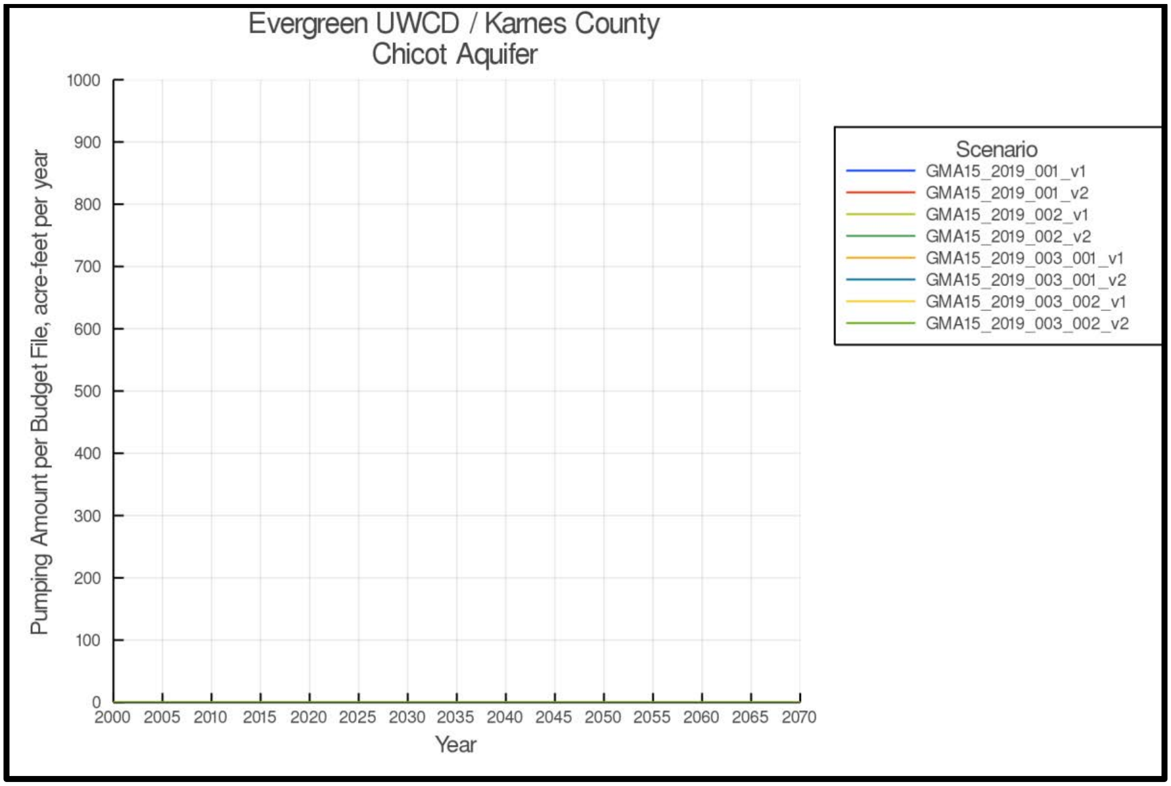

Colorado County GCD / Colorado County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
0
10000
20000
30000
40000
50000
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

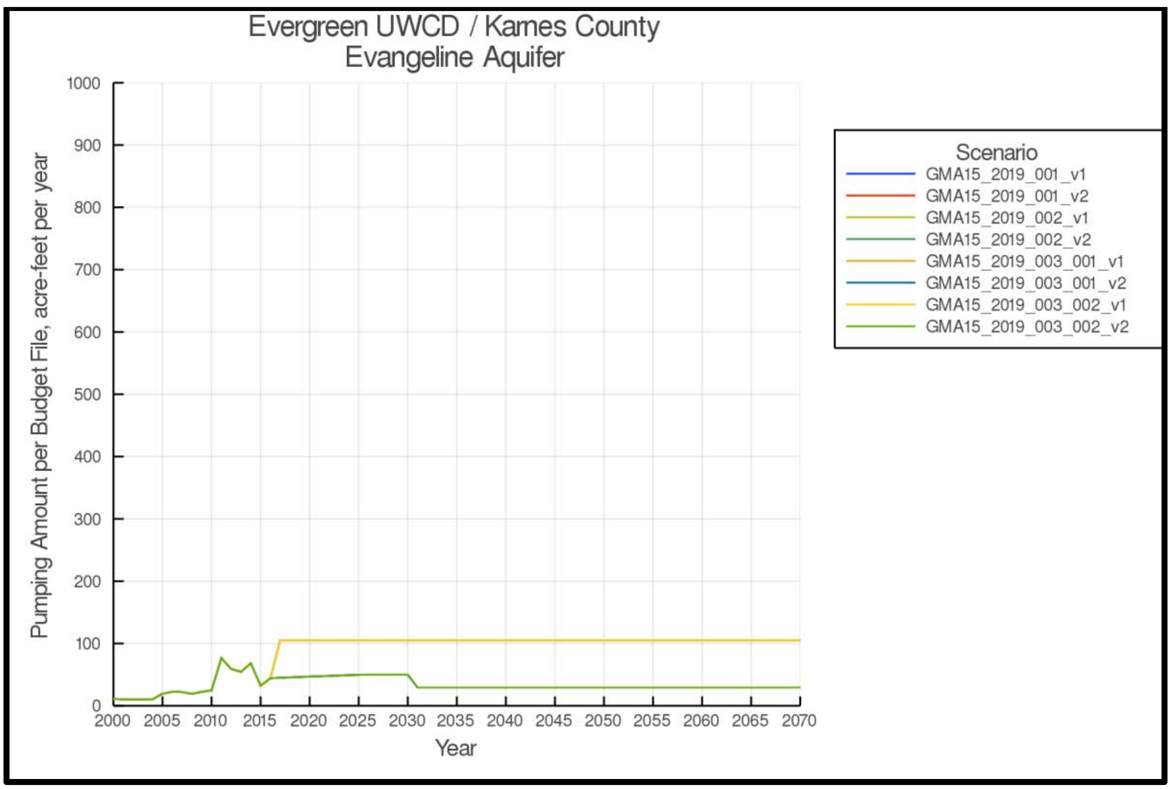

Colorado County GCD / Colorado County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
0
100
200
300
400
500
600
700
800
900
1000
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

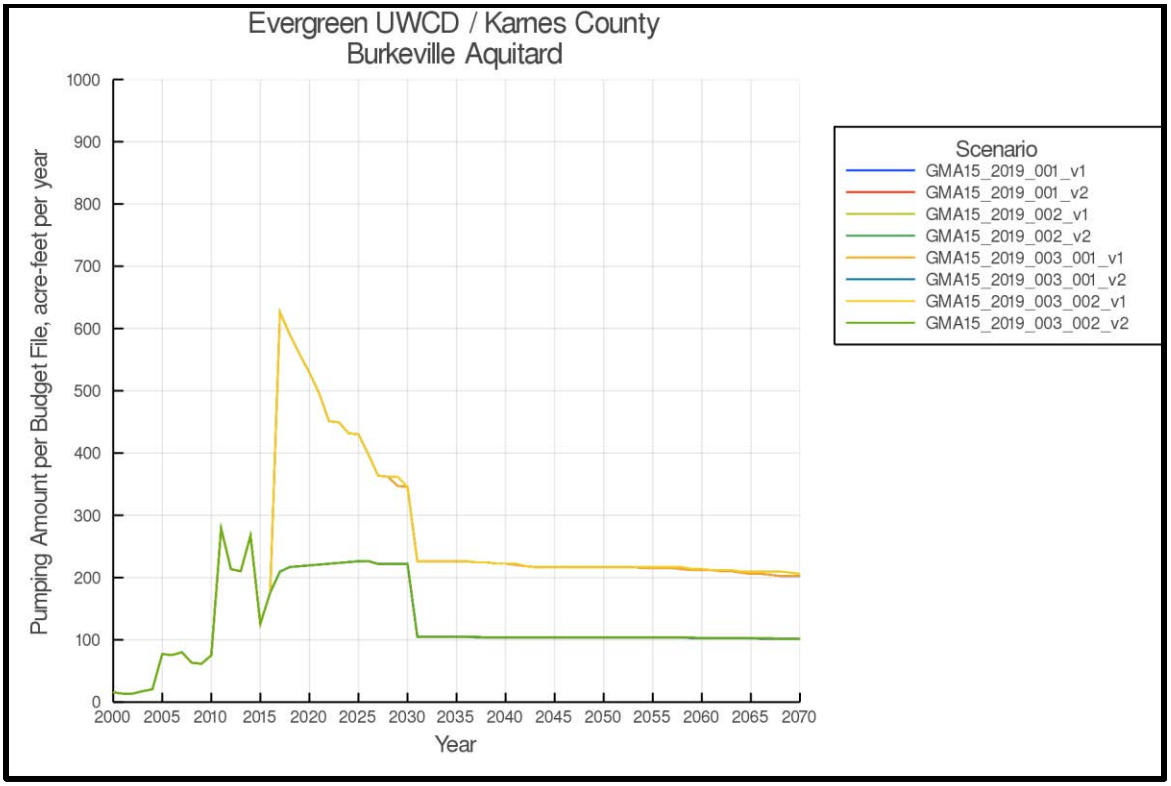

Colorado County GCD / Colorado County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

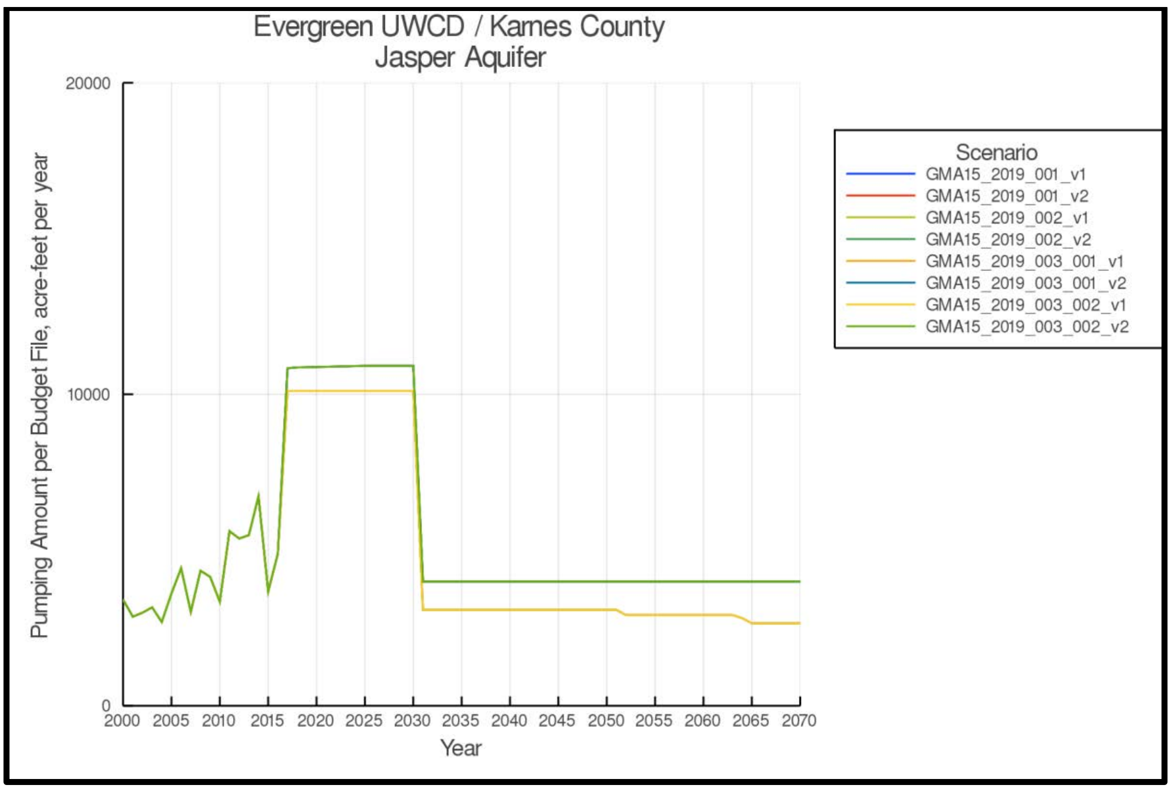

Colorado County GCD / Colorado County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
0
10000
20000
30000
40000
50000
60000
70000
80000
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

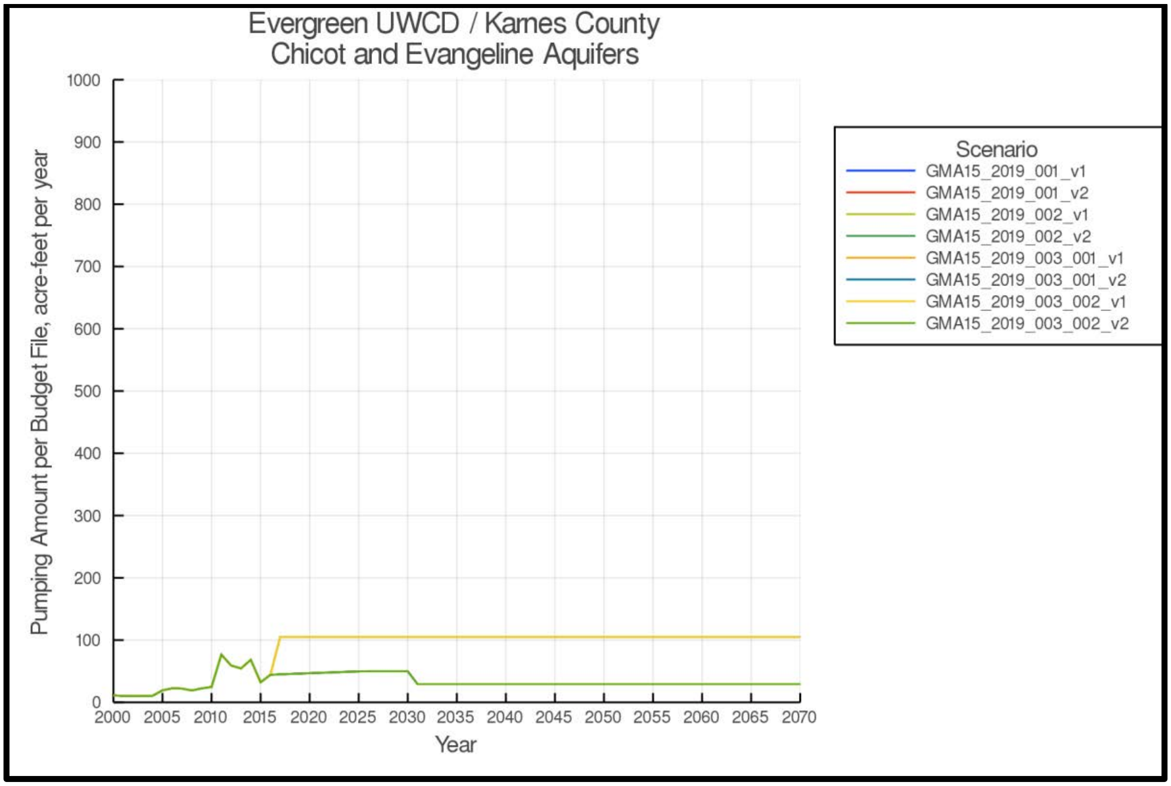

Colorado County GCD / Colorado County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
0
10000
20000
30000
40000
50000
60000
70000
80000
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

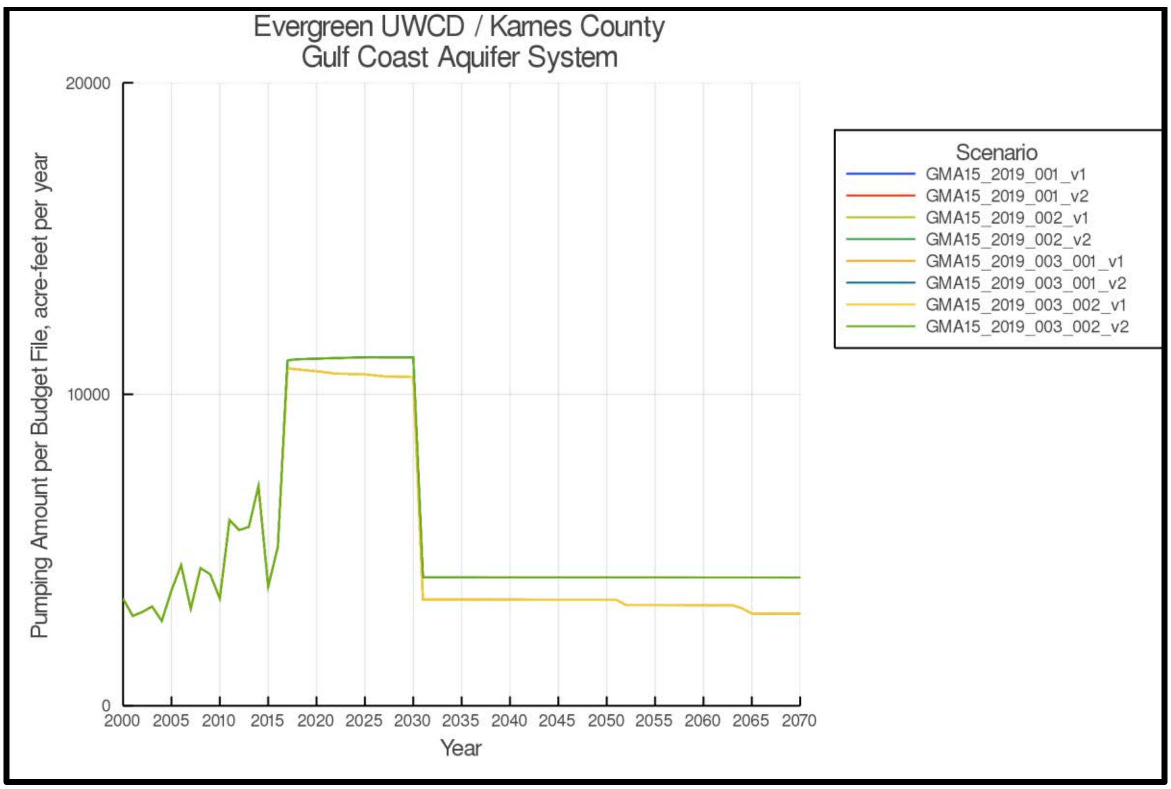

Evergreen UWCD / Karnes County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
0
100
200
300
400
500
600
700
800
900
1000
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

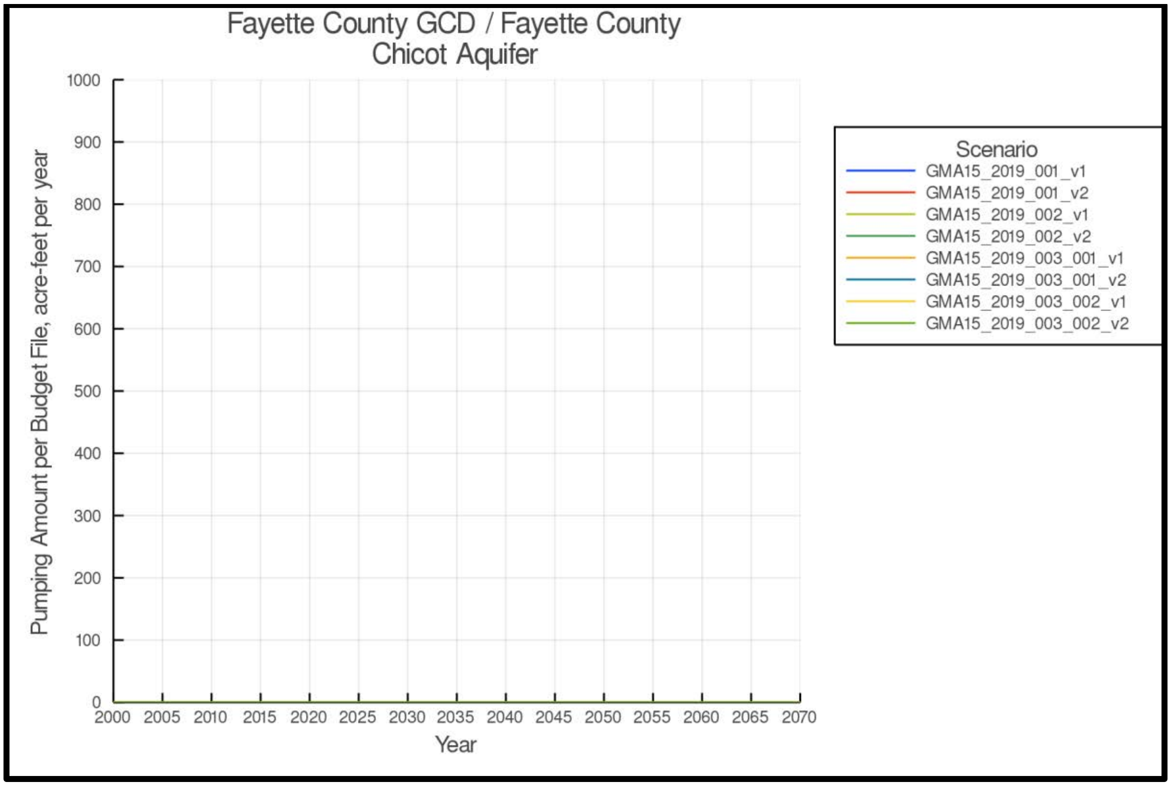

Evergreen UWCD / Karnes County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
0
100
200
300
400
500
600
700
800
900
1000
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

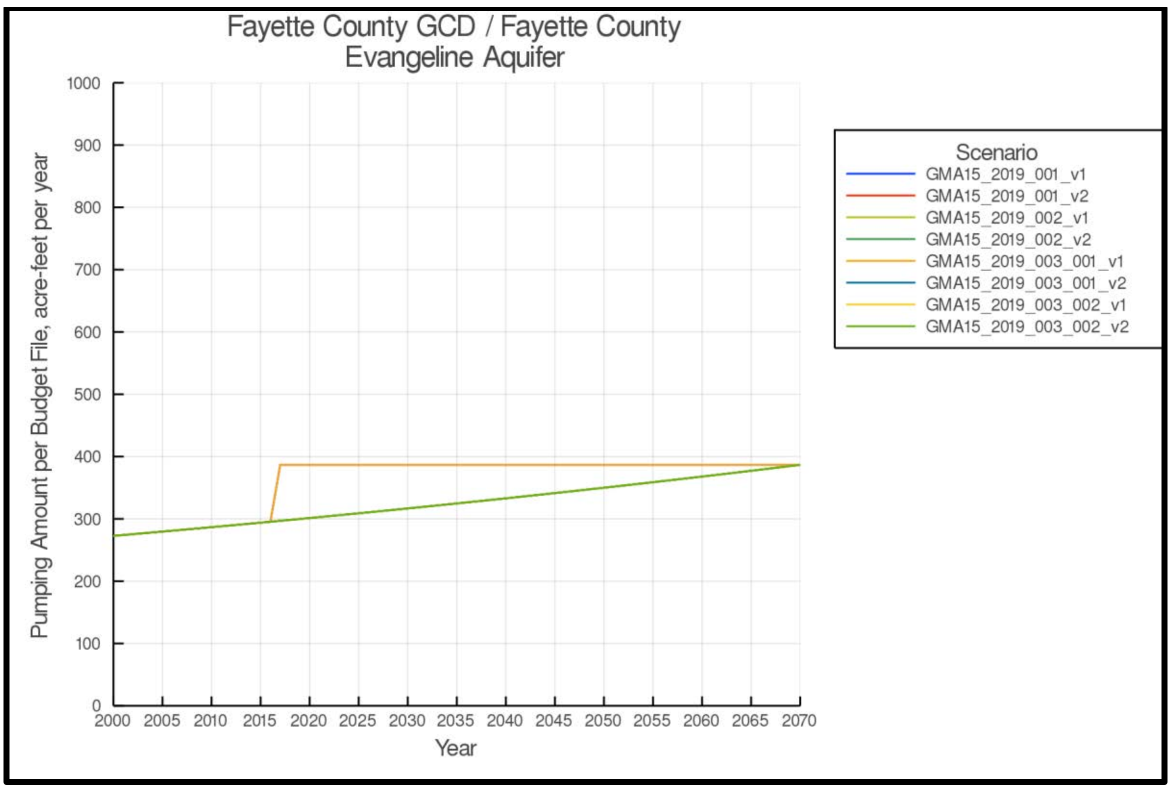

Evergreen UWCD / Karnes County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
1000
900
800
700
600
500
400
300
200
100
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

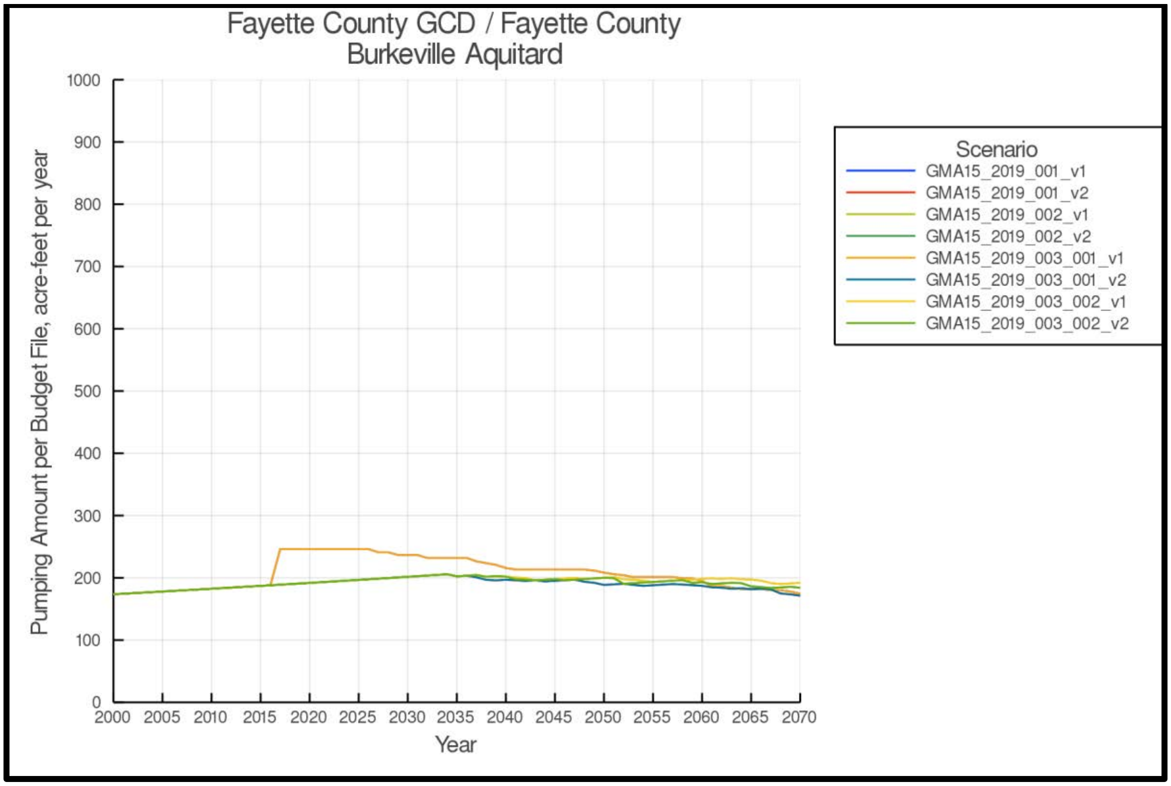

Evergreen UWCD / Karnes County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
20000
10000
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

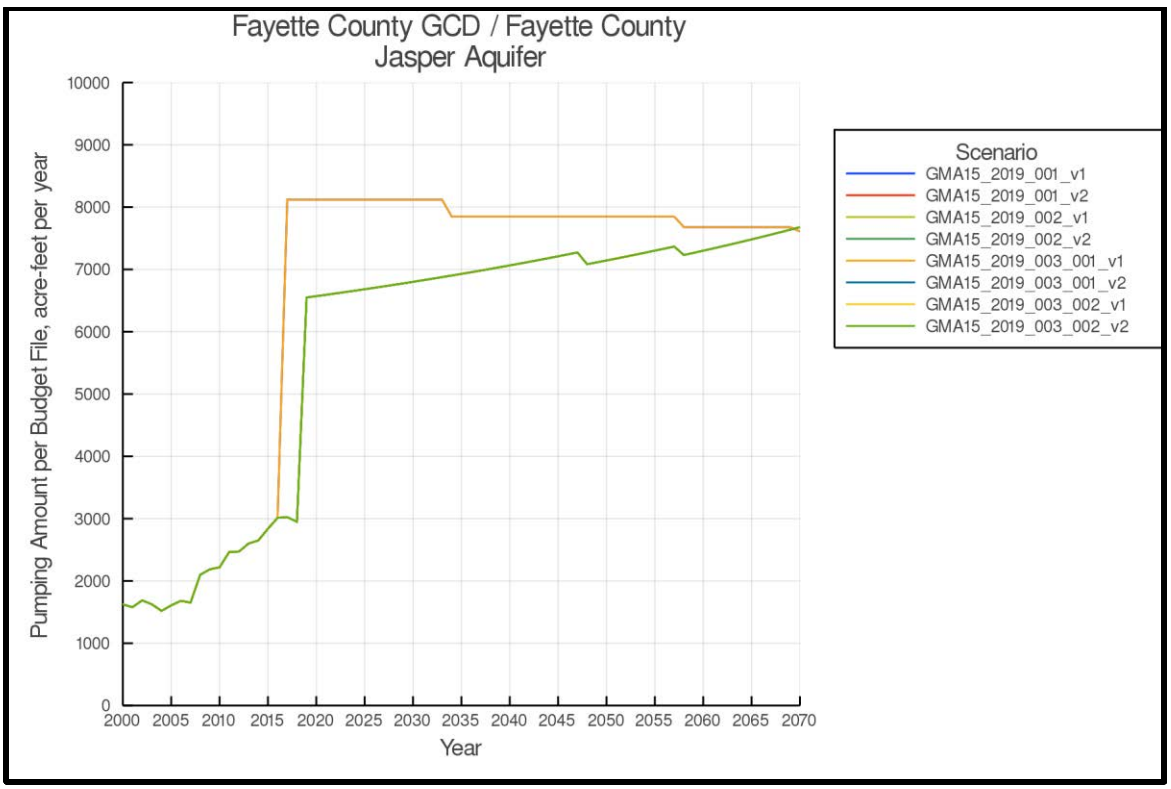

Evergreen UWCD / Karnes County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

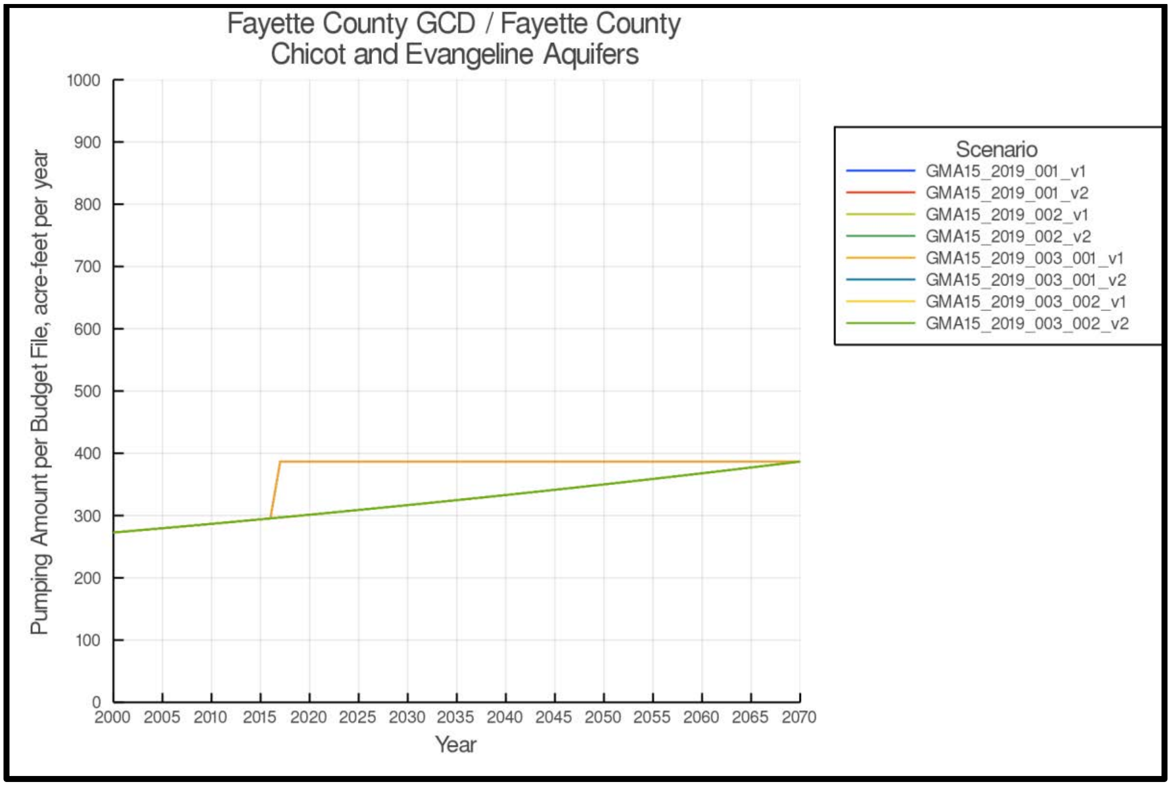

Evergreen UWCD / Karnes County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

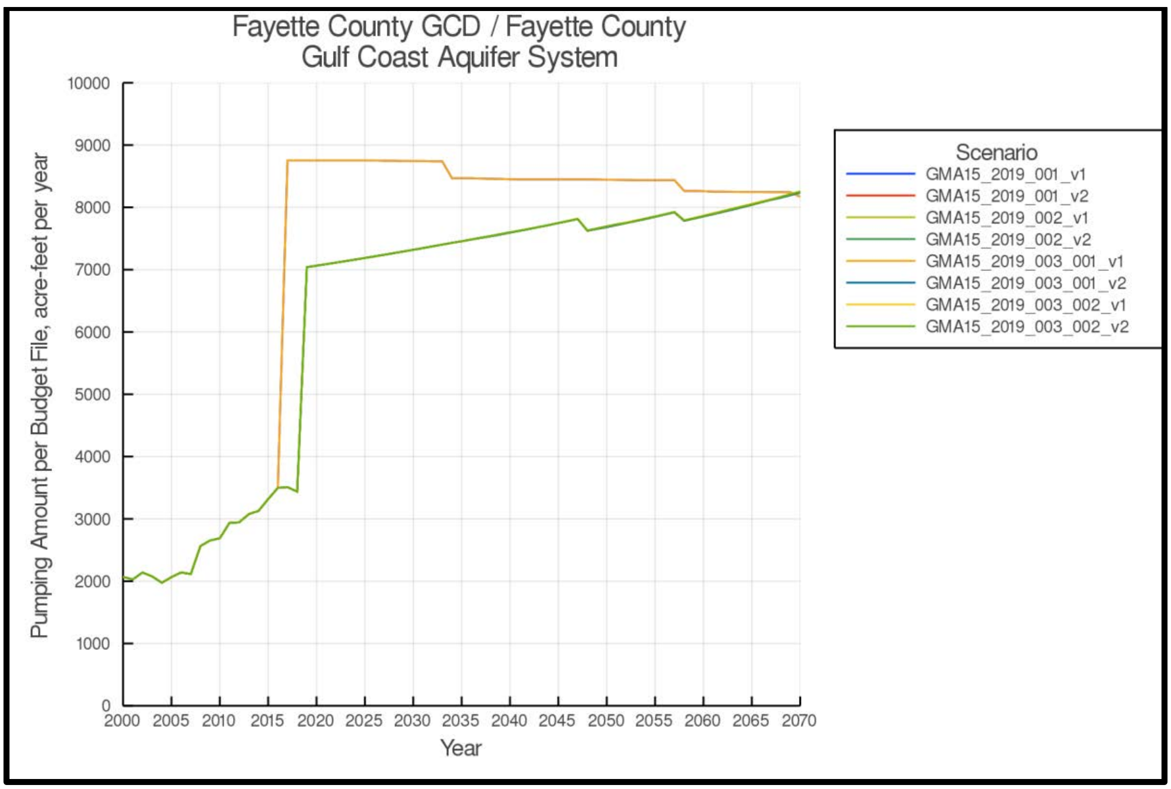

Fayette County GCD / Fayette County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
1000
900
800
700
600
500
400
300
200
100
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

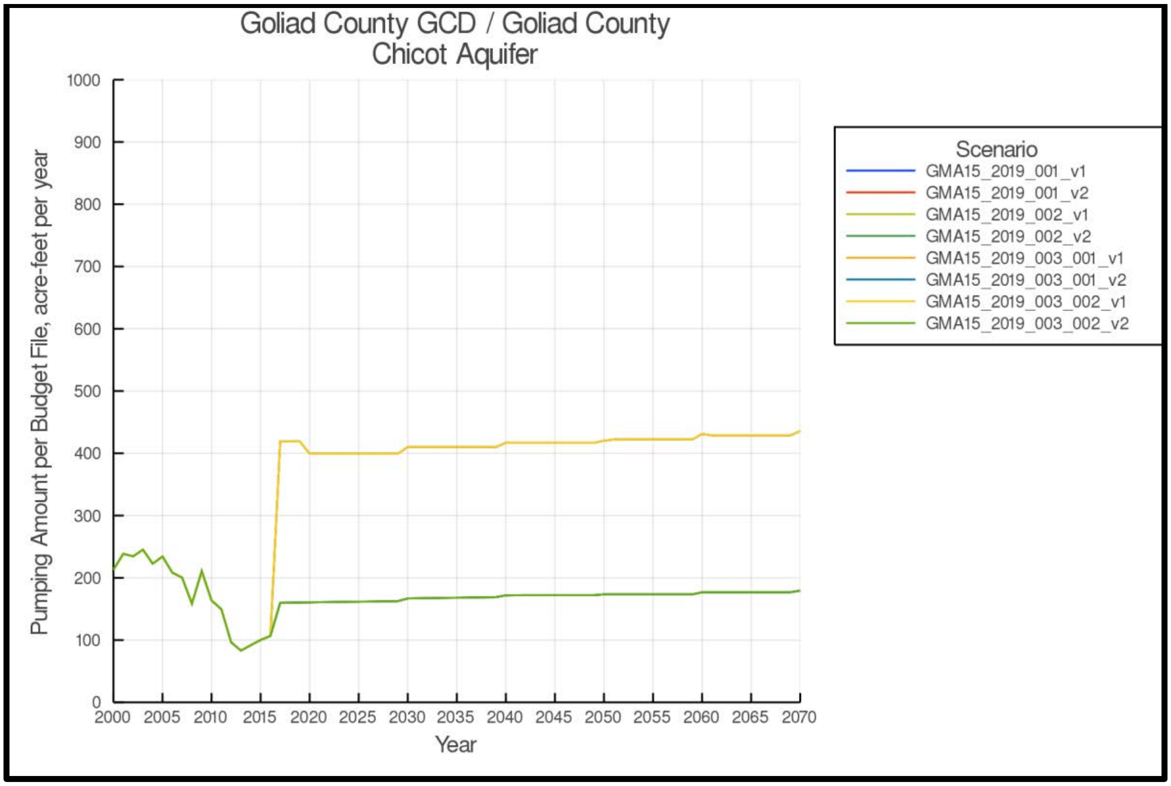

Fayette County GCD / Fayette County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
1000
900
800
700
600
500
400
300
200
100
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

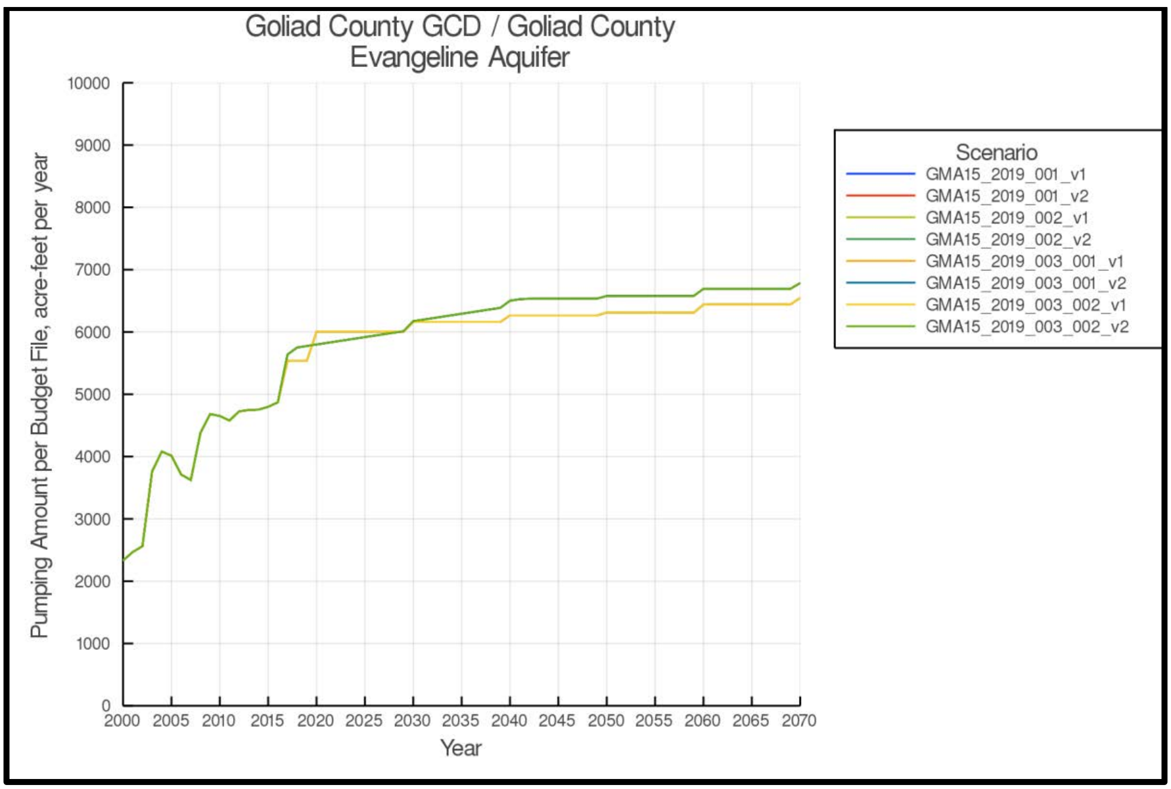

Fayette County GCD / Fayette County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

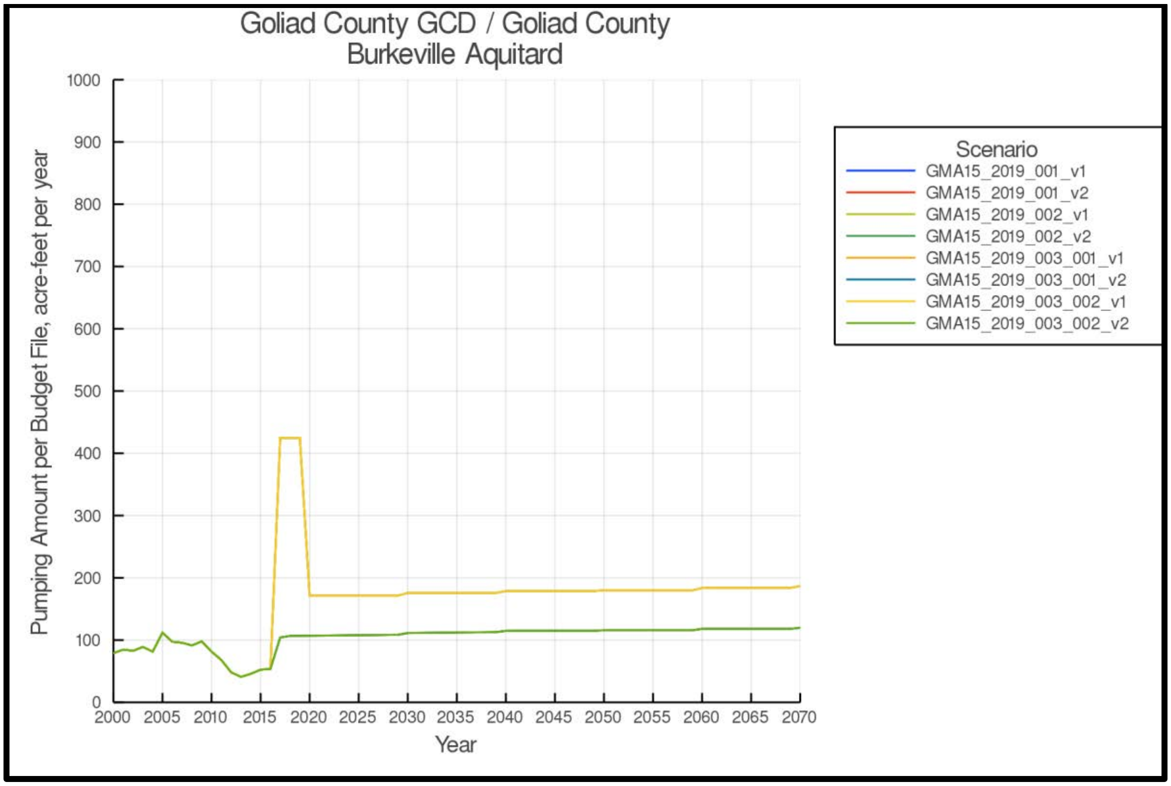

Fayette County GCD / Fayette County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

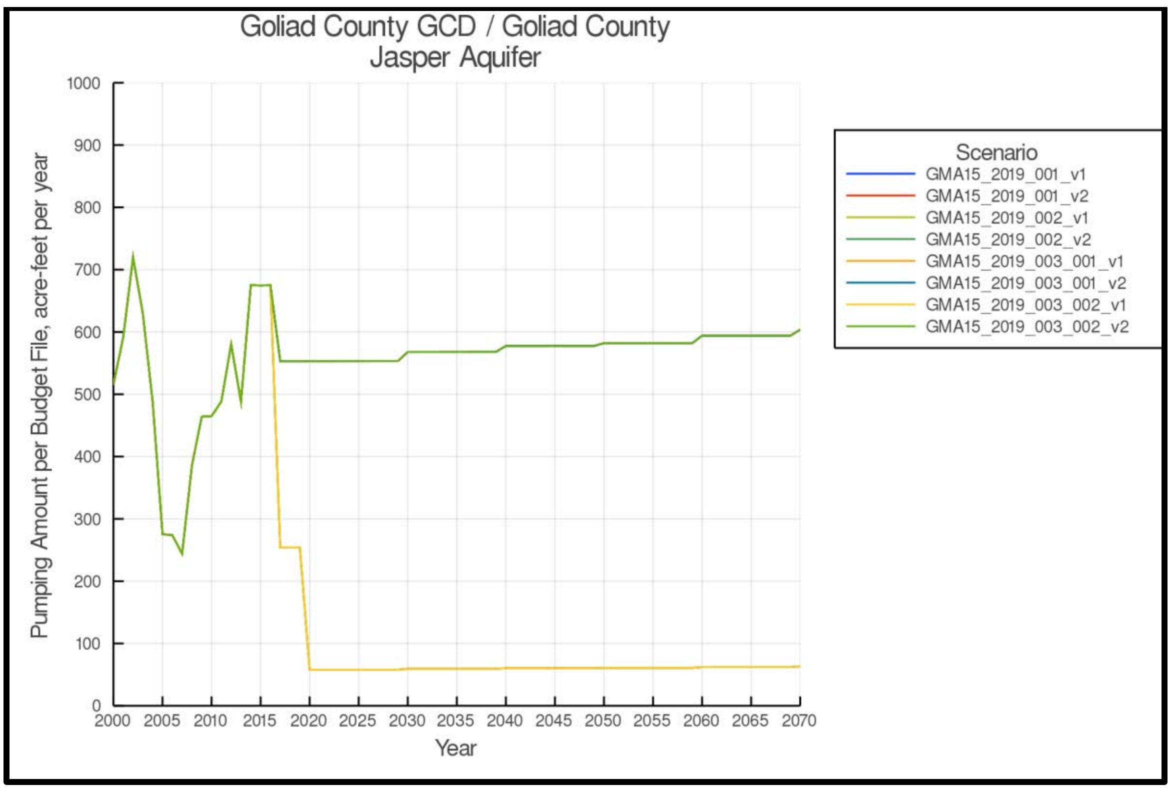

Fayette County GCD / Fayette County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

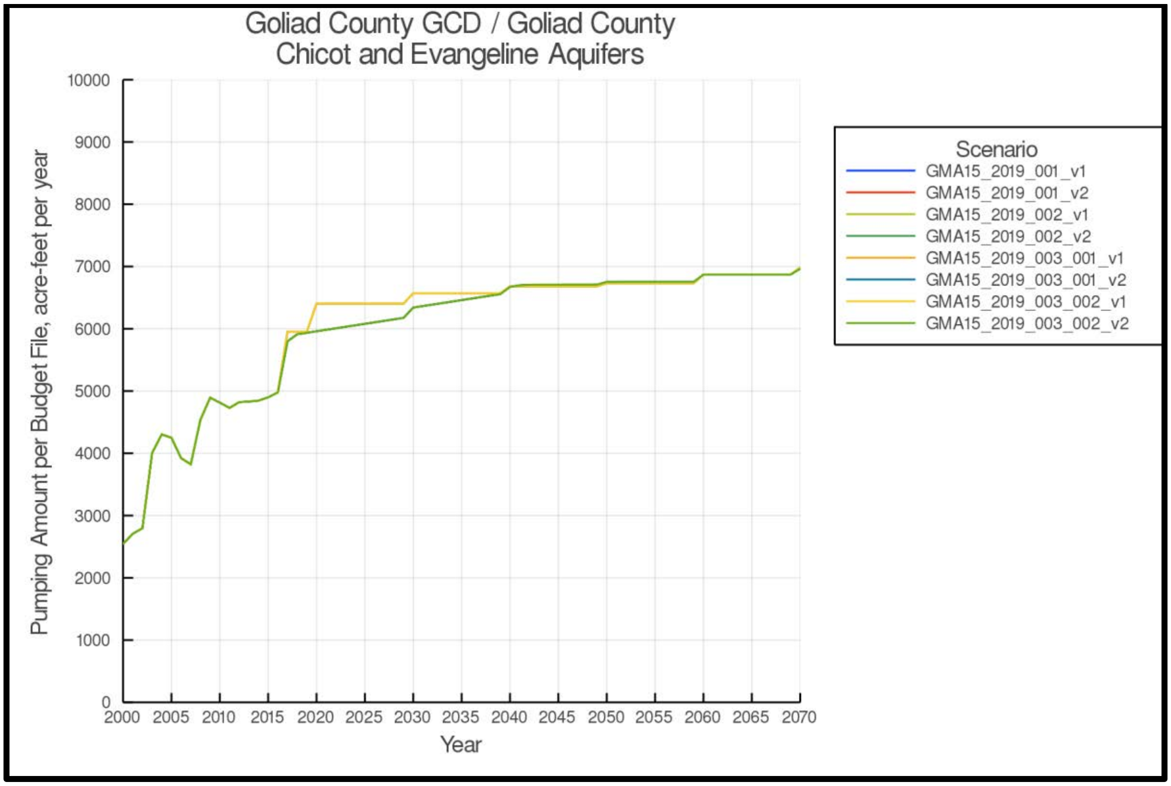

Fayette County GCD / Fayette County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

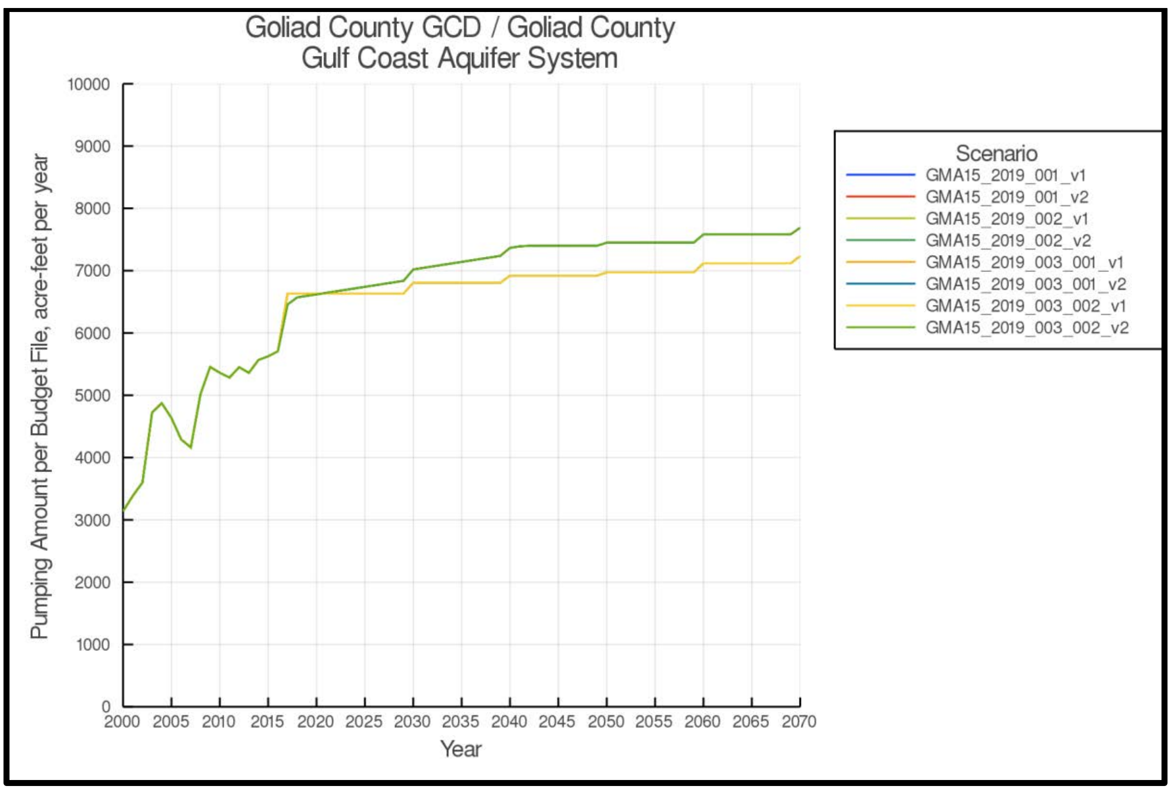

Goliad County GCD / Goliad County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

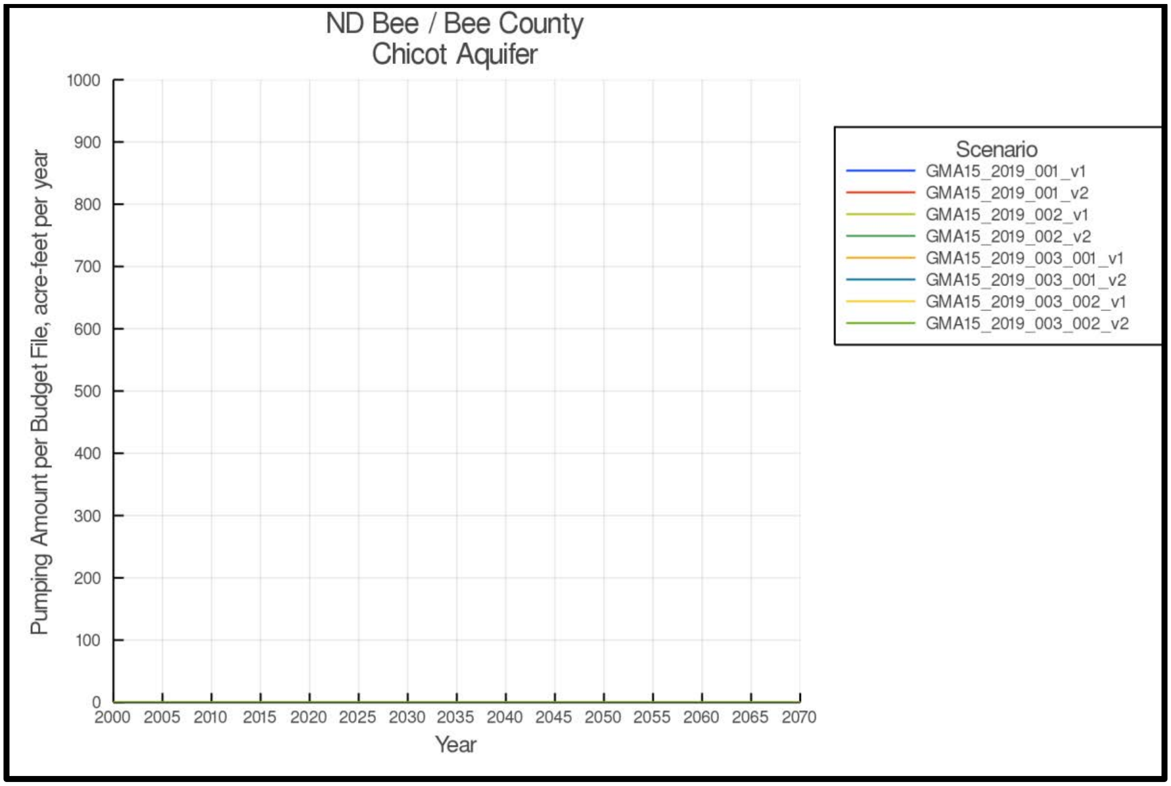

Goliad County GCD / Goliad County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

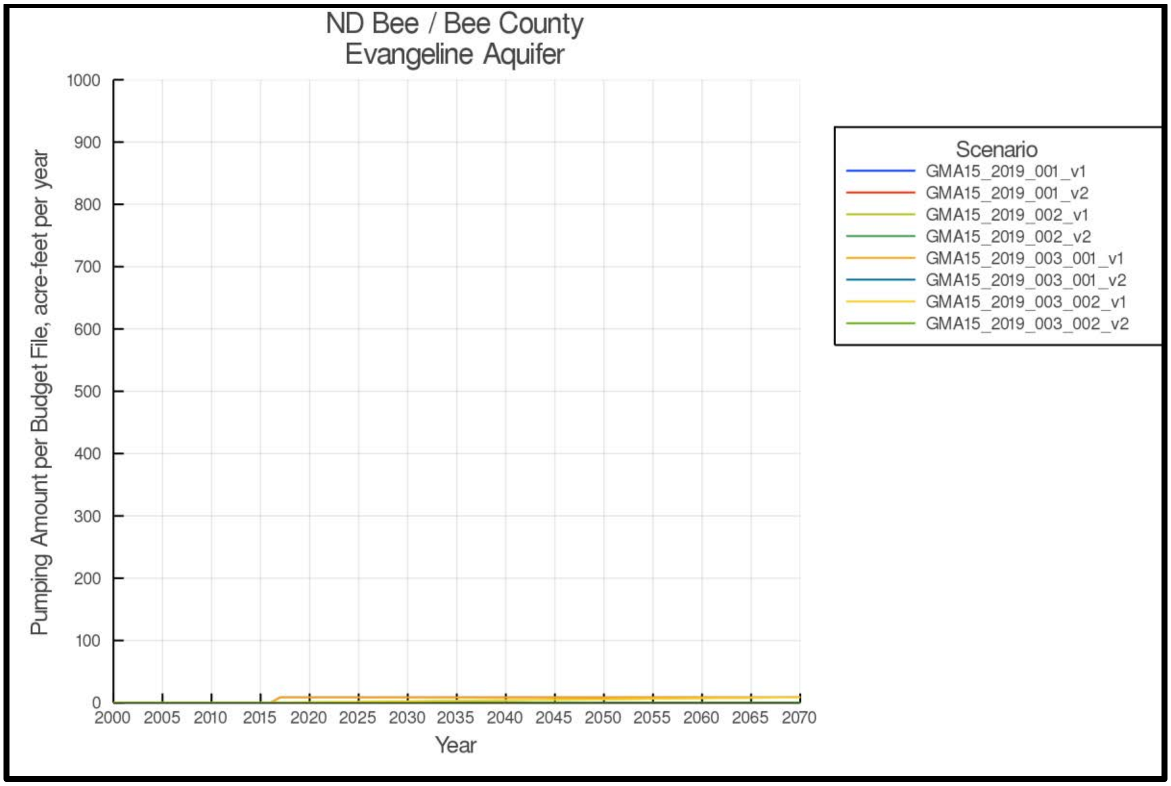

Goliad County GCD / Goliad County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

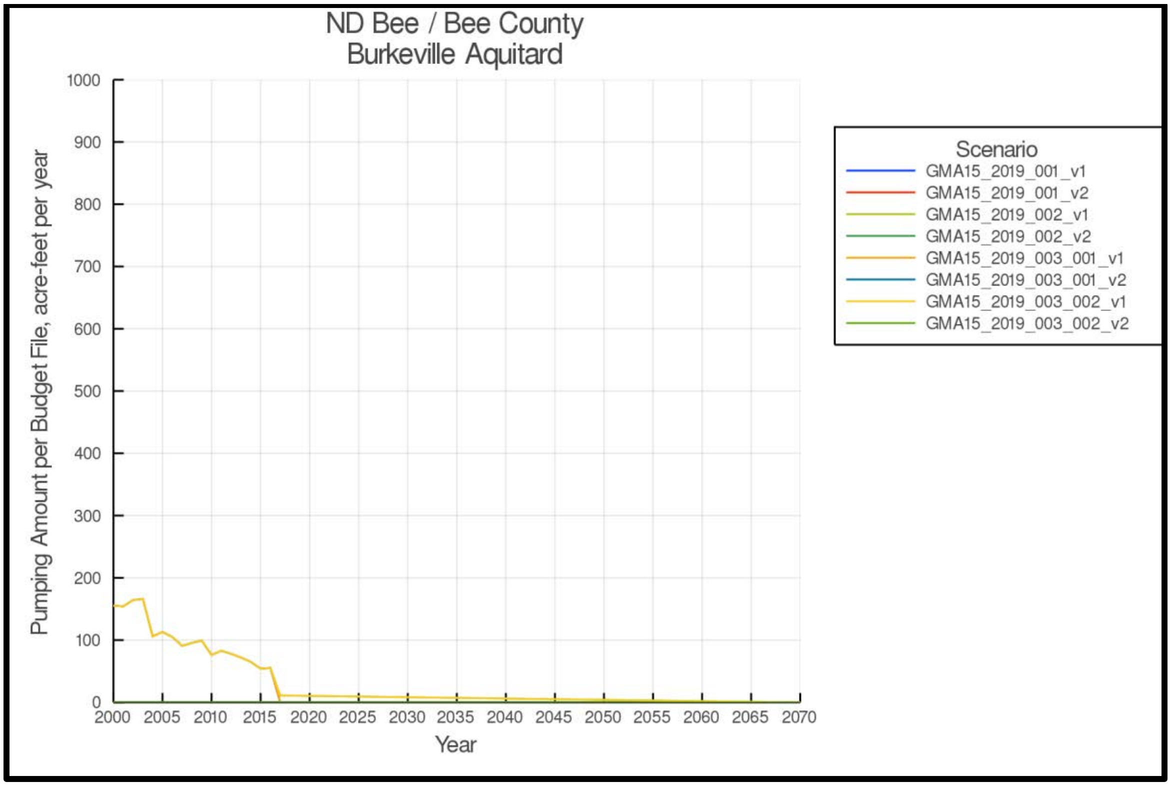

Goliad County GCD / Goliad County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

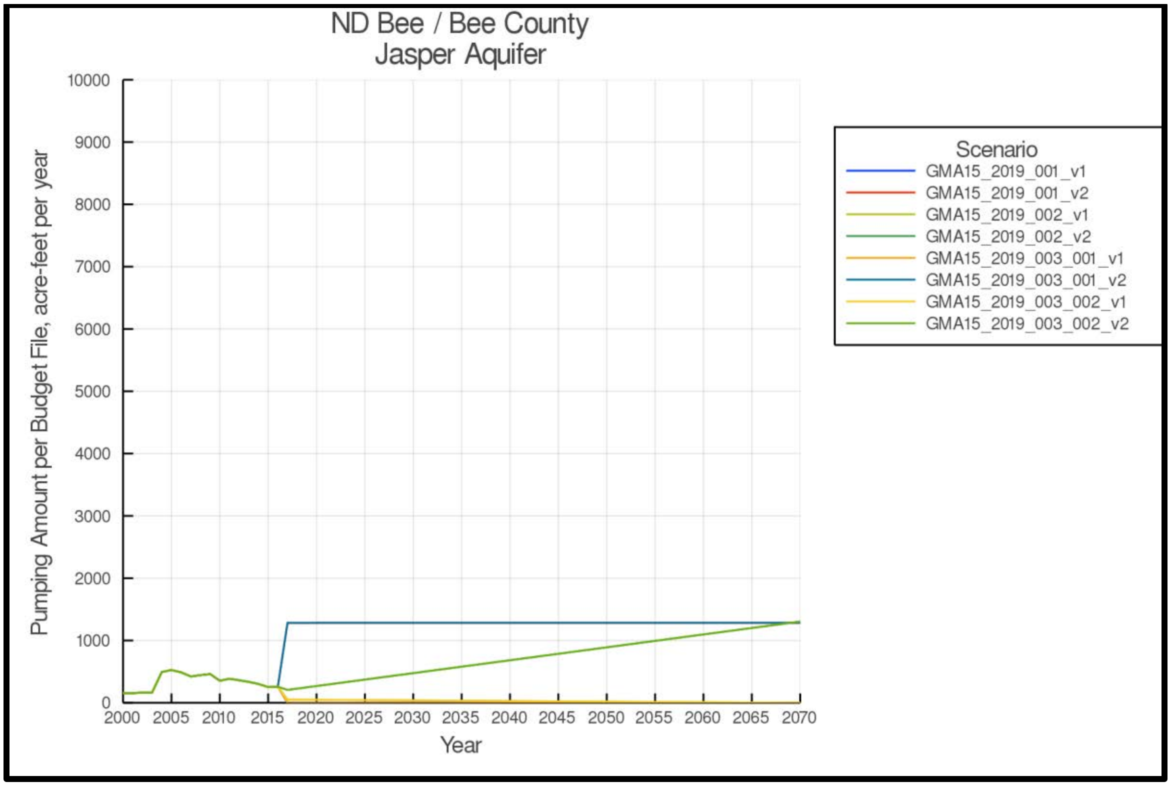

Goliad County GCD / Goliad County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

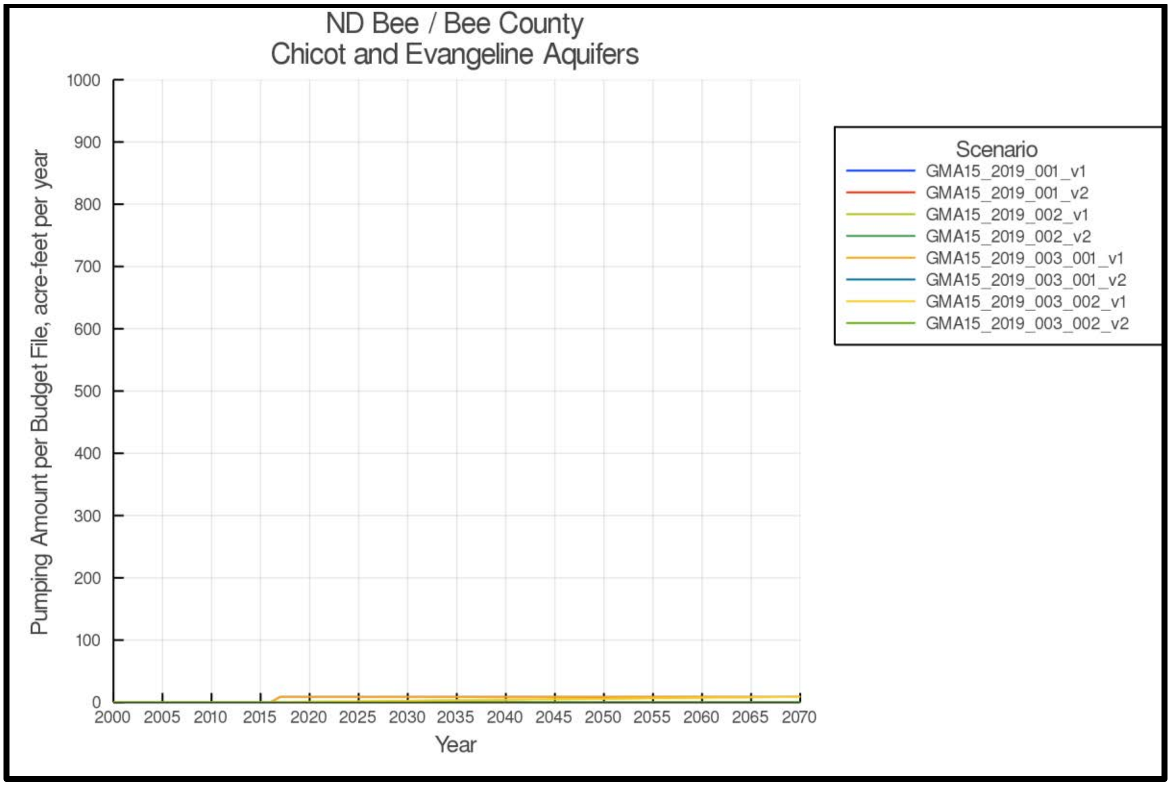

Goliad County GCD / Goliad County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

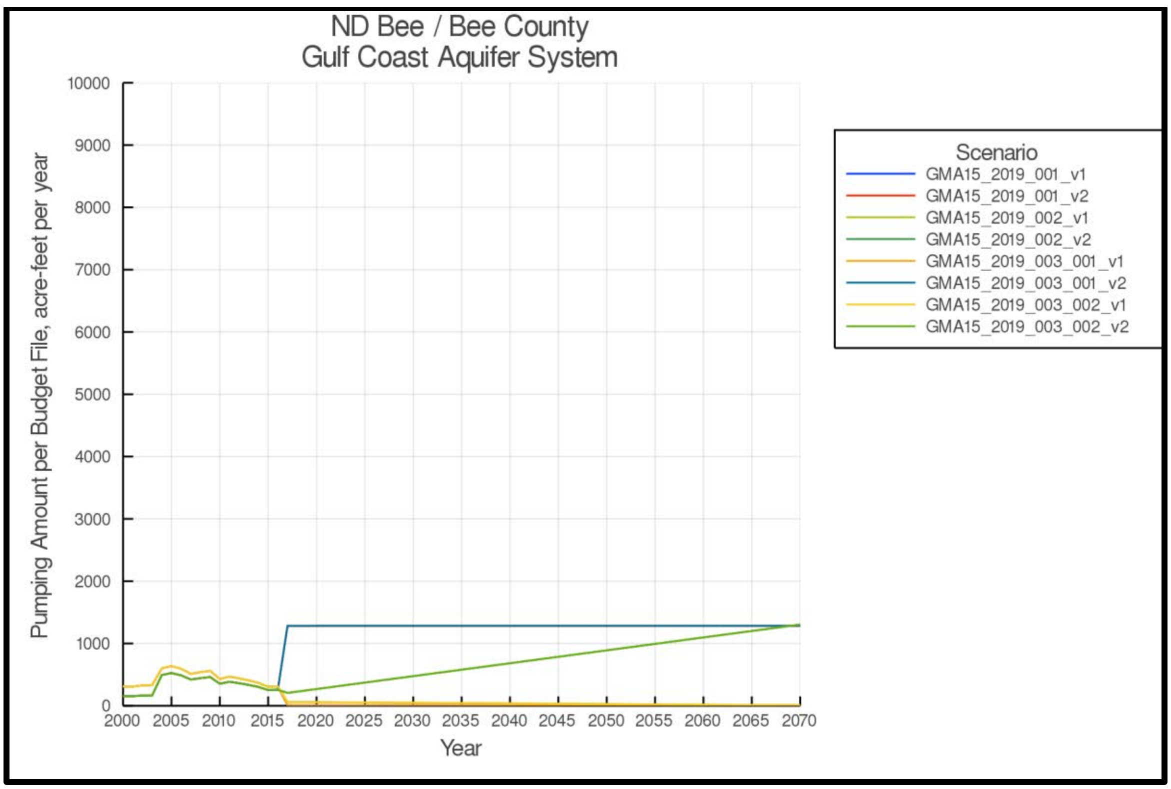

ND Bee / Bee County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

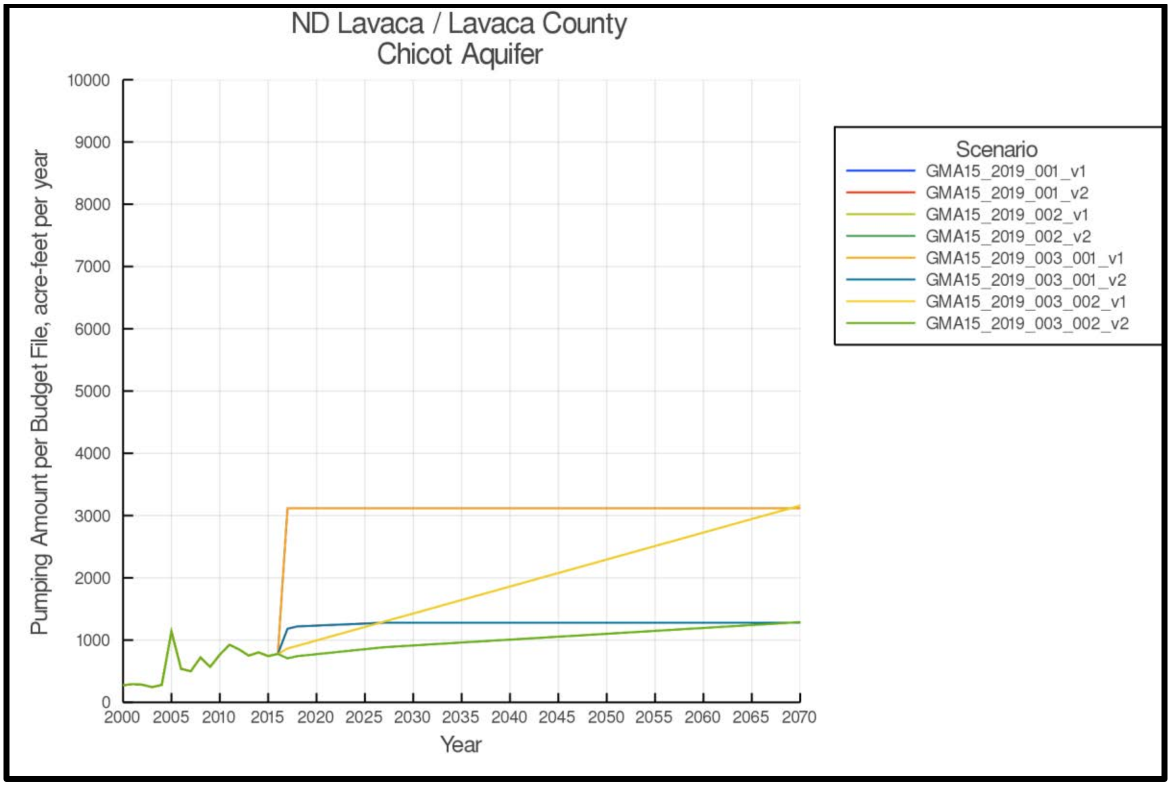

ND Bee / Bee County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

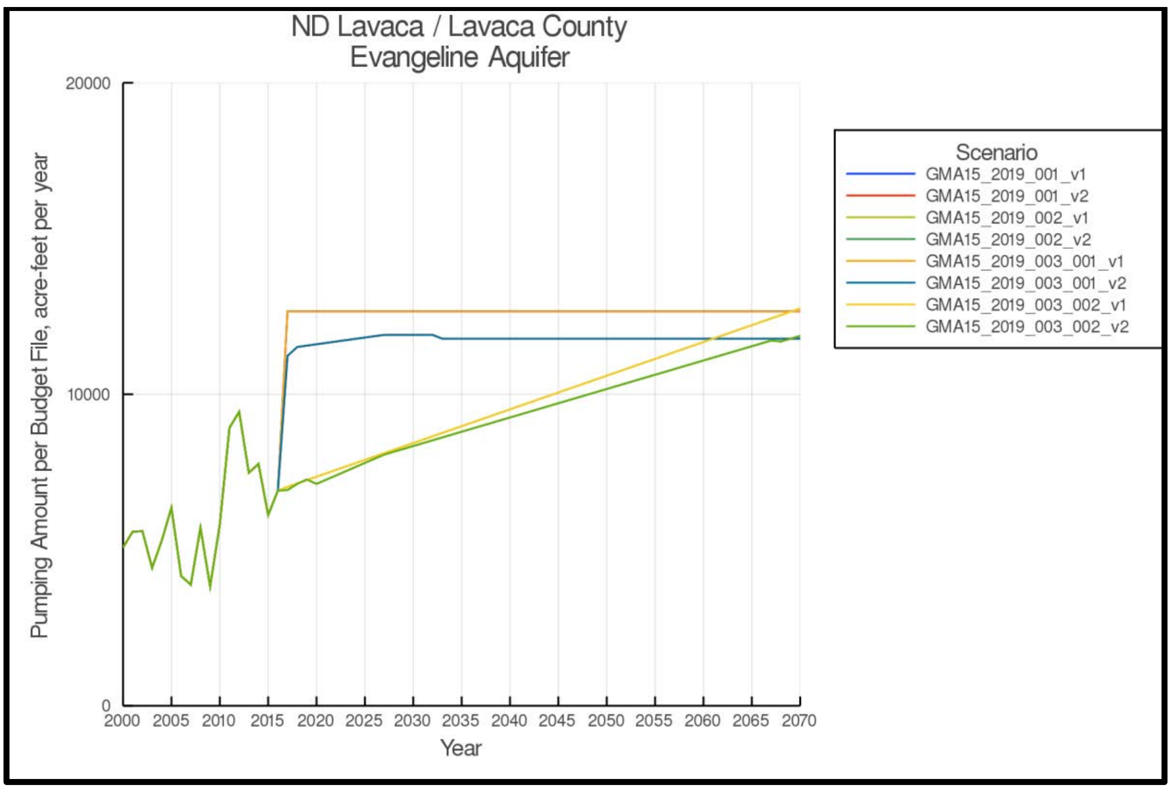

ND Bee / Bee County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

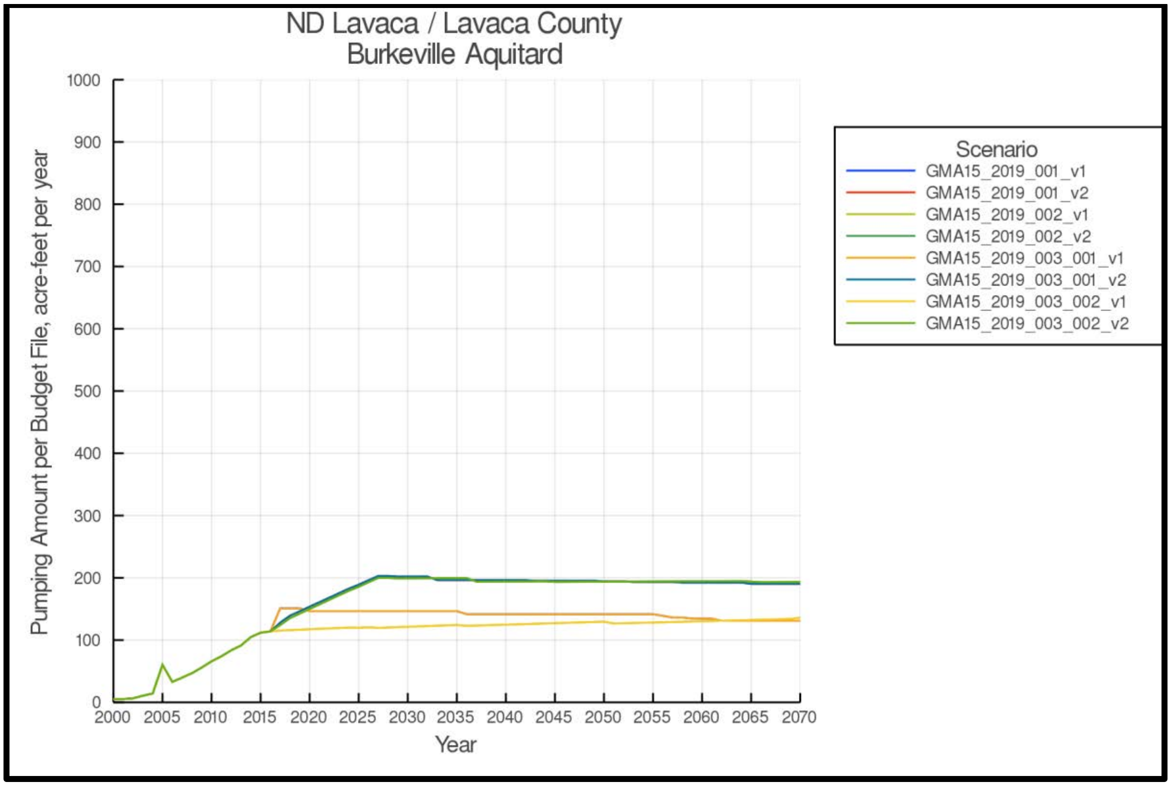

ND Bee / Bee County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

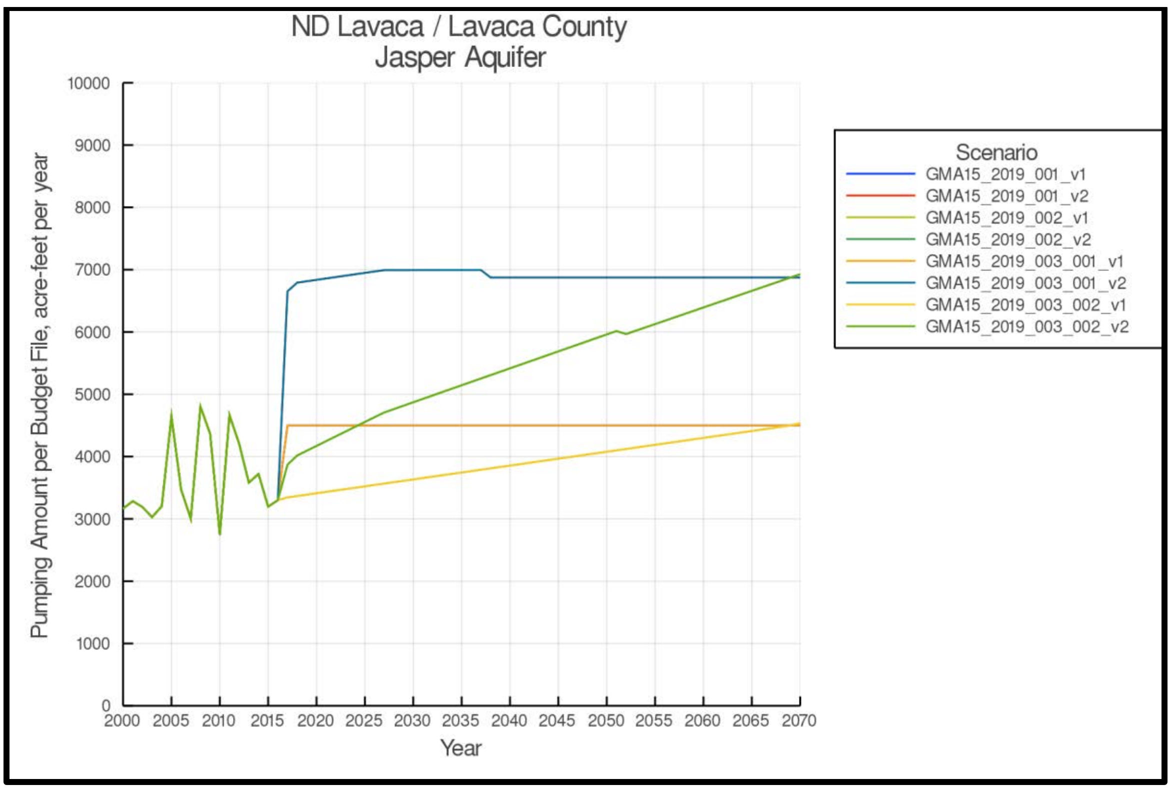

ND Bee / Bee County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

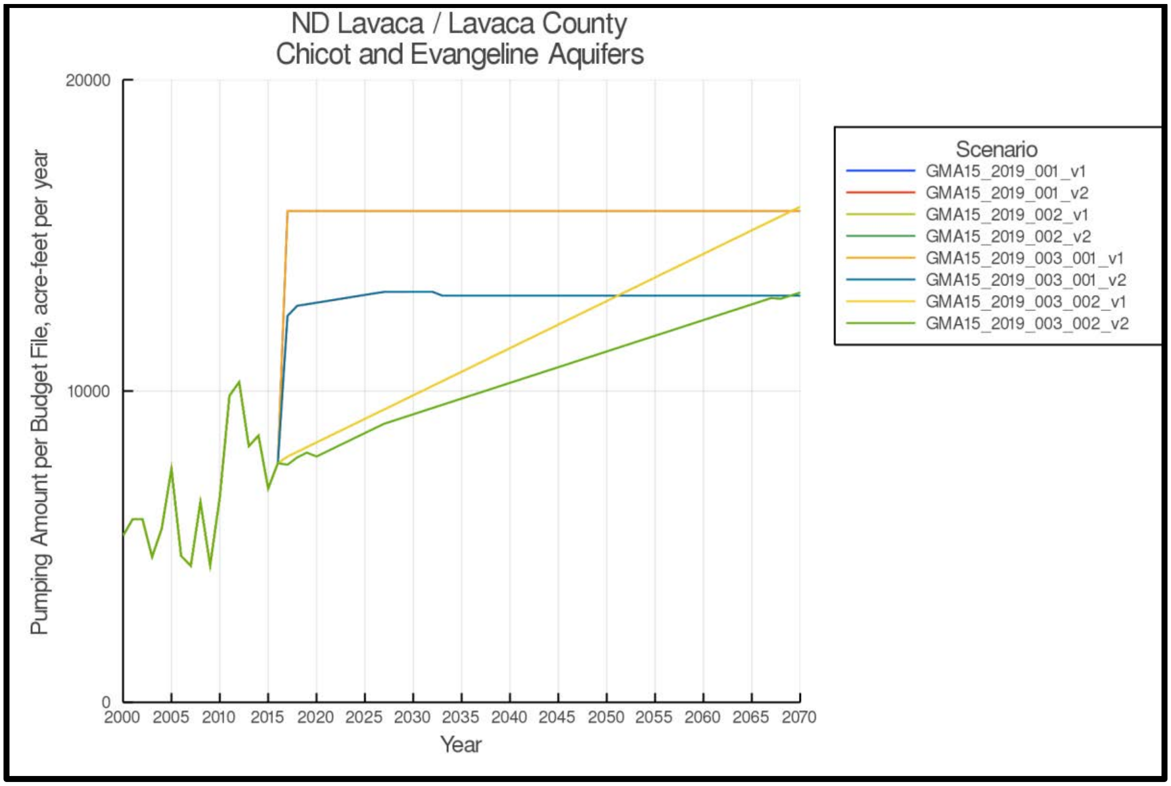

ND Bee / Bee County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

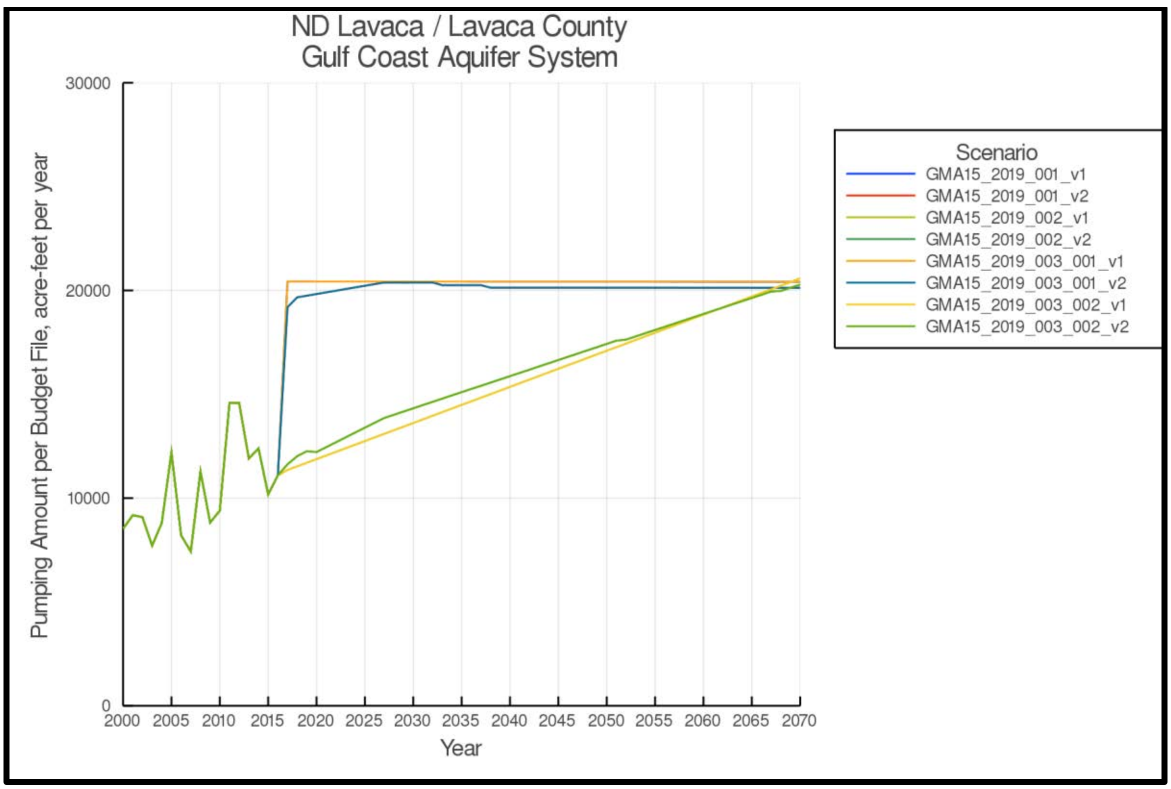

ND Lavaca / Lavaca County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

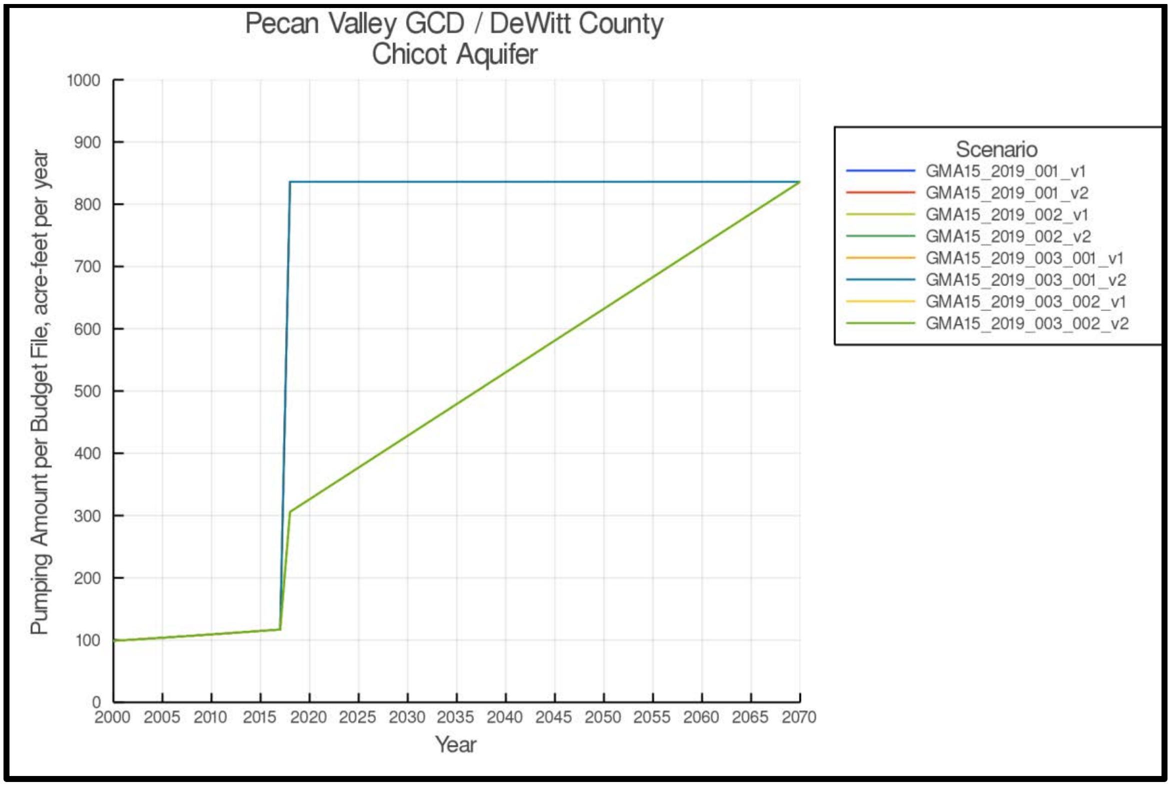

ND Lavaca / Lavaca County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
0
10000
20000
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

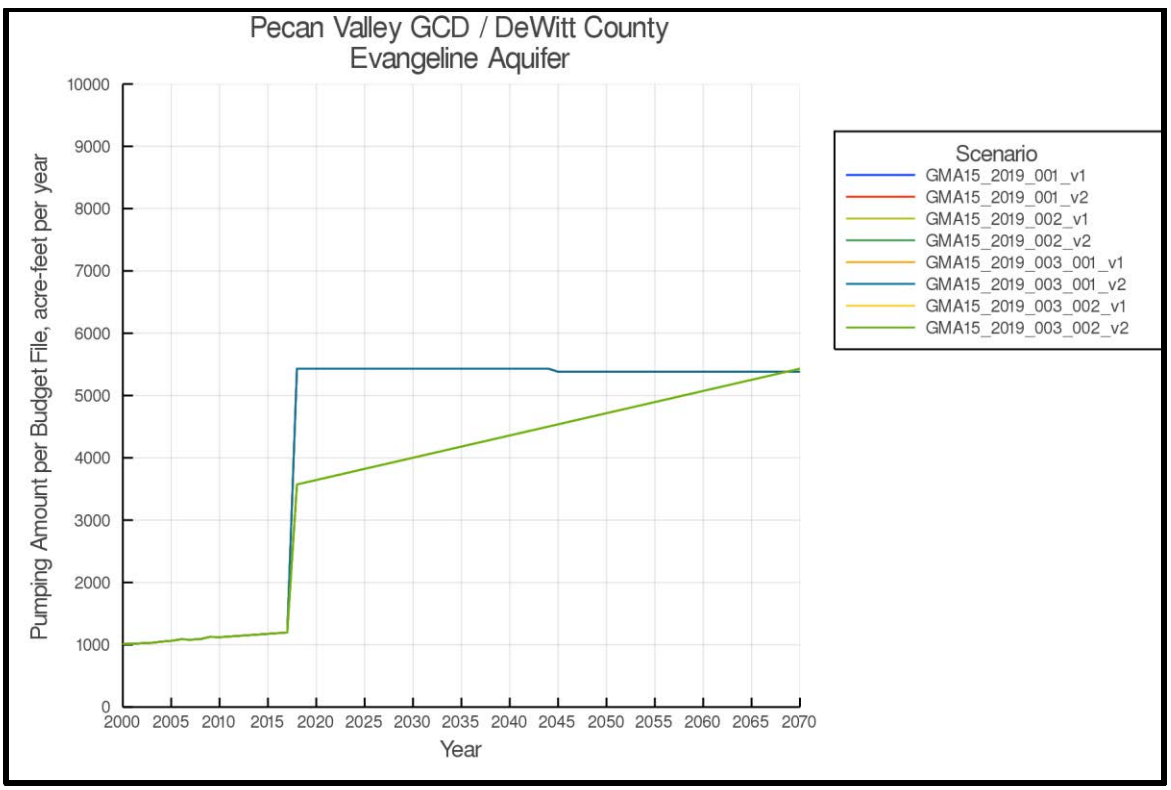

ND Lavaca / Lavaca County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

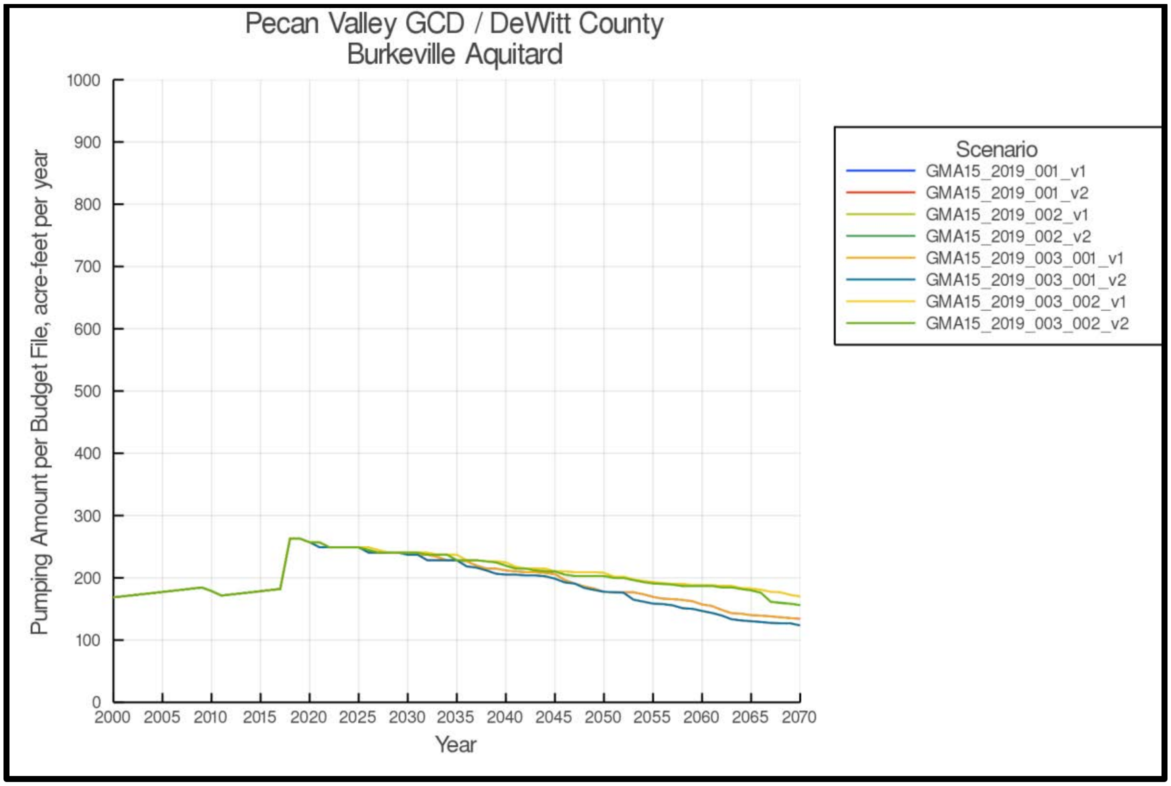

ND Lavaca / Lavaca County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

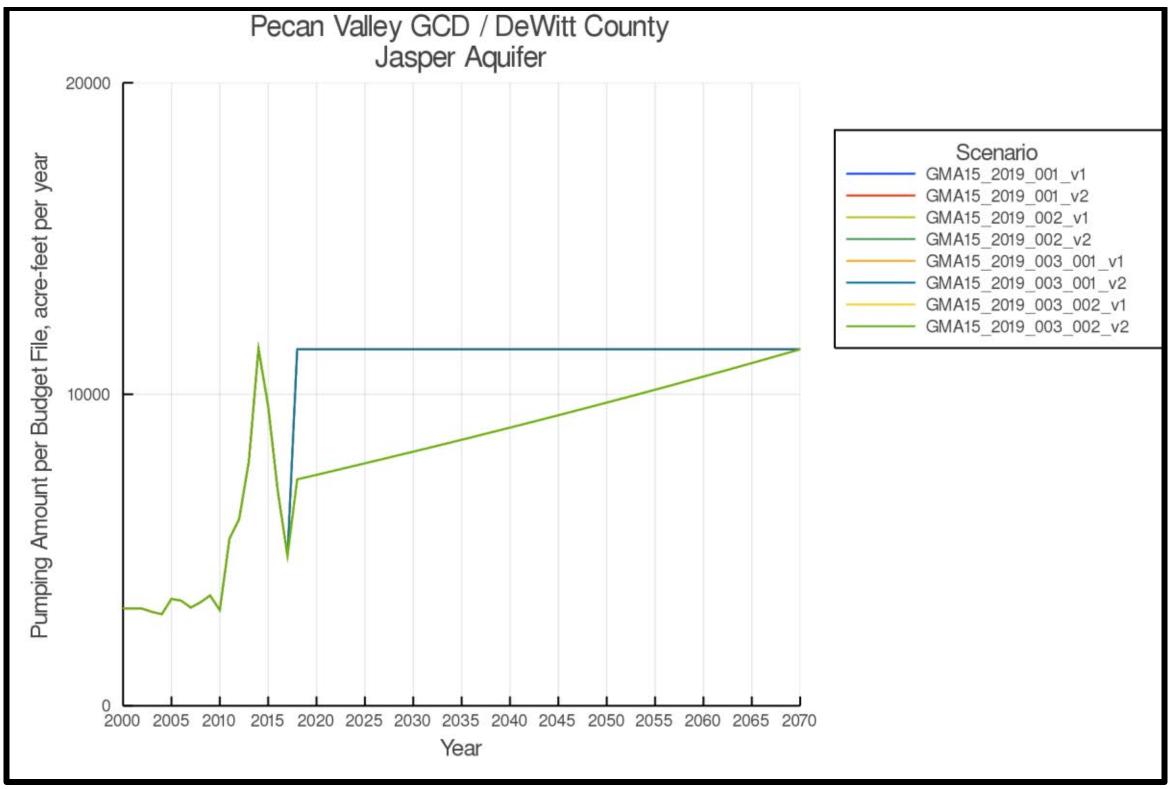

ND Lavaca / Lavaca County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

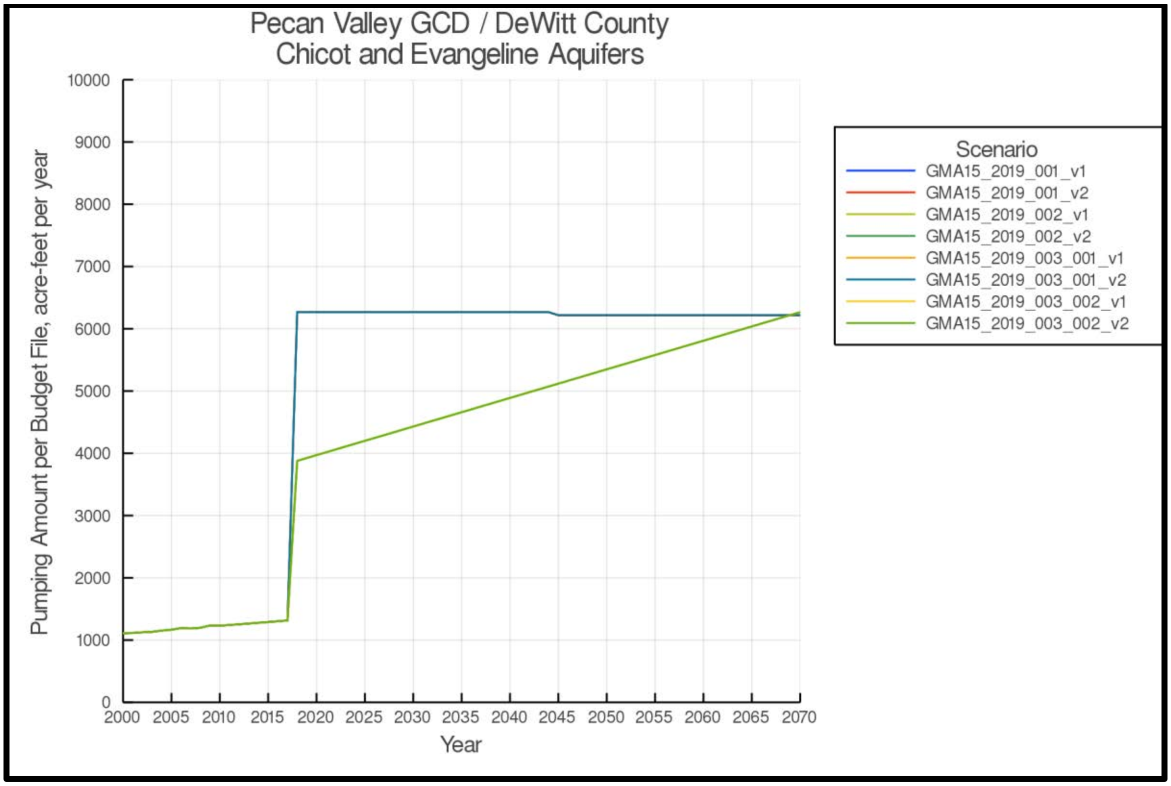

ND Lavaca / Lavaca County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

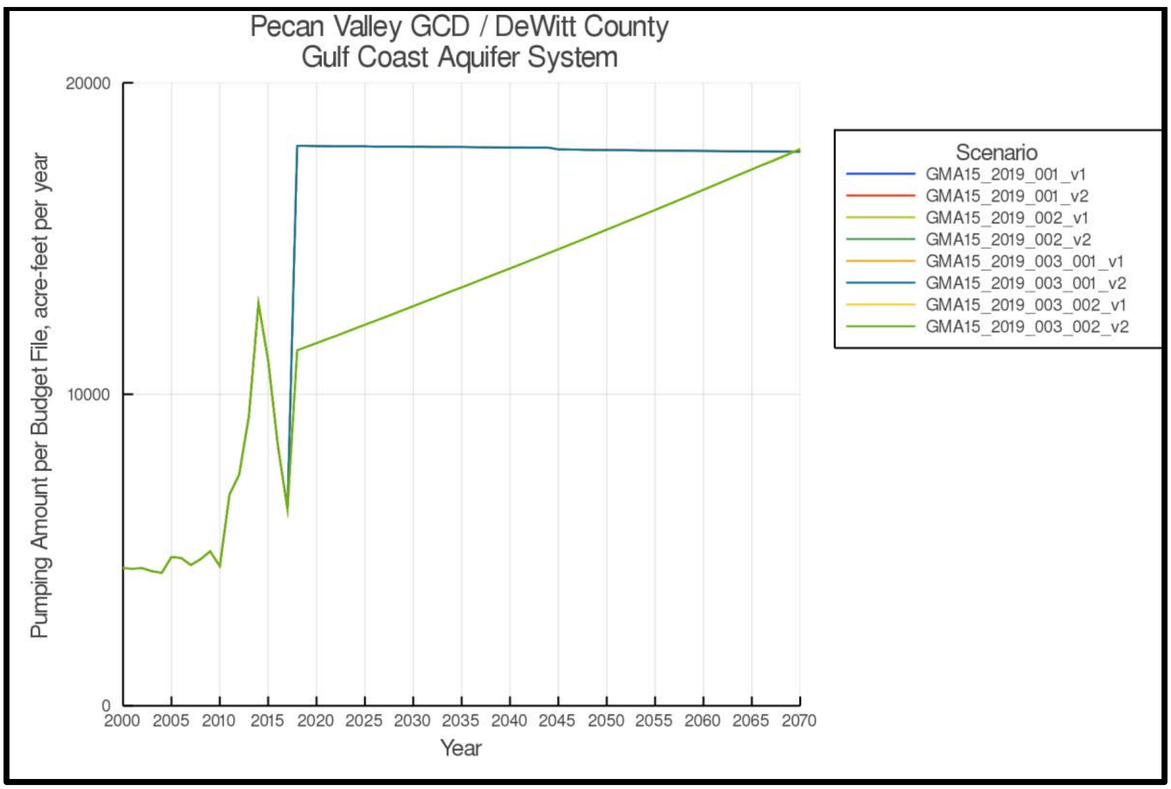

Pecan Valley GCD / DeWitt County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

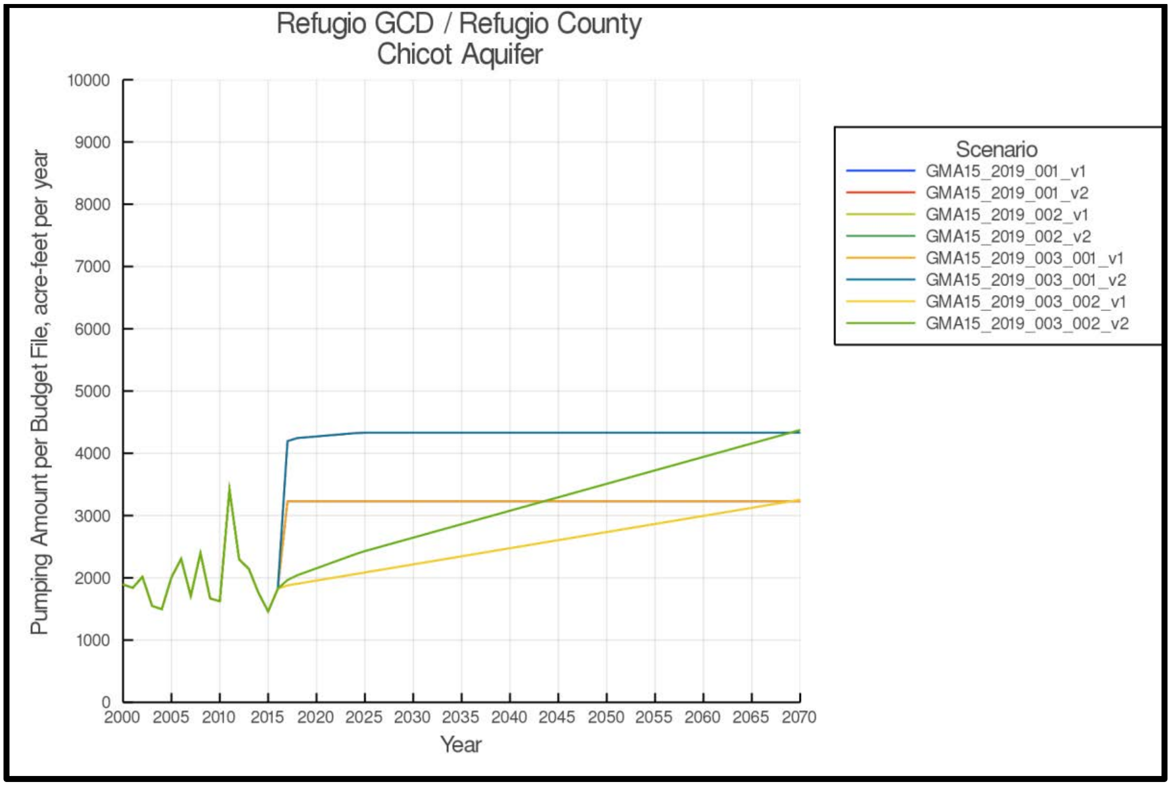

Pecan Valley GCD / DeWitt County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

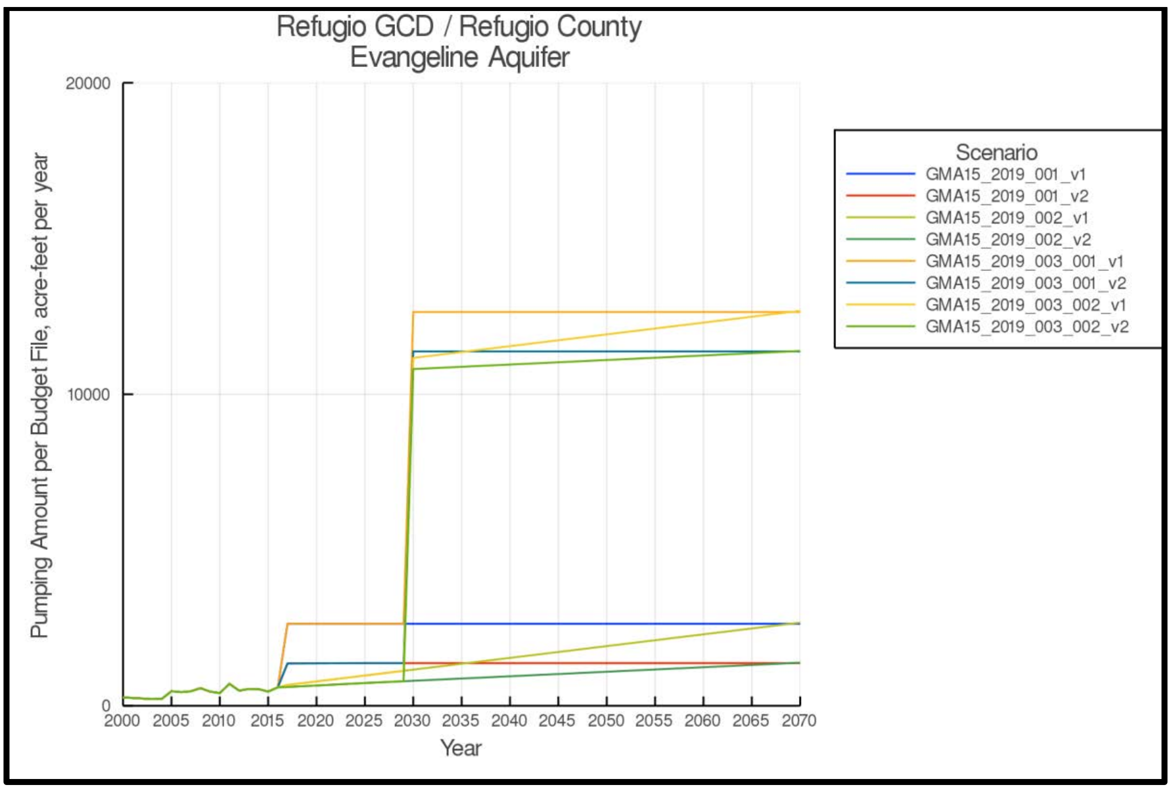

Pecan Valley GCD / DeWitt County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

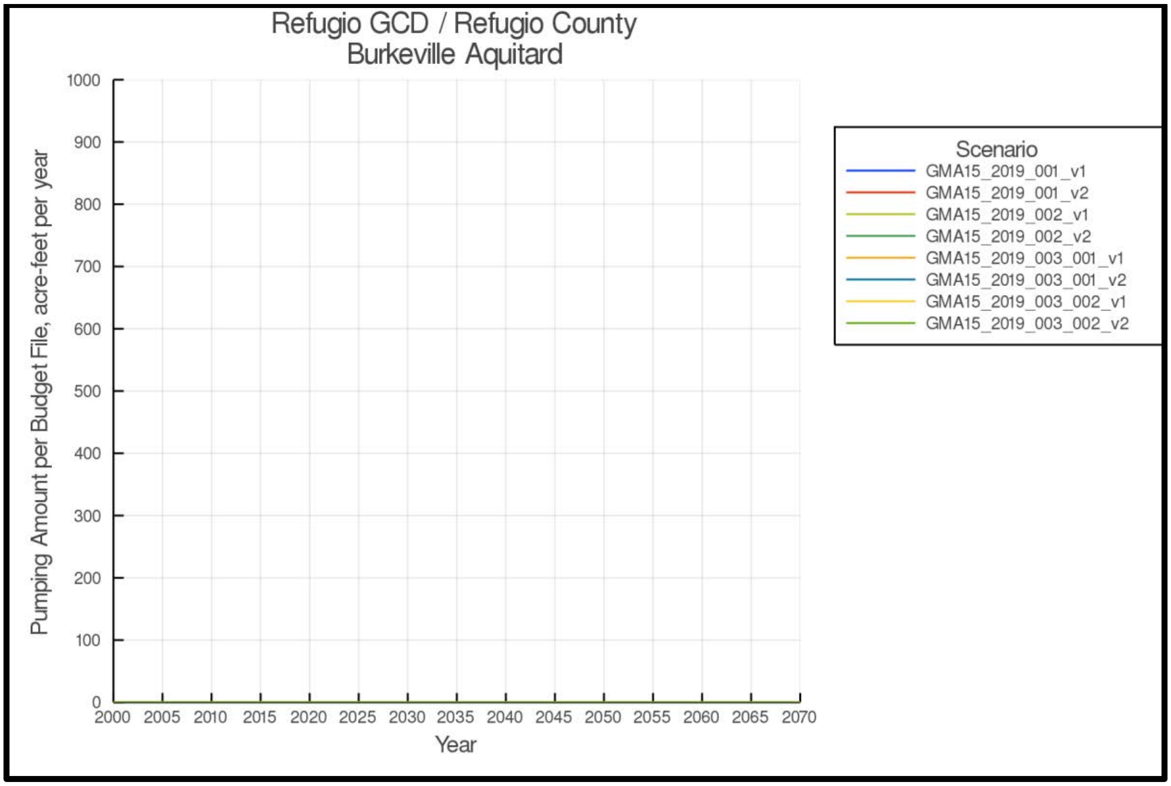

Pecan Valley GCD / DeWitt County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

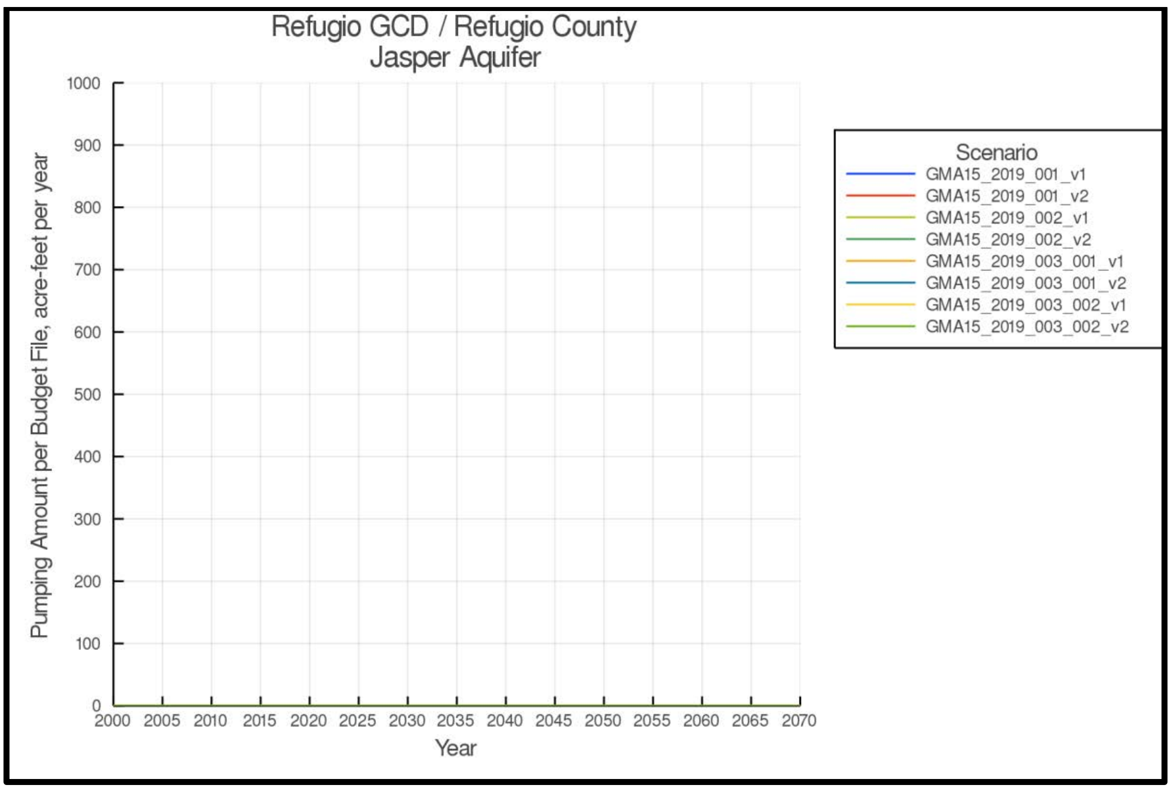

Pecan Valley GCD / DeWitt County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

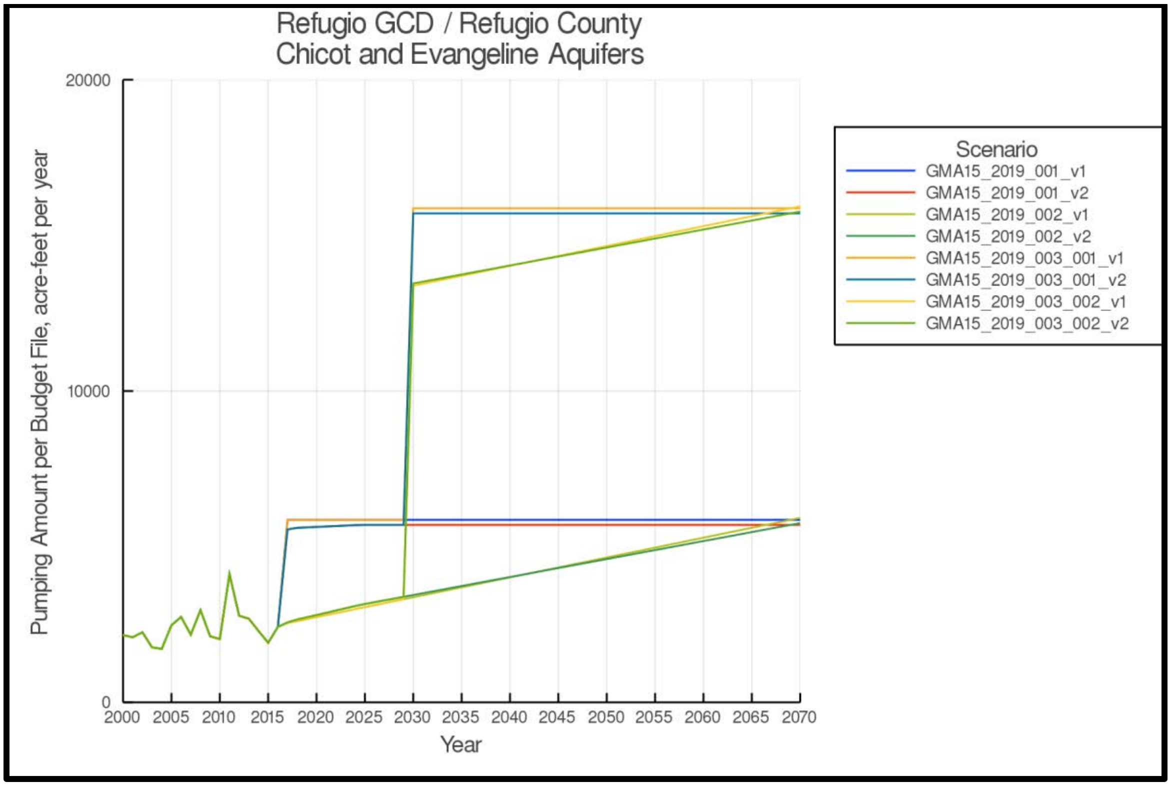

Pecan Valley GCD / DeWitt County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

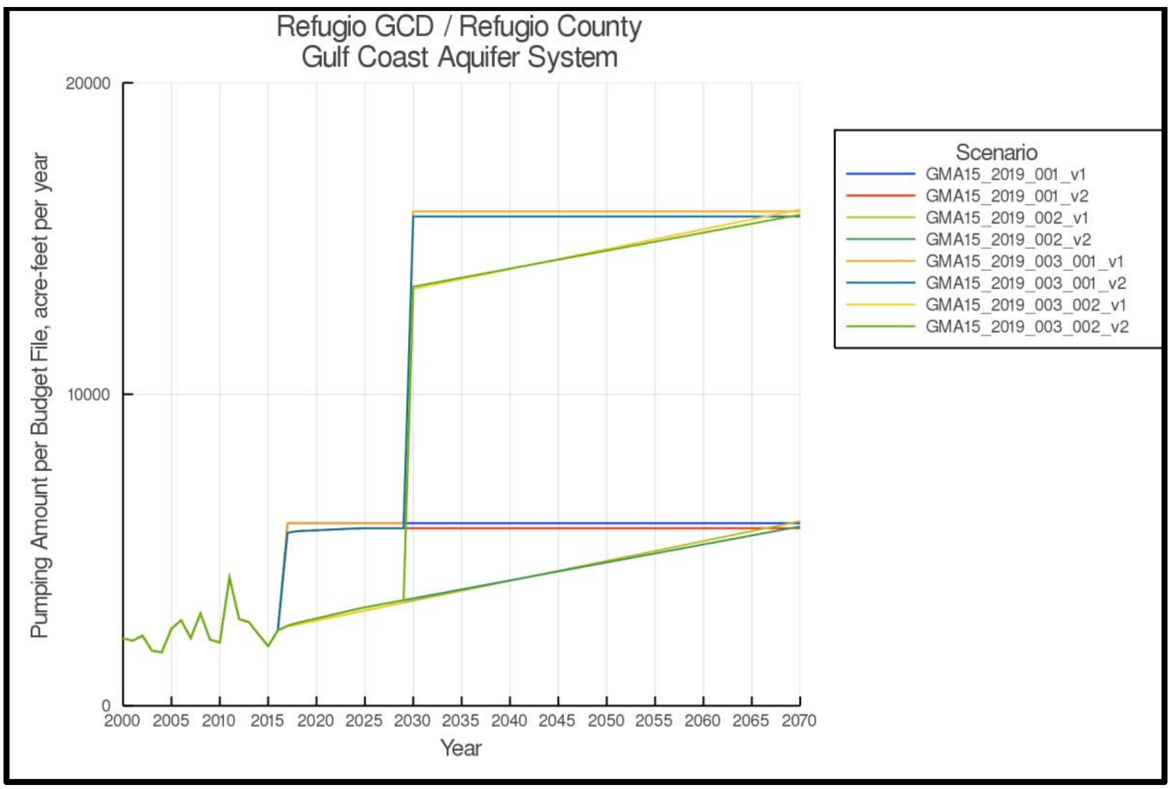

Refugio GCD / Refugio County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

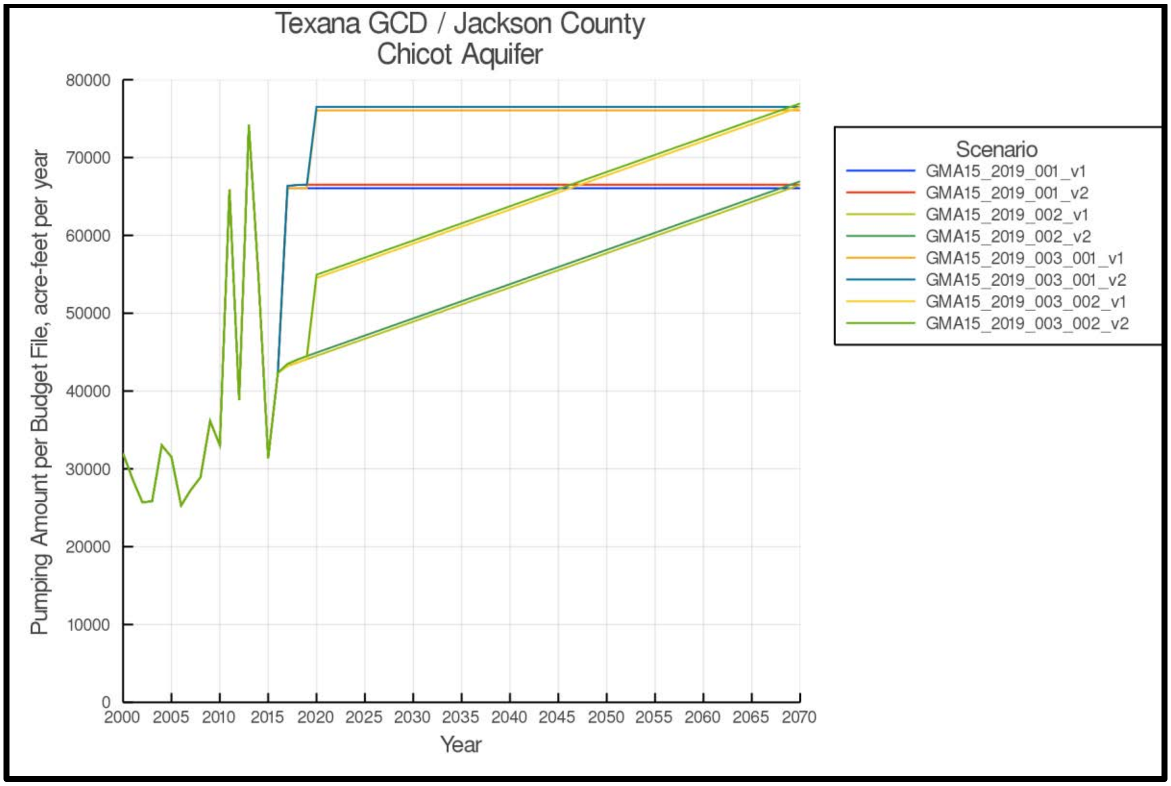

Refugio GCD / Refugio County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
20000
10000
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

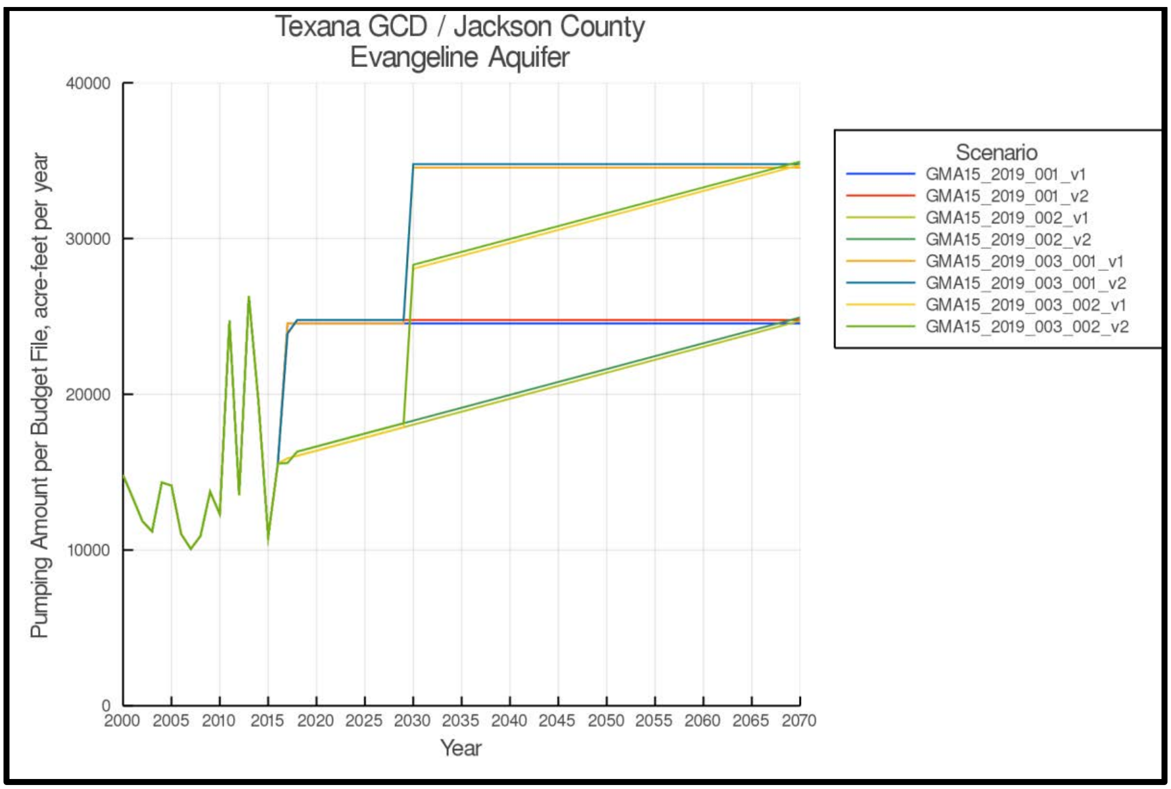

Refugio GCD / Refugio County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

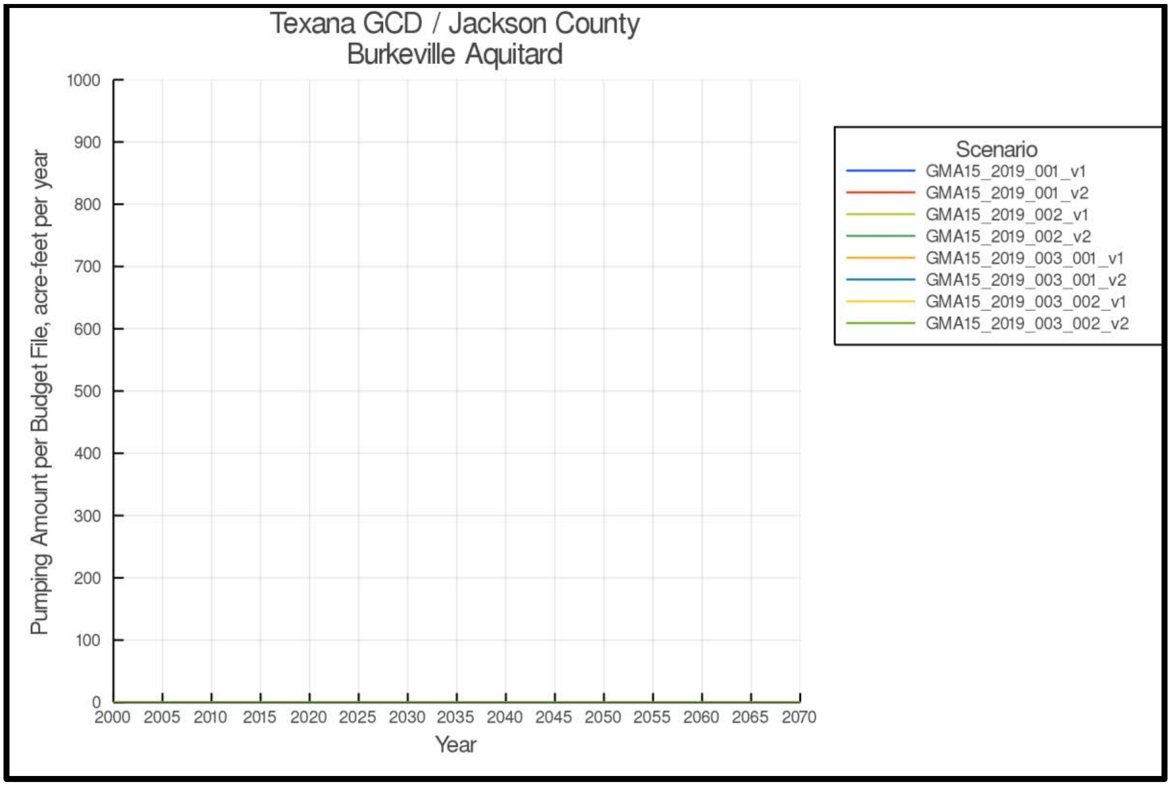

Refugio GCD / Refugio County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

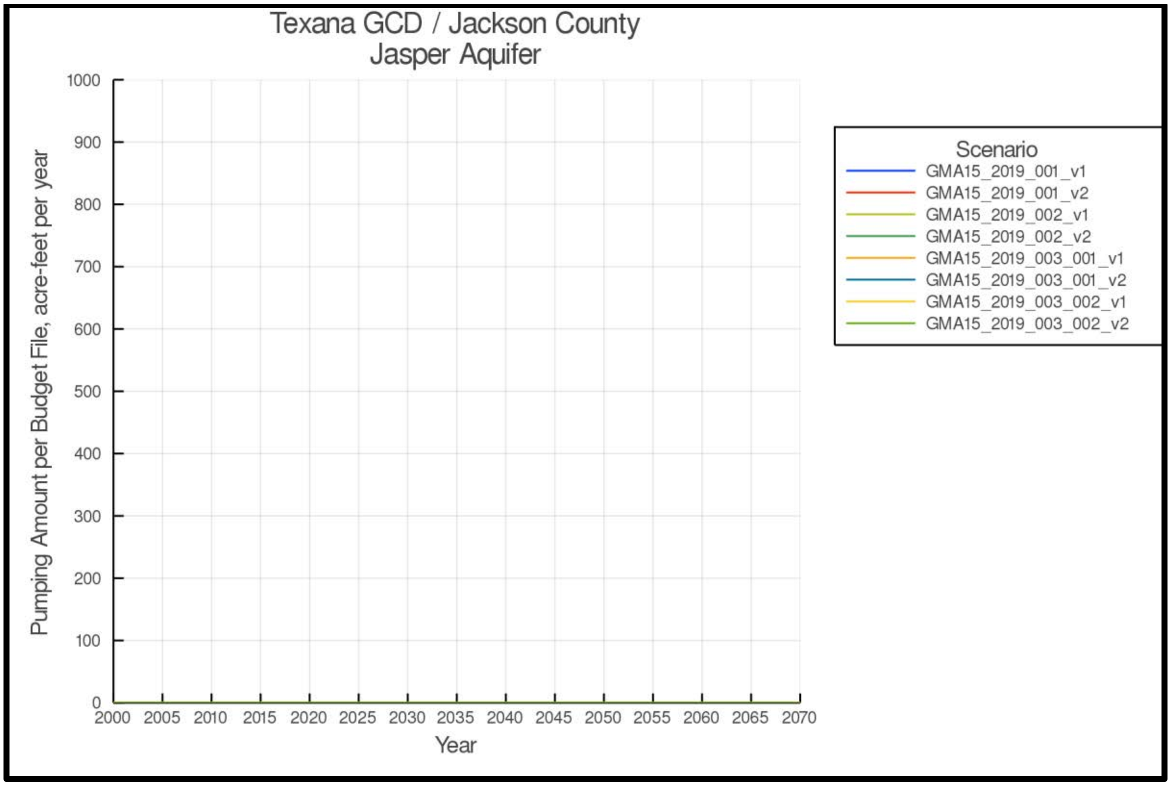

Refugio GCD / Refugio County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
20000
10000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

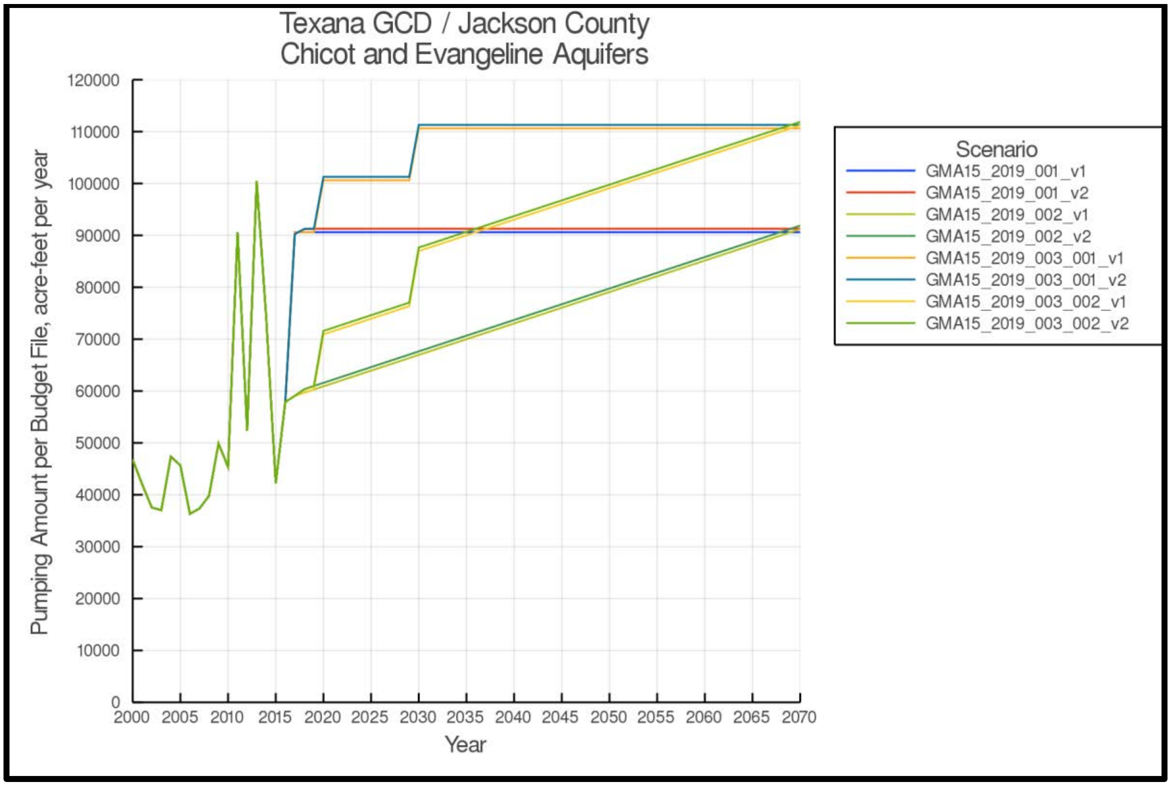

Refugio GCD / Refugio County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
20000
10000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

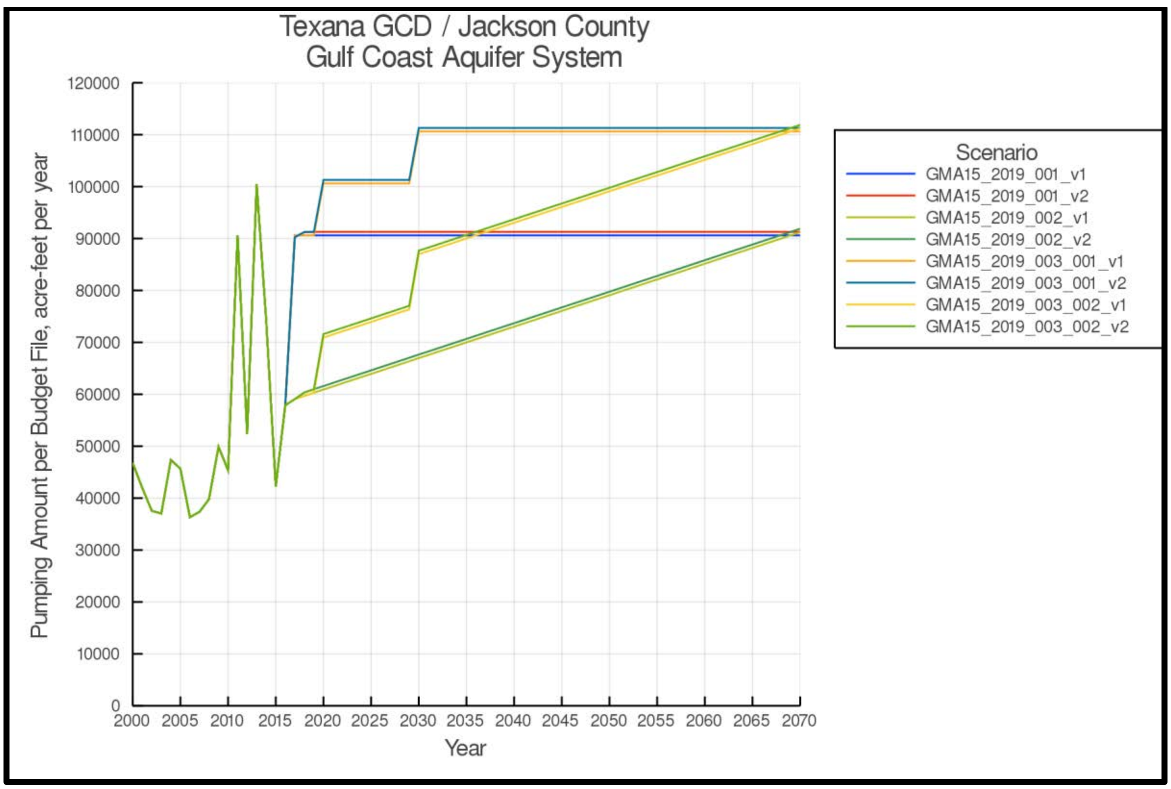

Texana GCD / Jackson County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
80000
70000
60000
50000
40000
30000
20000
10000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

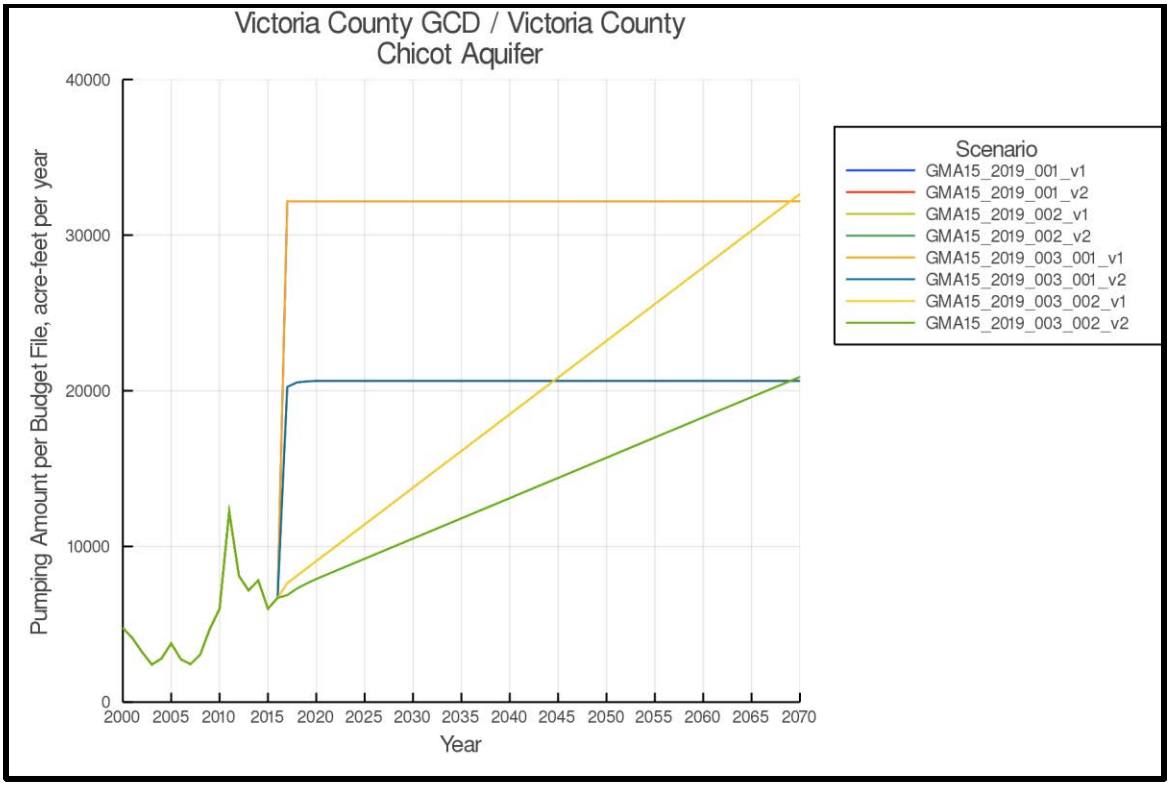

Texana GCD / Jackson County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
40000
30000
20000
10000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

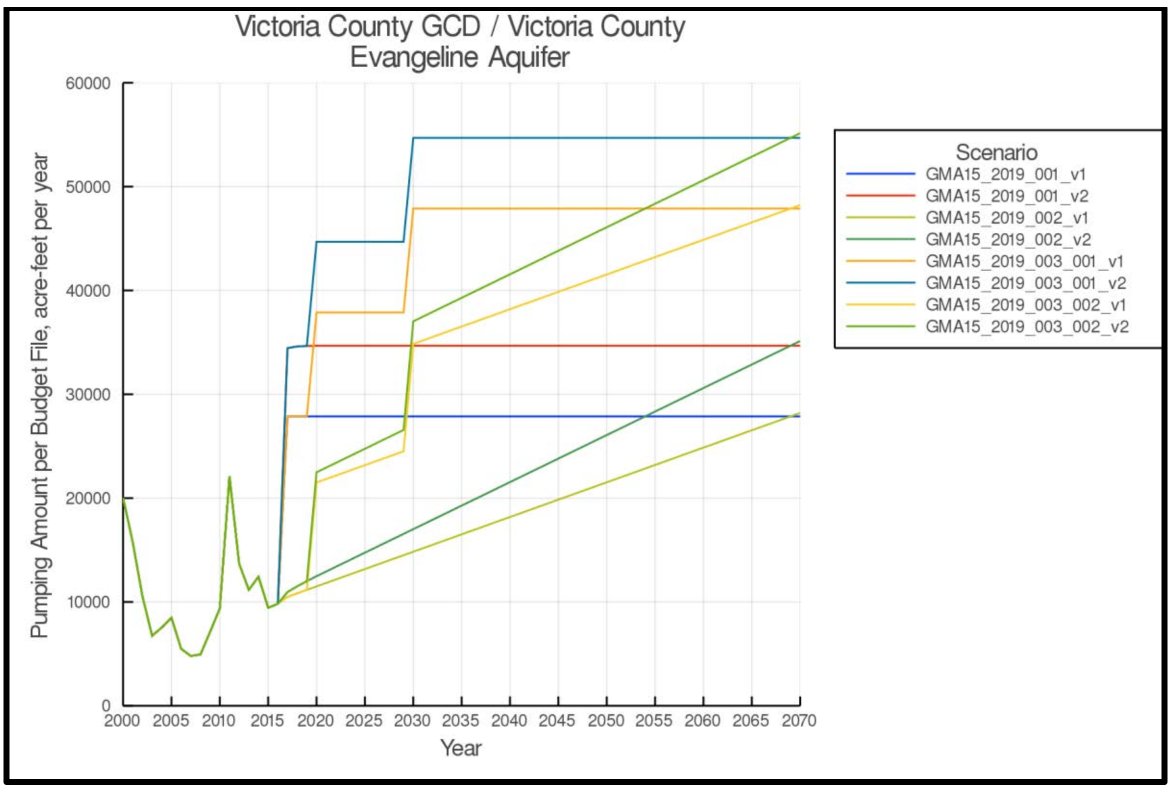

Texana GCD / Jackson County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
1000
900
800
700
600
500
400
300
200
100
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

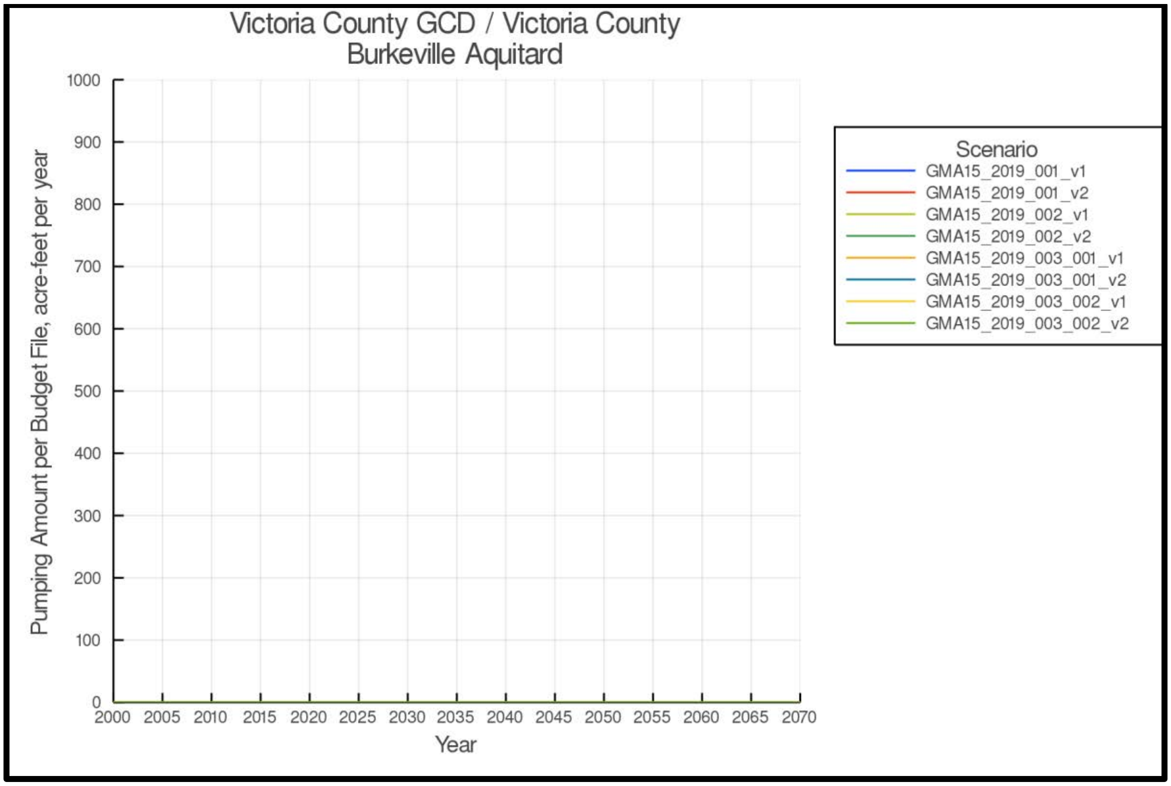

Texana GCD / Jackson County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
1000
900
800
700
600
500
400
300
200
100
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

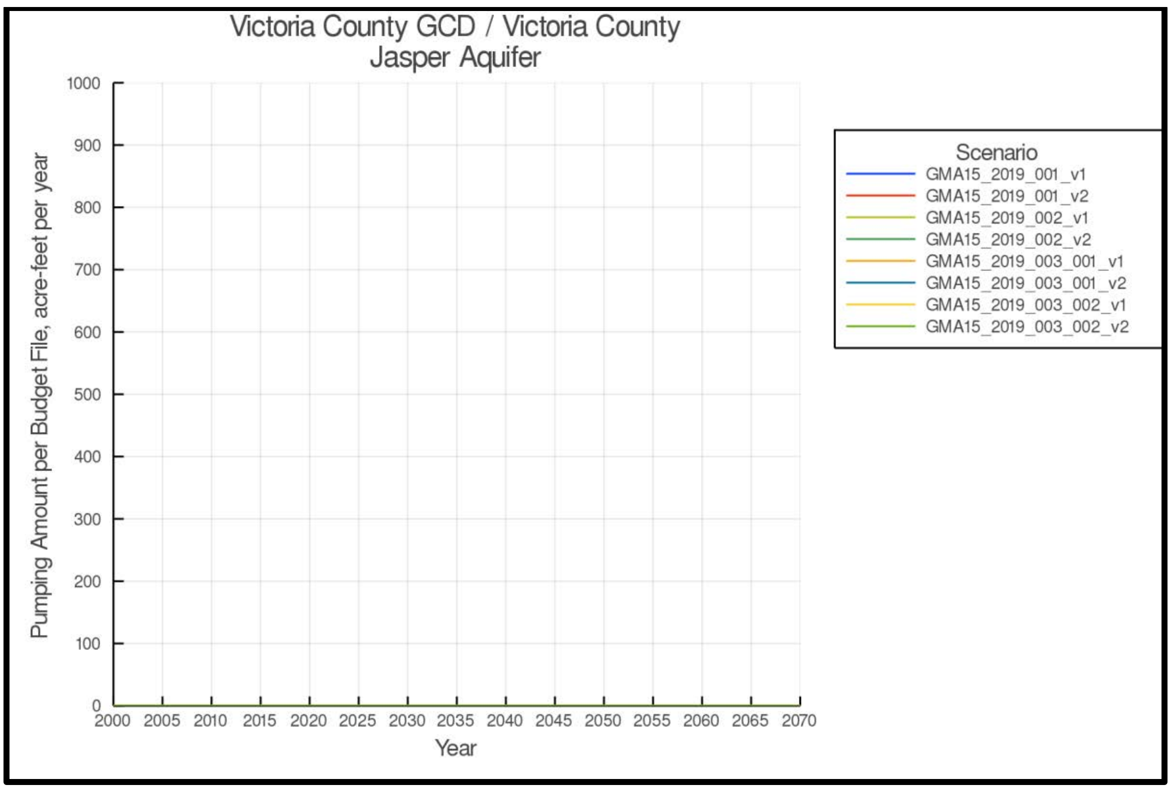

Texana GCD / Jackson County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

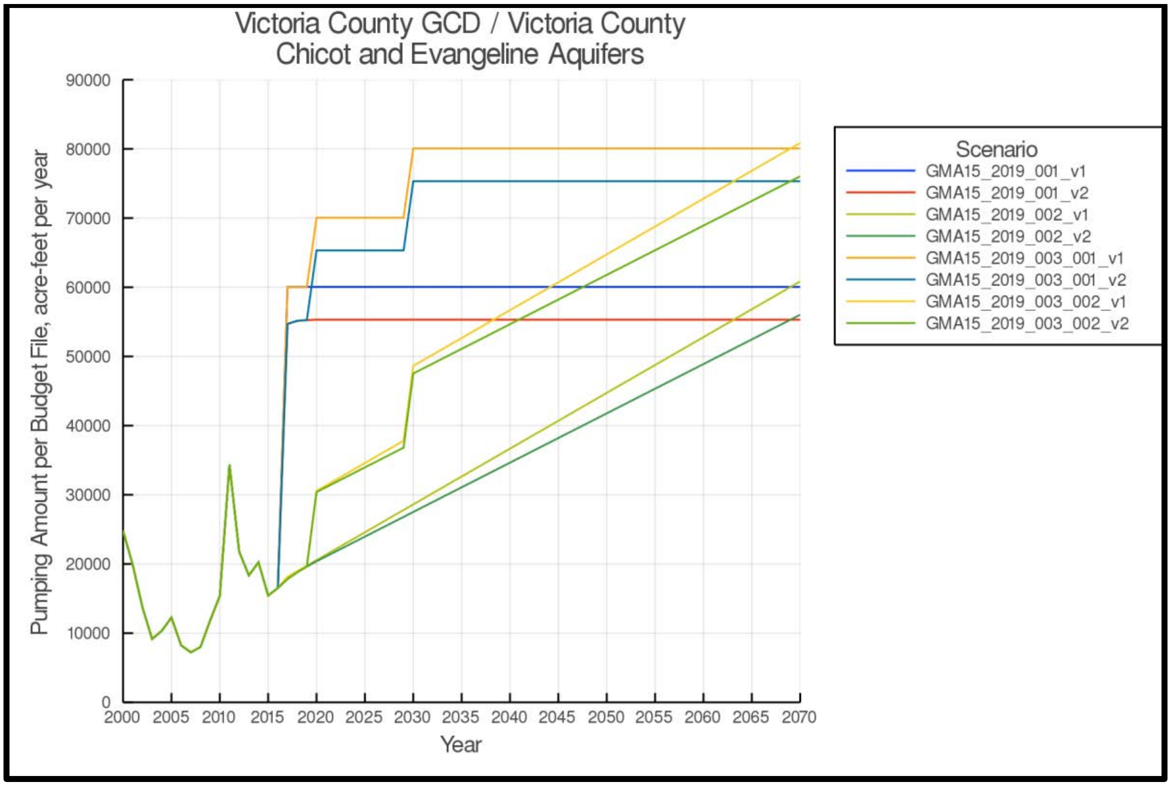

Texana GCD / Jackson County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

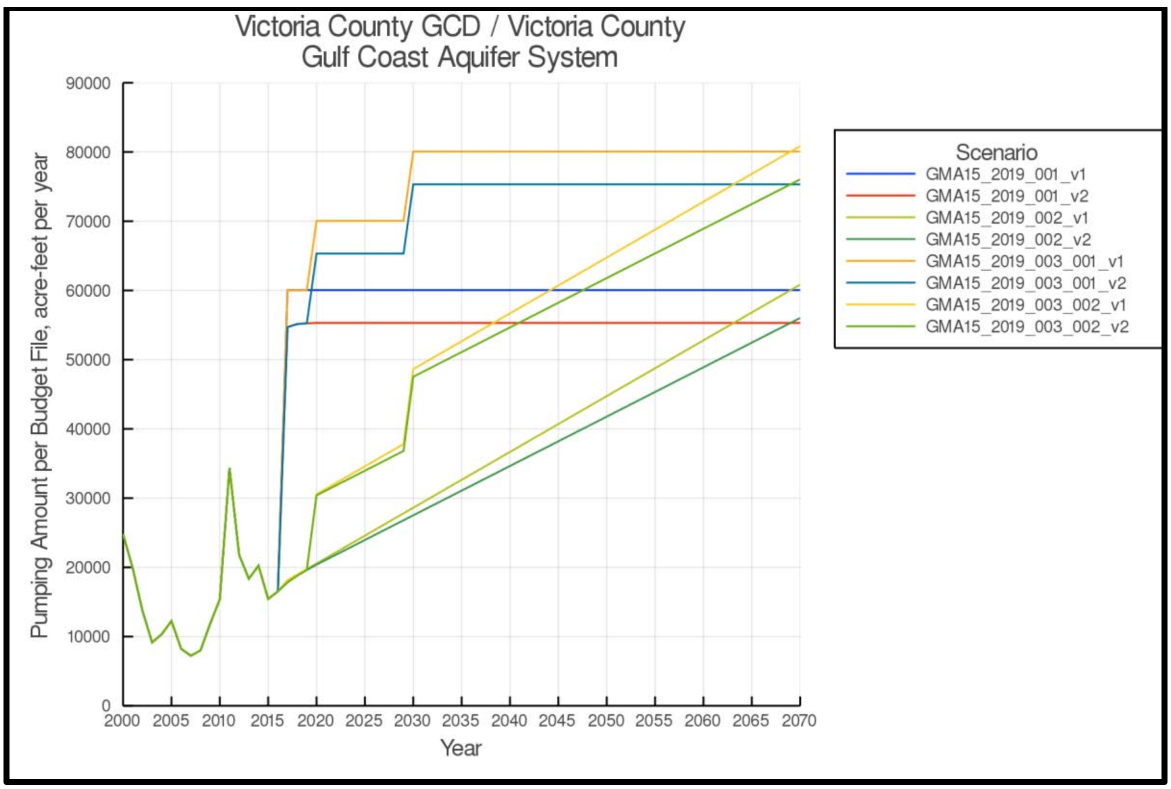

Victoria County GCD / Victoria County
Chicot Aquifer
Pumping Amount per Budget File, acre-feet per year
40000
30000
20000
10000
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Evangeline Aquifer
Pumping Amount per Budget File, acre-feet per year
60000
50000
40000
30000
20000
10000
0
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Burkeville Aquitard
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Jasper Aquifer
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Chicot and Evangeline Aquifers
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Gulf Coast Aquifer System
Pumping Amount per Budget File, acre-feet per year
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

Attachment 4 –
Scenario Average Drawdown Tables

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Aransas County GCD/ Aransas County	001	1	01/01/2000	0	6	0	N/A	N/A	0
			12/31/2016	0	7	0	N/A	N/A	0
		2	01/01/2000	0	1	0	N/A	N/A	0
			12/31/2016	0	2	0	N/A	N/A	0
	002	1	01/01/2000	0	6	0	N/A	N/A	0
			12/31/2016	0	7	0	N/A	N/A	0
		2	01/01/2000	0	1	0	N/A	N/A	0
			12/31/2016	0	2	0	N/A	N/A	0
	003_001	1	01/01/2000	0	13	0	N/A	N/A	0
			12/31/2016	0	14	1	N/A	N/A	1
		2	01/01/2000	0	8	0	N/A	N/A	0
			12/31/2016	0	9	1	N/A	N/A	1
	003_002	1	01/01/2000	0	13	0	N/A	N/A	0
			12/31/2016	0	14	1	N/A	N/A	1
		2	01/01/2000	0	8	0	N/A	N/A	0
			12/31/2016	0	10	1	N/A	N/A	1

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Bee GCD/ Bee County	001	1	01/01/2000	1	8	5	7	4	5
			12/31/2016	4	9	7	3	-2	4
		2	01/01/2000	-1	11	7	24	47	23
			12/31/2016	3	13	10	21	42	21
	002	1	01/01/2000	0	5	3	3	1	3
			12/31/2016	3	7	6	0	-5	1
		2	01/01/2000	3	29	20	24	40	26
			12/31/2016	5	28	20	20	34	24
	003_001	1	01/01/2000	3	13	10	9	4	8
			12/31/2016	6	15	12	5	-1	6
		2	01/01/2000	1	17	11	27	48	25
			12/31/2016	4	19	14	23	42	24
	003_002	1	01/01/2000	1	11	7	5	1	5
			12/31/2016	4	12	10	2	-5	4
		2	01/01/2000	5	35	25	26	41	29
			12/31/2016	7	34	25	22	34	26

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Calhoun County GCD/ Calhoun County	001	1	01/01/2000	-1	10	3	2	N/A	3
			12/31/2016	2	18	7	2	N/A	7
		2	01/01/2000	-1	1	0	2	N/A	0
			12/31/2016	2	9	5	2	N/A	5
	002	1	01/01/2000	-1	9	2	2	N/A	2
			12/31/2016	1	17	7	1	N/A	7
		2	01/01/2000	-1	0	-1	1	N/A	-1
			12/31/2016	2	8	4	1	N/A	4
	003_001	1	01/01/2000	1	70	25	6	N/A	25
			12/31/2016	4	78	30	6	N/A	30
		2	01/01/2000	2	61	23	5	N/A	22
			12/31/2016	5	70	27	5	N/A	27
	003_002	1	01/01/2000	1	69	25	5	N/A	25
			12/31/2016	4	78	30	5	N/A	29
		2	01/01/2000	1	61	22	5	N/A	22
			12/31/2016	4	69	27	5	N/A	27

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Coastal Bend GCD/ Wharton County	001	1	01/01/2000	14	11	13	21	24	17
			12/31/2016	10	62	36	25	20	29
		2	01/01/2000	21	-30	-4	3	13	1
			12/31/2016	16	21	19	6	9	13
	002	1	01/01/2000	11	9	10	18	22	15
			12/31/2016	7	59	33	22	17	27
		2	01/01/2000	19	-32	-7	1	12	-1
			12/31/2016	14	19	17	4	8	11
	003_001	1	01/01/2000	15	15	15	22	24	19
			12/31/2016	11	66	38	26	20	31
		2	01/01/2000	22	-26	-2	4	13	3
			12/31/2016	18	25	21	7	9	15
	003_002	1	01/01/2000	13	12	12	19	22	16
			12/31/2016	8	63	36	23	18	28
		2	01/01/2000	20	-28	-4	2	12	1
			12/31/2016	16	22	19	5	8	13

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Coastal Plains GCD/ Matagorda County	001	1	01/01/2000	5	17	9	14	N/A	9
			12/31/2016	1	39	14	13	N/A	14
		2	01/01/2000	6	-12	0	4	N/A	0
			12/31/2016	3	10	5	3	N/A	5
	002	1	01/01/2000	4	16	8	13	N/A	9
			12/31/2016	1	37	14	12	N/A	14
		2	01/01/2000	5	-13	-1	3	N/A	-1
			12/31/2016	2	9	4	2	N/A	4
	003_001	1	01/01/2000	5	23	11	15	N/A	12
			12/31/2016	2	44	17	14	N/A	17
		2	01/01/2000	7	-6	2	5	N/A	3
			12/31/2016	3	16	8	4	N/A	7
	003_002	1	01/01/2000	5	21	11	14	N/A	11
			12/31/2016	2	43	16	13	N/A	16
		2	01/01/2000	6	-7	1	4	N/A	2
			12/31/2016	3	15	7	4	N/A	7

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Colorado County GCD/ Colorado County	001	1	01/01/2000	12	25	19	21	26	21
			12/31/2016	16	34	26	21	23	24
		2	01/01/2000	8	14	11	20	28	18
			12/31/2016	12	23	18	20	26	21
	002	1	01/01/2000	7	22	15	15	19	16
			12/31/2016	12	31	22	15	17	19
		2	01/01/2000	4	11	8	14	21	13
			12/31/2016	8	20	15	14	19	16
	003_001	1	01/01/2000	12	26	19	21	26	22
			12/31/2016	16	35	26	21	23	24
		2	01/01/2000	8	14	11	20	28	18
			12/31/2016	12	24	19	20	26	21
	003_002	1	01/01/2000	7	22	16	15	20	17
			12/31/2016	12	31	23	15	17	19
		2	01/01/2000	4	11	8	14	21	13
			12/31/2016	9	21	15	14	19	16

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Evergreen UWCD/ Karnes County	001	1	01/01/2000	N/A	-1	-1	18	23	20
			12/31/2016	N/A	3	3	11	14	12
		2	01/01/2000	N/A	0	0	33	34	31
			12/31/2016	N/A	5	5	25	25	23
	002	1	01/01/2000	N/A	-1	-1	17	23	19
			12/31/2016	N/A	3	3	11	13	12
		2	01/01/2000	N/A	0	0	31	32	29
			12/31/2016	N/A	4	4	22	23	21
	003_001	1	01/01/2000	N/A	-1	-1	18	23	20
			12/31/2016	N/A	3	3	11	14	12
		2	01/01/2000	N/A	0	0	33	34	31
			12/31/2016	N/A	5	5	25	25	23
	003_002	1	01/01/2000	N/A	-1	-1	17	23	19
			12/31/2016	N/A	3	3	11	13	12
		2	01/01/2000	N/A	0	0	31	32	29
			12/31/2016	N/A	4	4	22	23	21

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Fayette County GCD/ Fayette County	001	1	01/01/2000	N/A	11	11	43	52	44
			12/31/2016	N/A	10	10	37	44	37
		2	01/01/2000	N/A	9	9	46	54	45
			12/31/2016	N/A	8	8	41	46	39
	002	1	01/01/2000	N/A	10	10	40	49	41
			12/31/2016	N/A	9	9	35	41	34
		2	01/01/2000	N/A	9	9	44	53	44
			12/31/2016	N/A	7	7	38	44	37
	003_001	1	01/01/2000	N/A	11	11	43	52	44
			12/31/2016	N/A	10	10	37	44	37
		2	01/01/2000	N/A	9	9	46	54	45
			12/31/2016	N/A	8	8	41	46	39
	003_002	1	01/01/2000	N/A	10	10	40	49	41
			12/31/2016	N/A	9	9	35	41	34
		2	01/01/2000	N/A	9	9	44	53	44
			12/31/2016	N/A	7	7	38	44	37

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Goliad County GCD/ Goliad County	001	1	01/01/2000	-4	-2	-2	4	7	3
			12/31/2016	1	3	3	4	3	3
		2	01/01/2000	-5	-2	-2	7	18	6
			12/31/2016	1	3	2	6	14	7
	002	1	01/01/2000	-4	-2	-2	4	7	2
			12/31/2016	1	3	2	3	2	3
		2	01/01/2000	-5	-2	-2	6	15	5
			12/31/2016	1	3	2	5	11	6
	003_001	1	01/01/2000	-3	0	0	5	8	3
			12/31/2016	3	5	4	4	3	4
		2	01/01/2000	-4	0	-1	8	18	7
			12/31/2016	2	5	4	7	14	8
	003_002	1	01/01/2000	-3	0	-1	4	7	3
			12/31/2016	2	5	4	4	3	4
		2	01/01/2000	-4	0	-1	6	15	6
			12/31/2016	2	5	4	6	11	7

Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
ND Bee/ Bee County	001	1	01/01/2000	N/A	6	6	16	21	14
			12/31/2016	N/A	5	5	-96	-58	-50
		2	01/01/2000	N/A	23	23	N/A	367	195
			12/31/2016	N/A	22	22	N/A	288	155
	002	1	01/01/2000	N/A	3	3	11	17	10
			12/31/2016	N/A	2	2	-100	-62	-53
		2	01/01/2000	N/A	19	19	N/A	345	182
			12/31/2016	N/A	18	18	N/A	265	142
	003_001	1	01/01/2000	N/A	6	6	16	21	14
			12/31/2016	N/A	5	5	-96	-58	-50
		2	01/01/2000	N/A	23	23	N/A	367	195
			12/31/2016	N/A	22	22	N/A	288	155
	003_002	1	01/01/2000	N/A	3	3	11	17	10
			12/31/2016	N/A	2	2	-100	-62	-53
		2	01/01/2000	N/A	19	19	N/A	345	182
			12/31/2016	N/A	18	18	N/A	265	142

Average Drawdown on 12/31/2070, Feet									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
ND Lavaca/ Lavaca County	001	1	01/01/2000	6	6	6	15	30	17
			12/31/2016	9	8	9	12	21	14
		2	01/01/2000	4	7	6	21	39	21
			12/31/2016	6	9	8	18	30	18
	002	1	01/01/2000	3	5	4	11	25	13
			12/31/2016	6	7	7	8	16	10
		2	01/01/2000	1	6	5	16	32	17
			12/31/2016	4	8	7	13	23	14
	003_001	1	01/01/2000	7	7	7	15	30	17
			12/31/2016	10	9	9	12	21	14
		2	01/01/2000	4	8	7	21	39	22
			12/31/2016	7	10	9	18	30	19
	003_002	1	01/01/2000	4	6	5	12	25	13
			12/31/2016	6	8	7	9	16	10
		2	01/01/2000	2	7	5	16	32	17
			12/31/2016	4	9	7	13	23	14

Average Drawdown on 12/31/2070, Feet									
GCD/County	**Scenario**	**Version**	**Baseline Date**	**Chicot**	**Evangeline**	**Chic./Evan.**	**Burkeville**	**Jasper**	**GCAS**
Pecan Valley GCD/ DeWitt County	001	1	01/01/2000	0	4	4	16	32	19
			12/31/2016	6	7	7	14	23	15
		2	01/01/2000	-1	4	4	17	36	21
			12/31/2016	5	7	7	15	26	17
	002	1	01/01/2000	0	4	3	14	27	16
			12/31/2016	5	6	6	12	18	13
		2	01/01/2000	-1	4	3	15	30	18
			12/31/2016	4	6	6	13	21	14
	003_001	1	01/01/2000	0	5	4	16	32	19
			12/31/2016	6	7	7	14	23	16
		2	01/01/2000	-1	5	4	18	36	21
			12/31/2016	5	7	7	15	27	17
	003_002	1	01/01/2000	0	4	3	14	27	16
			12/31/2016	6	6	6	12	18	13
		2	01/01/2000	-1	4	3	15	30	18
			12/31/2016	5	6	6	13	21	14

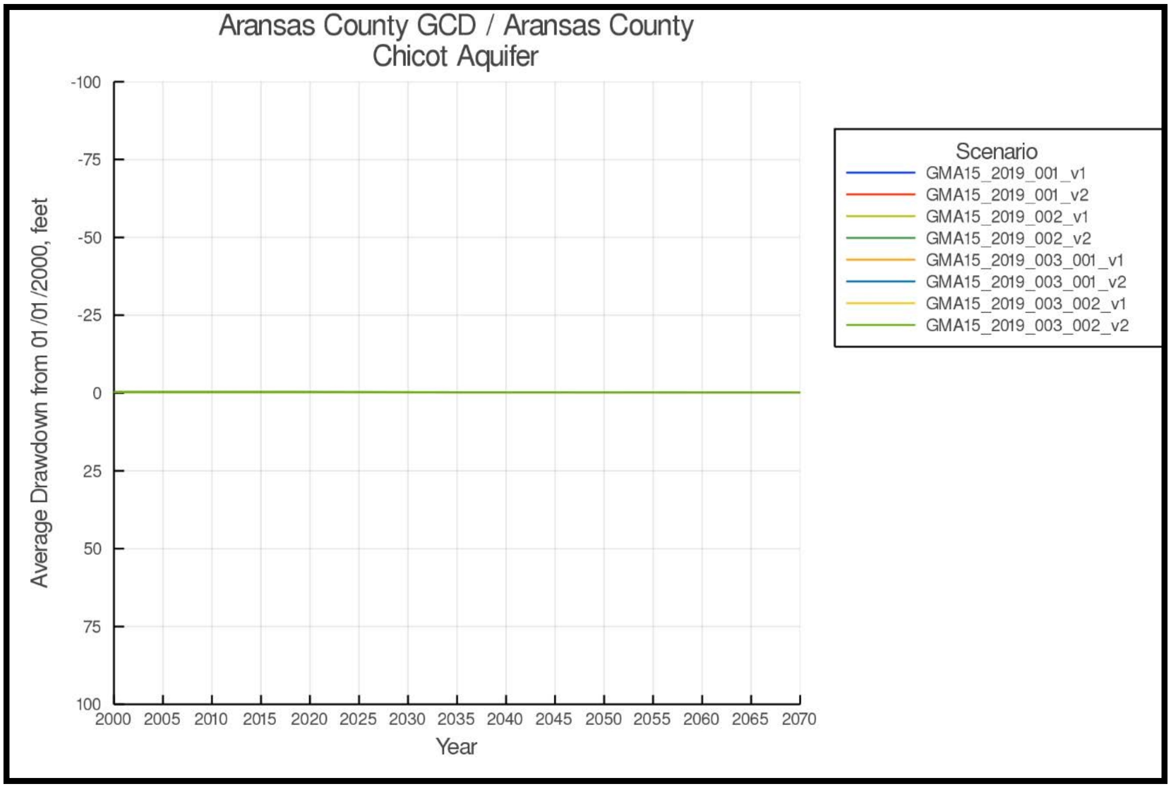
Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Refugio GCD/ Refugio County	001	1	01/01/2000	0	7	3	2	N/A	3
			12/31/2016	0	8	4	2	N/A	4
		2	01/01/2000	-1	2	1	2	N/A	1
			12/31/2016	0	3	2	1	N/A	2
	002	1	01/01/2000	-1	7	3	1	N/A	3
			12/31/2016	0	8	4	1	N/A	3
		2	01/01/2000	0	3	1	2	N/A	1
			12/31/2016	0	4	2	1	N/A	2
	003_001	1	01/01/2000	0	23	11	8	N/A	10
			12/31/2016	1	24	12	8	N/A	11
		2	01/01/2000	0	18	8	8	N/A	8
			12/31/2016	1	19	9	7	N/A	9
	003_002	1	01/01/2000	0	22	10	7	N/A	10
			12/31/2016	1	24	12	7	N/A	11
		2	01/01/2000	0	19	9	8	N/A	9
			12/31/2016	1	20	10	7	N/A	9

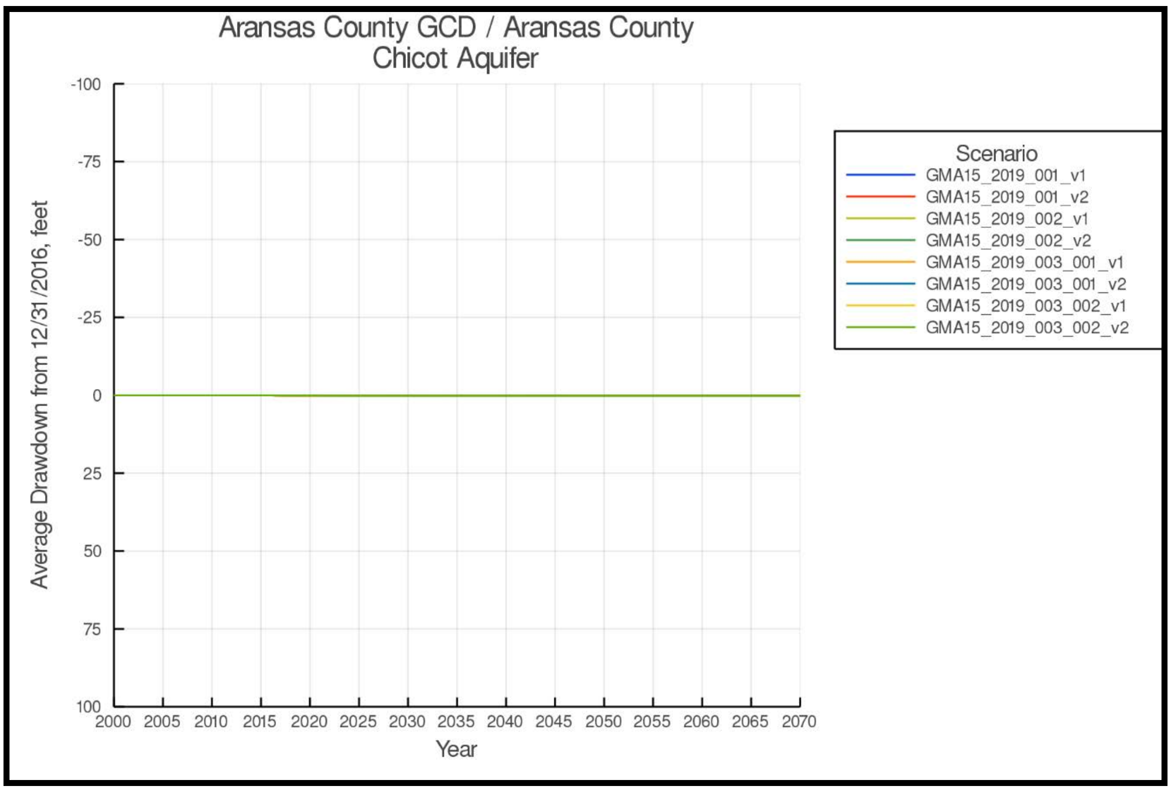
Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Texana GCD/ Jackson County	001	1	01/01/2000	15	20	17	12	19	16
			12/31/2016	12	37	24	14	15	20
		2	01/01/2000	18	8	13	8	16	12
			12/31/2016	15	25	20	10	12	16
	002	1	01/01/2000	12	17	15	8	16	13
			12/31/2016	10	34	22	10	11	17
		2	01/01/2000	15	5	10	4	13	9
			12/31/2016	12	22	17	6	8	13
	003_001	1	01/01/2000	20	41	30	19	21	26
			12/31/2016	17	58	37	21	17	30
		2	01/01/2000	23	29	26	15	18	22
			12/31/2016	20	46	33	17	14	26
	003_002	1	01/01/2000	17	38	27	15	18	23
			12/31/2016	14	55	35	17	13	27
		2	01/01/2000	19	26	23	10	15	19
			12/31/2016	17	43	30	12	10	23

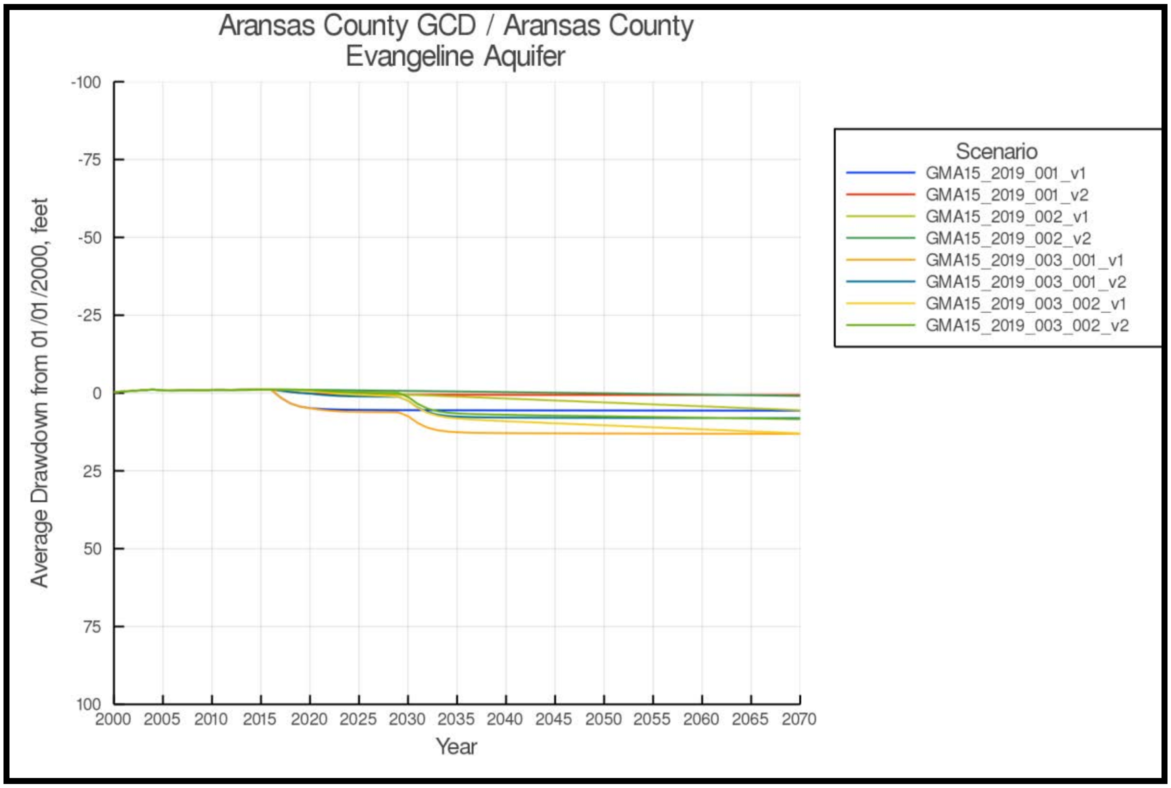
Average Drawdown on 12/31/2070, Feet									
GCD/County	Scenario	Version	Baseline Date	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Victoria County GCD/ Victoria County	001	1	01/01/2000	-4	6	1	4	7	3
			12/31/2016	7	21	14	8	7	11
		2	01/01/2000	-7	10	2	9	12	5
			12/31/2016	4	25	15	12	11	14
	002	1	01/01/2000	-5	5	0	1	3	1
			12/31/2016	6	20	13	5	3	9
		2	01/01/2000	-8	9	1	5	5	3
			12/31/2016	3	24	14	8	5	11
	003_001	1	01/01/2000	-2	31	15	11	10	13
			12/31/2016	9	46	29	15	9	22
		2	01/01/2000	-5	36	16	16	14	16
			12/31/2016	6	51	29	20	14	24
	003_002	1	01/01/2000	-3	30	14	8	6	11
			12/31/2016	8	45	27	12	5	19
		2	01/01/2000	-6	35	15	12	8	13
			12/31/2016	6	50	29	15	8	21

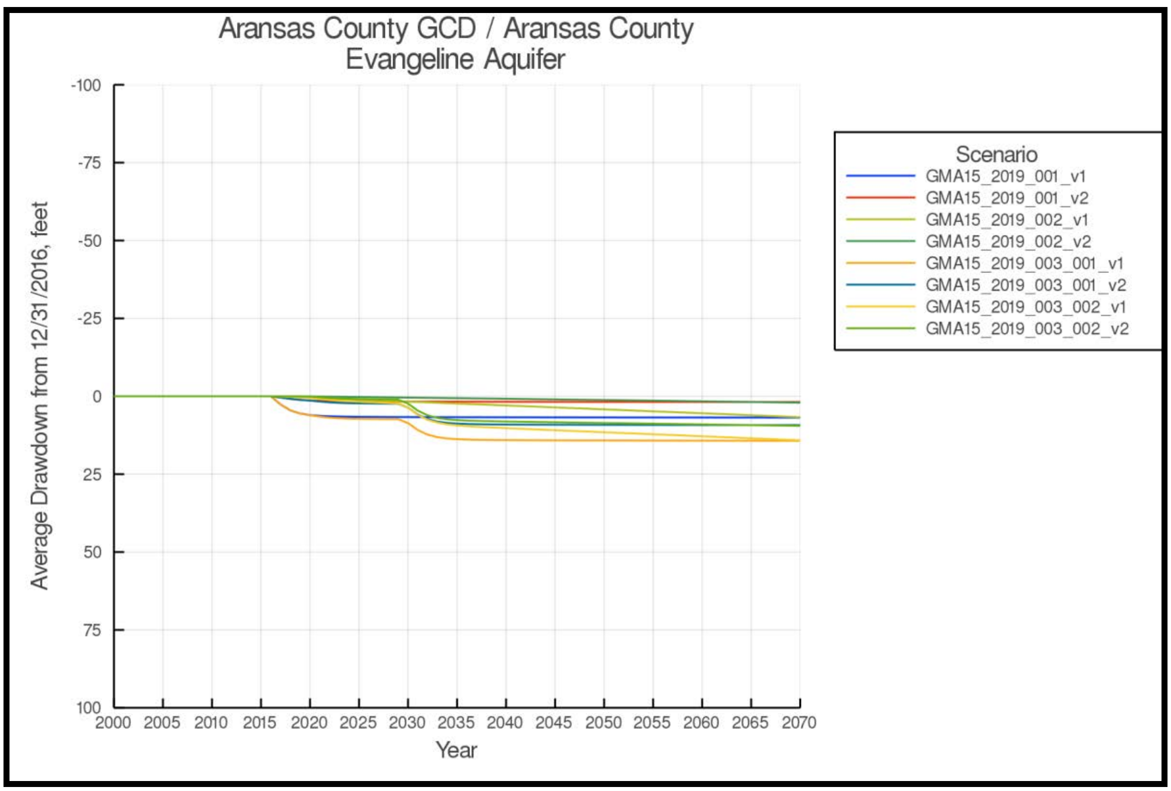
Adopted DFCs – Average Drawdown on 12/31/2069, Feet						
County	Chicot	Evangeline	Chic./Evan.	Burkeville	Jasper	GCAS
Aransas	—	—	—	—	—	0
Bee	—	—	—	—	—	7
Calhoun	—	—	—	—	—	5
Colorado	—	—	17	—	23	—
DeWitt	—	—	—	—	—	17
Fayette	—	—	—	—	—	16
Goliad	—	—	—	—	—	10
Jackson	—	—	—	—	—	15
Karnes	—	—	—	—	—	22
Lavaca	—	—	—	—	—	18
Matagorda	—	—	11	—	—	—
Refugio	—	—	—	—	—	5
Victoria	—	—	—	—	—	5
Wharton	—	—	15	—	—	—

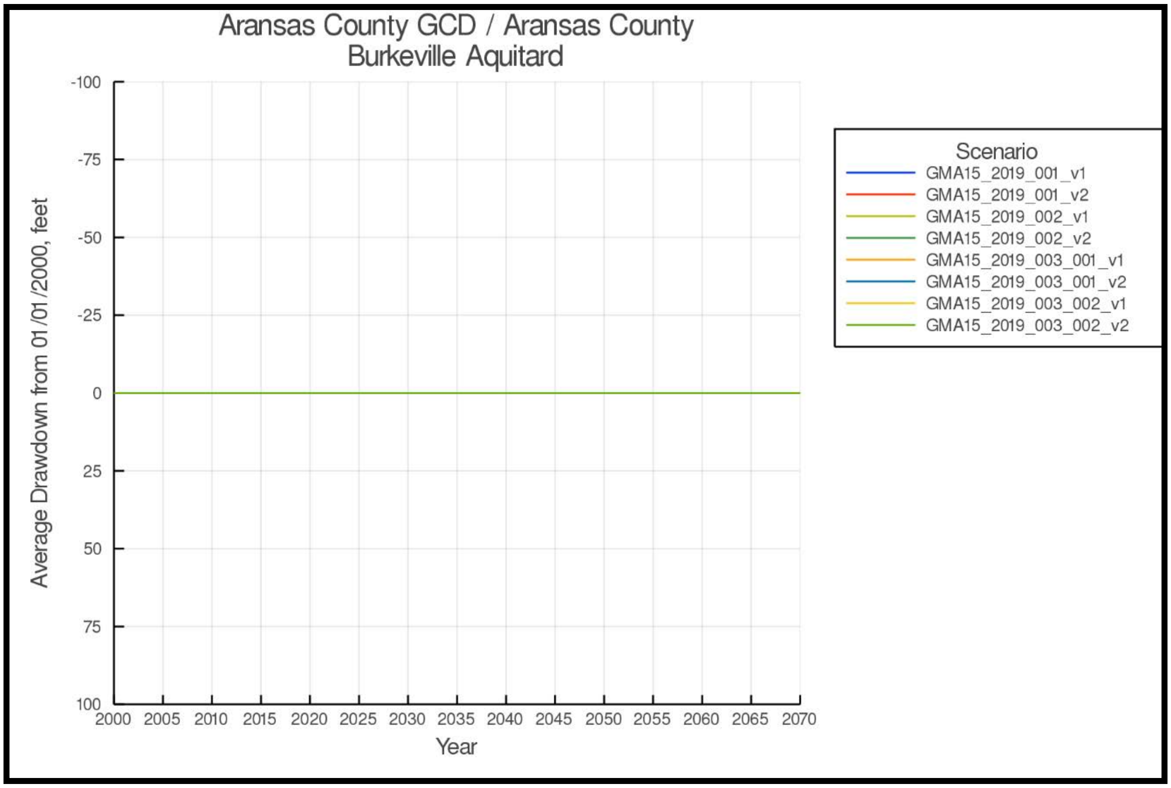
Attachment 5 –
Scenario Average Drawdown Charts

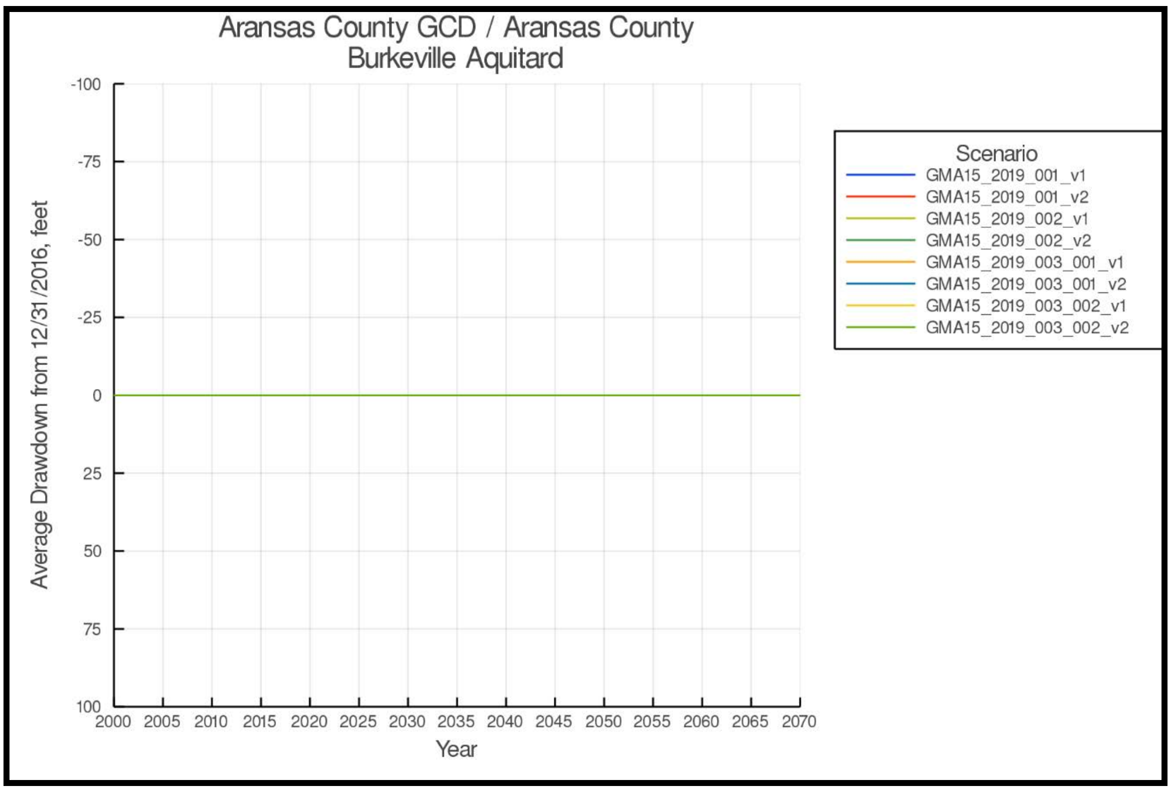

Aransas County GCD / Aransas County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

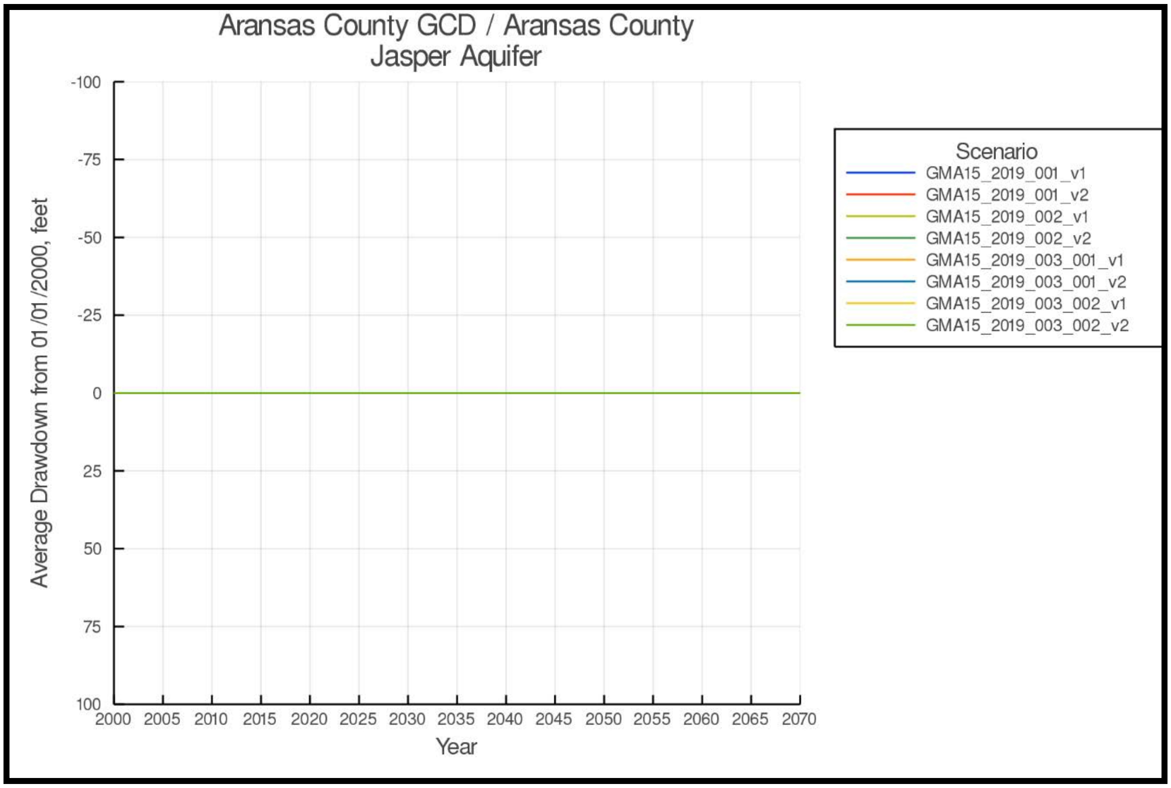

Aransas County GCD / Aransas County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

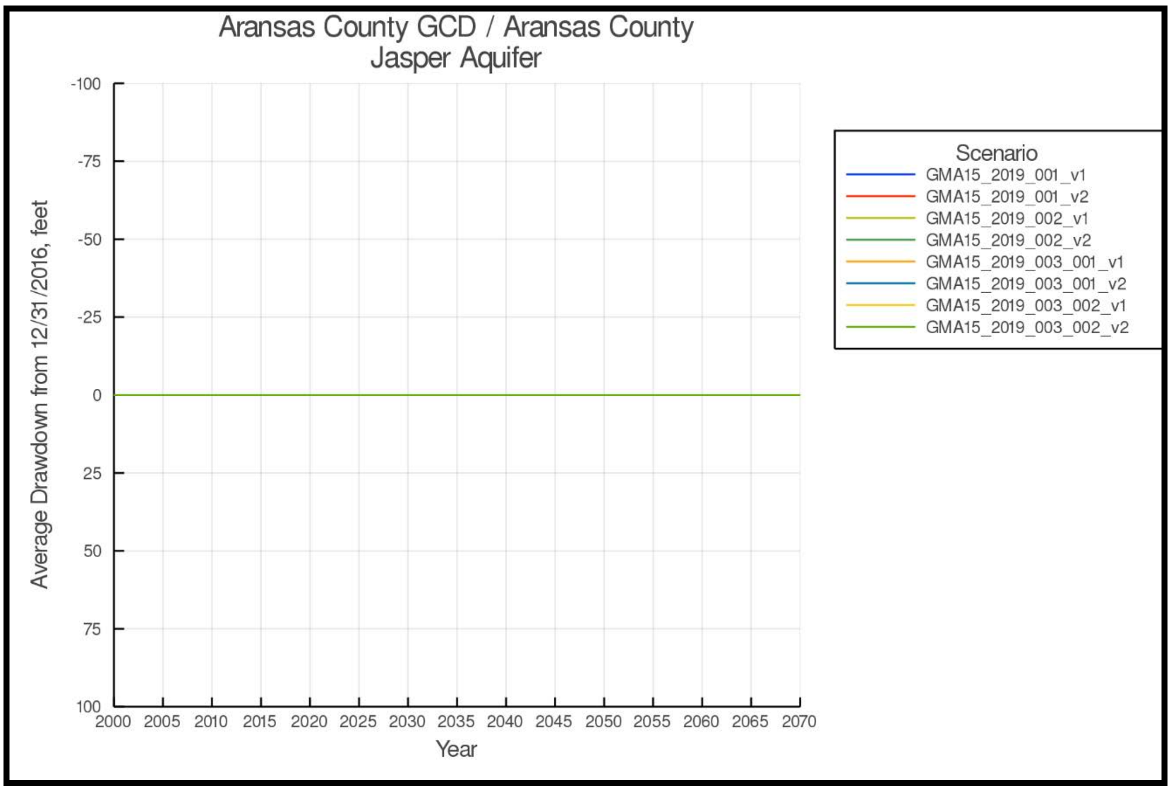

Aransas County GCD / Aransas County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

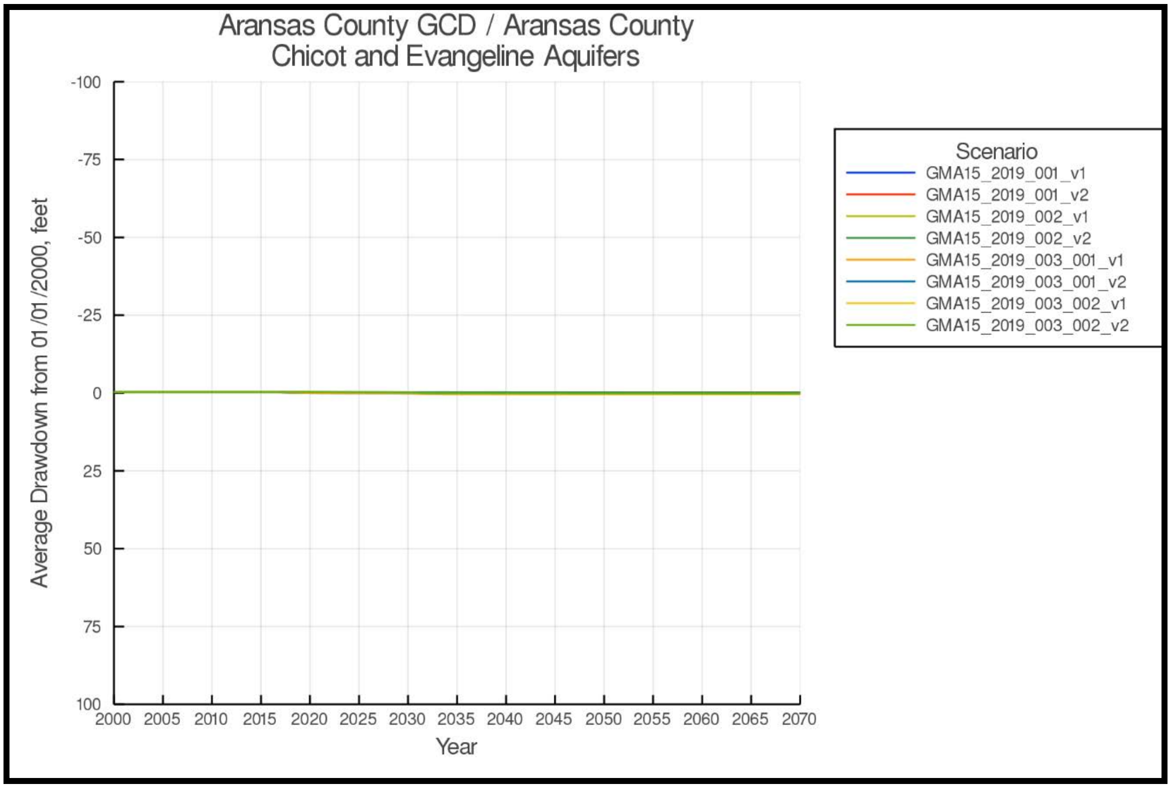

Aransas County GCD / Aransas County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

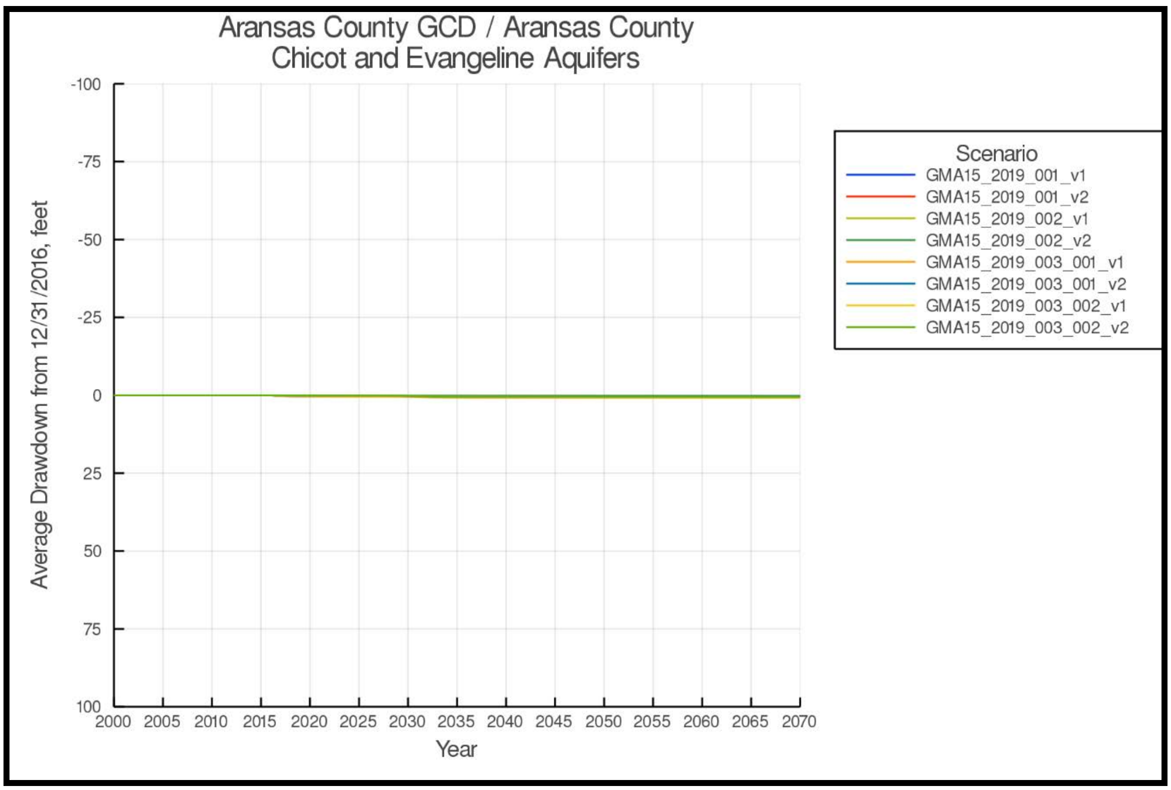

Aransas County GCD / Aransas County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

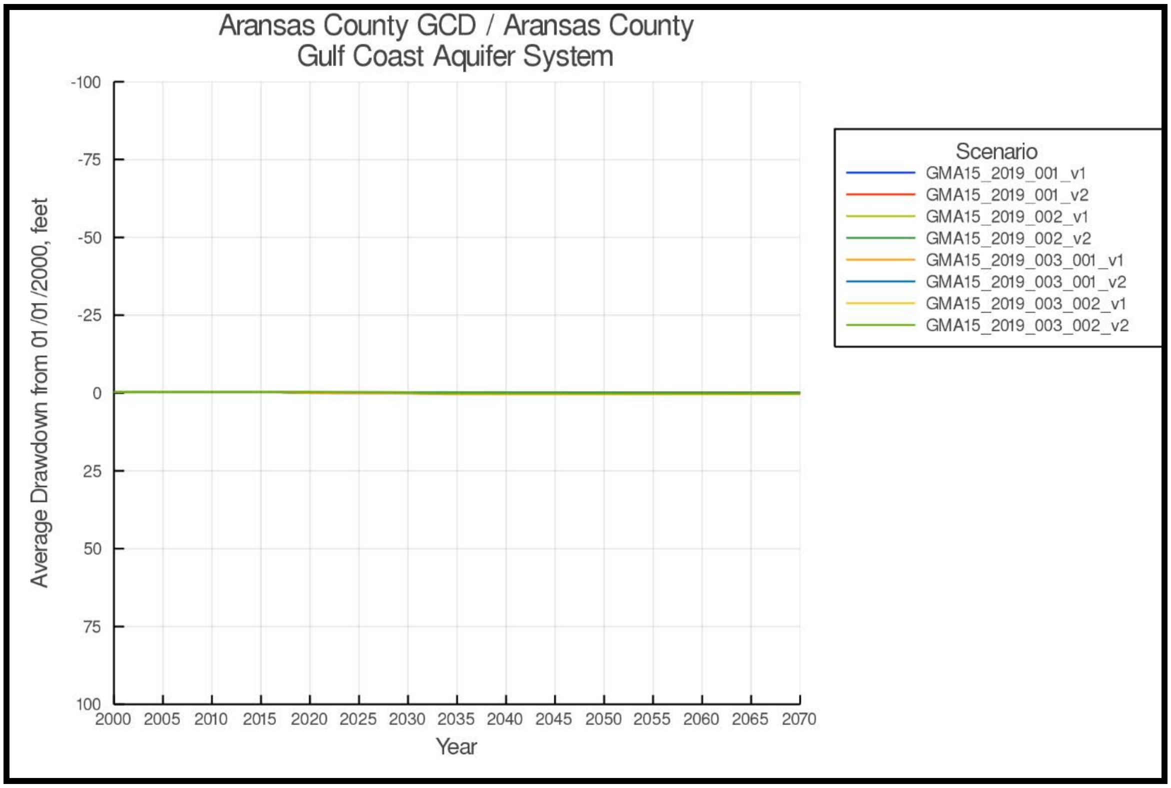

Aransas County GCD / Aransas County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

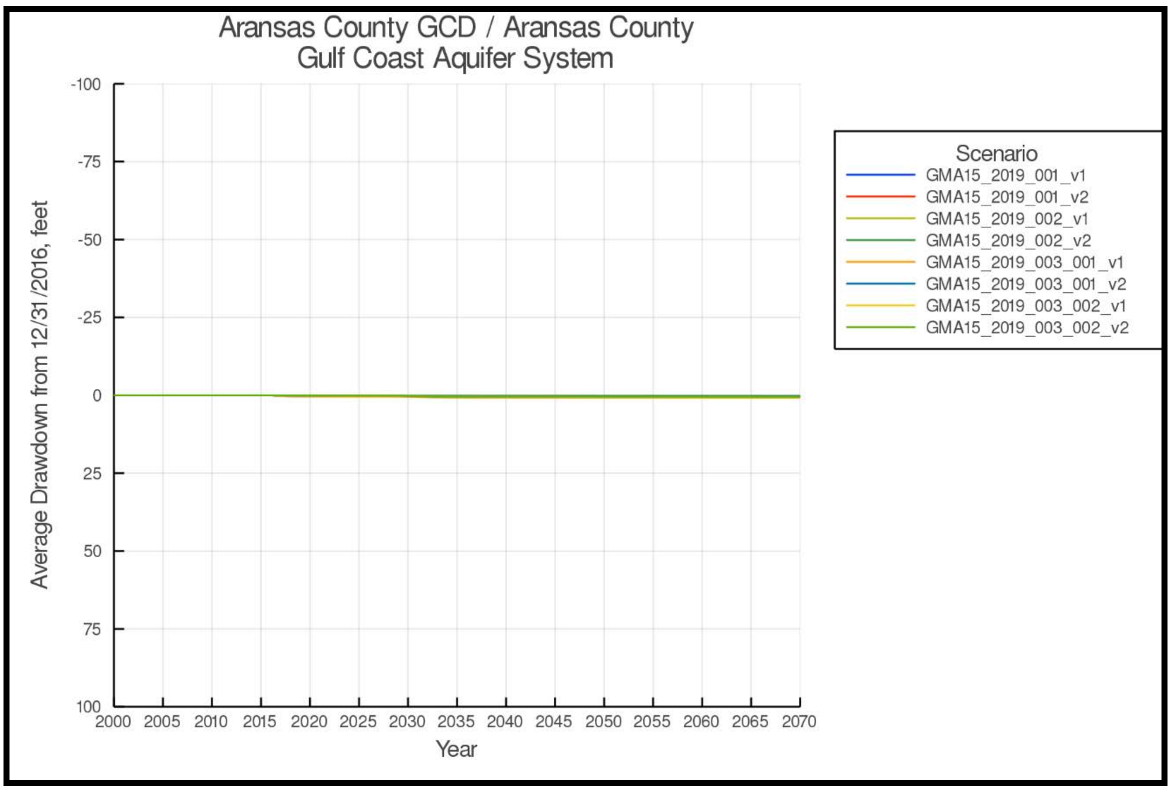

Aransas County GCD / Aransas County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

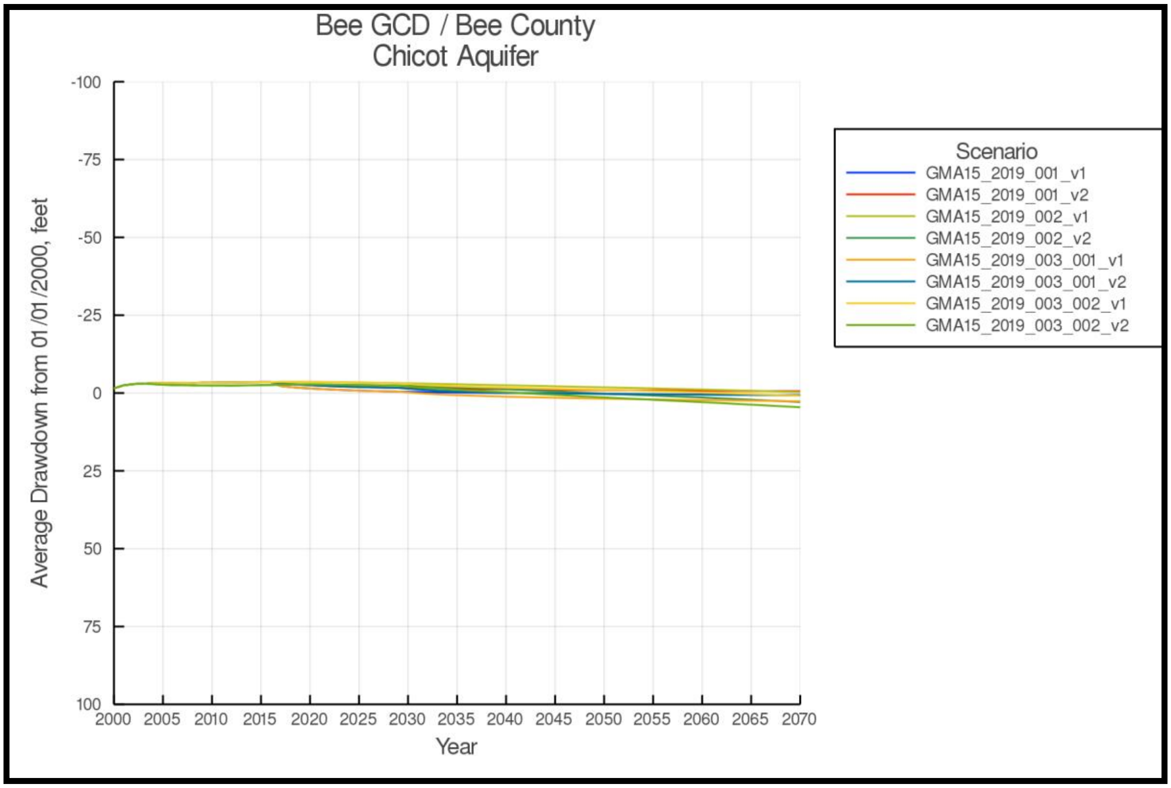

Aransas County GCD / Aransas County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

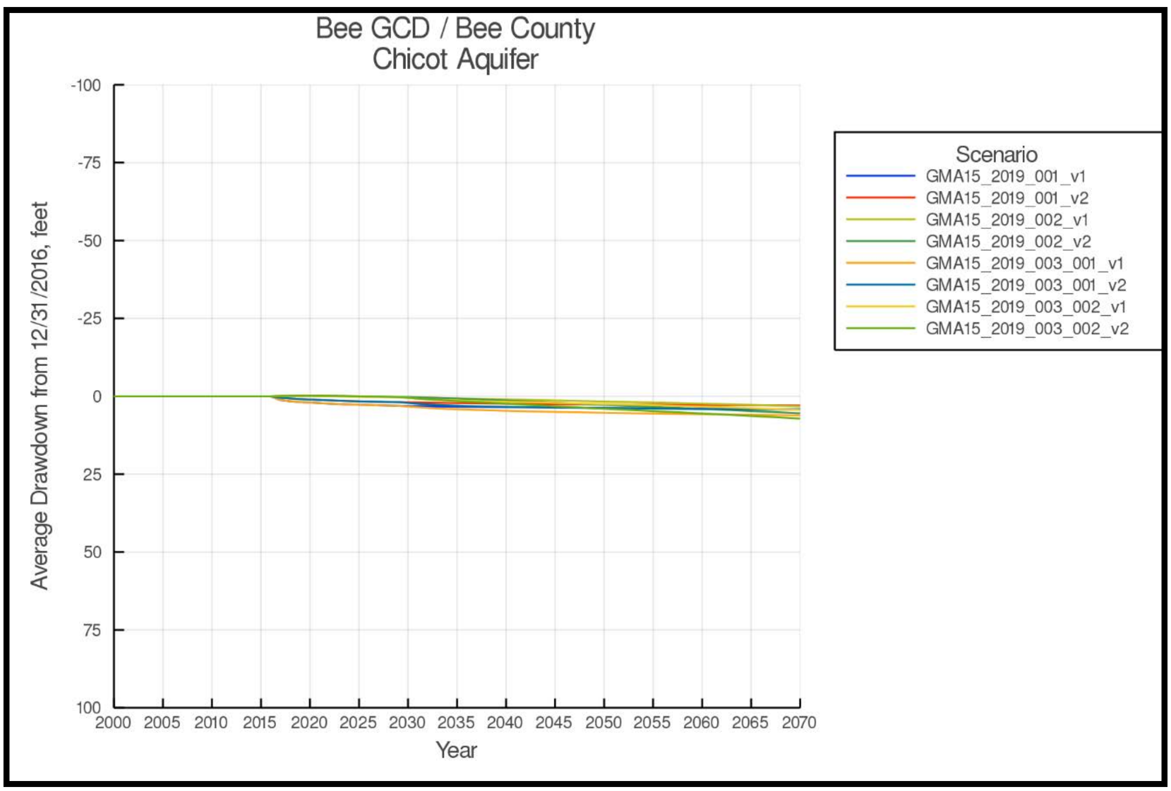

Aransas County GCD / Aransas County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

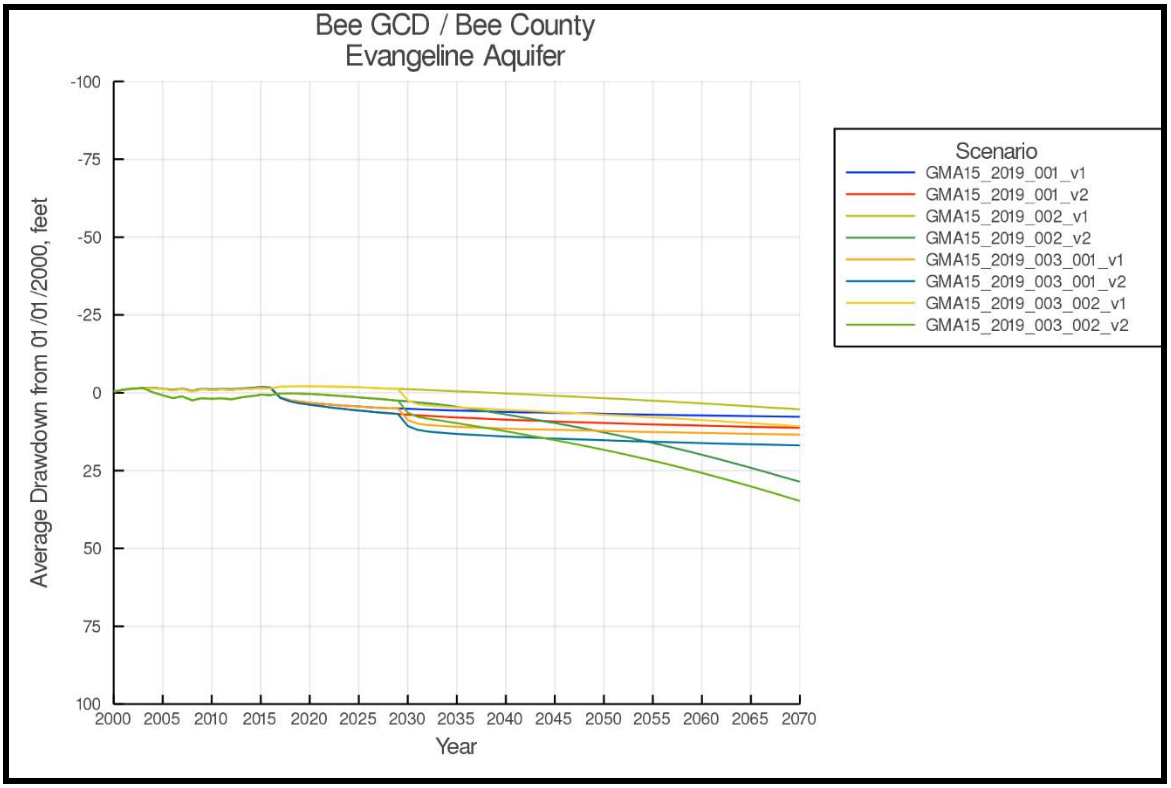

Aransas County GCD / Aransas County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

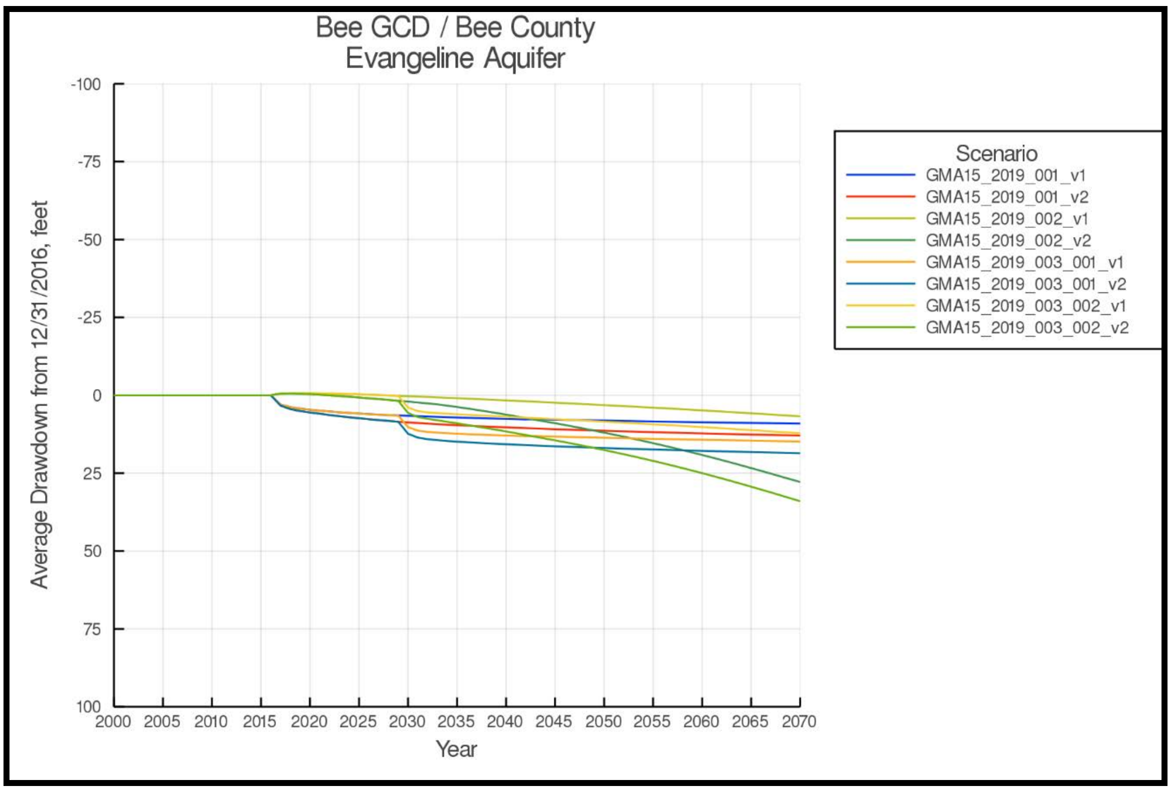

Aransas County GCD / Aransas County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

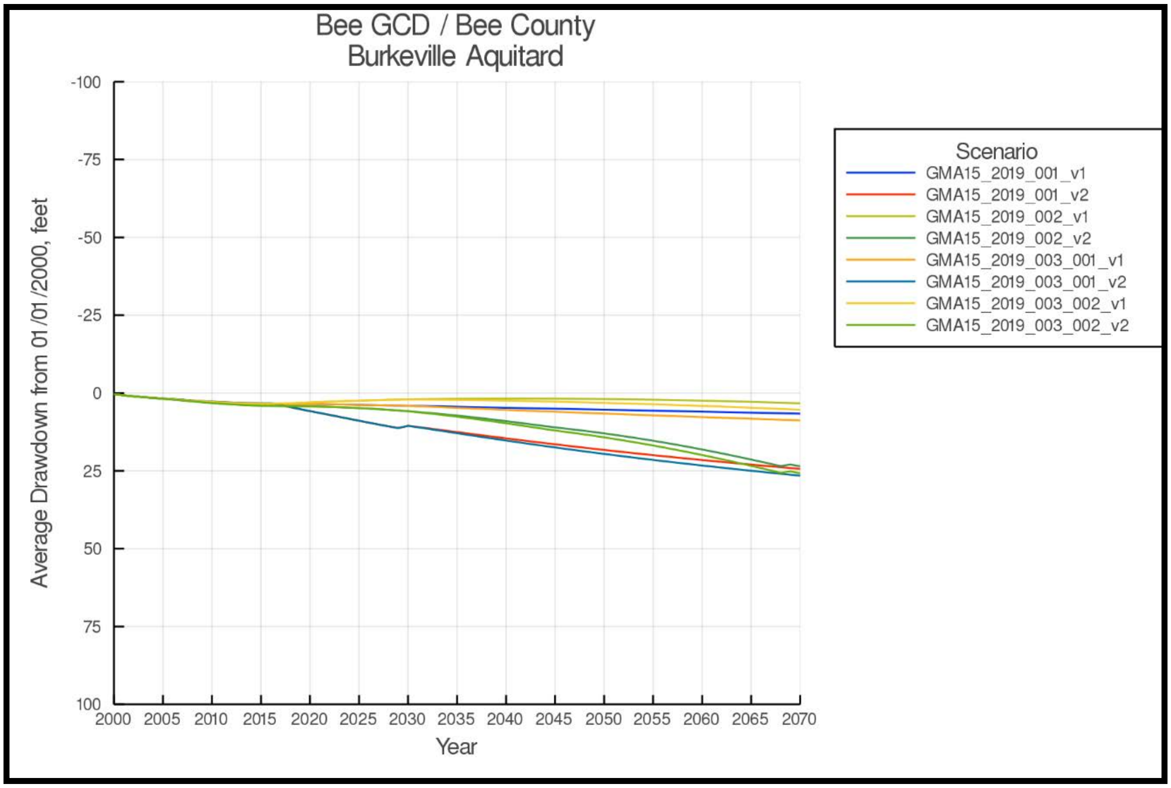

Aransas County GCD / Aransas County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

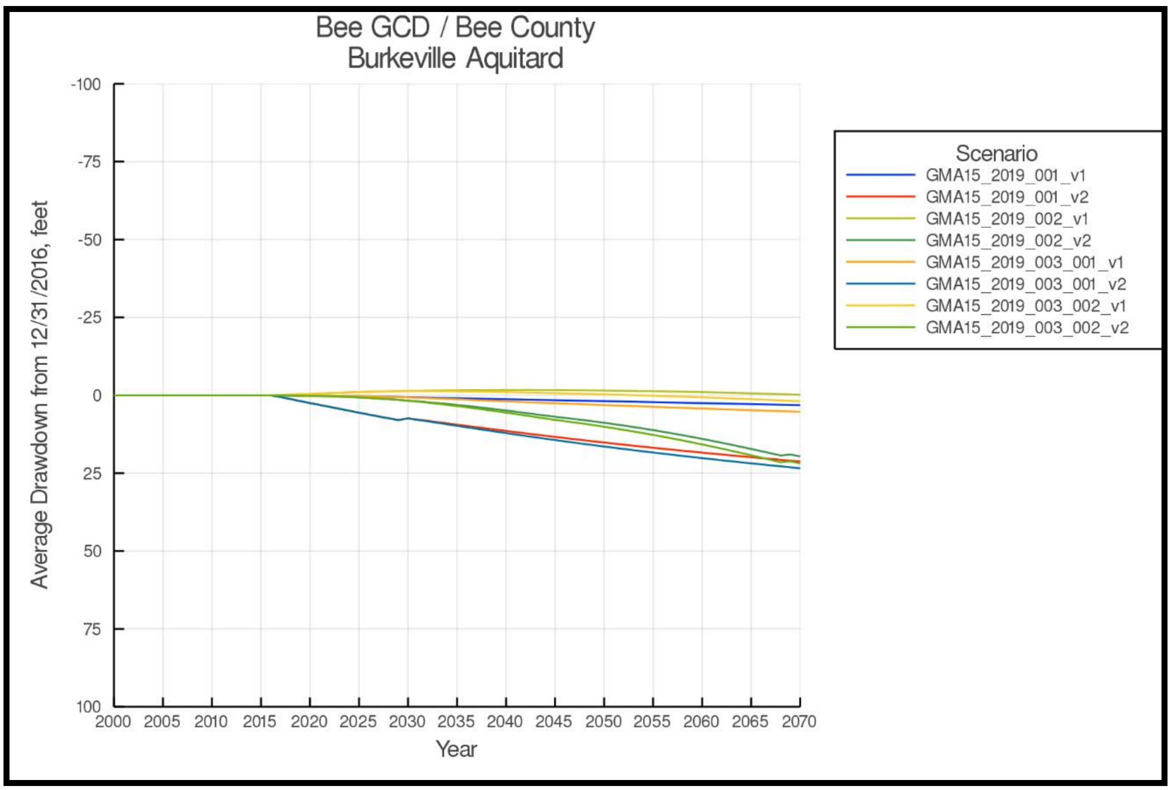

Bee GCD / Bee County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

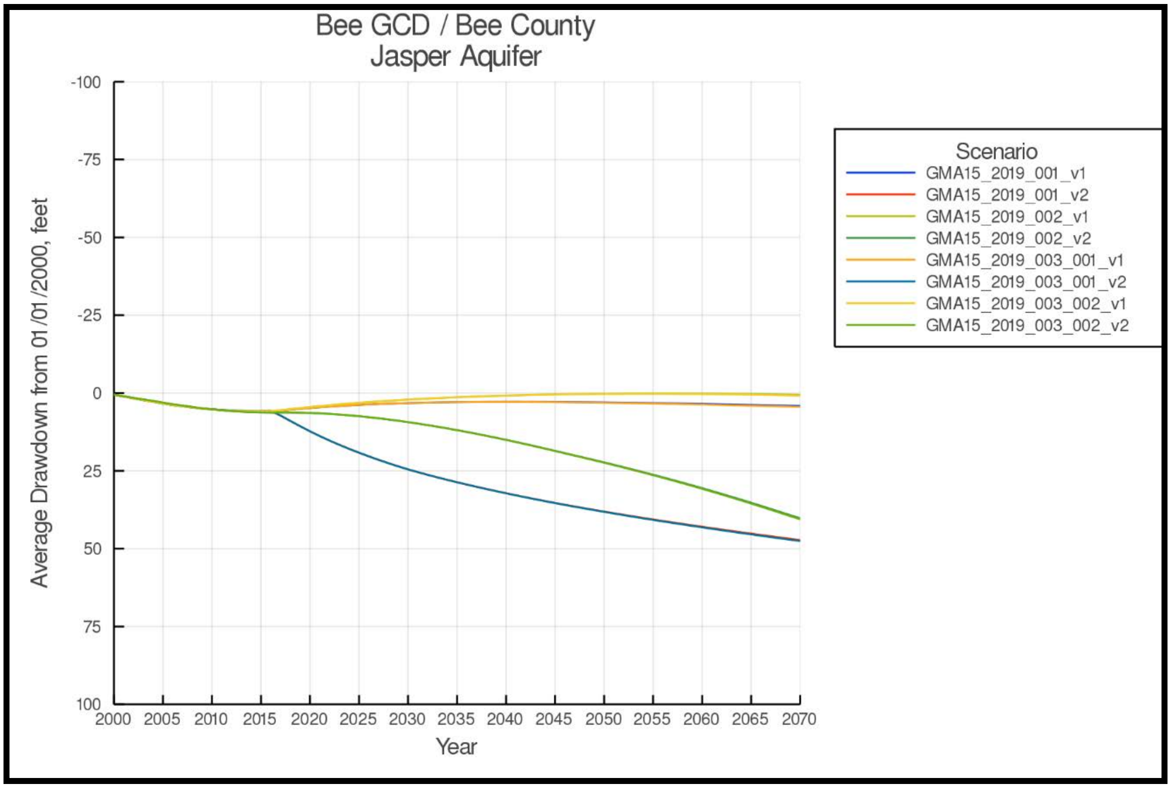

Bee GCD / Bee County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

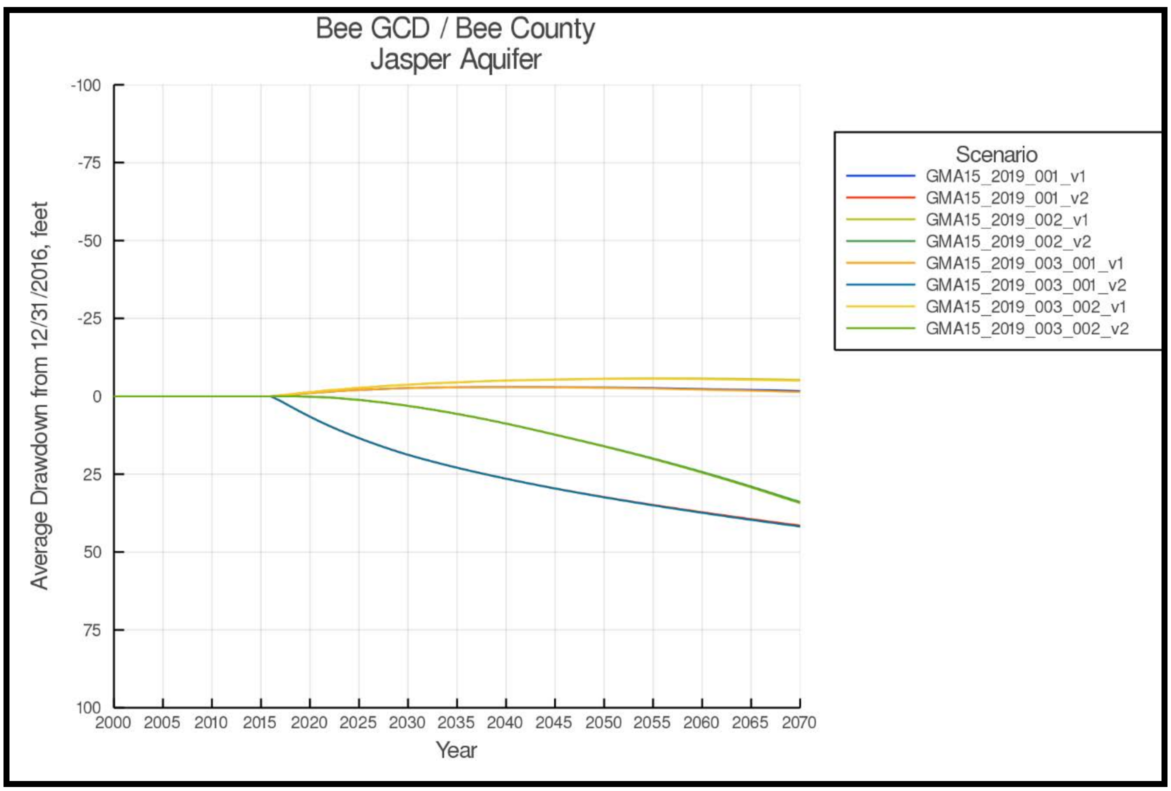

Bee GCD / Bee County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

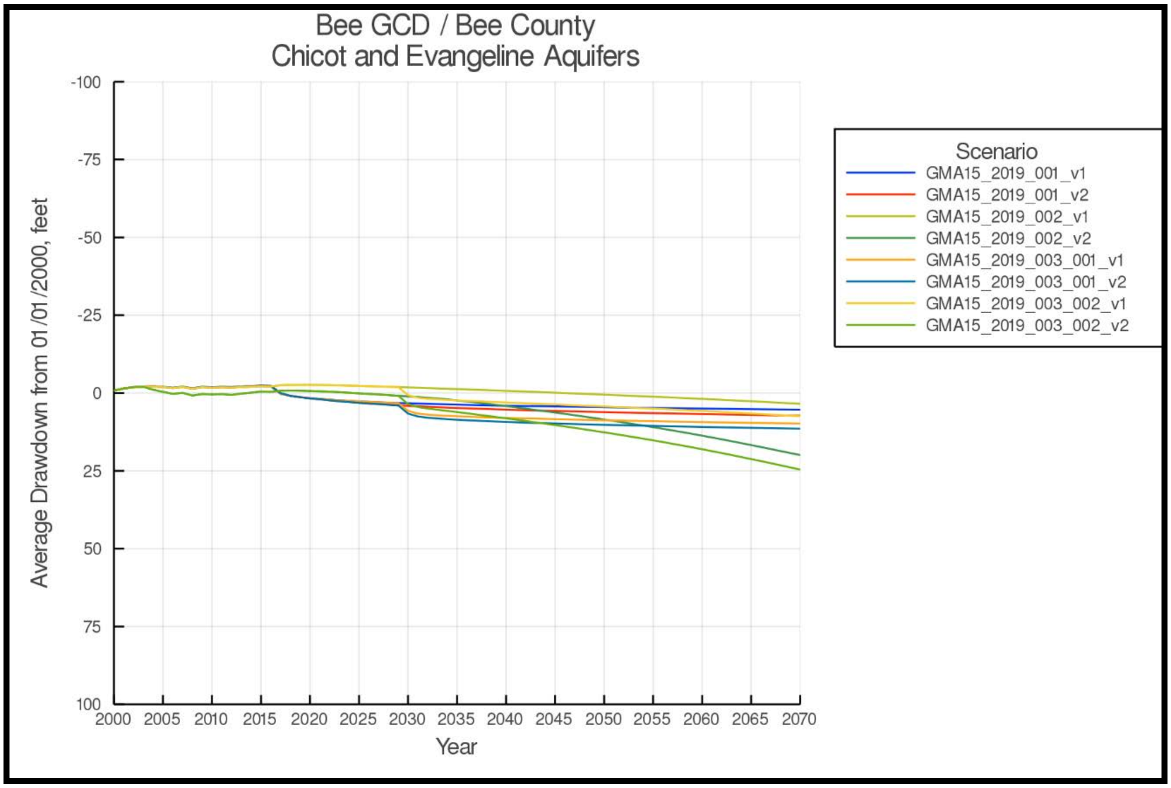

Bee GCD / Bee County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

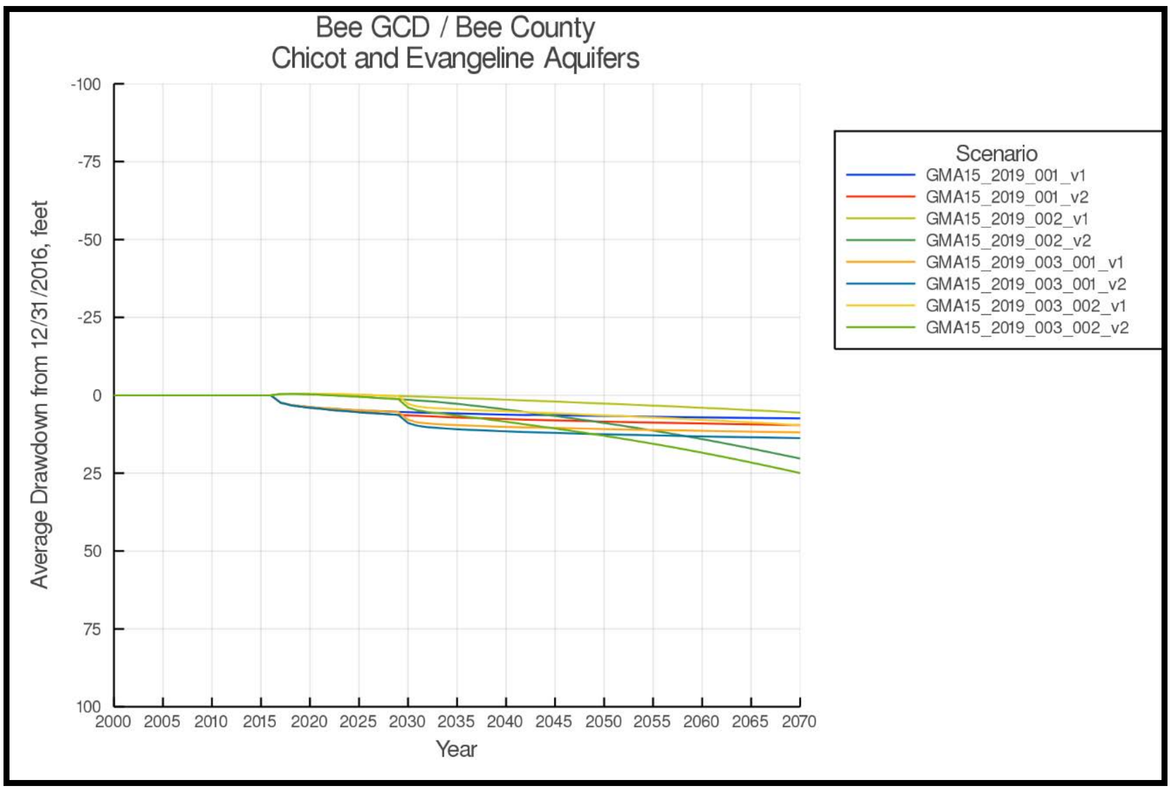

Bee GCD / Bee County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

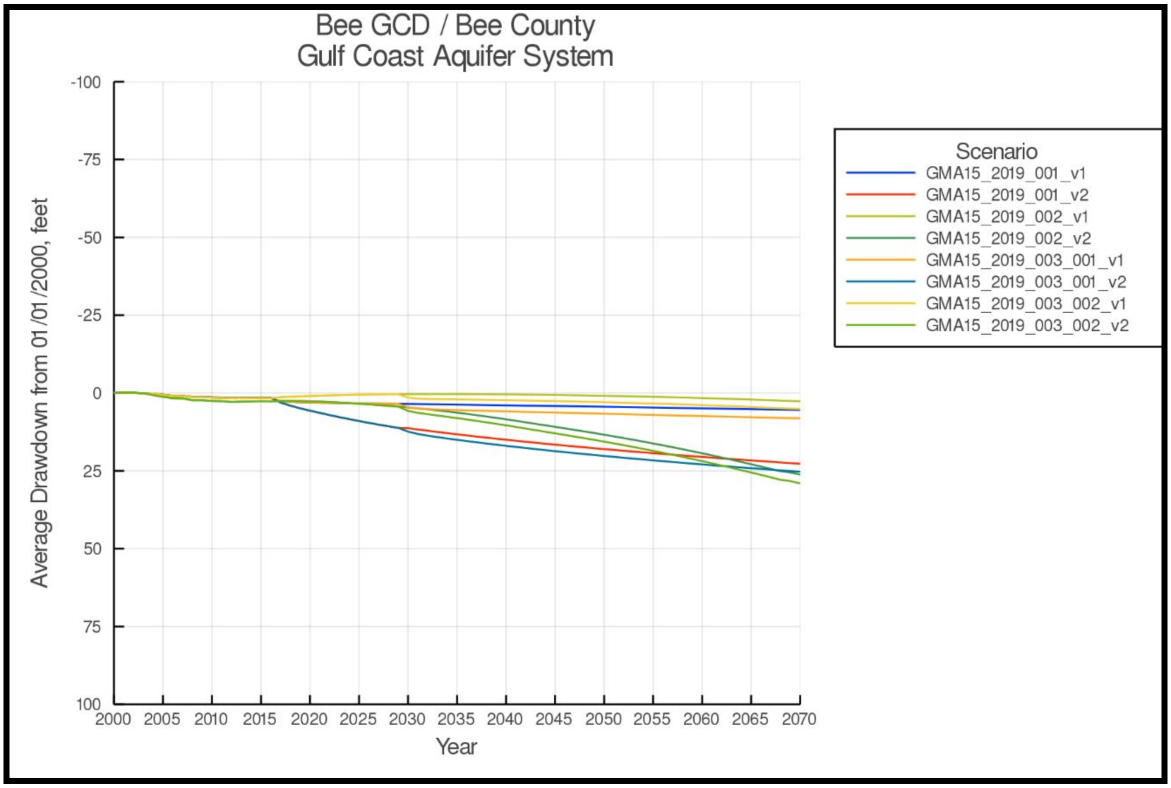

Bee GCD / Bee County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

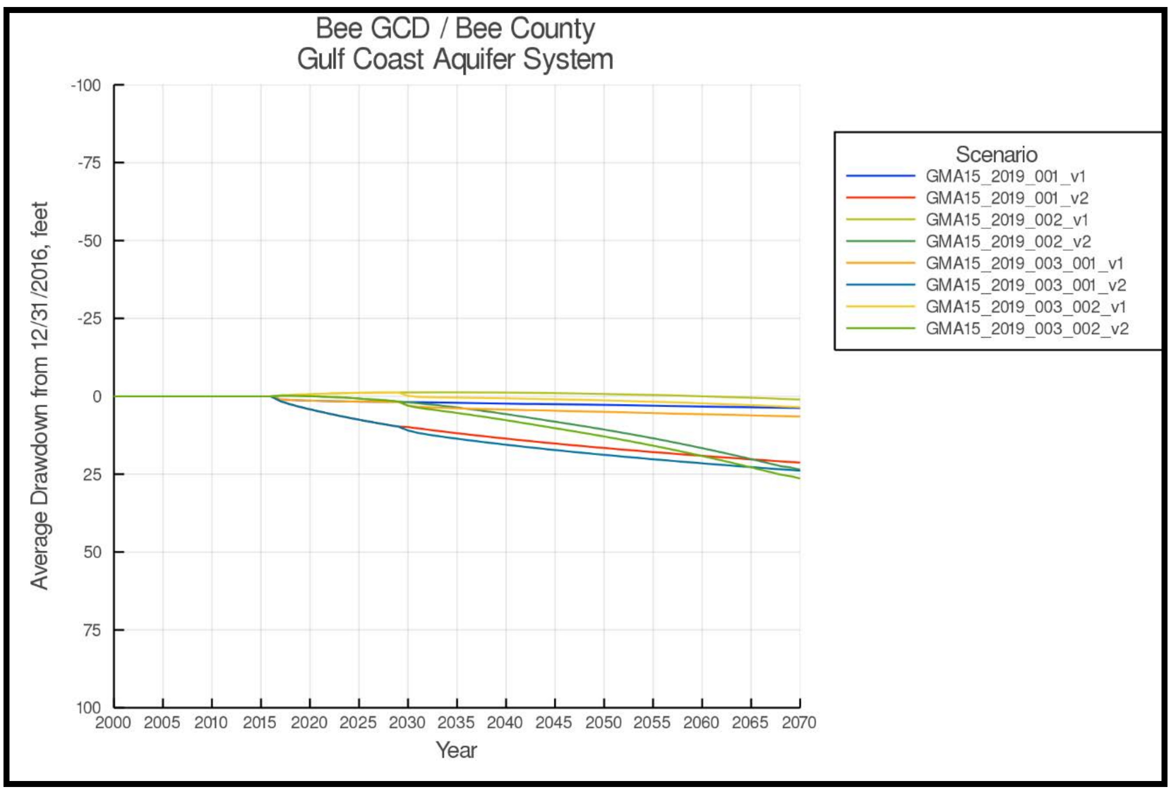

Bee GCD / Bee County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

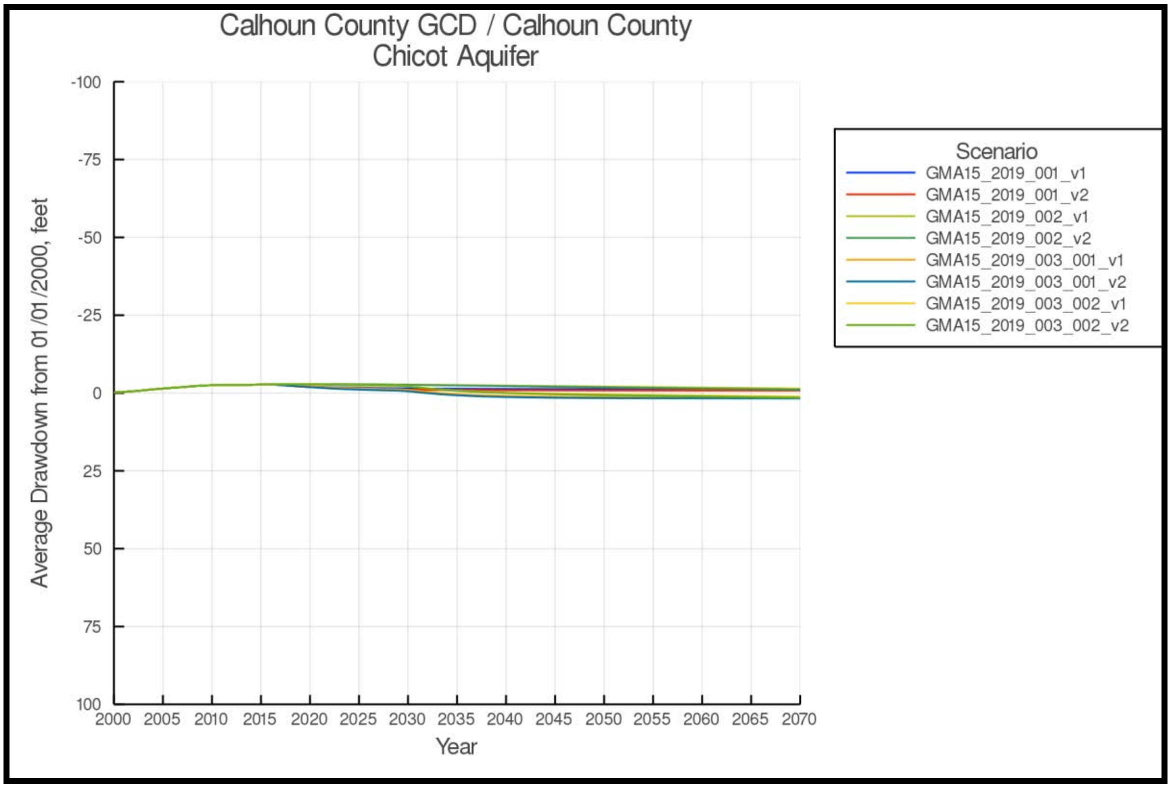

Bee GCD / Bee County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

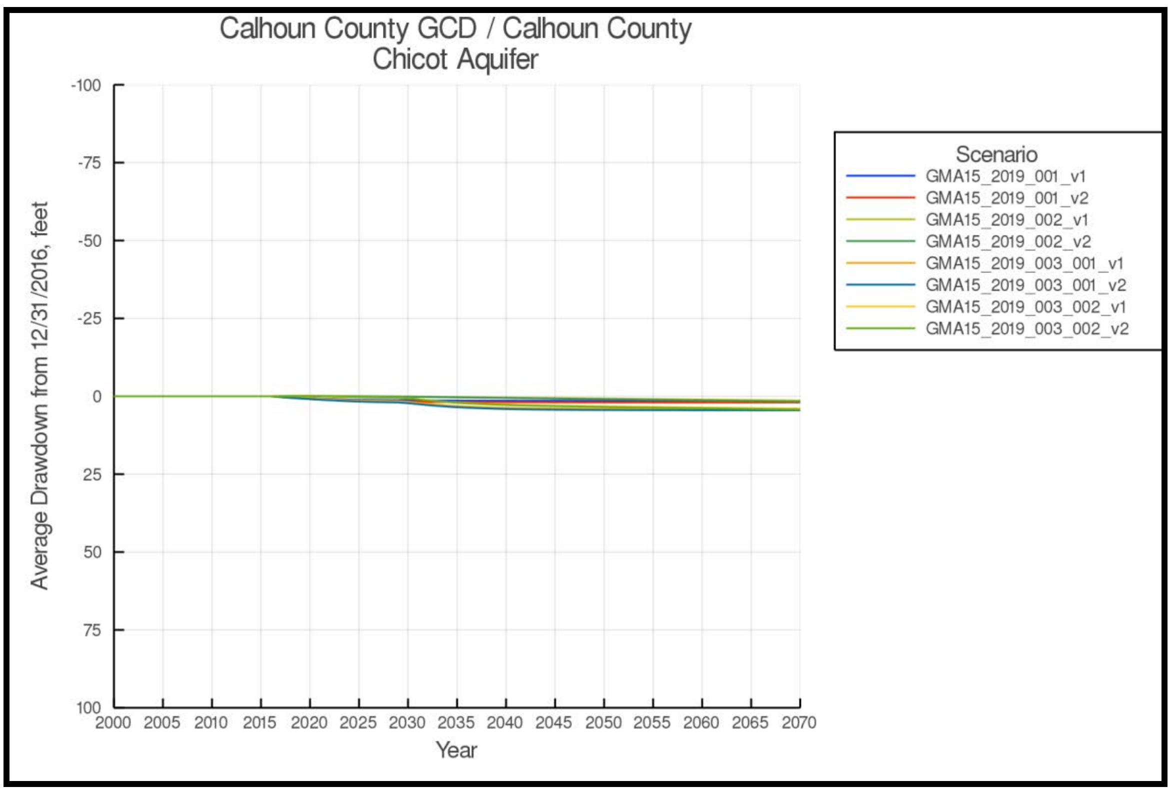

Bee GCD / Bee County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

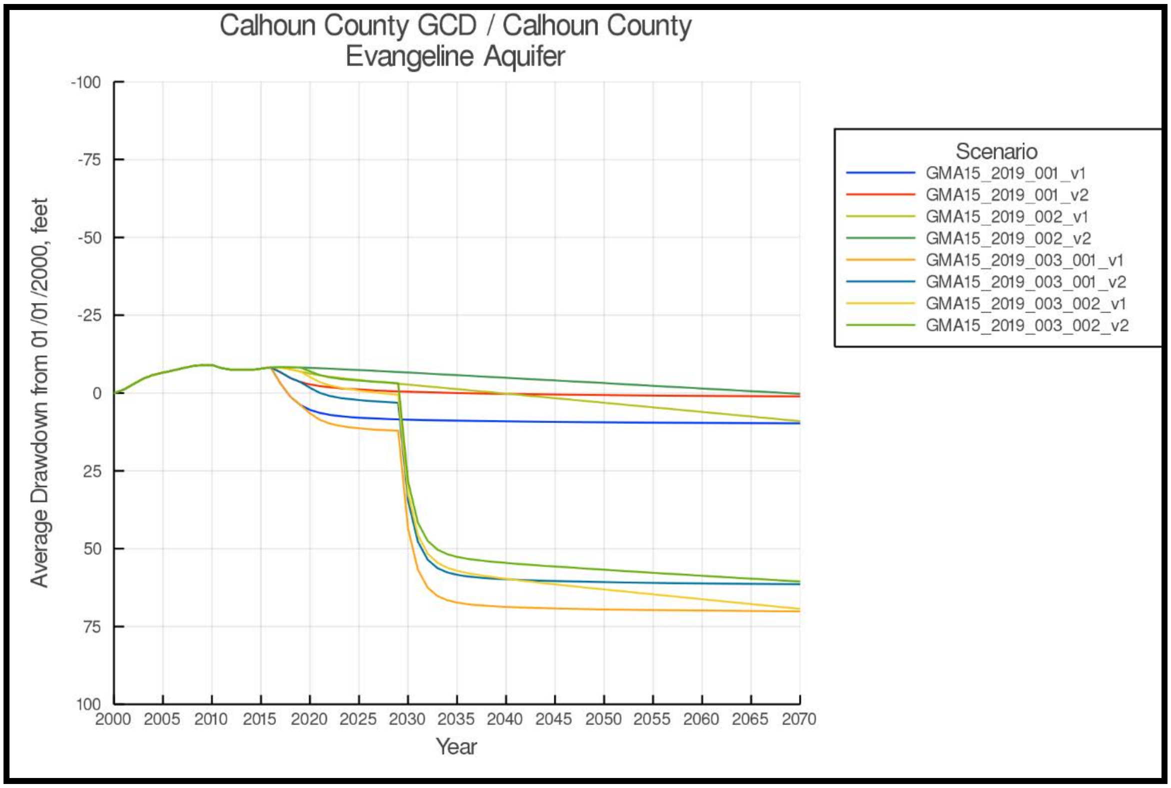

Bee GCD / Bee County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

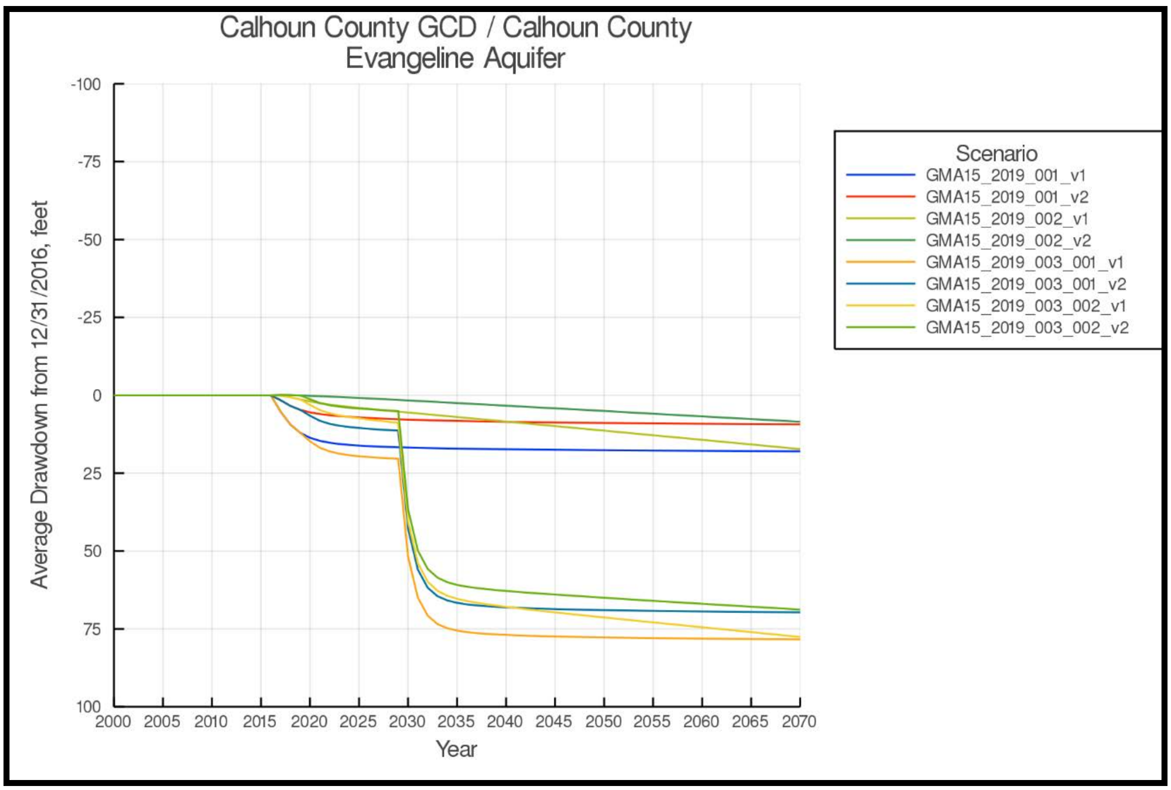

Bee GCD / Bee County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

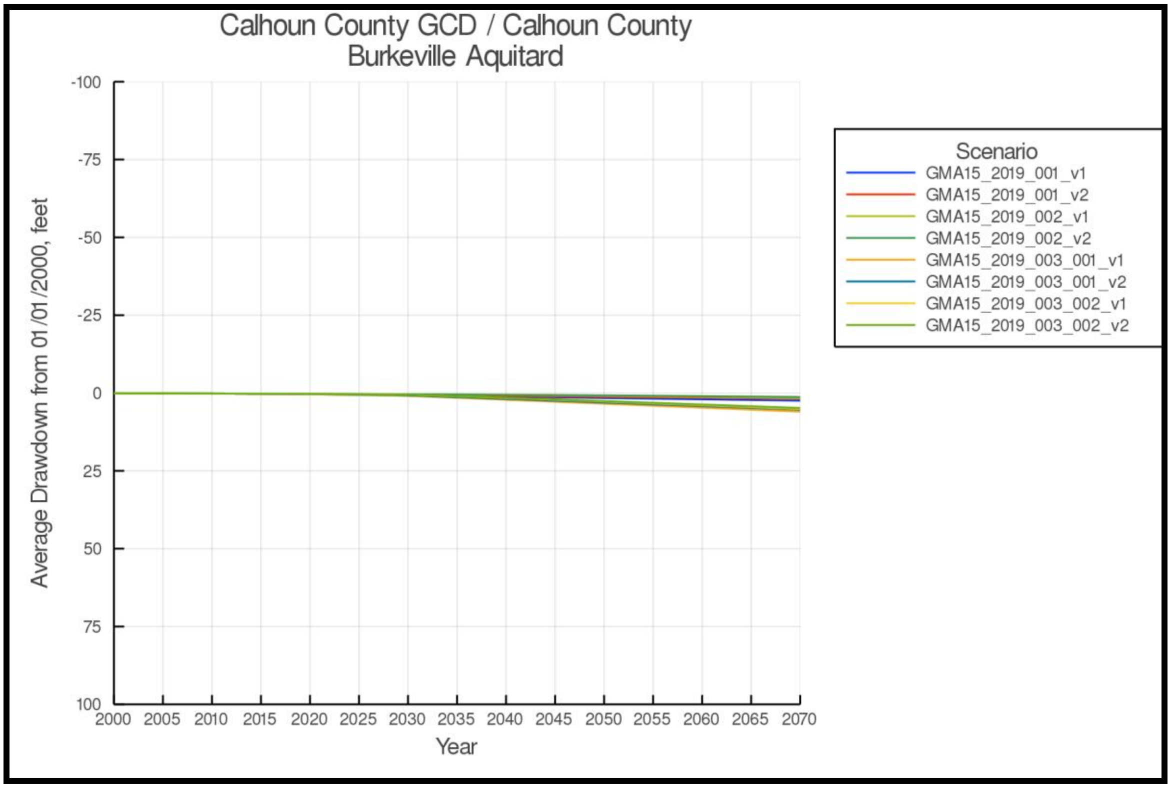

Bee GCD / Bee County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

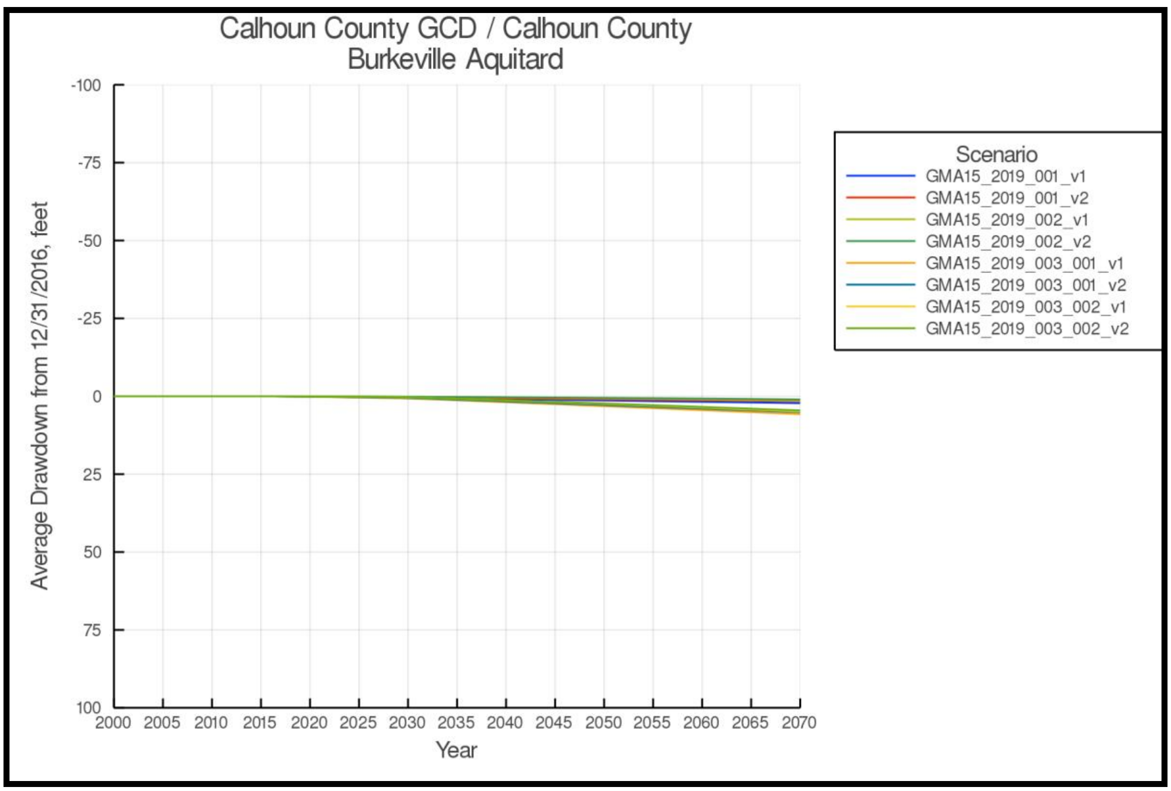

Calhoun County GCD / Calhoun County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

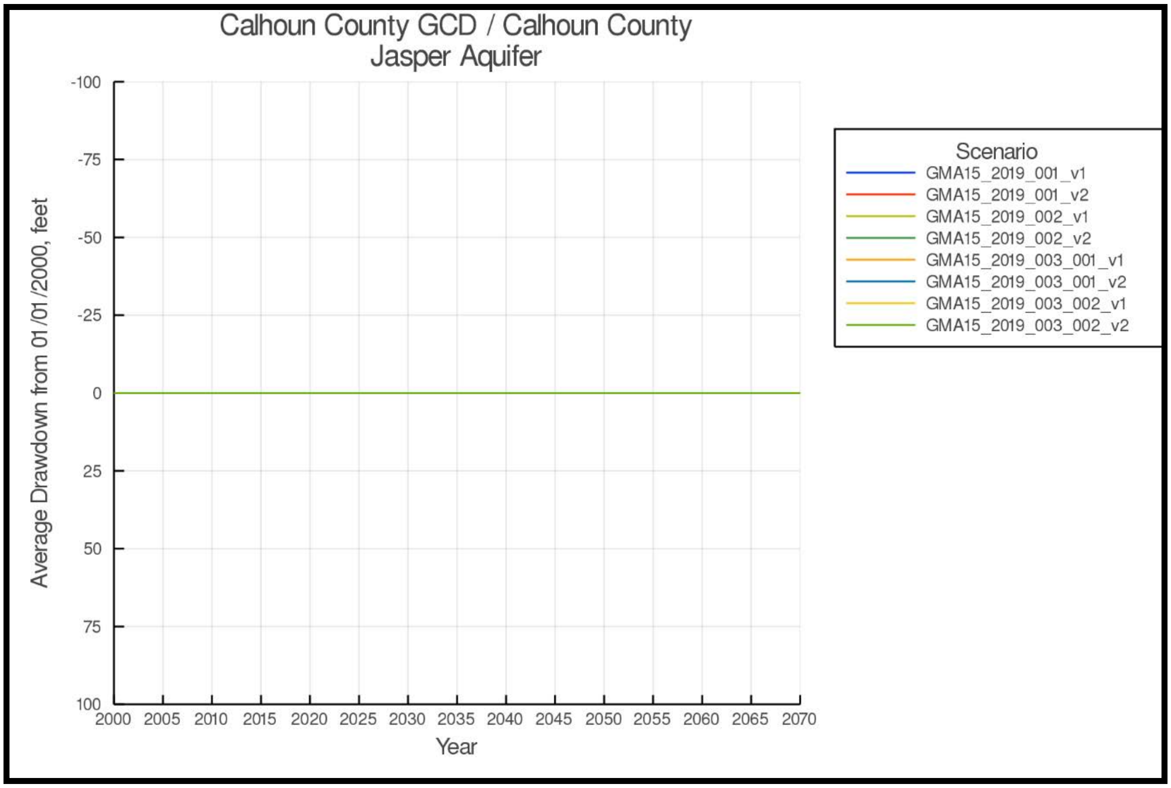

Calhoun County GCD / Calhoun County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

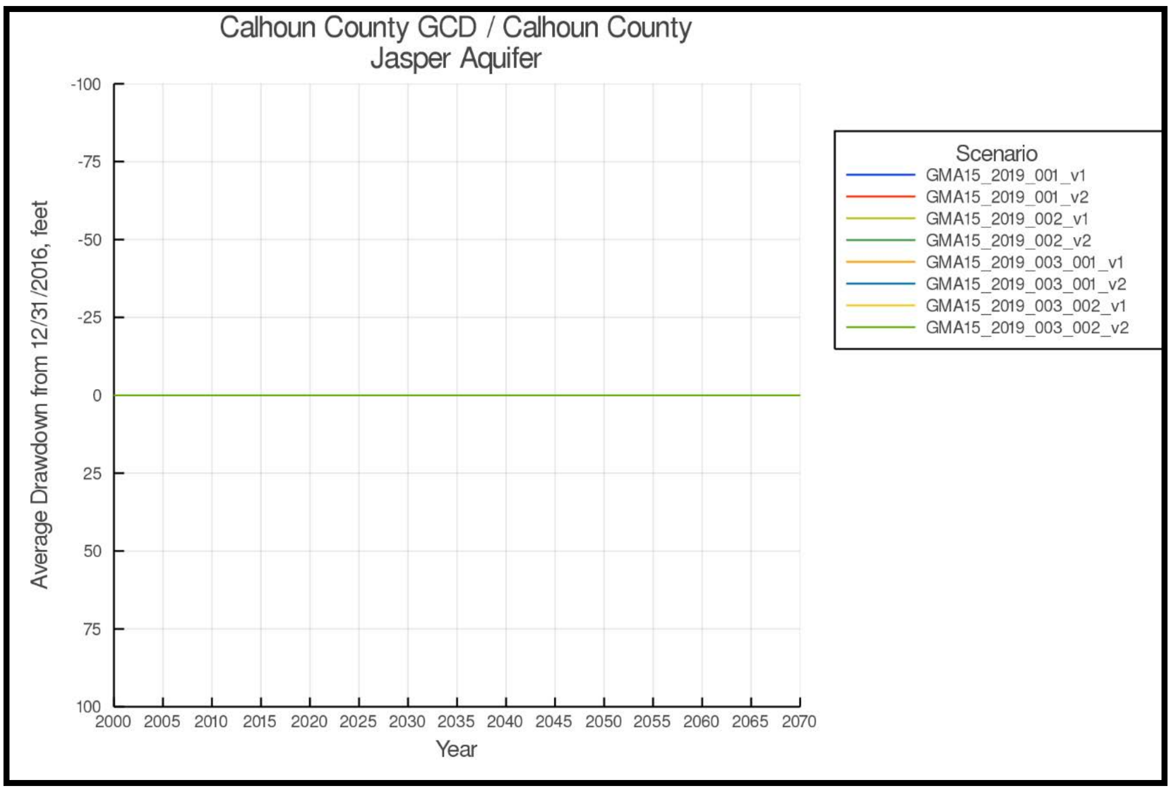

Calhoun County GCD / Calhoun County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

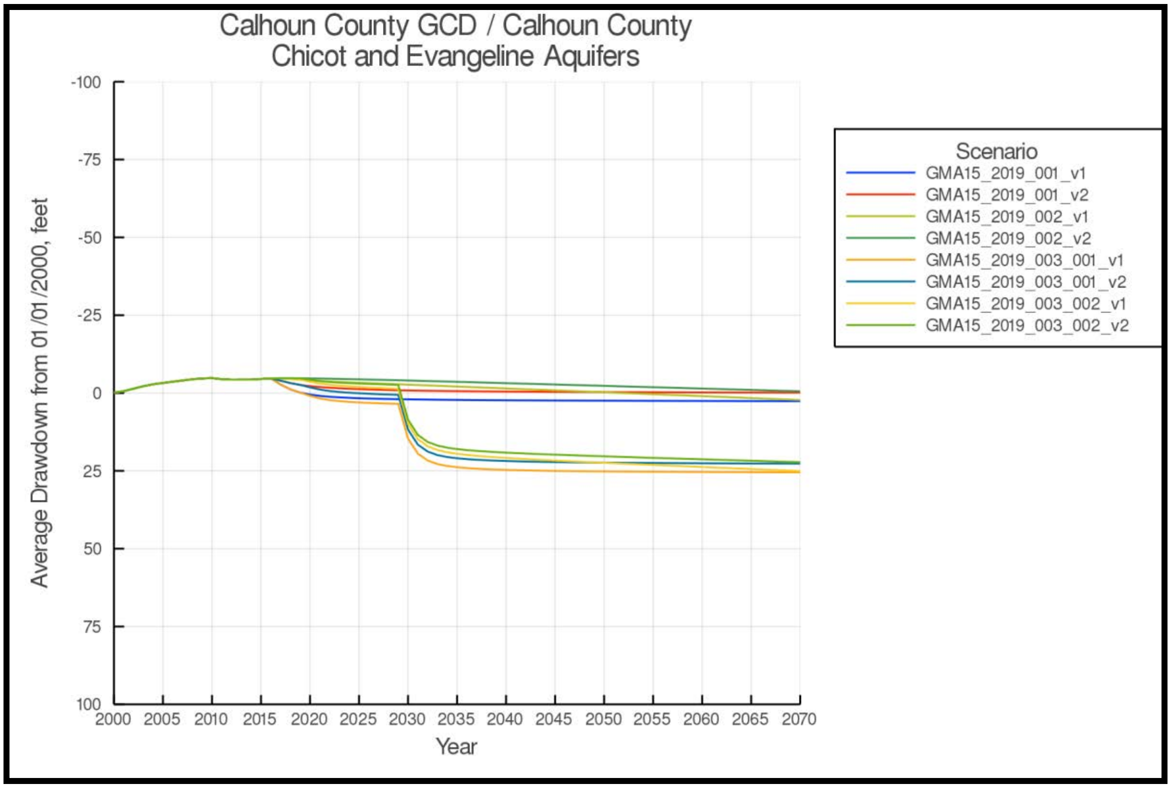

Calhoun County GCD / Calhoun County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

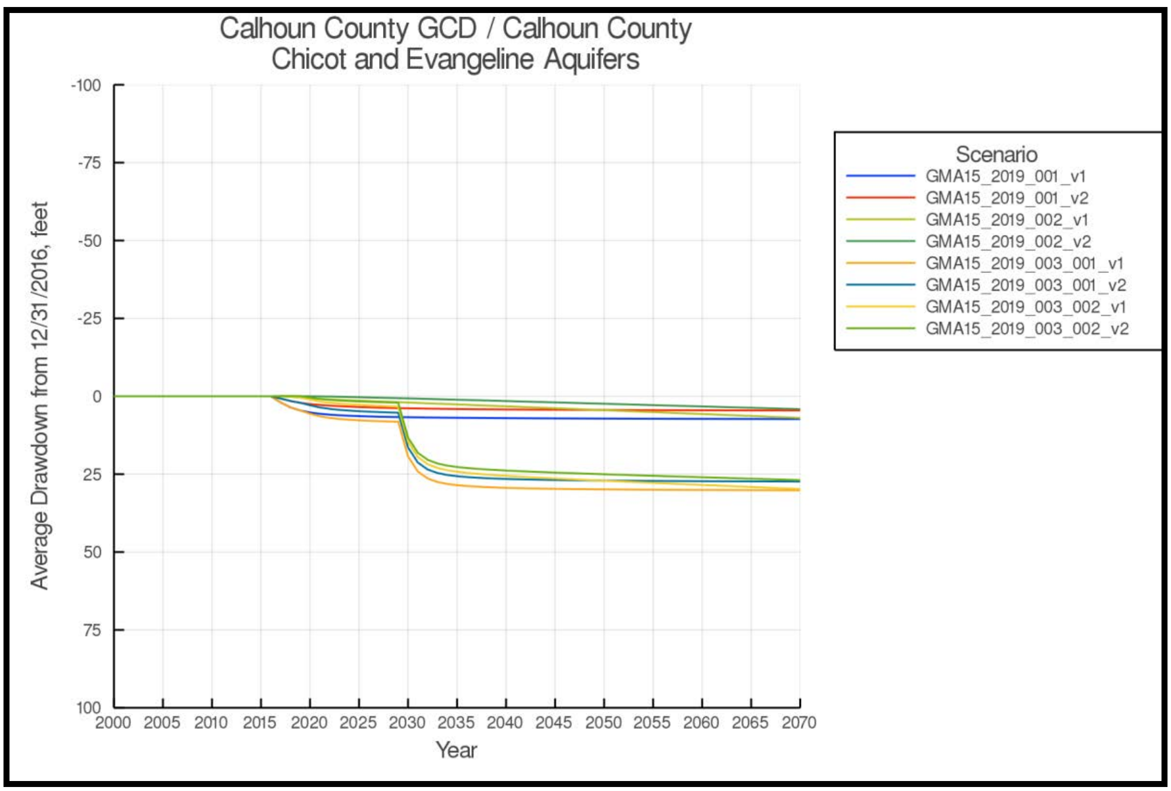

Calhoun County GCD / Calhoun County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

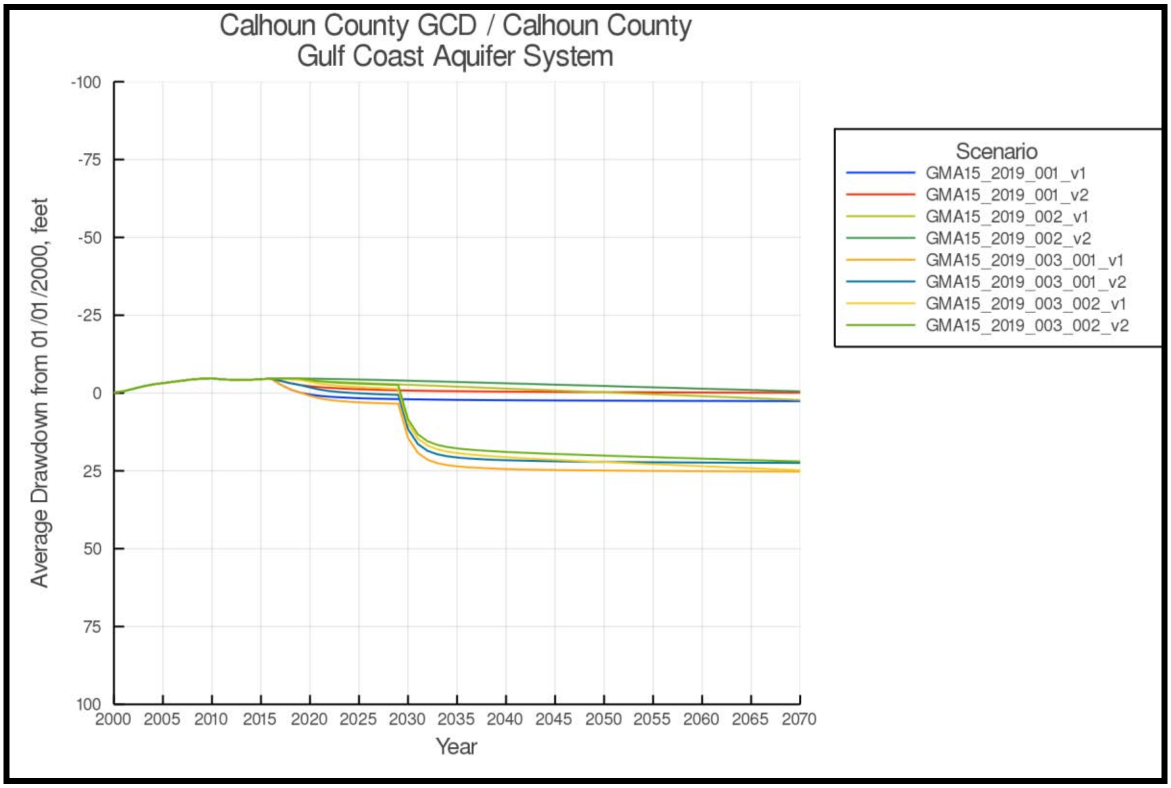

Calhoun County GCD / Calhoun County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

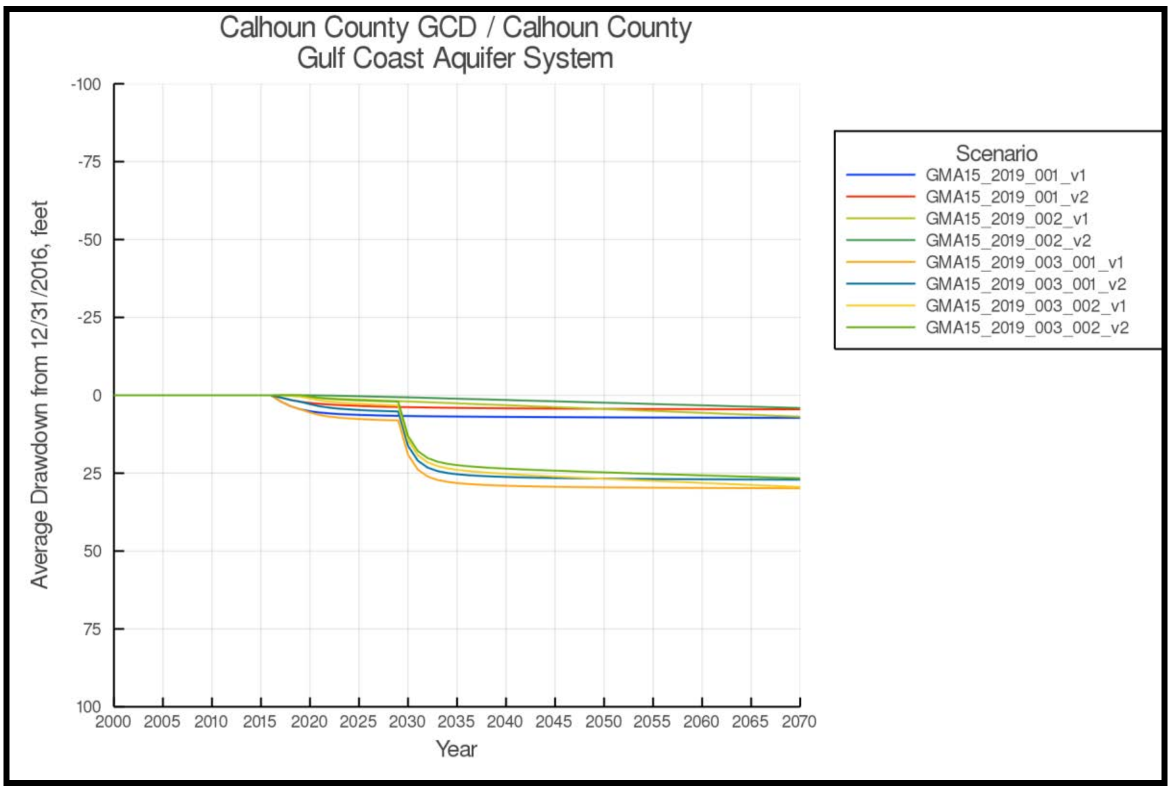

Calhoun County GCD / Calhoun County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

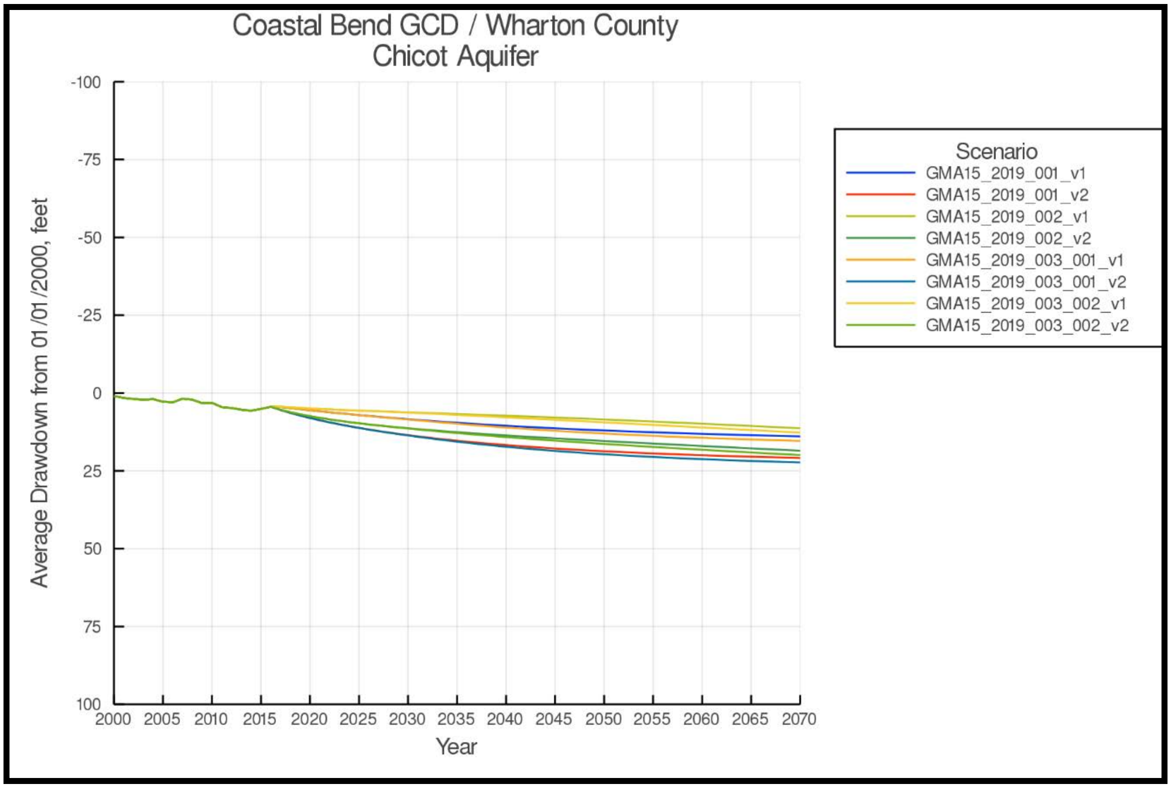

Calhoun County GCD / Calhoun County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

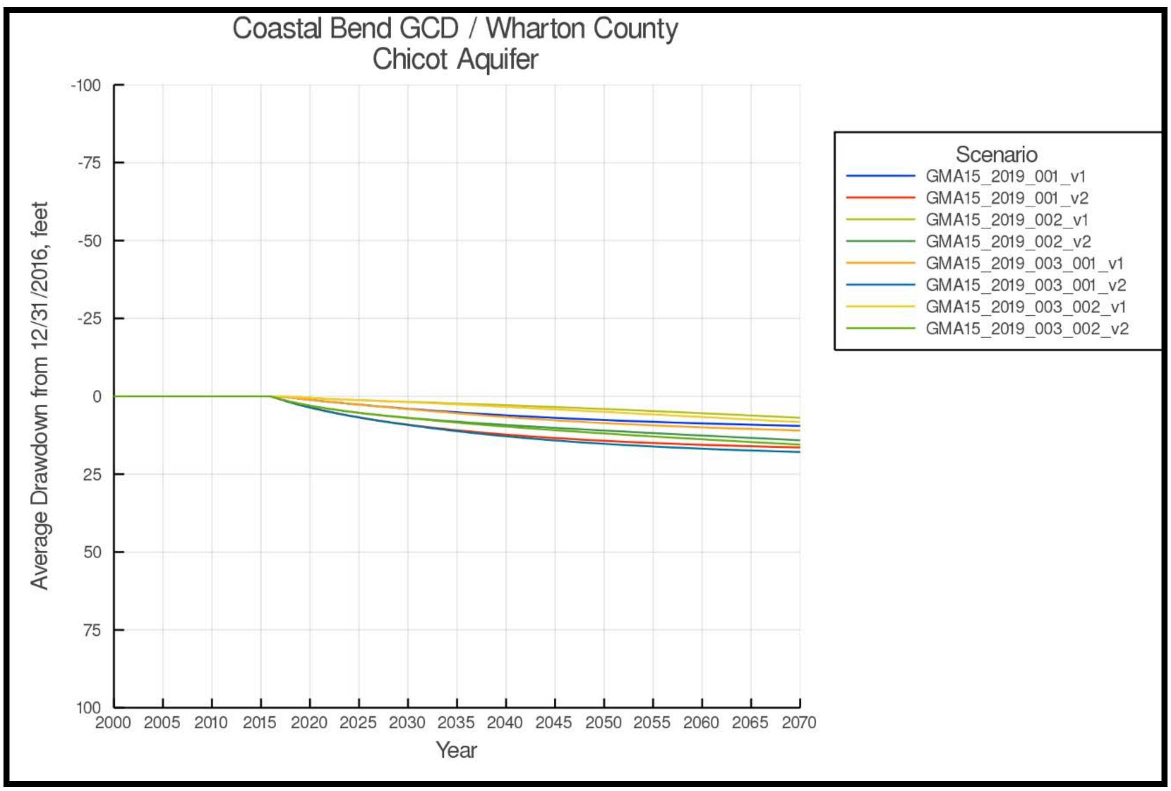

Calhoun County GCD / Calhoun County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

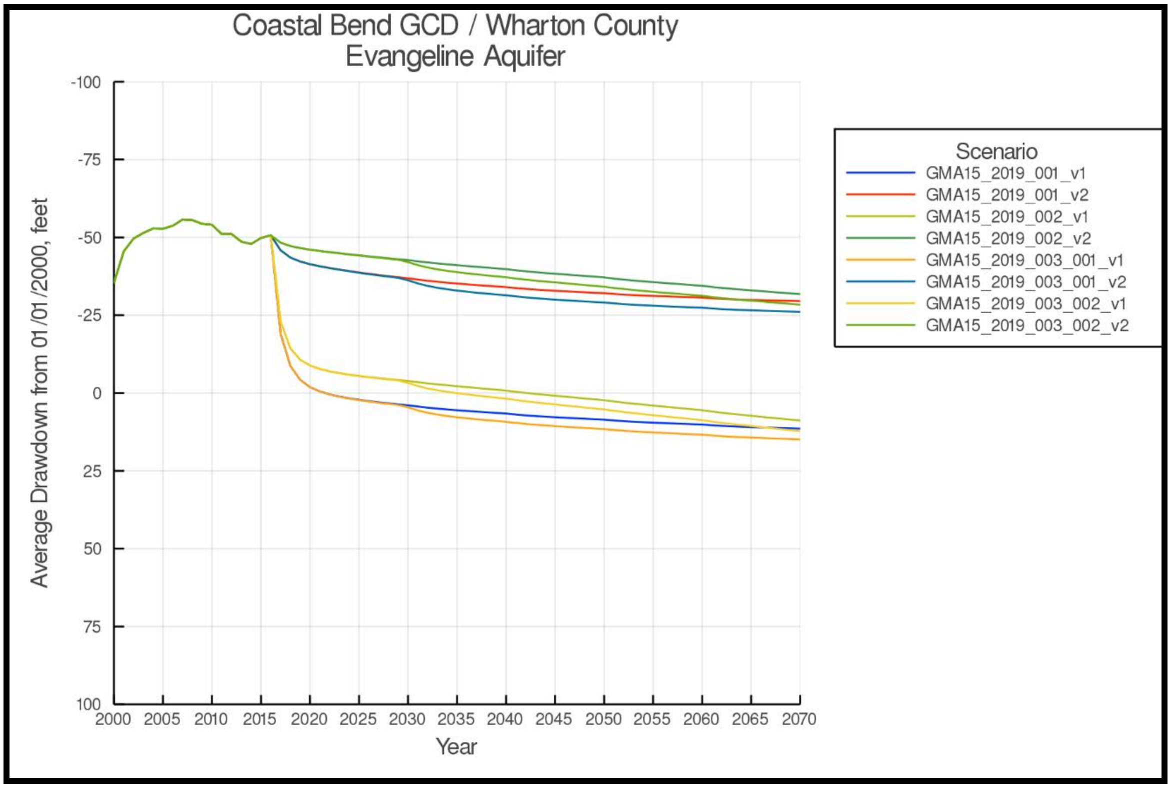

Calhoun County GCD / Calhoun County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

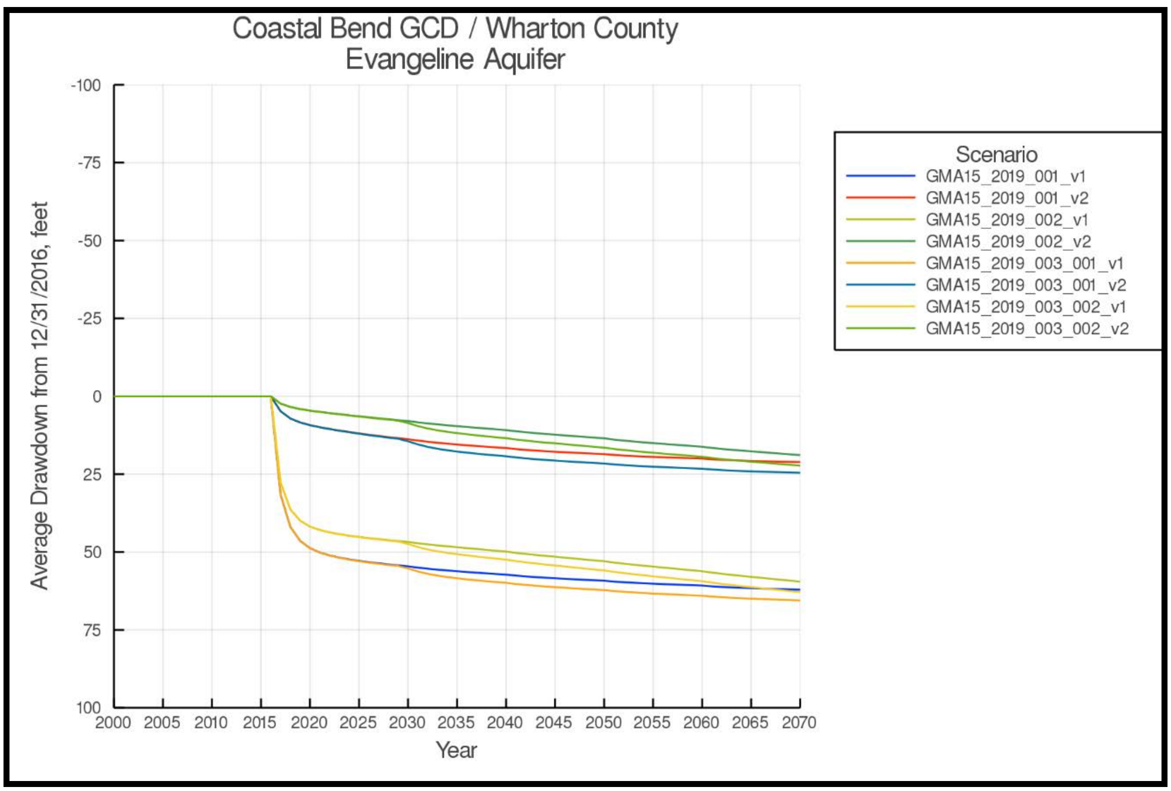

Calhoun County GCD / Calhoun County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

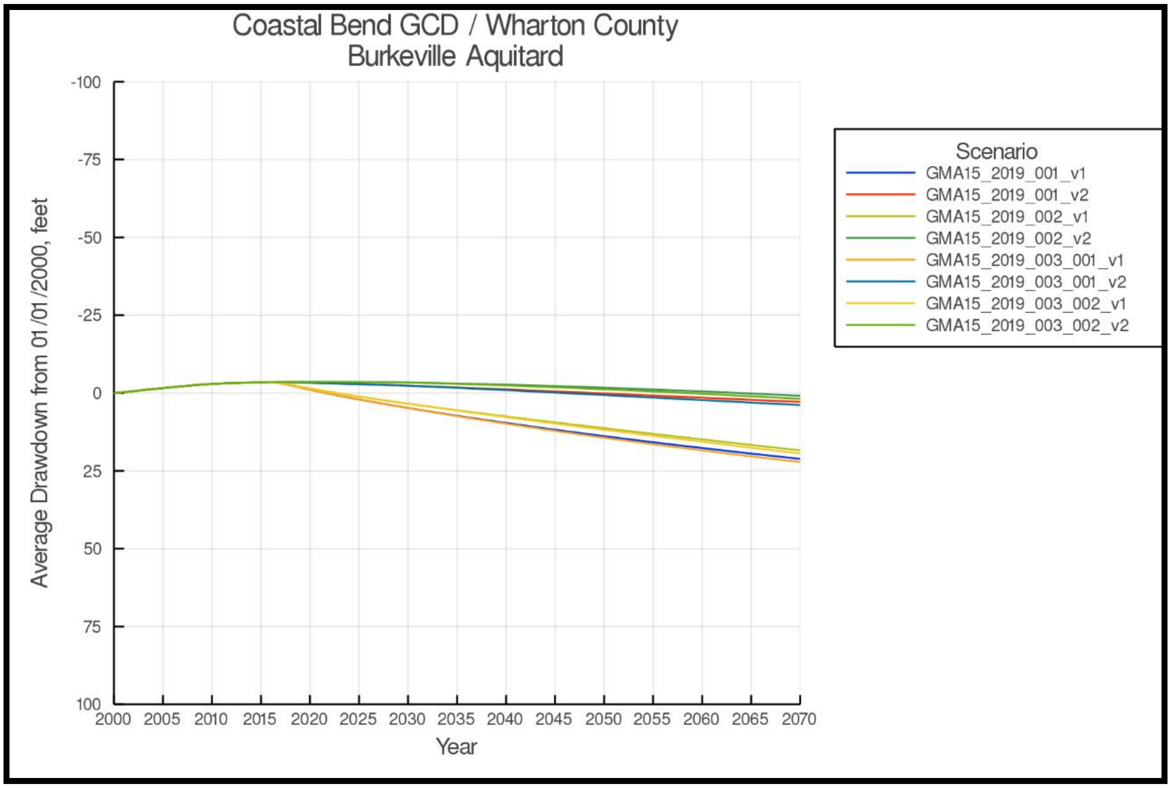

Calhoun County GCD / Calhoun County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

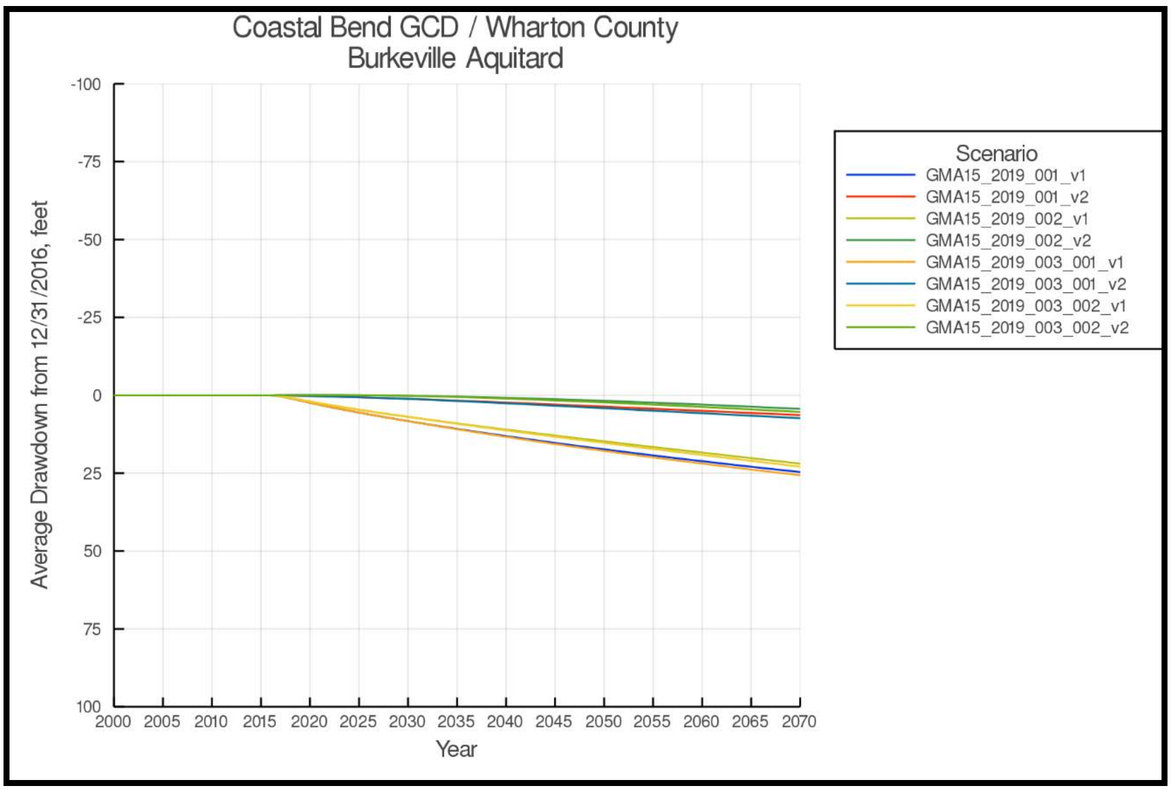

Coastal Bend GCD / Wharton County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

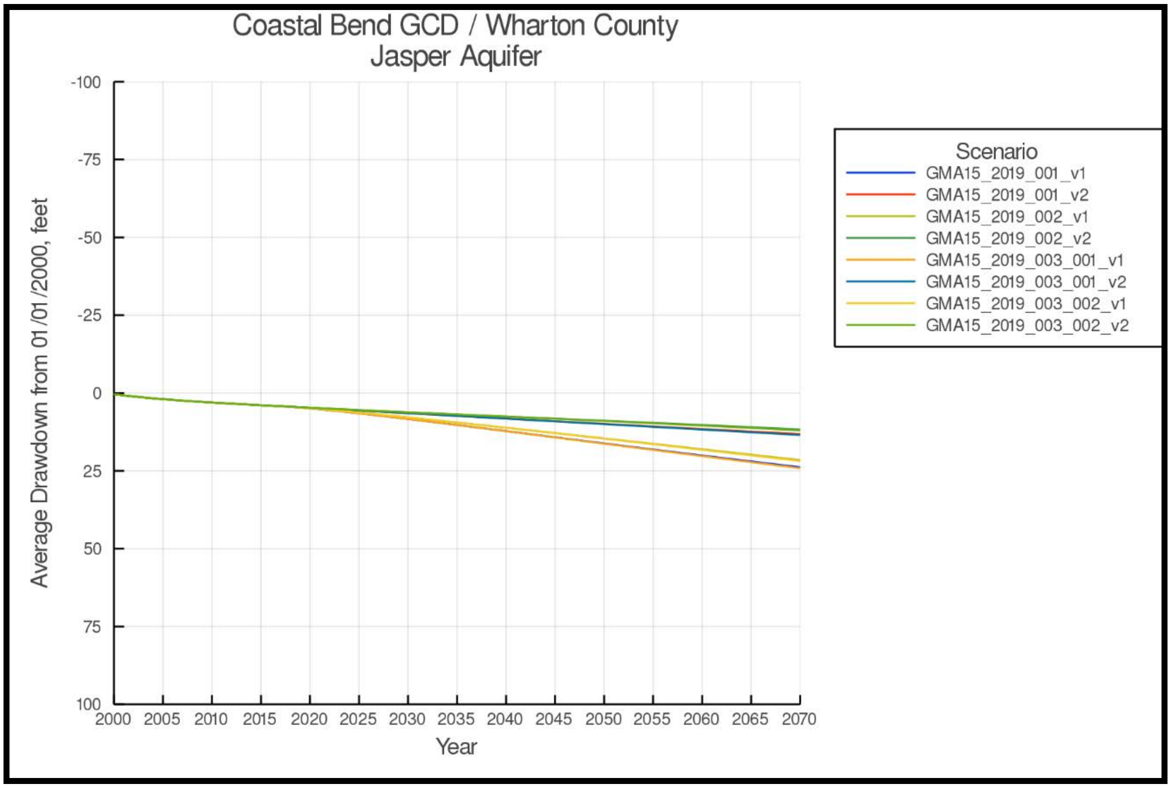

Coastal Bend GCD / Wharton County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

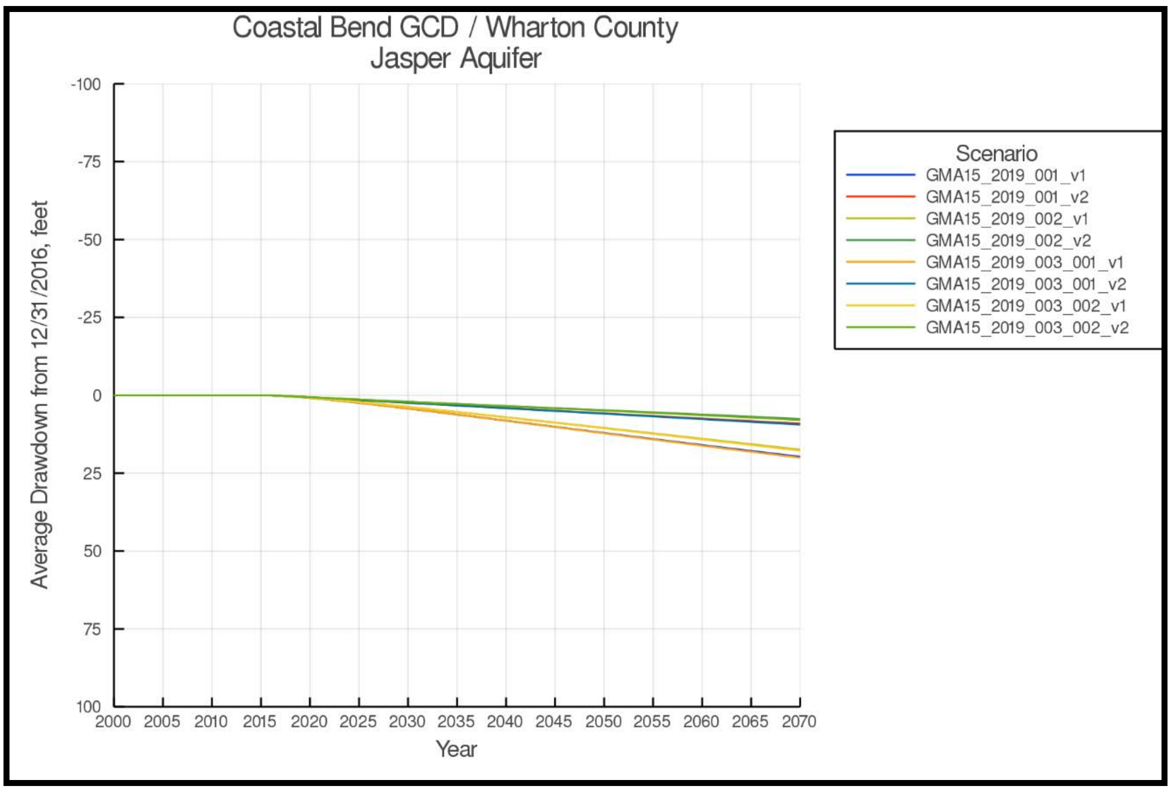

Coastal Bend GCD / Wharton County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

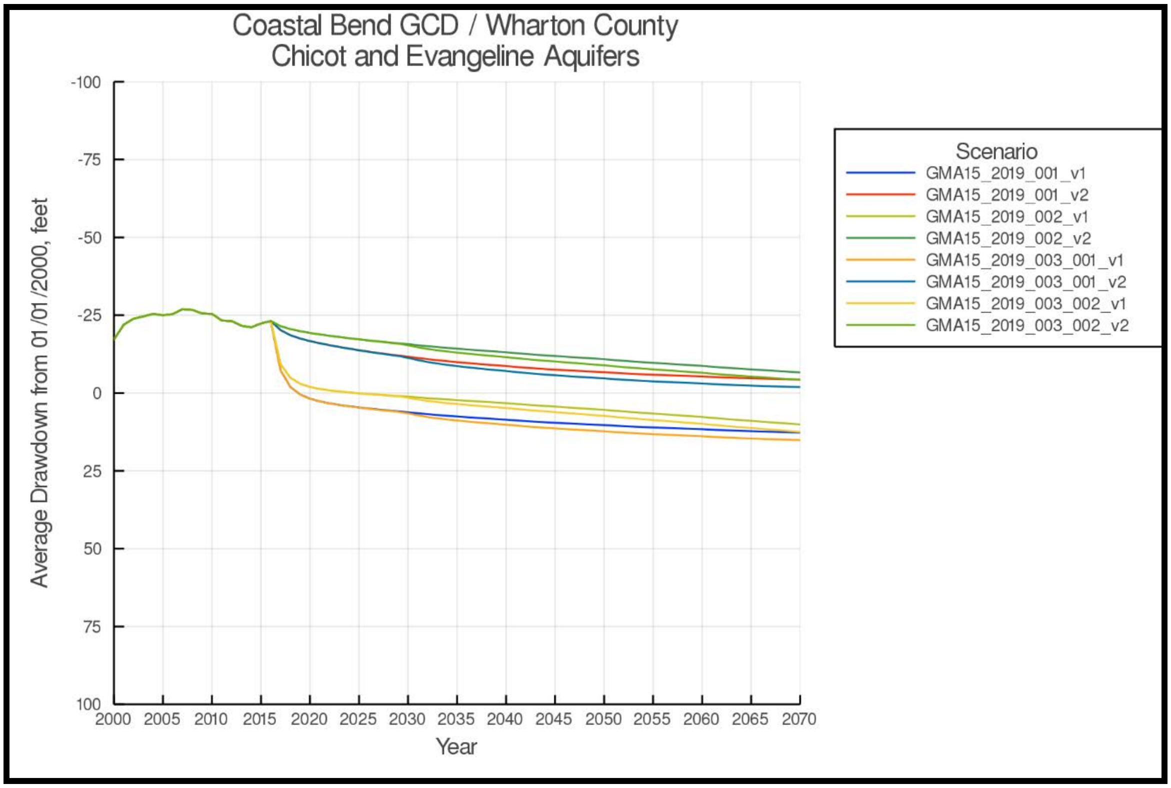

Coastal Bend GCD / Wharton County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

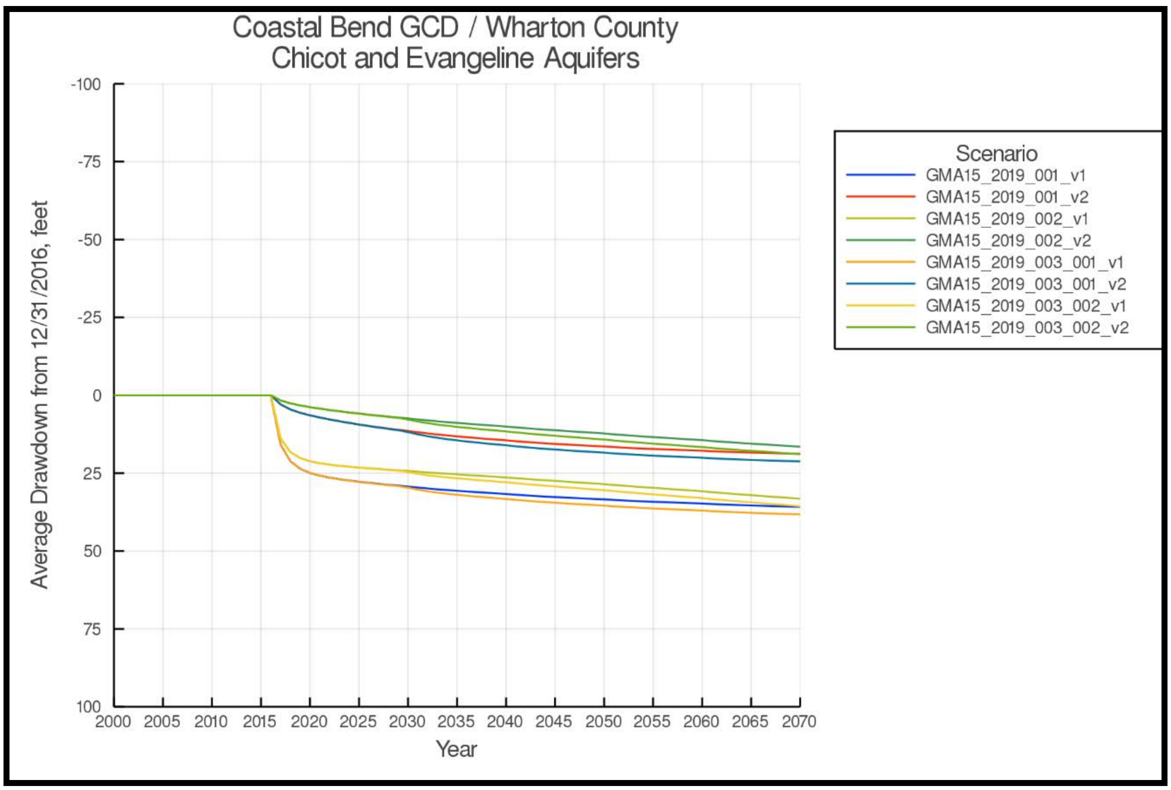

Coastal Bend GCD / Wharton County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

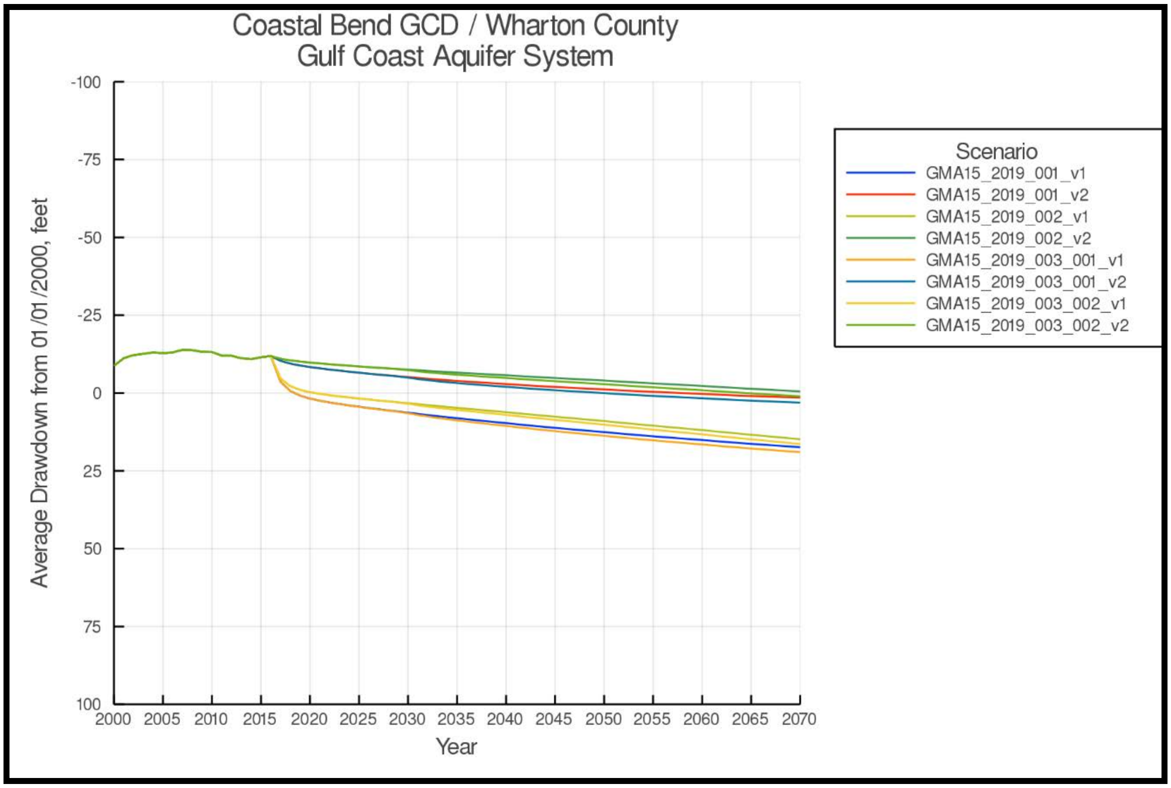

Coastal Bend GCD / Wharton County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

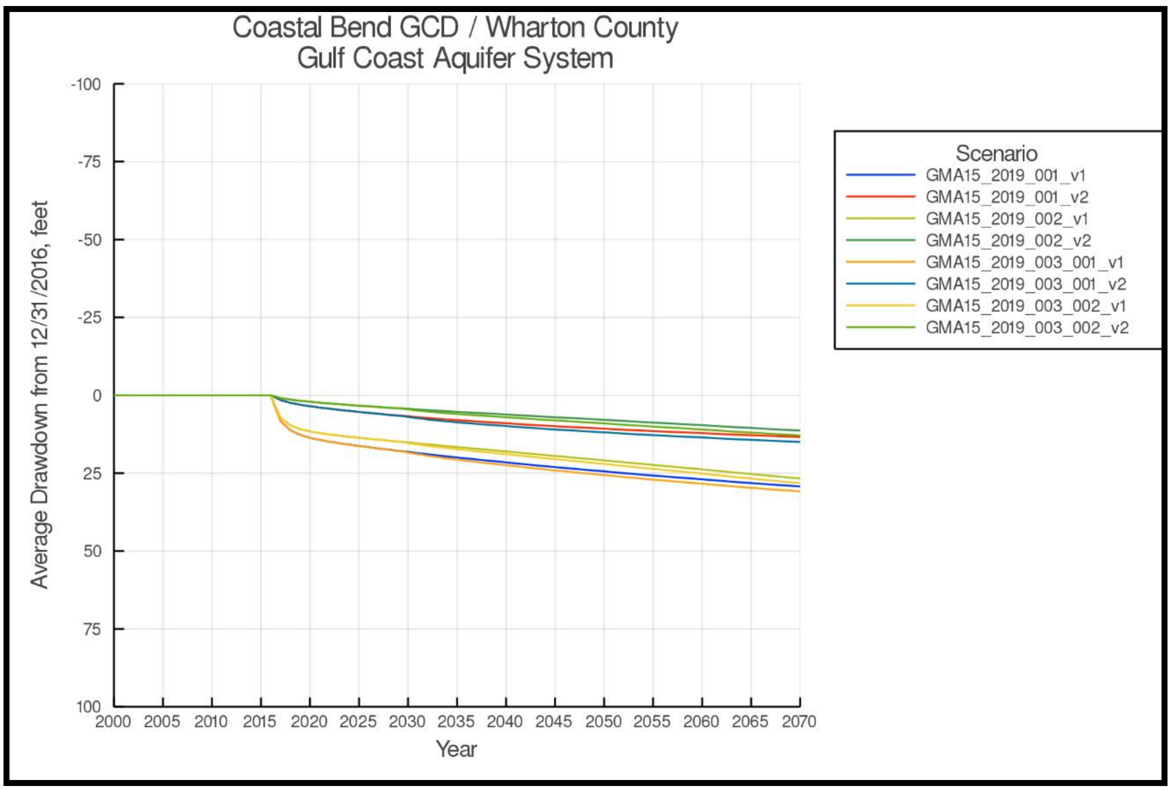

Coastal Bend GCD / Wharton County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

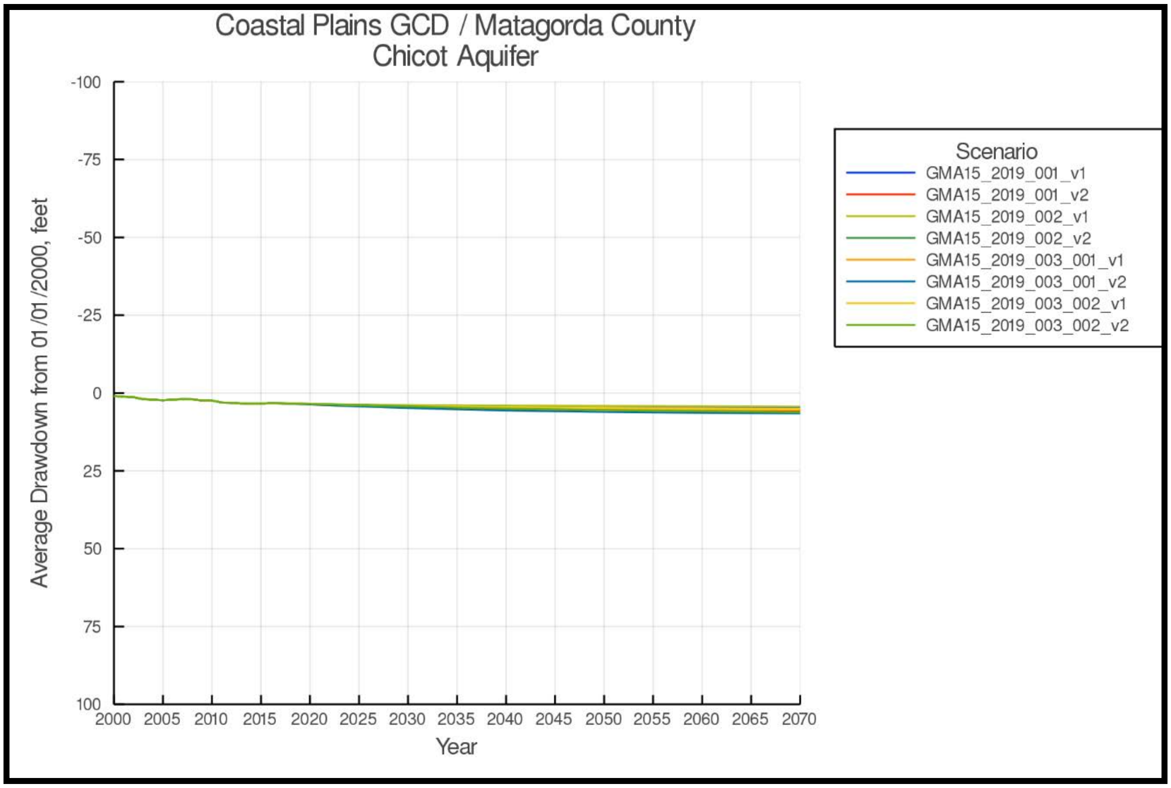

Coastal Bend GCD / Wharton County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

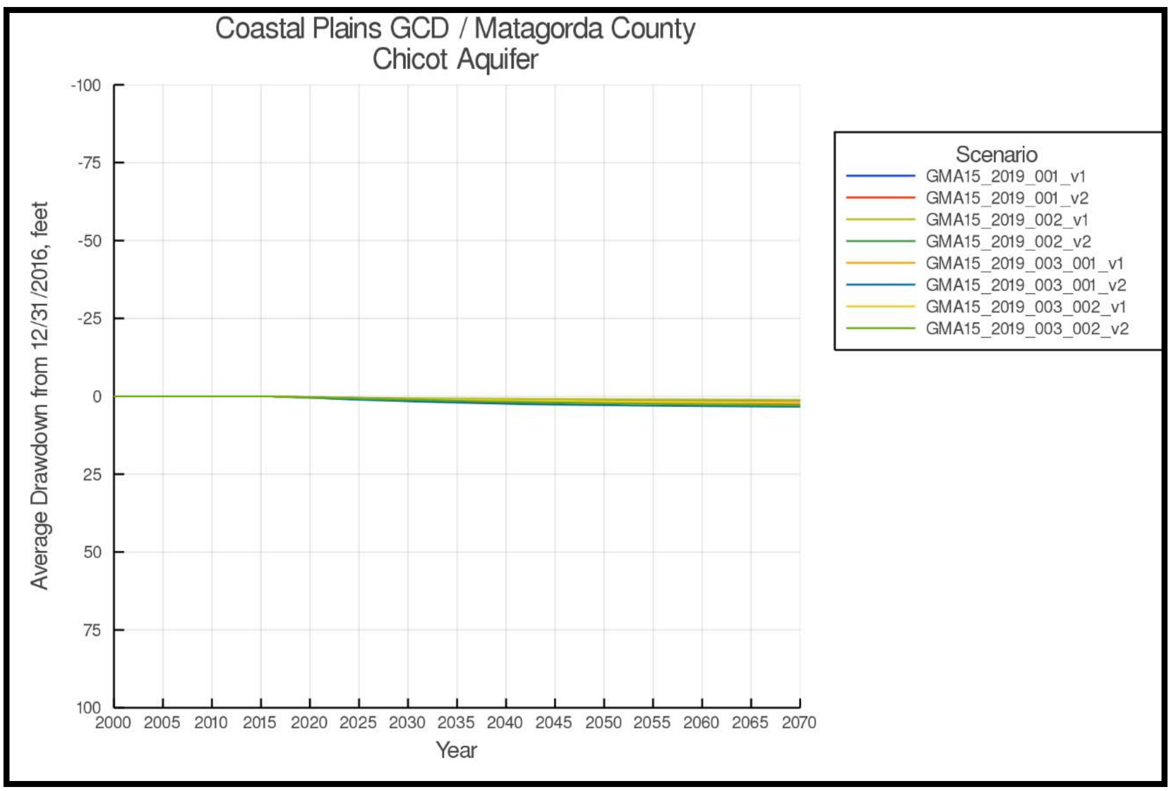

Coastal Bend GCD / Wharton County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

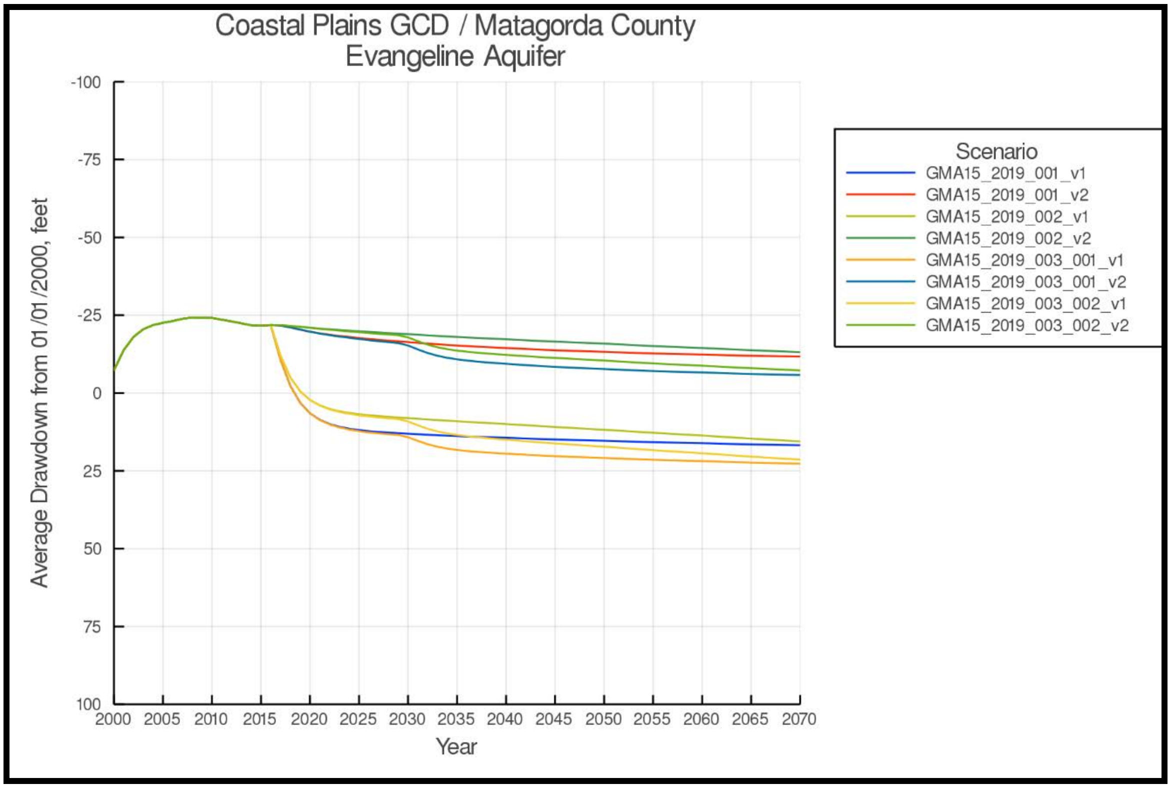

Coastal Bend GCD / Wharton County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

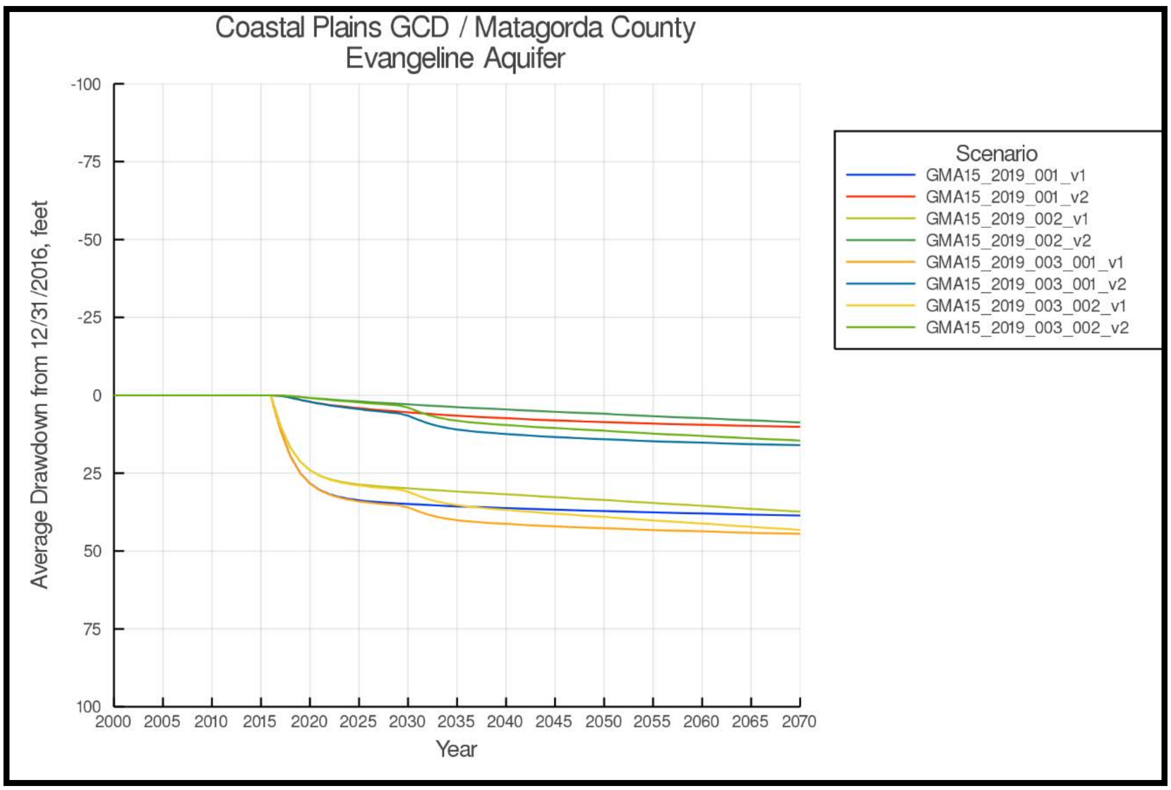

Coastal Bend GCD / Wharton County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

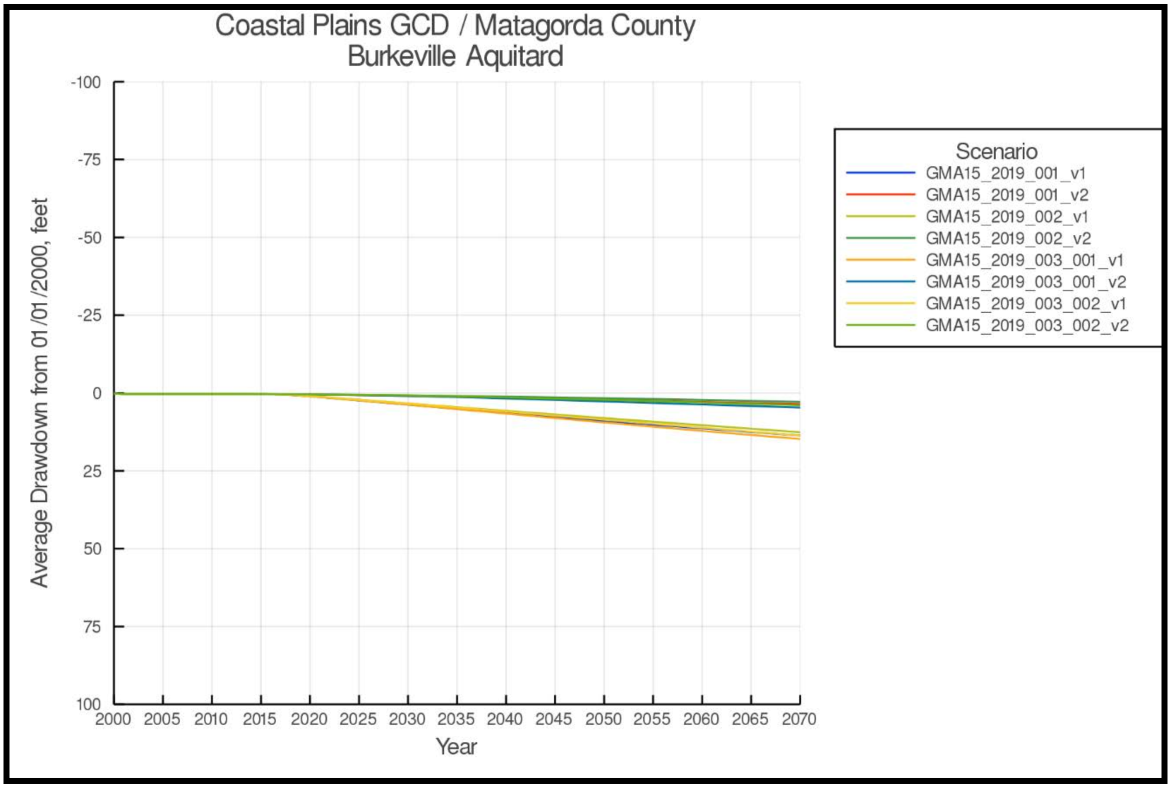

Coastal Bend GCD / Wharton County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

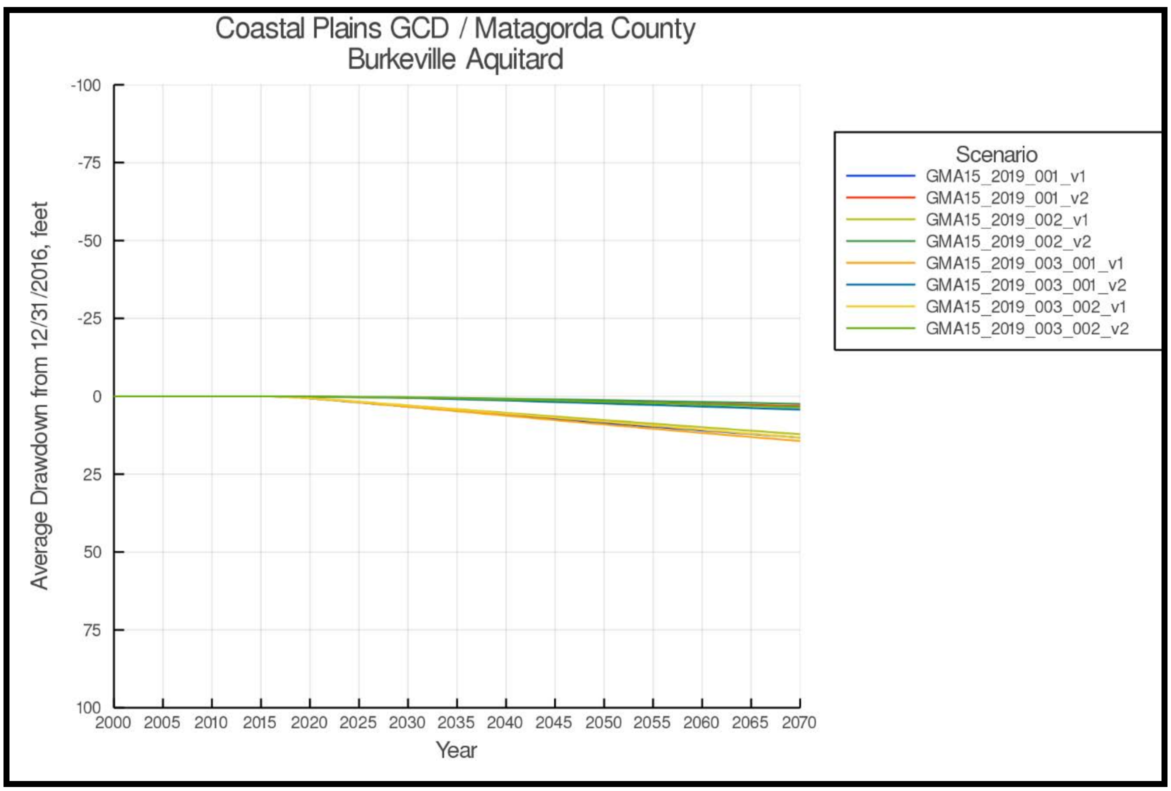

Coastal Plains GCD / Matagorda County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

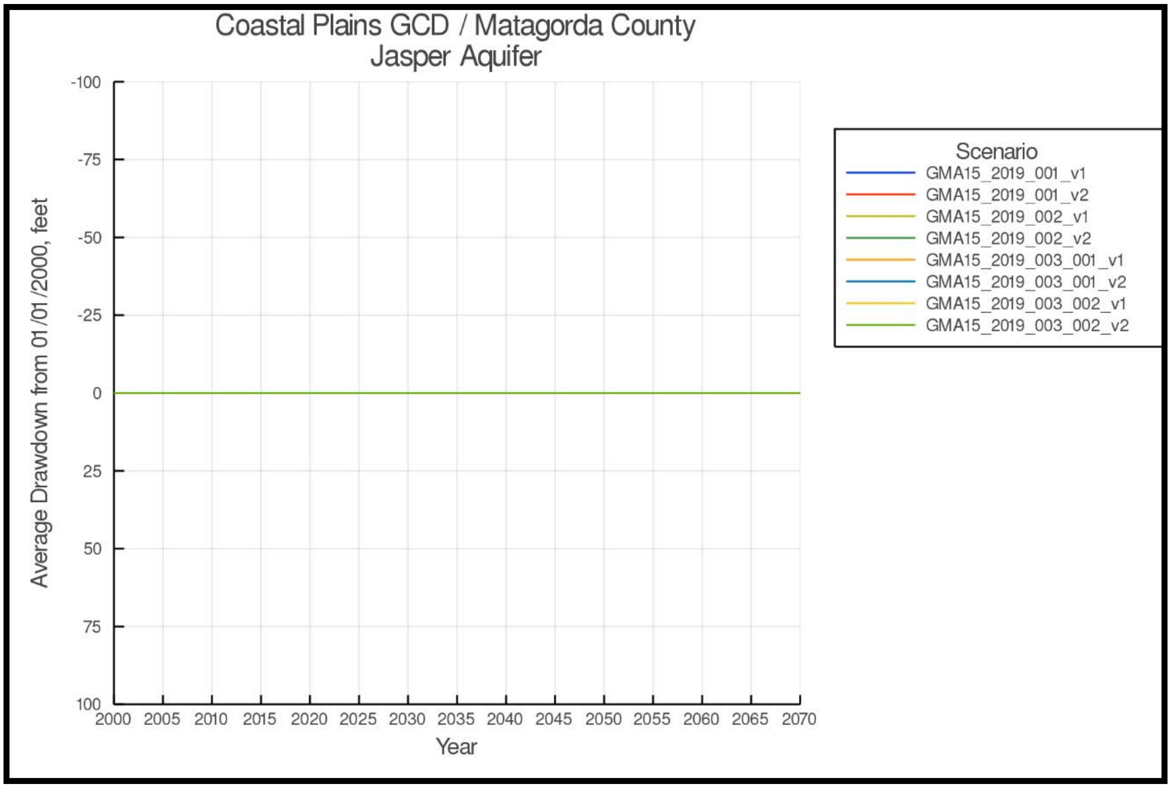

Coastal Plains GCD / Matagorda County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

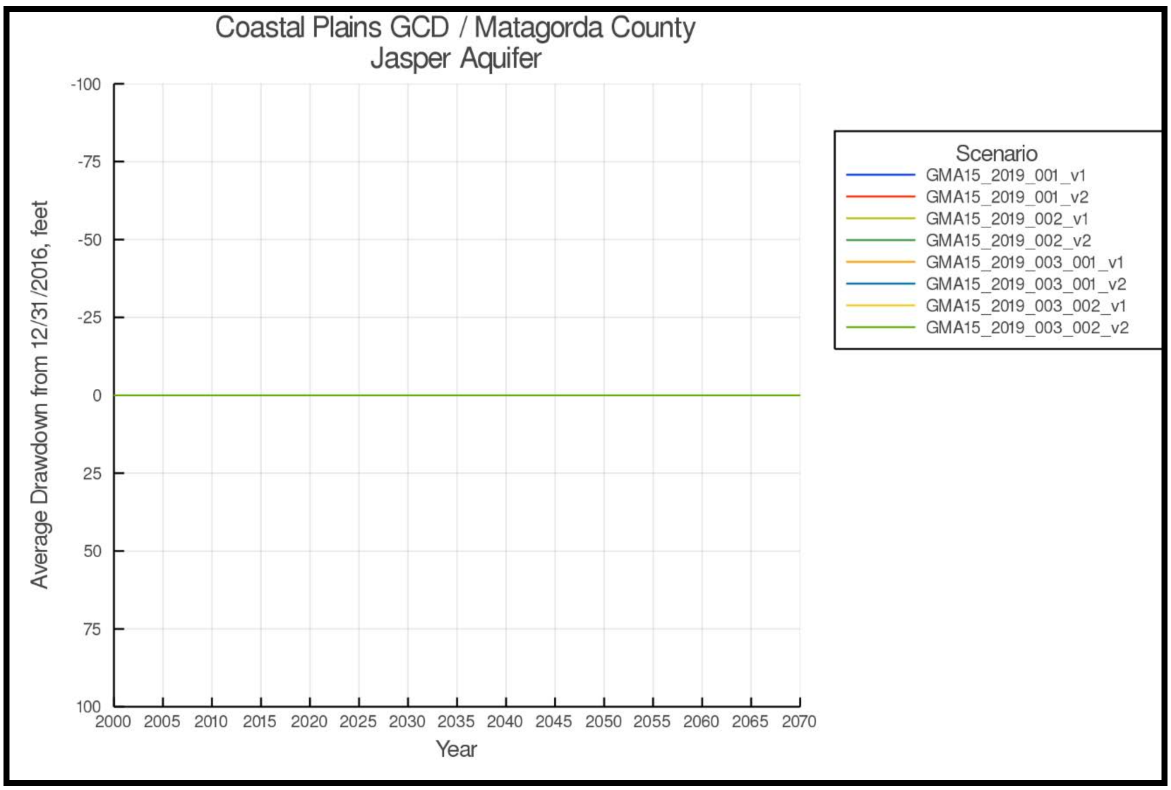

Coastal Plains GCD / Matagorda County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

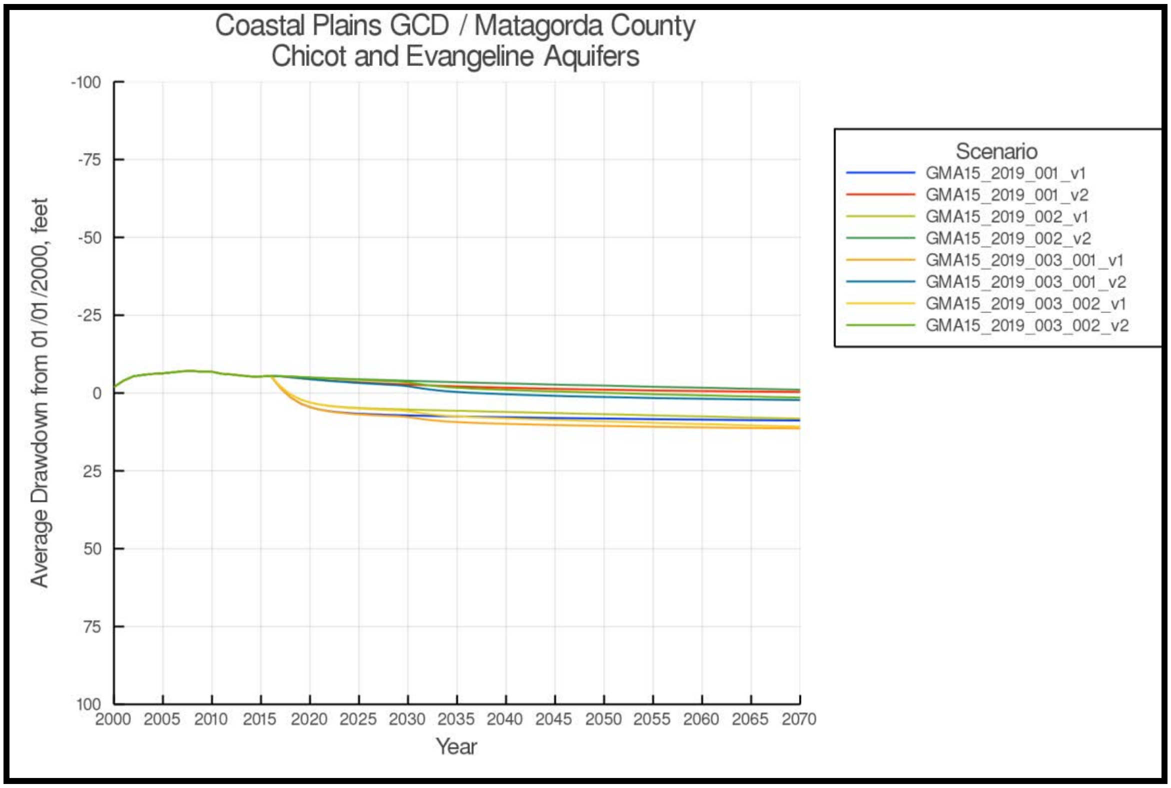

Coastal Plains GCD / Matagorda County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

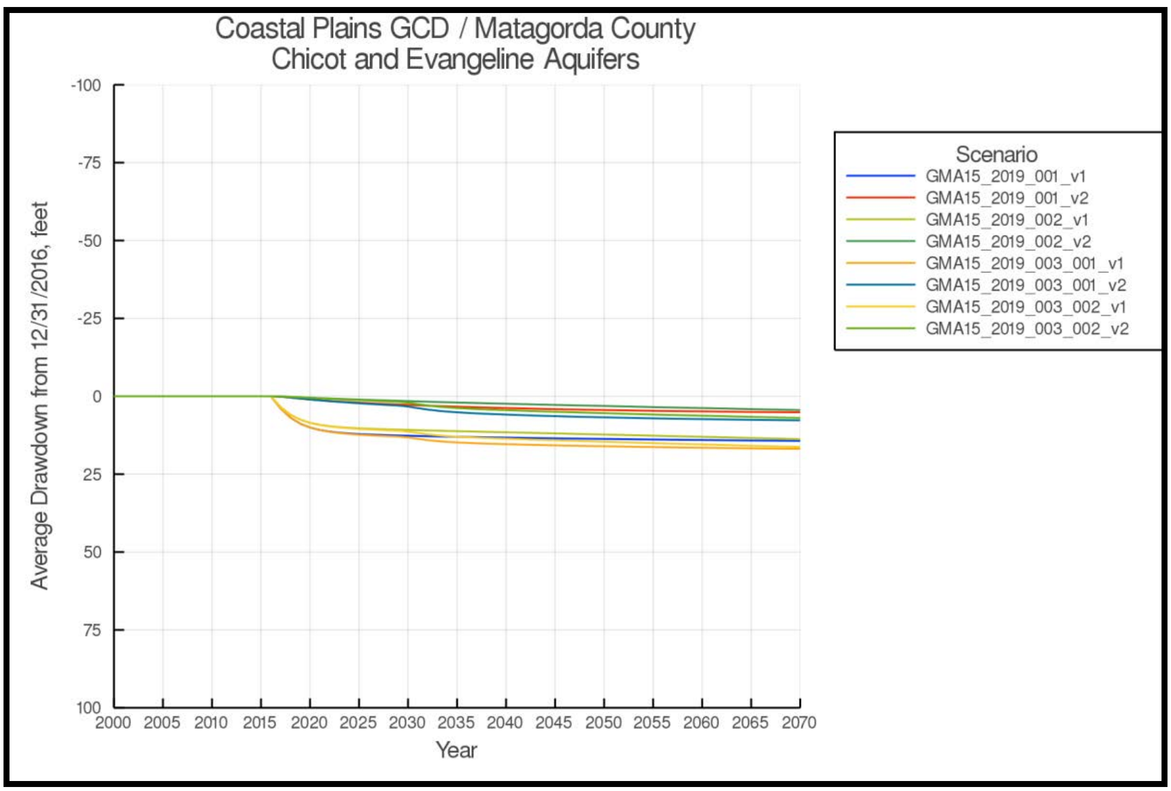

Coastal Plains GCD / Matagorda County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

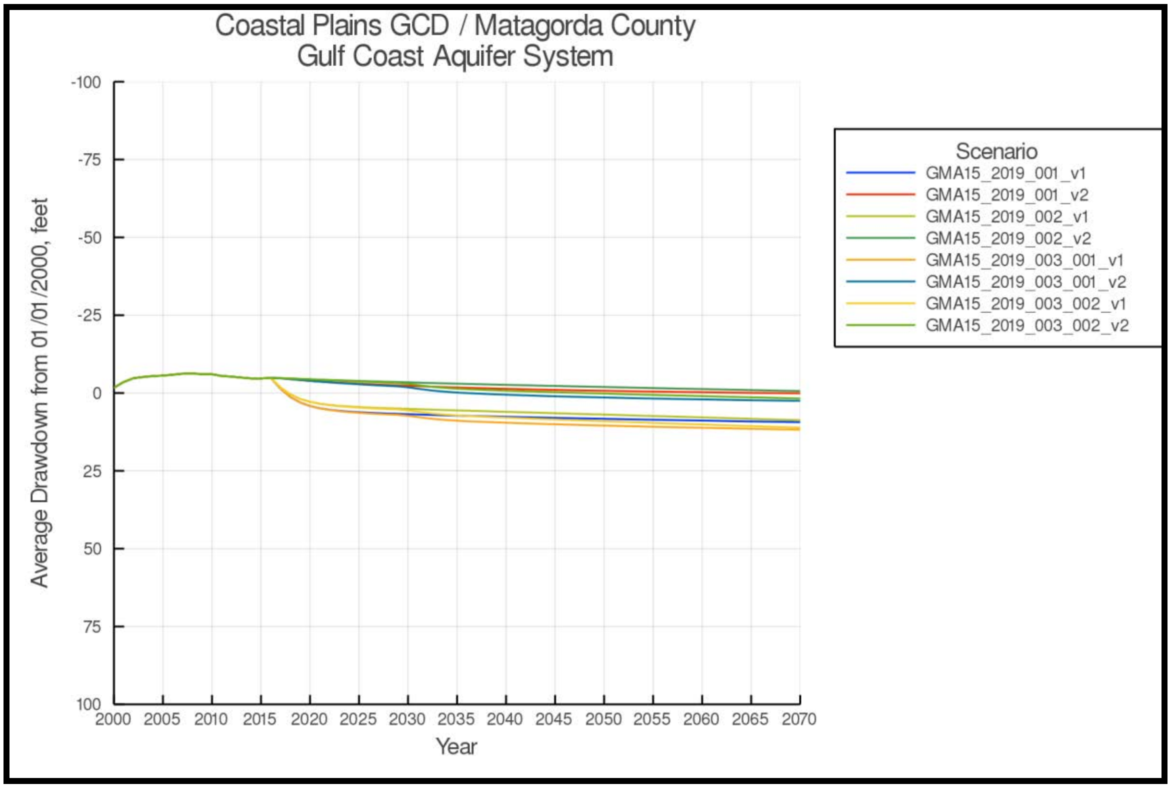

Coastal Plains GCD / Matagorda County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

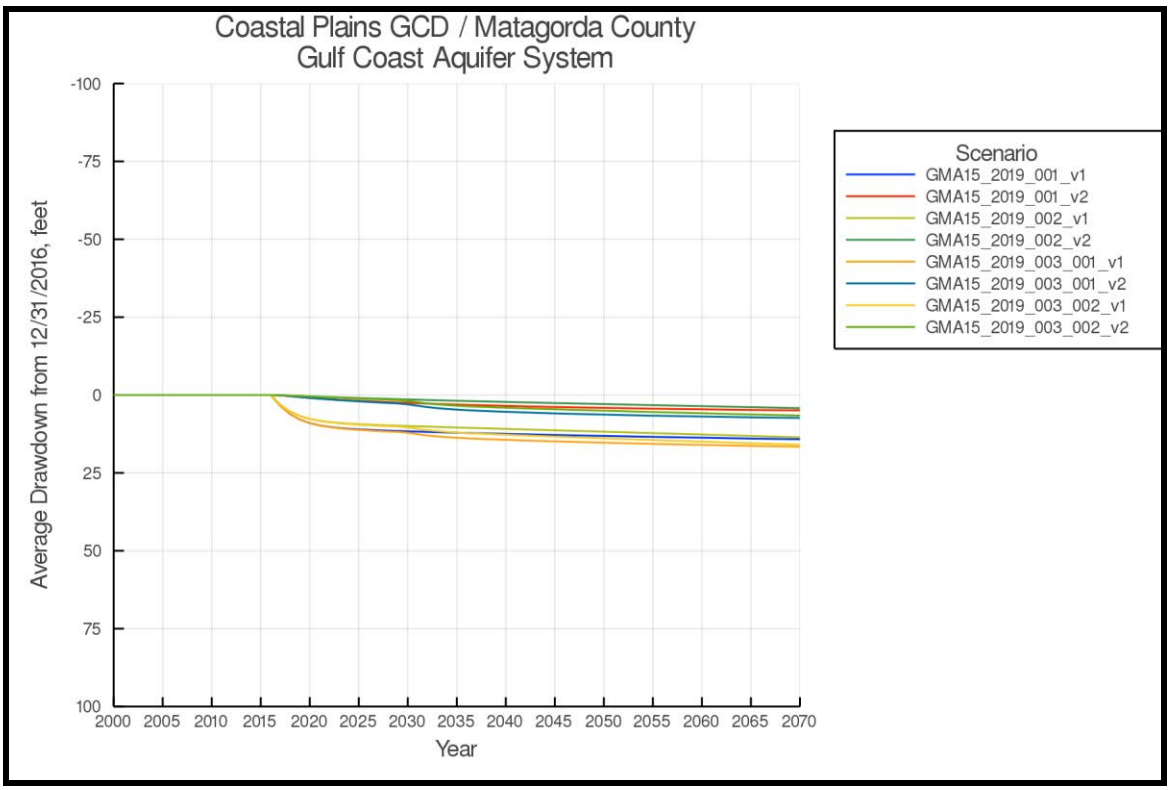

Coastal Plains GCD / Matagorda County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

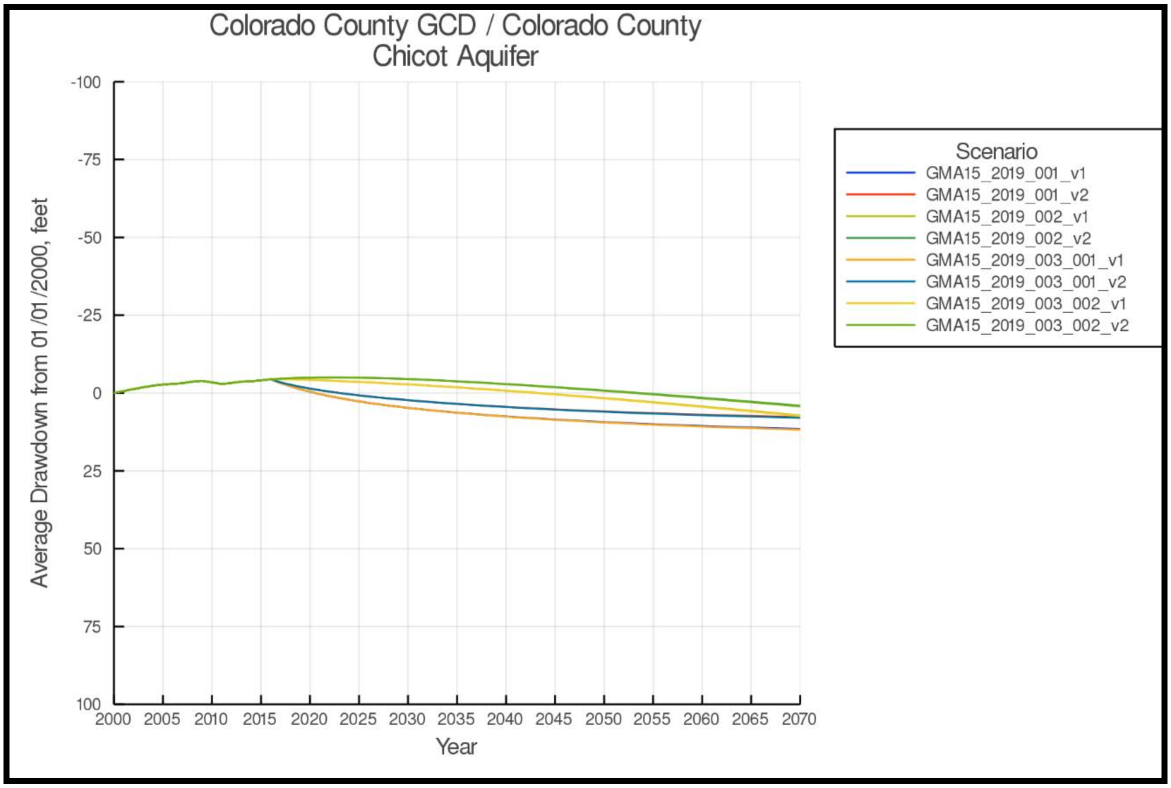

Coastal Plains GCD / Matagorda County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

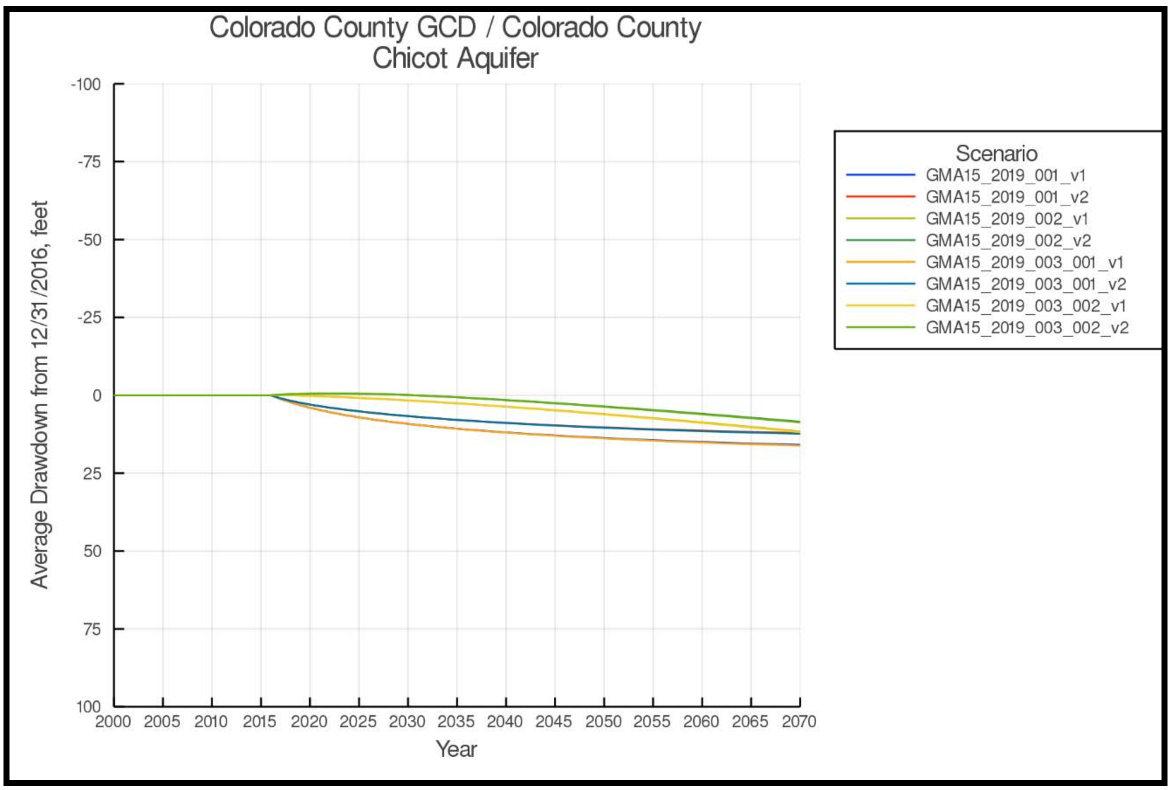

Coastal Plains GCD / Matagorda County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

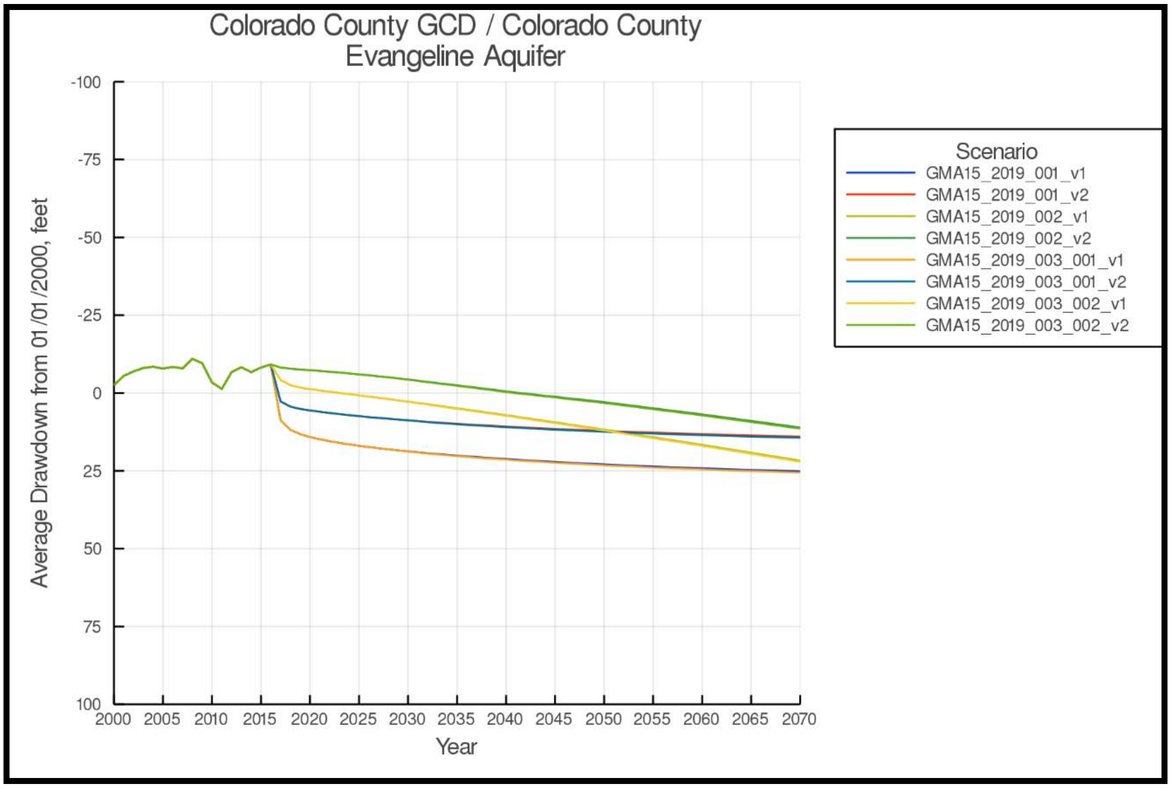

Coastal Plains GCD / Matagorda County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

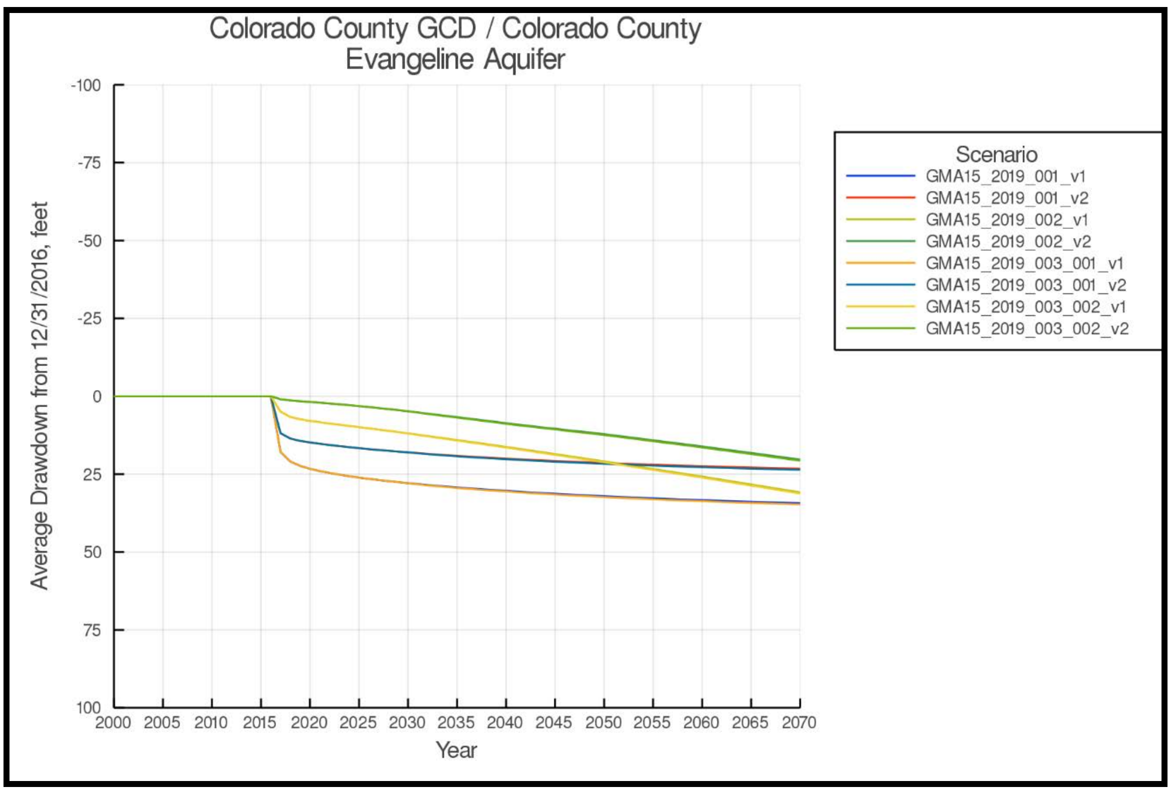

Coastal Plains GCD / Matagorda County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

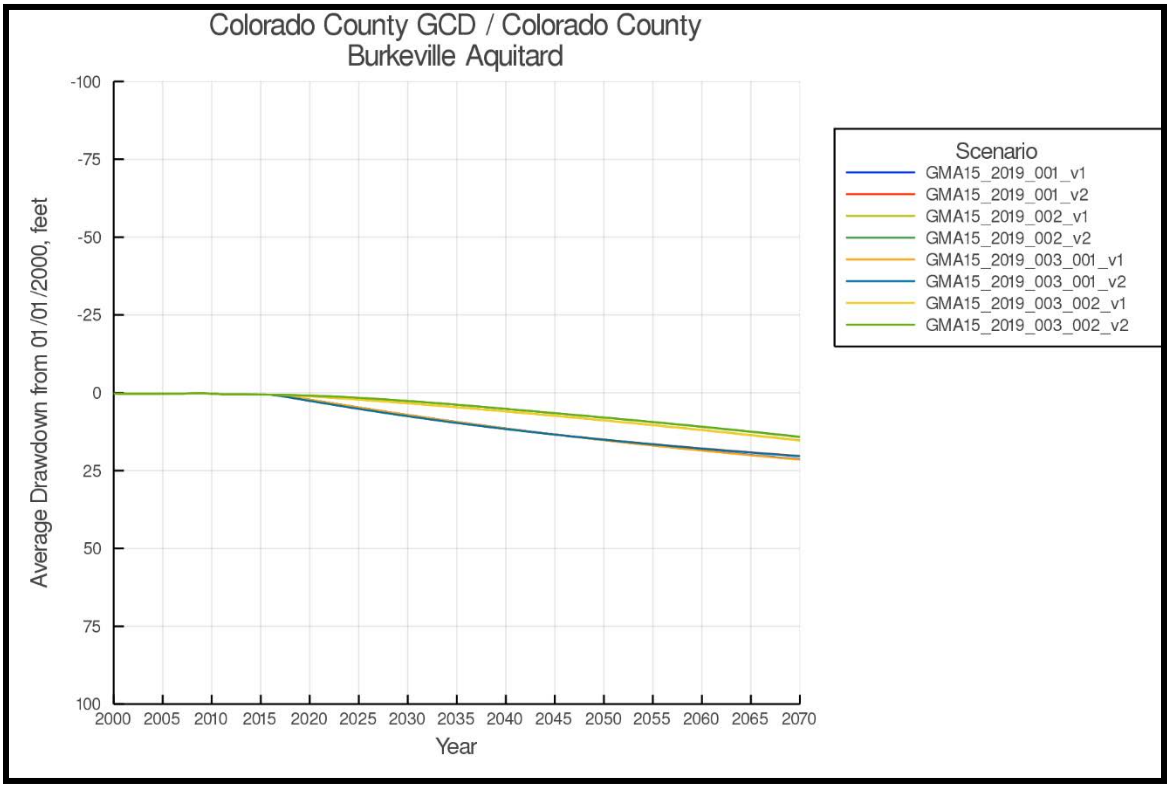

Coastal Plains GCD / Matagorda County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

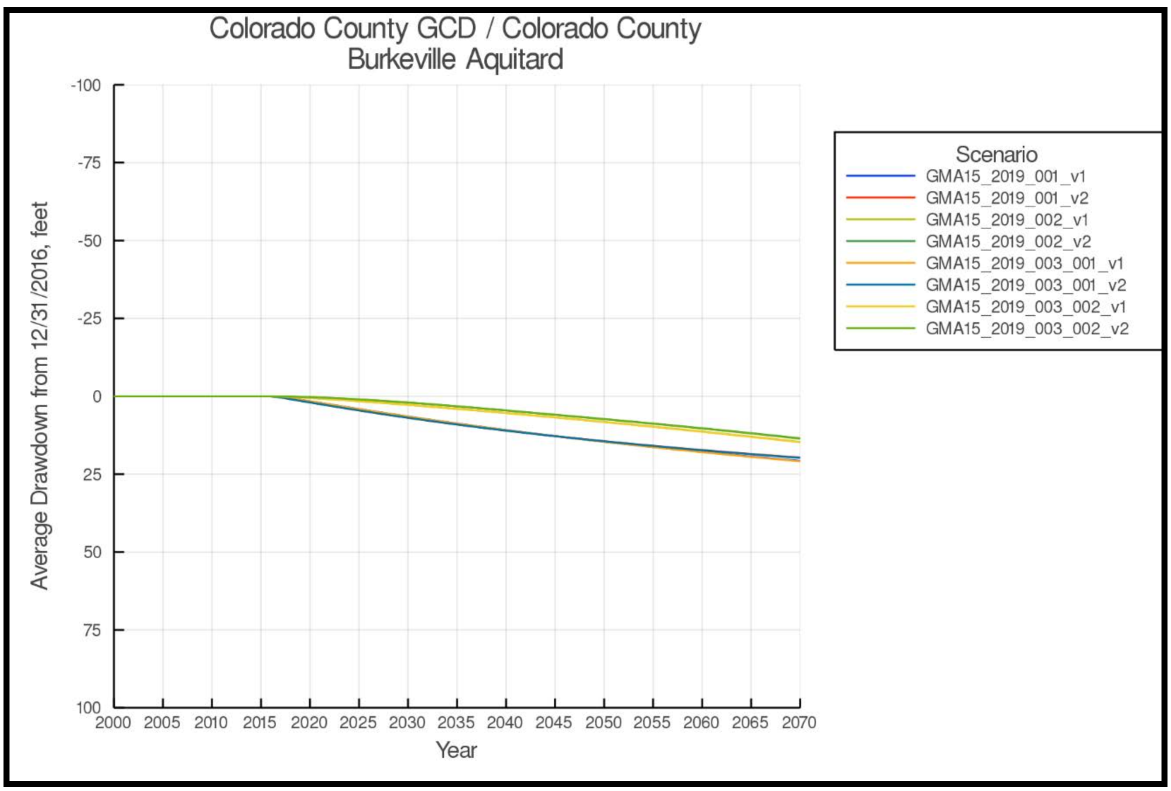

Colorado County GCD / Colorado County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

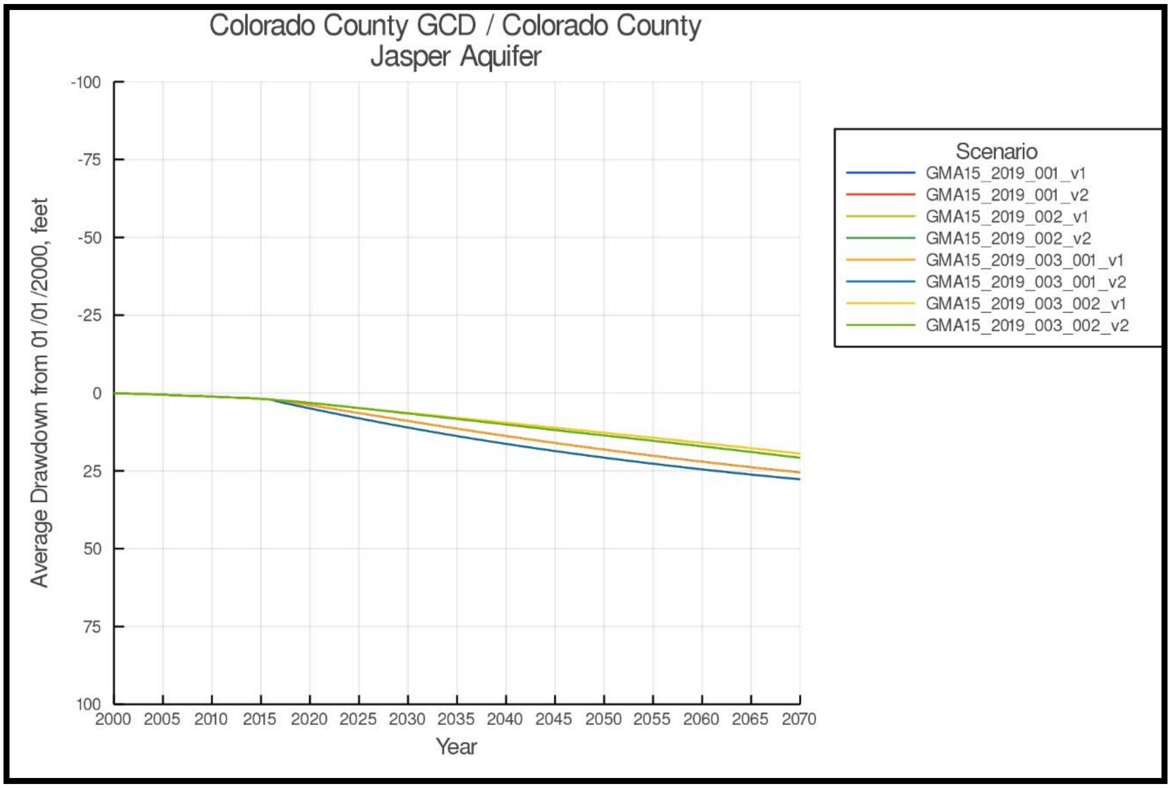

Colorado County GCD / Colorado County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

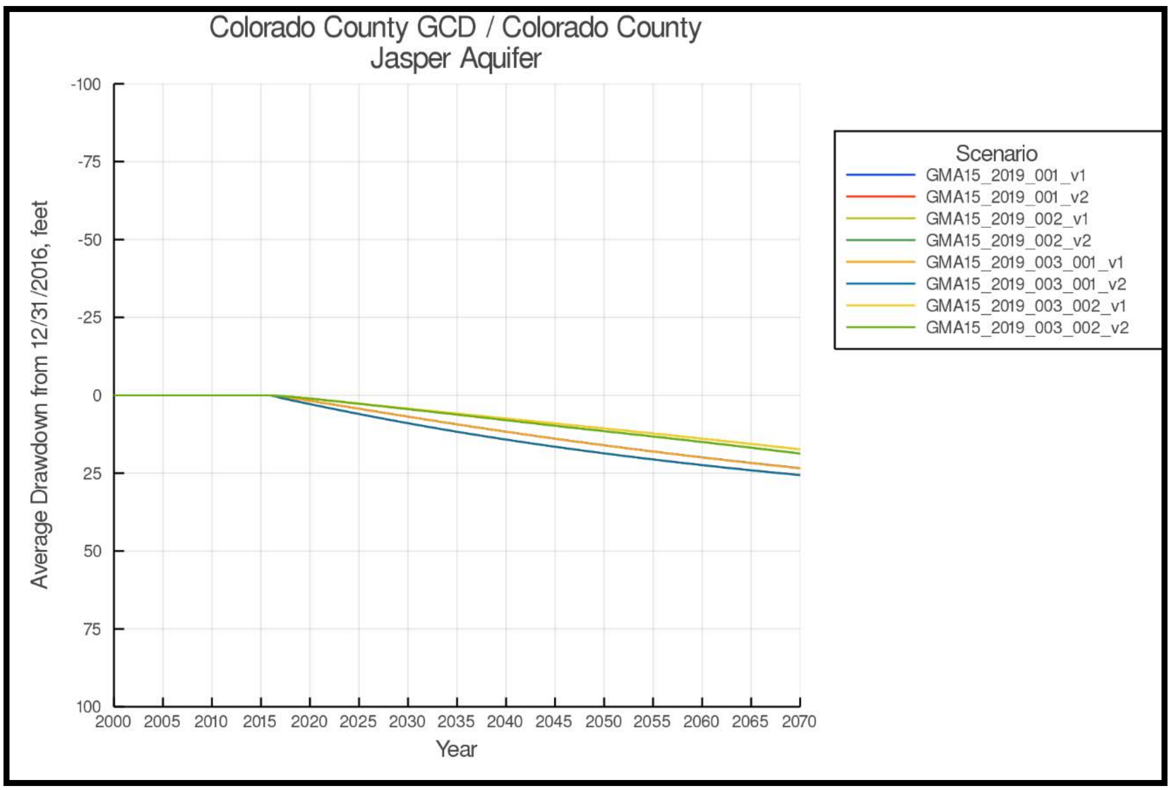

Colorado County GCD / Colorado County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

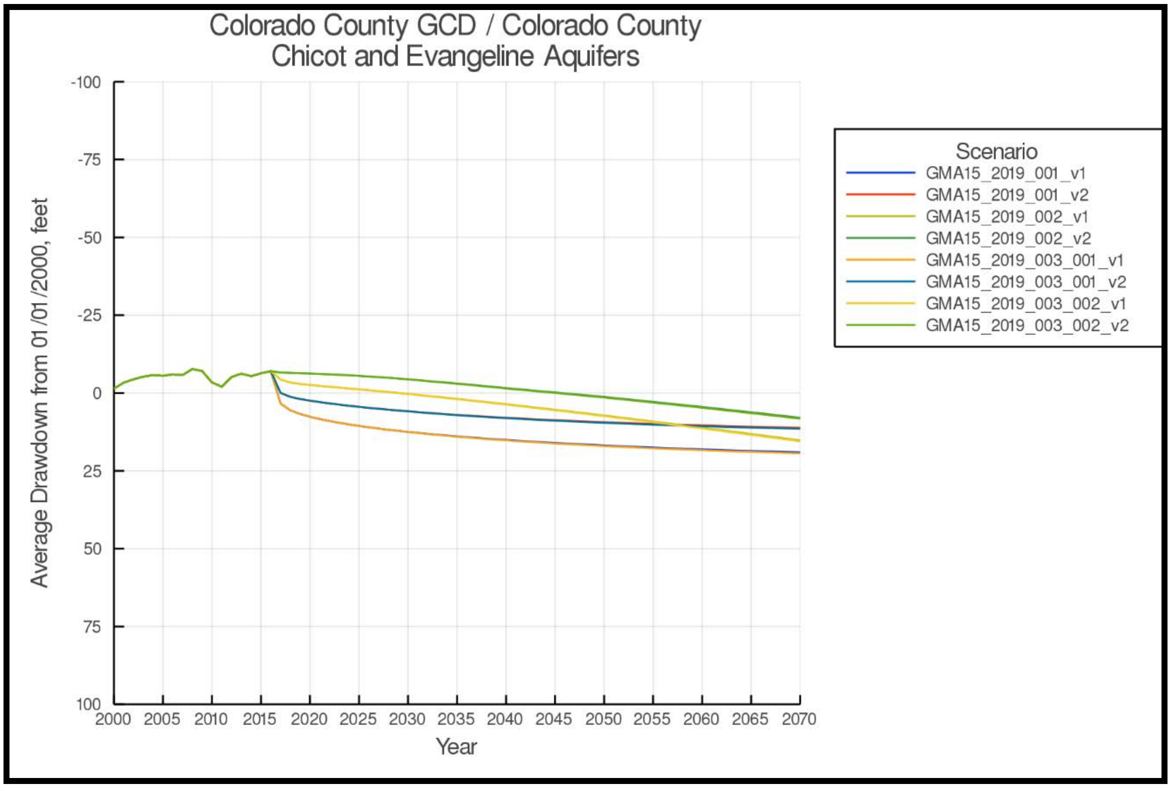

Colorado County GCD / Colorado County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

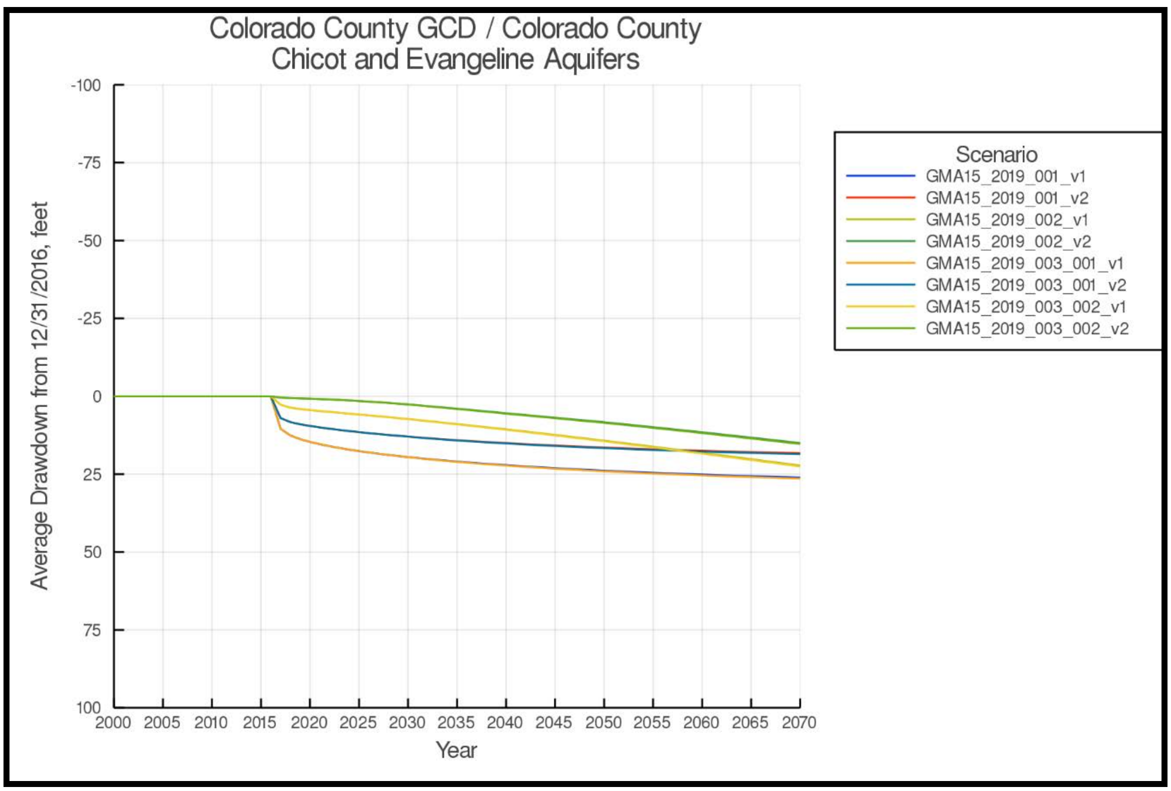

Colorado County GCD / Colorado County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

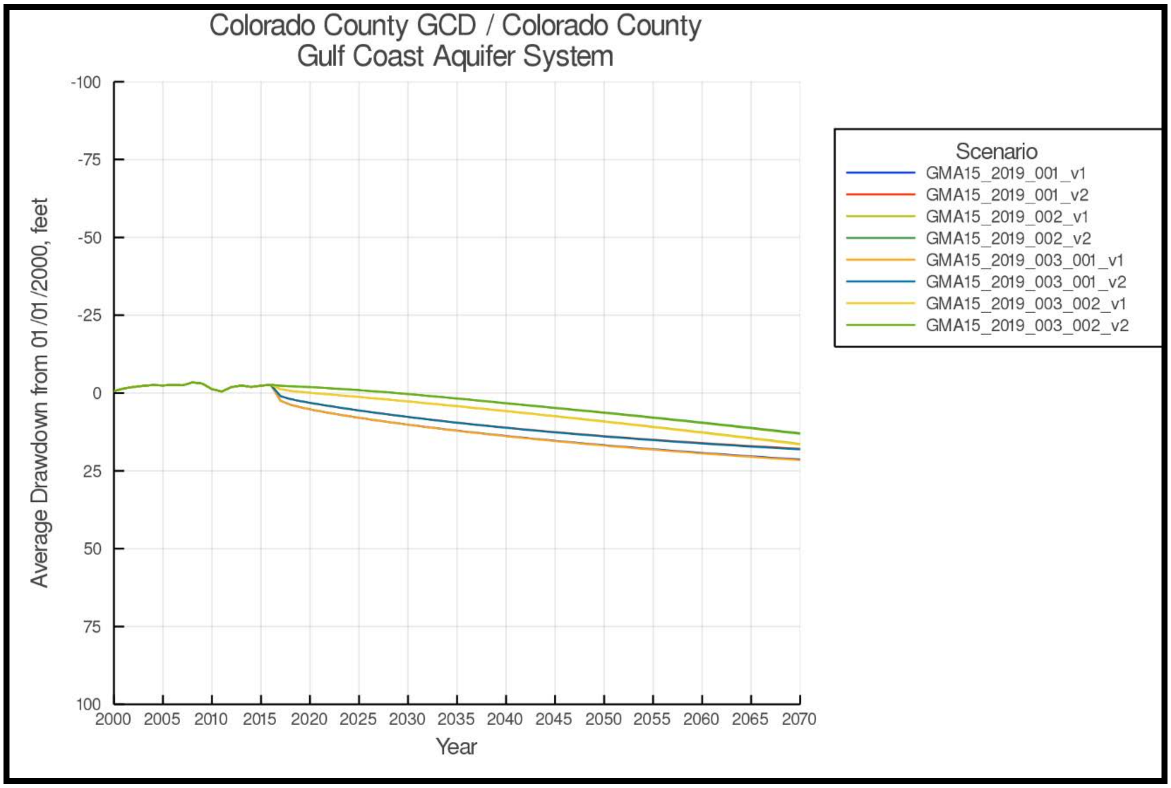

Colorado County GCD / Colorado County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

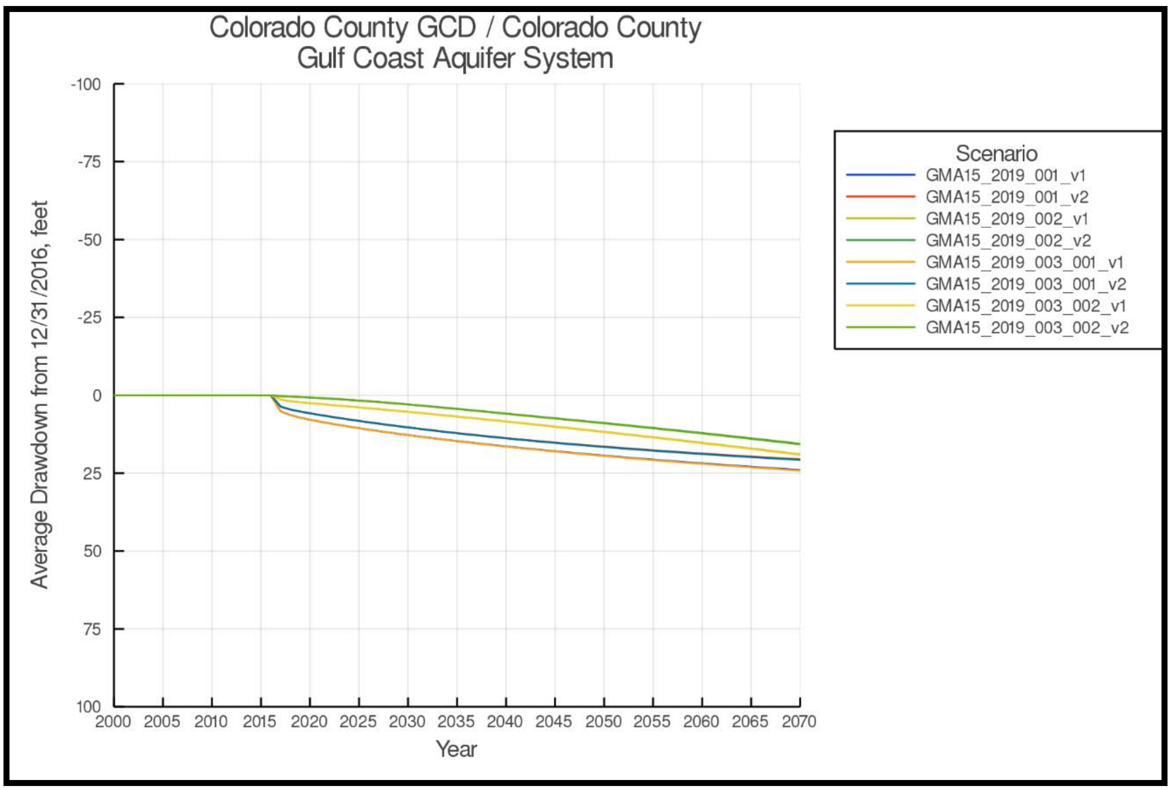

Colorado County GCD / Colorado County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

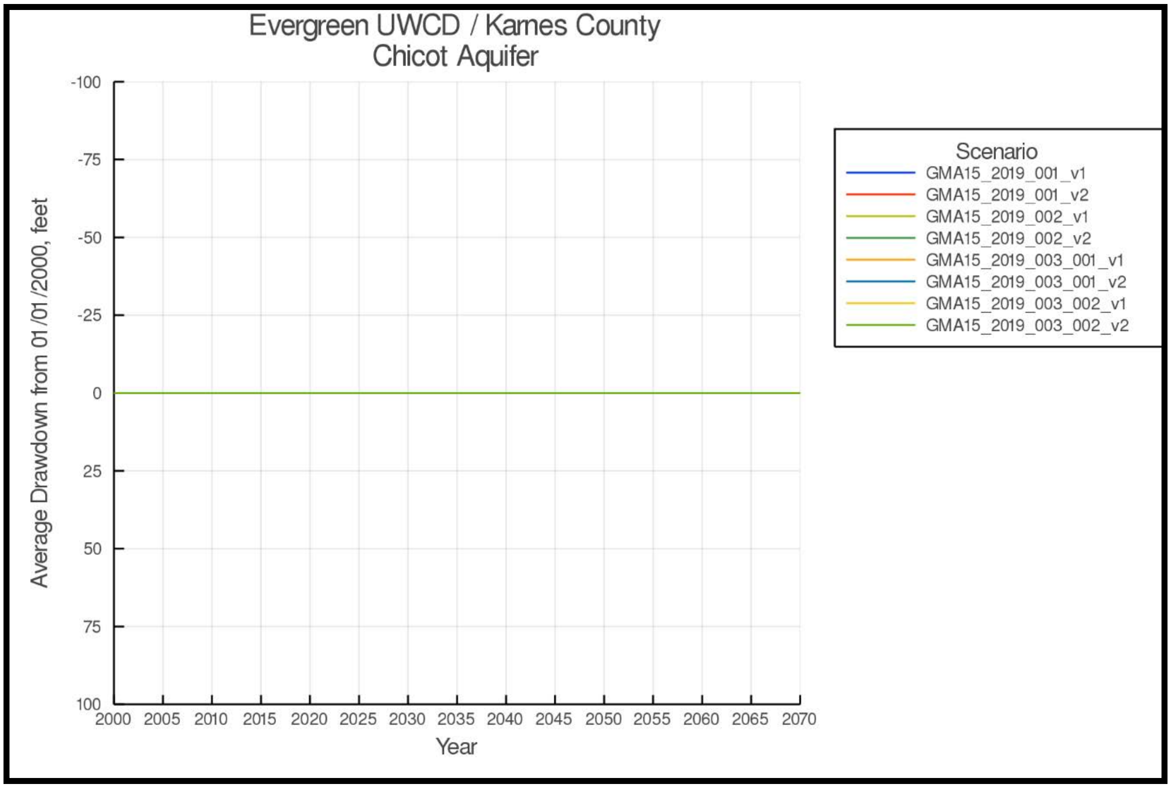

Colorado County GCD / Colorado County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

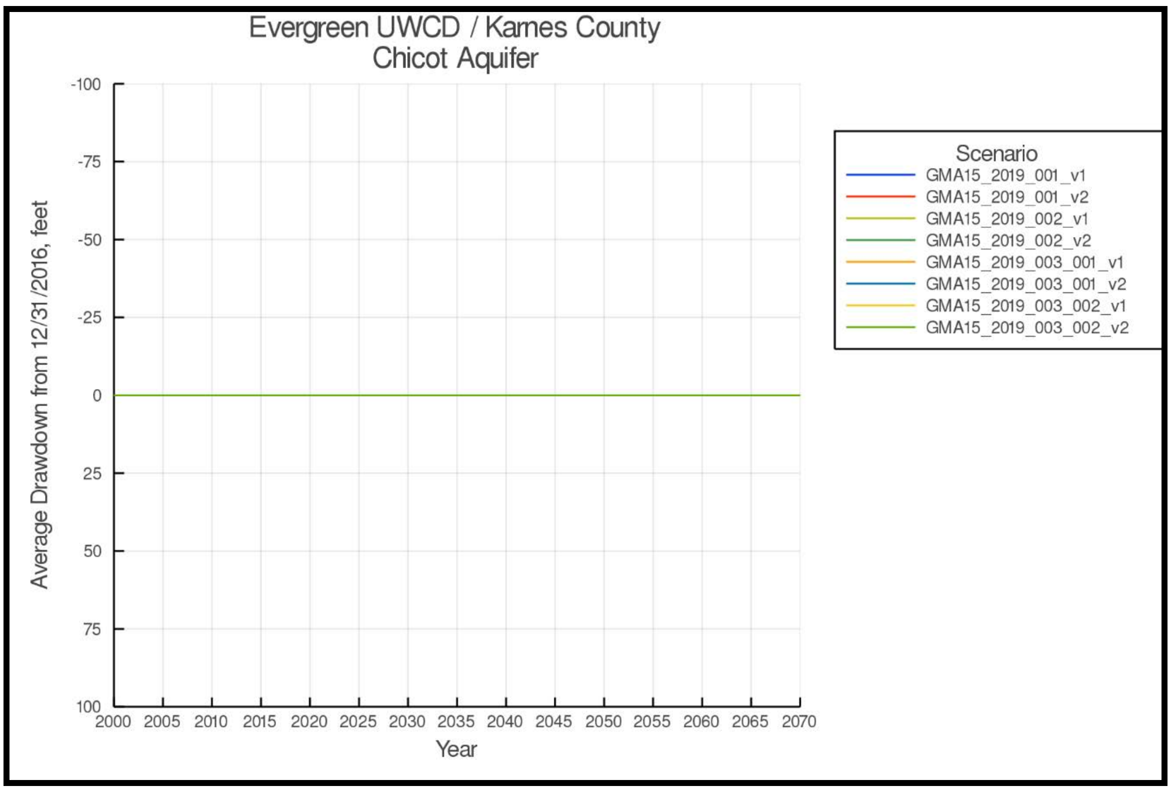

Colorado County GCD / Colorado County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

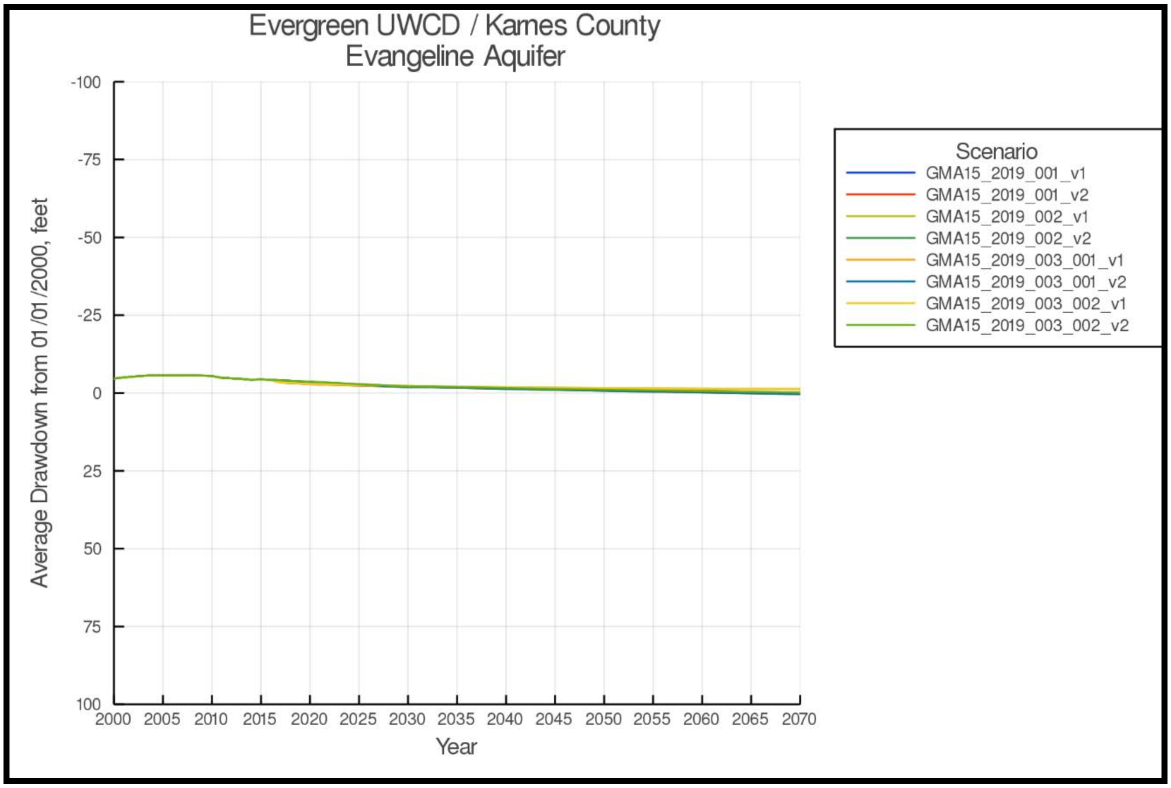

Colorado County GCD / Colorado County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

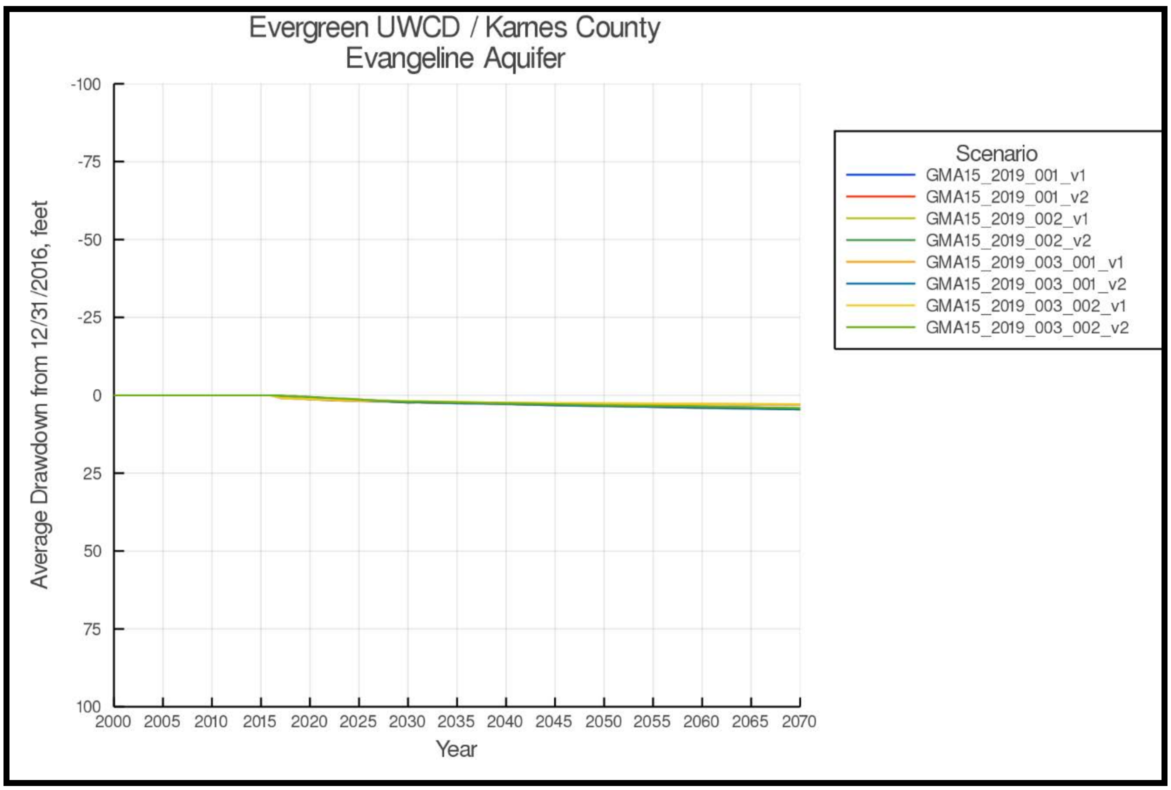

Colorado County GCD / Colorado County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

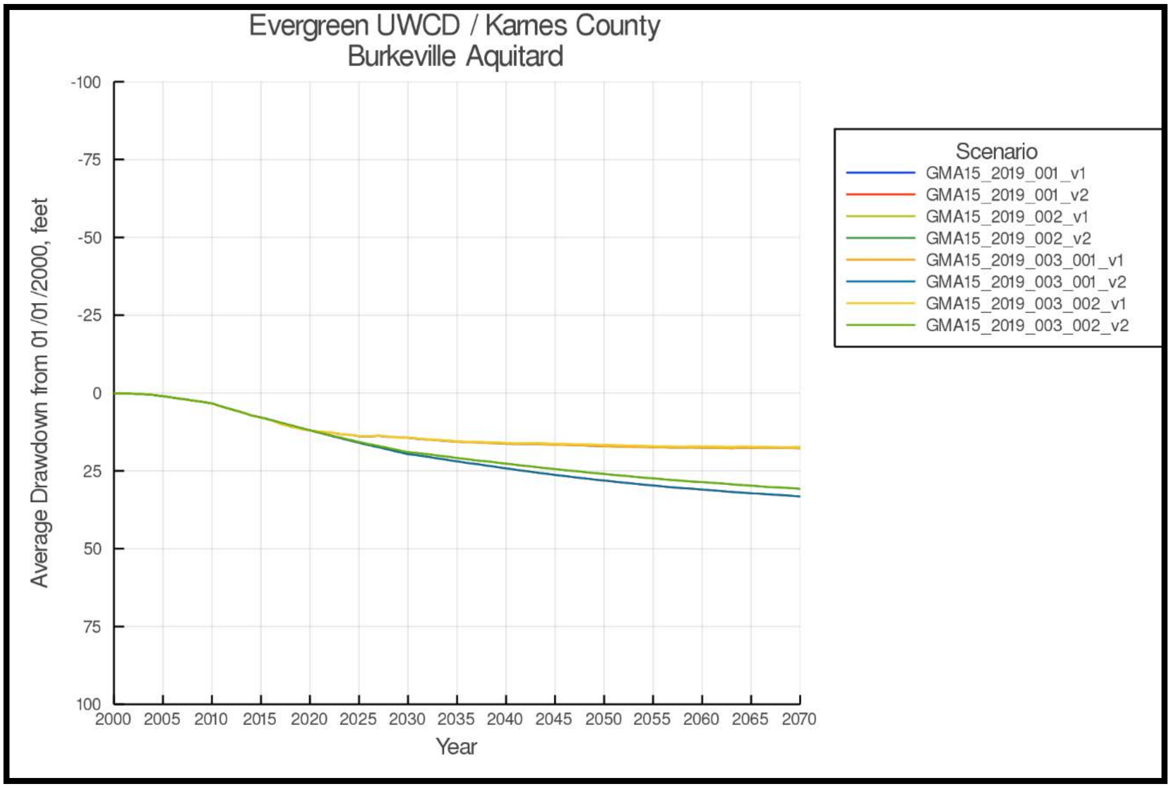

Colorado County GCD / Colorado County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

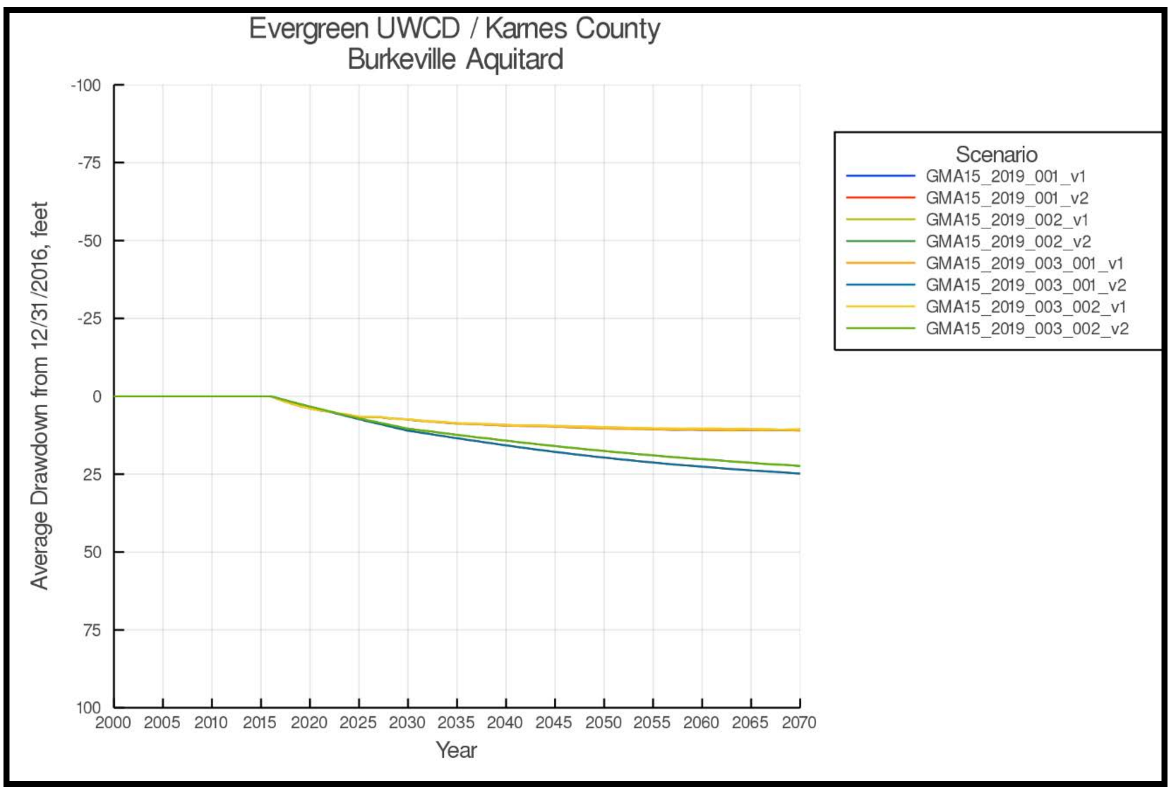

Evergreen UWCD / Karnes County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

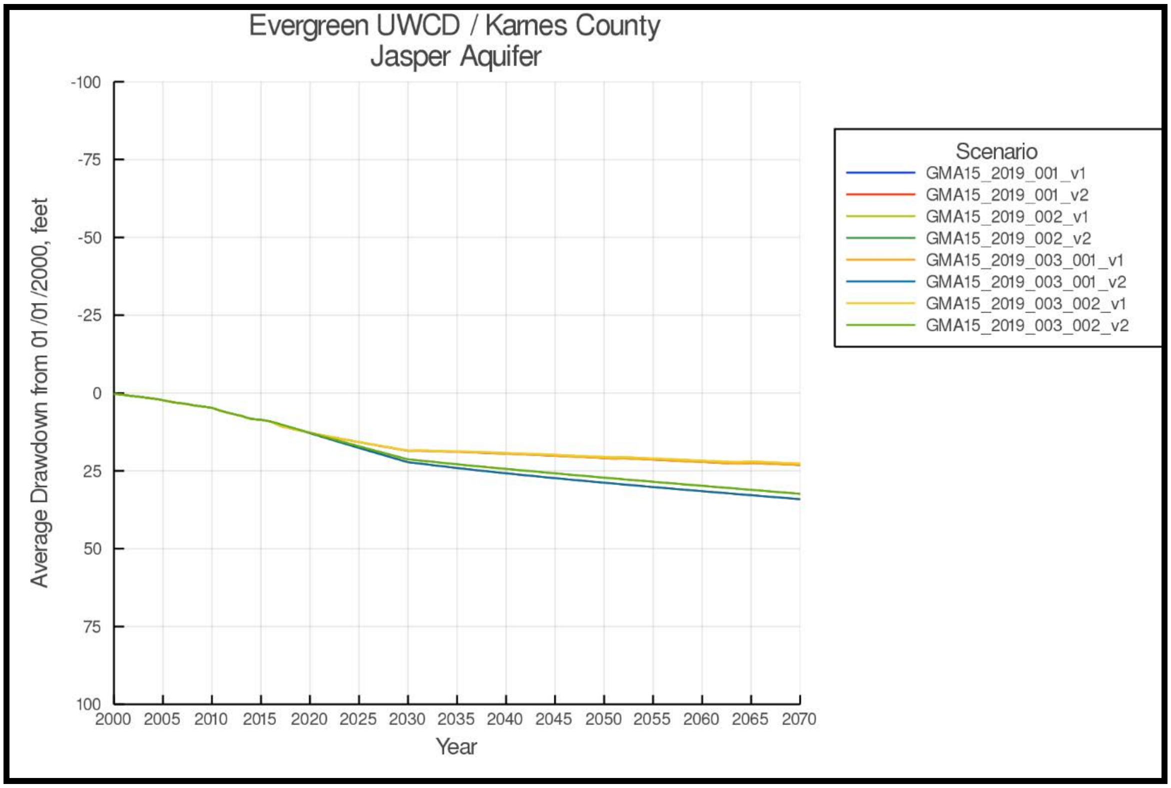

Evergreen UWCD / Karnes County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

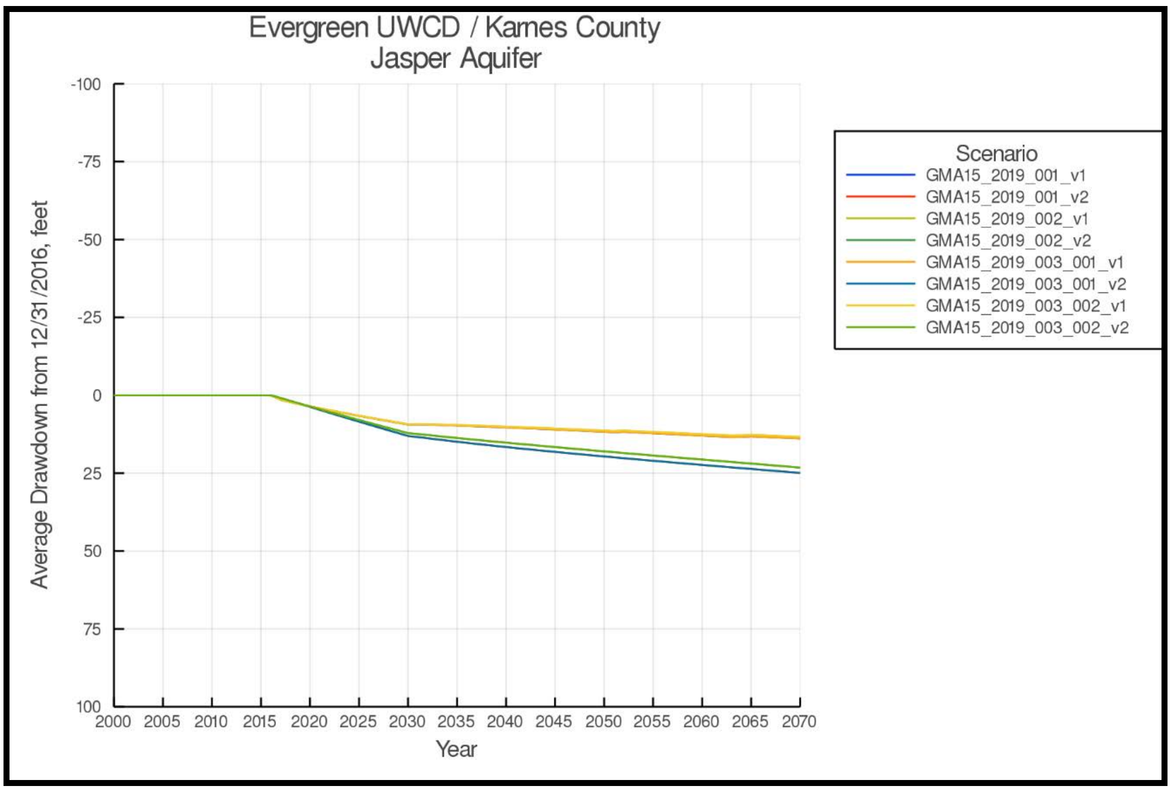

Evergreen UWCD / Karnes County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

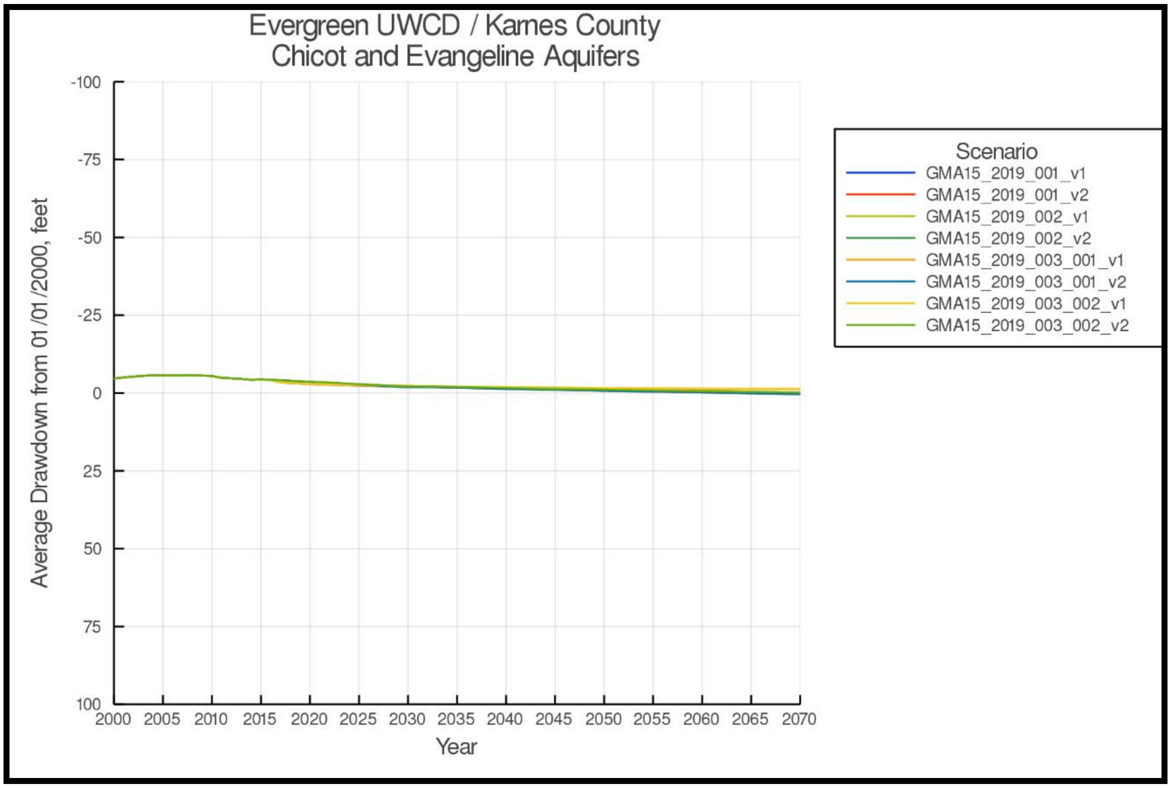

Evergreen UWCD / Karnes County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

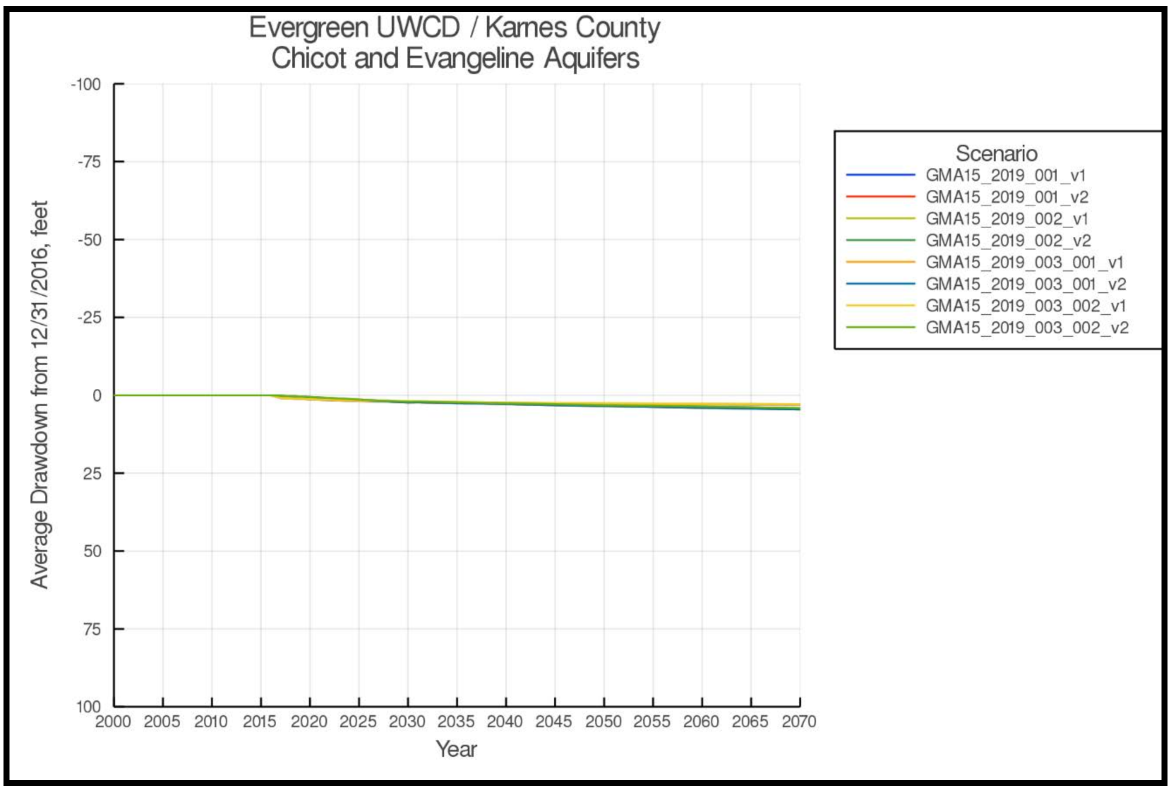

Evergreen UWCD / Karnes County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

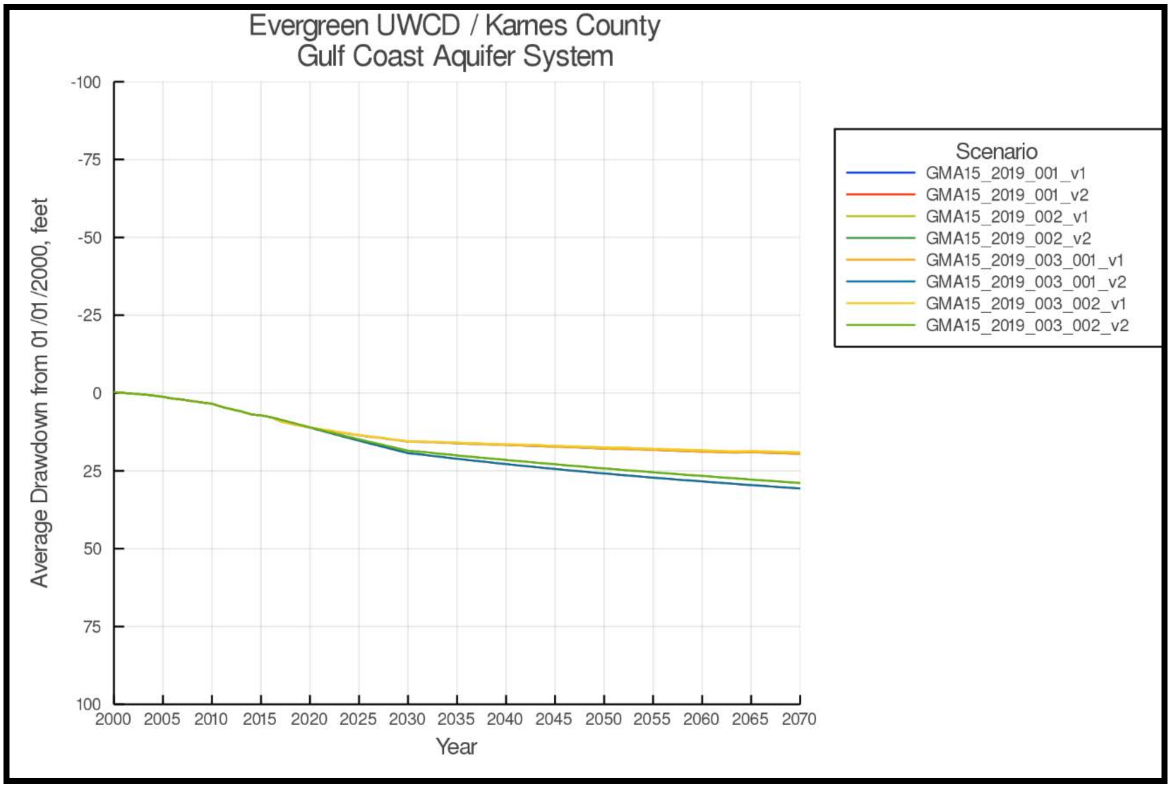

Evergreen UWCD / Karnes County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

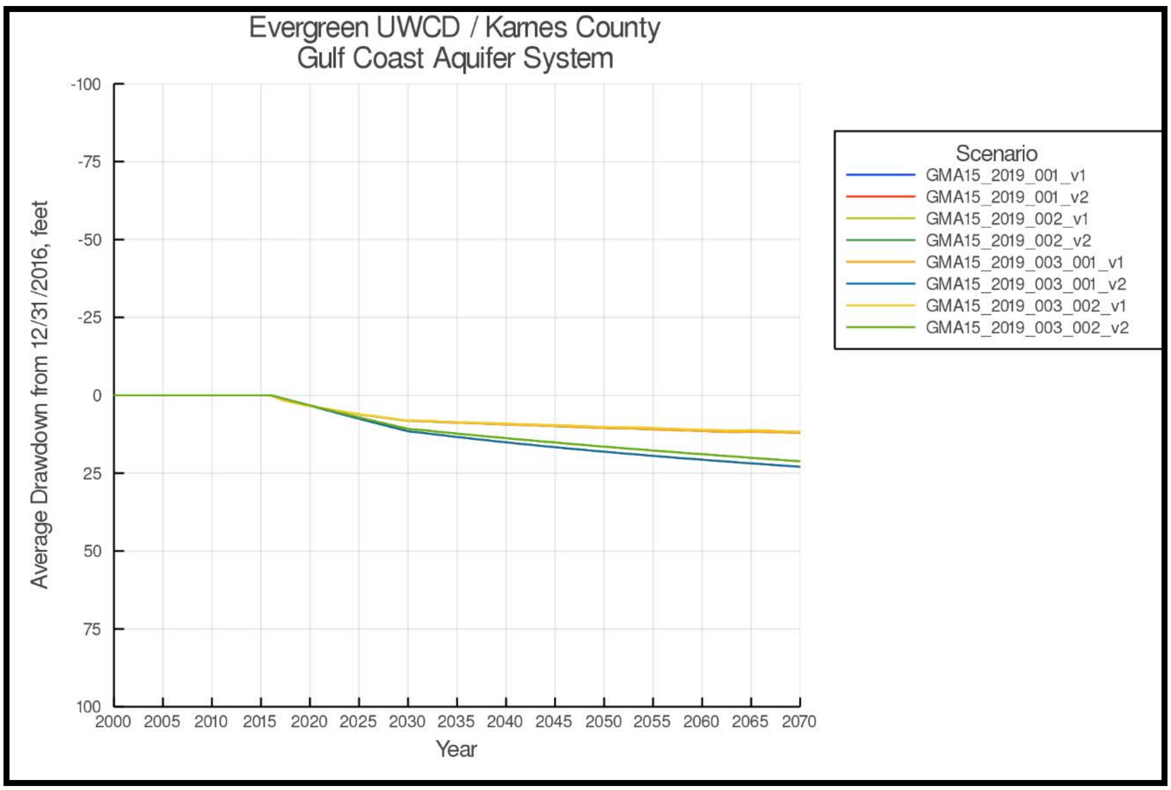

Evergreen UWCD / Karnes County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

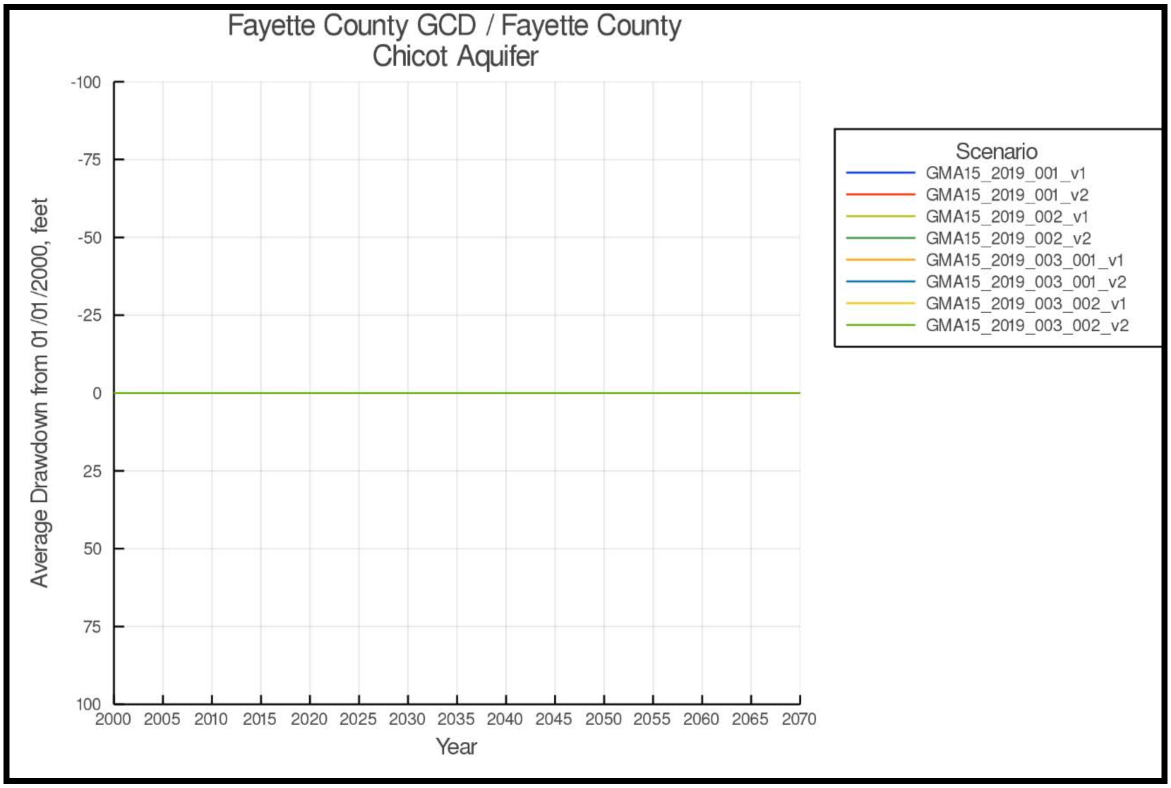

Evergreen UWCD / Karnes County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

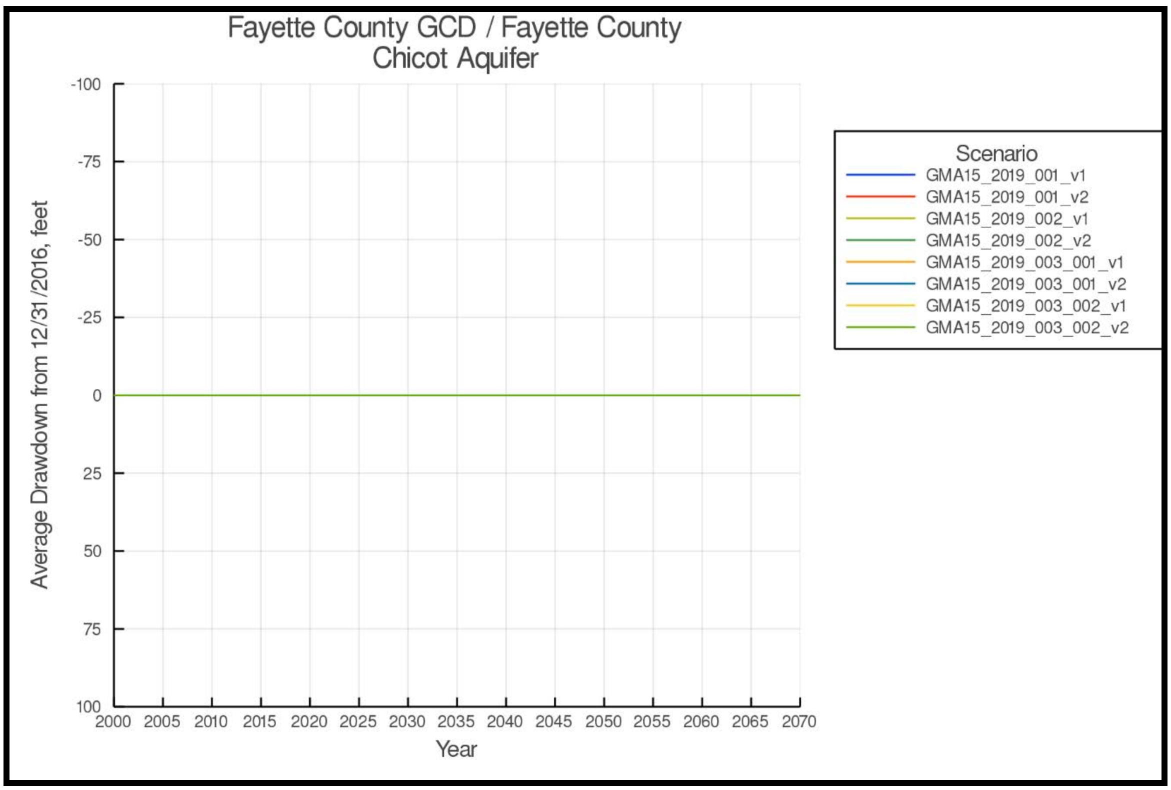

Evergreen UWCD / Karnes County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

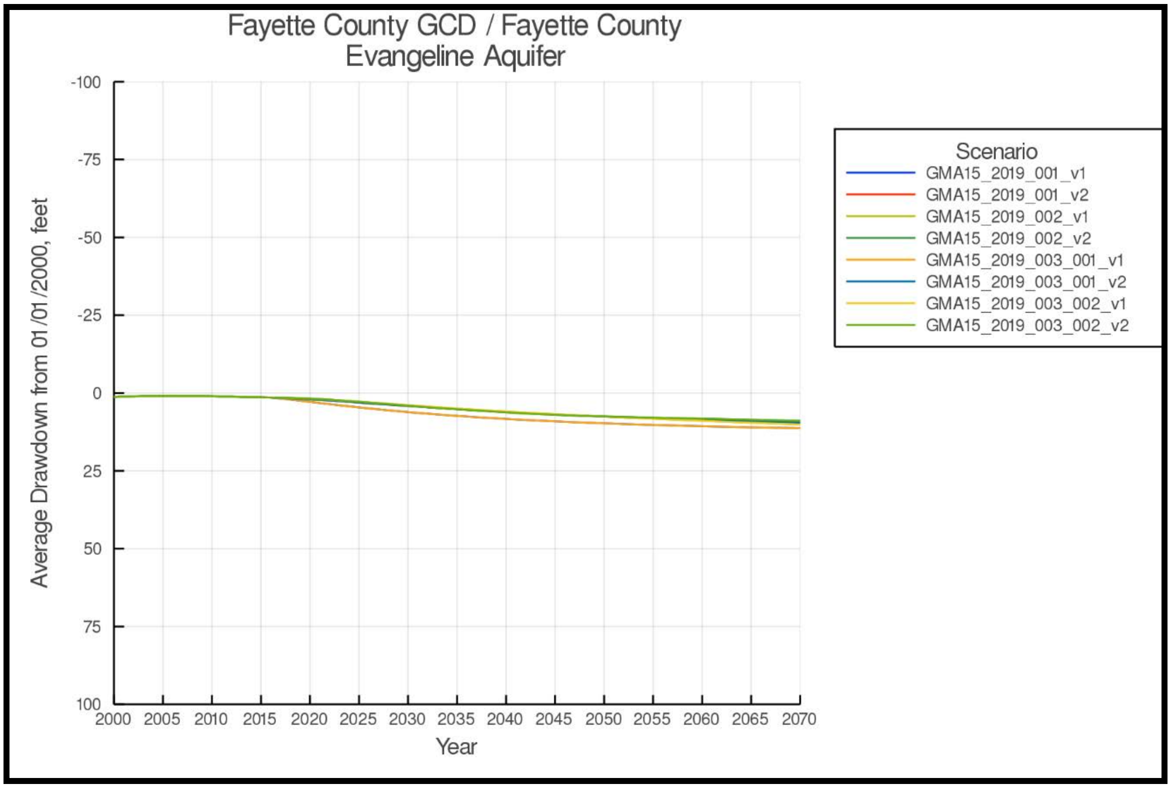

Evergreen UWCD / Karnes County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

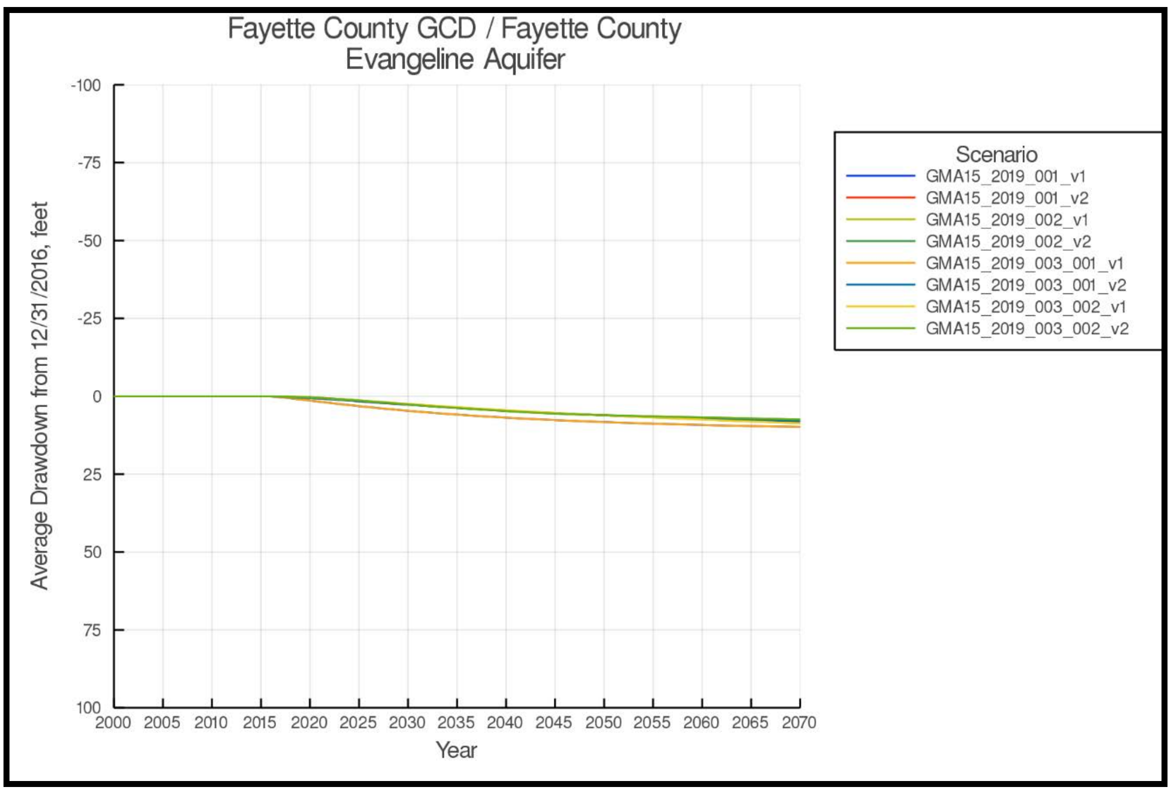

Evergreen UWCD / Karnes County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

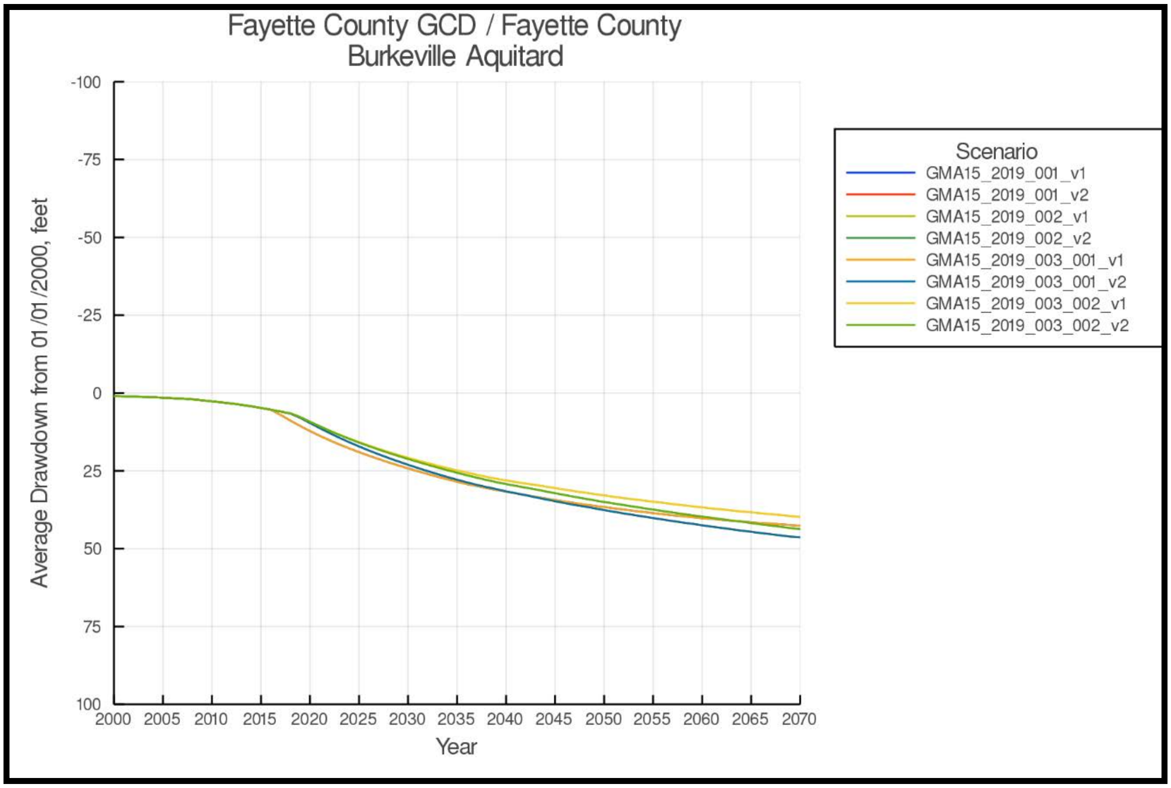

Evergreen UWCD / Karnes County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

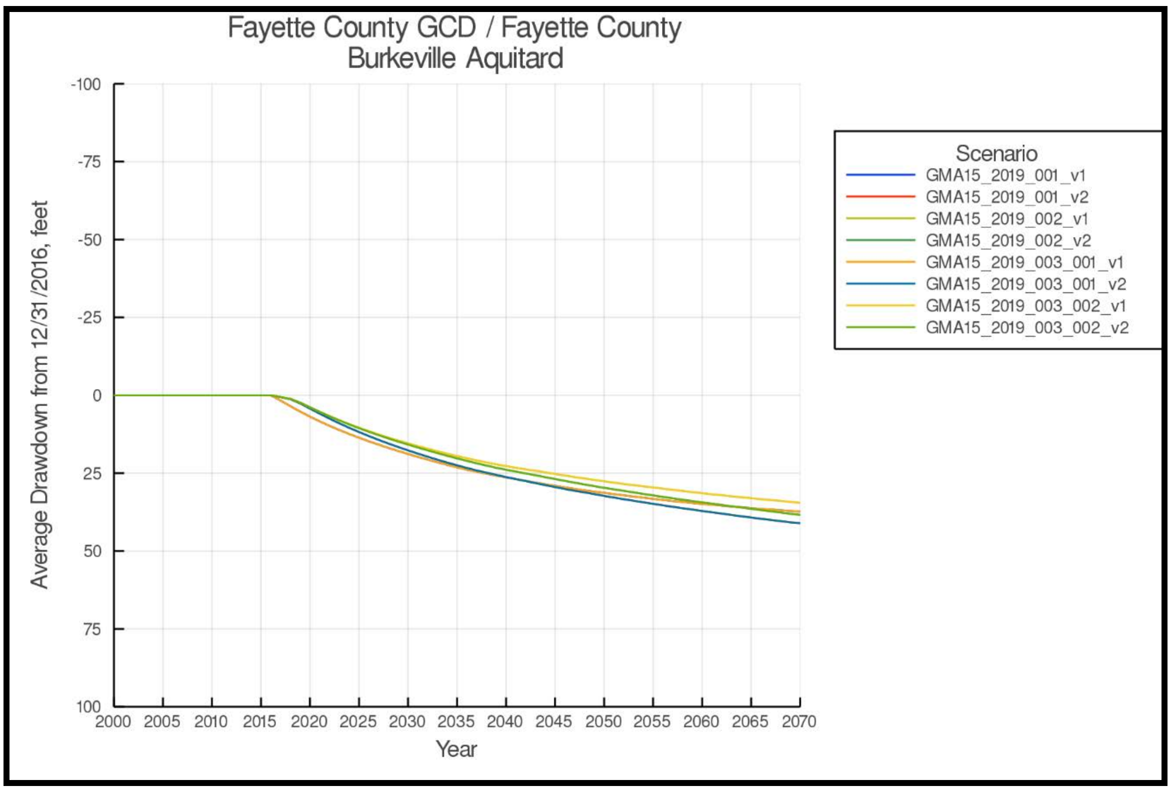

Fayette County GCD / Fayette County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

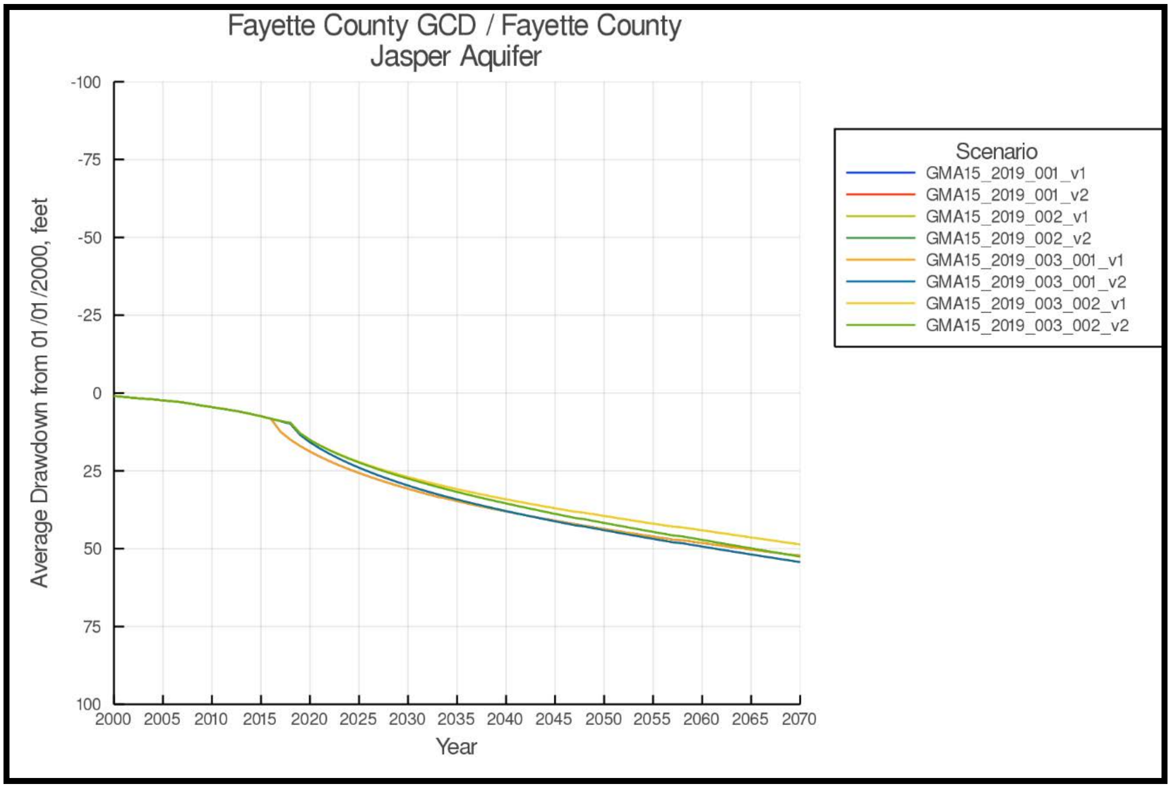

Fayette County GCD / Fayette County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

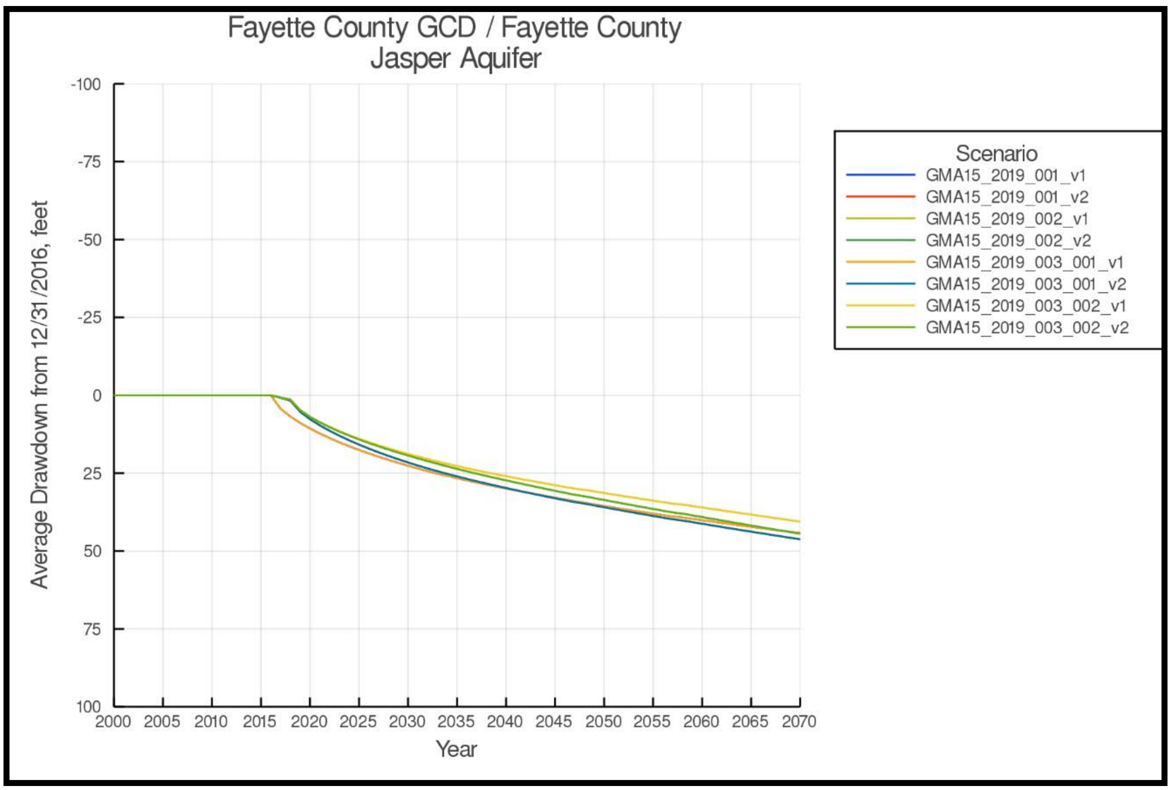

Fayette County GCD / Fayette County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

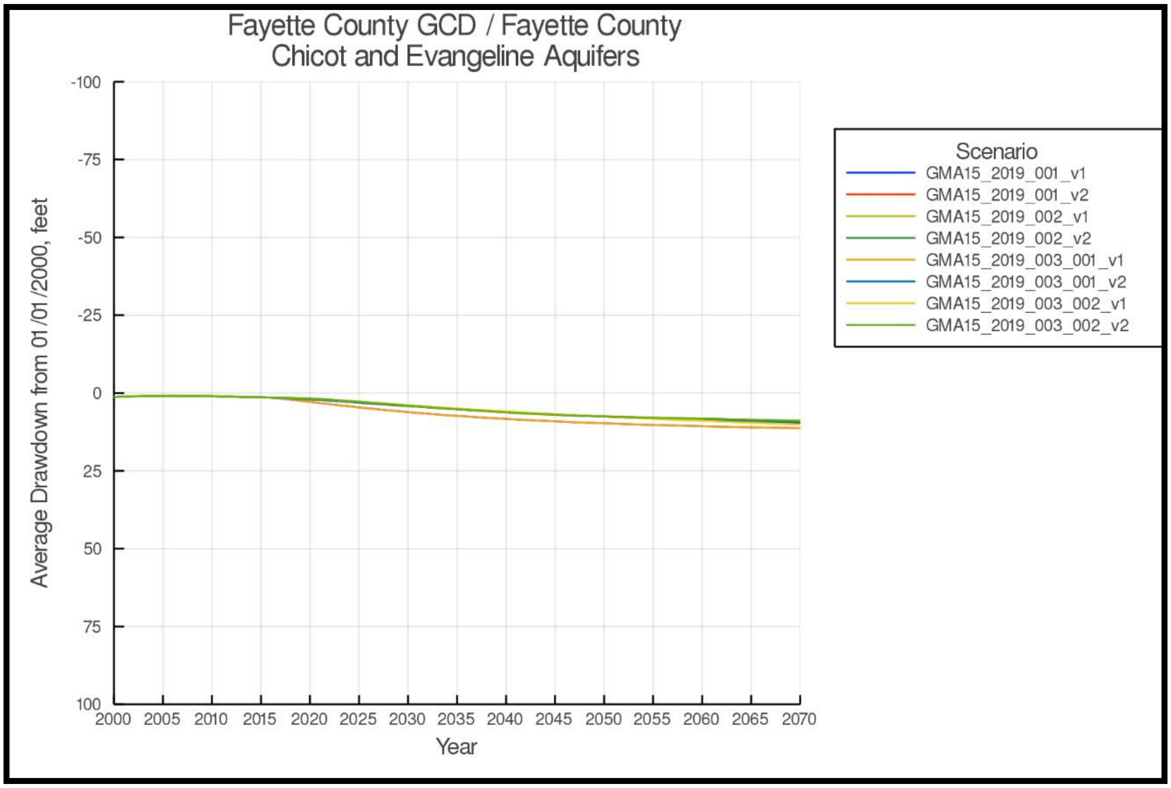

Fayette County GCD / Fayette County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

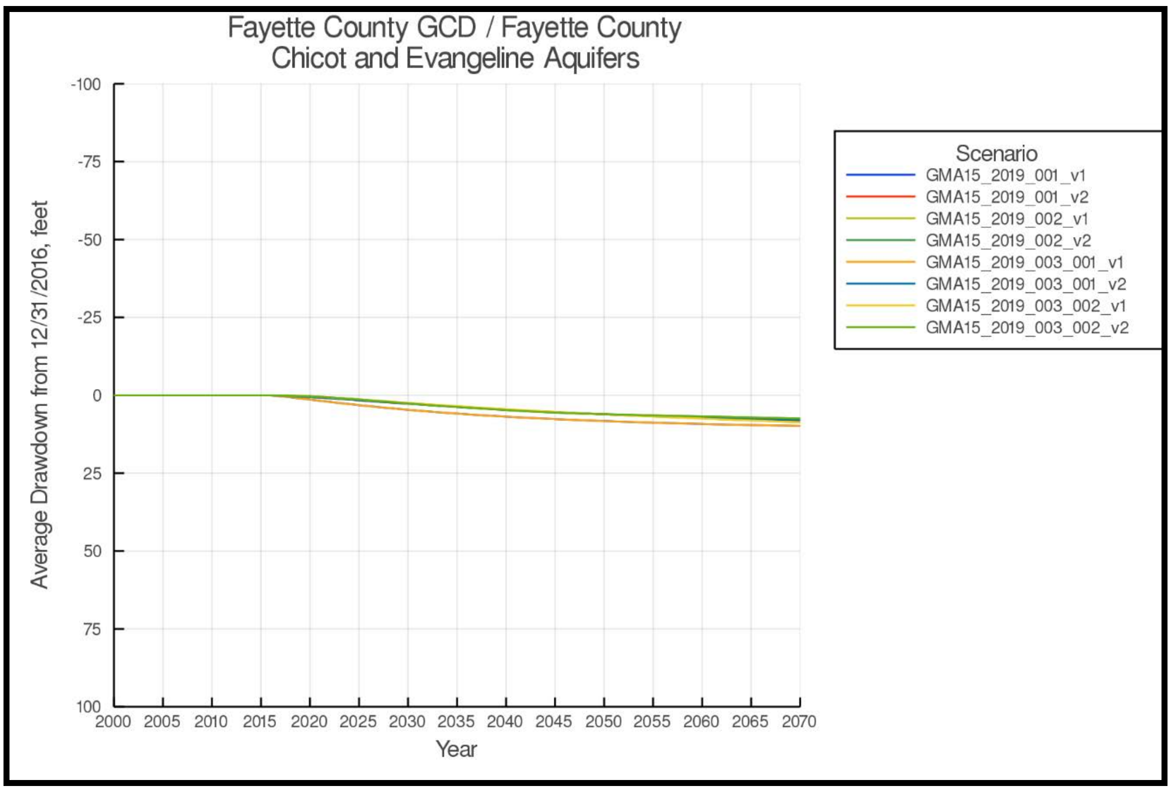

Fayette County GCD / Fayette County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

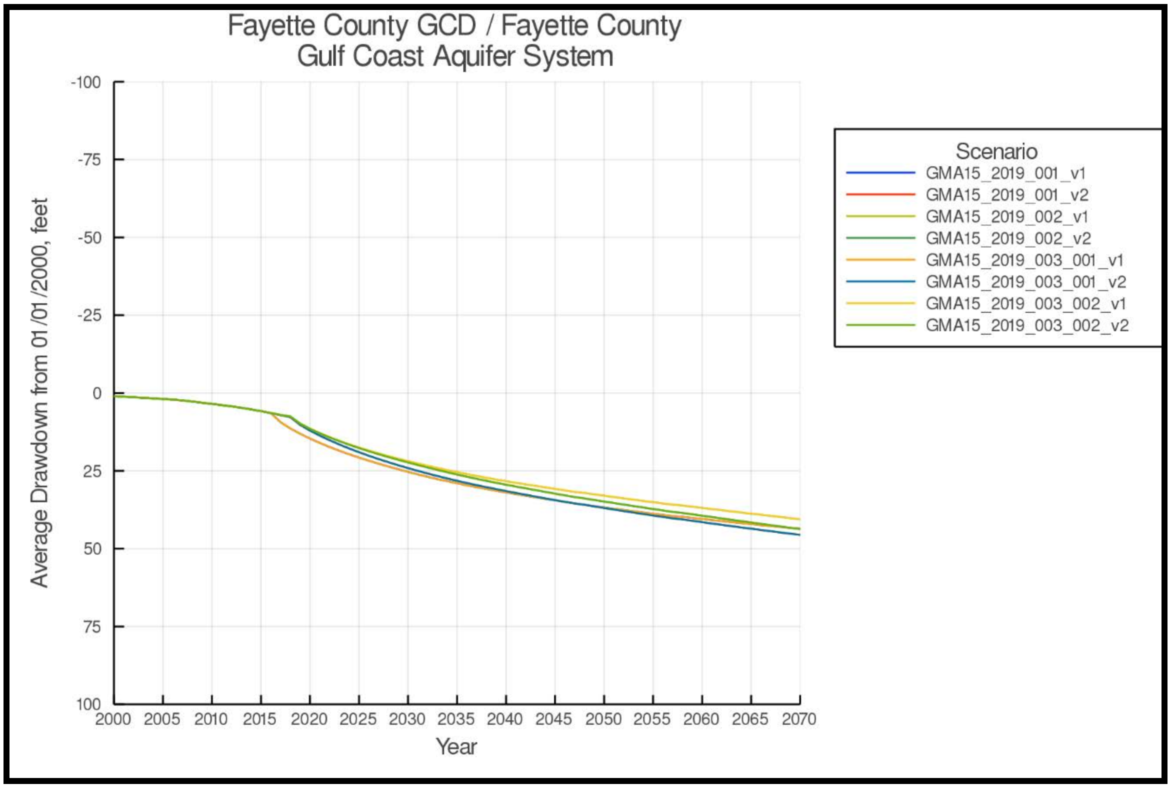

Fayette County GCD / Fayette County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

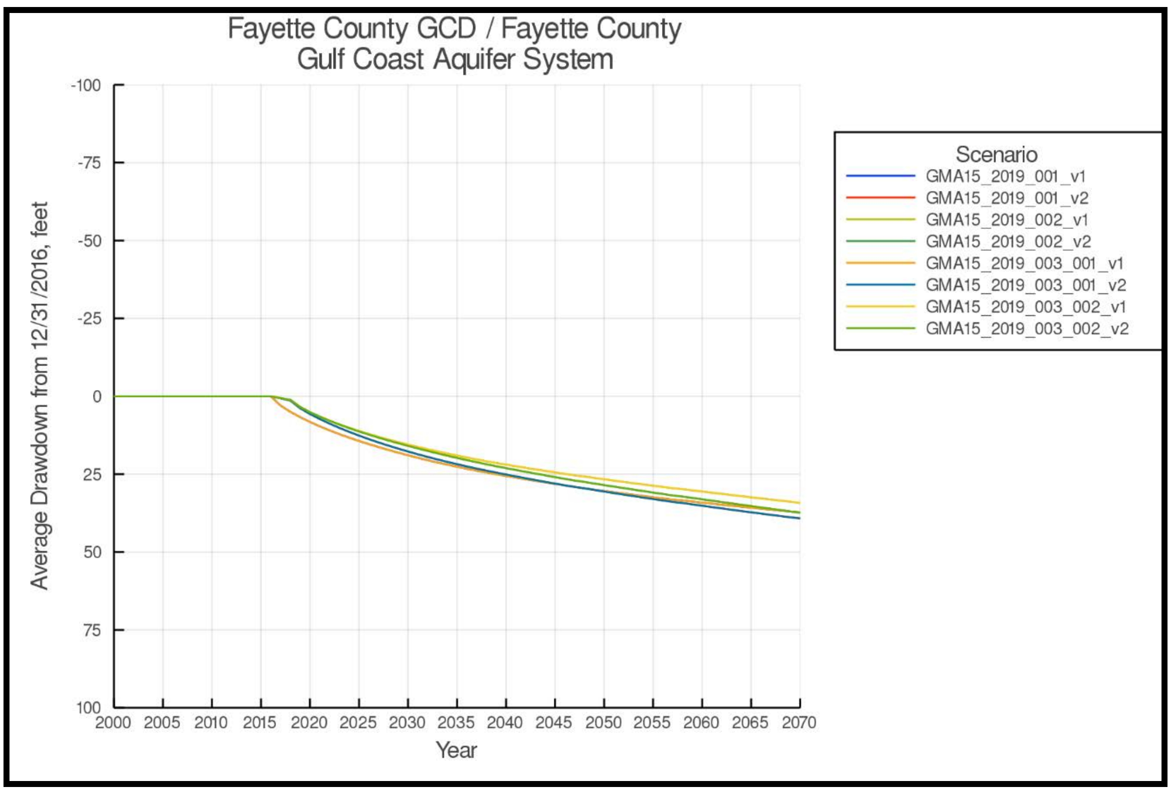

Fayette County GCD / Fayette County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

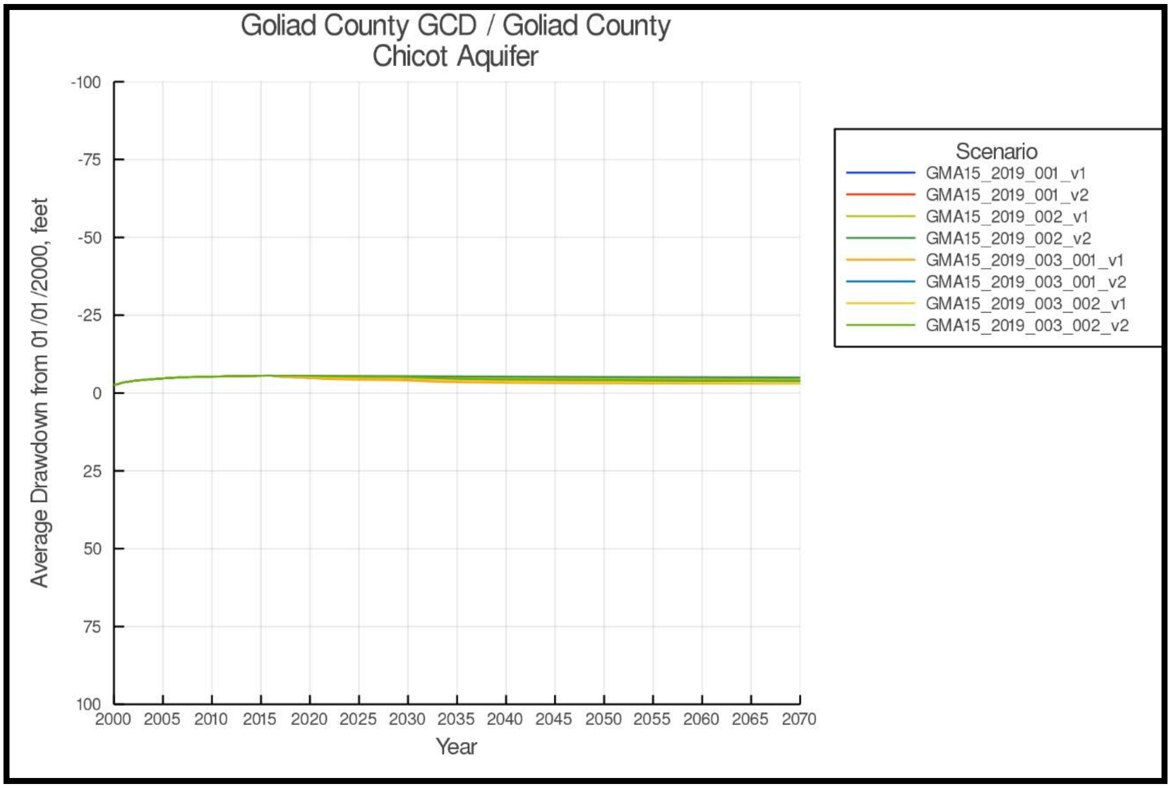

Fayette County GCD / Fayette County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

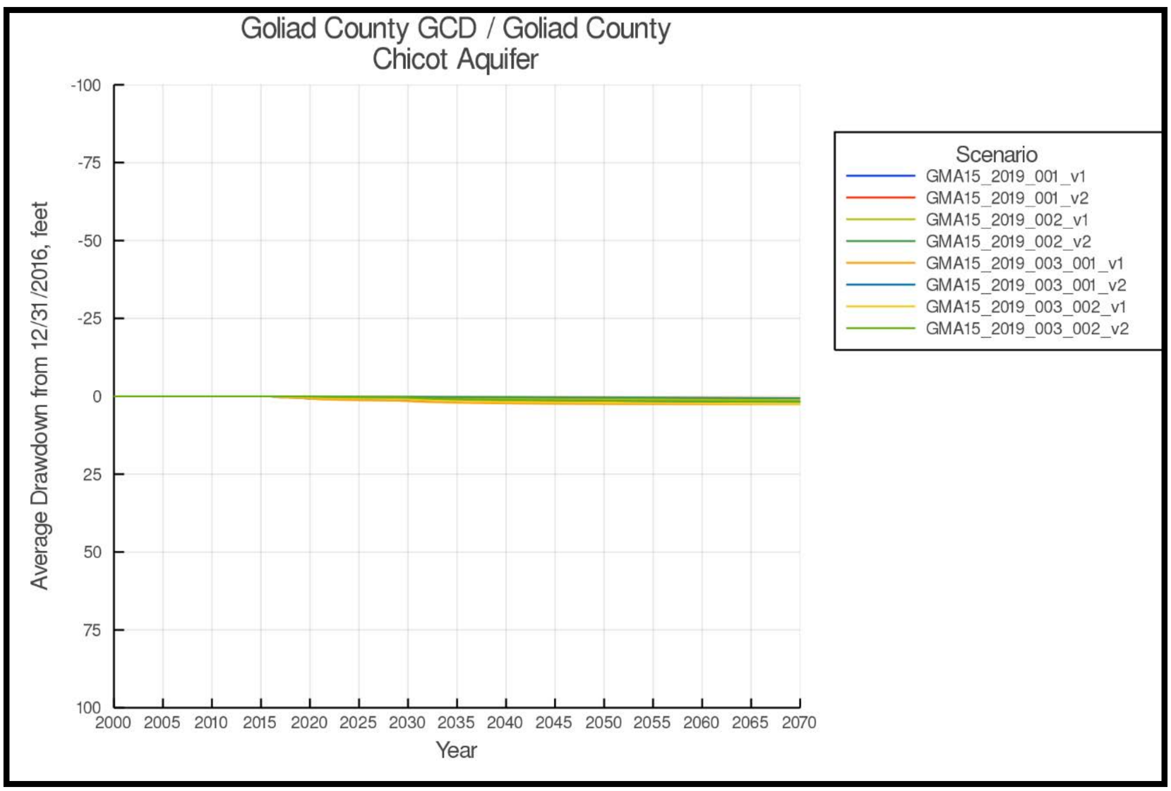

Fayette County GCD / Fayette County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

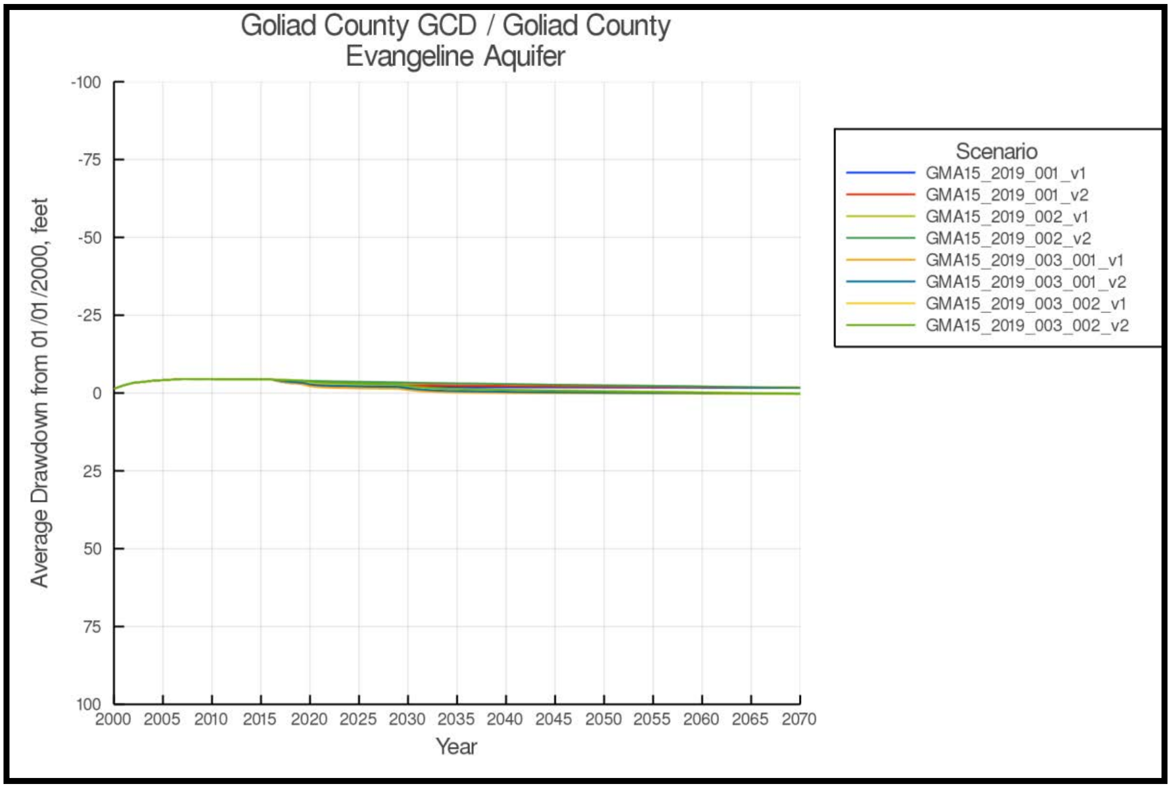

Fayette County GCD / Fayette County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

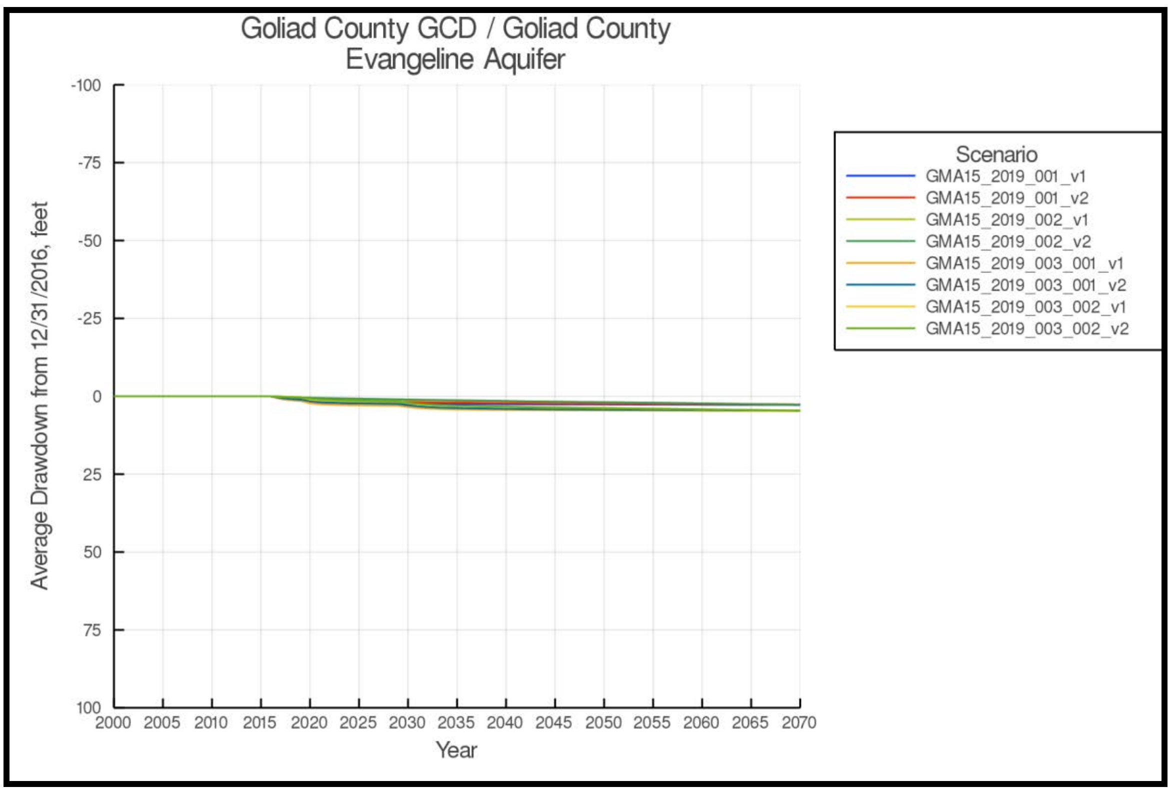

Fayette County GCD / Fayette County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

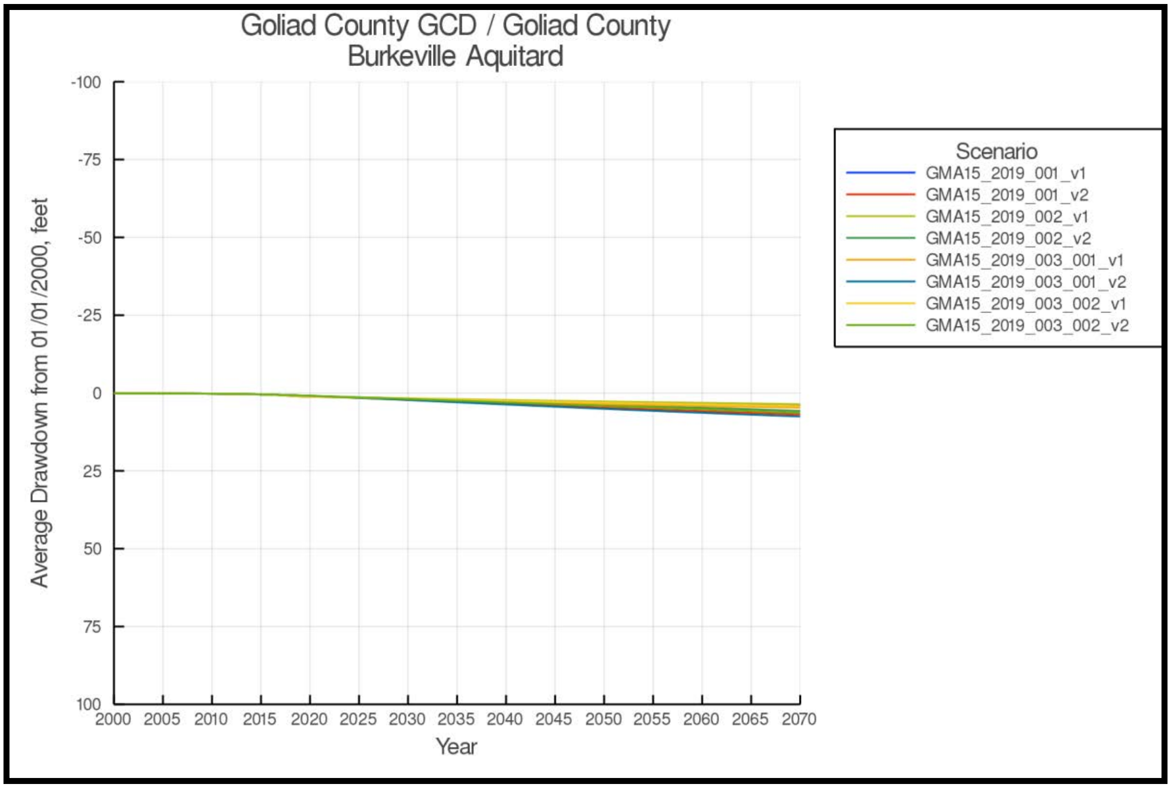

Fayette County GCD / Fayette County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

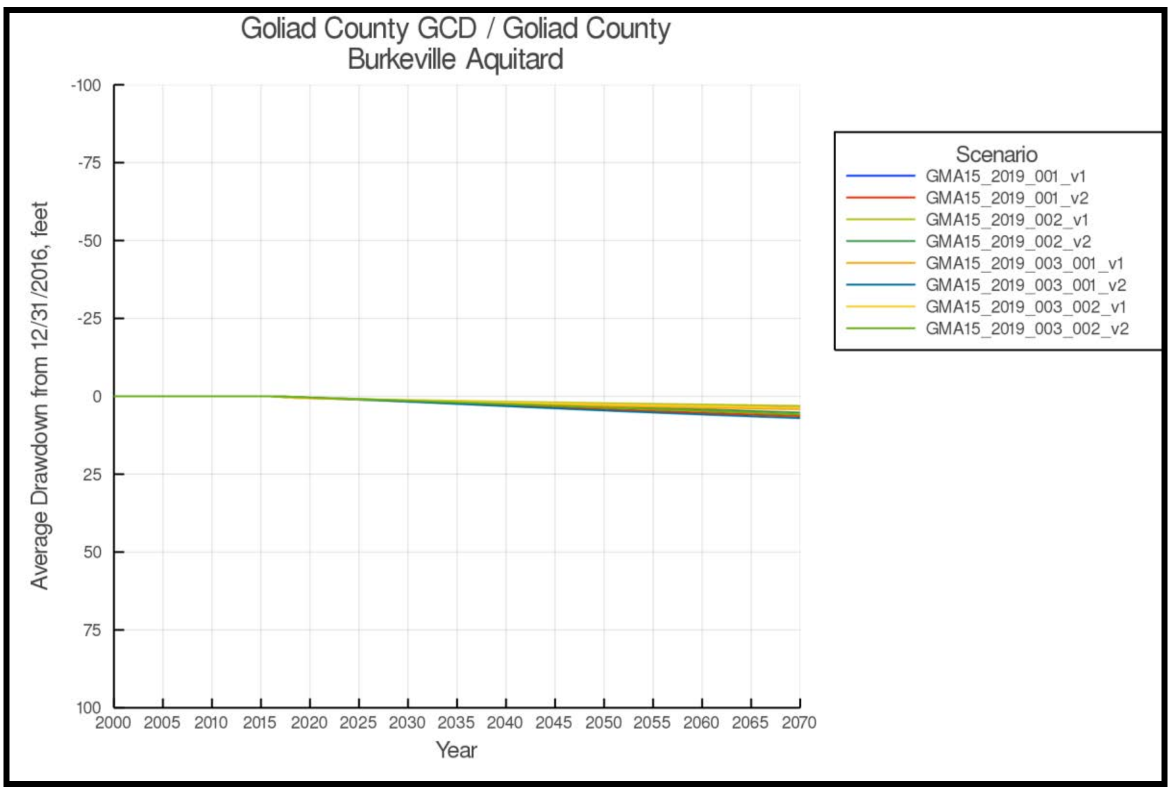

Goliad County GCD / Goliad County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

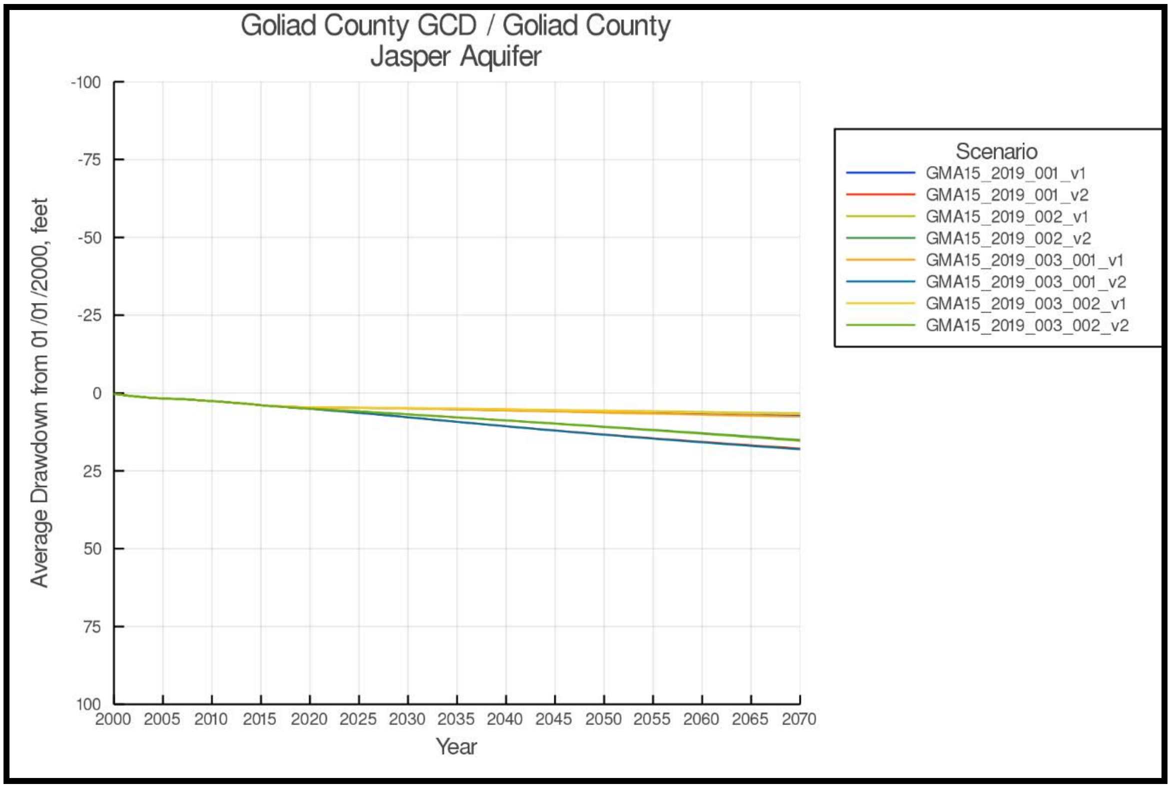

Goliad County GCD / Goliad County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

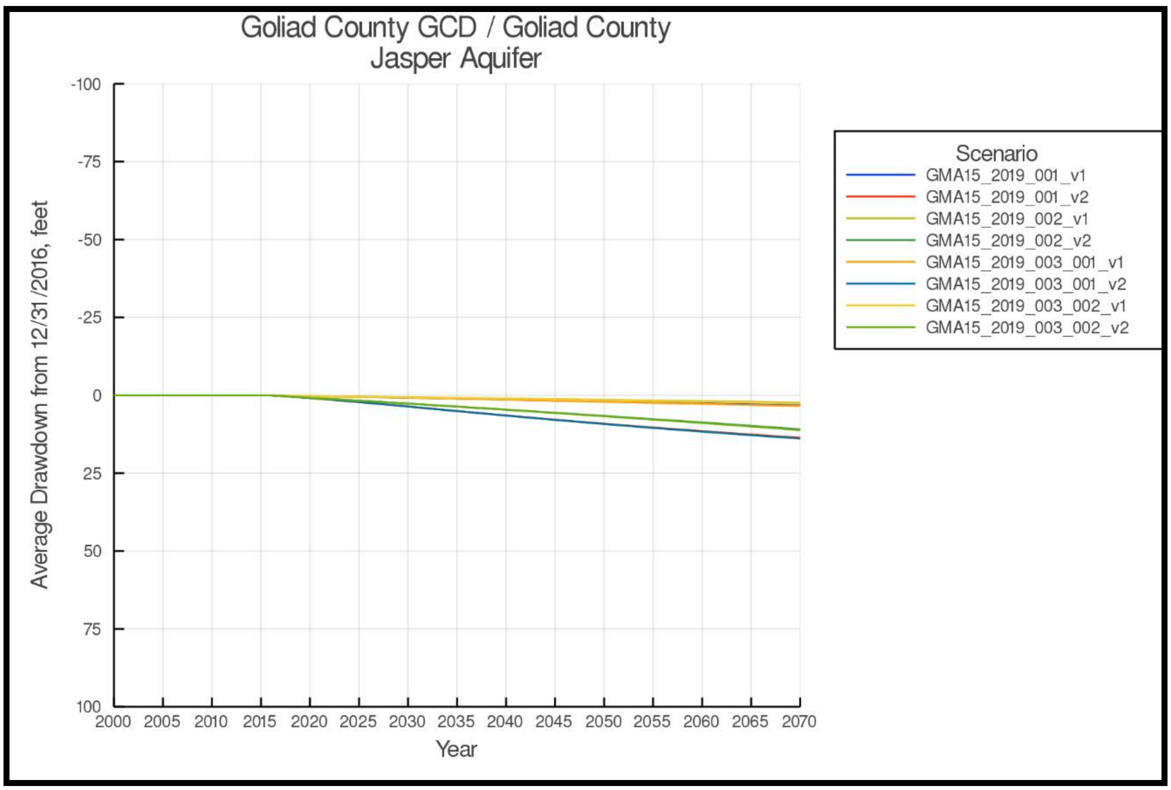

Goliad County GCD / Goliad County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

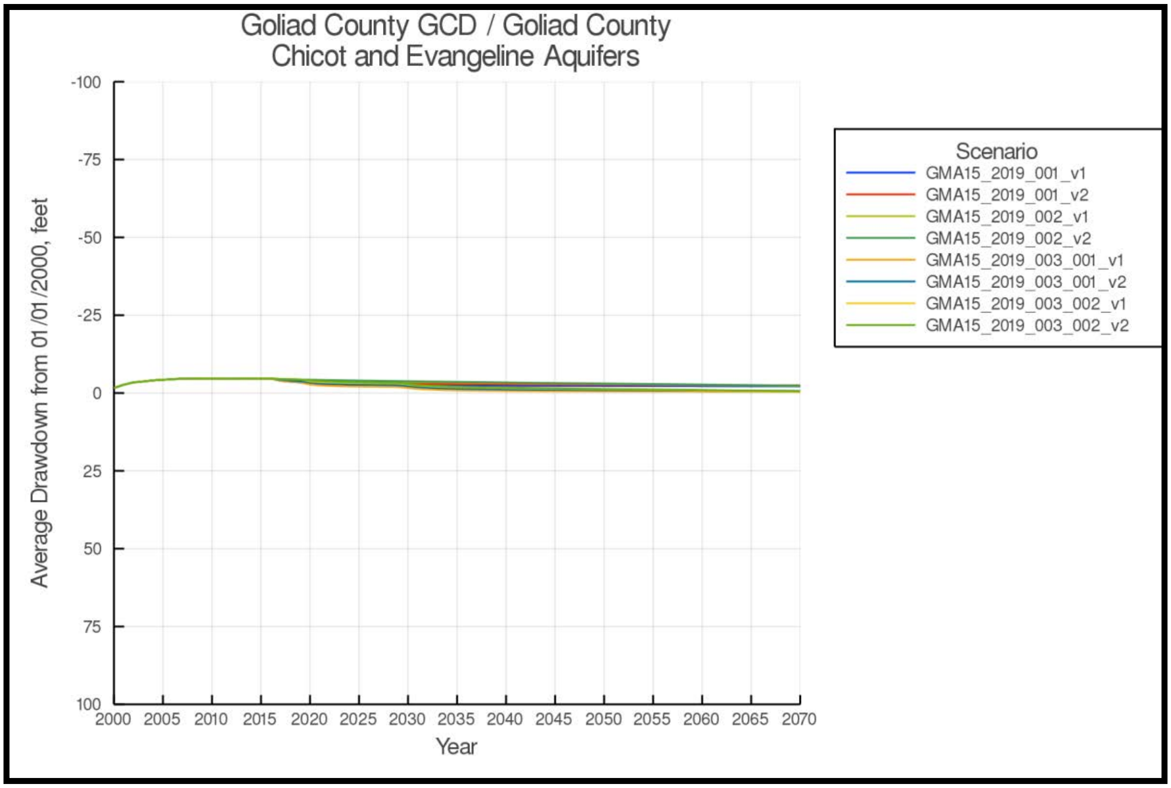

Goliad County GCD / Goliad County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

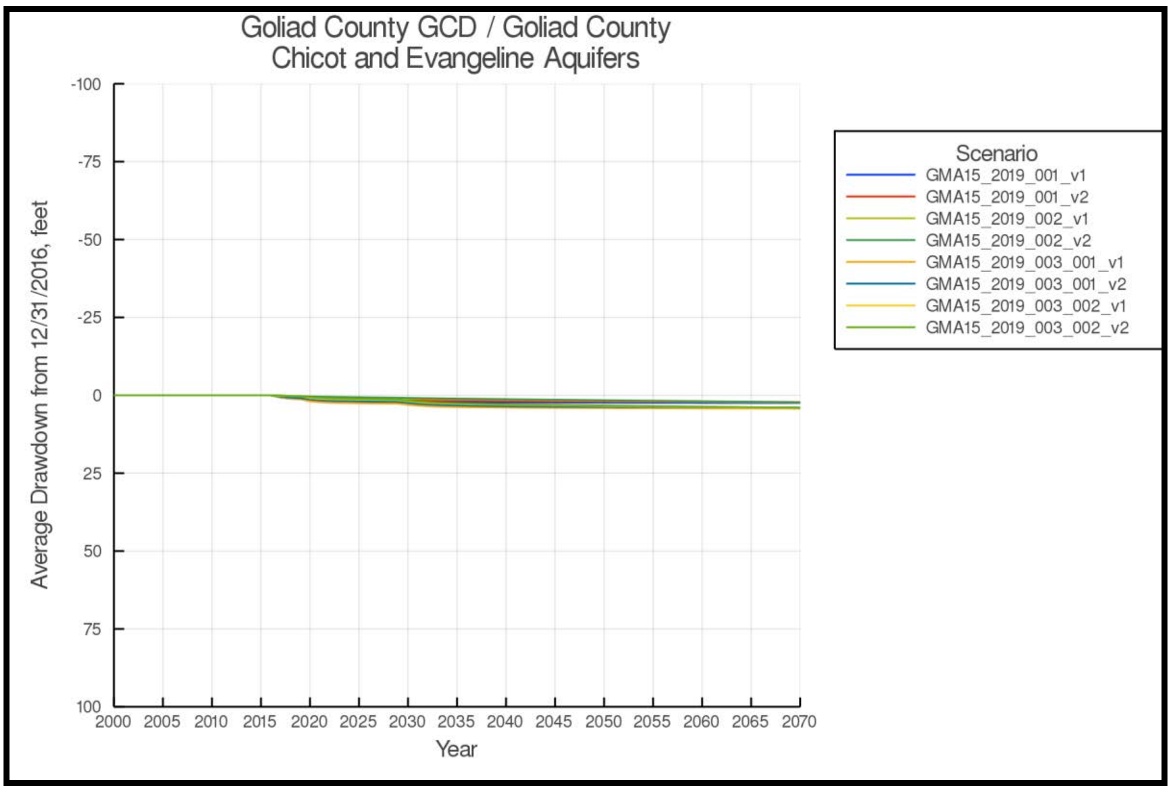

Goliad County GCD / Goliad County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

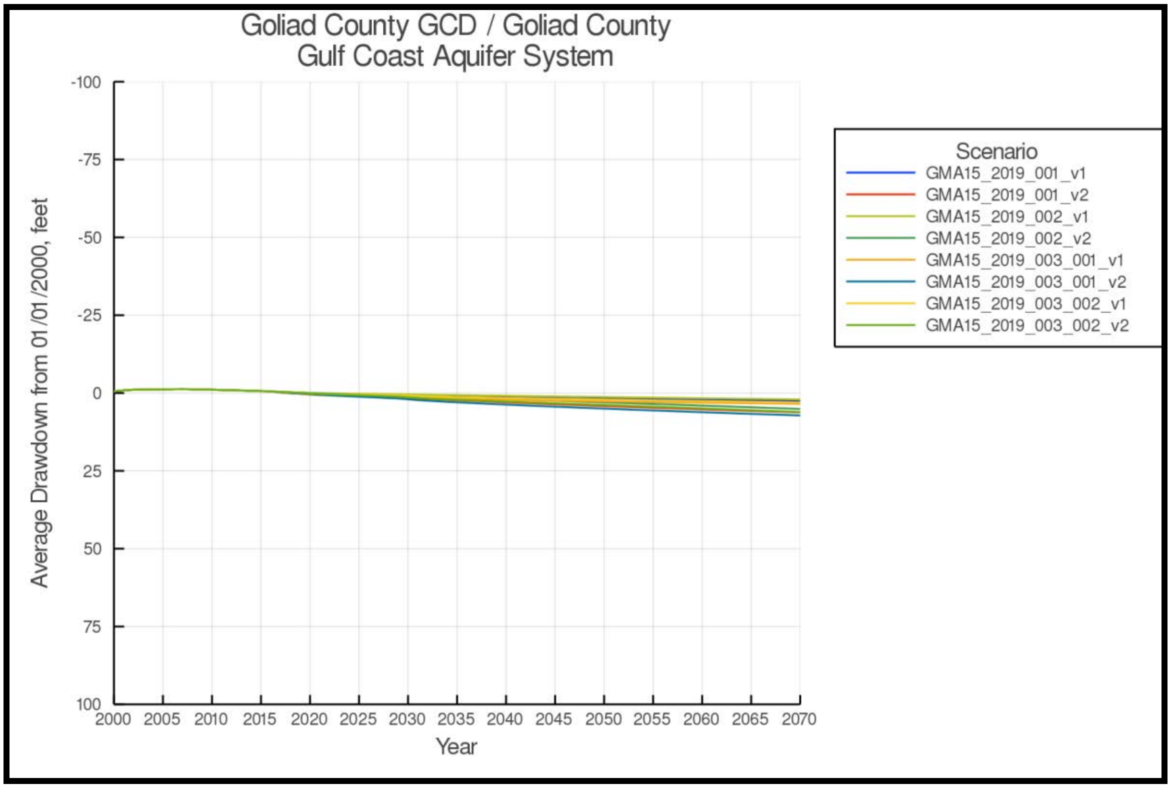

Goliad County GCD / Goliad County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

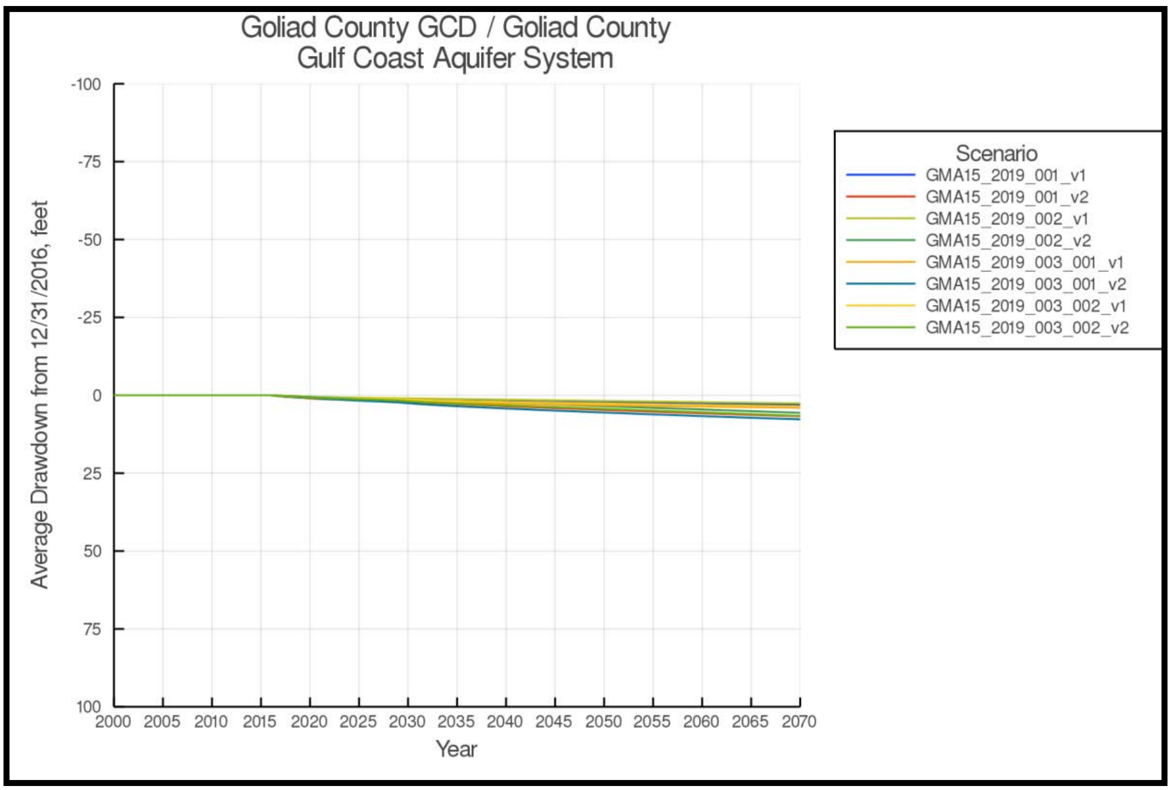

Goliad County GCD / Goliad County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

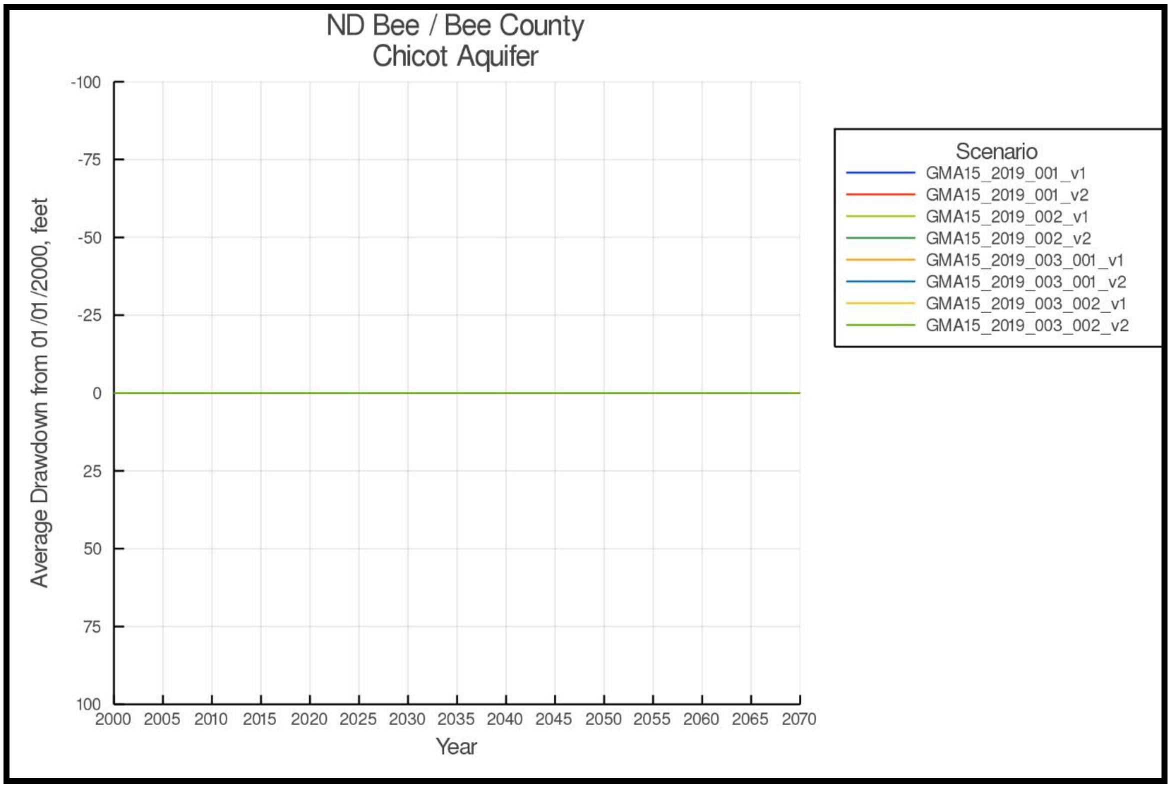

Goliad County GCD / Goliad County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

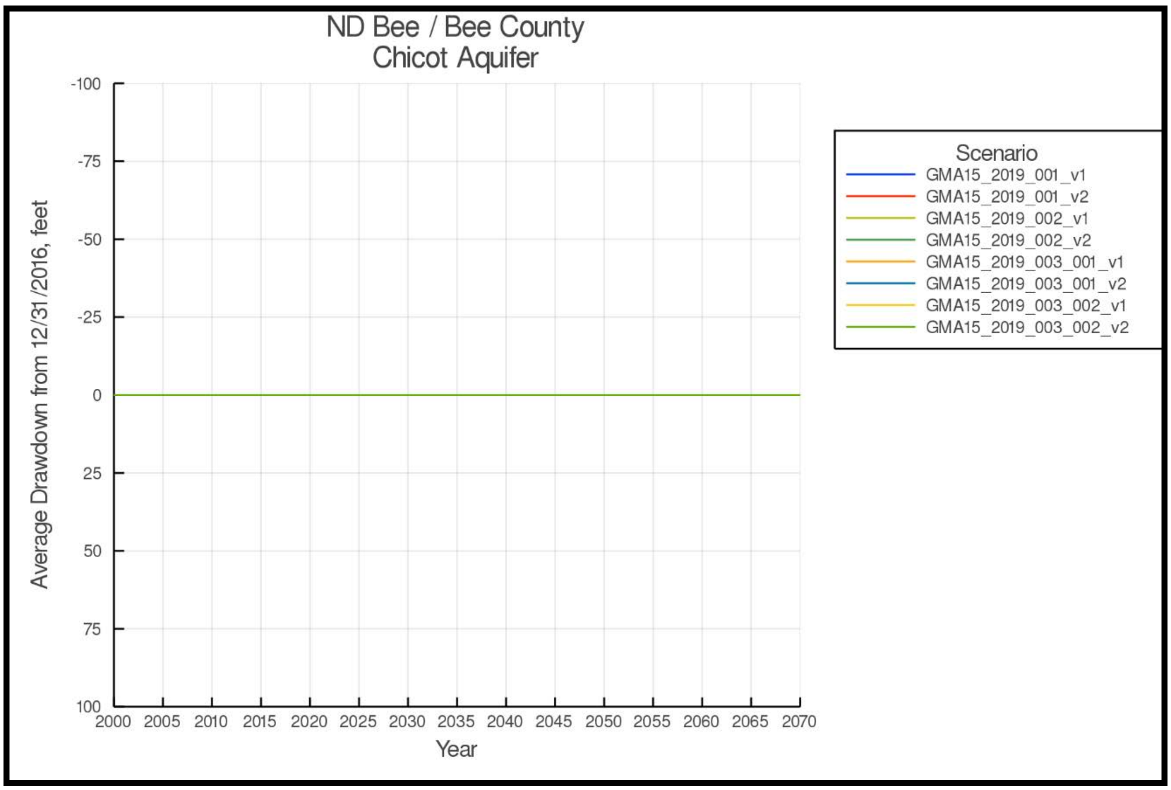

Goliad County GCD / Goliad County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

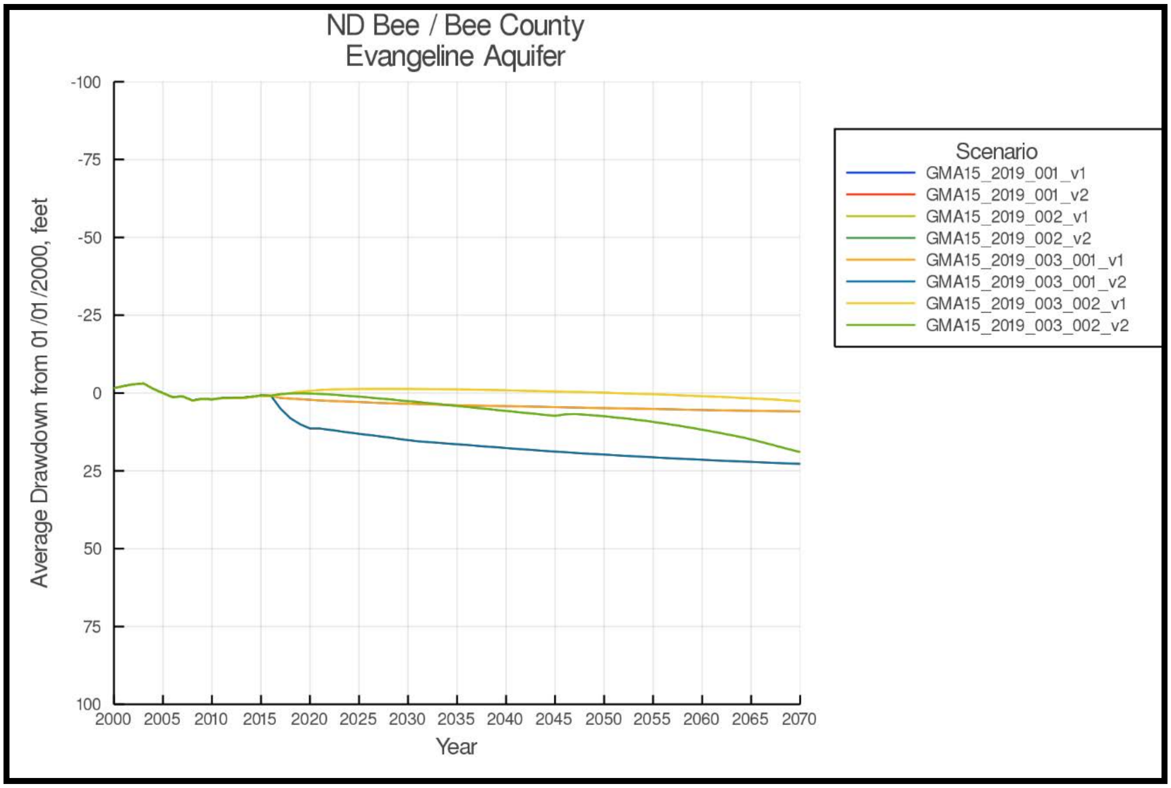

Goliad County GCD / Goliad County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

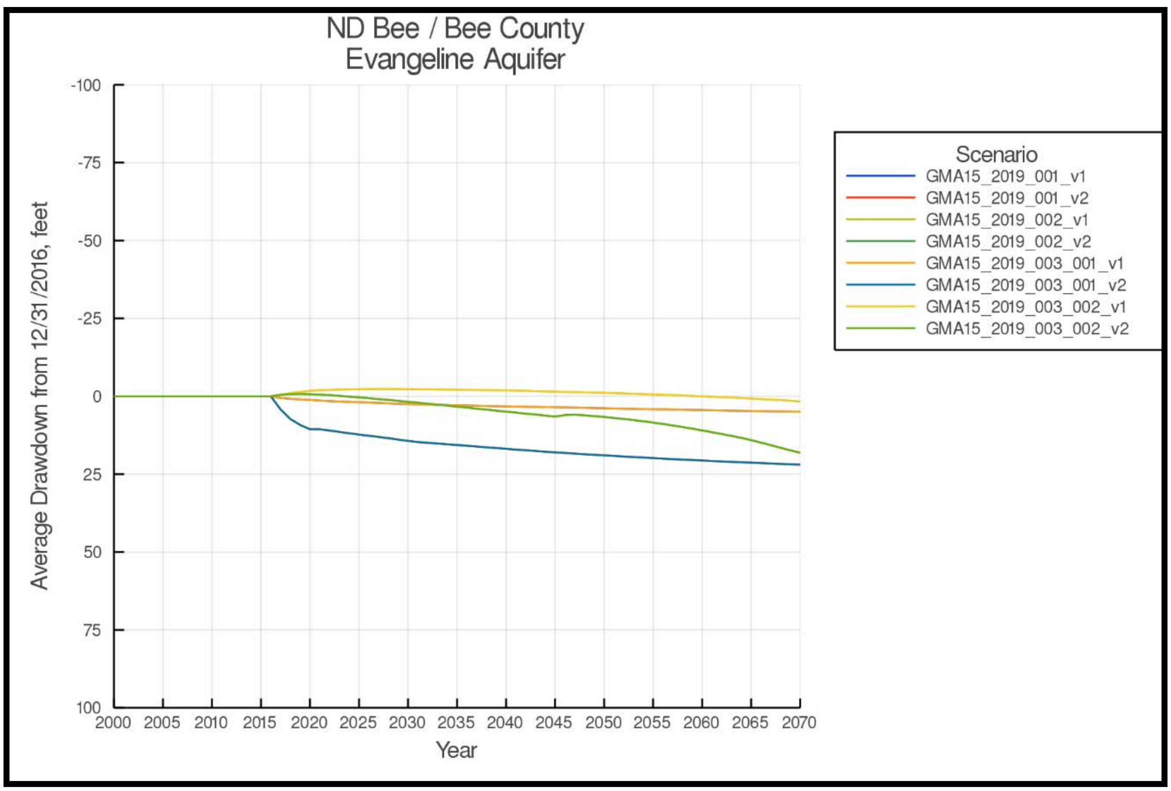

Goliad County GCD / Goliad County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

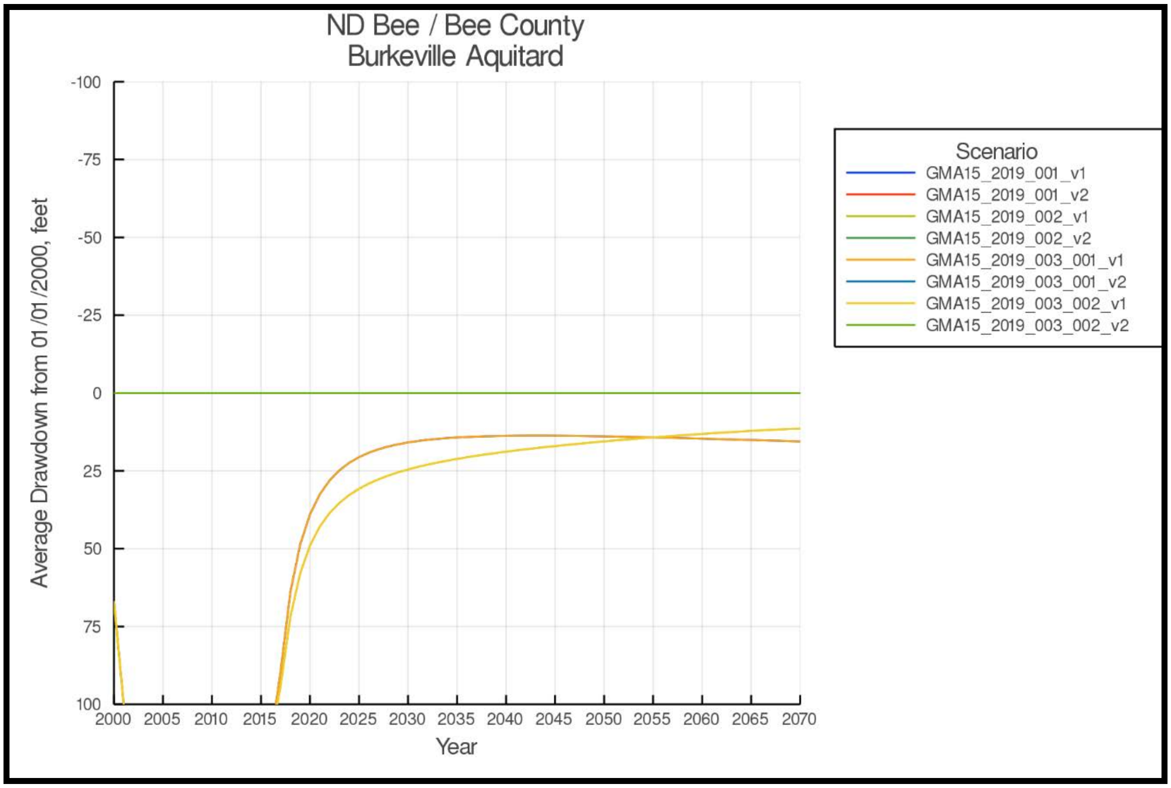

Goliad County GCD / Goliad County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

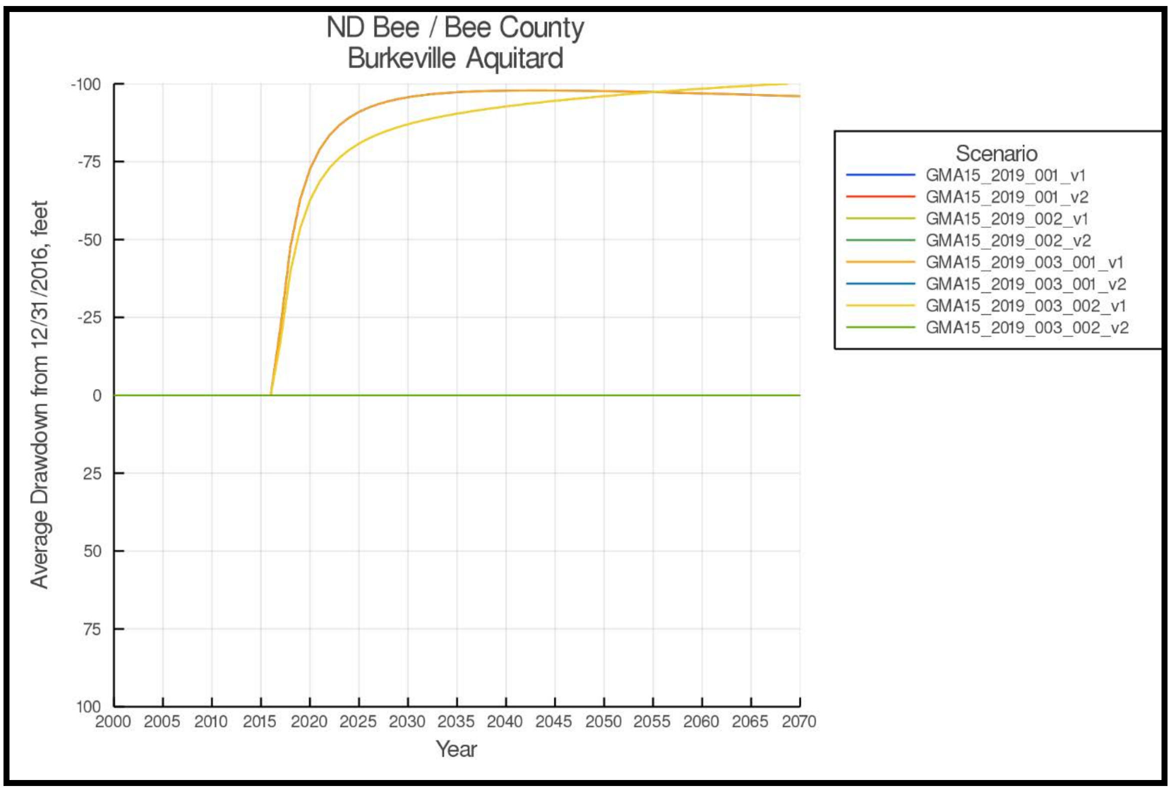

ND Bee / Bee County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

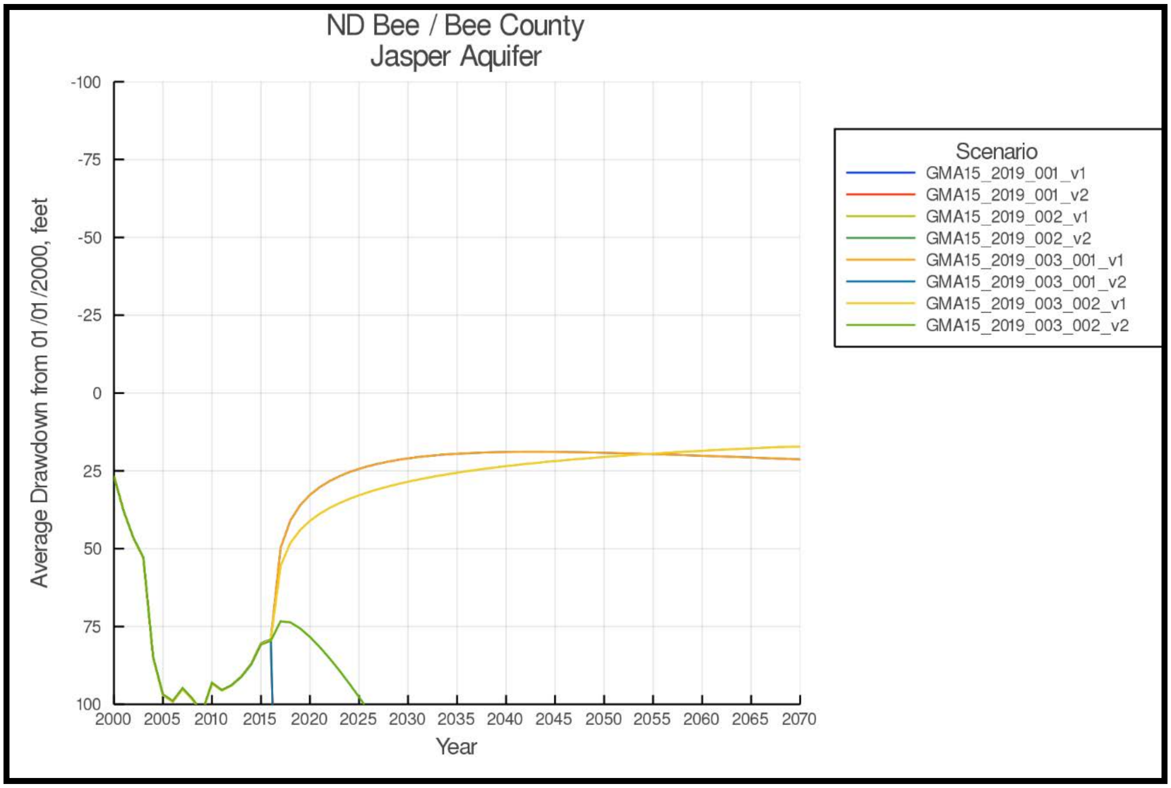

ND Bee / Bee County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

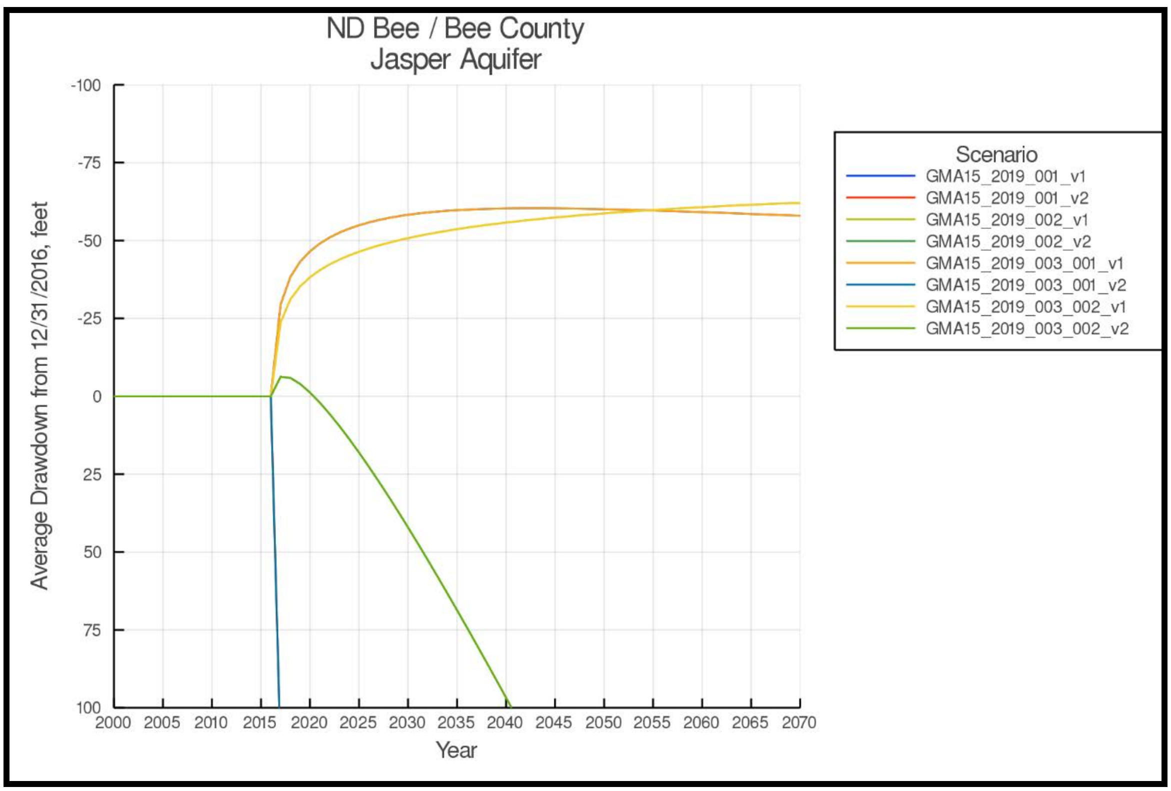

ND Bee / Bee County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

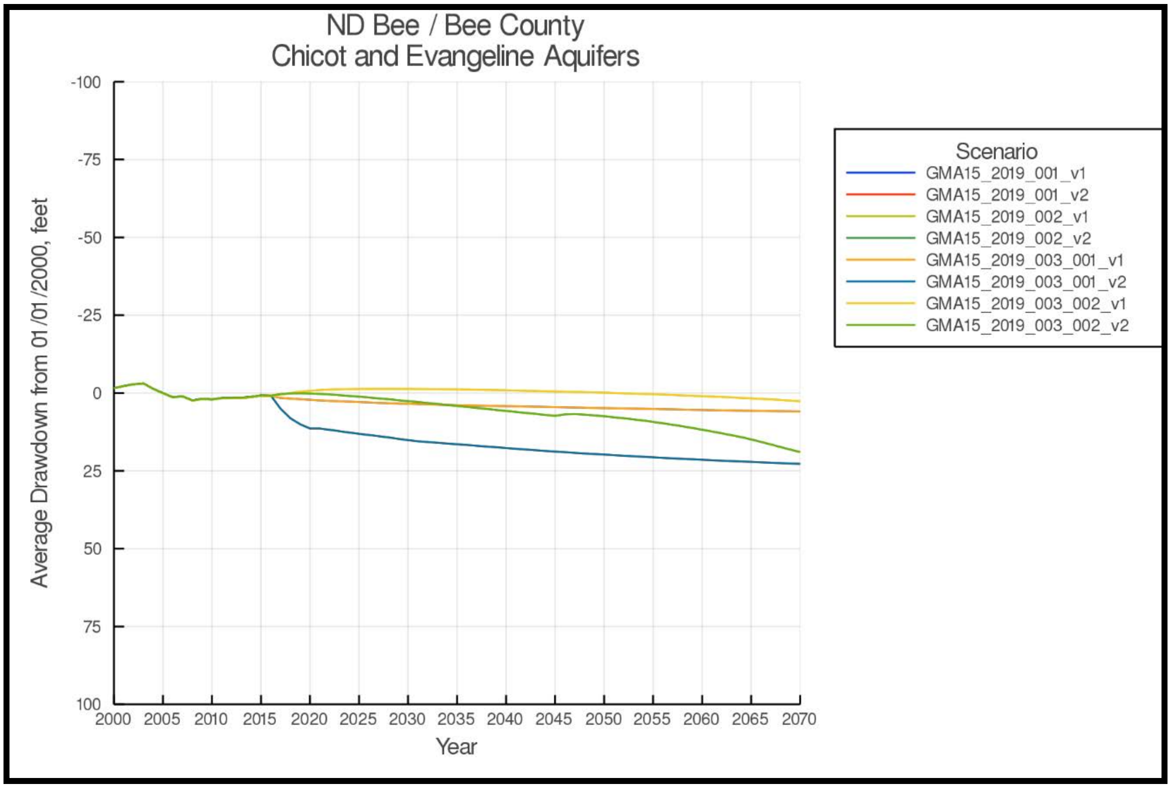

ND Bee / Bee County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

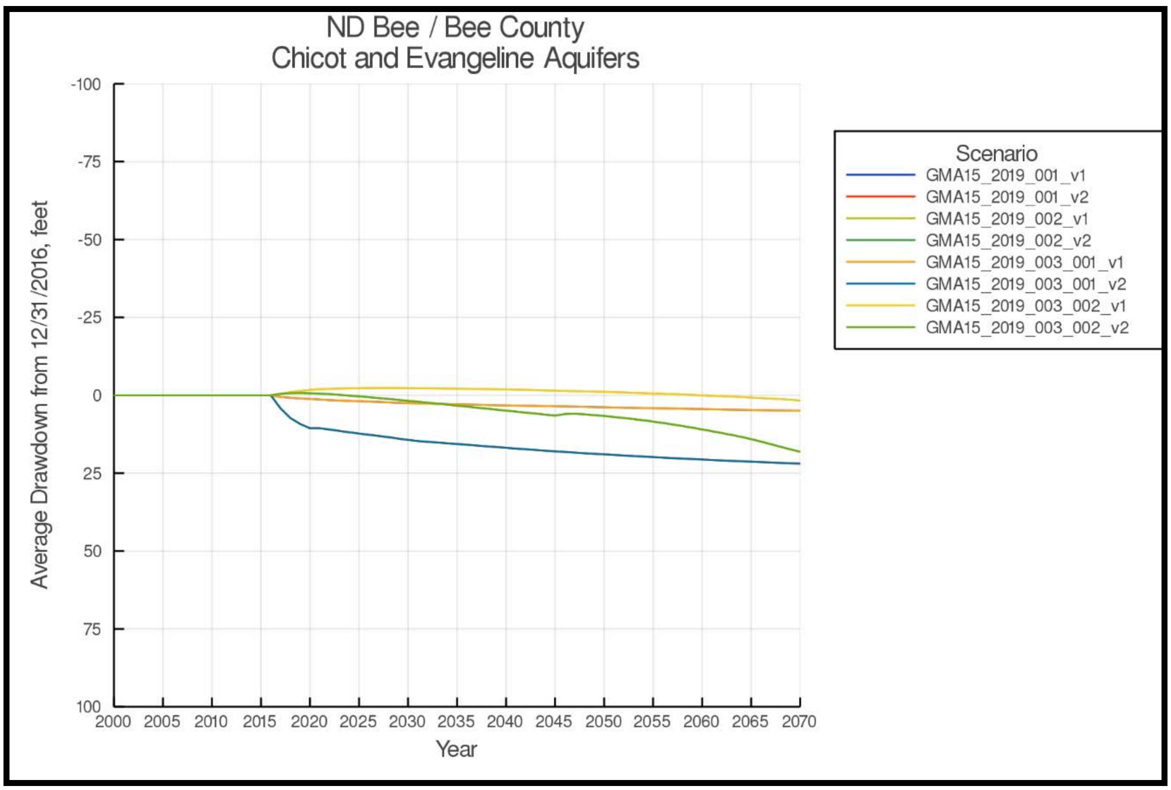

ND Bee / Bee County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

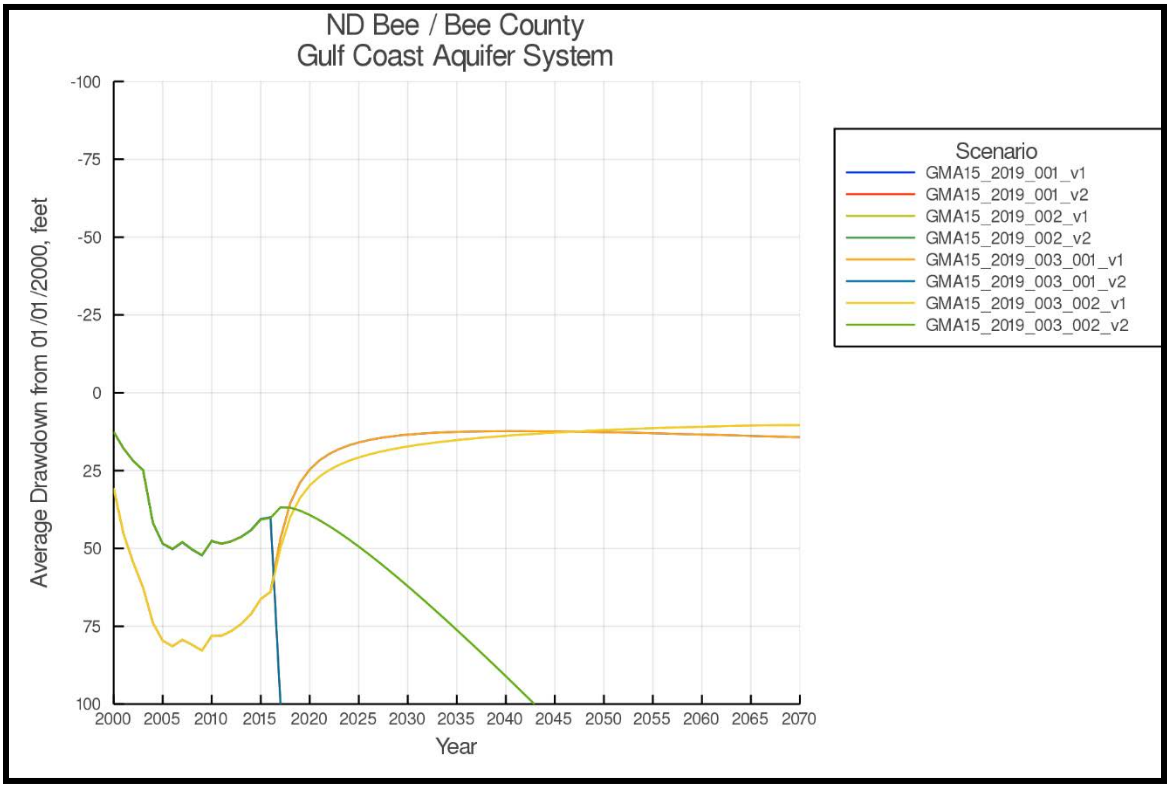

ND Bee / Bee County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

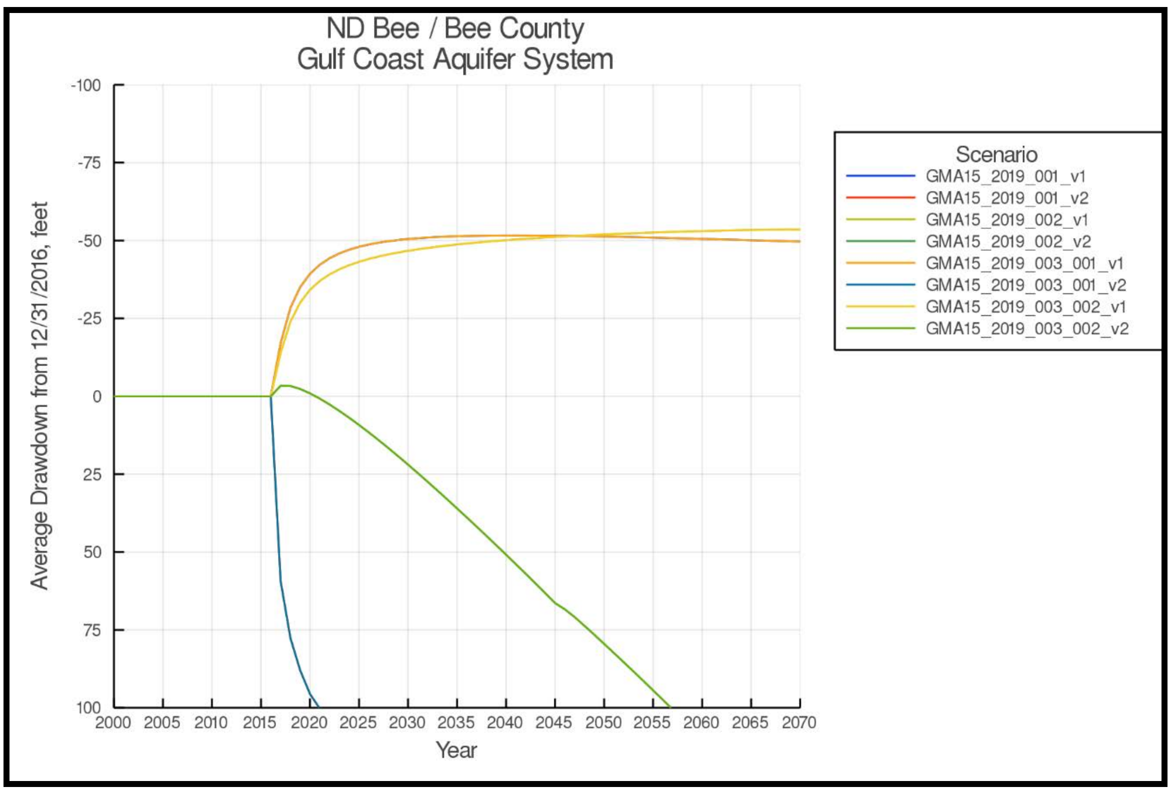

ND Bee / Bee County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

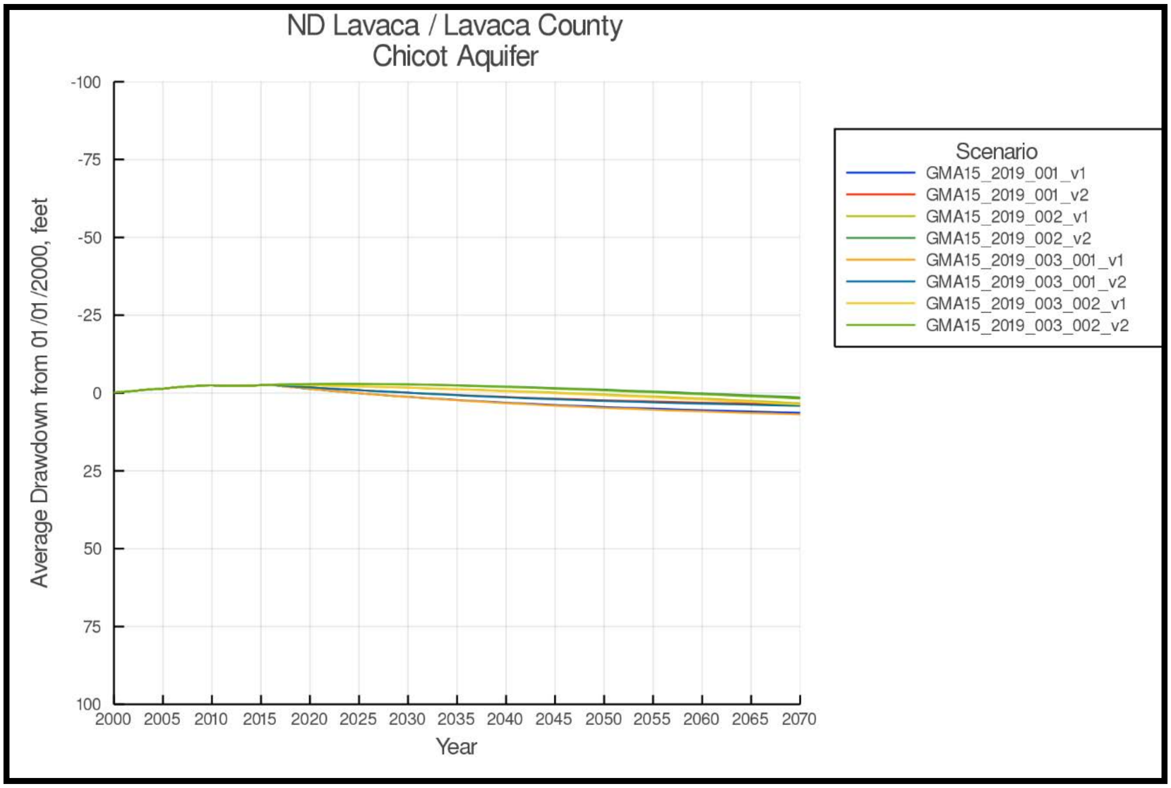

ND Bee / Bee County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

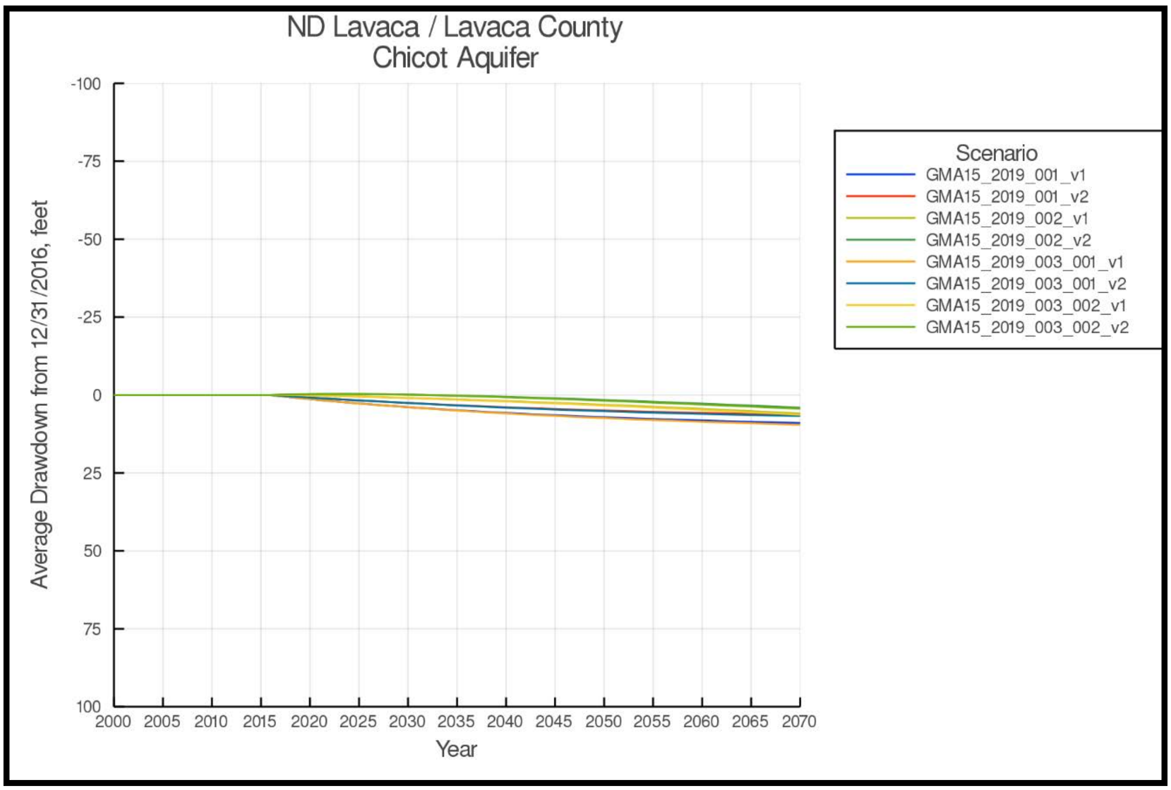

ND Bee / Bee County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

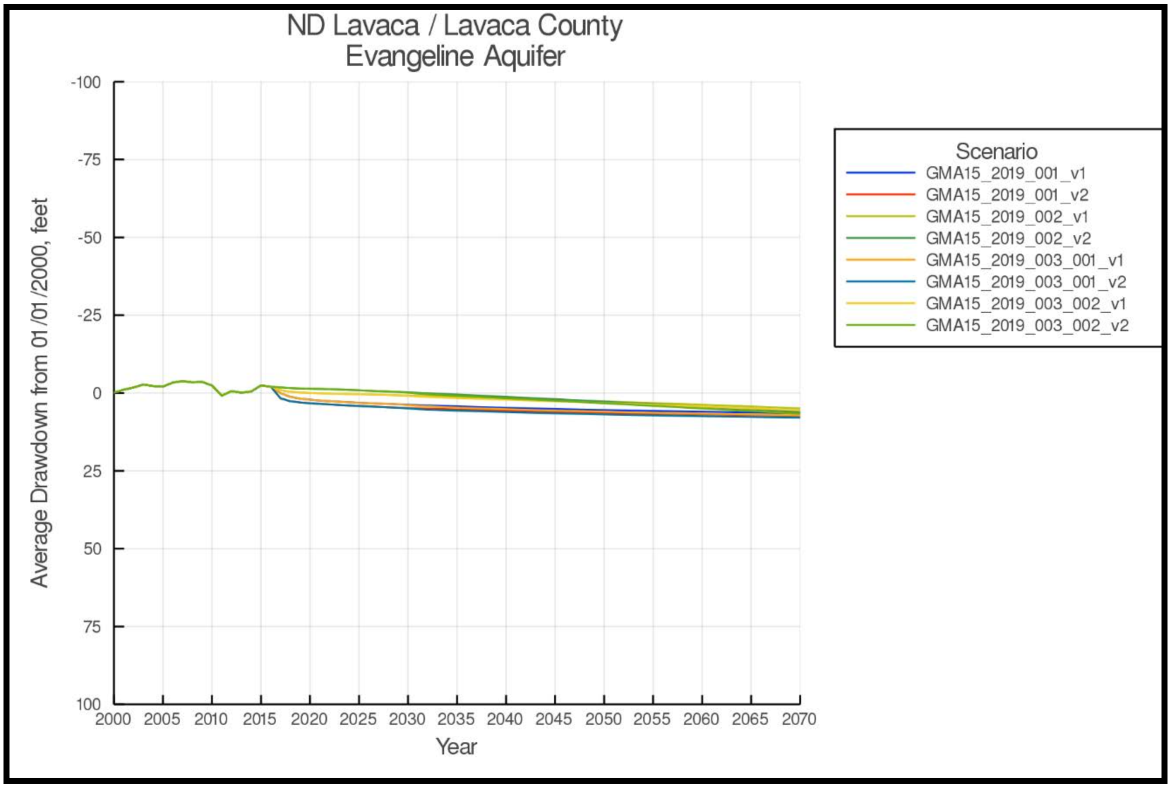

ND Bee / Bee County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

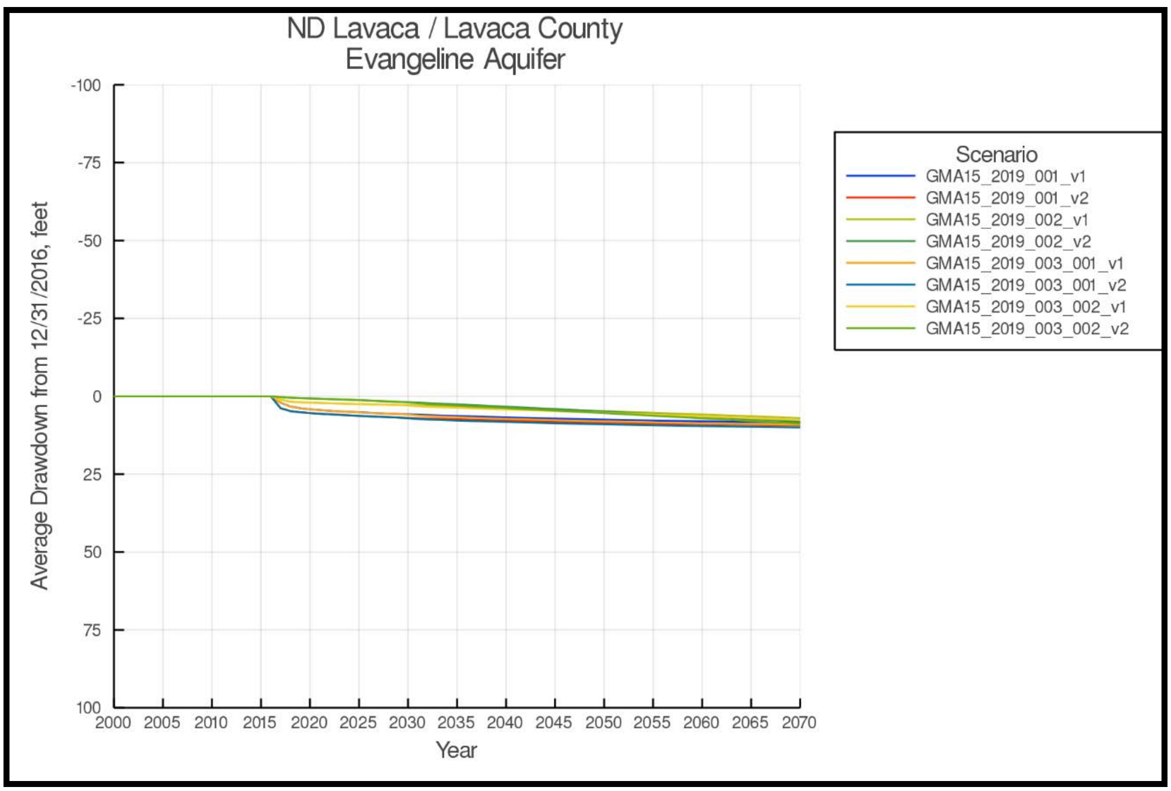

ND Bee / Bee County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

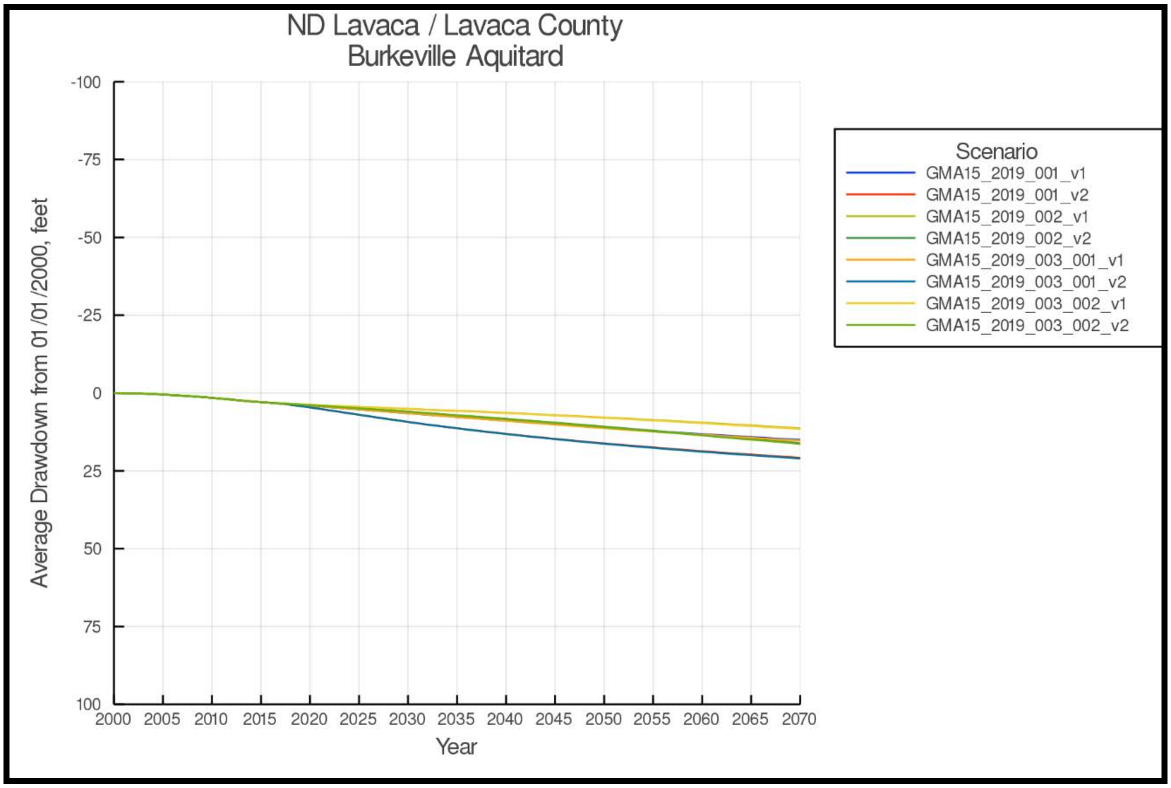

ND Bee / Bee County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

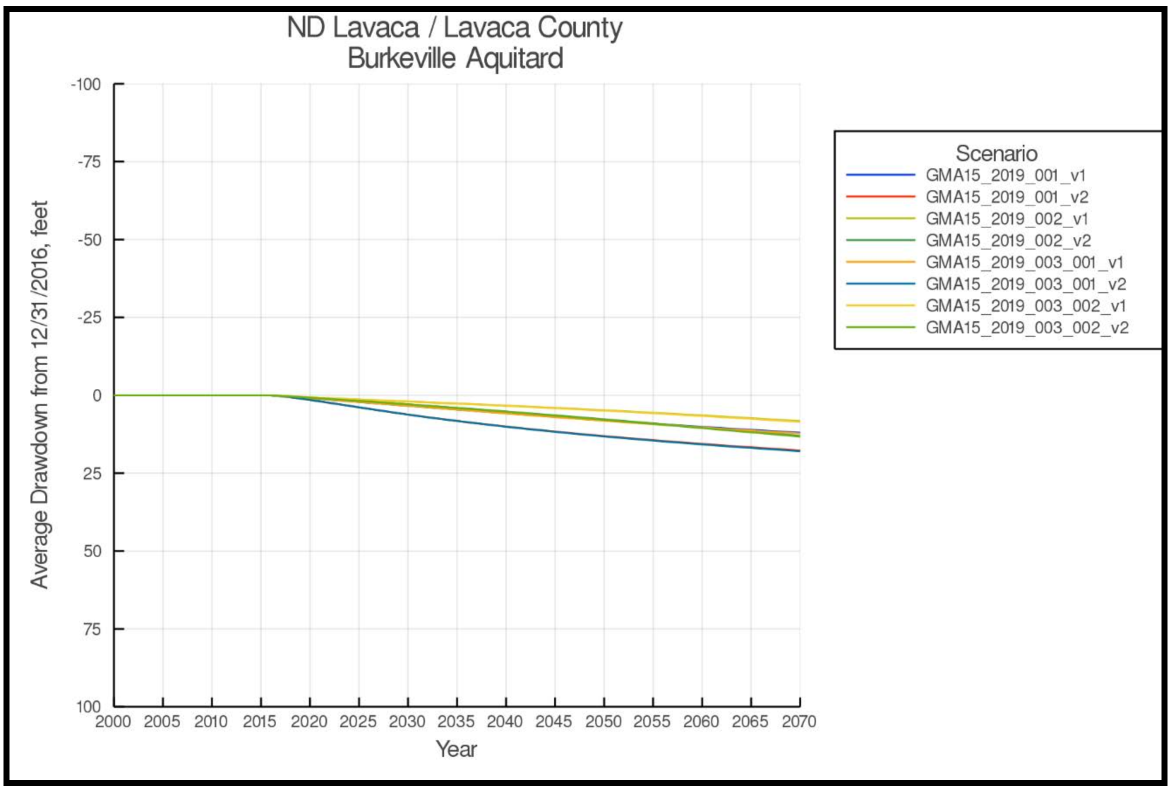

ND Lavaca / Lavaca County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

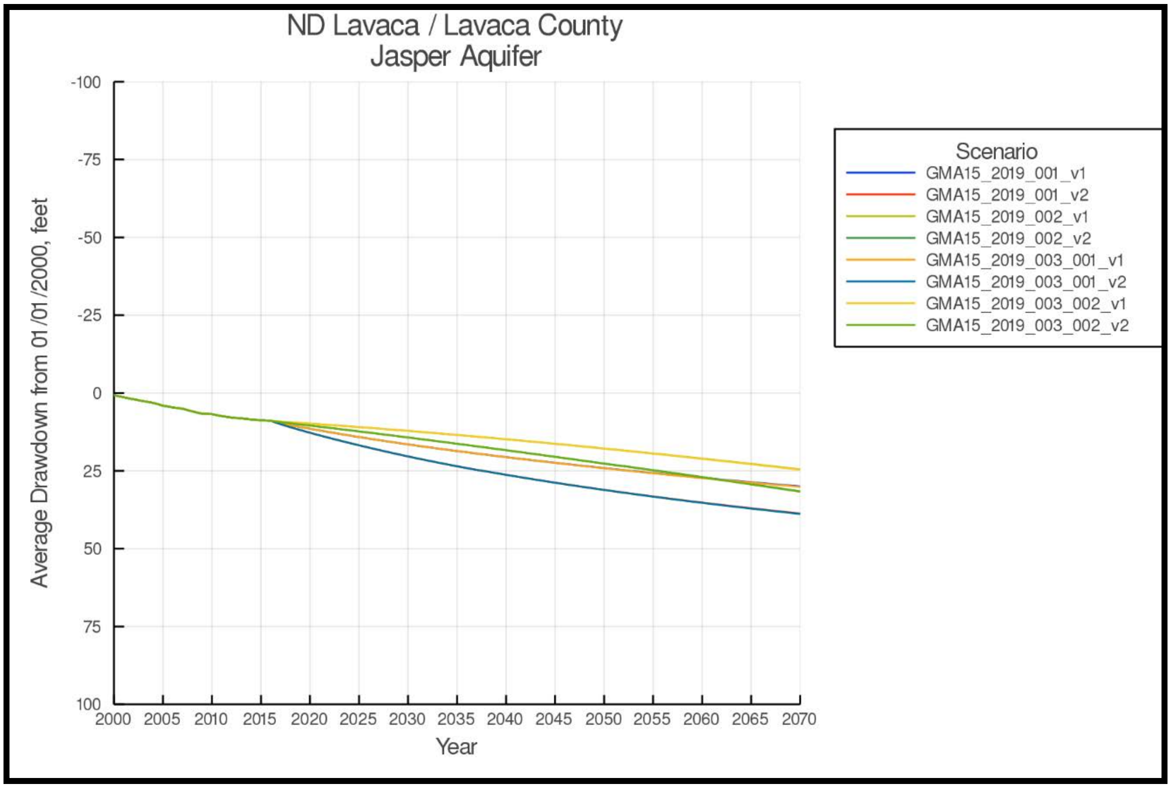

ND Lavaca / Lavaca County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

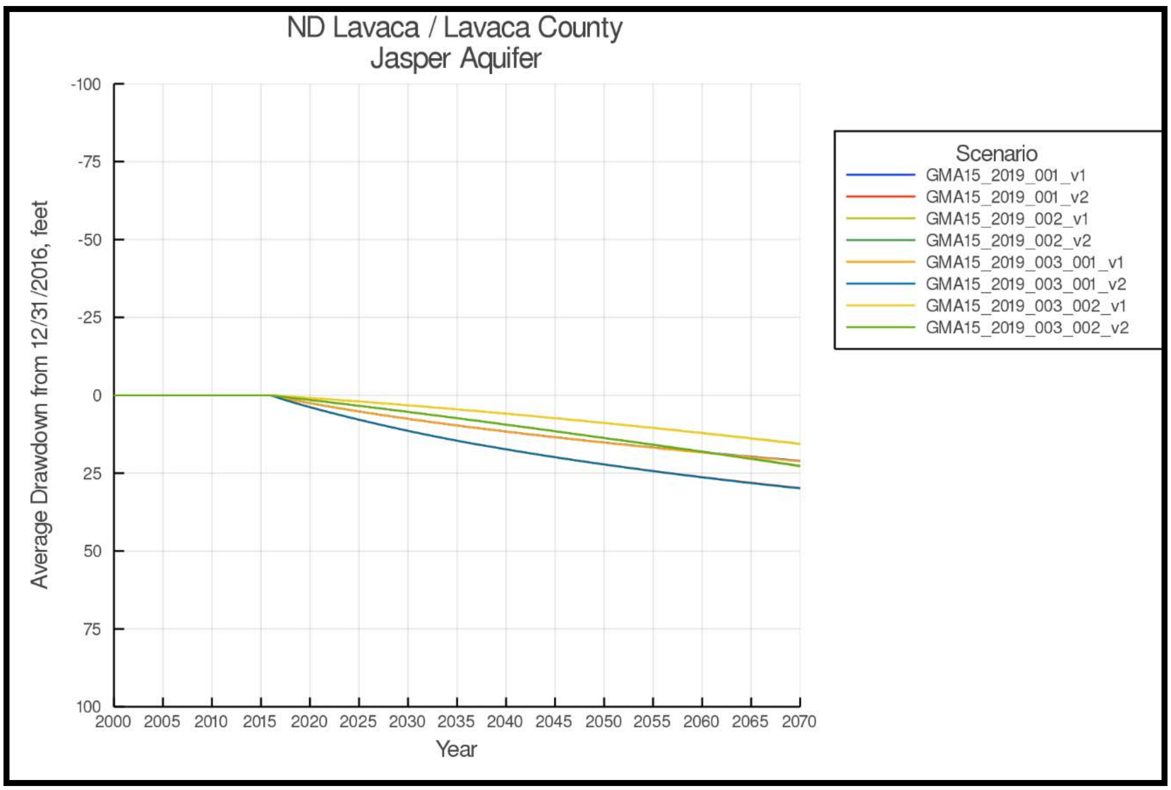

ND Lavaca / Lavaca County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

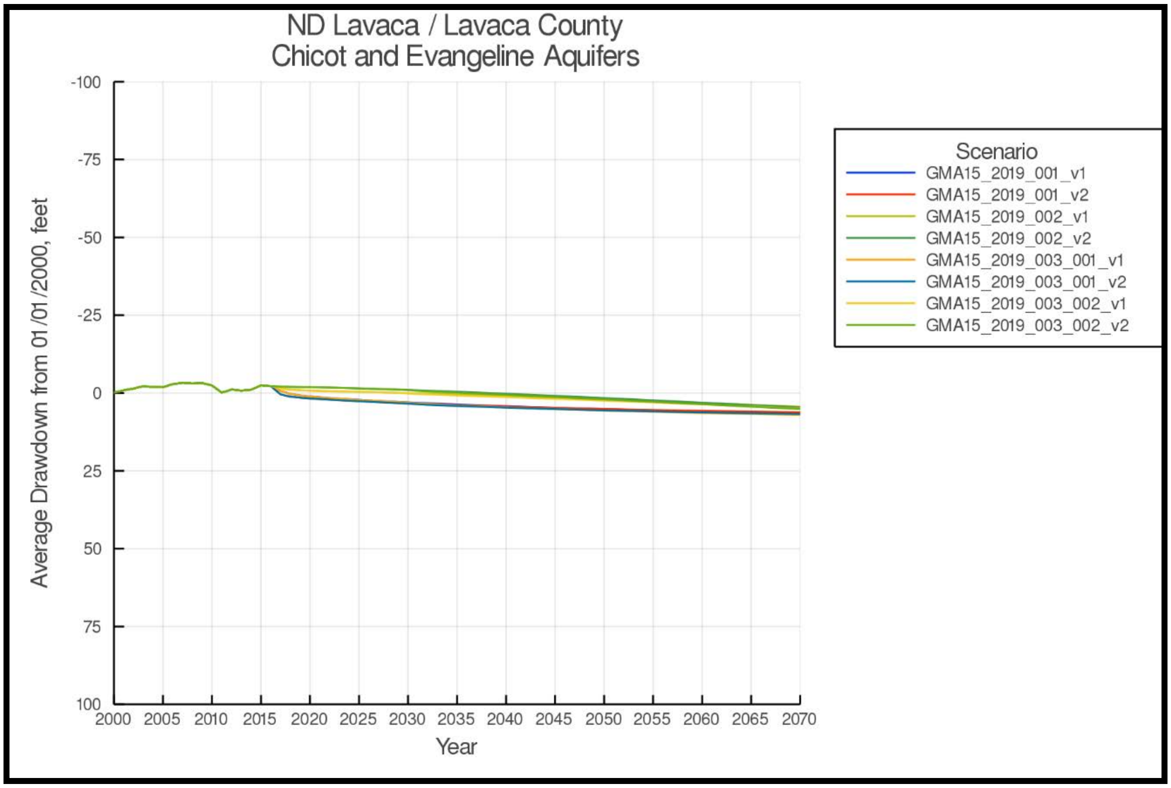

ND Lavaca / Lavaca County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

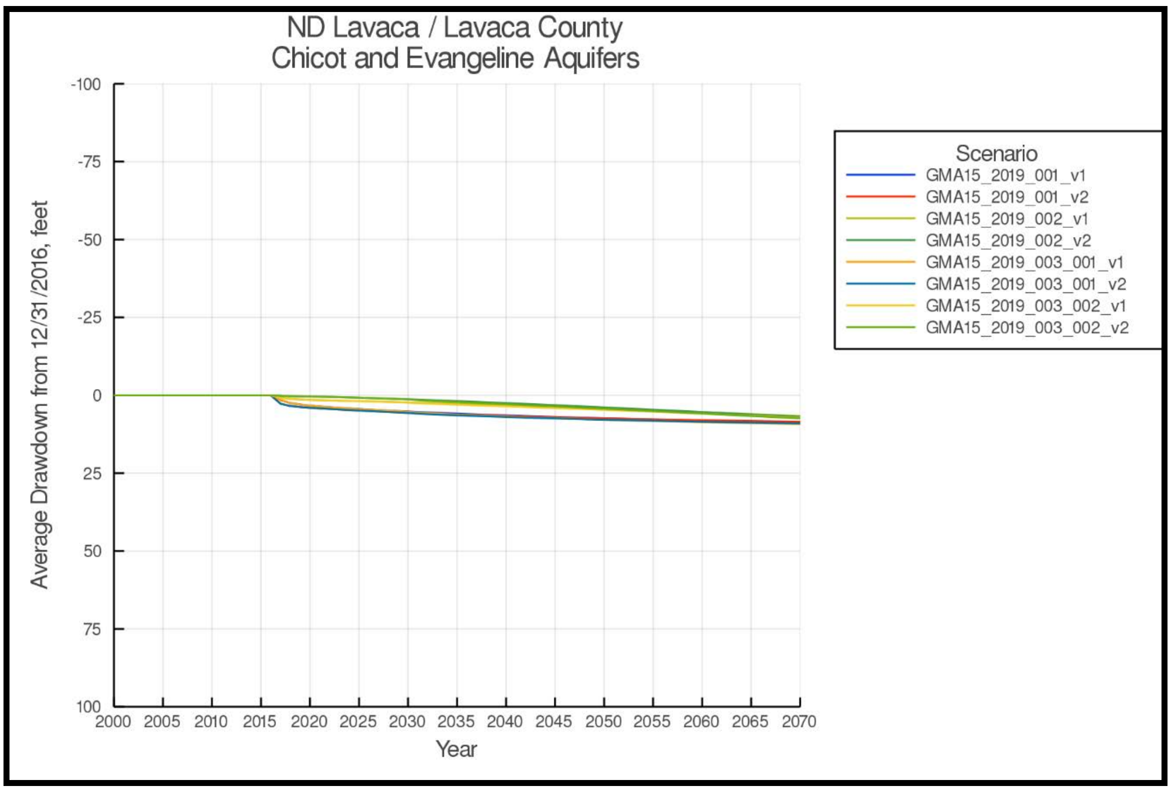

ND Lavaca / Lavaca County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

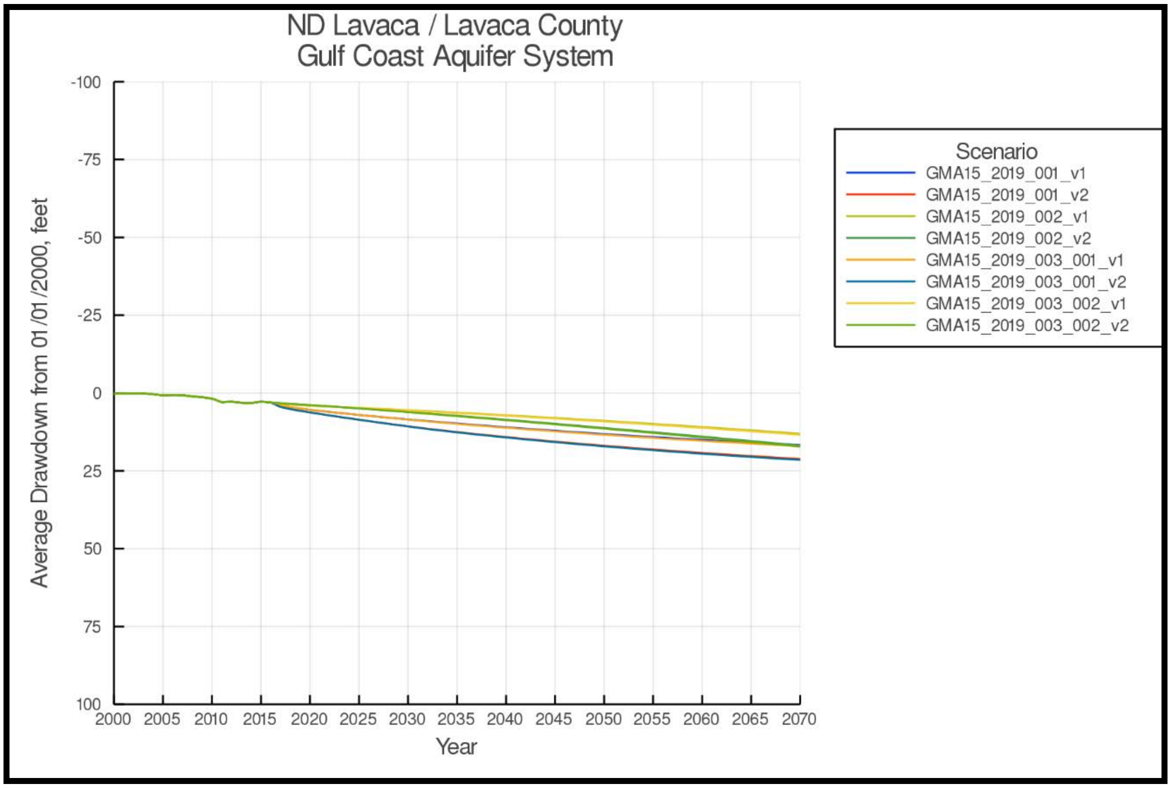

ND Lavaca / Lavaca County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

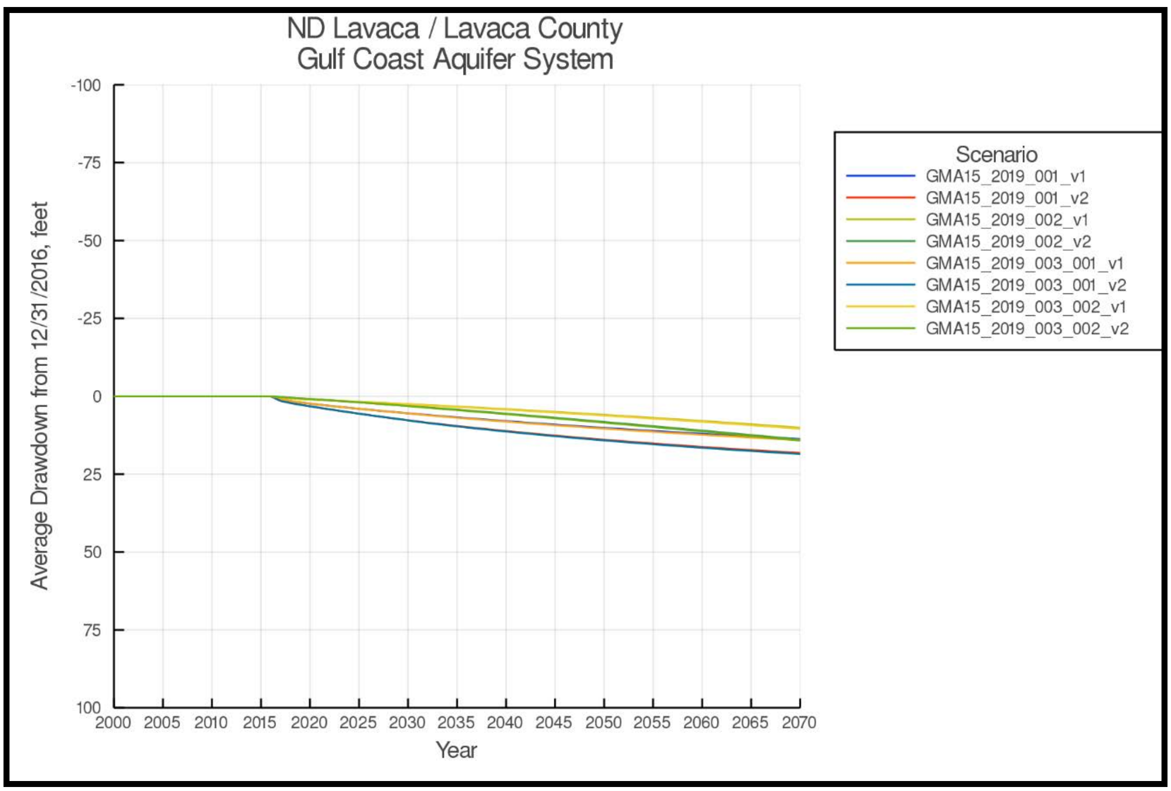

ND Lavaca / Lavaca County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

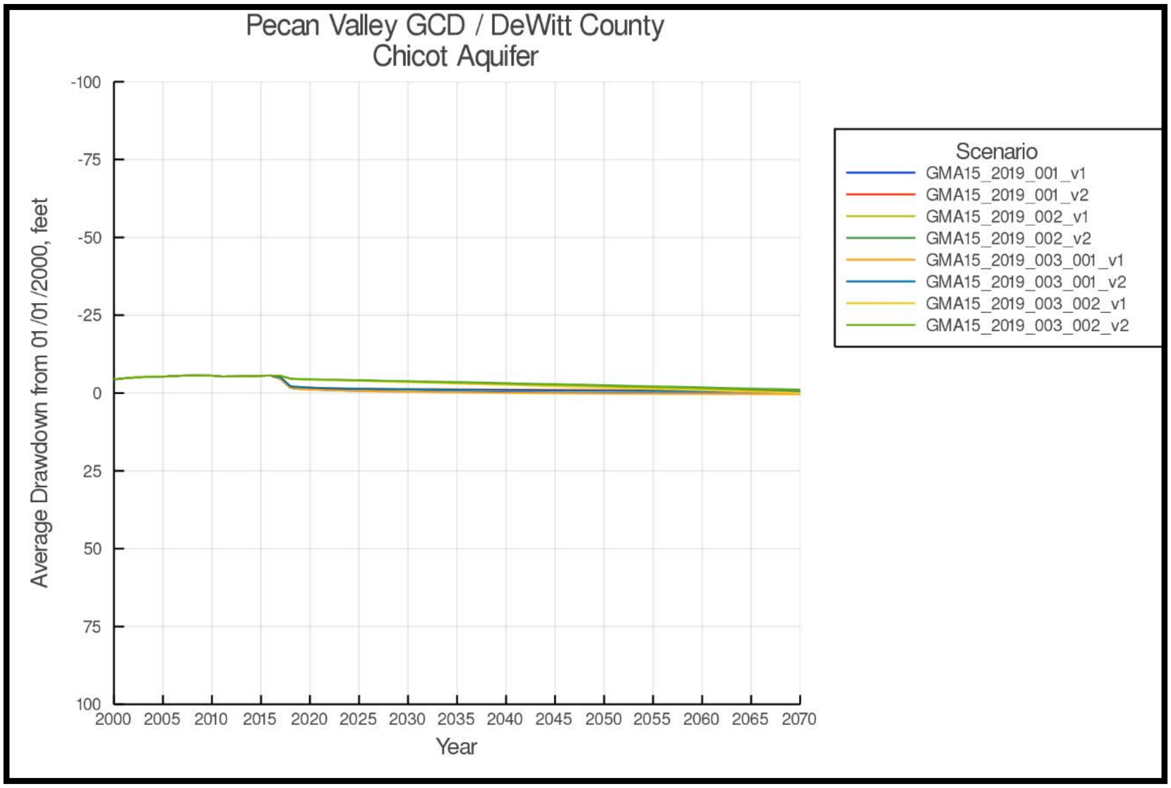

ND Lavaca / Lavaca County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

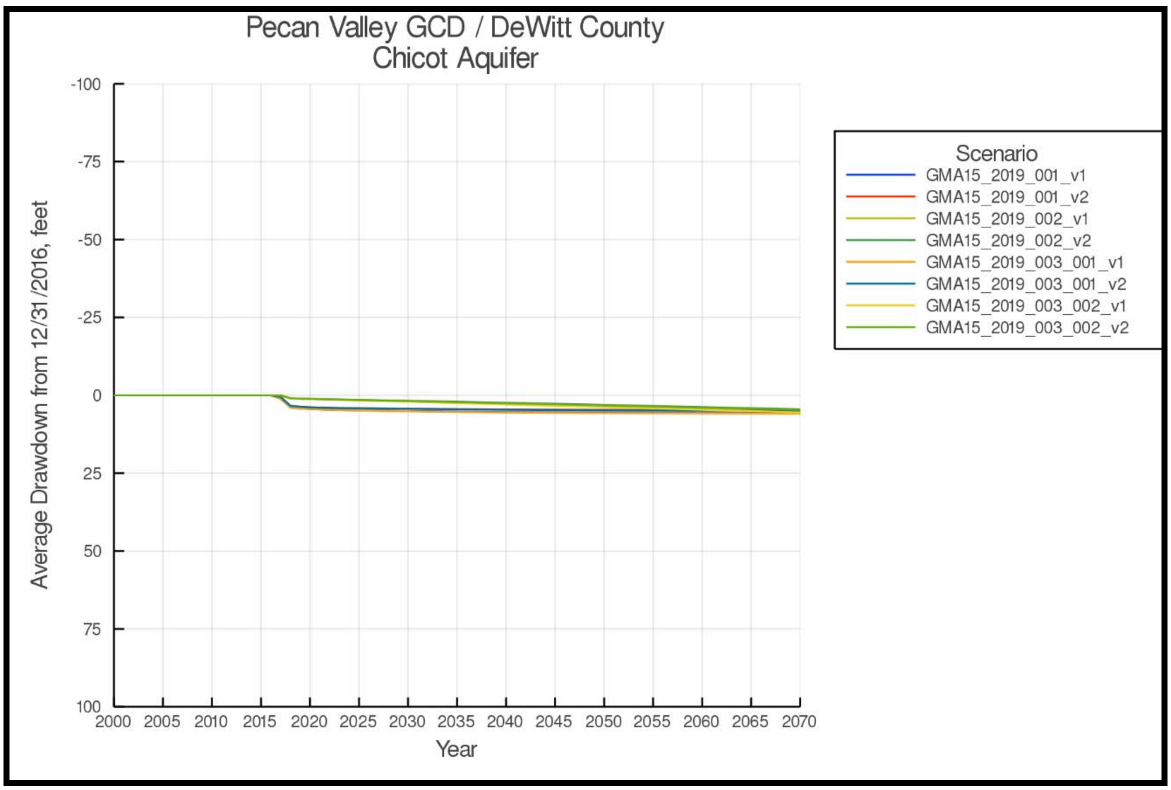

ND Lavaca / Lavaca County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

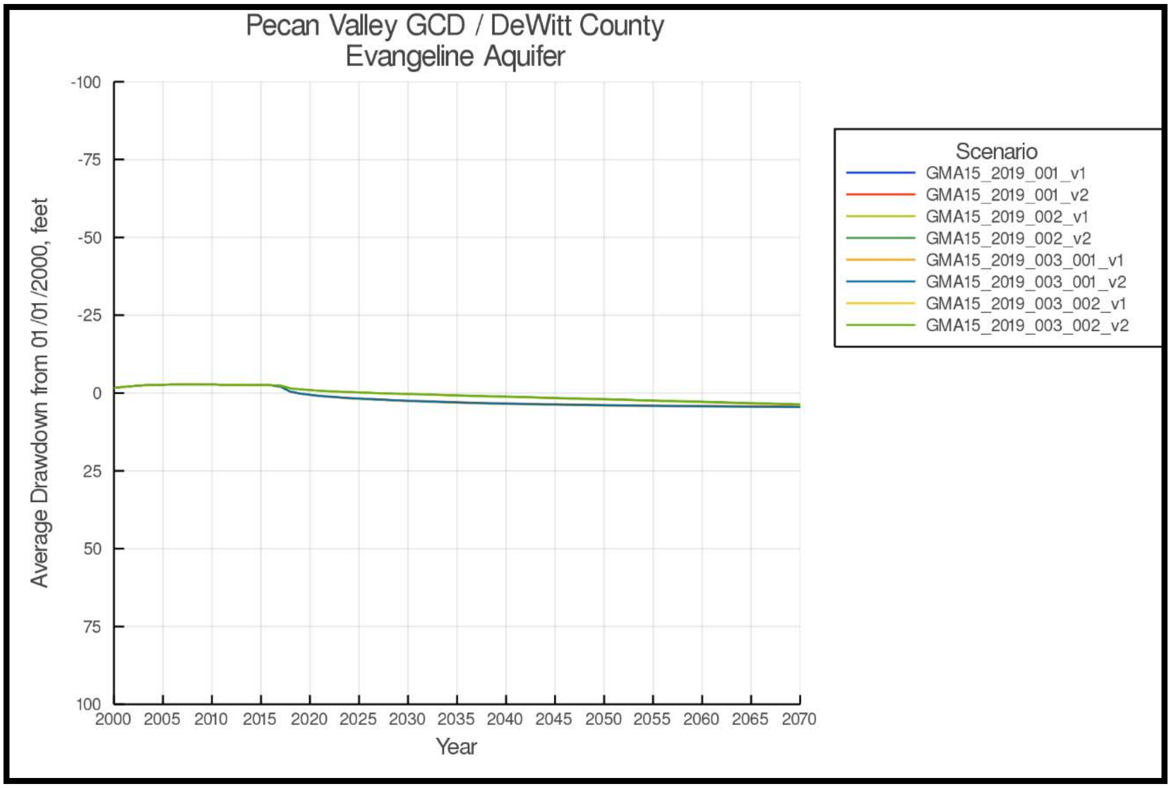

ND Lavaca / Lavaca County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

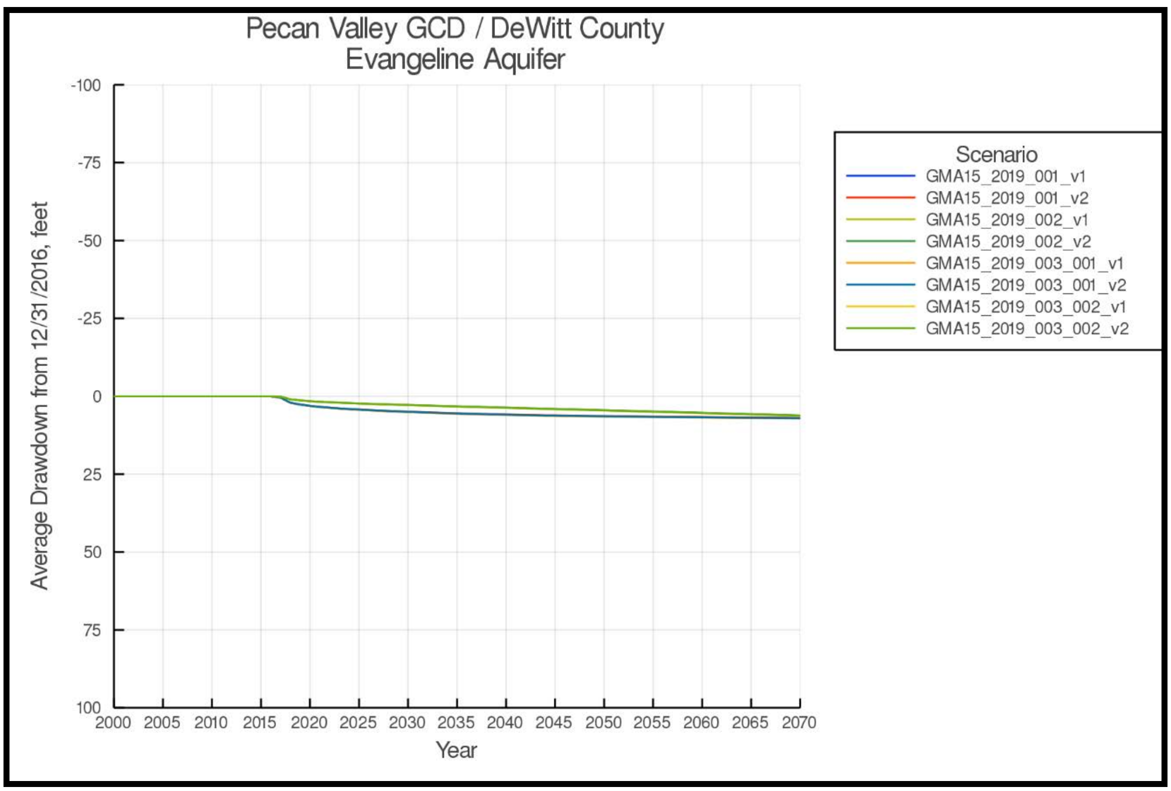

ND Lavaca / Lavaca County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

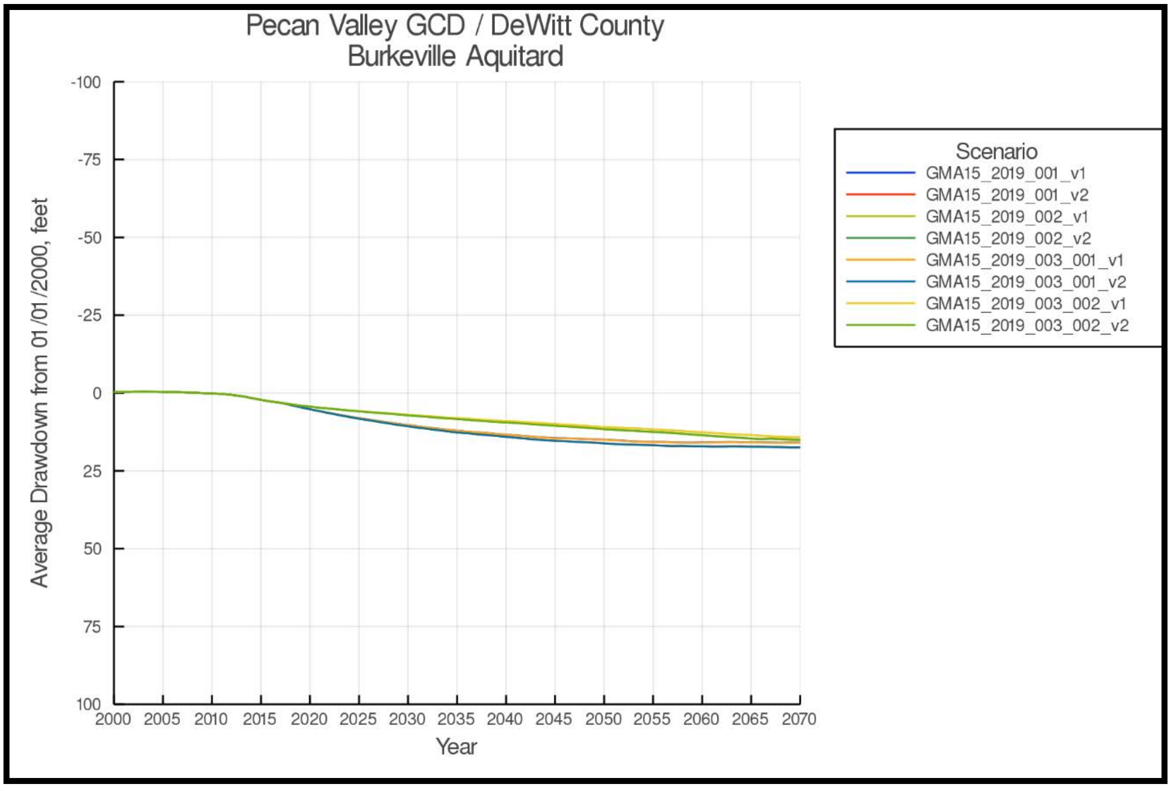

ND Lavaca / Lavaca County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

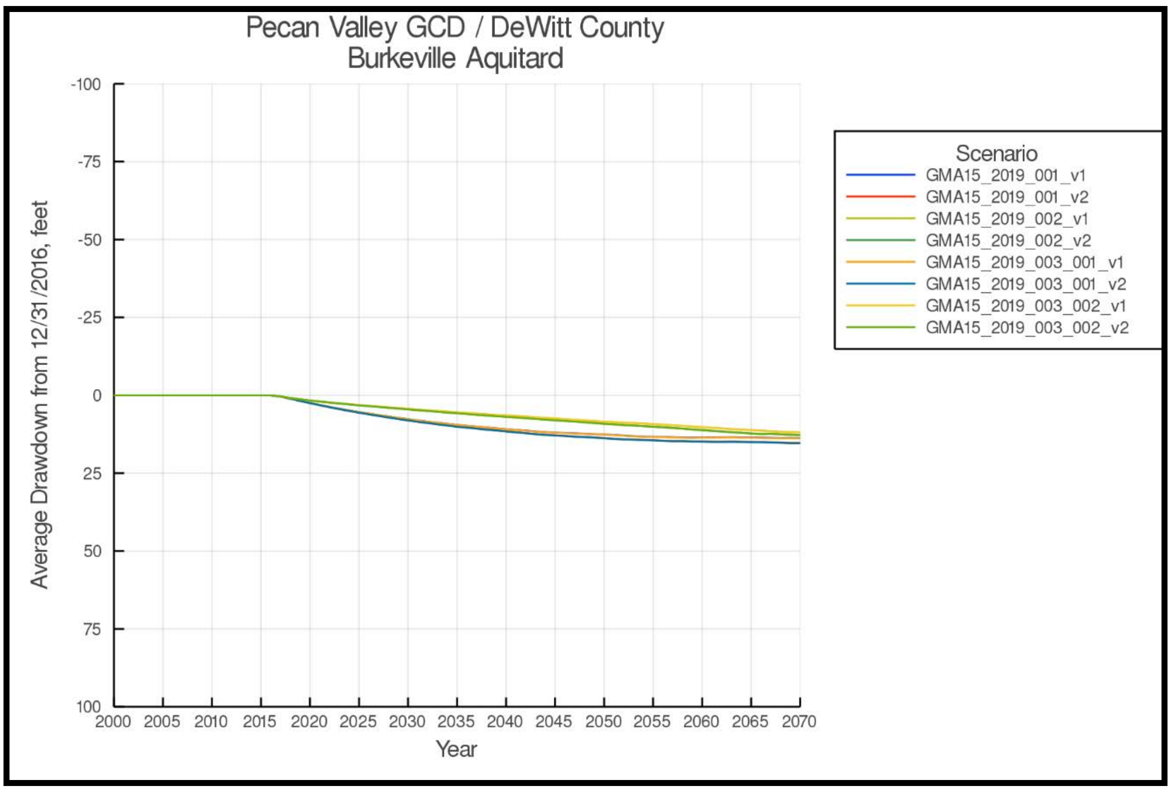

Pecan Valley GCD / DeWitt County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

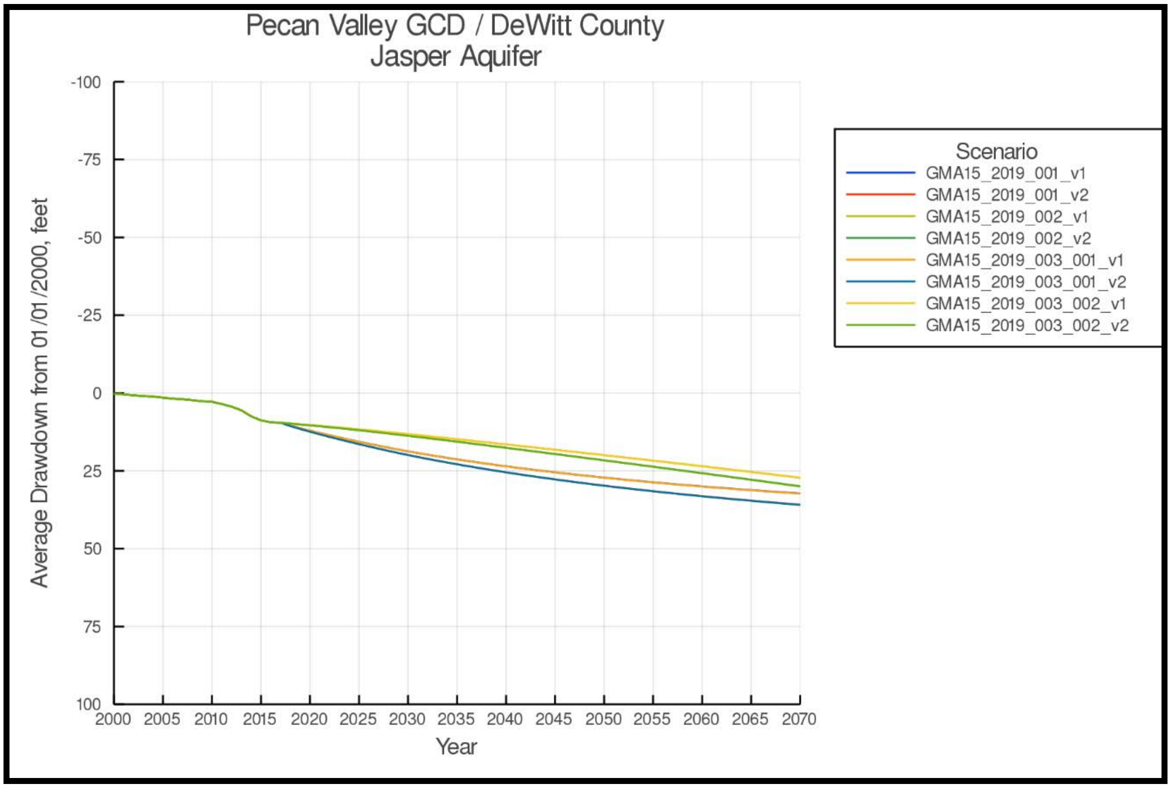

Pecan Valley GCD / DeWitt County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

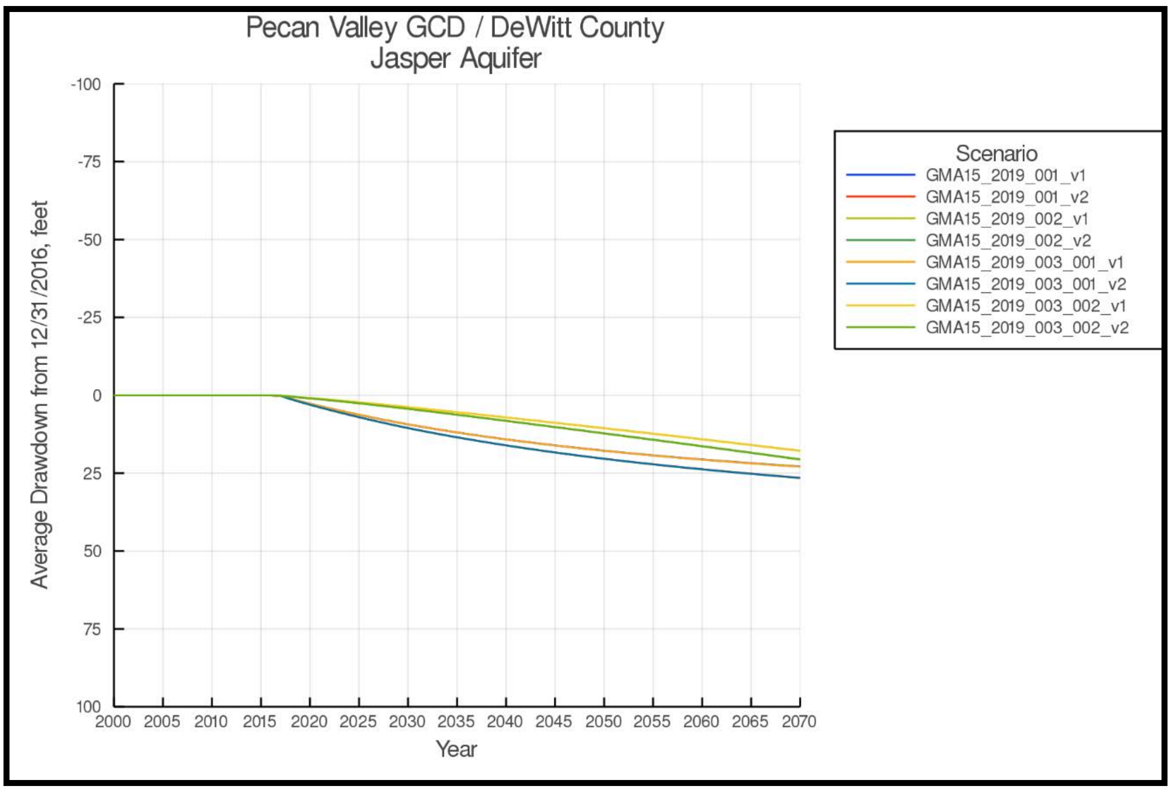

Pecan Valley GCD / DeWitt County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

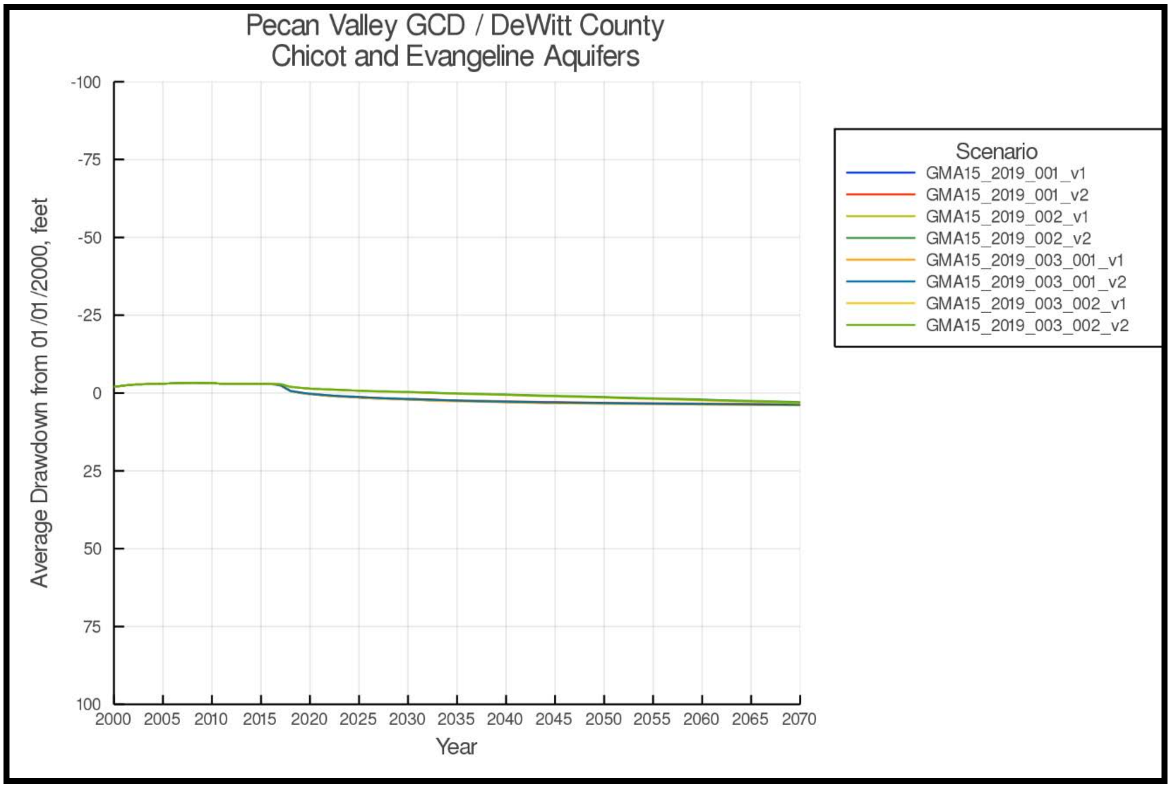

Pecan Valley GCD / DeWitt County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

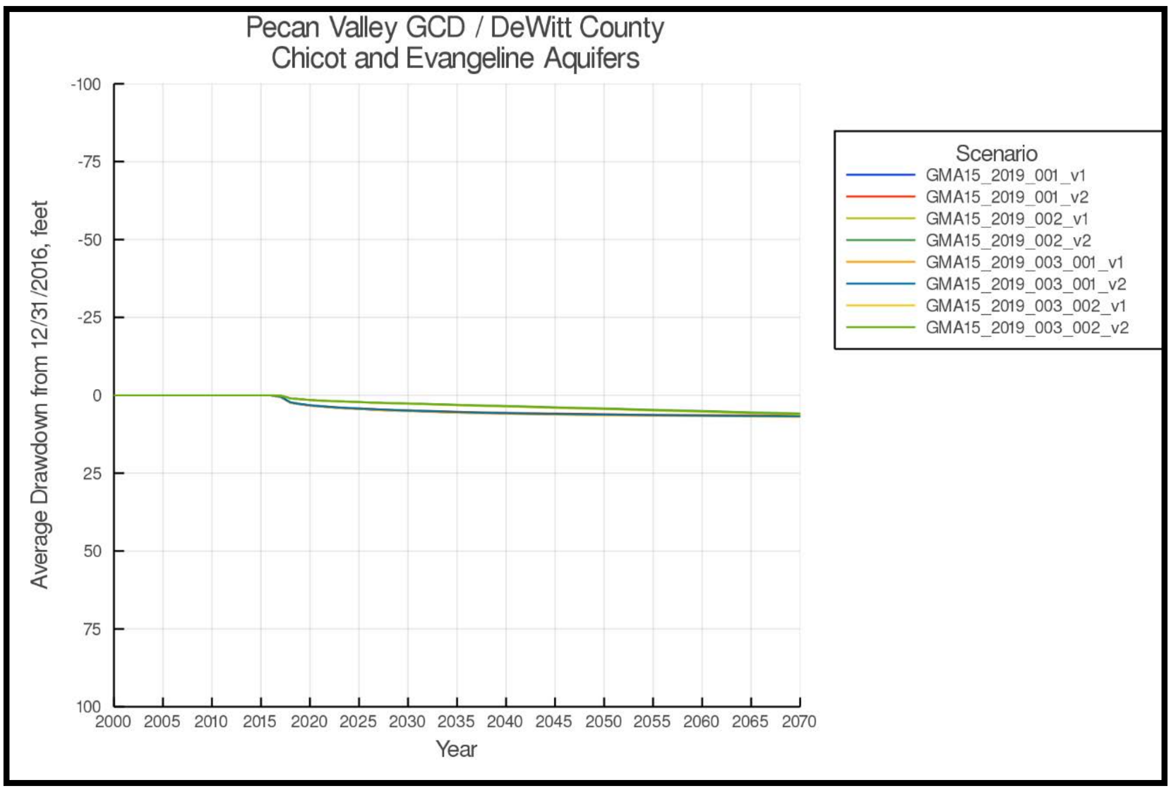

Pecan Valley GCD / DeWitt County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

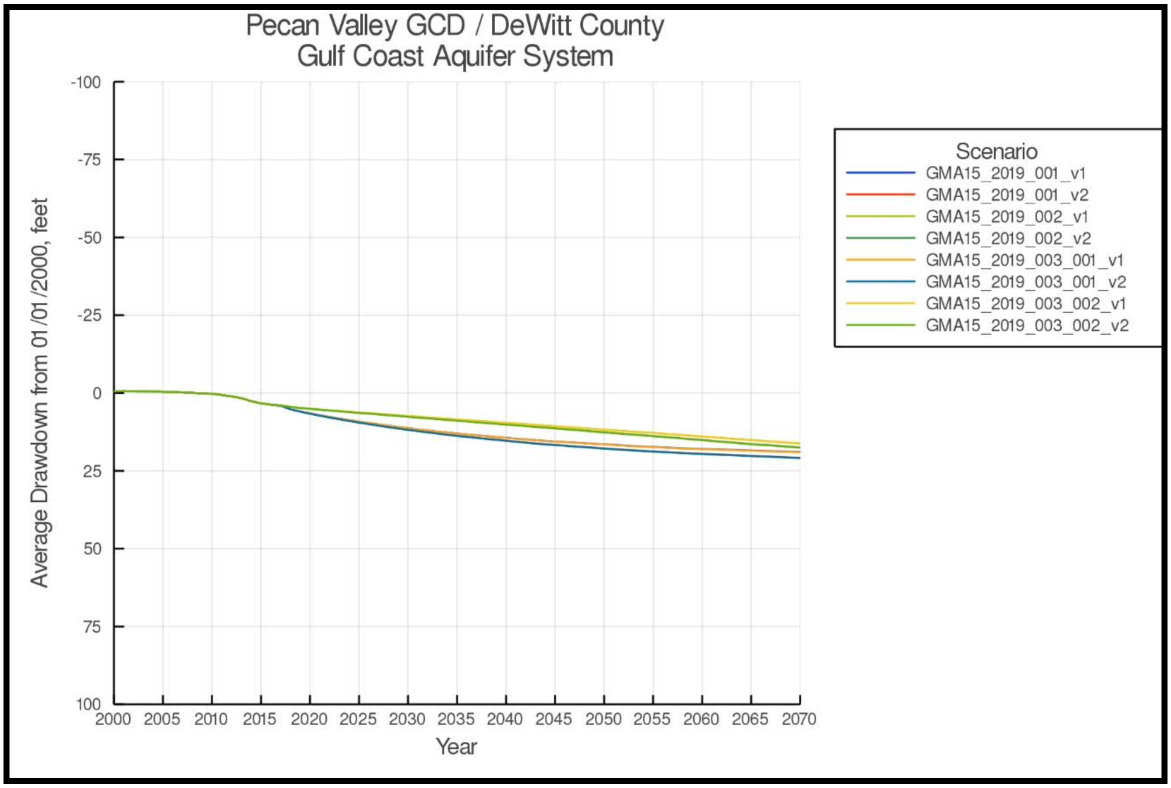

Pecan Valley GCD / DeWitt County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

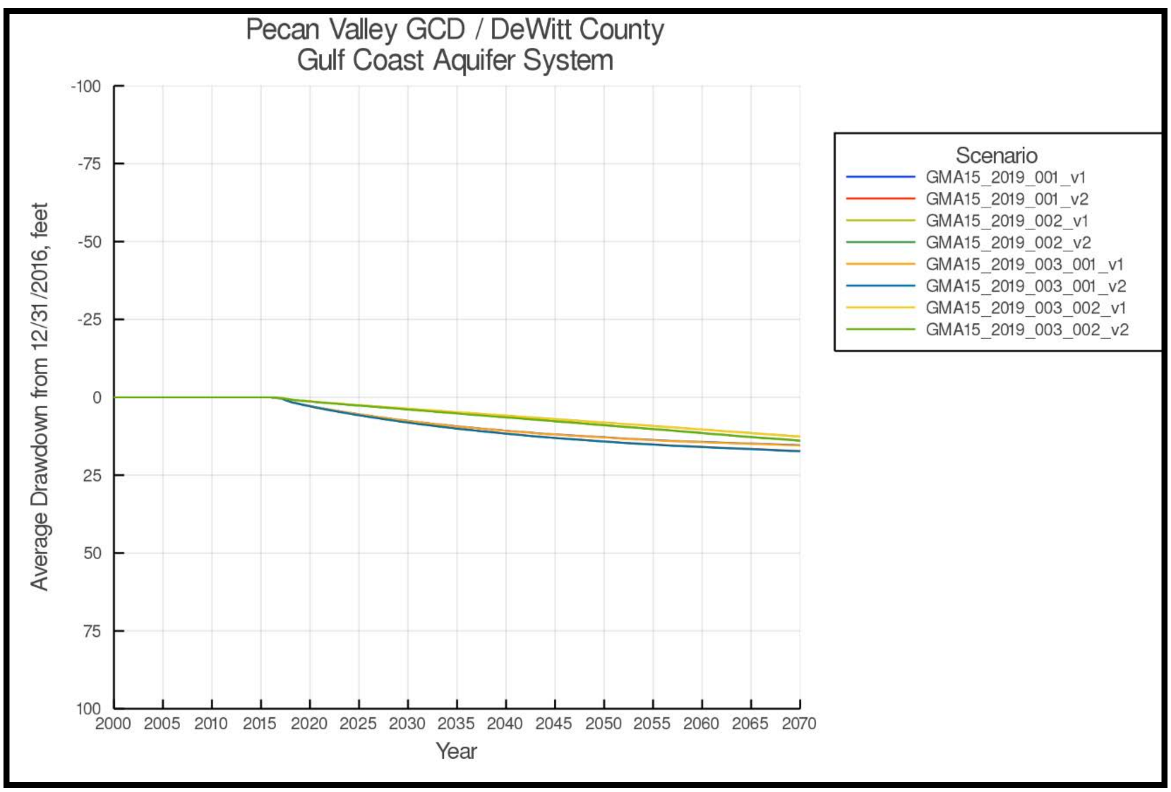

Pecan Valley GCD / DeWitt County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

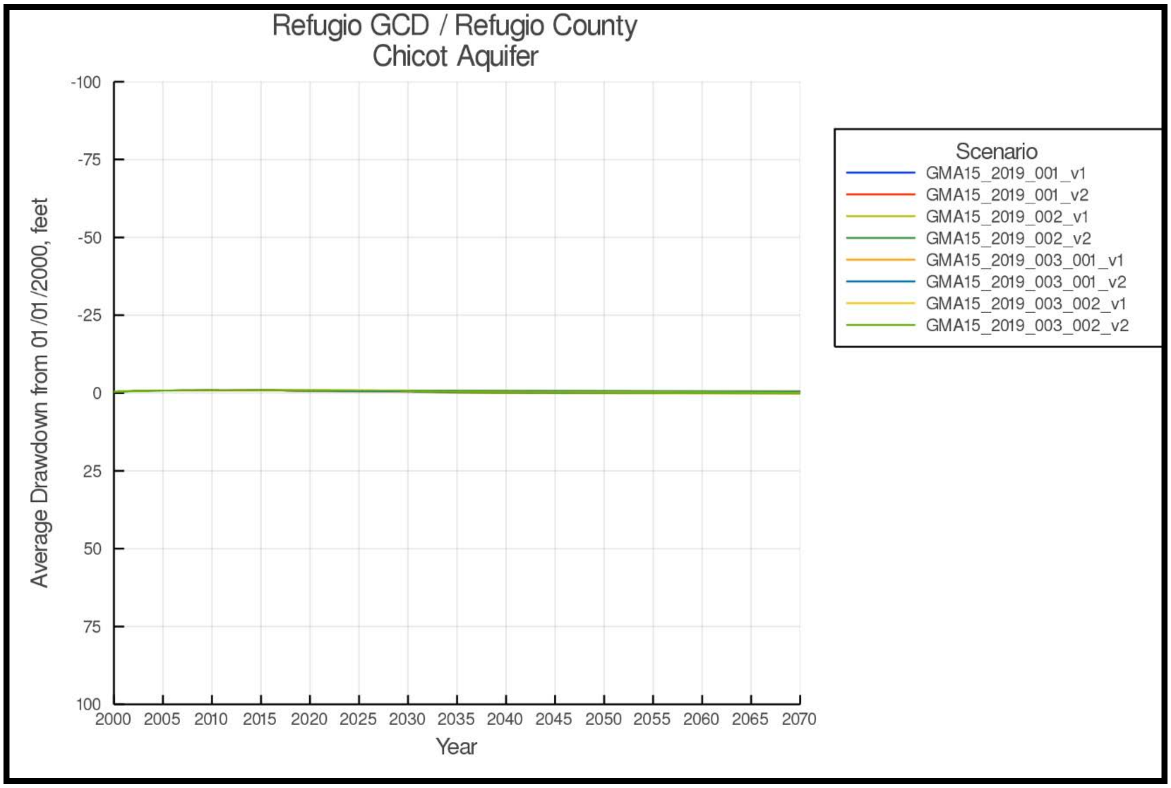

Pecan Valley GCD / DeWitt County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

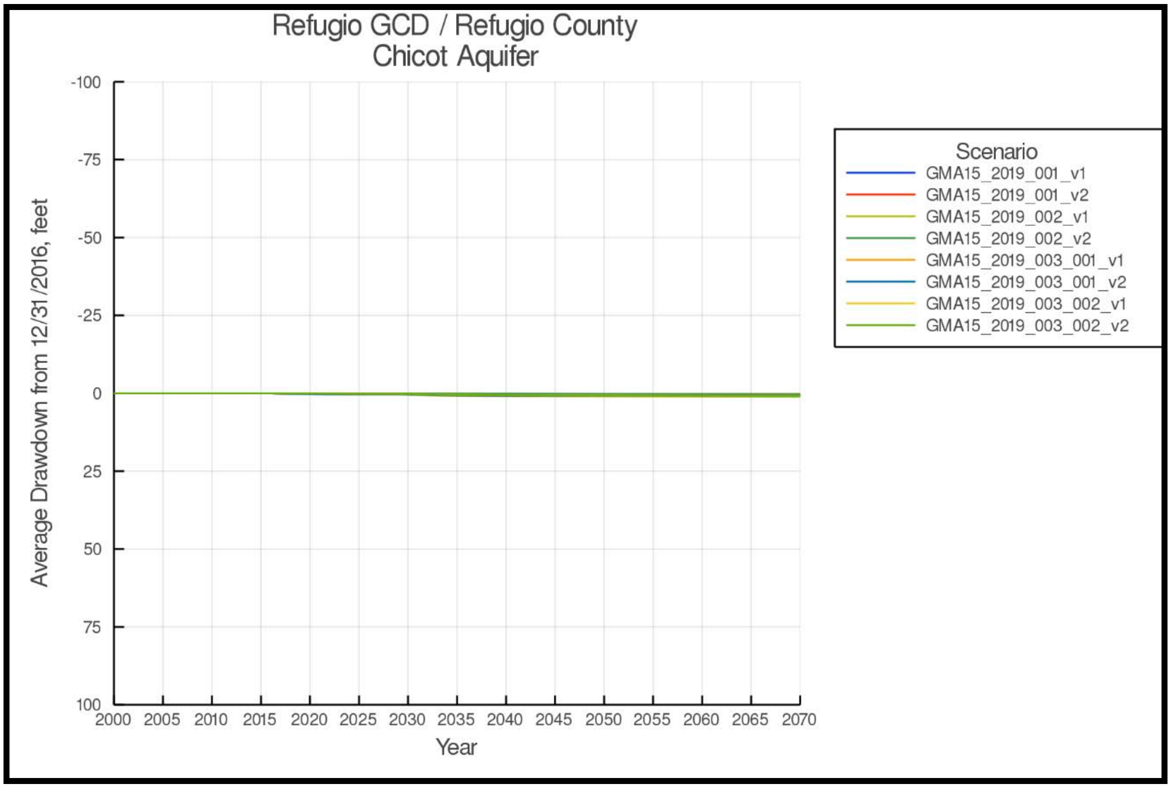

Pecan Valley GCD / DeWitt County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

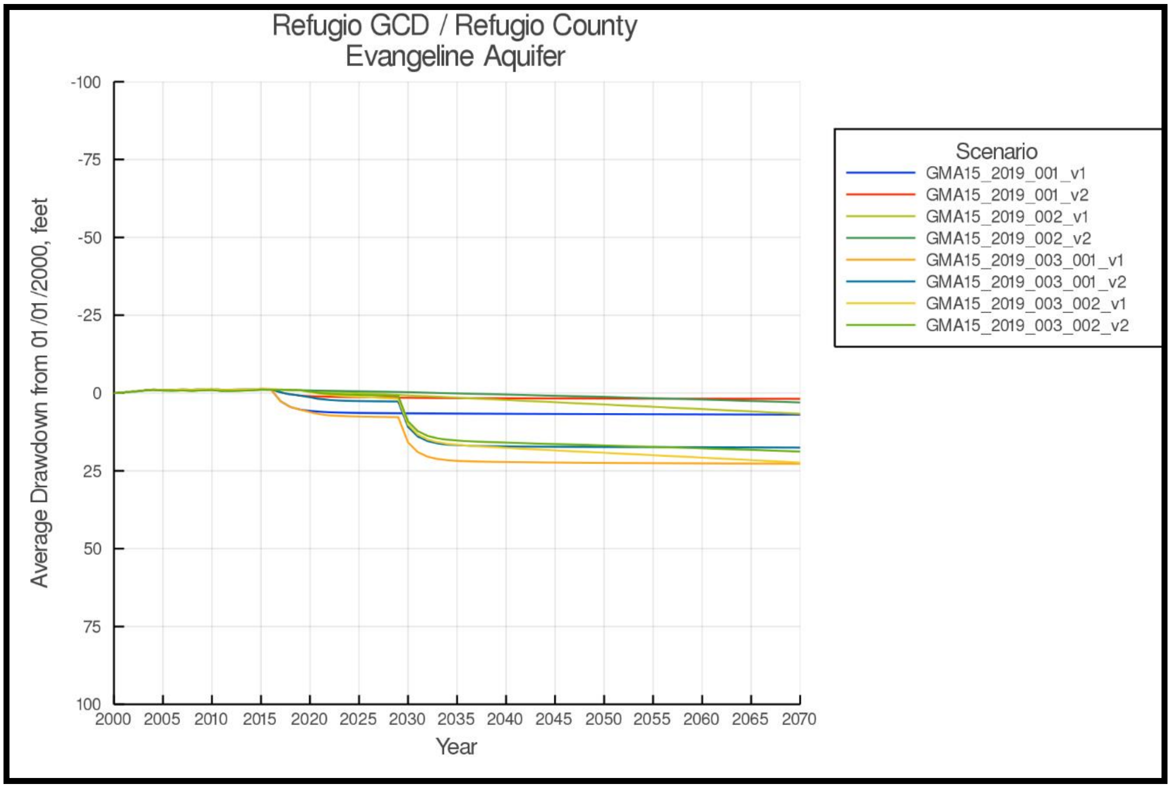

Pecan Valley GCD / DeWitt County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

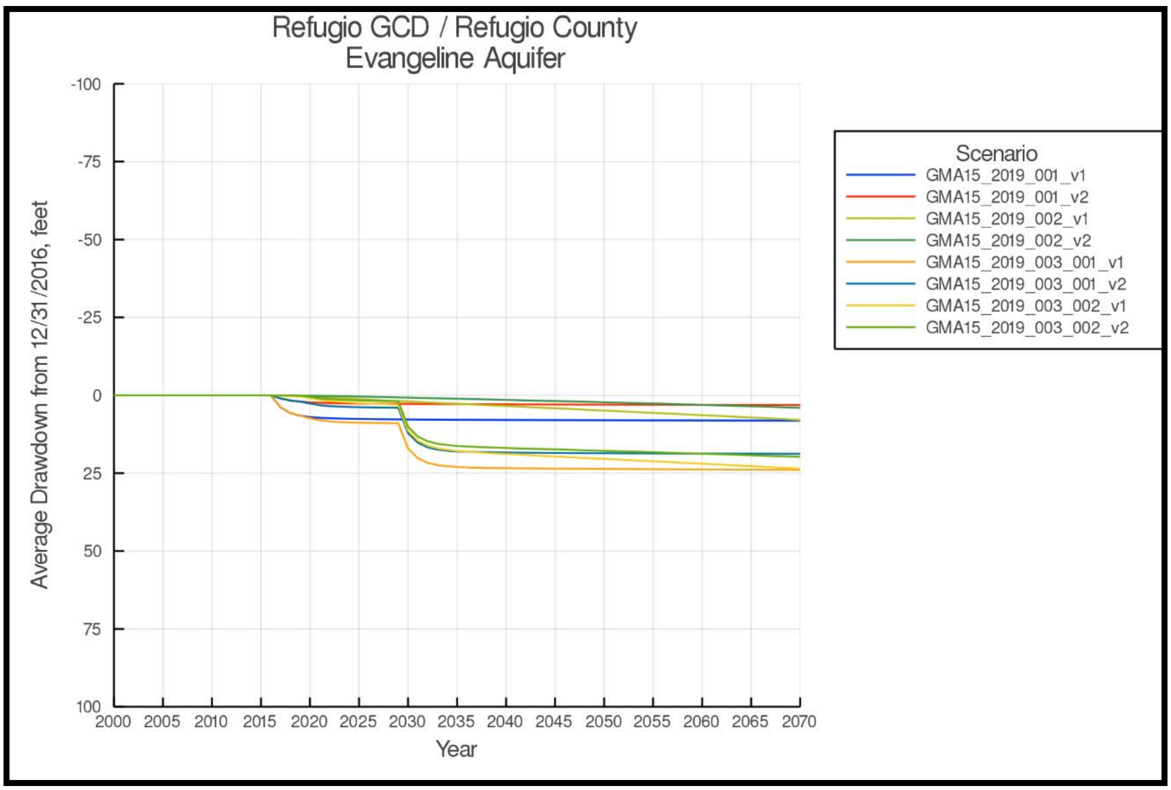

Pecan Valley GCD / DeWitt County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

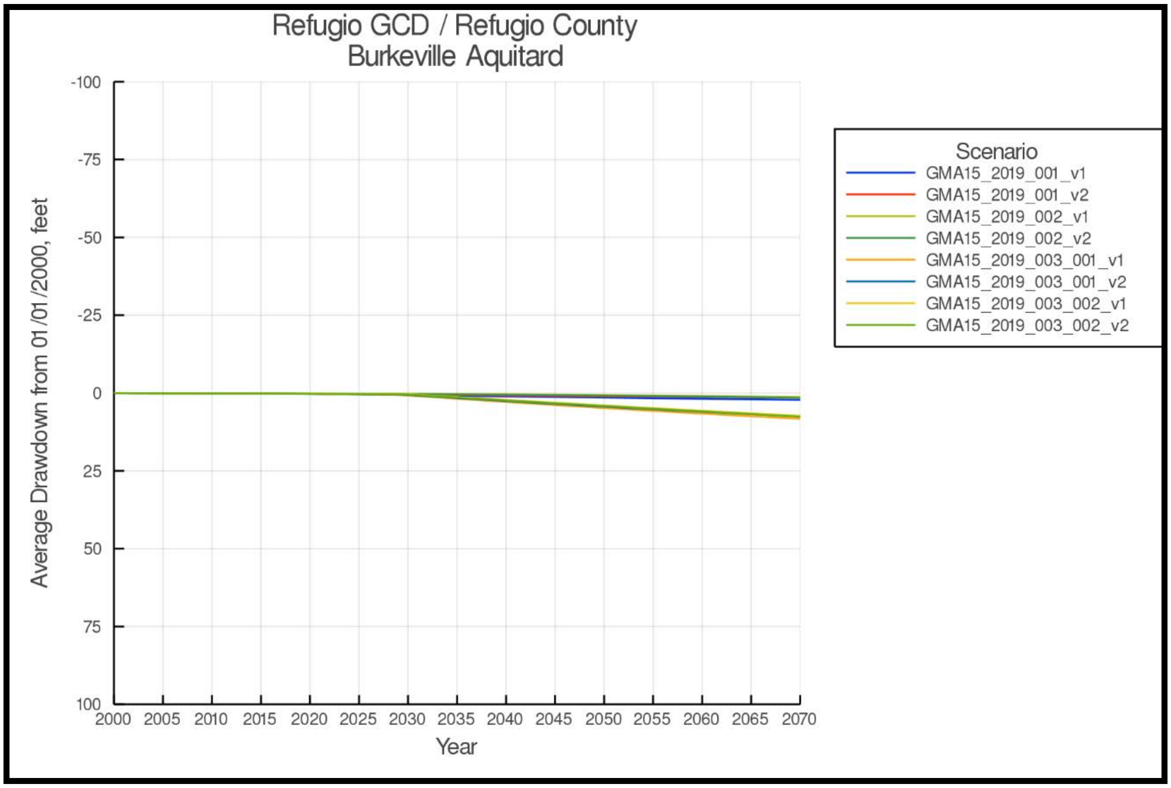

Pecan Valley GCD / DeWitt County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

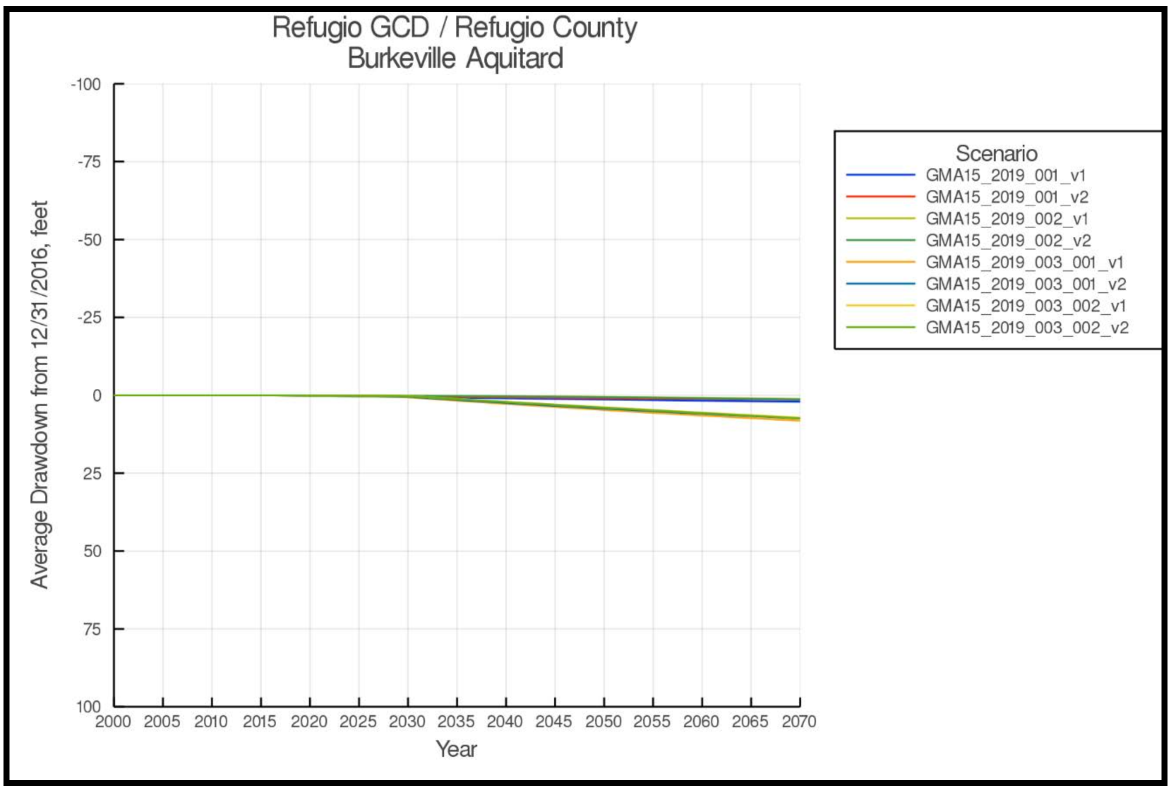

Refugio GCD / Refugio County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

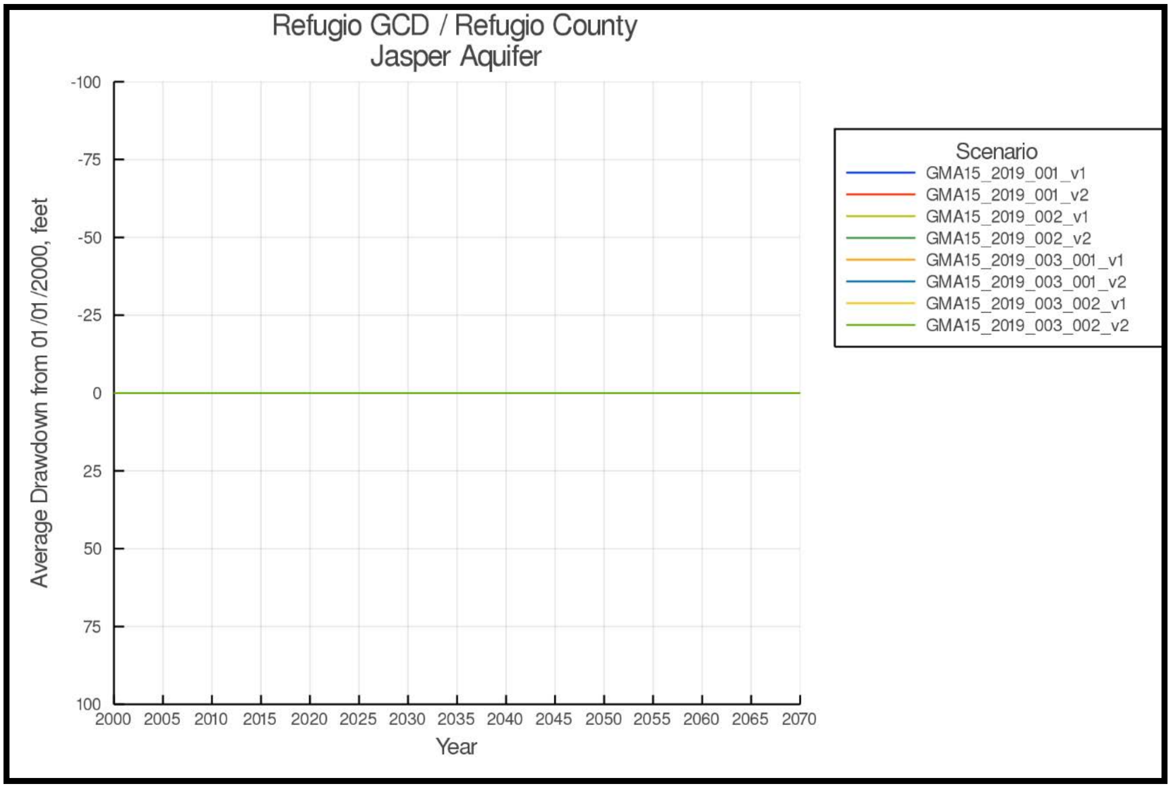

Refugio GCD / Refugio County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

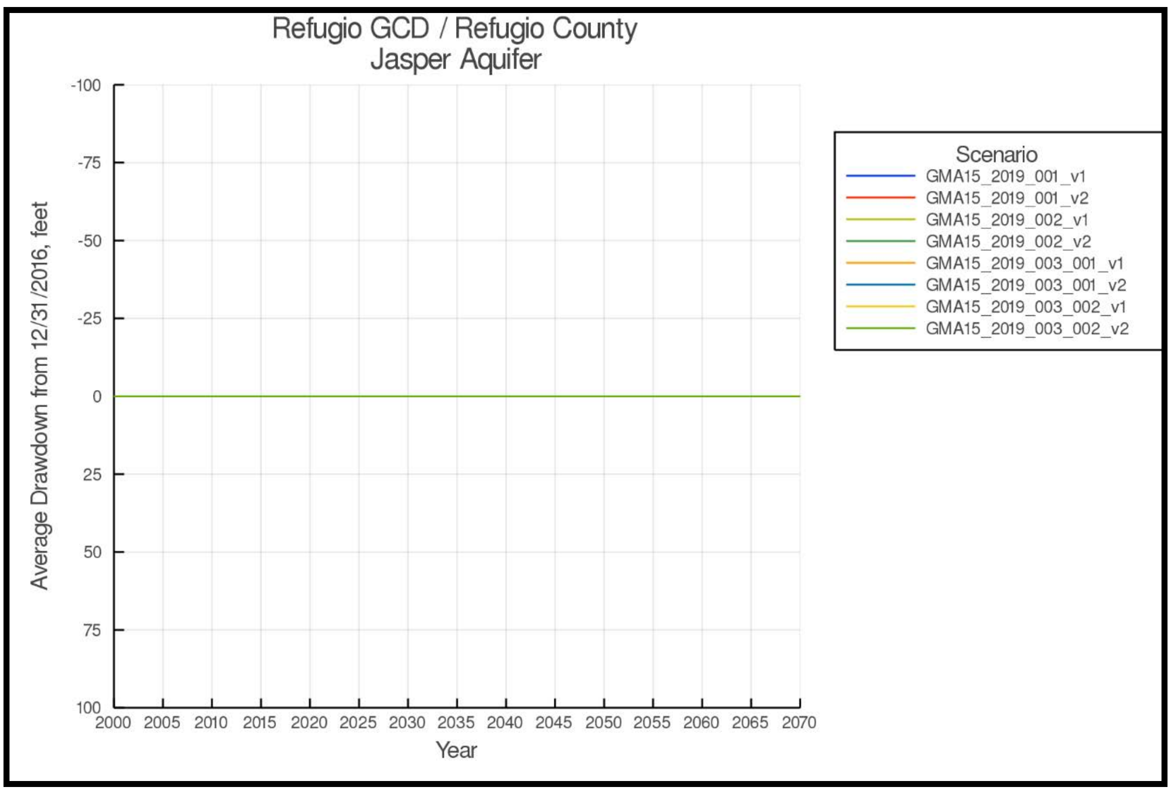

Refugio GCD / Refugio County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

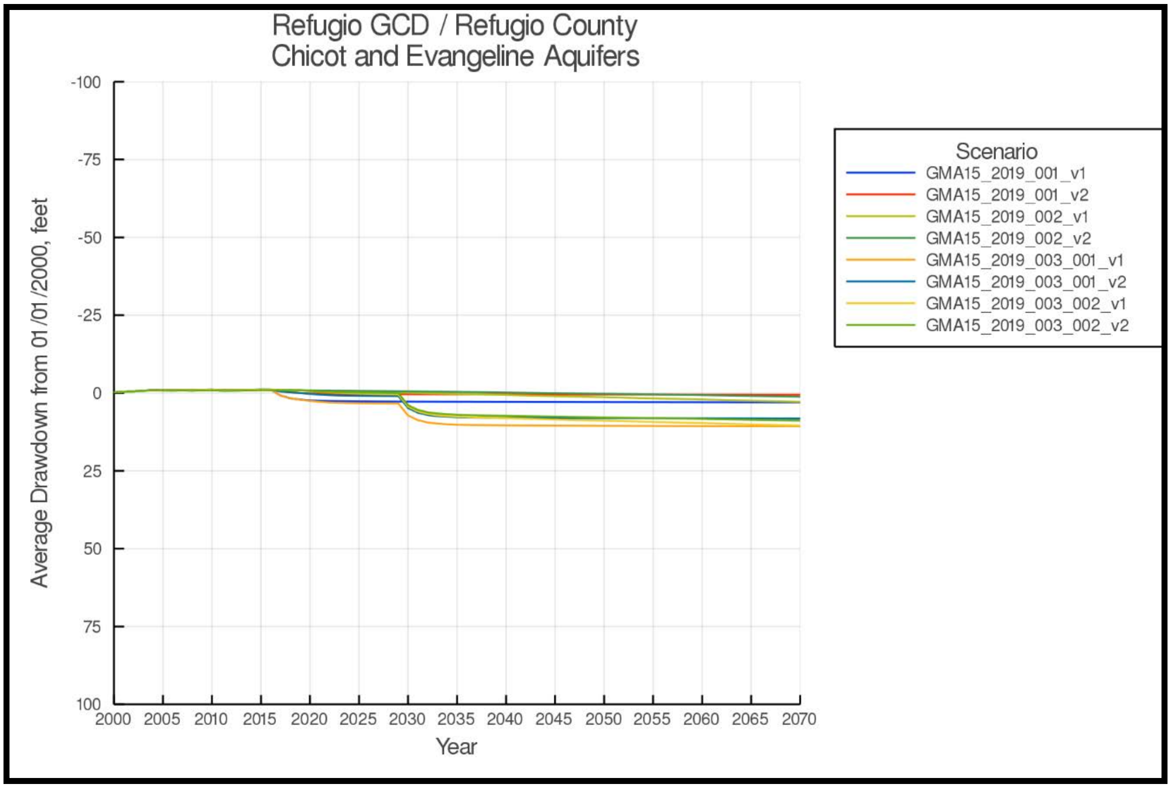

Refugio GCD / Refugio County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

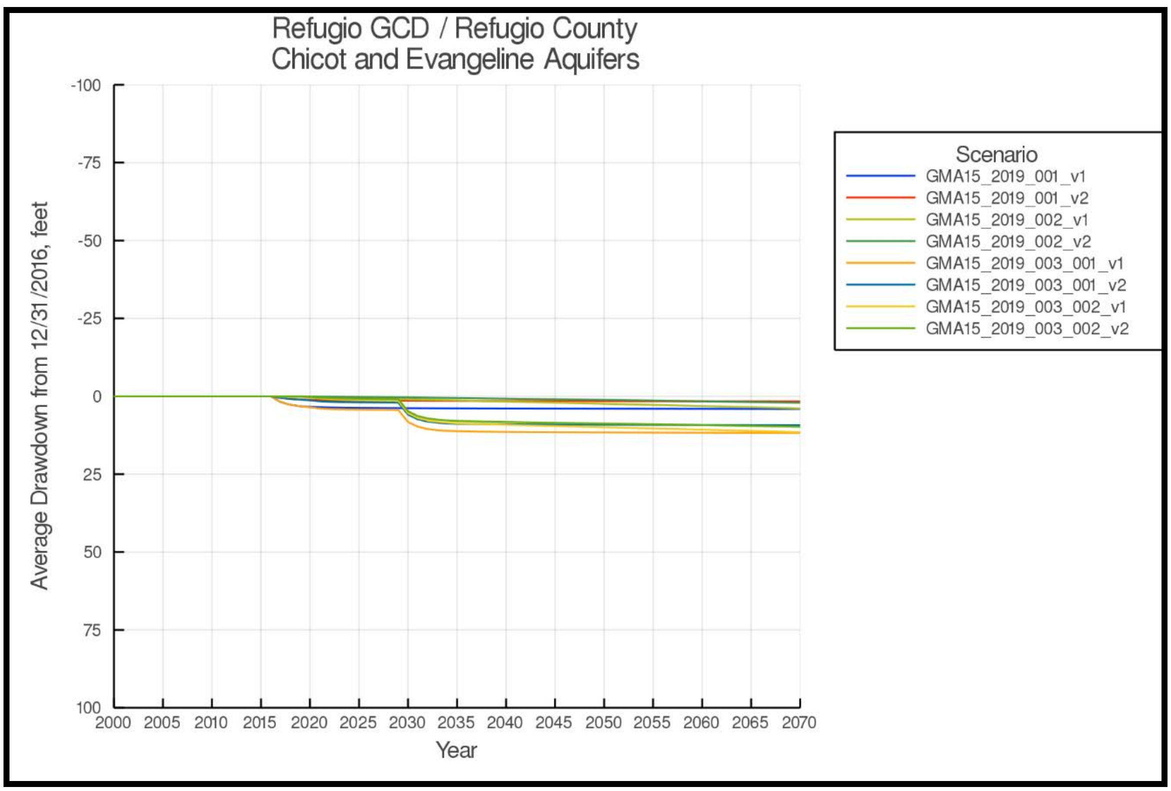

Refugio GCD / Refugio County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

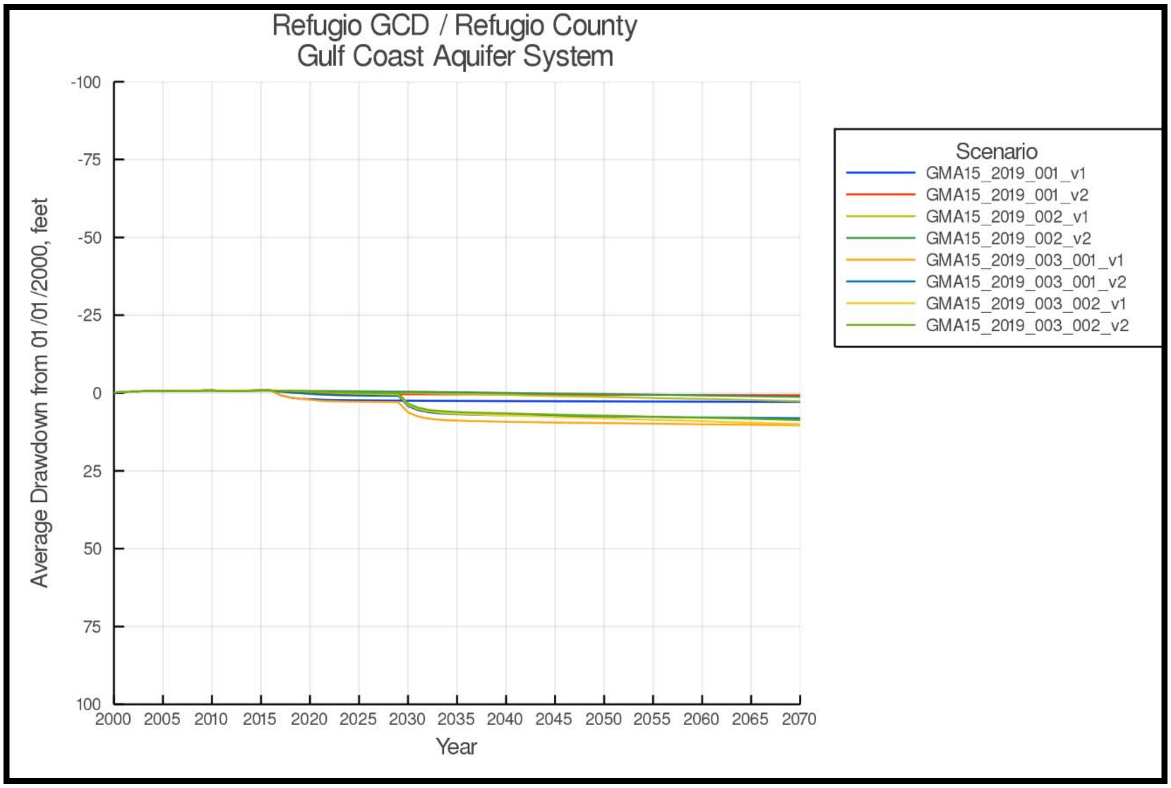

Refugio GCD / Refugio County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

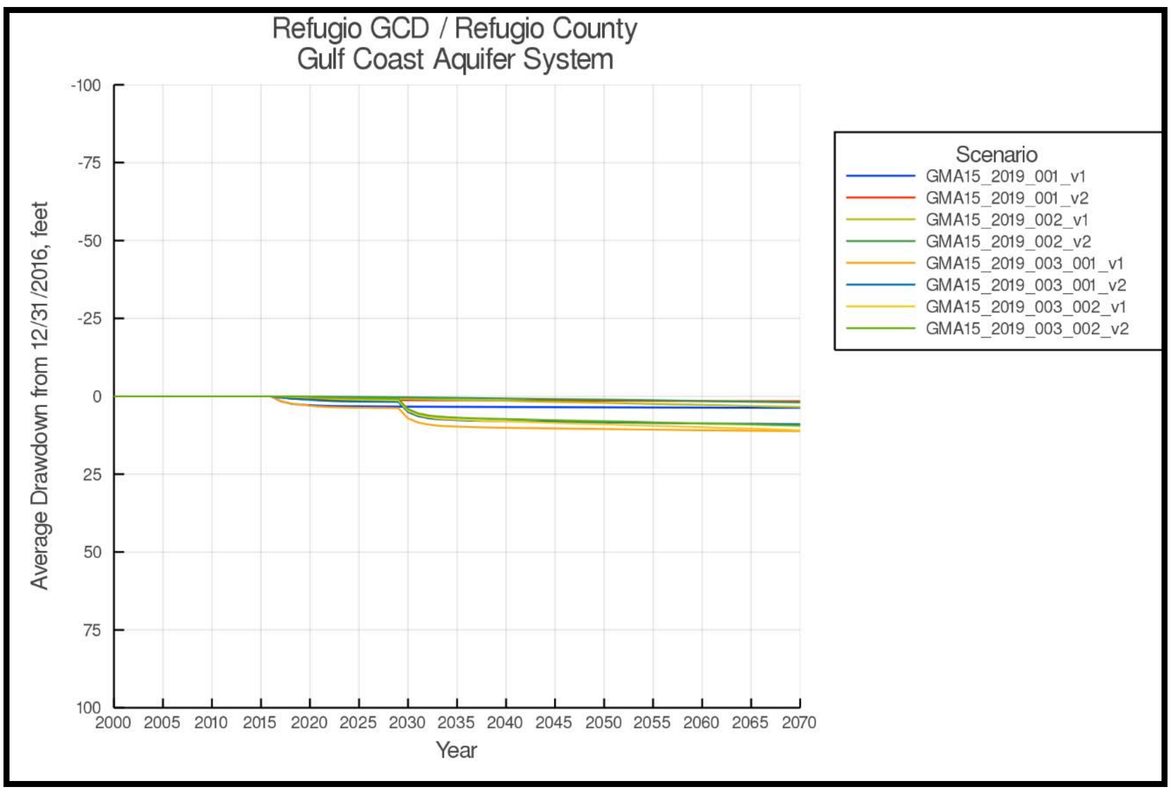

Refugio GCD / Refugio County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

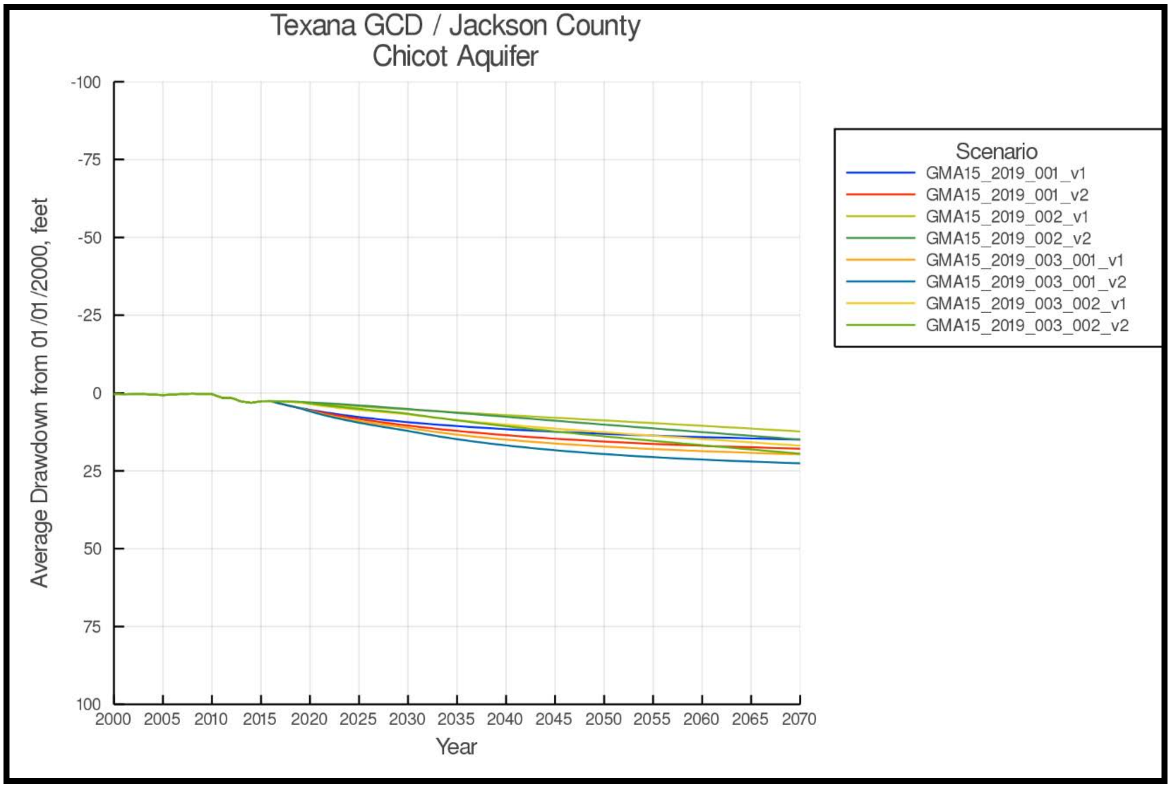

Refugio GCD / Refugio County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

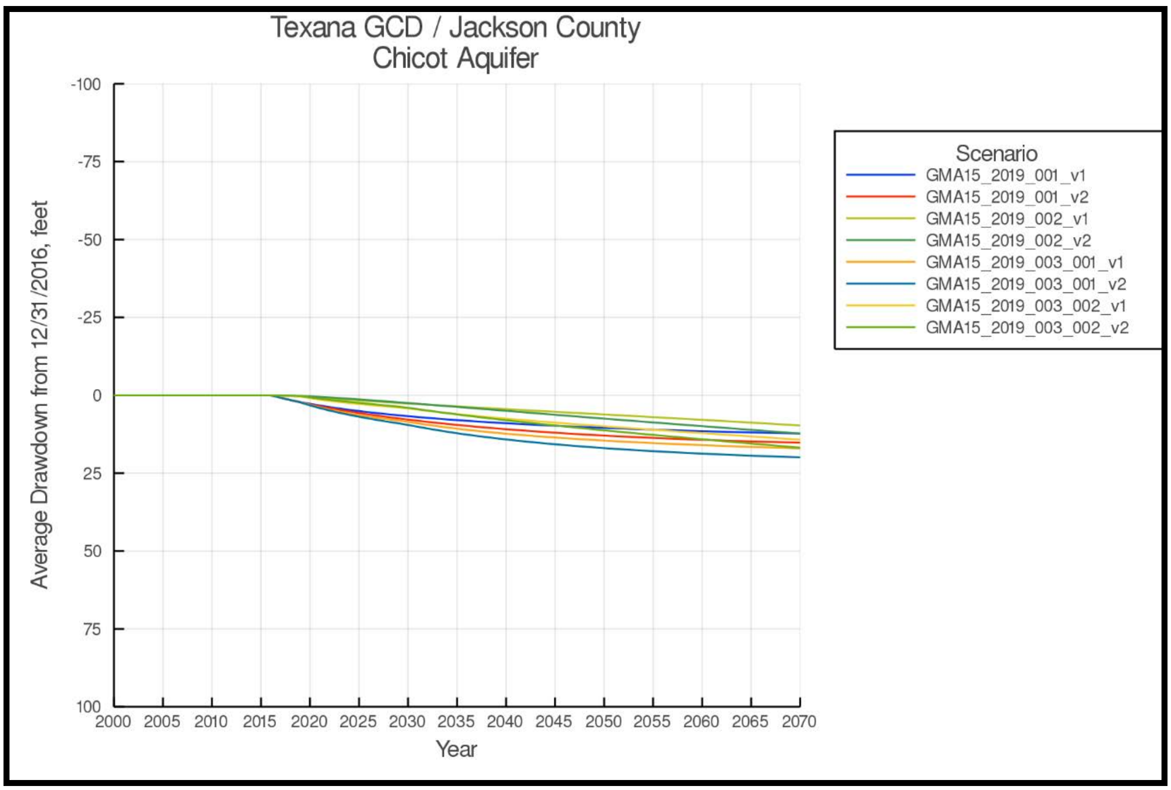

Refugio GCD / Refugio County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

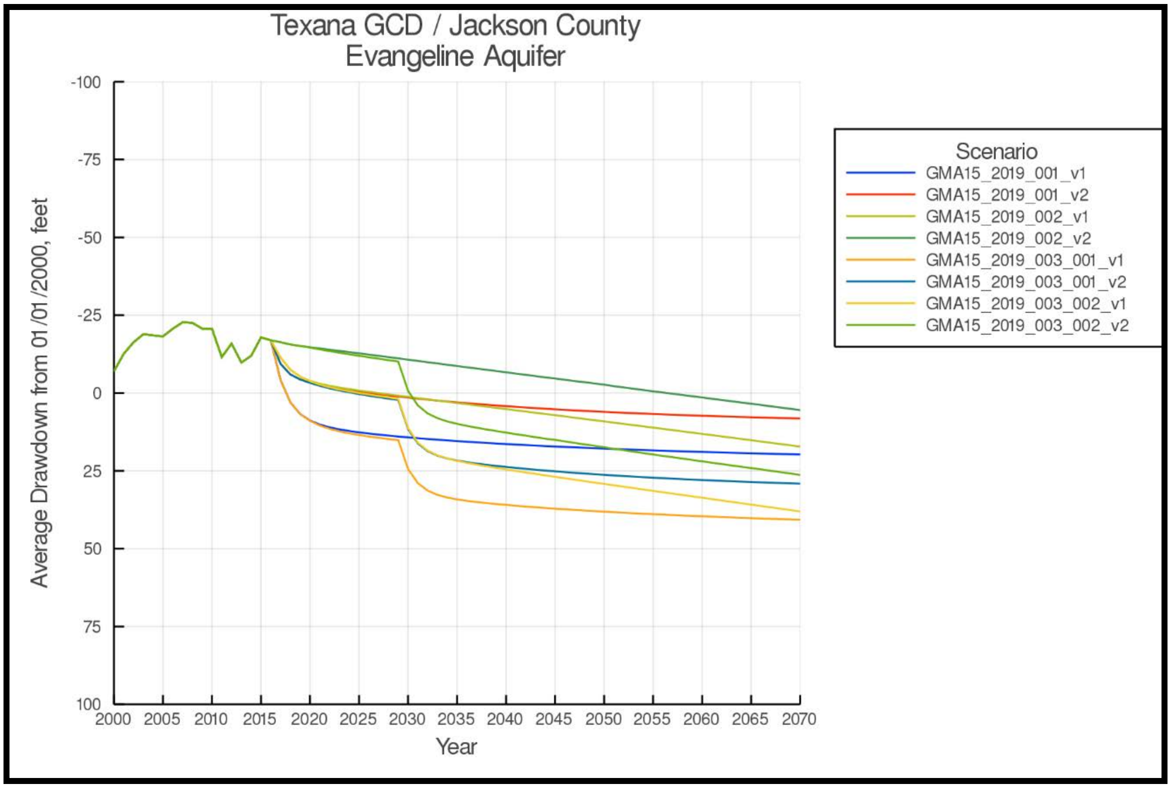

Refugio GCD / Refugio County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

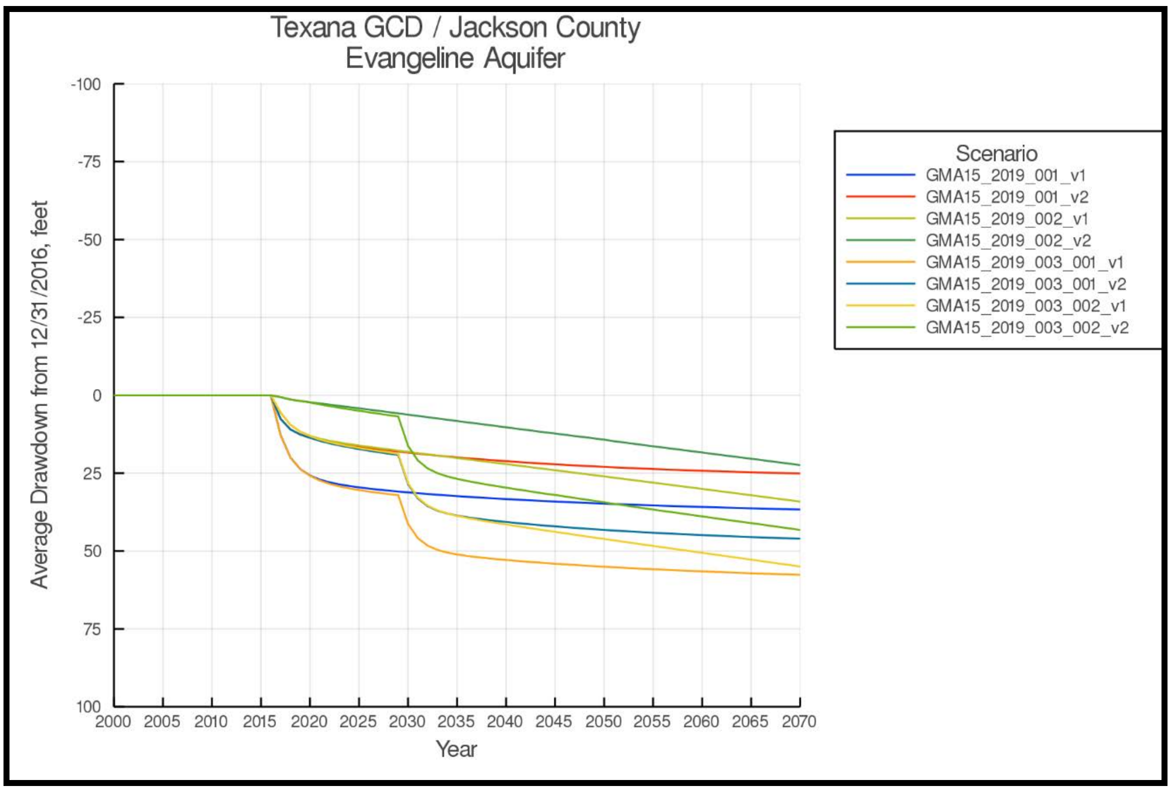

Refugio GCD / Refugio County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

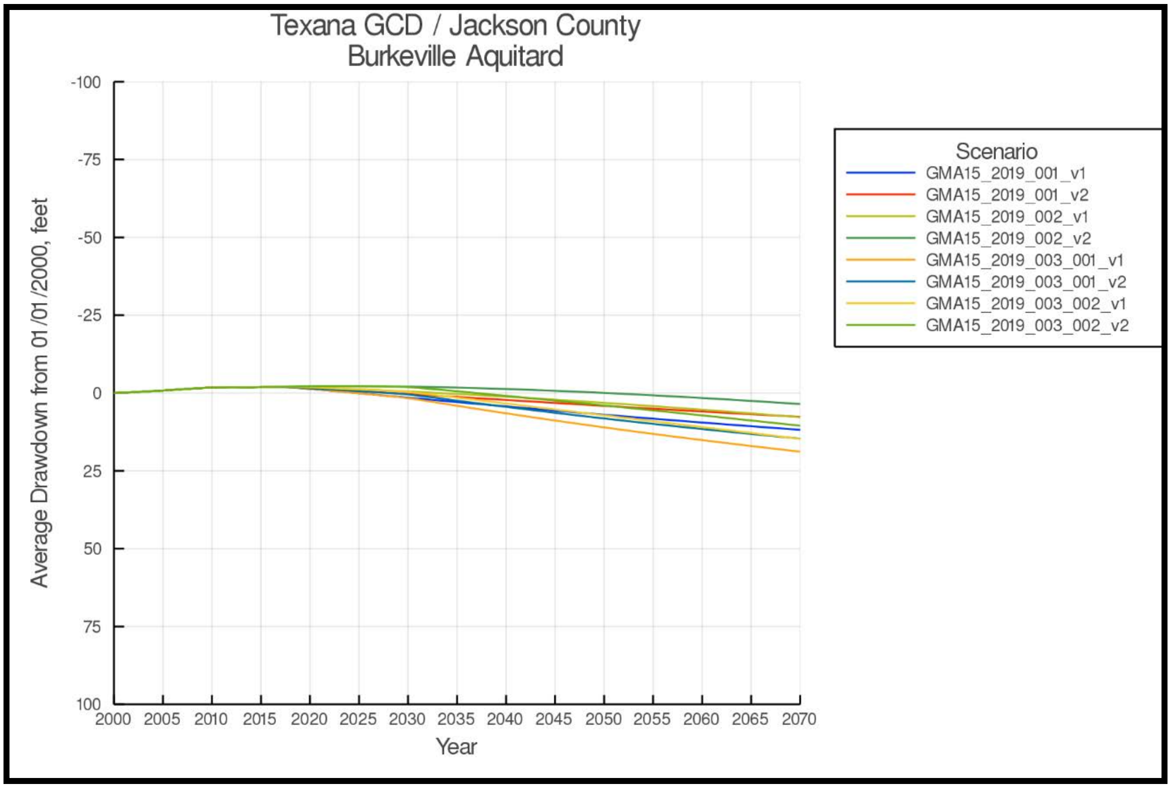

Refugio GCD / Refugio County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

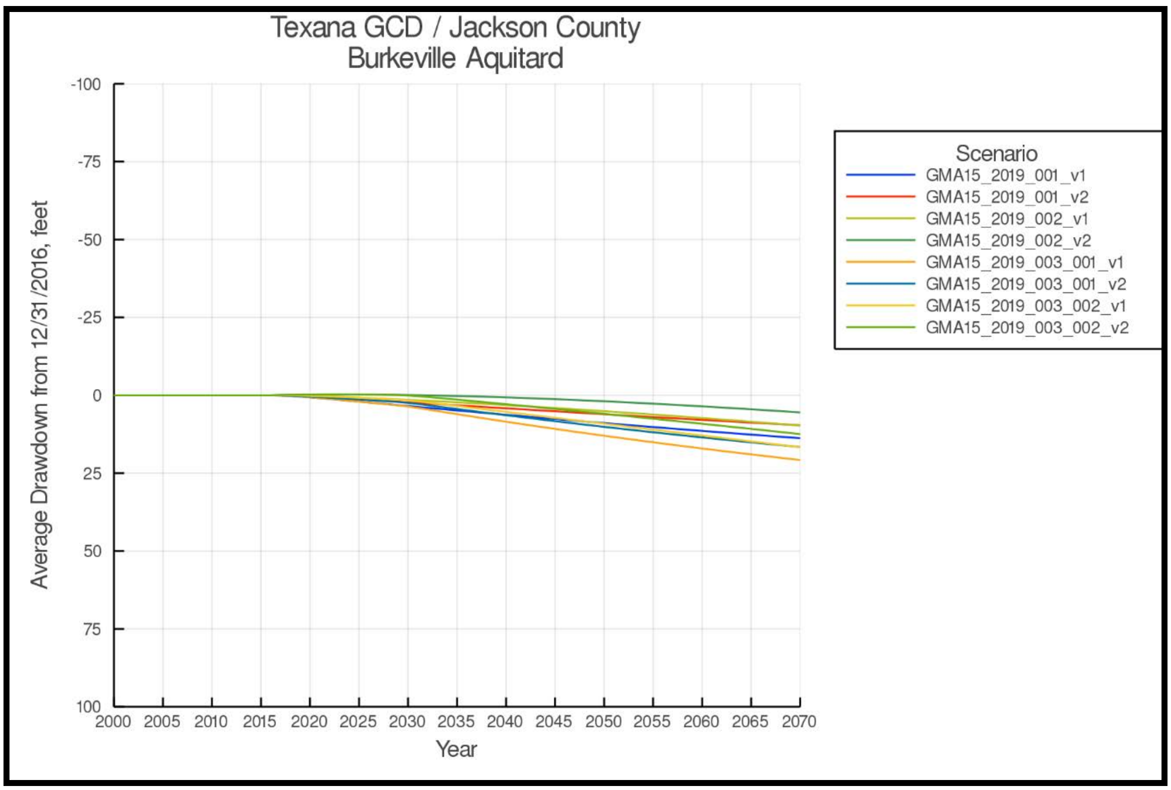

Texana GCD / Jackson County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

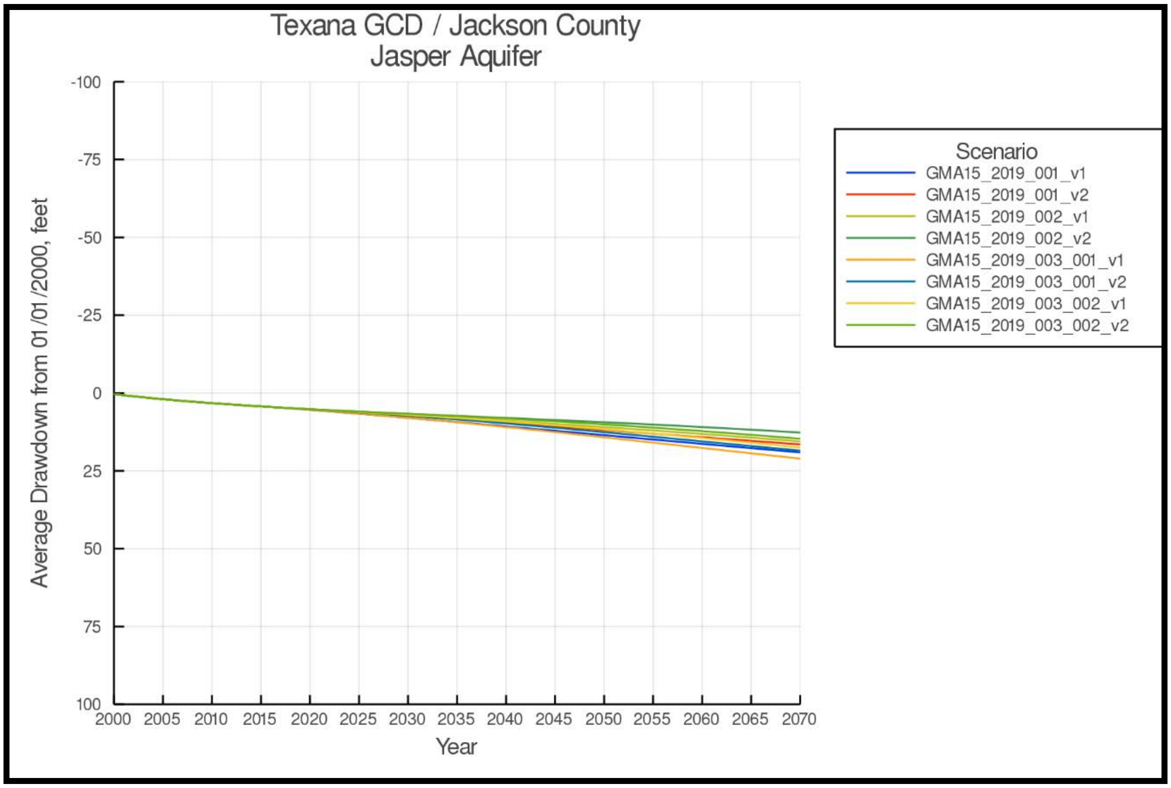

Texana GCD / Jackson County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

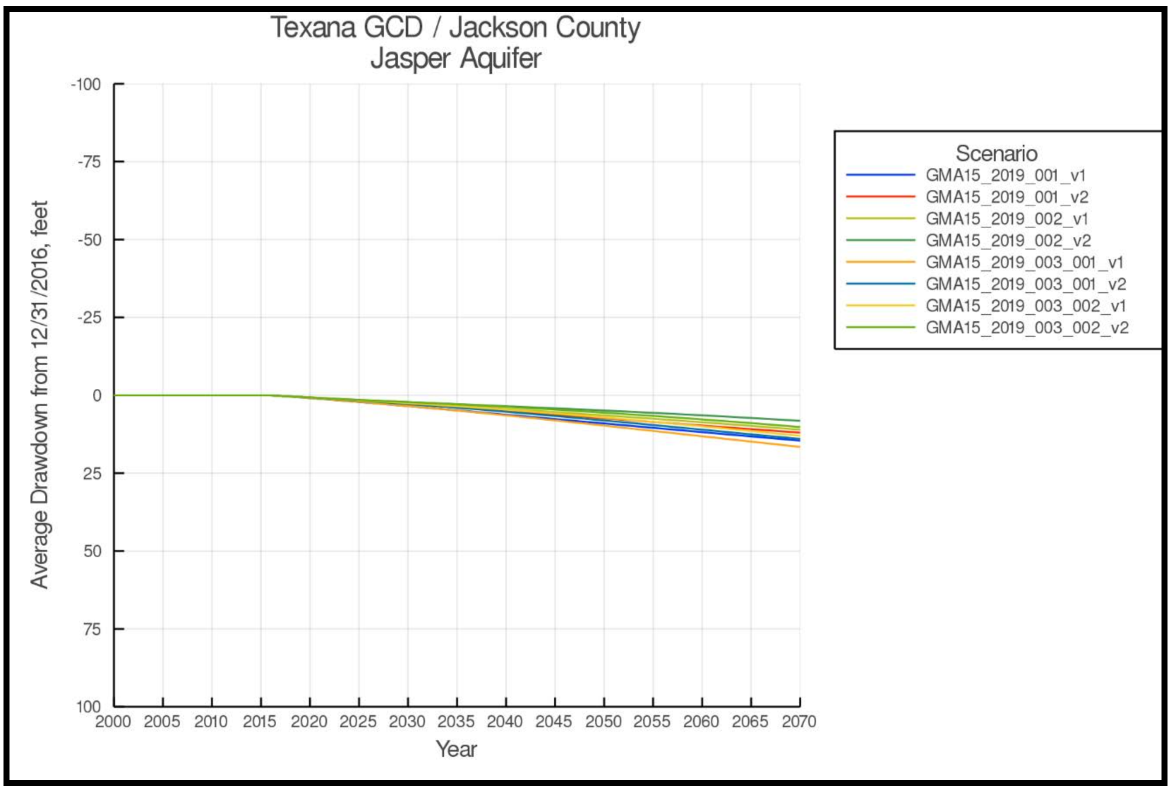

Texana GCD / Jackson County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

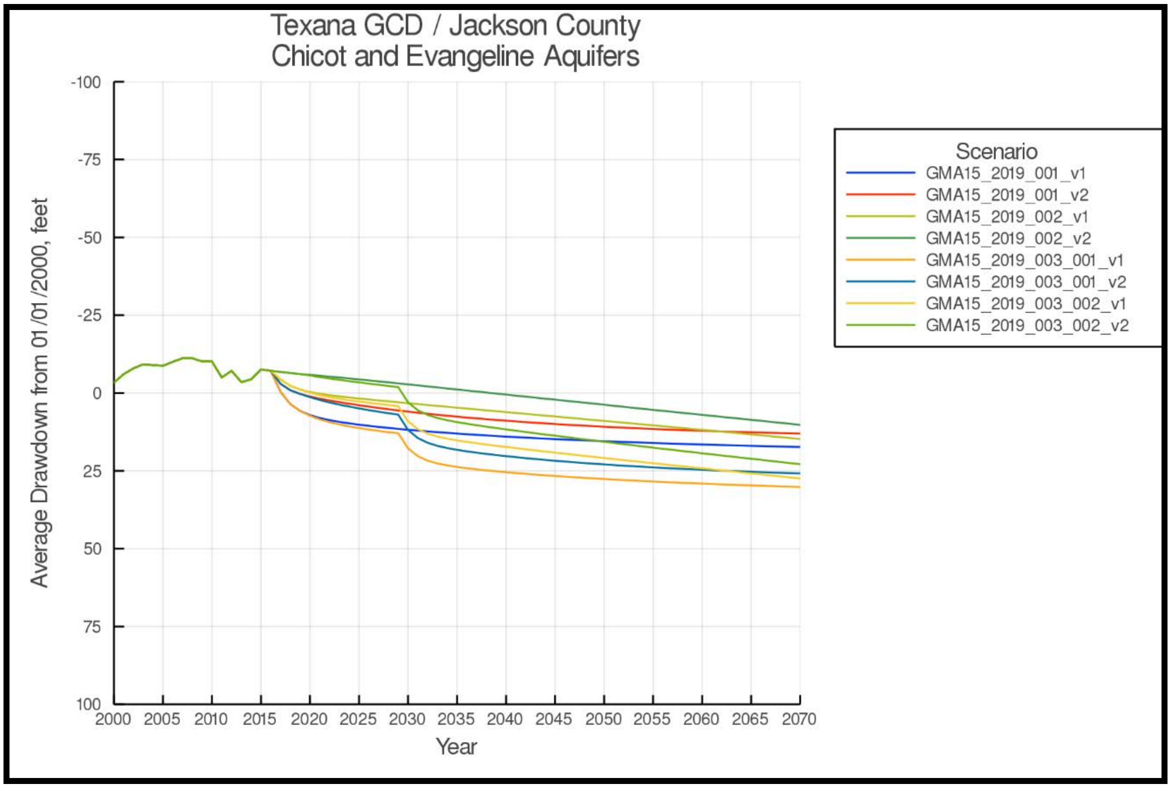

Texana GCD / Jackson County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

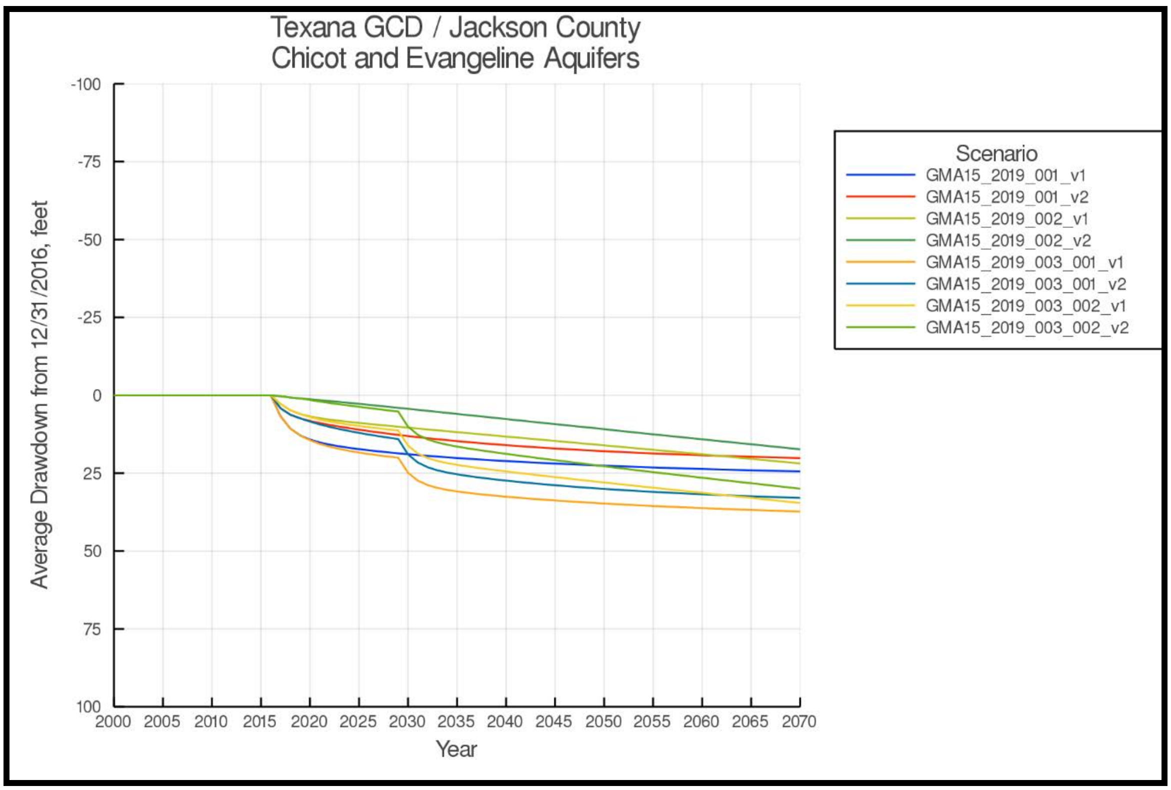

Texana GCD / Jackson County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

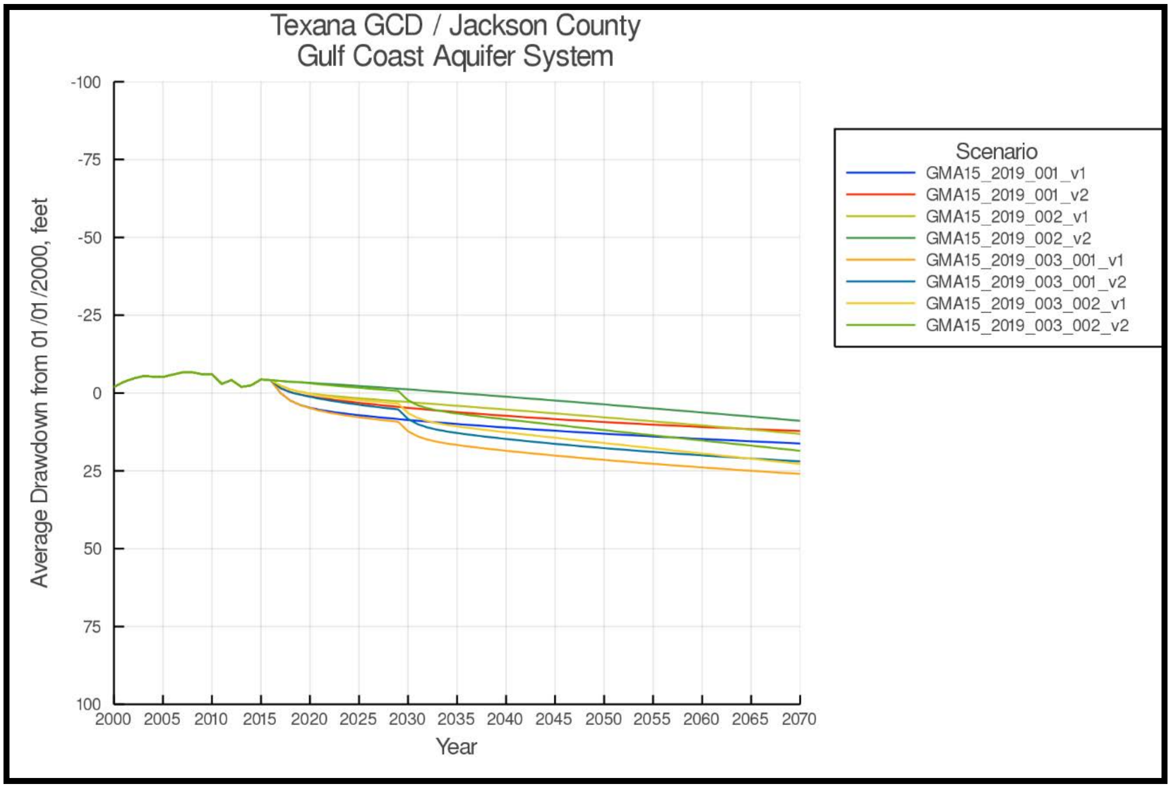

Texana GCD / Jackson County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

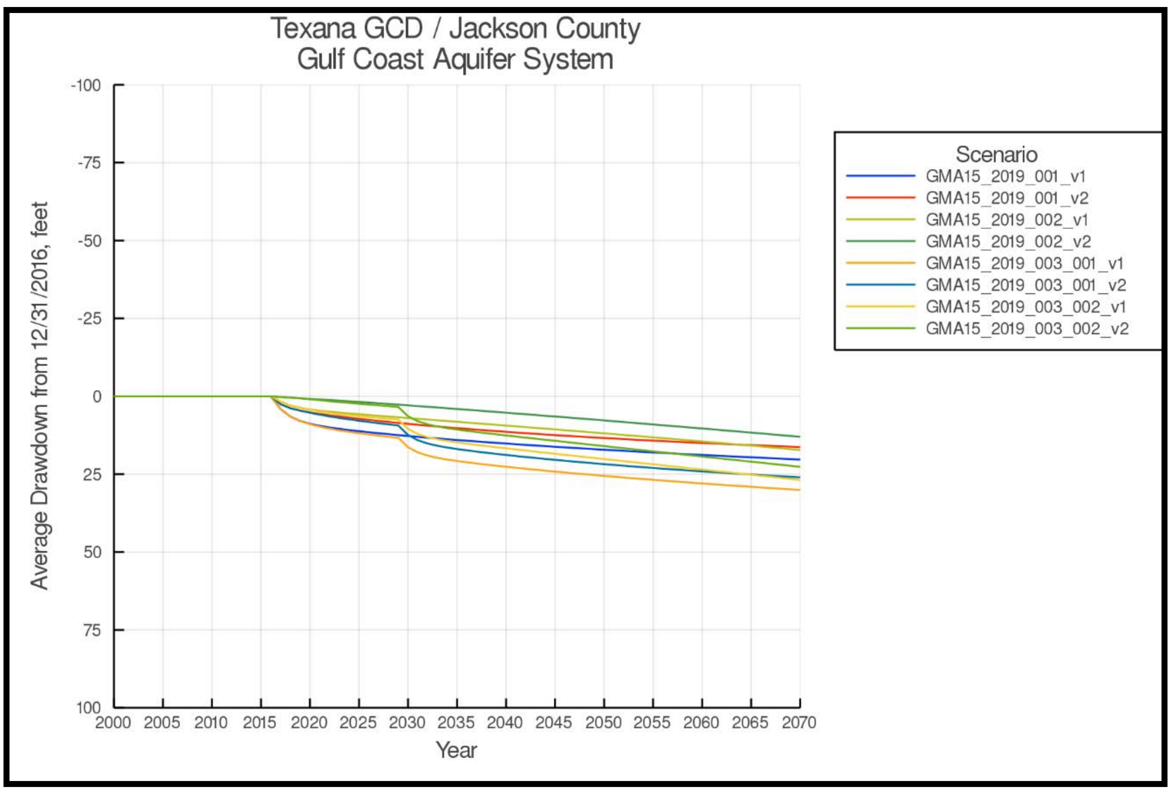

Texana GCD / Jackson County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

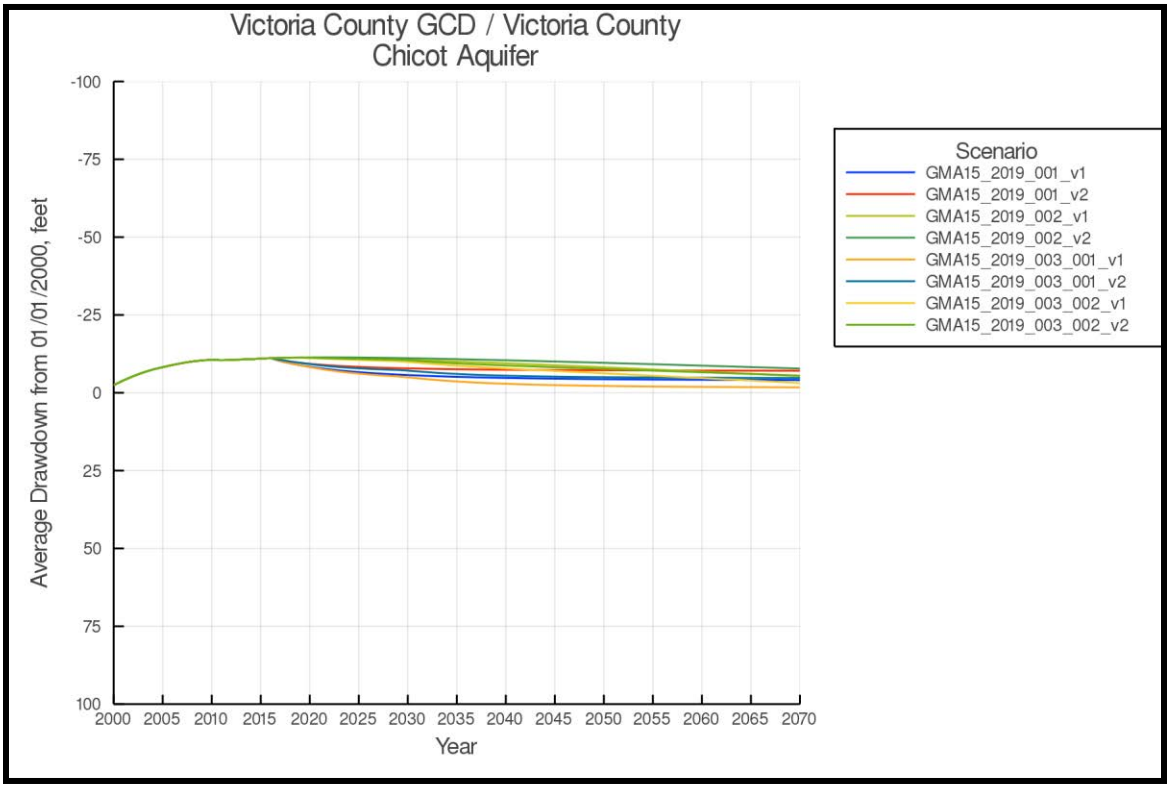

Texana GCD / Jackson County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

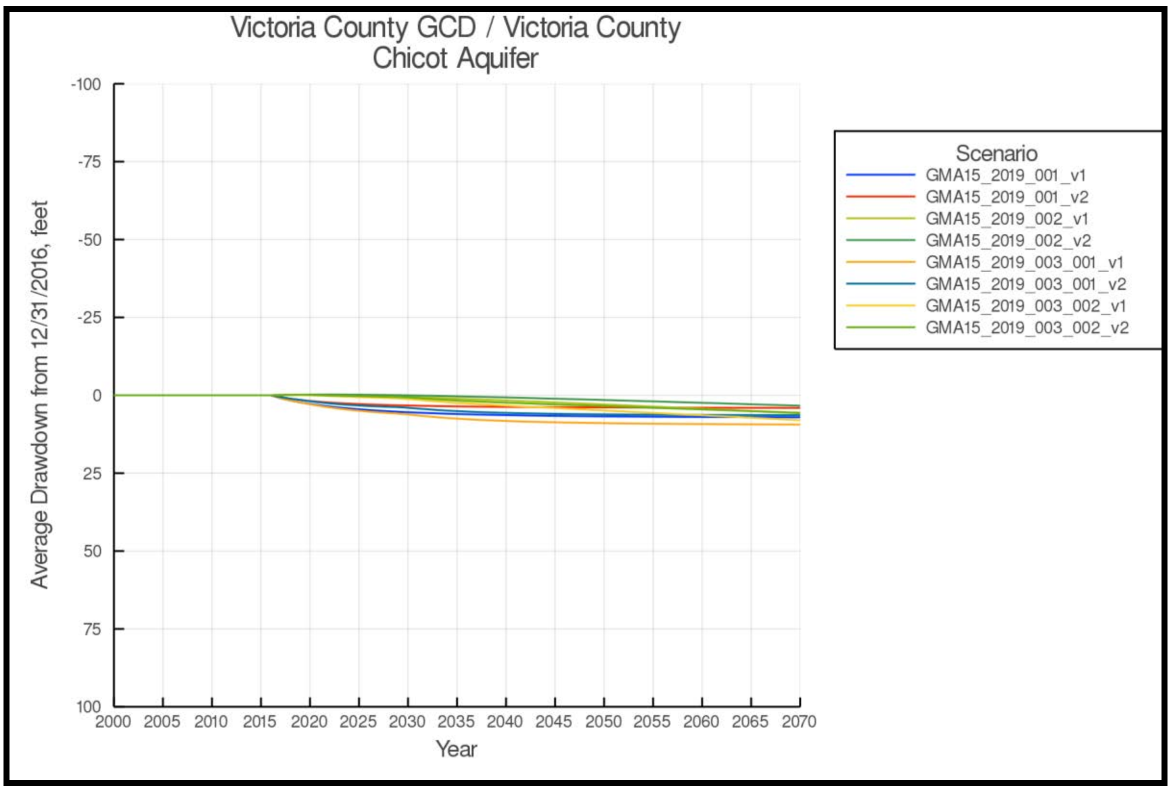

Texana GCD / Jackson County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

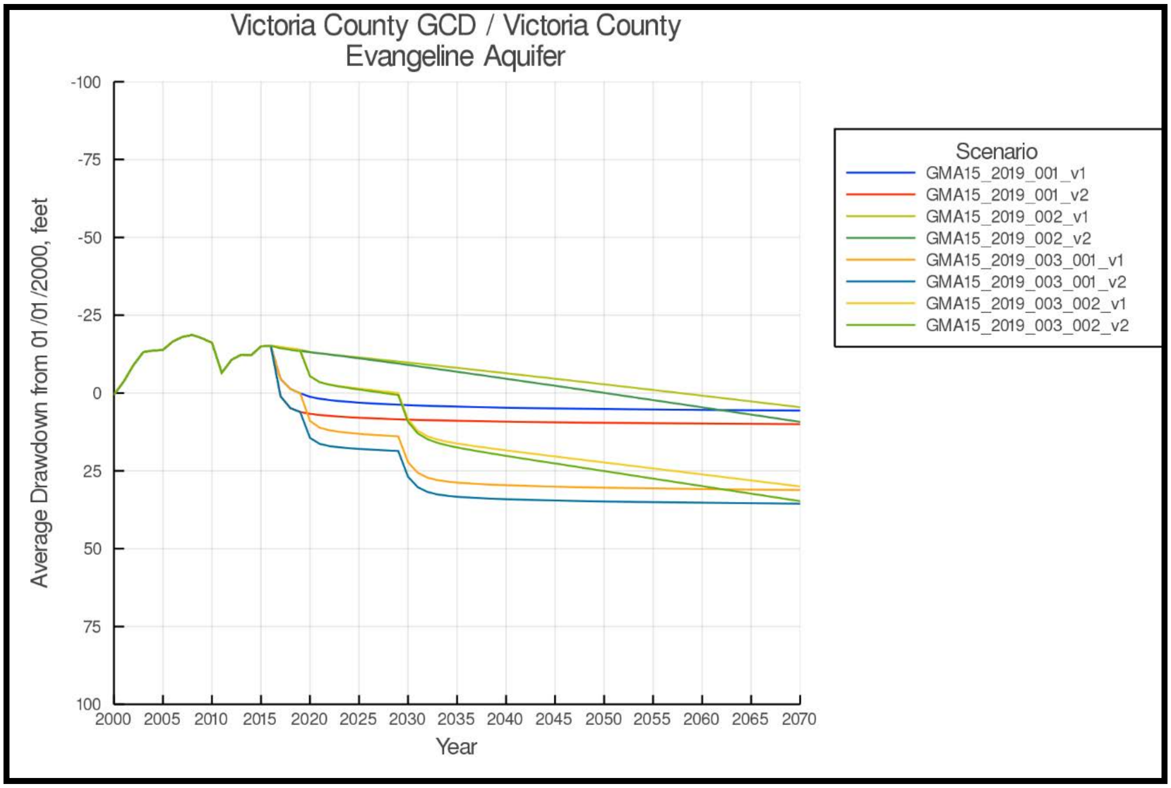

Texana GCD / Jackson County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

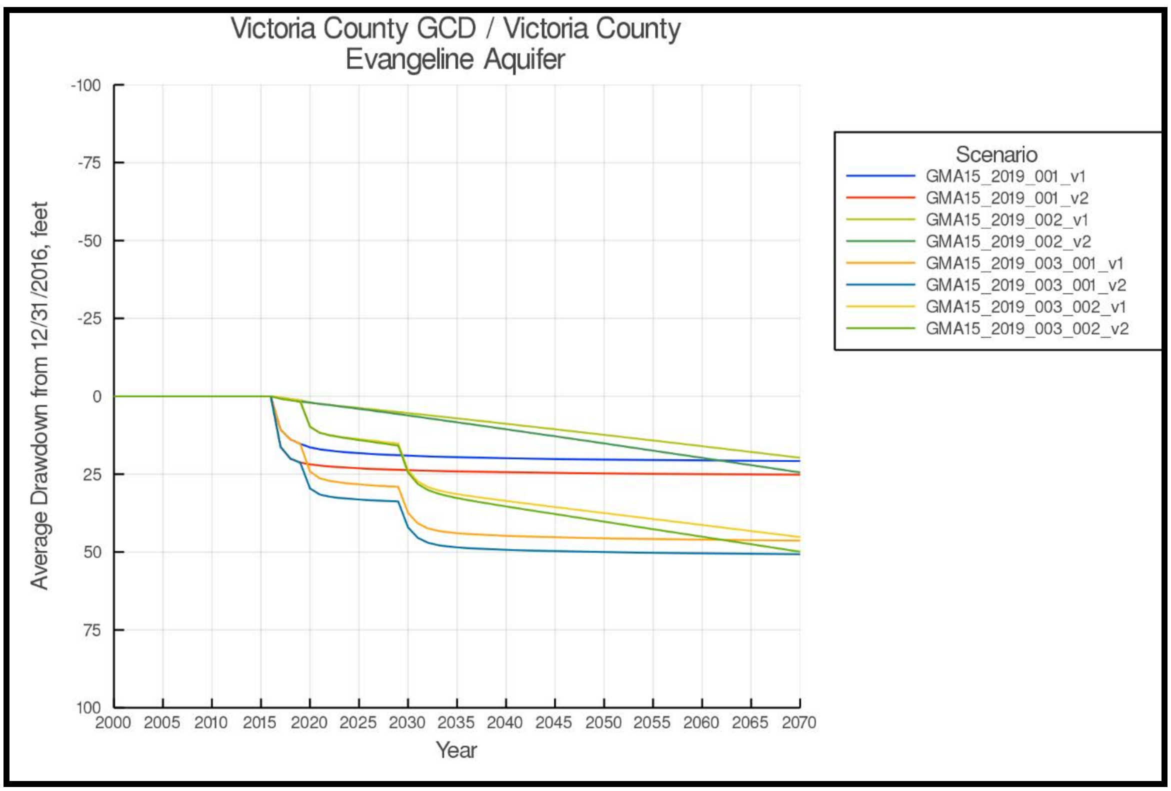

Texana GCD / Jackson County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

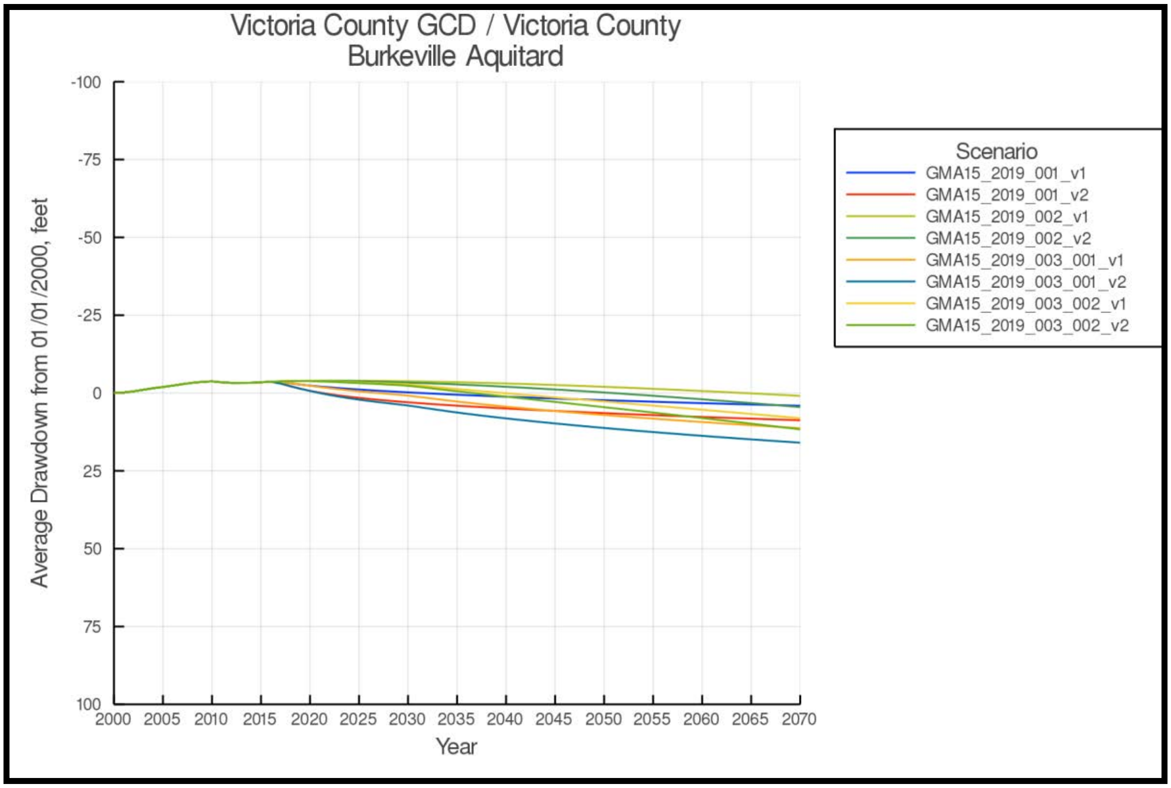

Texana GCD / Jackson County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

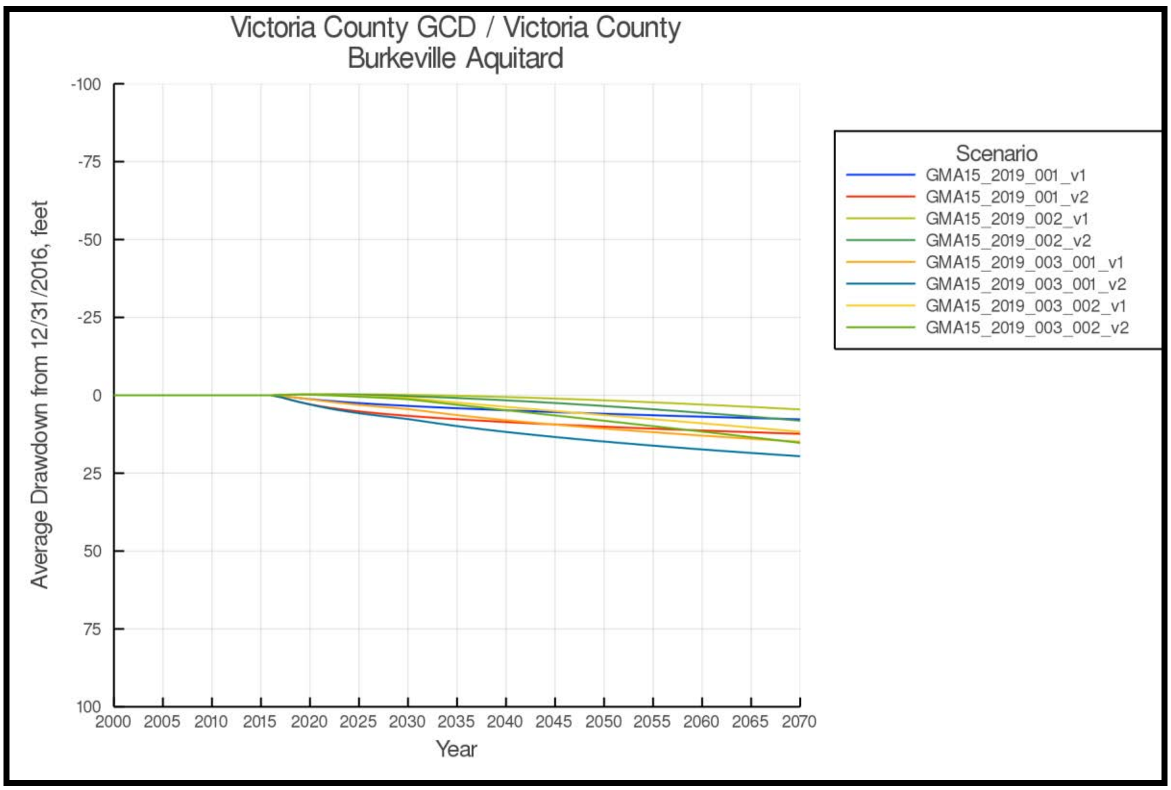

Victoria County GCD / Victoria County
Chicot Aquifer
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

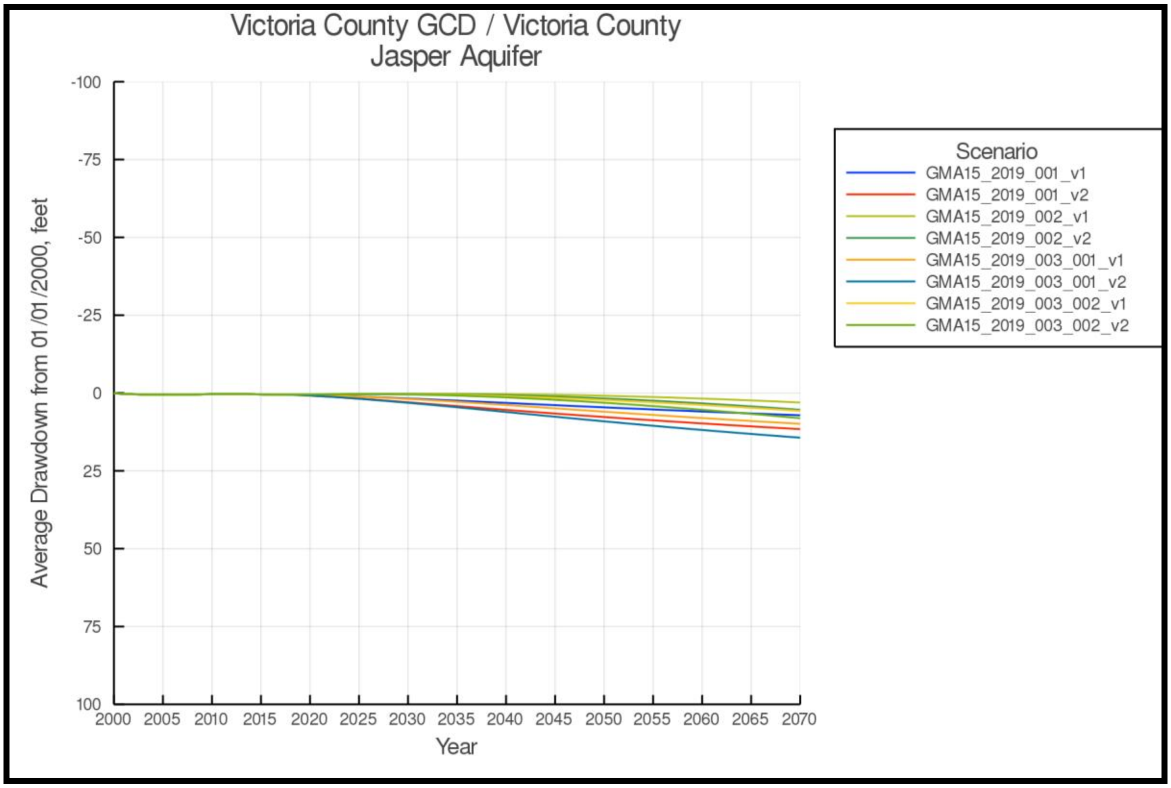

Victoria County GCD / Victoria County
Chicot Aquifer
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

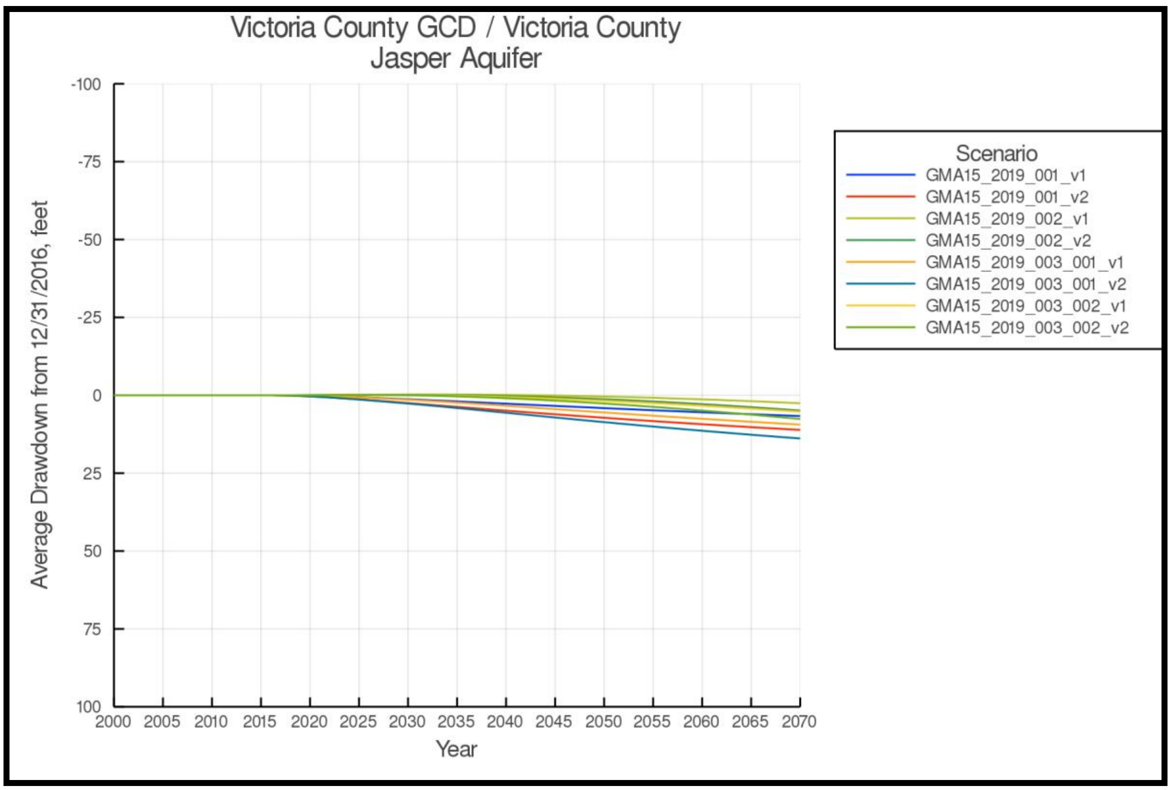

Victoria County GCD / Victoria County
Evangeline Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

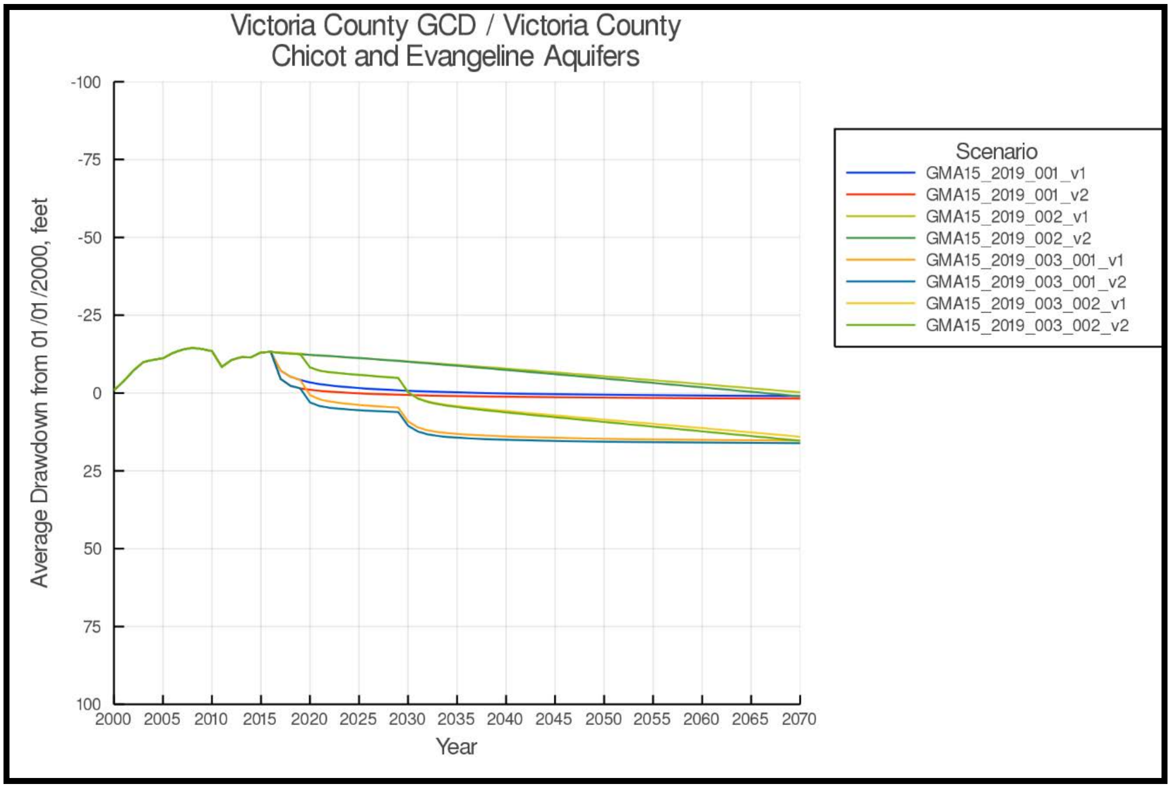

Victoria County GCD / Victoria County
Evangeline Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

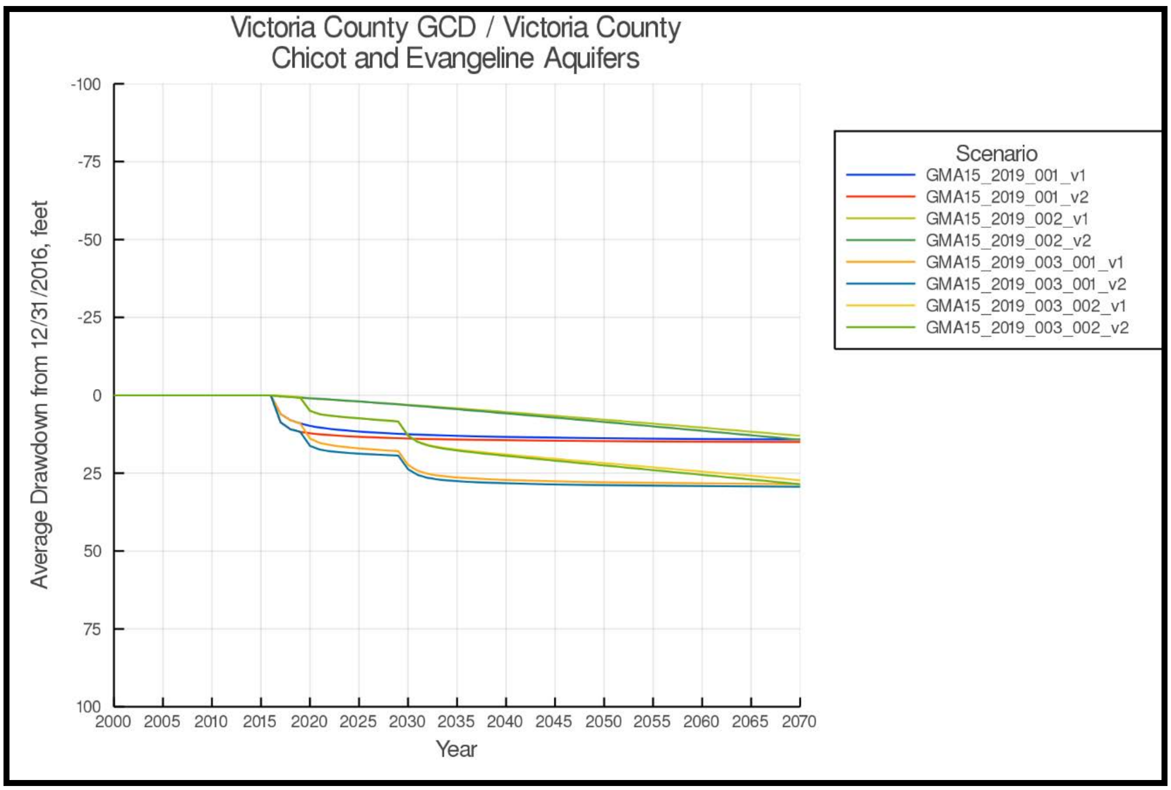

Victoria County GCD / Victoria County
Burkeville Aquitard
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

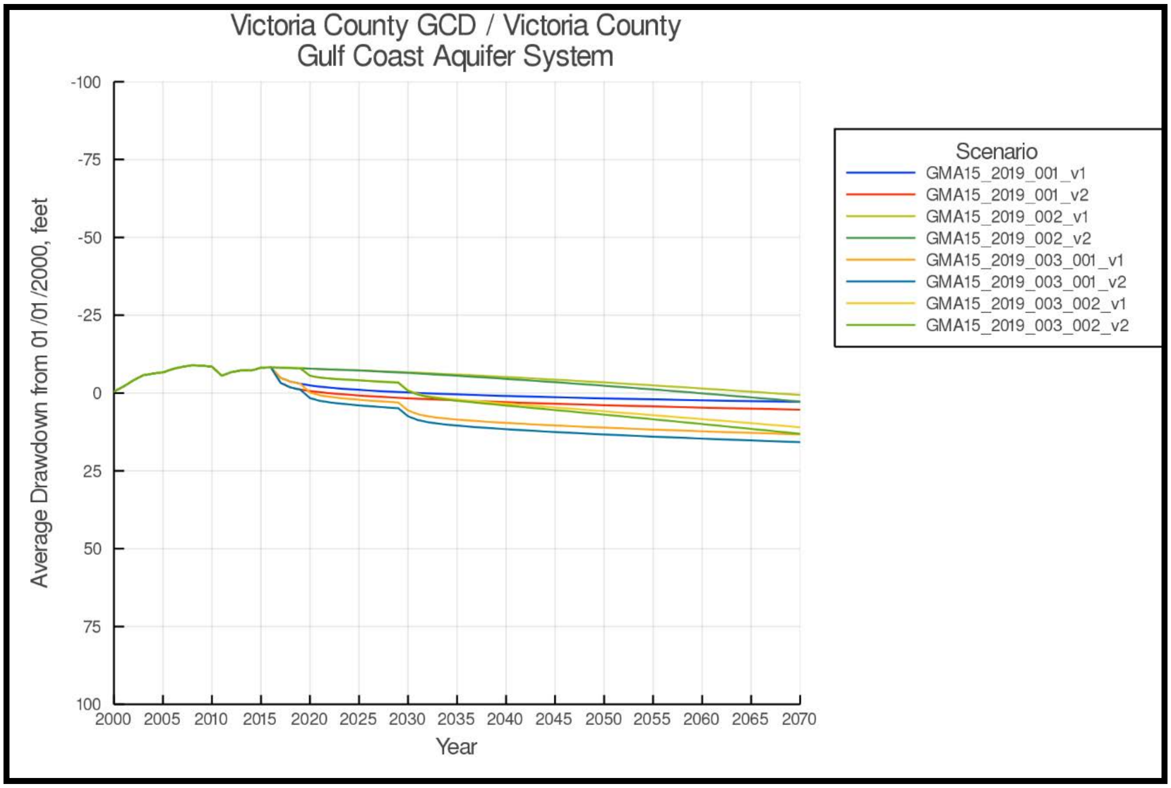

Victoria County GCD / Victoria County
Burkeville Aquitard
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

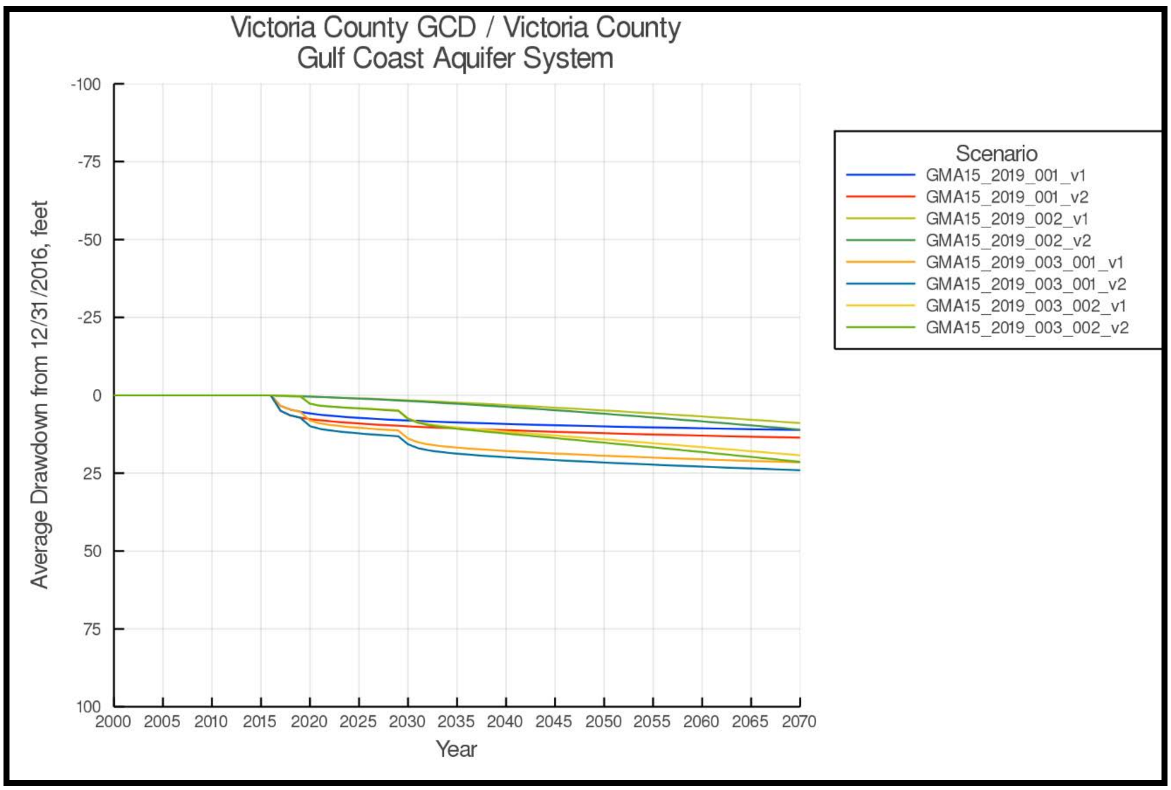

Victoria County GCD / Victoria County
Jasper Aquifer
Average Drawdown from 01/01/2000, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Jasper Aquifer
Average Drawdown from 12/31/2016, feet
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Chicot and Evangeline Aquifers
Average Drawdown from 01/01/2000, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Chicot and Evangeline Aquifers
Average Drawdown from 12/31/2016, feet
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Year
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Gulf Coast Aquifer System
Average Drawdown from 01/01/2000, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2


Victoria County GCD / Victoria County
Gulf Coast Aquifer System
Average Drawdown from 12/31/2016, feet
Year
-100
-75
-50
-25
0
25
50
75
100
2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070
Scenario
GMA15_2019_001_v1
GMA15_2019_001_v2
GMA15_2019_002_v1
GMA15_2019_002_v2
GMA15_2019_003_001_v1
GMA15_2019_003_001_v2
GMA15_2019_003_002_v1
GMA15_2019_003_002_v2

Appendix 3.4 —
October 8, 2019 Presentation of Modeling Results

Discussion of Modeling Related to Evaluation of Potential DFCs

GMA 15 Agenda Item 7

October 10, 2019

Modeling Predictive Scenarios

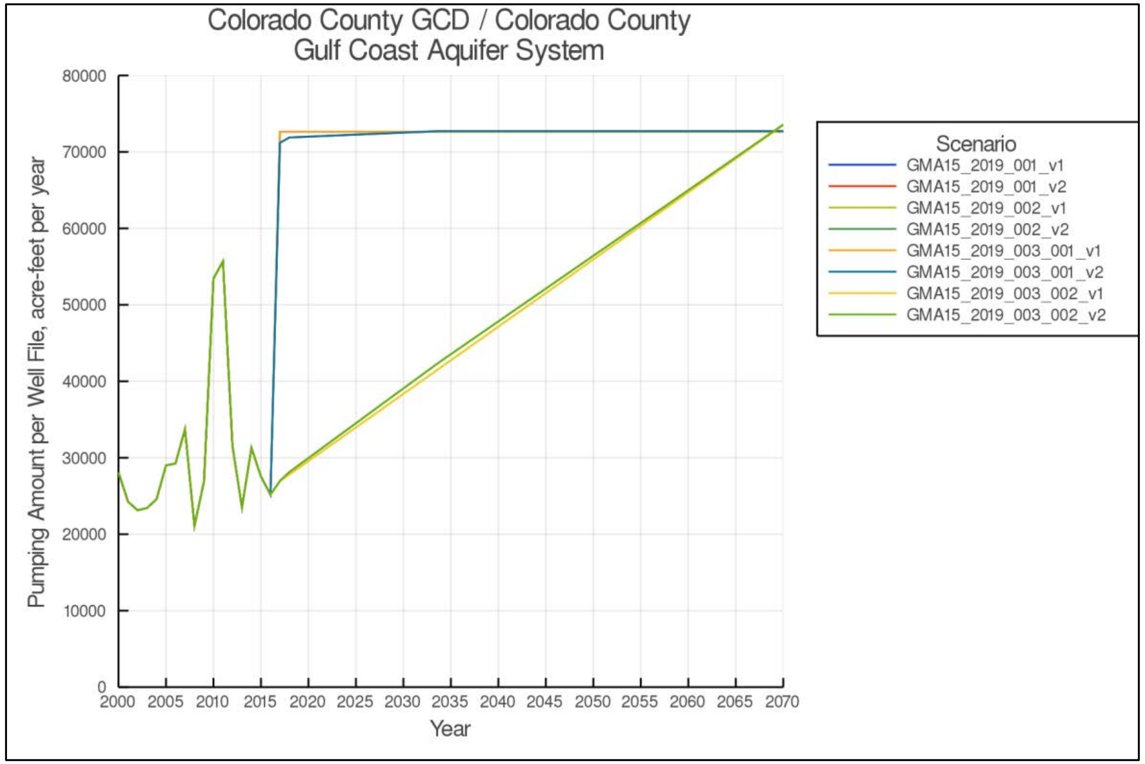
- Three base scenarios simulating from 1/1/2017 through 12/31/2070
  - GMA15_2019_001 – Relatively constant pumping
  - GMA15_2019_002 – Generally increasing pumping
  - GMA15_2019_003 – Additional potential pumping with the previous scenarios as the baseline pumping
- Two versions of each scenario
  - 1 – Same pumping distribution as second round MAG pumping file
  - 2 – Modified distribution based on known well locations and completion intervals
- Total of 8 predictive runs
- GMA15_2019_001_v1 essentially same as 2nd round MAG with revised transition period pumping

Transition Period Pumping

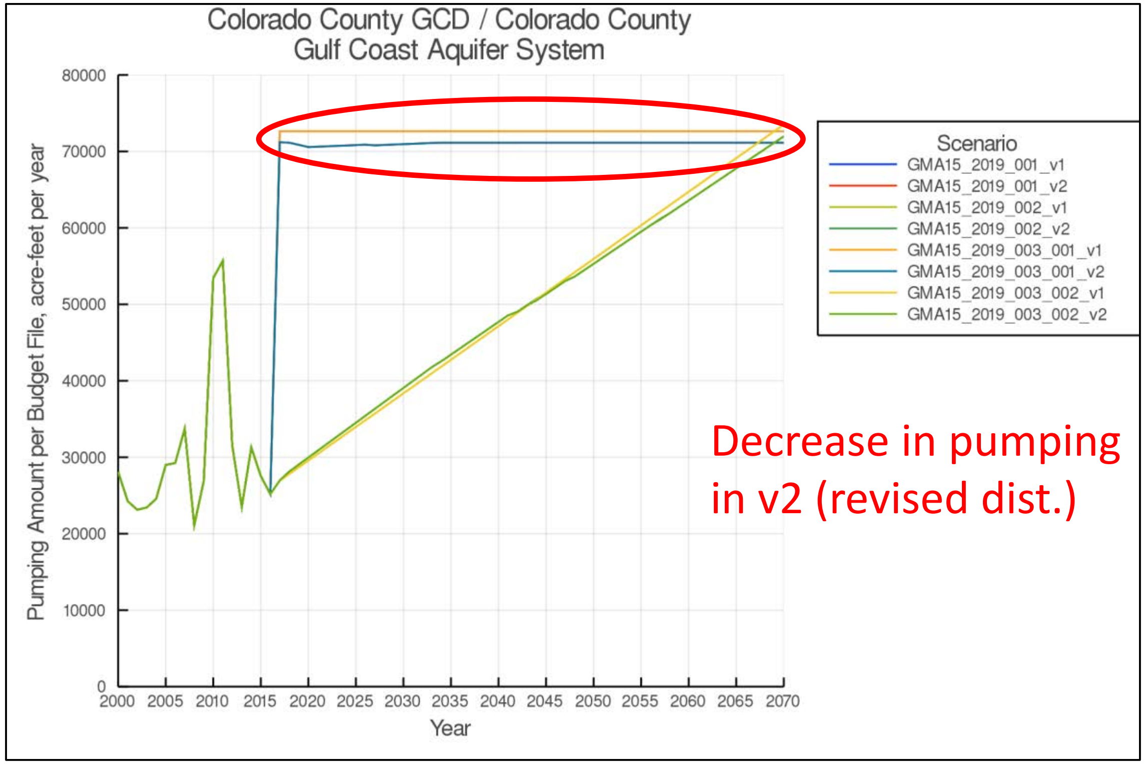
- Transition period from 1/1/2000 through 12/31/2016
- Pumping amounts per county
  - Modified transition period pumping amounts per GCD and TWDB data
  - Used GCD data if available
  - Used TWDB estimates of pumping elsewhere
- Amount per layer followed MAG distribution unless District data differed
- For revised spatial distribution:
  - Used aquifer code from TWDB GWDB
  - Used depth and completion interval along with aquifer structure

Simulated Pumping – Colorado County GCD

Pumping Input

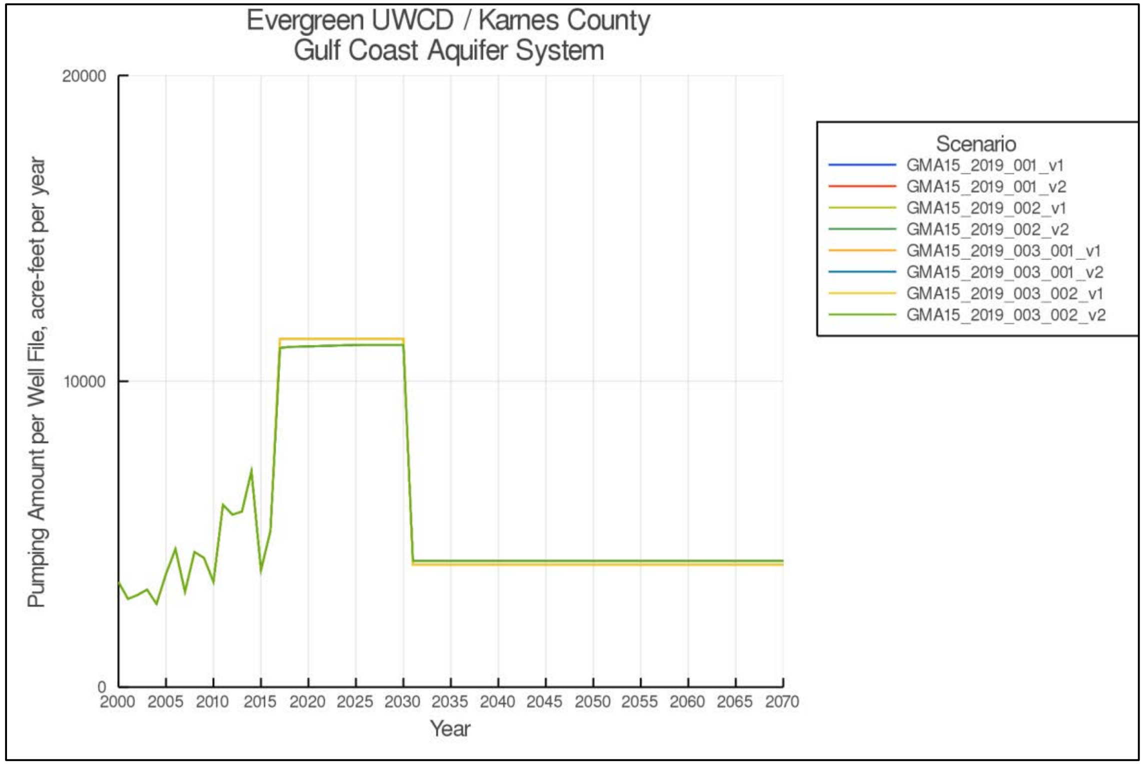


Pumping Output

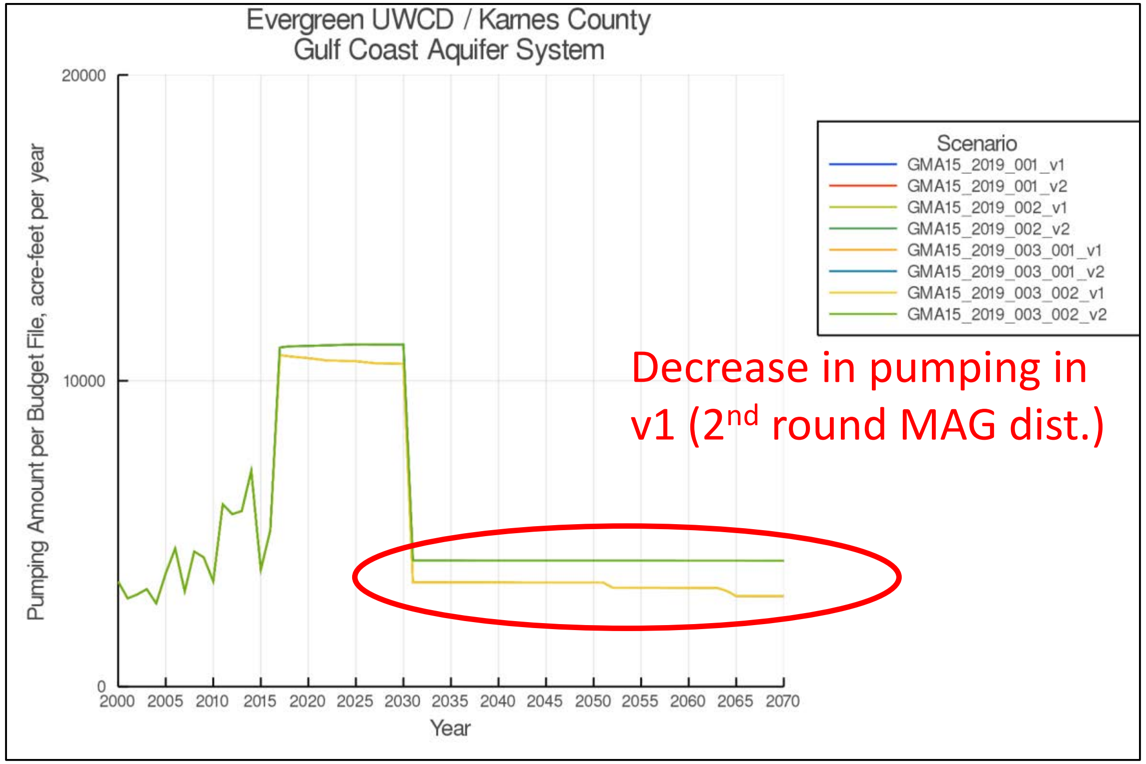


Simulated Pumping – Evergreen UWCD

Pumping Input

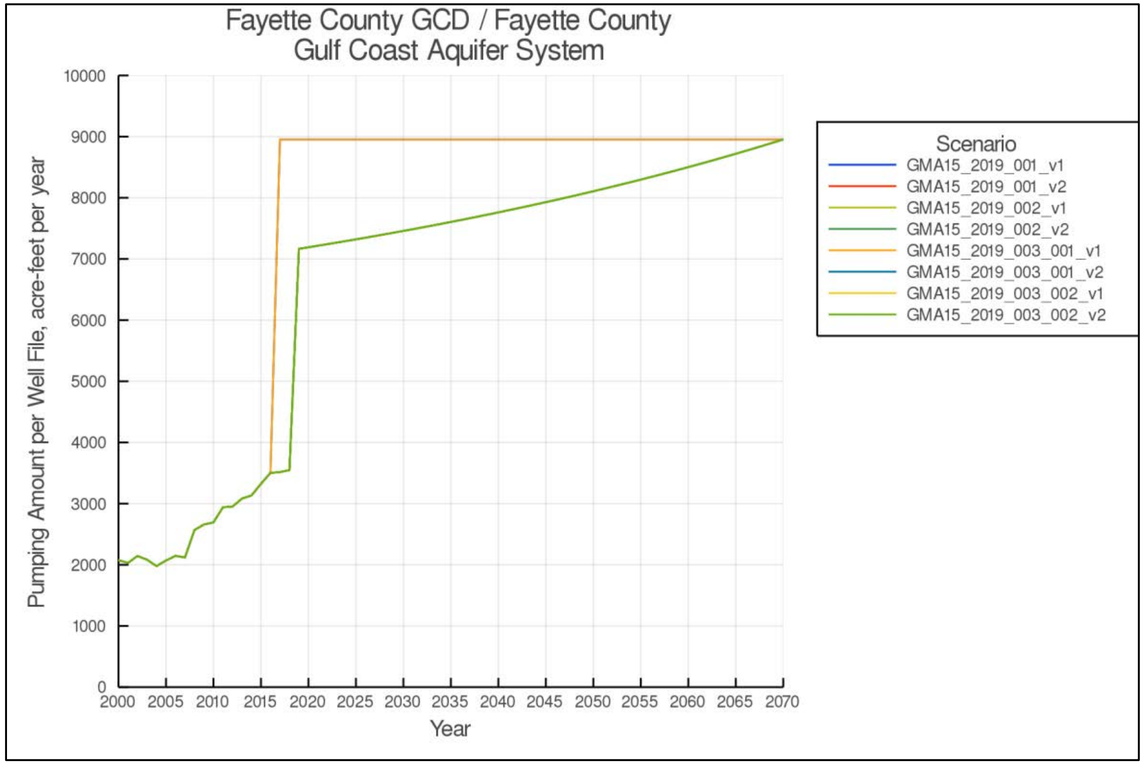


Pumping Output

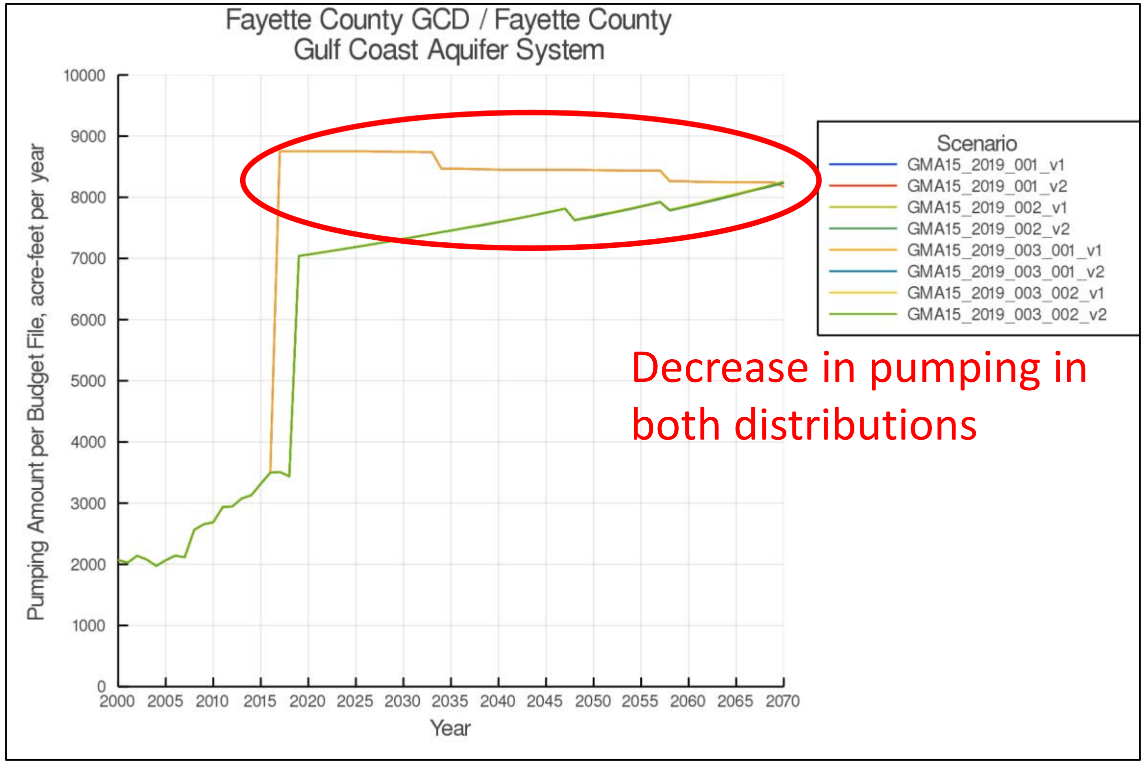


Simulated Pumping – Fayette County GCD

Pumping Input



Pumping Output



Simulated Pumping Observations

- Important to understand dry cells
  - Result in less pumping than input files show
  - Only an issue in outcrop areas
  - Decreases are relatively small
  - Can likely increase pumping downdip to account for lost pumping
  - Occur in both versions of pumping distribution
- Revised pumping distribution
  - No problems with simulations
  - Better reflects distribution of known wells

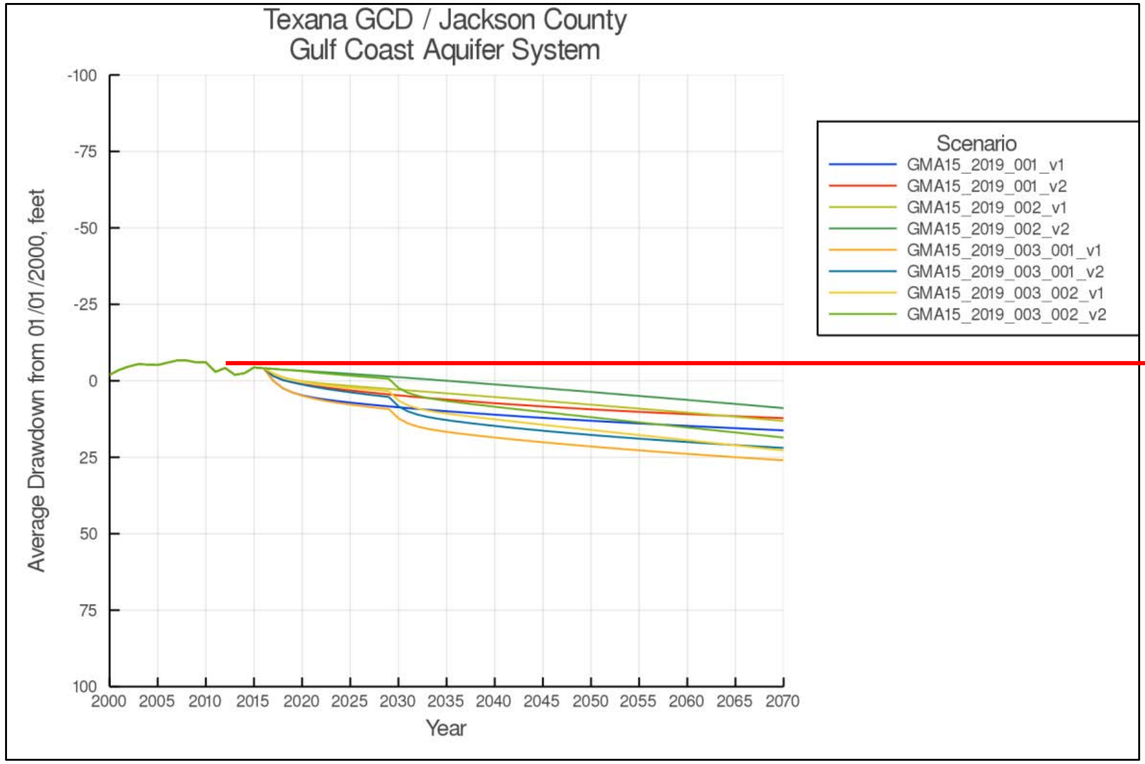
Simulation Results

- Results presented as average drawdown
  - Consistent with the 2nd round of joint planning
  - Used simulated heads for 1/1/2000 and 12/31/2016 as baseline
  - Present for each layer, combined layer 1 and 2, and 4 layers combined
- Used baseline recharge to the model
  - Consistent with the 2nd round of joint-planning
  - Results relatively insensitive to changes
- Cells used in calculations if
  - Occur in GMA 15
  - Included in the aquifer footprint
  - Were not dry

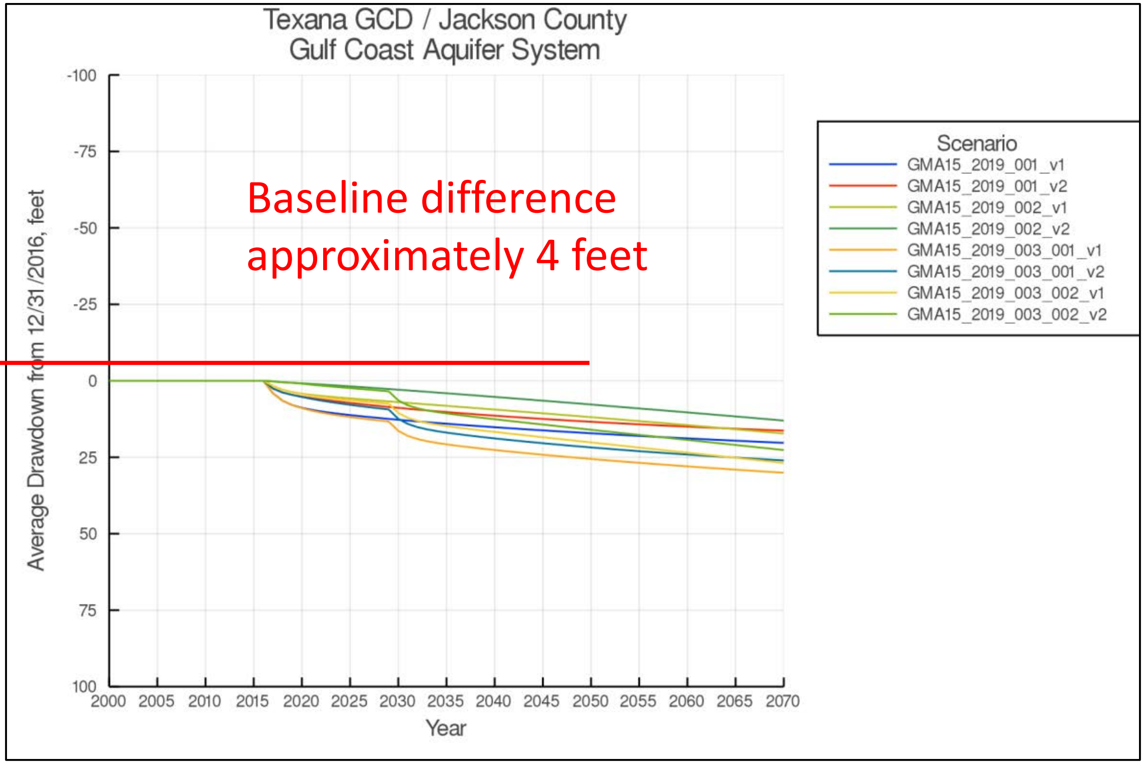
Average Drawdown – Texana GCD

1/1/2000 Baseline Water Level

Adopted DFC = 15 feet average drawdown in GCAS



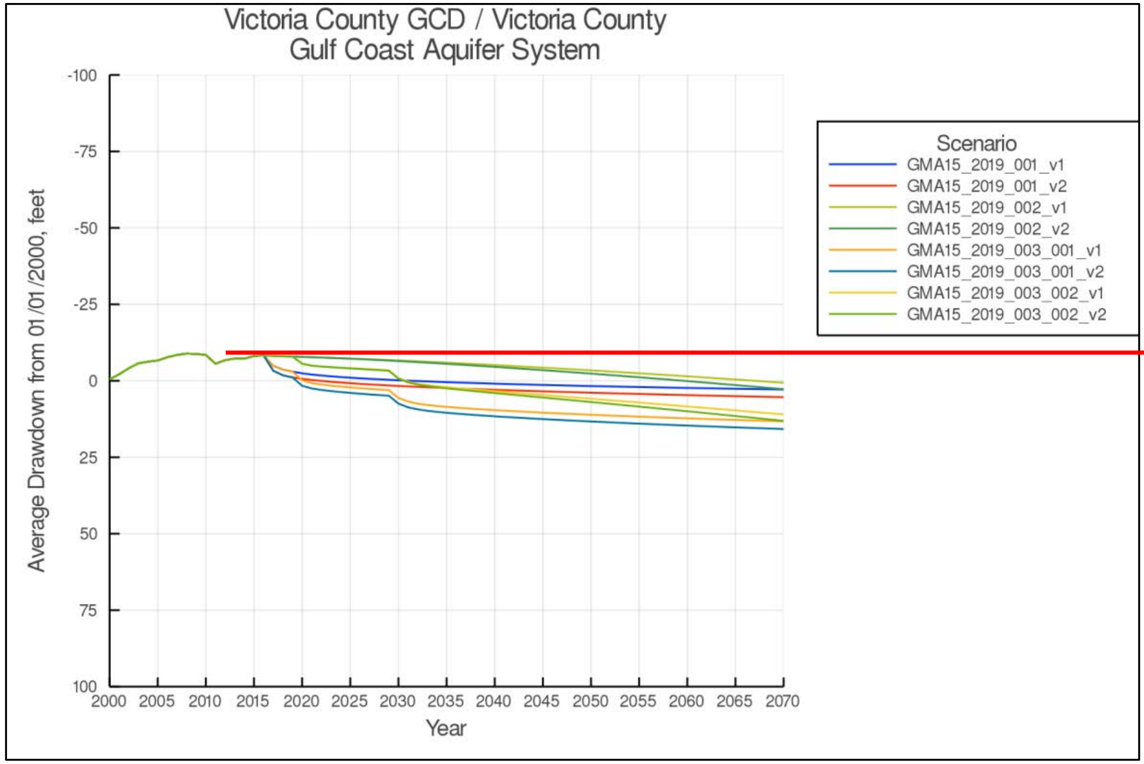
12/31/2016 Baseline Water Level

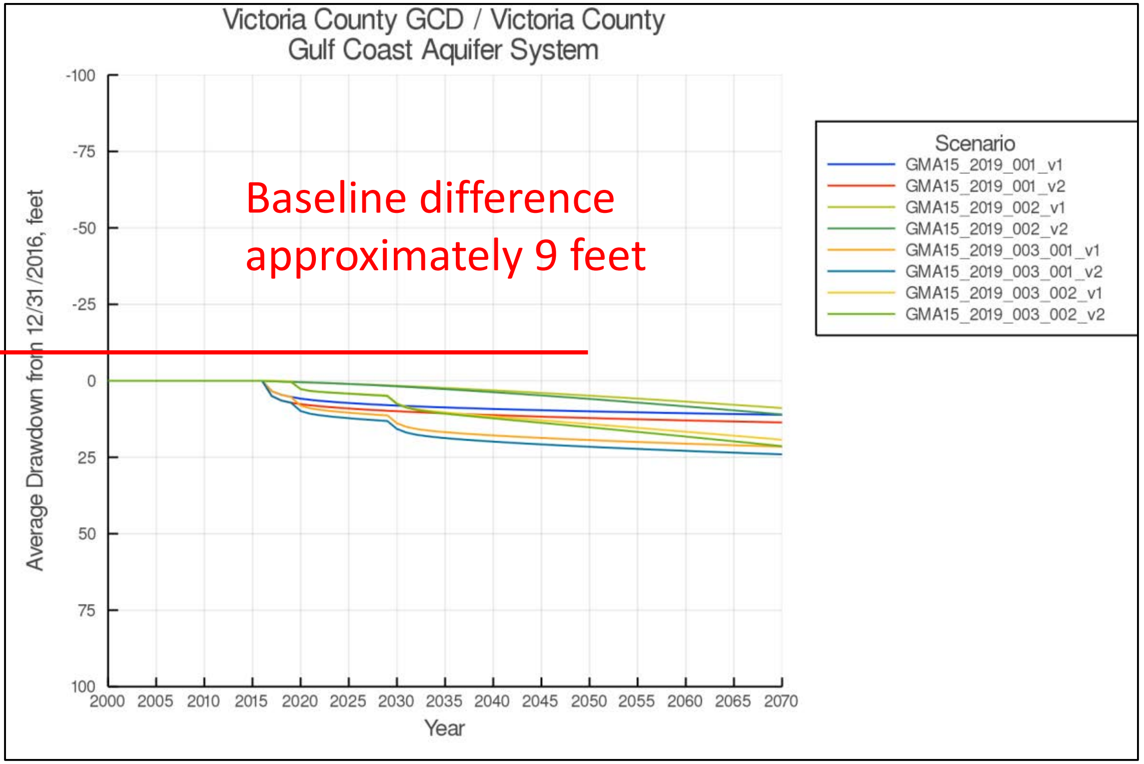


Average Drawdown – Victoria County GCD

1/1/2000 Baseline Water Level
Adopted DFC = 5 feet average drawdown in GCAS

12/31/2016 Baseline Water Level

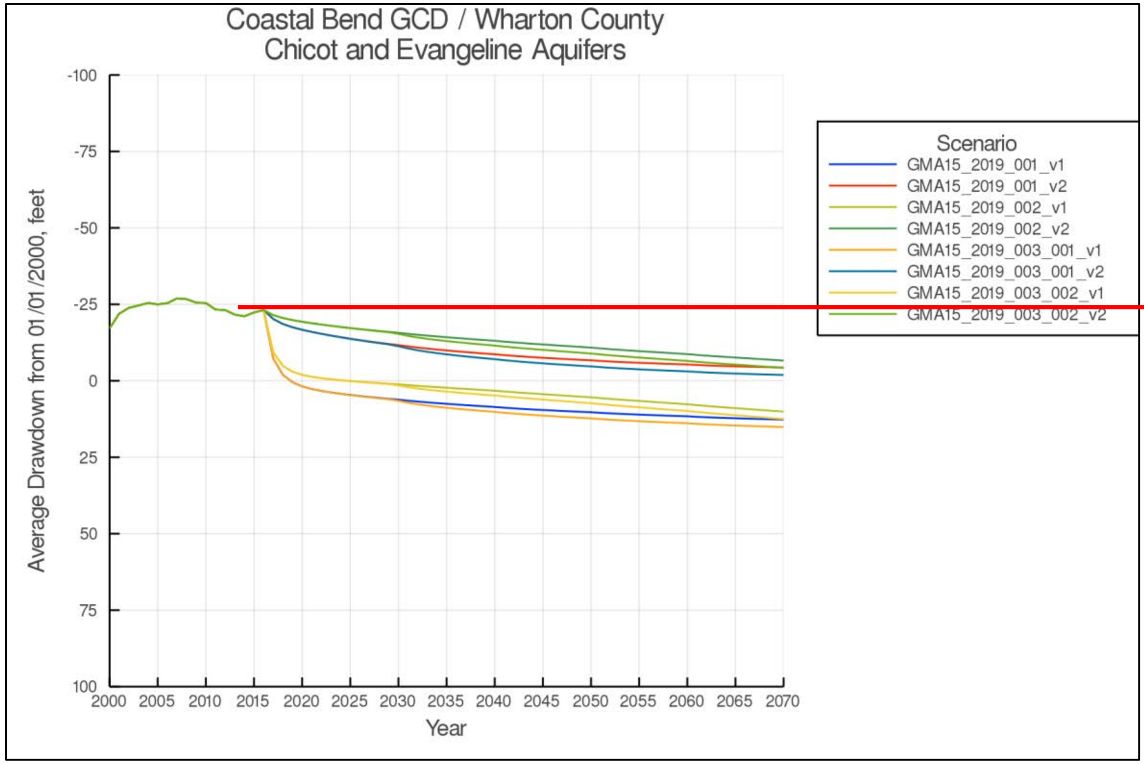


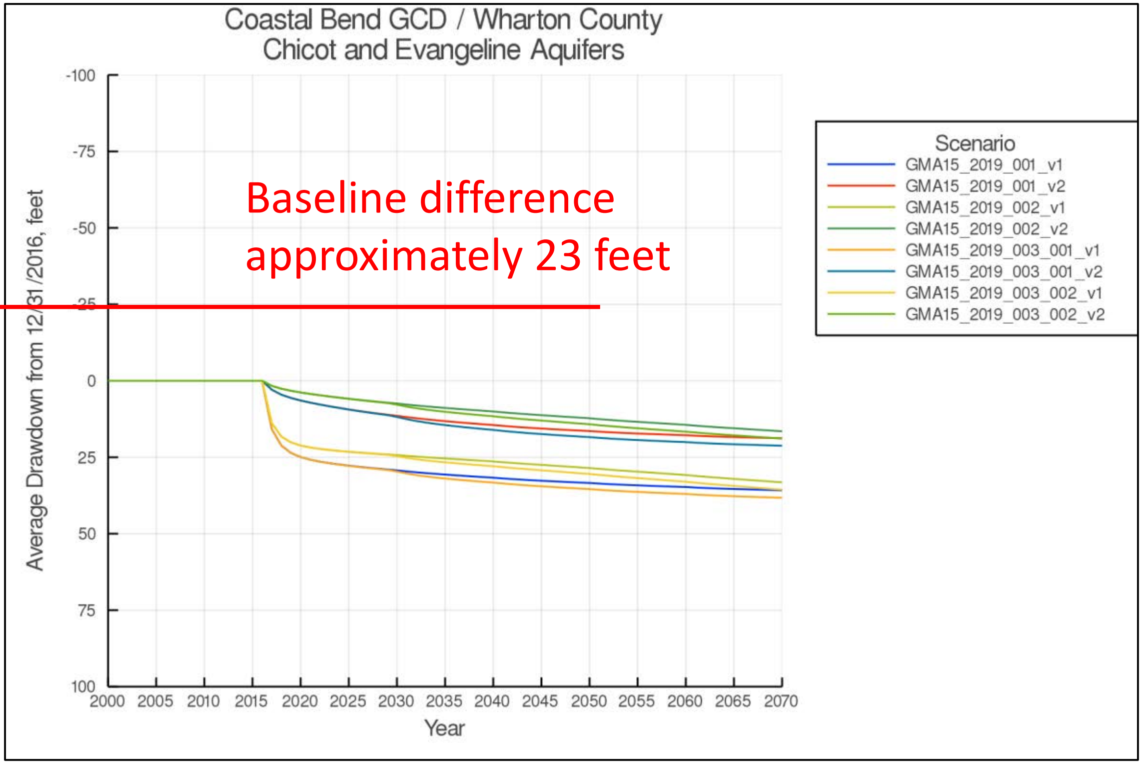


Average Drawdown – Coastal Bend GCD

1/1/2000 Baseline Water Level **12/31/2016 Baseline Water Level**

Adopted DFC = 15 feet average drawdown in Chicot and Evangeline aquifers





Simulation Results Observations

- Revised transition period causes water levels to rise in most areas

- Change in baseline date may affect DFCs
  - Impact of change varies by GCD/County
  - Areas with higher pumping show a potential for greater change

- Constant pumping scenarios not significantly different from ramped up pumping scenarios

Recommendations and Next Step

- Use revised transition period pumping distribution
  - More reflective of available data
  - Is likely more reflective of updated GAM distribution
- Use the constant pumping scenarios for predictive simulations
  - No significant difference in results from ramping up pumping
  - Consistency in MAG through planning period
- Use the 12/31/2016 simulated water level as the baseline
  - Stable value at end of the transition period from 1/1/2000 through 12/31/2016
- Select a single simulation and baseline to move forward for potential DFC consideration
  - Possibly refine pumping to address dry cells and/or other concerns

Discussion of Modeling Related to Evaluation of Potential DFCs

GMA 15 Agenda Item 7
October 10, 2019

QUESTIONS/DISCUSSION

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

Meeting and project files available at: http://bit.ly/GMA_15_3rd_Round

APPENDIX 4 —
ADDITIONAL INFORMATION PROVIDED BY
GOLIAD COUNTY GROUNDWATER CONSERVATION DISTRICT

Appendix 4.1 —
Goliad County Recharge Evaluation

Goliad County Recharge Evaluation

Summary of Field Data Collection for August 2020

Submitted by

Ken Rainwater, Ph.D., P.E., and Cade Coldren, Ph.D.

Department of Civil, Environmental, and Construction Engineering and Department of Plant and Soil Science

Texas Tech University

Lubbock, Texas 79409

Submitted to

Goliad County Groundwater Conservation District

c/o Ms. Heather Sumpter

118 S. Market Street

Goliad, Texas 77963

August 2020

Goliad County Recharge Evaluation

Summary of Field Data Collection for August 2020

Monitoring Sites

Rainwater and Coldren (2018a) previously reported the details of the instrumentation choices and site positions at the Landgrebe and Dohmann properties in Goliad County. A third location was established at the Fuller property in January 2020 as reported by Rainwater and Coldren (2020). Aerial images (Google Earth) of the locations are shown in Figures 1, 2, and 3, respectively. Table 1 summarizes the details about the depths of the soil moisture sensor probes (P1-P5) at each of the datalogger sites (L1-L3, D1-D3, and F1-F3), as well as the coordinates of the datalogger sites and weather stations (WS). Local soil conditions were presented in the previous reports.

Data Collection

As reported by Rainwater and Coldren (2018b, 2019), data collection began in late June 2018 at the Landgrebe and Dohmann locations, and later at the Fuller location in January 2020. Table 2 provides the timing of the seven data collection visits since the previous data summary. The TTU team is grateful for the data downloads and maintenance performed by the District staff who provided the datafiles as email attachments or as datafile transfers. The most recent downloads were collected on 8/21/2020. All data files were converted to Excel spreadsheets for analyses and plotting. All Excel files are available upon request, as the tables are too large for inclusion in this report. The data presented in this report were collected from 6/28/19 to 8/21/20. It should be noted that the soil moisture sensors provide data on 30- or 60-min intervals, while the WSs report to their dataloggers on 30-min intervals.

Most of the soil moisture sensors have performed well continuously, but there have been some instrument problems. P3 at site L1 does not provide readings due to cable damage by livestock and a subsequent failed repair attempt. P5 at site L3, the lowest probe, provided no readings from 1/10/2018 to 4/19/2019, most likely due to a loose cable connection. Inspection of the L3 P5 recorded data showed the last reading was 0.338 m^3/m^3 on 1/10/19 and the first reading on 4/19/19 was 0.334 m^3/m^3. Corresponding readings for L3 P4, the probe directly above L3 P5, were 0.399 and 0.397 m^3/m^3, respectively, with little variation from that range for the period between 1/10/19 and 4/19/19. That set of observations indicated that L3 P5 did not likely experience any significant changes in moisture content during that time period. The datalogger batteries failed at L2 on 12/9/2019 and were replaced on 1/14/2020. The weather station showed very little rain during those five weeks, and the soil moisture readings were relatively unchanged. Unfortunately, P2 at L2 did not show any more readings after that period, but P3 is at the same depth and continues to work. At Dohmann site D2, P5 provided reasonable readings until 10/2/2019 and then shut down. P2 at D2 failed on 2/4/2020, and P4 at D2 failed on 6/12/2020. These failures leave only P1 and P3 recording at D2. When the Fuller installation was completed on 1/10-12/2020, all 15 soil moisture sensors were providing reasonable readings. Unfortunately, P2 at F2 stopped working the next day and remains inactive. P5 at F2 missed some days in January due to a loose connection at the datalogger, but that sensor was reconnected and remains in service since 1/31/2020. As of the date of this report, 39 of the 45 installed soil moisture sensors were still working.

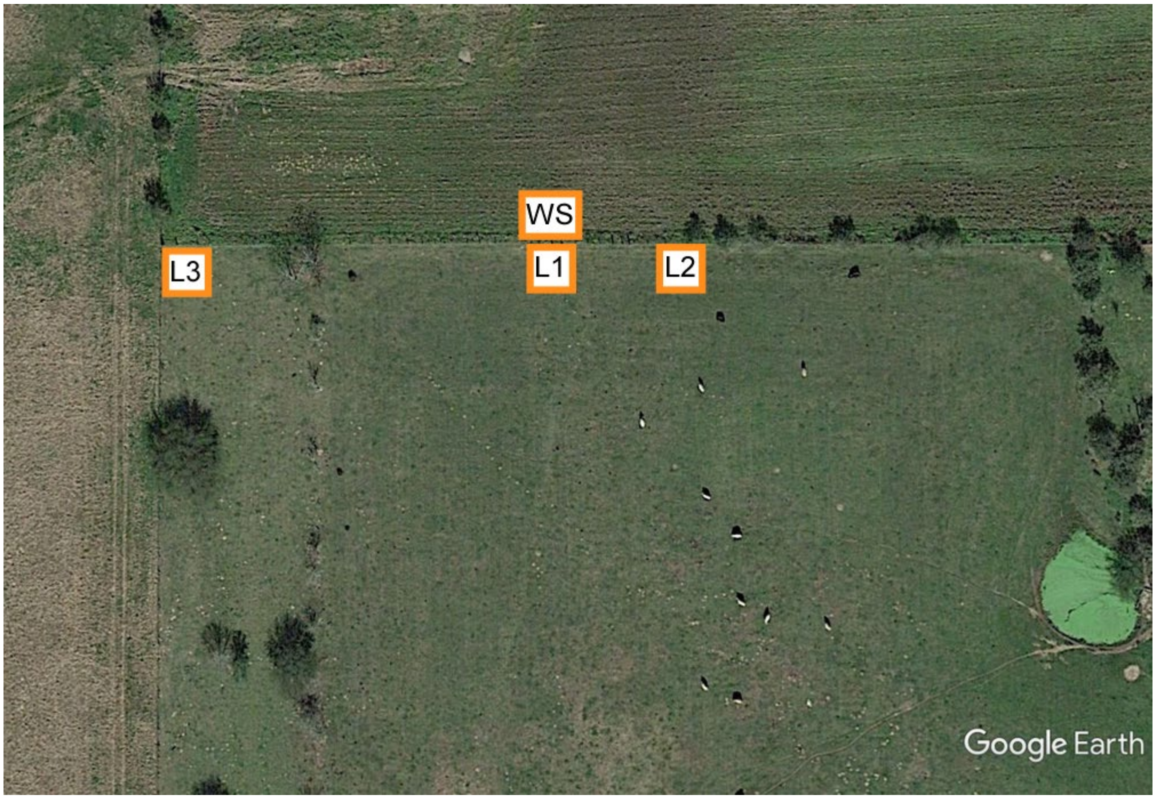


Figure 1. Approximate instrumentation sites at the Landgrebe cultivated location

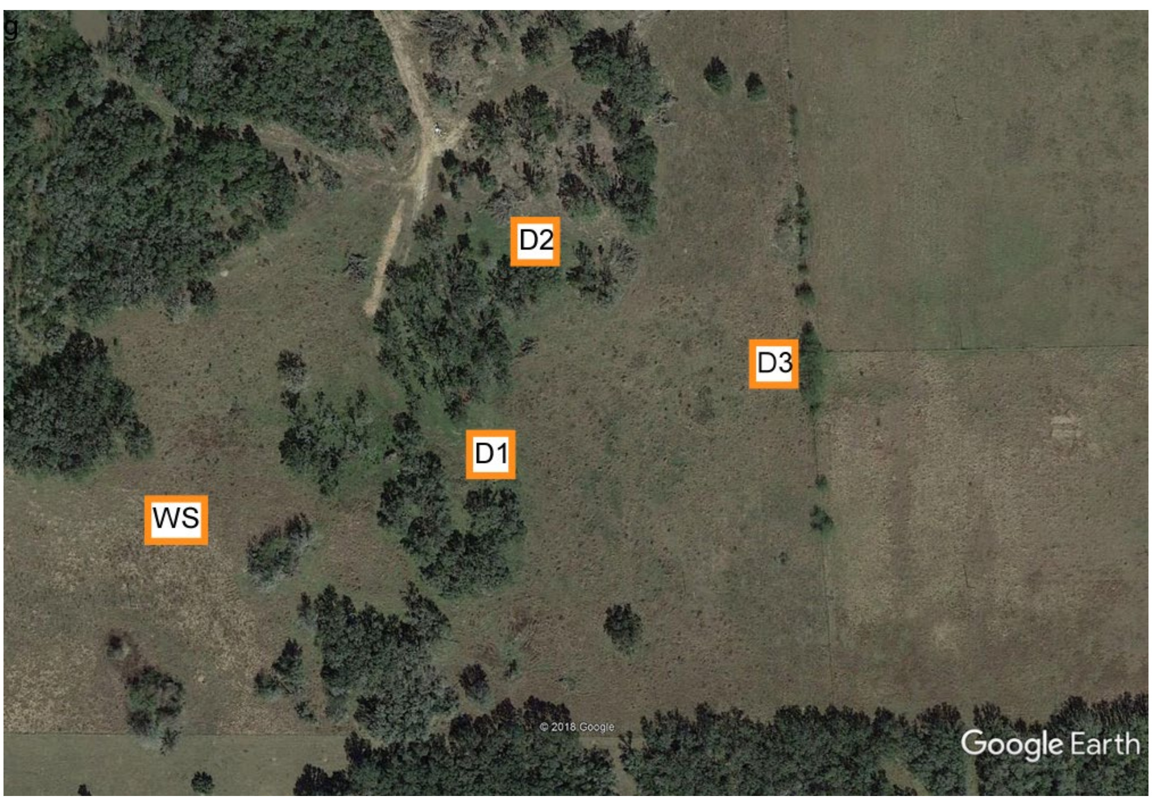


Figure 2. Approximate instrumentation sites at the Dohmann wooded location

Figure 3. Approximate instrumentation sites at the Fuller location

Table 1. Installation Details

Land Use, Location	Site	Latitude (DD)	Longitude (DD)	Sensor Depths (ft)				
				P1	P2	P3	P4	P5
Cultivated, Landgrebe	L1	28.88164	-97.39657	1.0	3.3	4.9	4.9	5.9
	L2	28.88614	-97.39632	1.0	3.3	lost	4.9	5.9
	L3	28.88155	-97.39714	1.0	3.3	4.9	4.9	9.5
	WS	28.88164	-97.39657					
Ranch, Dohmann	D1	28.79439	-97.42340	1.0	3.3	4.9	4.9	8.2
	D2	28.79519	-97.42325	1.0	3.3	4.9	4.9	8.2
	D3	28.79480	-97.42204	1.0	3.3	4.9	4.9	8.2
	WS	28.79410	-97.42496					
Ranch, Fuller	F1	28.6536039	-97.6195353	1.0	3.3	4.9	4.9	9.0
	F2	28.6537386	-97.6194403	1.0	lost	4.9	4.9	9.0
	F3	28.653917	-97.6194149	1.0	3.3	4.9	4.9	9.0
	WS	28.654	-97.619					

Table 2. Site Visit Dates

Date	Data Collectors
8/20/2019	GCGCD
10/2/2019	GCGCD
12/9/2019	GCGCD
1/30/2020	TTU (Fuller online)
3/24/2020	GCGCD
5/19/2020	TTU/GCGCD
8/21/2020	GCGCD

As noted in the previous reports, the WS at each site has instruments for rainfall (RF), wind speed, temperature, humidity, and solar radiation. The last four observations allow calculation of evapotranspiration for a reference grass (ET ref). The SpecWare Pro software presents the daily RF and ET ref values. During the past year, we had problems with the anemometers at both the Landgrebe and Dohmann properties. The anemometers were not rotating freely due to increased resistance on their shafts. The Landgrebe problem was noted first, so the TTU team replaced the Landgrebe anemometer on 5/19/20, but the Dohmann WS problem was first noted on that same date. The GCGCD staff attempted to repair the Dohmann anemometer by carefully cleaning the shaft, but the repair did not last long, so that anemometer will have to be replaced also. That repair should happen soon, and the GCGCD staff can take care of that task. The TTU team reviewed the wind speed data from all three WSs [1] to identify when the wind speeds diminished incorrectly and [2] to select replacement wind speed and ET ref data from one of the other sites. The Landgrebe data were replaced by the Dohmann site data from 12/1/2019 to 3/31/2020 and by the Fuller site data from 4/1/2020 to 5/19/2020. The Dohmann data were replaced by the Fuller site data from 4/14/2020 to 8/21/2020 for this report, and this adjustment must continue until the Dohmann anemometer is replaced. This replacement of missing data is the best we can do, but it should be noted that the ET ref values will likely be more similar, but not identical, from site to site, while the RF values will likely be more variable.

Results and Observations

With the start of data collection at the first two sites on 6/28/18, it was reasonable to see Year 1 of the dataset stretching from that date to 6/27/2019, Year 2 from 6/28/2019 to 6/27/2020, and Year 3 from 6/28/2020 to 6/27/2021. Data collection at the Fuller site began on 1/10/2020, starting almost six months into Year 2 and continuing into Year 3. Table 3 summarizes the twelve-month RF and ET ref values for the three sites and the three years. It is notable that the Year 1 RF totals of 48.92 in and 41.39 in at the Dohmann and Landgrebe sites, respectively, were well above the average annual RF of 36 to 37 in for Goliad. The Year 2 RF totals of 23.52 in and 27.77 in at the Dohmann and Landgrebe sites, respectively, were well below the Goliad annual average. The ET ref values for these two sites are a little higher for Year 2 than Year 1. The Fuller site RF and ET ref values in Year 2 were much smaller than the other two sites because of the shorter observation time. For the first two months of Year 3, the Landgrebe site received more rain than the other two sites, while the ET ref values were similar.

Table 3. Yearly Rainfall and ET ref

Location	6/28/18-6/27/19		6/28/19-6/27/20		6/28/20-8/21/2020	
	RF (in)	ET ref (in)	RF (in)	ET ref (in)	RF (in)	ET ref (in)
Dohmann	48.92	43.41	23.52	50.45	1.96	12.52
Landgrebe	41.39	45.52	27.77	49.13	3.59	11.01
Fuller	na	na	17.70	38.00	1.75	12.77

During Year 1, the rainfall events with 1.0 in or more were correlated with increases in soil moisture, but that year was much wetter than average at the two monitoring locations. Year 2 was much drier, and fewer days had 1.0 in or more of rain, as shown in Table 4. In addition, the largest daily RF amounts were much smaller than those seen in Year 1. The lower RF amounts led to drier soils, and much less response was noted in the soil moisture data. The RF, ET ref, and soil moisture data are presented for Years 2 and 3 for the Landgrebe and Dohmann locations in graphical form. As the observations began at the Fuller site in January 2020, the RF, ET ref, and soil moisture data are presented for the calendar year 2020.

Table 4. Dates with Daily Rainfall of 1.0 in or Greater in Year 2 and 3

Date	Rainfall (in)		
	Dohmann WS	Landgrebe WS	Fuller WS
10/16/2019	2.09	1.91	
10/29/2019	1.16		
10/30/2019	1.11		
1/22/2020	1.24	1.11	1.01
4/9/2020			1.23
5/12/2020		1.44	1.12
5/16/2020			1.17
5/24/2020		1.25	1.06
5/26/2020			1.17
6/26/2020			1.67

Figures 4 to 8 display the Year 2 observations for the Landgrebe location, aligned vertically on a tabloid-sized page to allow visual comparison of the graphs while keeping the horizontal time axes aligned. Figure 4 is a bar chart that shows the daily values of RF and ET ref in in/d provided by the Landgrebe WS data. ET ref is calculated for a hypothetical reference grass as used in the Penman-Monteith approach, based on one of the most popular evapotranspiration formulas (Shuttleworth 1993). Figures 5 to 7 provide the variations in moisture content for the sensor probes at sites L1, L2, and L3, respectively. While the soil moisture data show decreased in the summer months, responses to the fall and spring rainfall events were noted in the upper sensors. The three lower sensors at all three sites changed little over the entire year, so it appeared that no water reached below the third depth of 4.9 ft.

Figure 8 shows the cumulative depths of rainfall and ET ref. Coupled with the large deficit between ET ref and RF, this dataset indicates that both evaporation from the soil and transpiration through the plants were drying the upper soils so that the water could not migrate below.

Figures 9 to 13 provide the Year 3 data for the Landgrebe location in the same progression. The two summer months were dry with only one daily RF value above 1.0 in followed by some smaller showers. The shallowest sensor showed drying between rains and increases following the events while the lower sensors showed declines or no change, indicating little to no further infiltration. Cumulative ET ref exceeded cumulative RF as expected.

Figures 14 to 18 summarize the Year 2 data for the Dohmann location. For the D2 and D3 sites, the shallower soil moisture sensors were most responsive to the rain events, while the two lower sensors showed little to no change. P4 at the D1 site sometimes responded to the rain events as much or more that the shallowest P1 during both years, so it may be possible that some short-circuiting may be occurring at that hole. Otherwise, the other lower sensors were stable or decreasing, again indicating little to no migration from above.

The Year 3 data for the Dohmann location is shown in Figures 19 to 23. With little rainfall, the soil moisture sensors at D1 and D3 changes little in the two summer months. The D2 site only has two remaining active sensors, and the shallower sensor showed temporary increases followed by drying, while the lower sensor was stable.

Figures 24 to 28 display the calendar year 2020 data for the Fuller location. As shown in Table 4 and Figure 24, the Fuller location received more RF than the other two locations. At the F1 site, the three upper soil moisture sensors responded to most of the larger events, but the two lower sensors showed little change. At the F2 site, only the shallowest sensor responded to the rain events, and the other three lower sensors were stable or declining. The F3 site sensors showed no responses to the rain events. As seen for the other sites, these data coupled with the large deficit between ET ref and RF indicated that no water was migrating through these sites during this dry year.

<u>Next Steps</u>

The TTU team is hopeful to continue this monitoring and reporting work with the GCGCD staff into the future, with occasional site visits by the TTU for maintenance of the instrumentation. Also, during the May 2020 visit by the TTU team, Dr. Terry McLendon began to characterize the vegetation types at both sites for assignment of appropriate ET crop coefficients to refine the estimates of soil water lost to ET at the sites. Those findings will be presented in the next fiscal year. The TTU team is also available to discuss installation of one or more additional field observation locations, or other pertinent topics.

References

Shuttleworth, W., 1993. Chapter 4, Evaporation, in Handbook of Hydrology (D. Maidment ed.), McGraw-Hill, Inc., pp. 4.13-4.15.

Rainwater, K. and Coldren, C., 2018a. Site Installations for Goliad County Groundwater Conservation District Recharge Study, Report to Goliad County Groundwater Conservation District, Goliad, TX, 8 p.

Rainwater, K. and Coldren, C., 2018b. Goliad County Recharge Evaluation Preliminary Report December 2018, Report to Goliad County Groundwater Conservation District, Goliad, TX, 24 p.

Rainwater, K. and Coldren, C., 2019. Goliad County Recharge Evaluation Summary of Field Data Collection as of June 2019, Report to Goliad County Groundwater Conservation District, Goliad, TX, 9 p.

Rainwater, K. and Coldren, C., 2020. Fuller Site Installation for Goliad County Groundwater Conservation District Recharge Study, Report to Goliad County Groundwater Conservation District, Goliad, TX, 13 p.

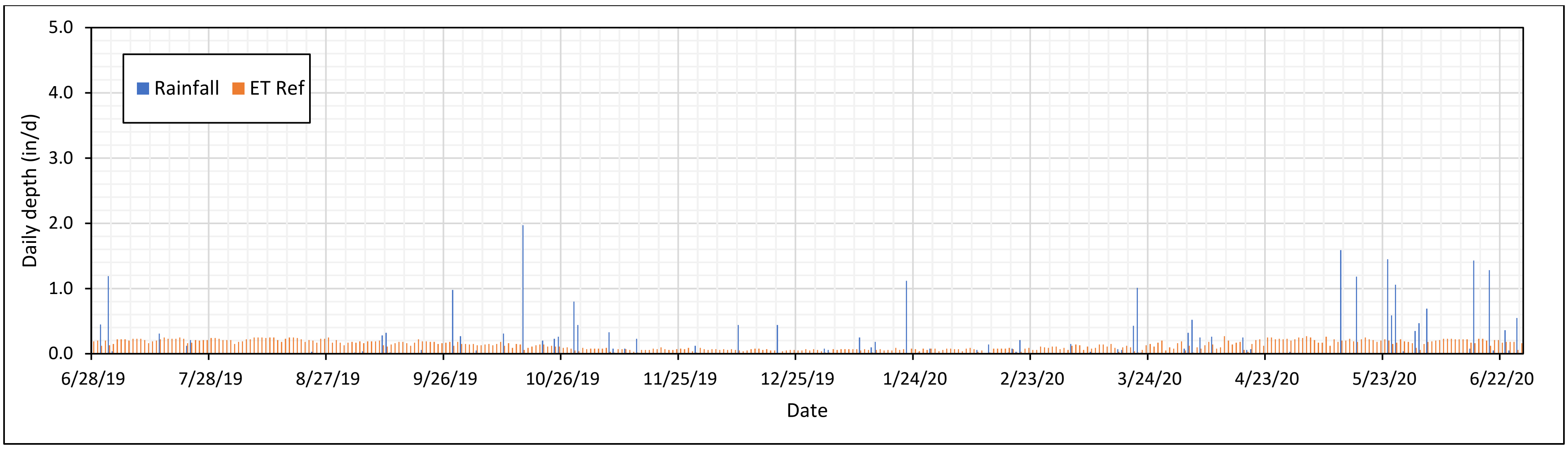


Figure 4. Landgrebe daily rainfall and ET ref June 28, 2019 to June 27, 2020

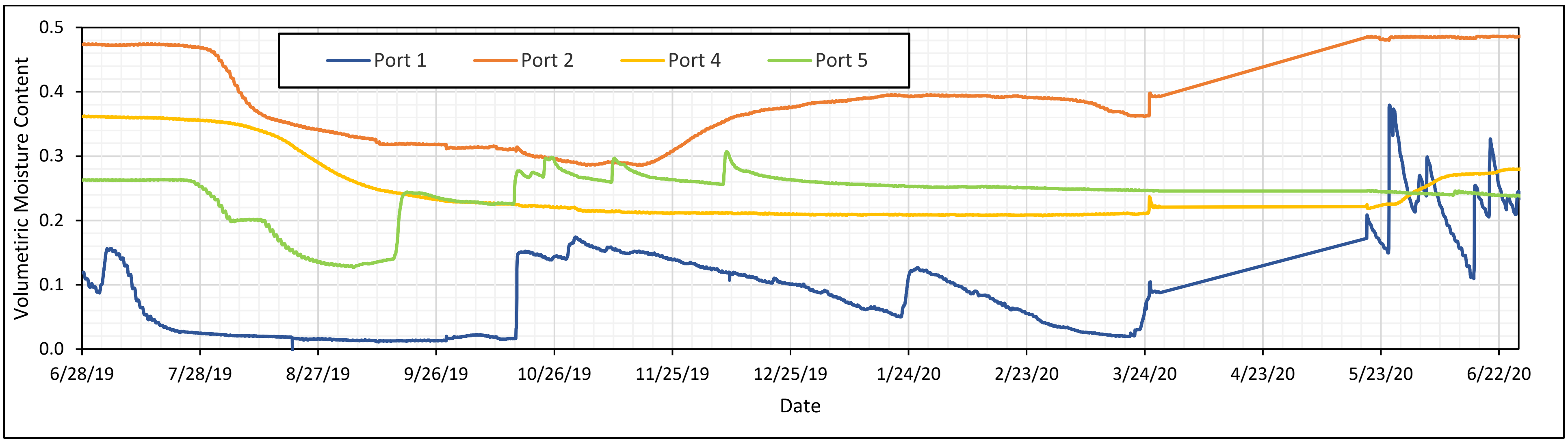


Figure 5. Landgrebe L1 soil moisture probes June 28, 2019 to June 27, 2020

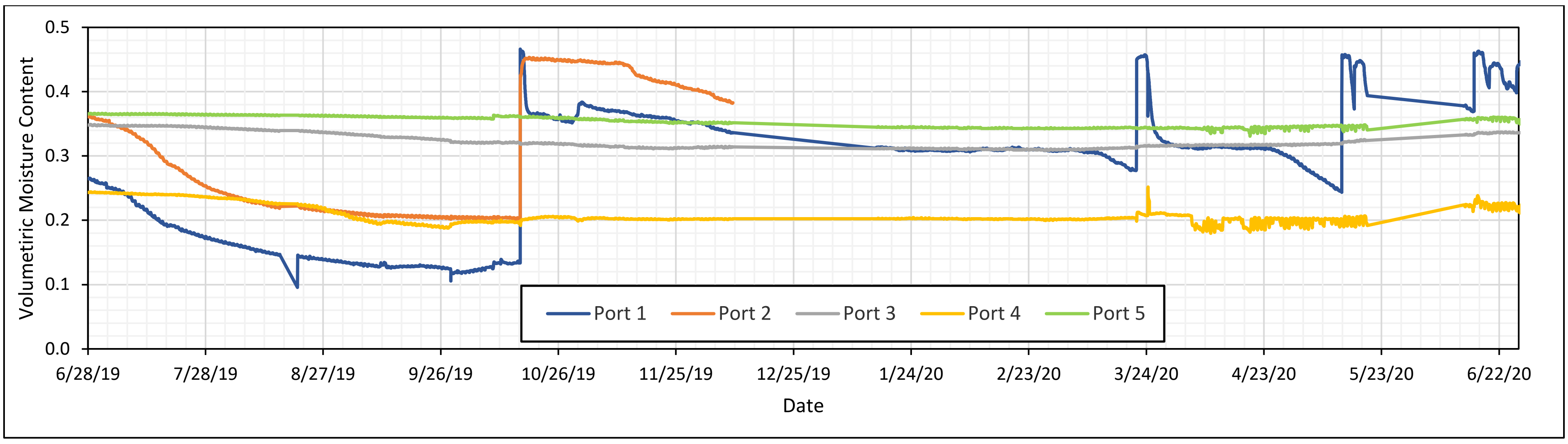


Figure 6. Landgrebe L2 soil moisture probes June 28, 2019 to June 27, 2020

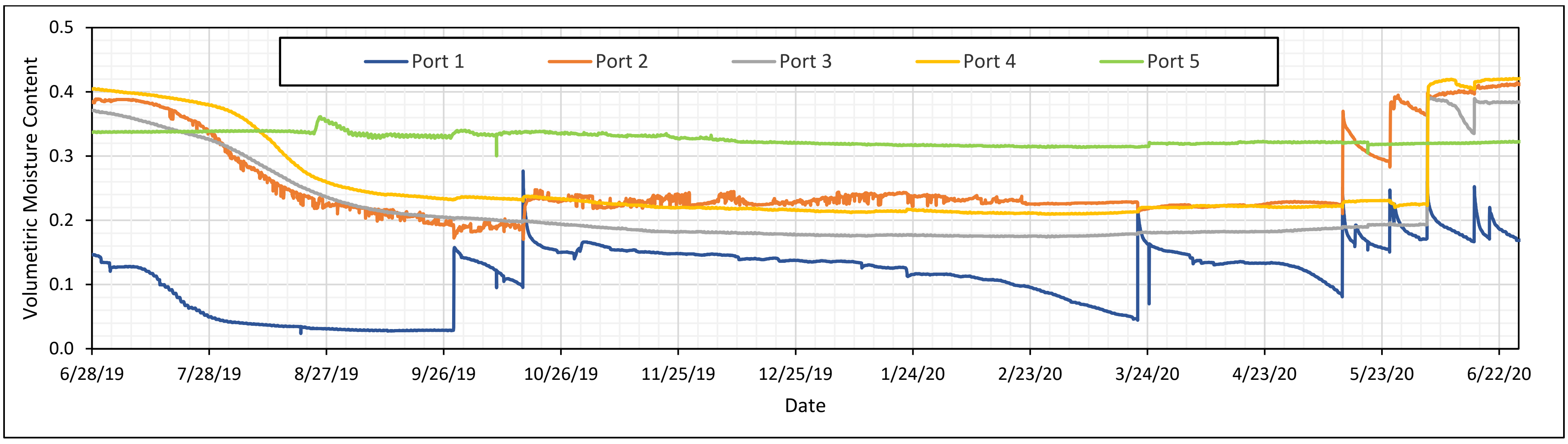


Figure 7. Landgrebe L3 soil moisture probes June 28, 2019 to June 27, 2020

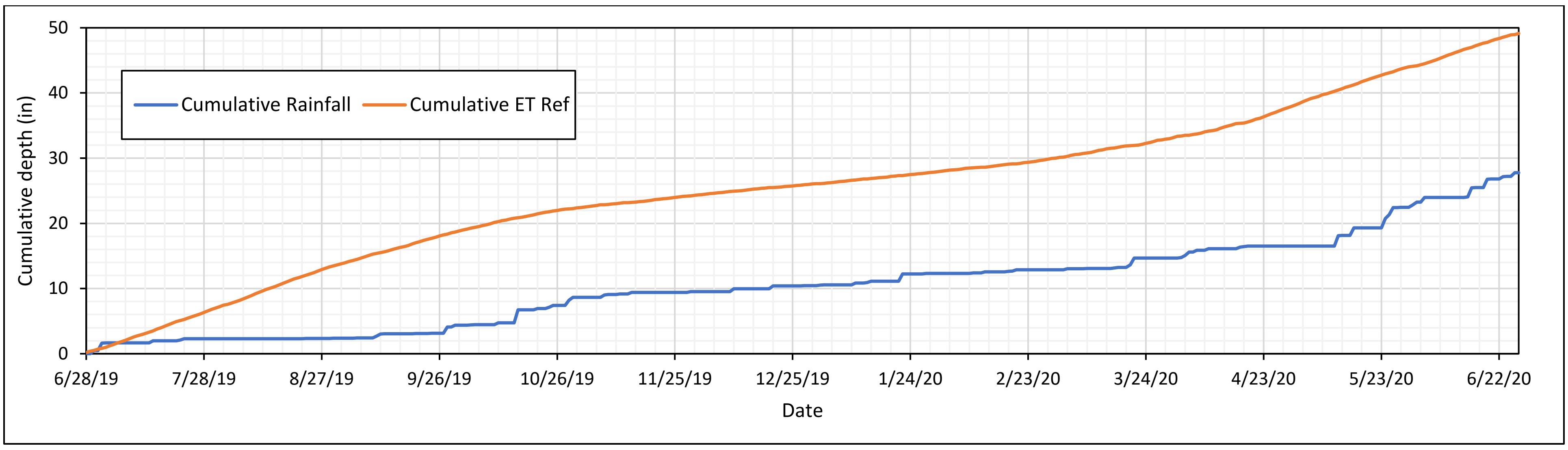


Figure 8. Landgrebe cumulative rainfall and ET ref June 28, 2019 to June 27, 2020

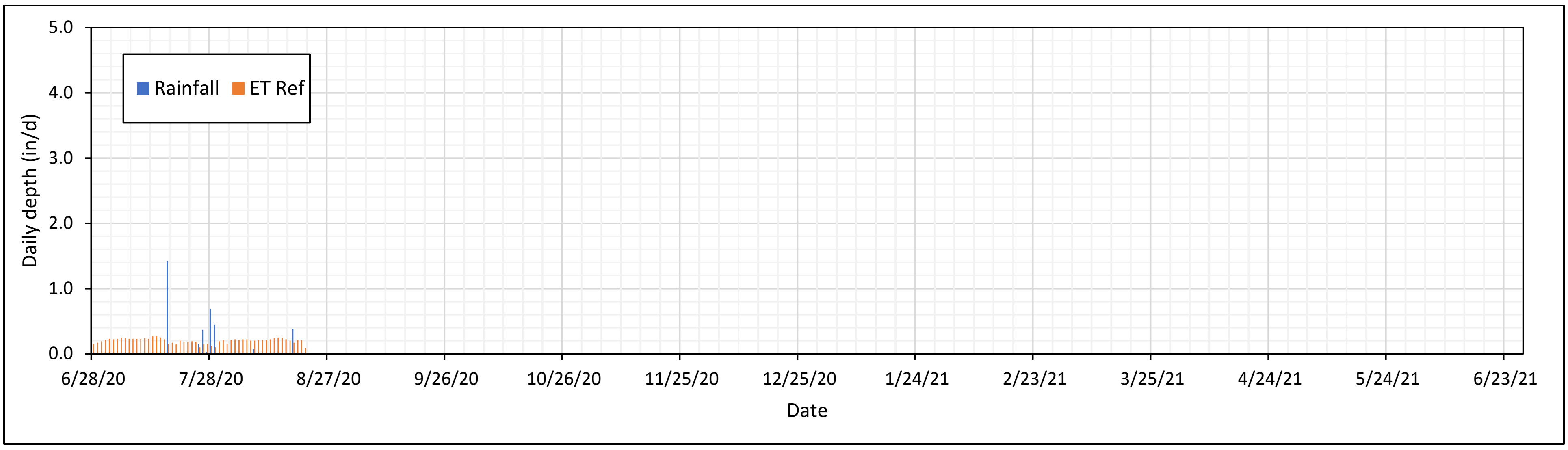


Figure 9. Landgrebe daily rainfall and ET ref June 28, 2020 to June 27, 2021

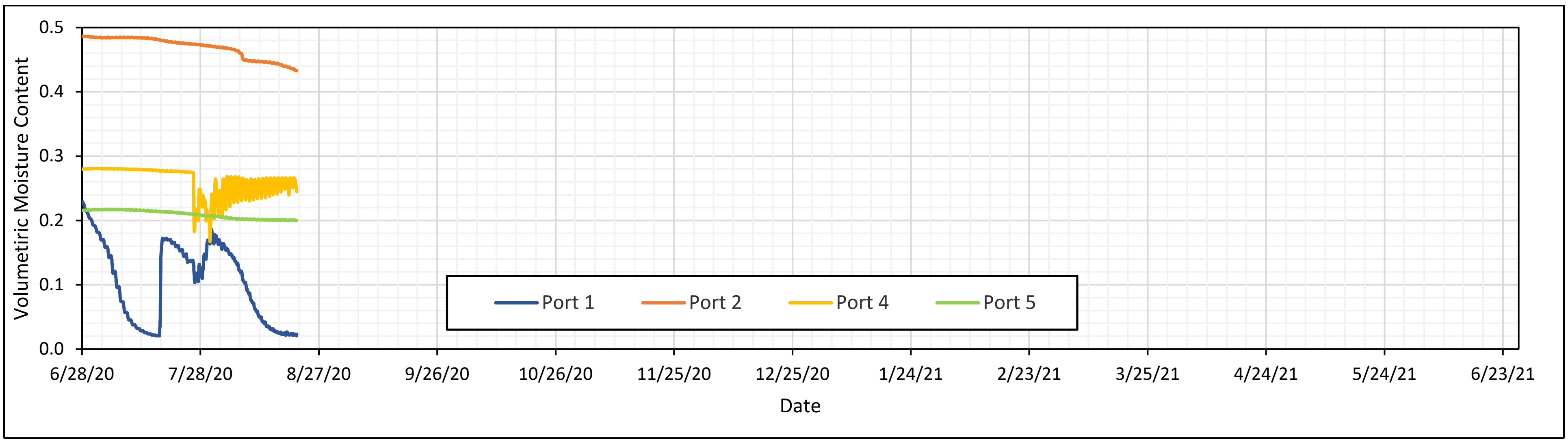


Figure 10. Landgrebe L1 soil moisture probes June 28, 2020 to June 27, 2021

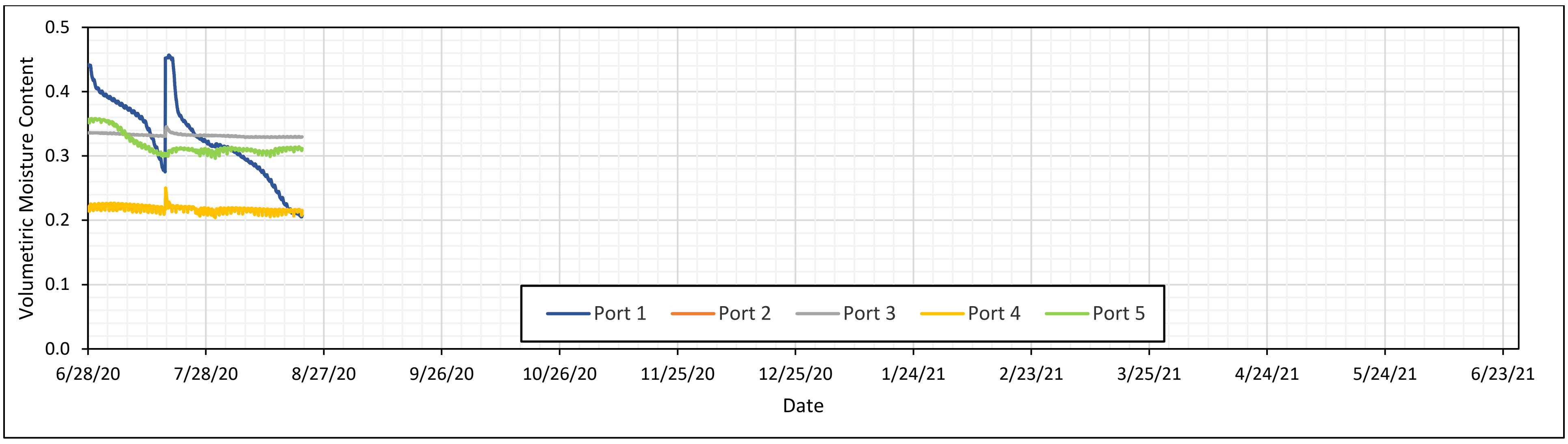


Figure 11. Landgrebe L2 soil moisture probes June 28, 2020 to June 27, 2021

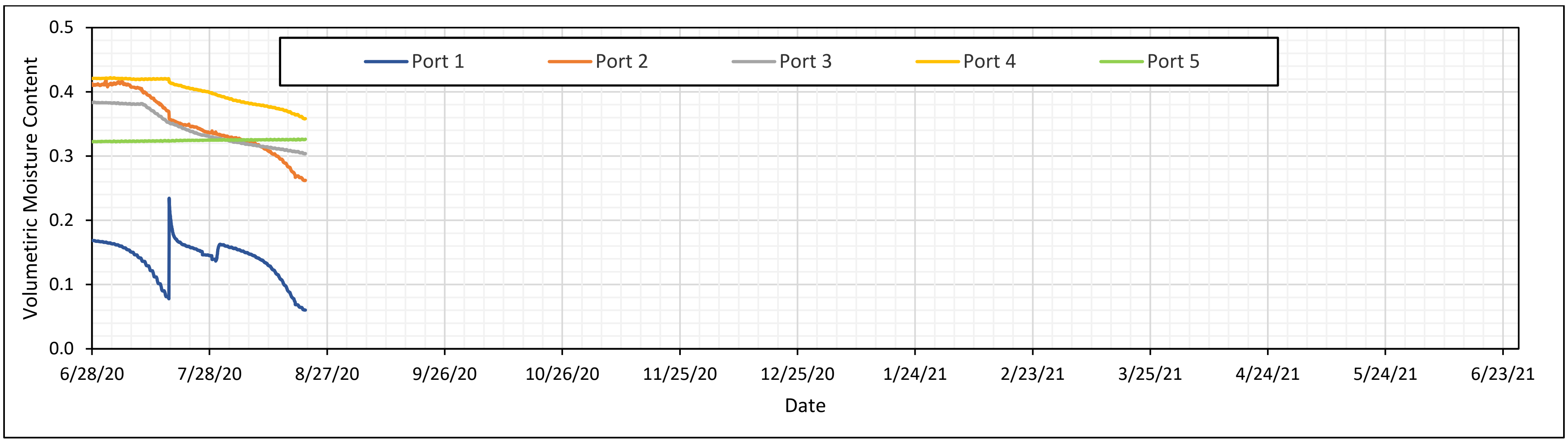


Figure 12. Landgrebe L3 soil moisture probes June 28, 2020 to June 27, 2021

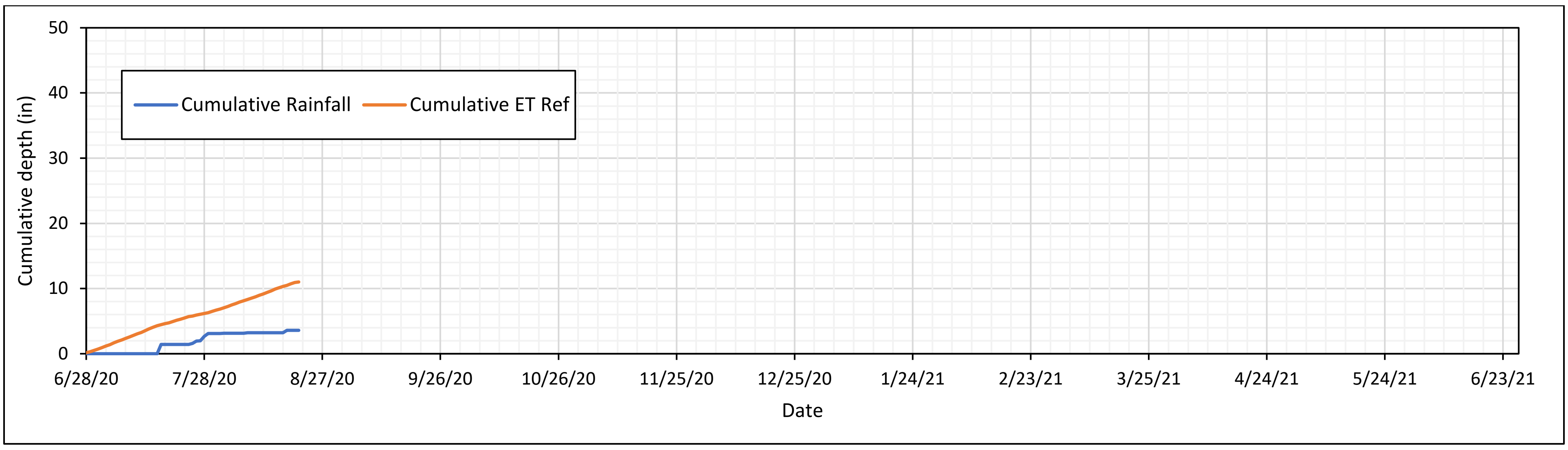


Figure 13. Landgrebe cumulative rainfall and ET ref June 28, 2020 to June 27, 2021

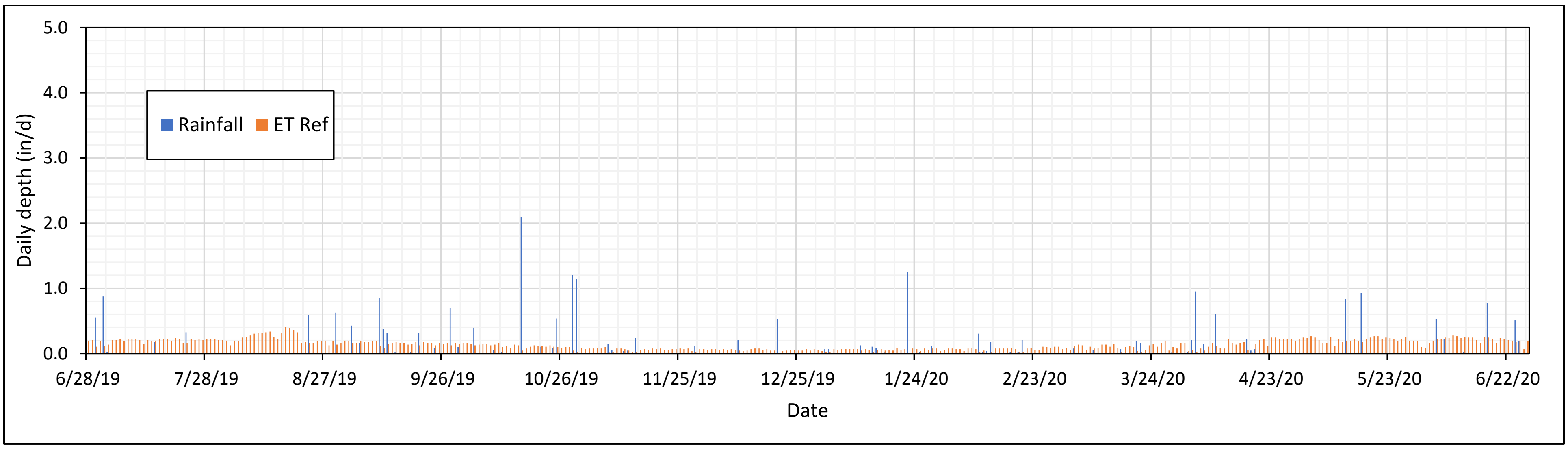


Figure 14. Dohmann daily rainfall and ET ref June 28, 2019 to June 27, 2020

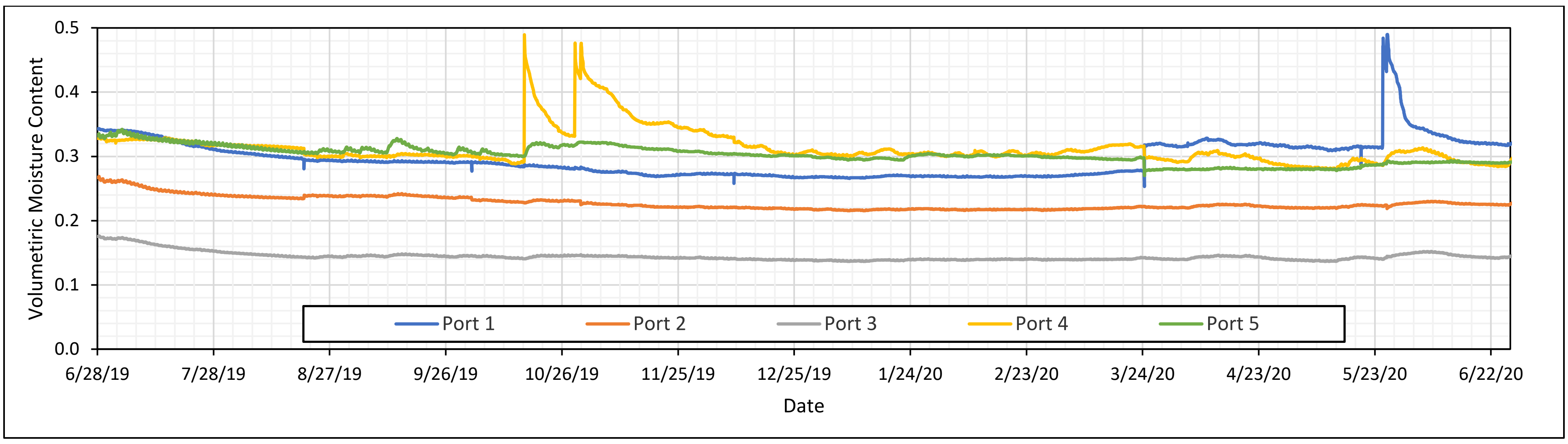


Figure 15. Dohmann D1 soil moisture probes June 28, 2019 to June 27, 2020

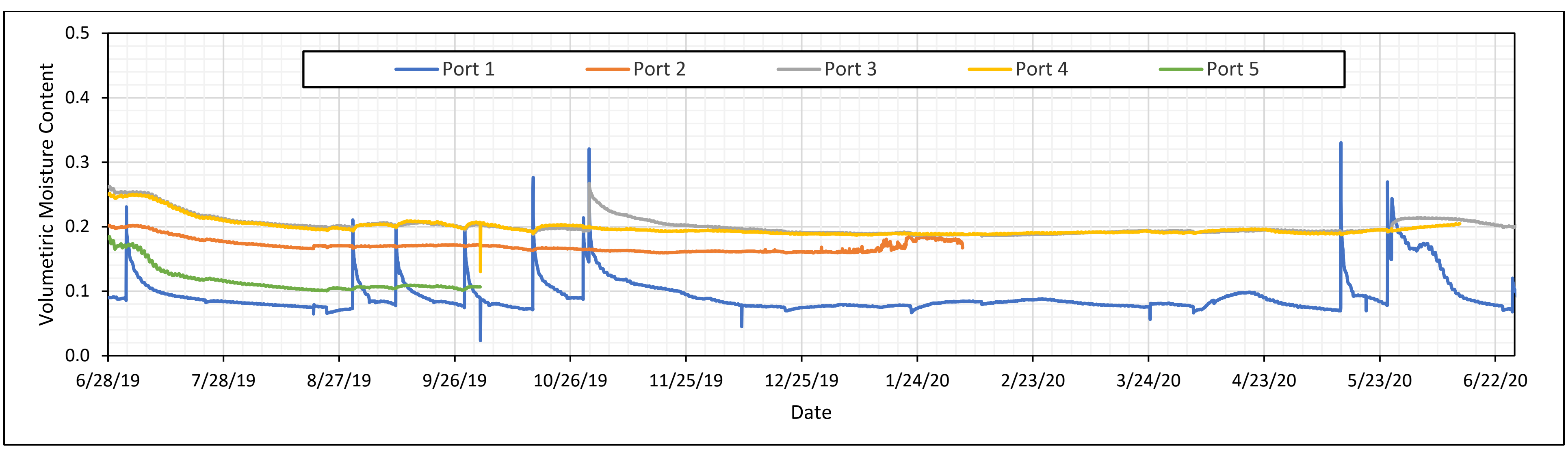


Figure 16. Dohmann D2 soil moisture probes June 28, 2019 to June 27, 2020

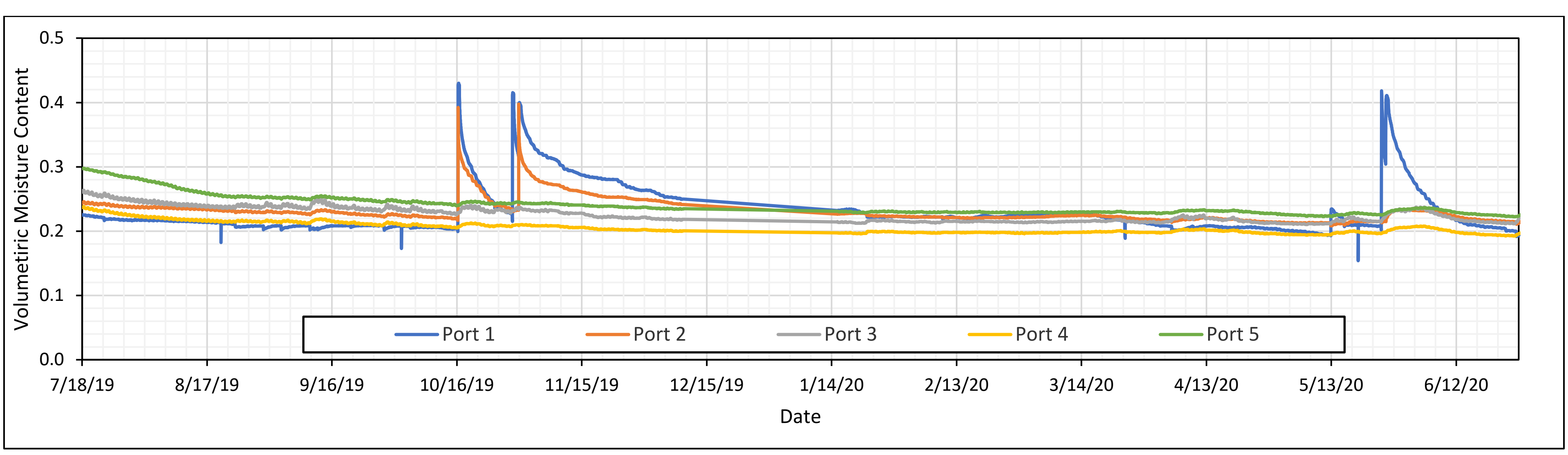


Figure 17. Dohmann D3 soil moisture probes June 28, 2019 to June 27, 2020

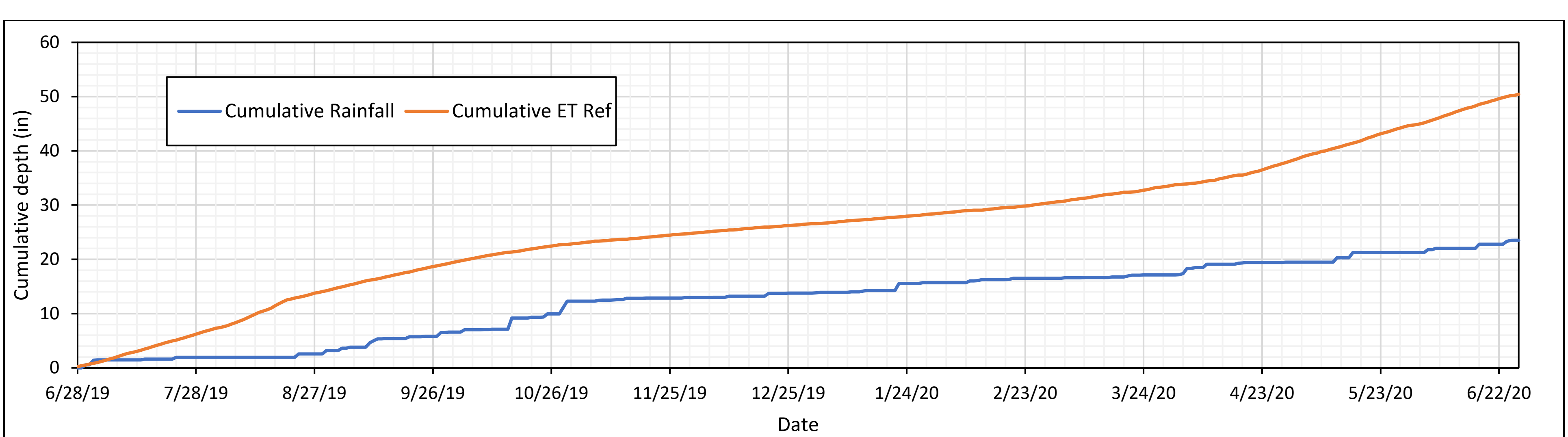


Figure 18. Dohmann cumulative rainfall and ET ref June 28, 2019 to June 27, 2020

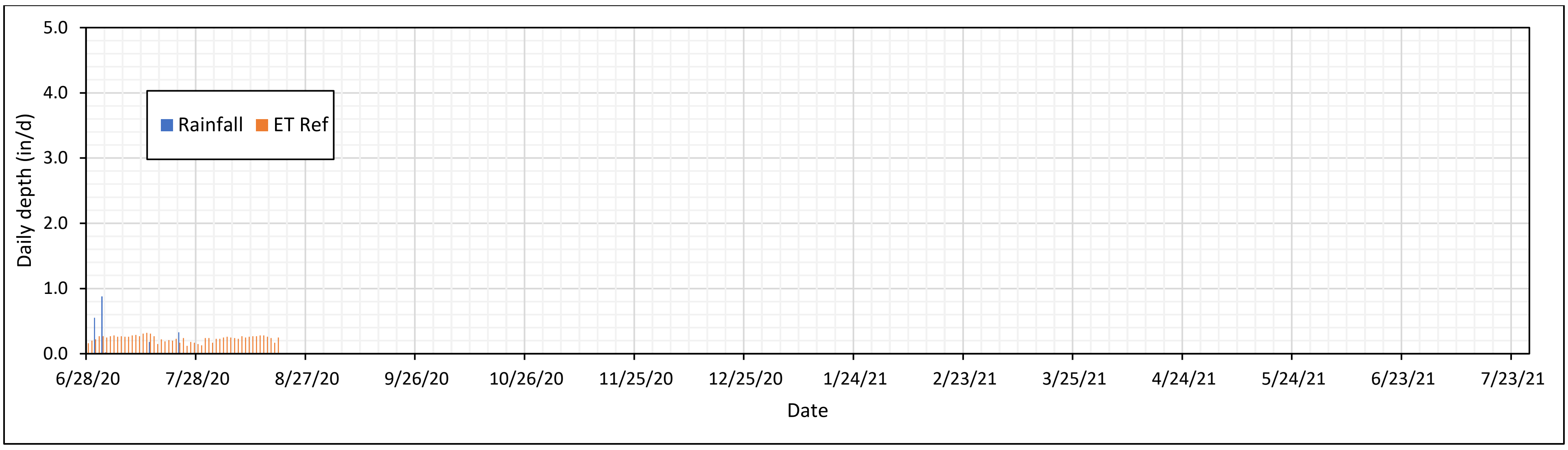


Figure 19. Dohmann daily rainfall and ET ref June 28, 2020 to June 27, 2021

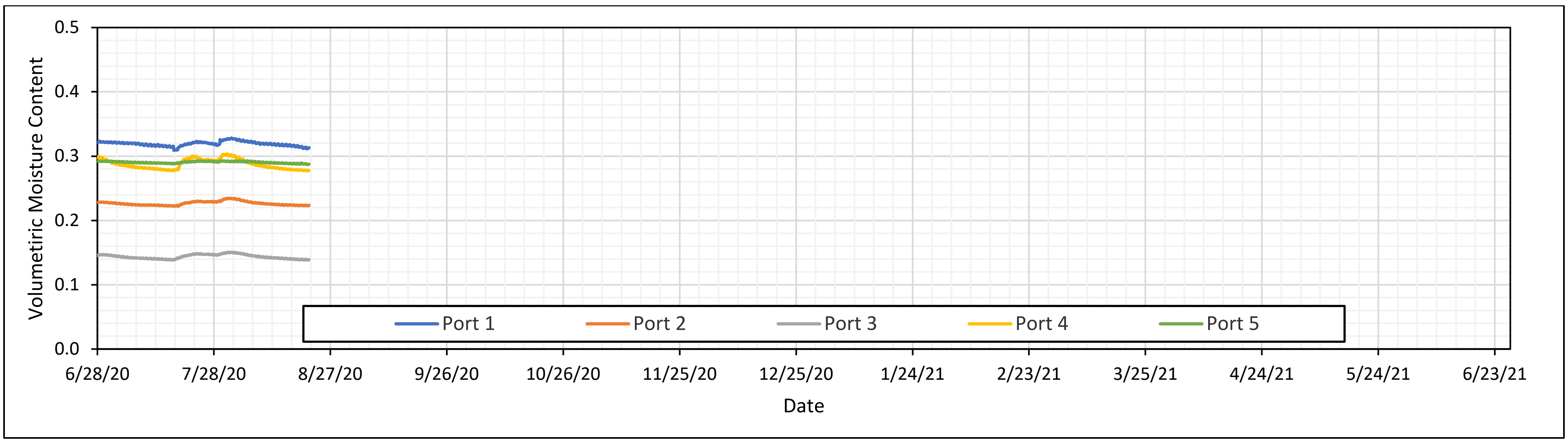


Figure 20. Dohmann D1 soil moisture probes June 28, 2020 to June 27, 2021

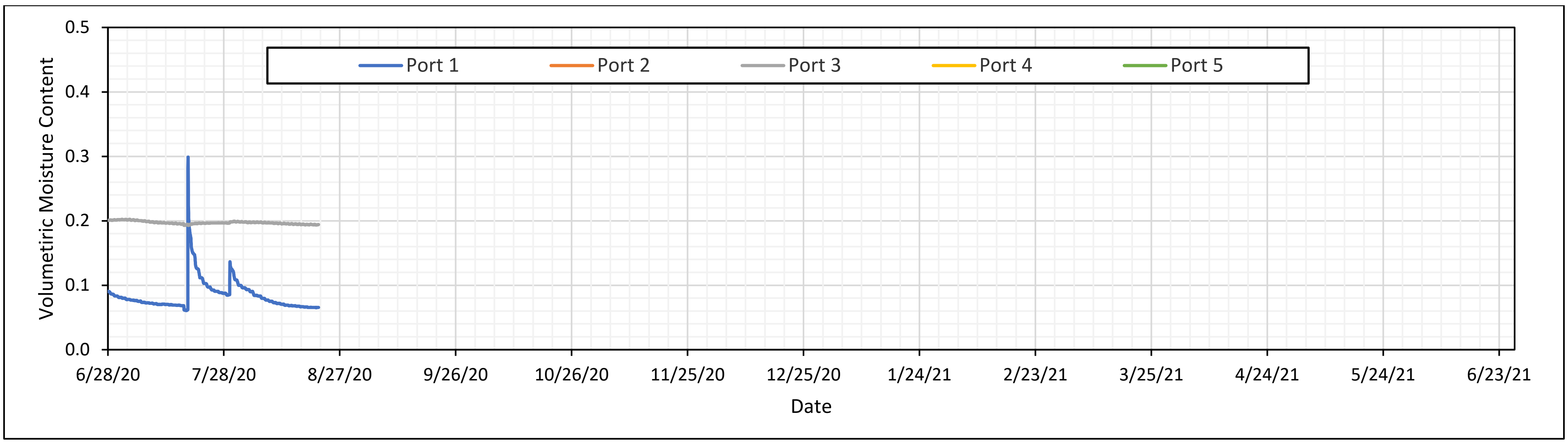


Figure 21. Dohmann D2 soil moisture probes June 28, 2020 to June 27, 2021

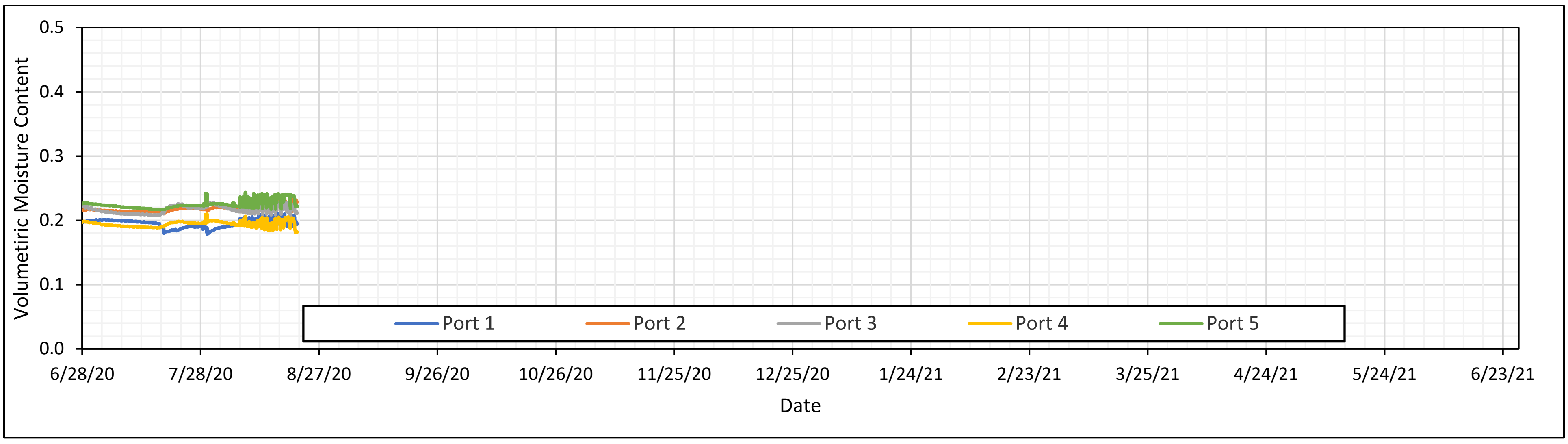


Figure 22. Dohmann D3 soil moisture probes June 28, 2020 to June 27, 2021

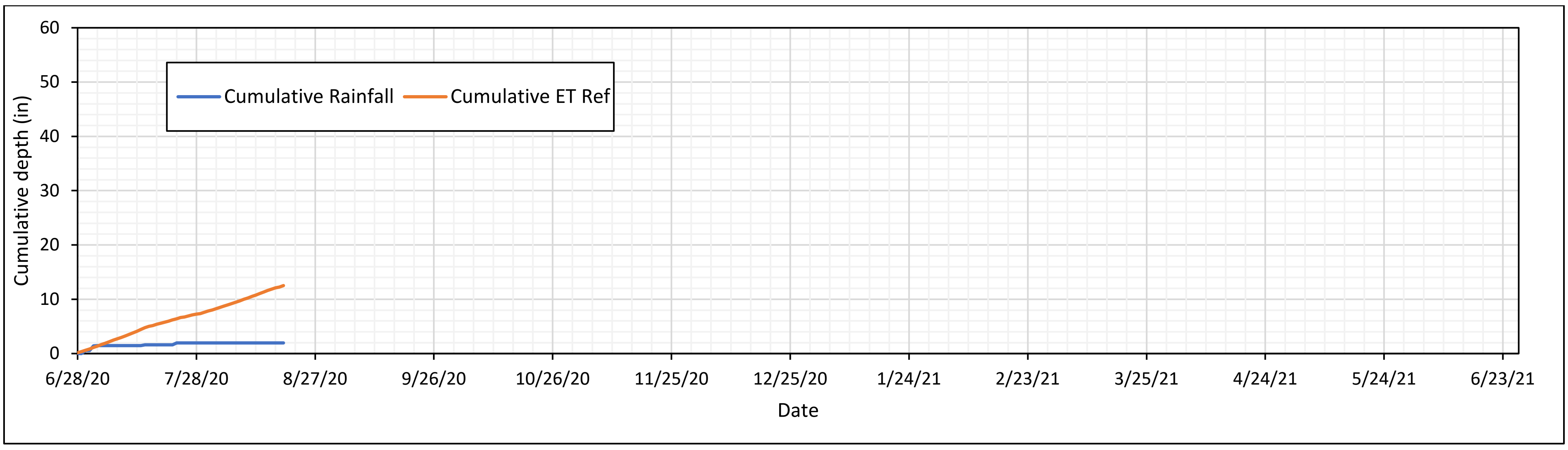


Figure 23. Dohmann cumulative rainfall and ET ref June 28, 2020 to June 27, 2021

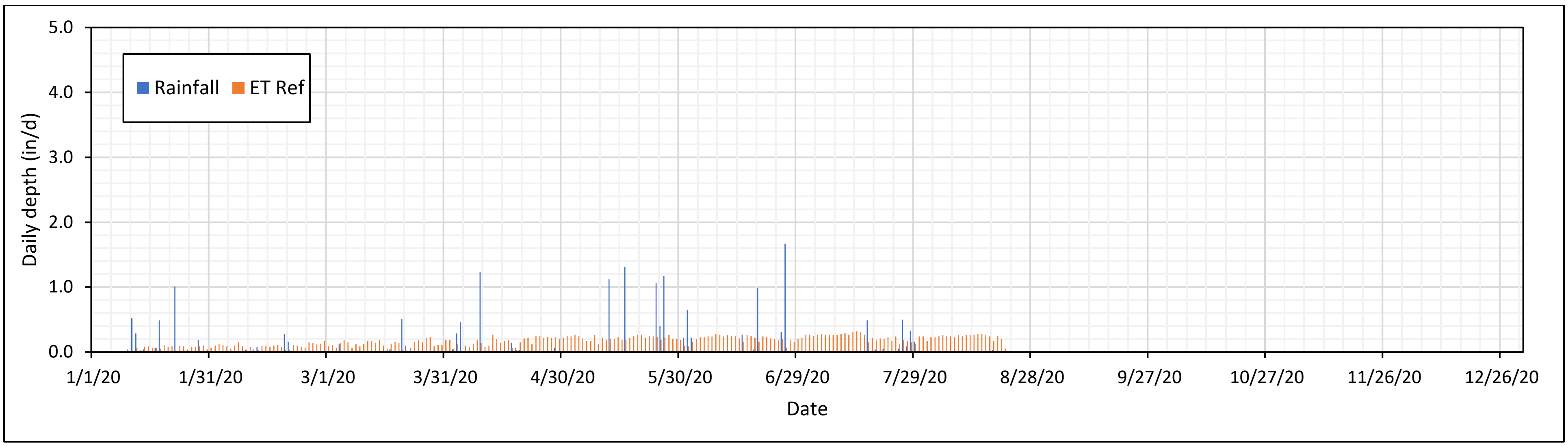


Figure 24. Fuller daily rainfall and ET ref January 1 to December 31, 2020

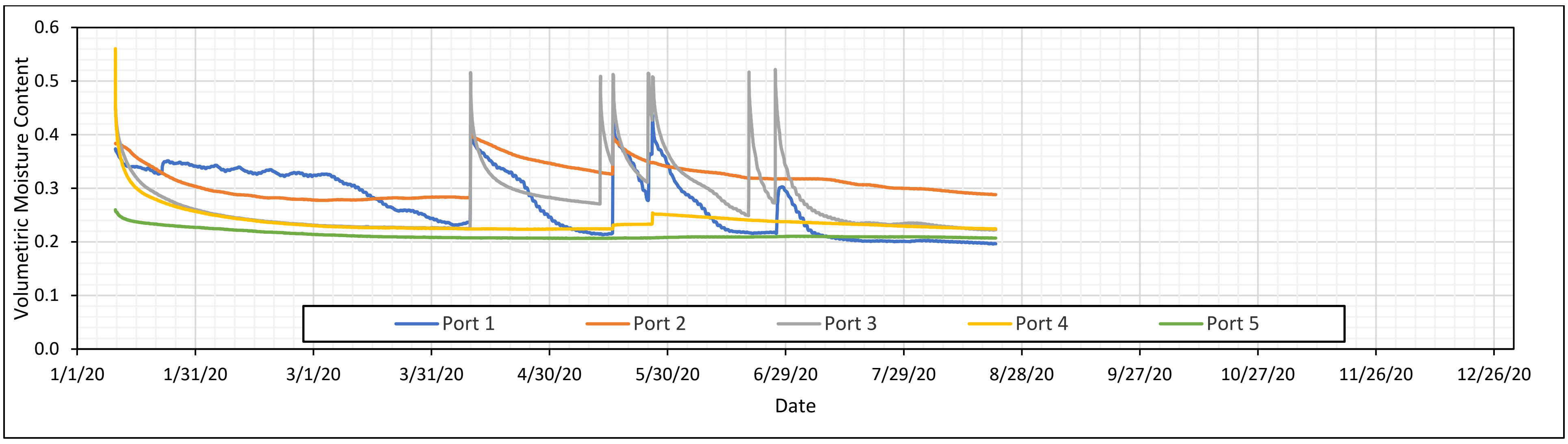


Figure 25. Fuller F1 soil moisture probes January 1 to December 31, 2020

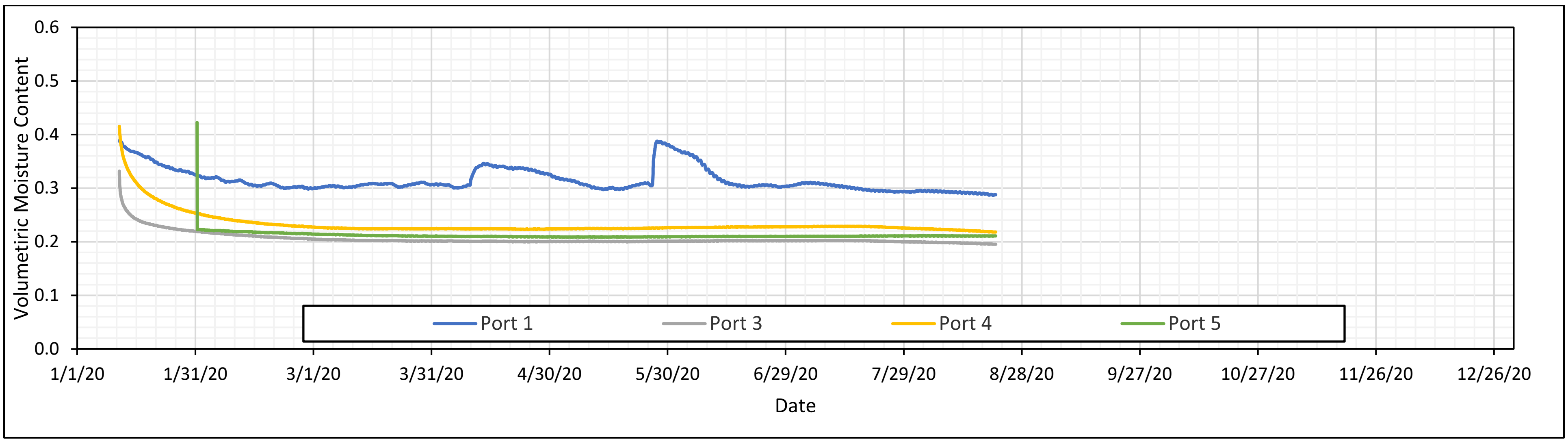


Figure 26. Fuller F2 soil moisture probes January 1 to December 31, 2020

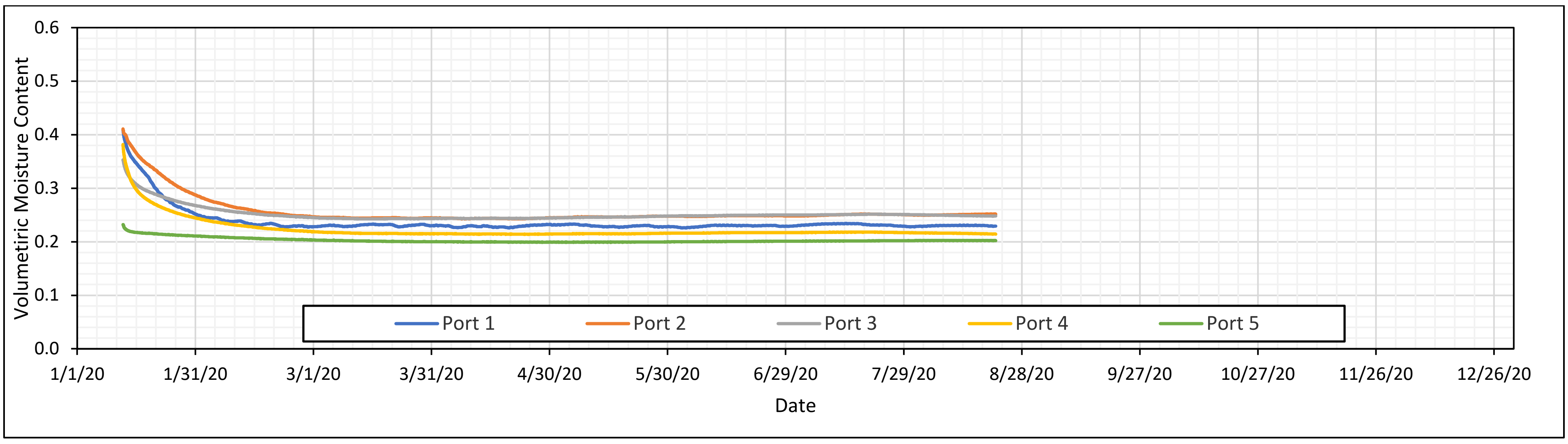


Figure 27. Fuller F3 soil moisture probes January 1 to December 31, 2020

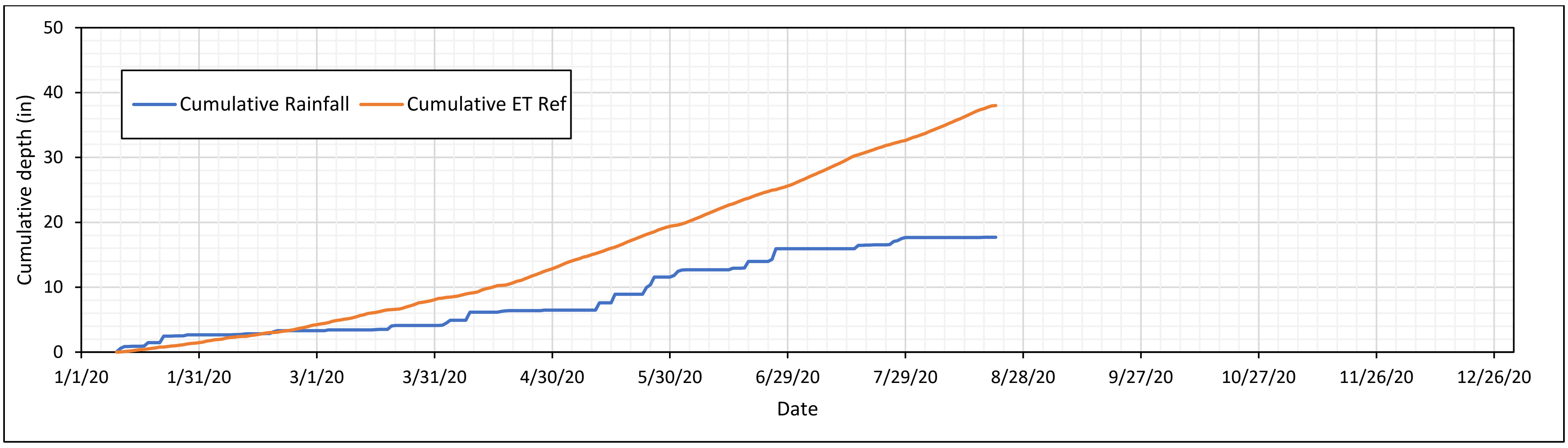


Figure 28. Fuller cumulative rainfall and ET ref January 1 to December 31, 2020

Appendix 4.2 —
GAM Recalibration Focusing on Goliad County

CONNECTING WATER TO LIFE

To:	Ms. Heather Sumpter, General Manager Goliad County Groundwater Conservation District
From:	Michael Keester, PG
Date:	October 20, 2020
Project:	GAM Recalibration Focusing on Goliad County

The purpose of this technical memorandum is to summarize the results of recalibration of the Groundwater Availability Model for the central portion of the Gulf Coast Aquifer System ("GAM"). Goliad County Groundwater Conservation District ("GCGCD") contracted LRE Water ("LRE") to recalibrate the GAM within Goliad County with a focus on the simulated groundwater elevations in the Evangeline Aquifer. While simulated water levels from the GAM would not be expected to perfectly match observed water levels, the adopted GAM provides a very poor match to the observed water levels and also the trend in water levels. The poor match with the trend is a particular problem as the joint planning effort with Groundwater Management Area ("GMA") 15 currently results in Desired Future Conditions ("DFCs") that are based on a change in water level over time. This recalibration effort resulted in a tool that better represents the observed water level changes in the Gulf Coast Aquifer System ("GCAS") in Goliad County and provides GCGCD an improved model to aid with groundwater management within the District.

Background

Chowdhury and others (2004) developed and calibrated the original GAM from pre-development (year 1910) through year 1999. Young (2016) utilized the GAM with a predictive dataset representing the year 2000 through 2070 to assist with the development of the current DFCs for GMA 15. During the current round of joint planning, the predictive period pumping from January 1, 2000 through December 31, 2016 was updated to better reflect the amount of actual pumping during that period (Keester, 2019).

Using the pumping updates through 2016, LRE modified the input files for the calibrated model from the end of 1999 through 2016. That is, we created input datasets using the original GAM input files representing conditions in year 1910 and extended the simulation time through 2016. We initially made no changes to the structure or parameters in these input files and performed an informal sensitivity analysis to identify parameters that would most affect the simulated water levels within the District. We then modified the model parameters to improve the match between simulated water levels and the water levels measured by District staff.

Calibration Observations

For the recalibration effort, we relied on measured water-level data provided by GCGCD. The dataset included 132 monitoring wells with the earliest water-level measurements being from 2002. As illustrated on Figure 1, many of the monitoring wells are located close to one another. For assessing the recalibration results, we limited the number of calibration target locations to wells with a longer period of available measurements. Using wells with a longer period of record allowed us to track the simulated versus measured water levels along with the trend in simulated and measured water levels in the aquifer. The calibration target locations are identified on Figure 1 along with the other monitoring well locations with available water level data.

Building upon the work conducted by Donnelly (2018) we utilized the hydrostratigraphy of the GCAS developed by Young and others (2010) along with the depth data for each of the monitoring wells to verify the hydrostratigraphic unit in which each well was likely completed. Of the 132 monitoring wells, 114 included depth data which allowed us to identify in which aquifer the bottom of the well was located. If the total depth of the well was more than 20 feet below the top of the aquifer, we assigned the well to the same aquifer where the bottom of the well was located. Otherwise, the well was assigned to the overlying aquifer. For wells without depth information, we assigned the well to the shallowest aquifer. This process resulted in 16 Chicot monitoring wells, 113 Evangeline monitoring wells, two Burkeville monitoring wells, and one Jasper monitoring well. Figure 2 depicts the distribution of GCGCD monitoring wells by aquifer and Figure 3 illustrates the number of monitoring wells by aquifer.

As noted by Donnelly (2018), monitoring wells completed in the Chicot Aquifer are only found along the southeastern county line. However, monitoring wells completed in the Evangeline Aquifer are located throughout the county. As such we focused our recalibration effort on layer 2 of the GAM which represents the Evangeline. Our final water level target dataset included 20 Evangeline Aquifer monitoring wells with a total of 322 water level measurements.

Existing Calibration Issues

As previously noted, water level monitoring in GCGCD has shown a significant discrepancy between measured water levels and results from the GAM. In general there are two issues with the GAM results that need to be addressed:

1. GCGCD monitoring shows regional groundwater declines in the Evangeline Aquifer while the GAM simulates a rising water level. Figure 4 is an example of the GAM simulated water levels (from a simulation with the pumping file adopted by GMA 15 to represent potential DFCs) and measured water levels at monitoring well 4. The measured water level in the well declines about 10 feet from 2003 to 2020, while the model simulates a rise of between 5 and 10 feet for the same time period.
2. The measured water levels are typically lower than the GAM simulated water levels. Figure 5 is a plot of observed versus GAM simulated water levels. As shown the figure, the model tends to simulate heads that are greater than observed.

Recalibration Approach

To improve the calibration of the GAM, we modified the recharge and the horizontal hydraulic conductivity of the Evangeline Aquifer. We limited, the calibration to these two parameters because they appeared to have the greatest effect on simulated water levels and there is available data to justify modifications while also constraining the calibration. We performed the model recalibration in two steps: (1) modifying the recharge package based on surface water balance surveys in the county and surrounding areas, followed by (2) calibrating the hydraulic conductivity of the Evangeline Aquifer using PEST++ (Welter and others, 2015) and pilot points.

We modified the GAM recharge based on the observed water levels, the EDYS ecological model of Goliad County (McLendon and others, 2016), and information from the Goliad County Recharge Evaluation (Rainwater and Coldren, 2019; Rainwater and Coldren, 2020). The fact that (1) the measured water levels are lower than GAM simulated water levels and (2) there is an observed declining water level trend compared to a GAM simulated rising water level trend indicates that the simulated recharge (or more generally, inflow) in the GAM is too high. The EDYS ecological model and the Landgrebe site data suggest that the net recharge in Goliad County is likely low or zero. The EDYS model indicates that there is more transpiration than recharge in the county as a whole and thus the net recharge is actually negative (McLendon and others, 2016). Also, data for the Landgrebe and Dohmann recharge evaluation sites indicates recent evapotranspiration is near or greater than rainfall suggesting little if any recharge potential at the site (Rainwater and Coldren, 2020).

Through our initial evaluations, we found that the current GAM structure and properties perform better with no simulated recharge. As such, we did not include the recharge package in the recalibration effort and subsequent calibration work focused on modifying the hydraulic conductivity values for the Evangeline with no recharge occuring within the model domain. However, we did not make modifications to the stream or river packages in the GAM and these packages continued to allow inflow to the simulated aquifers.

We performed the calibration of the hydraulic conductivity values for the Evangeline Aquifer using PEST++ (Welter and others, 2015) with pilot points. PEST++ is essentially interchangeable with PEST (Watermark Numerical Computing, 2020) which is a model impendent, widely used and industry accepted, code for model calibration and parameter estimation. Pilot points are a method for parameter estimation where parameter values are estimated at specific locations and the values for each model cell are interpolated from the point locations.

We used 65 pilot point locations for the estimation of the hydraulic conductivity of layer 2 of the GAM representing the Evangeline Aquifer. The location of each pilot point was determined based on triangulation of the 132 monitoring wells in the District. Modification of the hydraulic conductivity was limited to Goliad County and a zone extending approximately three to five miles beyond the county boundary. Figure 6 illustrates the extent of the recalibration area and the location of the pilot points.

We assigned the minimum and maximum hydraulic conductivity value for each pilot point to 1 foot per day (ft/d) and 15 ft/d respectively based on transmissivity estimates from specific capacity tests recorded in the TWDB Groundwater Database (TWDB, 2020). The hydraulic conductivity of layer 2 across Goliad County in the GAM is a constant value of 3.5 ft/d. The potential hydraulic conductivity range we assigned to the pilot points allowed PEST++ to slightly reduce the hydraulic conductivity or increase it by up to approximately four times.

Recalibration Results

To recalibrate the model, we began with a base recalibration and then moved to alternate recalibrations that drew upon information developed during the base recalibration.

Base Recalibration

The recalibration resulted in a variable hydraulic conductivity distribution across Goliad County. While the GAM has a constant value of 3.5 ft/d in the county and surrounding area, the re-calibration resulted in values ranging from 1.2 ft/d to 12.4 ft/d with most of the area falling within a range of 2.4 ft/d to 6.6 ft/d. Figure 7 illustrates the distribution of hydraulic conductivity values in layer 2 of the model representing the Evangeline Aquifer within the recalibration area. As shown on Figure 7, the recalibration suggest hydraulic conductivity values generally increase in the Evangeline Aquifer toward the Gulf Coast.

Figure 8 is the same cross plot as Figure 5 with the recalibration results added. While the GAM generally simulates water levels higher than the measured values, the recalibration resulted in a more even distribution of too high and too low values. Figure 9 illustrates how the trend in simulated water levels more closely matches the trend at GCGCD monitoring well #4.

To quantitatively assess the recalibration results we used the District measured water levels and corresponding modeled water levels from the recalibrated model to calculate statistics that indicate how well the model matches historical conditions. For each measured and modeled water level pair we calculated the residual by subtracting the modeled water level from the corresponding measured water level. Using the residuals, we then calculated the **mean error** (“ME”) or average of the residuals and the **mean absolute error** (“MAE”) or average of the absolute values of the residuals (Anderson and Woessner, 2002). An advantage of the MAE over the ME is that negative values do not skew the statistic toward zero with the MAE. For example, four residuals with values of -7, -6, 10, and -2 would have a ME of -1.75 which appears relatively small, but the MAE is 6.75 indicating that the average magnitude of the error is quite large. The negative value of the ME does illustrate one benefit in that it provides an indication of the average model bias which, for the example above, is that simulated values are biased toward being higher than measured values.

We also calculated the **root mean square error** (“RMSE”), **relative root mean square error** (“RRMSE”), and the **normalized root mean square error** (“NRMSE”). The RMSE is the square root of the average of the squared residuals. The RRMSE is the RMSE divided by the average of the measured water levels. The NRMSE is the RMSE divided by the difference between the maximum measured water level and the minimum measured water level. The RMSE is a measure of how concentrated the residuals are around the line of best fit (that is, a perfect match between measured and modeled water levels). With the RMSE, the residuals are squared before being averaged which gives a relatively high weight to large error values. The RRMSE provides an indication of the variance from the average water level. The NRMSE provides an indication of the variance between residuals with a lower NRMSE value indicating that errors are small compared to total change in water level across the area of interest.

One other statistic is the **Nash-Sutcliffe model efficiency** ("NSME"). The NSME is a calculation that expresses the ability of the model to reproduce the measured water levels (Gupta and others, 1998). For the ME, MAE, RMSE, RRMSE, and NRMSE a value of zero is ideal and for NSME good model results should yield a value close to one.

In addition to comparing the measured and modeled water levels, we calculated the linear trend of the water levels. That is, we calculated the rate that the water levels were increasing or decreasing over time. We also calculated the trend using the corresponding simulated water levels and compared the results to assess how well the model is simulating the trend in water levels.

Quantitatively, the recalibration statistics confirm our observation from Figure 8 that the recalibration provides an improved match between measured and modeled water levels. Table 1 provides the calibration statistics for the GAM and the recalibration. For each of the statistics, we observe that the recalibration is closer to the target value indicating an improved match between modeled and measured water levels.

Importantly for determining DFCs, the recalibration results also show an improved match between the trends in measured and simulated water levels. As shown in Table 2, the recalibration results provide a closer match between the simulated and the observed trends in water levels versus the GAM. Since the DFCs are currently based on drawdown, providing a good match between the trends in water levels may be more important for planning purposes. While the simulation of the actual water level may be off by a few feet, if the trend matches reasonably well then the predicted drawdown calculation (starting water level minus ending water level) may be more reasonable as well.

Alternate Recalibrations

Using the data files developed during the base recalibration effort, we then created 100 alternate recalibrations (that is, realizations) of the recalibrated model. For each realization we generated a random starting hydraulic conductivity value, within the minimum and maximum bounds, for each pilot point. We then used PEST++ to recalibrate the model using the new initial conditions. While not all of the realizations calibrated as well as the base calibration, these additional realizations allow us to explore the range of potential predictive results from the same pumping file.

Figure 10 illustrates how the various realizations relate to the recalibration results at GCGCD monitoring well #4. Most of the realizations results in a similar trend in simulated water levels during the calibration periods with the range in simulated water levels from the realizations being about 30 feet. While some of the realization results plot closer to the measured water levels for the well, it is important to remember that the calibration is based on a balancing of results at many locations across the county.

Predictive Simulation Results

As one primary purpose of the recalibration is to provide an improved tool for evaluating potential DFCs, we used the recalibration and the realizations to assess the predicted drawdown using the pumping file adopted by GMA 15. During a joint planning meeting on November 15, 2019, GMA 15 adopted the use of a pumping file designated as “GMA15_2019_001 version 1” to represent the predicted pumping conditions. The potential DFCs based on this pumping file would be stated as the amount of average drawdown that occurs between December 31, 1999 (January 1, 2000) and December 31, 2080. Also, unless dry cells occur during simulation of the DFCs by the TWDB using the pumping file, the predictive pumping amounts included in the file will become the modeled available groundwater.

To calculate the predicted drawdown in 2080, we used the simulated water level from the recalibration and realization simulations as the starting water level in the predictive simulation. We then performed the predictive simulation using a revised version of the adopted GMA 15 pumping file. The revisions to the pumping file only occurred within Goliad County and reflect changes to the predicted pumping amounts as directed by the GCGCD Board and staff. Table 3 summarizes the changes to the GMA 15 pumping file used for the simulations. The largest changes occur in the Evangeline Aquifer where predicted pumping decreases from 6,548 acre-feet in 2080 to 5,304 acre-feet. However, most of the pumping decrease in the Evangeline simply shifts to the deeper units with total predicted pumping only decreasing by a little more than 200 acre-feet in 2080. After running the model with the revised pumping file, we extracted the simulated water levels from the predictive simulation results and calculated the average drawdown for each of the four layers of the model and for the GCAS as a whole (all four layers combined).

Table 4 provides the calculated average drawdown from the recalibration and realizations for comparison to the results from the adopted GAM. As mentioned previously, the GAM generally show water levels rising in the aquifers which is reflected in the negative average drawdown values. However, the recalibration and realization results show greater average drawdown in all of the model layers. For the Evangeline layer, the average drawdown in the recalibrated model is about 50 feet more than in the GAM. Figure 11 illustrates the range of the predicted average drawdown values within GCGCD based on the recalibration and realizations.

Table 5 provides the predicted drawdown results at selected GCGCD monitoring wells through 2080 using the recalibrated model. These results suggest there is a relatively small range in the predicted drawdown at the monitoring locations, though the predicted drawdown is much greater than the that from the adopted GAM. The values presented in Table 5, provide a more reasonable estimate of the predicted drawdown for groundwater management purposes. To illustrate how the predicted water levels change with the adopted pumping file, attached are charts illustrating the predictive results at each of the GCGCD monitoring wells used for assessing the recalibration results along with the predicted water levels at each of the GCGCD monitoring wells. As expected, the greatest variation in results occurs at wells completed in the Evangeline Aquifer as this layer was the focus of the recalibration effort due to the reasons discussed in previous sections.

While there is always uncertainty in predictive simulation results from a model, the improvement in calibration suggests the predictive simulation results with the recalibrated model provide reasonable values for planning purposes. In particular, the improvement in matching the measured trend in water levels would provide GCGCD with predicted drawdown values that can be used to assess compliance with adopted desired future conditions. The recalibrated model can also be used to assess what a reasonable value for groundwater production may be under various water-level decline scenarios.

Conclusions and Limitations

The current GAM does not reasonably simulate the change in water level that GCGCD has observed in their monitoring wells. To address the poor match between measured and modeled water levels, we performed a recalibration of the current GAM within and near GCGCD. The recalibration focused on the Evangeline Aquifer where sufficient monitoring data were available.

The recalibration resulted in an improvement over the current GAM with respect to the simulation of the measured water levels and the trend in measured water levels. Rather than having water levels increasing (that is, recovering) in the simulated aquifers, the simulated water levels followed a generally declining trend similar to the measured water levels. Alternative recalibrations or realizations showed similar results and provided a range in the predicted results.

Predictive simulations performed using the pumping file adopted by GMA 15 resulted in average drawdown values being about 50 feet more in the Evangeline Aquifer than were simulated using the current GAM. These predictive results appear to better reflect the trend in measured water levels within Goliad County. Due to the identified issues with the calibration of the current GAM, the results from the recalibration effort provide GCGCD with reasonable results for use in groundwater management, joint planning, adopting proposed DFCs, and assessing compliance with the adopted DFCs.

Like any model there are limitations in its use and results. The limitations of the current GAM as discussed by Chowdhury and others (2004) remain applicable. In addition, by limiting the source of inflow to the simulated aquifers as coming from rivers and streams, we do not include more diffuse sources of recharge to the aquifer. However, as a regional model this limitation does not appear to significantly affect the results. Many of the limitations in the model will be addressed during the model update that is currently underway by the TWDB.

Geoscientist Seal

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

STATE OF TEXAS
MICHAEL R. KEESTER
GEOLOGY
10331
PROFESSIONAL GEOSCIENTIST
LICENSED

10/20/2020

Michael R. Keester, P.G.
Senior Project Manager | Hydrogeologist

References

Anderson, M.P. and Woessner, W.W., 2002, Applied Groundwater Modeling: Simulation of Flow and Advective Transport: San Diego, Academic Press,

Chowdhury, A.H., Wade, S., Mace, R.E., and Ridgeway, C., 2004, Groundwater Availability Model of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999: Model Report, 108 p.

Donnelly, A., 2018, Task One results: Technical Memorandum to Heather Sumpter, General Manager, Goliad County Groundwater Conservation District dated February 26, 2018, 31 p.

Gupta, H.V., Sorooshian, S., and Yapo, P.O., 1998, Toward improved calibration of hydrologic models: Multiple and noncommensurable measures of information: Water Resources Research, v. 34, no. 4, p. 751-763.

Keester, M., 2019, Status Summary of Third Round of Joint Planning: Memorandum to Groundwater Management Area 15 dated January 10, 2019, 3 p.

McLendon, T., Booker, J.D., Coldren, C.L., and Pappas, C.R., 2016, Development of an EDYS Ecological Model for Goliad County, Texas: Final report prepared for San Antonio River Authority and Texas State Soil and Water Conservation Board, 242 p.

Rainwater, K. and Coldren, C., 2019, Goliad County Recharge Evaluation Summary of Field Data Collection as of June 2019: Report submitted to Goliad County Groundwater Conservation District, 8 p.

Rainwater, K. and Coldren, C., 2020, Goliad County Recharge Evaluation - Summary of Field Data Collection for August 2020: Report submitted to Goliad County Groundwater Conservation District, 12 p.

Texas Water Development Board, 2020, Groundwater Database Reports, http://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp, accessed February 2020.

Watermark Numerical Computing, 2020, PEST – Model-Independent Parameter Estimation User Manual Part I: PEST, SENSAN, and Global Optimizers: Watermark Numerical Computing, 368 p.

Welter, D.E., White, J.T., Hunt, R.J., and Doherty, J.E., 2015, Approaches in highly parameterized inversion—PEST++ Version 3, a Parameter ESTimation and uncertainty analysis software suite optimized for large environmental models: U.S. Geological Survey Techniques and Methods 7-C12, 54 p.

Young, S., 2016, Desired Future Condition Explanatory Report for Groundwater Management Area 15: Report prepared for Groundwater Management Area 15, 52 p.

Young, S.C., Budge, T., Knox, P.R., Kalbouss, R., Baker, E., Hamlin, S., Galloway, B., and Deeds, N., 2010, Hydrostratigraphy of the Gulf Coast Aquifer from the Brazos River to the Rio Grande: Contract report for the Texas Water Development Board, 203 p.

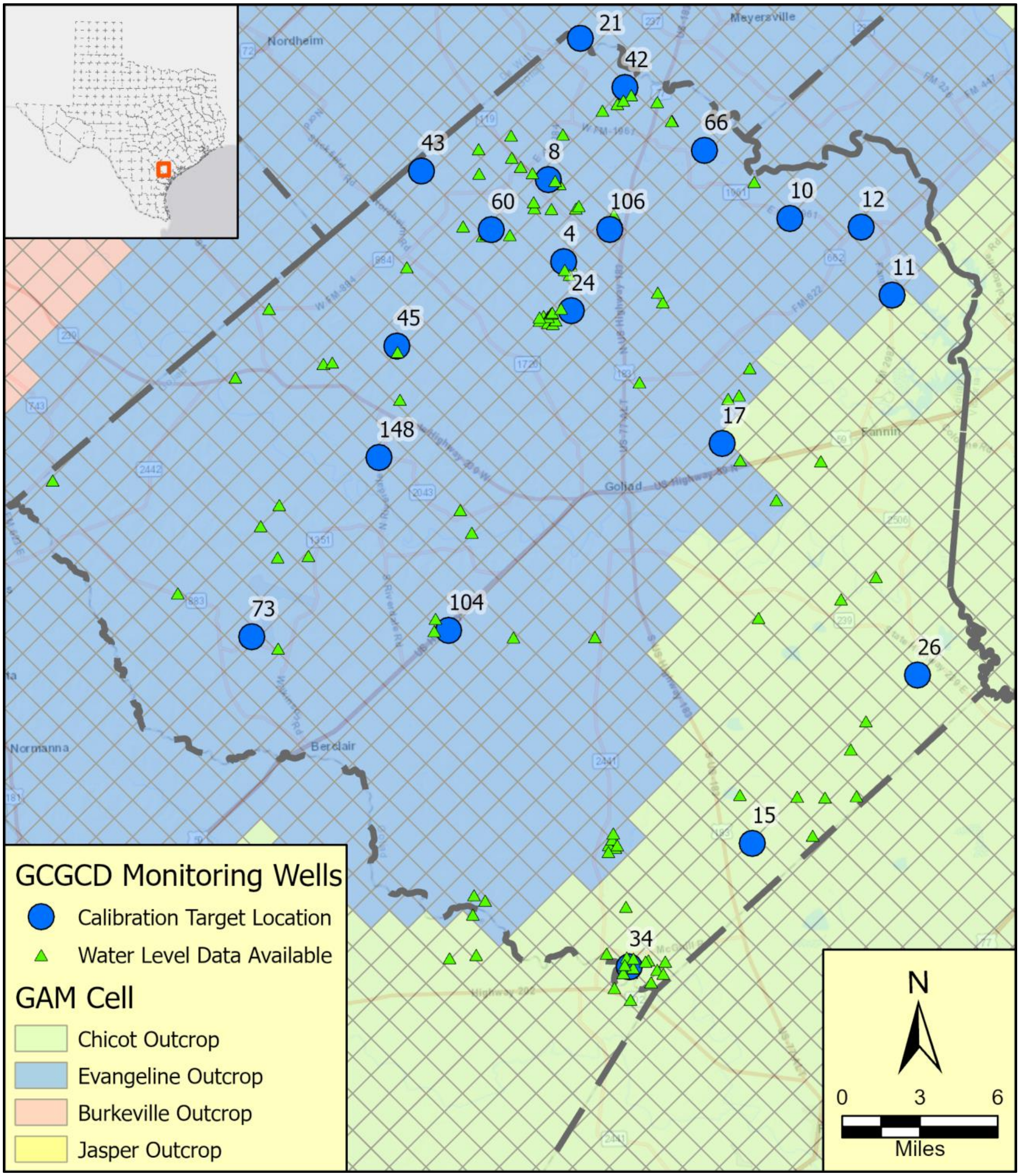


Figure 1. GCGCD monitoring well locations.

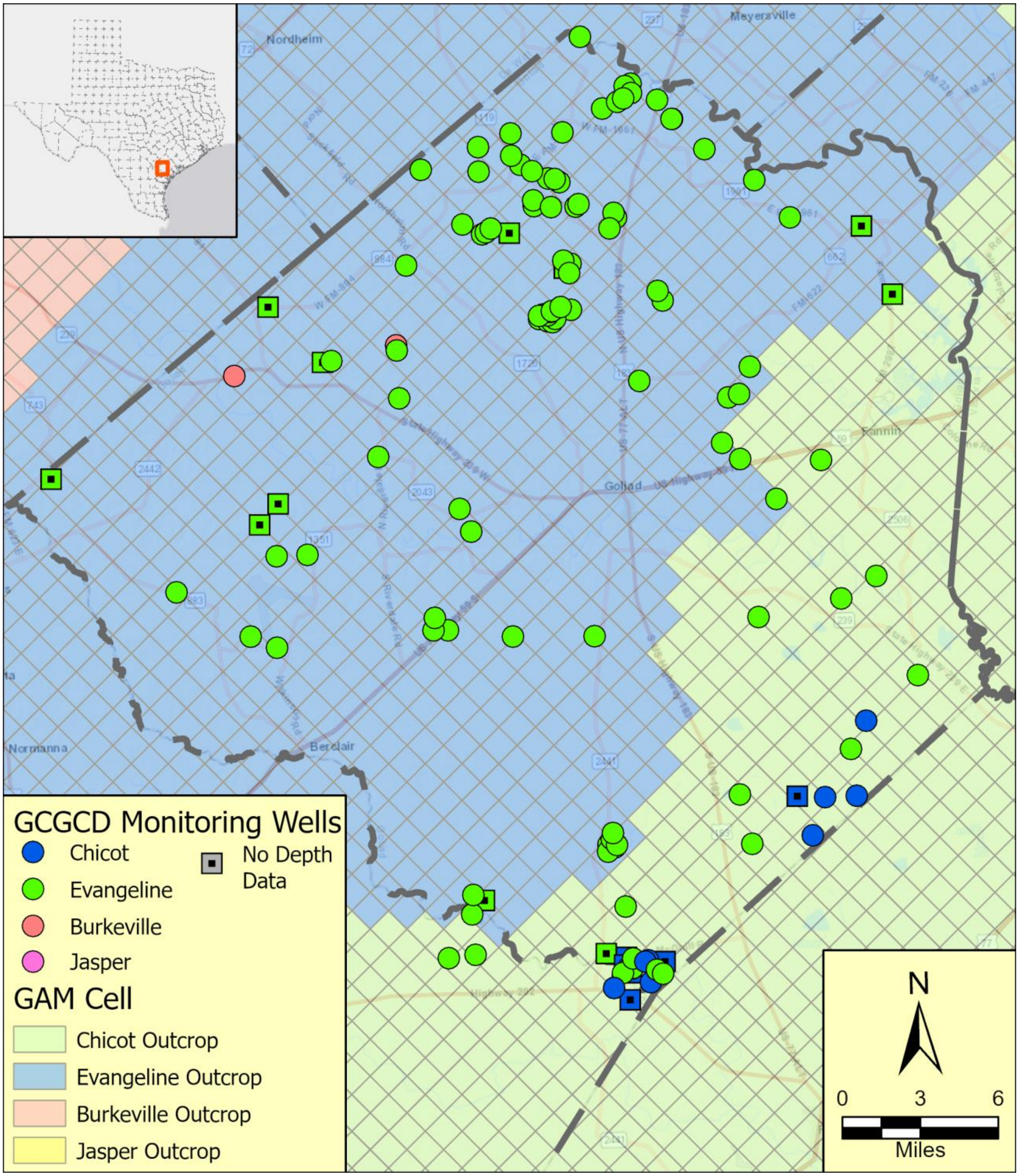


Figure 2. GCGCD monitoring wells by aquifer.

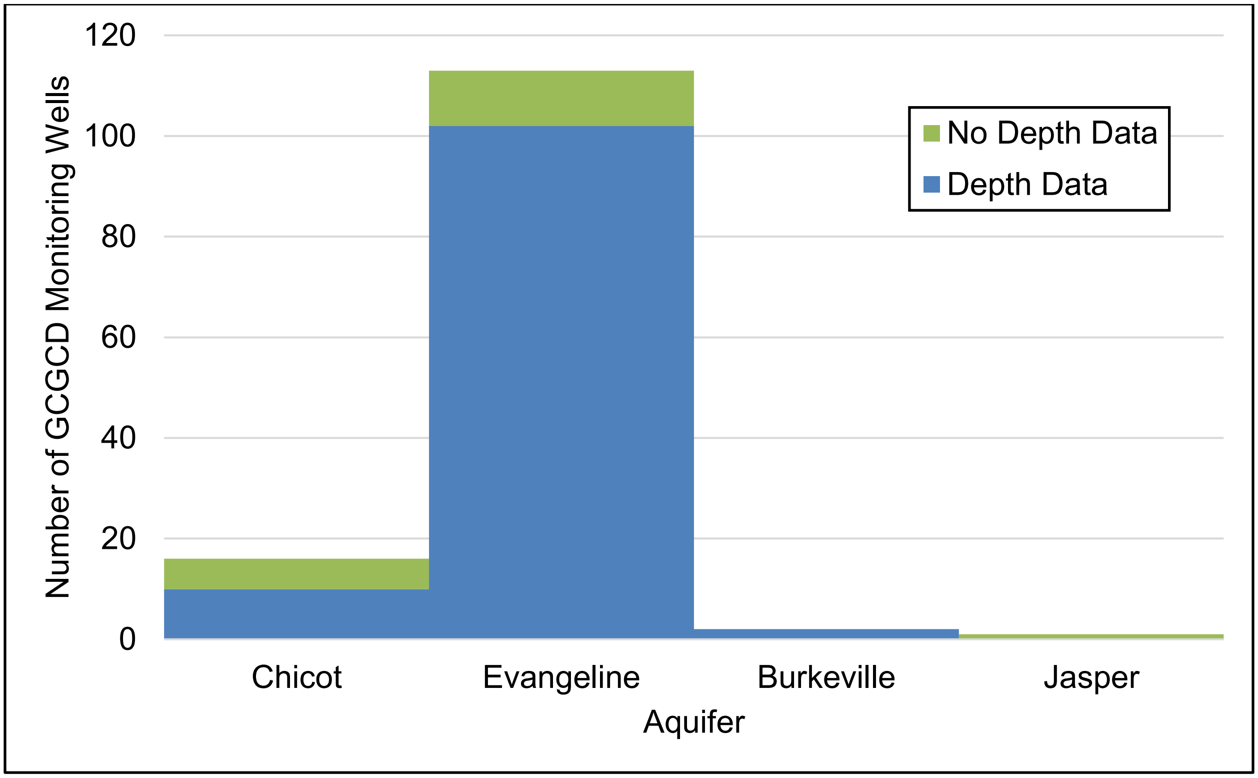


Figure 3. Number GCGCD monitoring wells by aquifer.

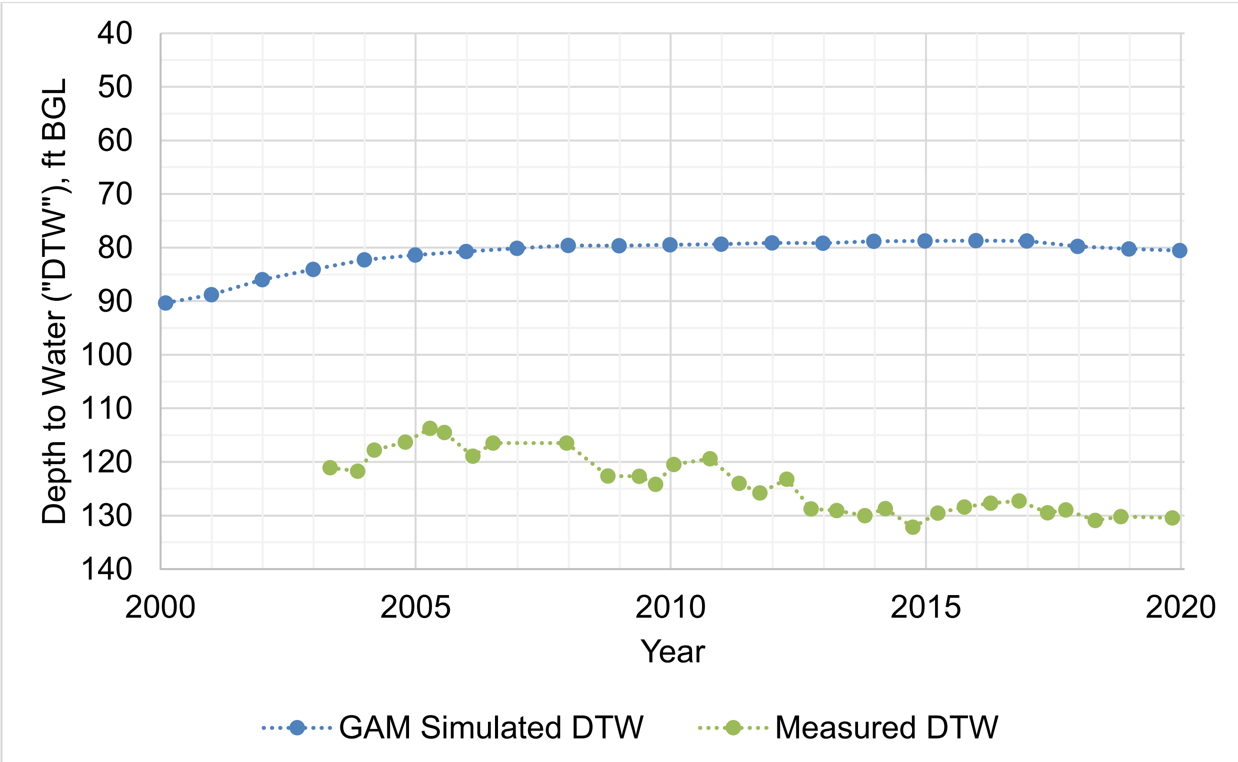


Figure 4. GCGCD monitoring well #4 simulated and measured depth to water. Simulated depth to water calculated as the difference between the land surface elevation and the simulated water level.

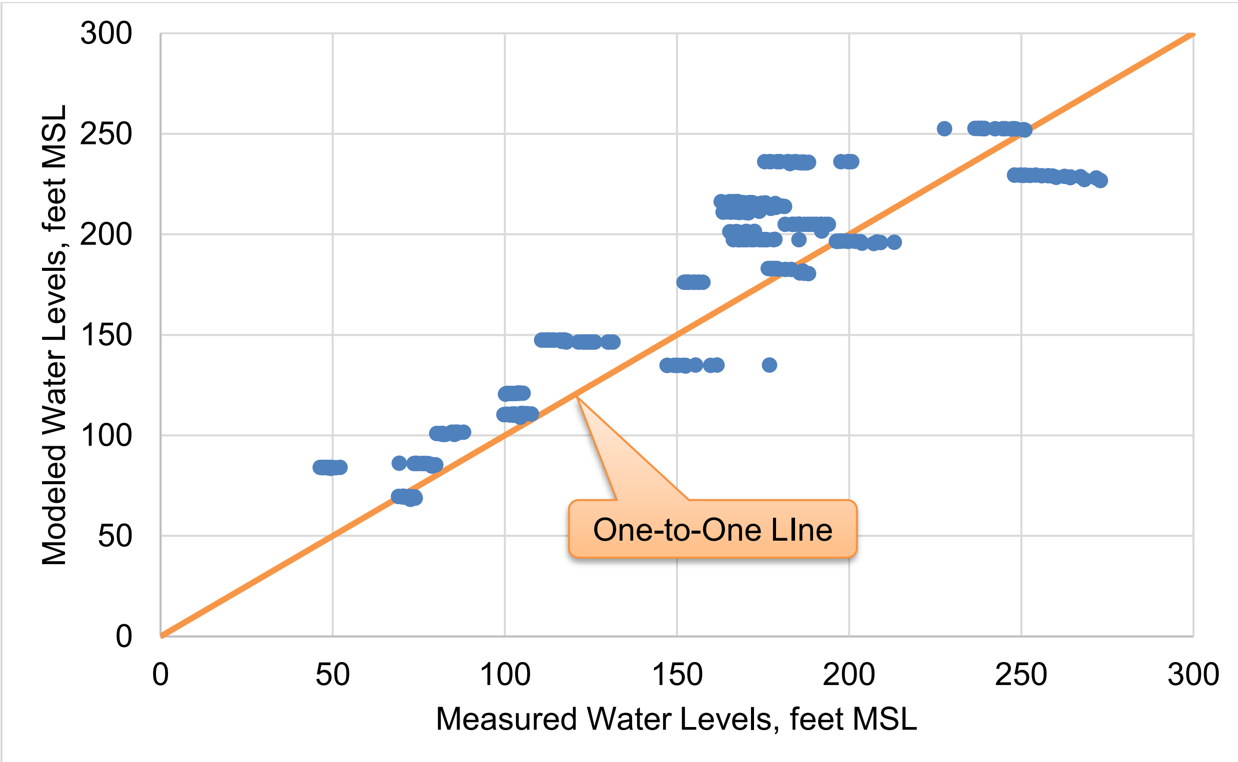


Figure 5. GAM simulated water levels versus measured water levels at the target monitoring wells. Points above the "One-to-One Line" indicate the simulated water level is higher than the corresponding measured water level.

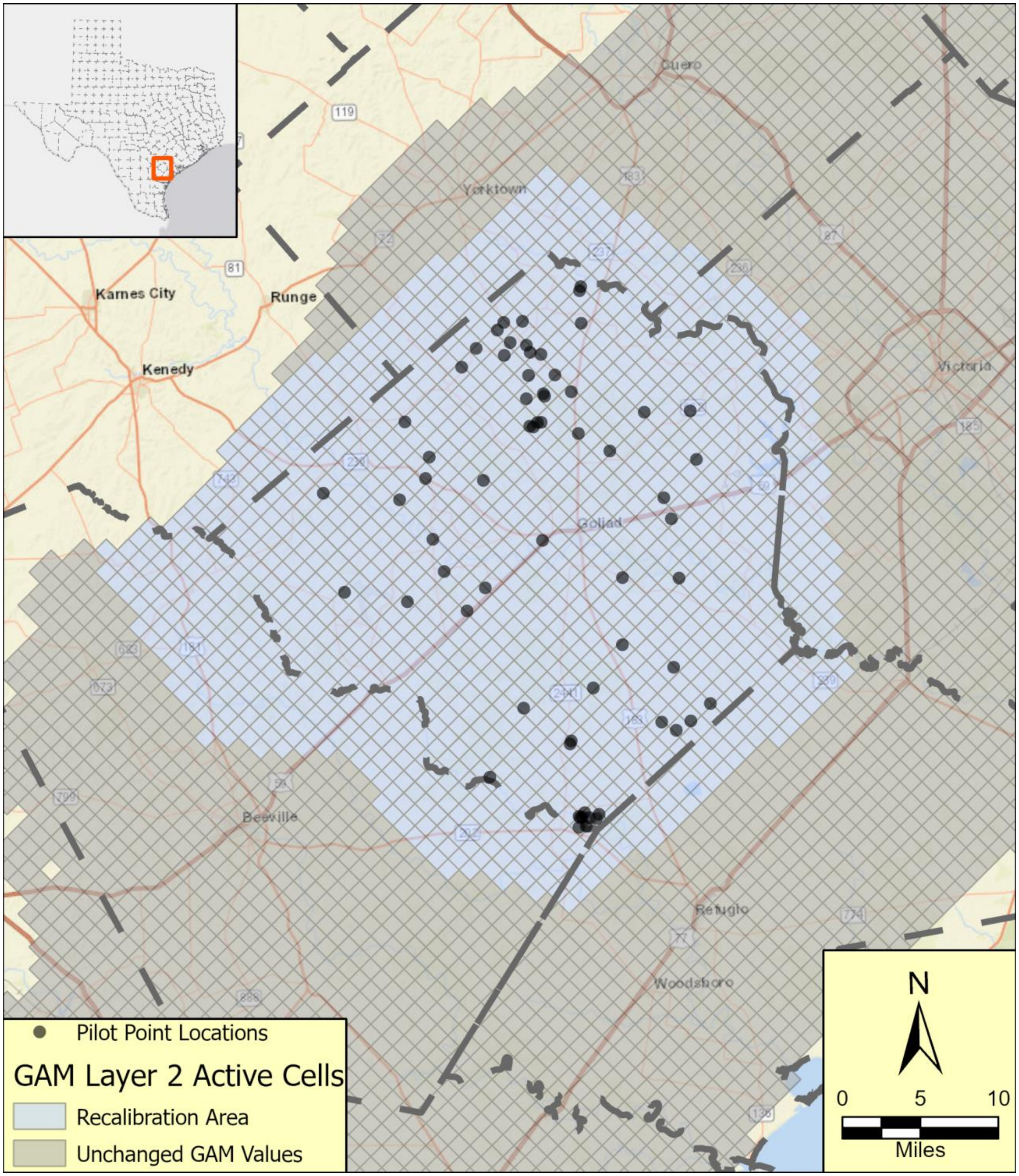


Figure 6. GAM layer 2 recalibration error and pilot point locations.

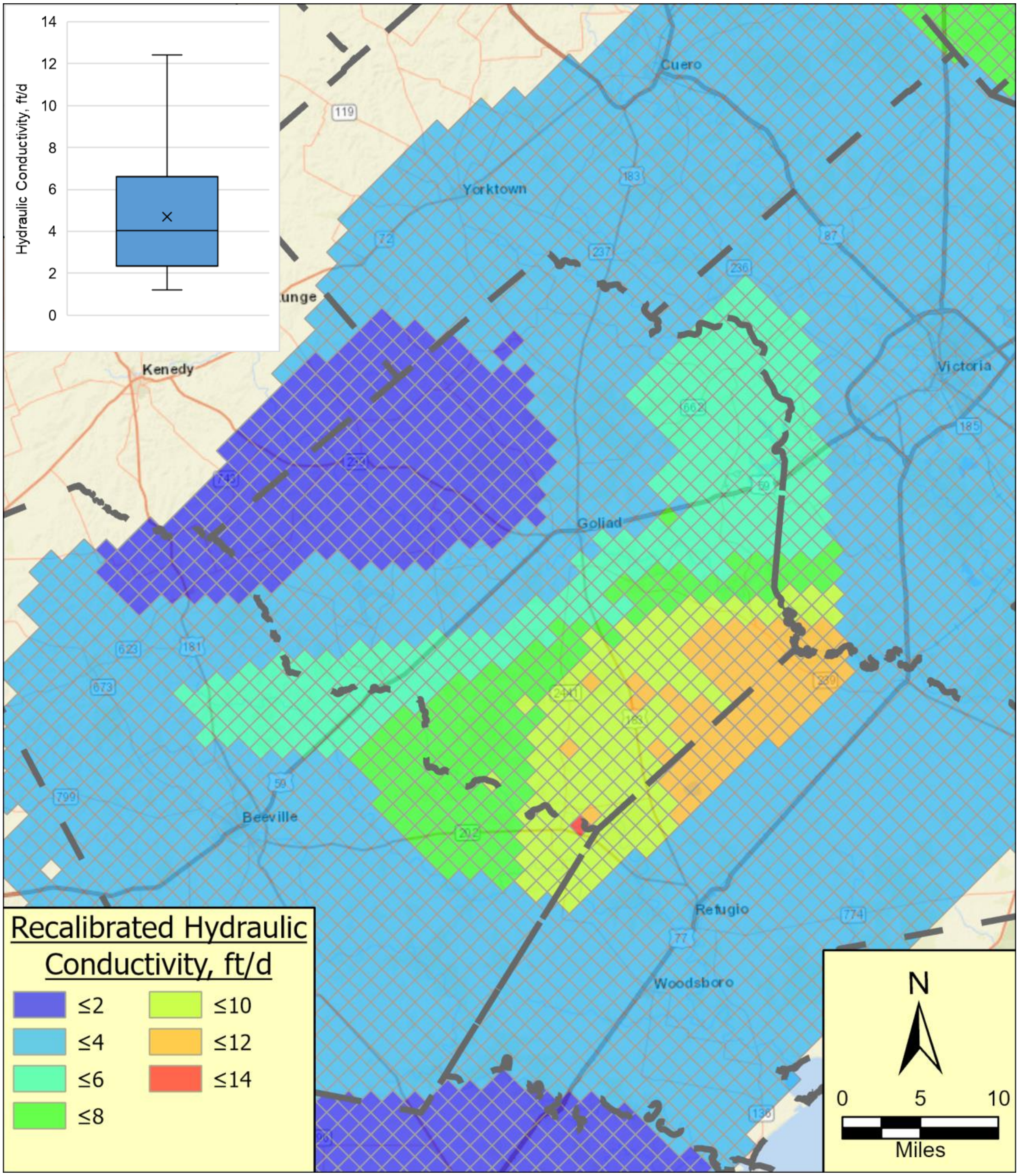


Figure 7. GAM layer 2 recalibration hydraulic conductivity distribution.

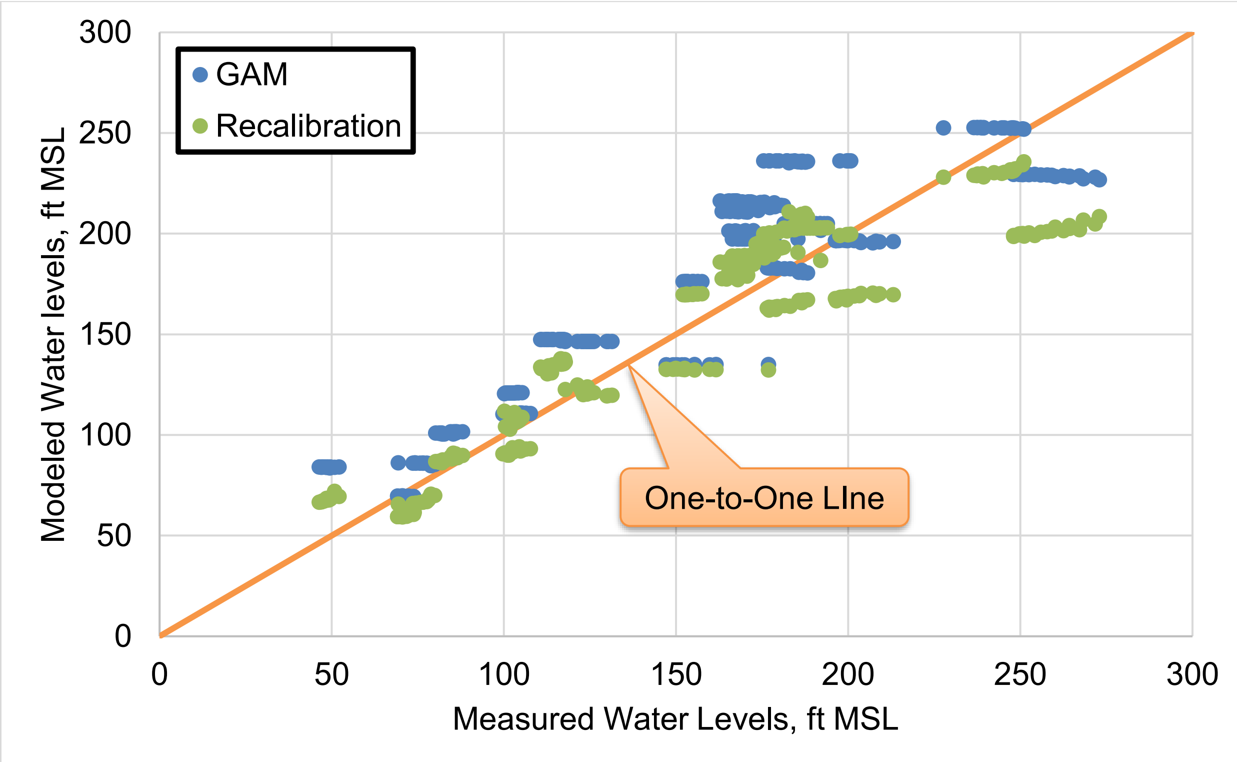


Figure 8. GAM and recalibration simulated water levels versus measured water levels at the target monitoring wells. Points above the “One-to-One Line” indicate the simulated water level is higher than the corresponding measured water level.

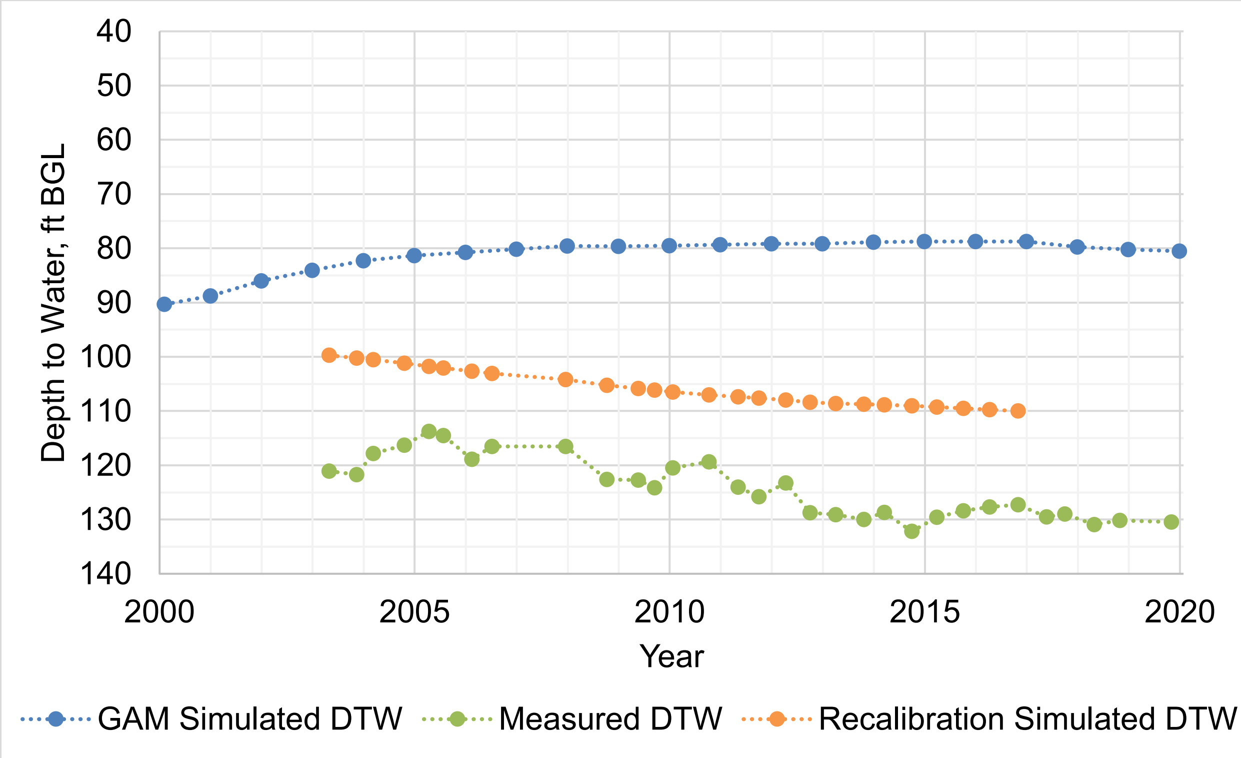


Figure 9. GCGCD monitoring well #4 GAM and recalibration simulated and measured depth to water. Simulated depth to water calculated as the difference between the land surface elevation and the simulated water level.

Table 1. GCGCD calibration statistics calculated using measured and modeled water levels at target locations.

Statistical Measure	Target Value	GAM	Recalibration
Head Measurements	N/A	322	
Minimum Measured Water Level	N/A	46.4 feet MSL	
Maximum Measured Water Level	N/A	273.0 feet MSL	
Average Measured Water Level	N/A	153.1 feet MSL	
Range of Water Levels	N/A	226.6 feet	
Mean Error	0	-17.69	0.47
Mean Absolute Error	0	23.49	17.10
Root Mean Square Error	0	27.78	21.17
Relative Root Mean Square Error	0	0.18	0.14
Normalized Root Mean Square Error	0 (< 0.10)	0.12	0.09
Nash-Sutcliffe Model Efficiency	> 0.90	0.75	0.85

Table 2. GCGCD calibration statistics calculated using trends in the measured and modeled water levels at target locations.

Statistical Measure	Target Value	GAM	Recalibration
Observed Trend Calculations	N/A	20	
Minimum Observed Trend Calculation	N/A	-2.32 feet/year	
Maximum Observed Trend Calculation	N/A	0.72 feet/year	
Average Observed Trend Calculation	N/A	-0.80 feet/year	
Range of Observed Trend Calculation	N/A	3.04 feet/year	
Mean Error	0	-0.85	-0.34
Mean Absolute Error	0	0.99	0.60
Root Mean Square Error	0	1.12	0.75
Relative Root Mean Square Error	0	-1.39	-0.94
Normalized Root Mean Square Error	0 (< 0.10)	0.37	0.25

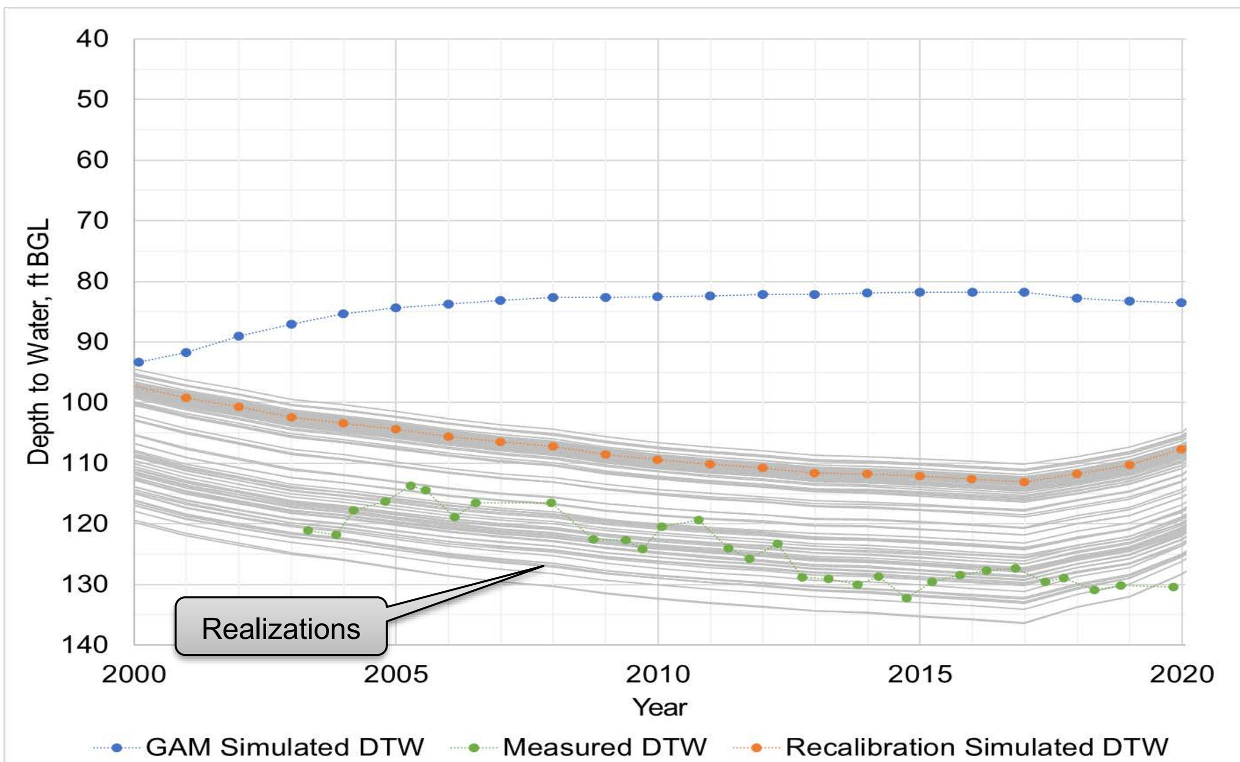


Figure 10. GCGCD monitoring well #4 measured depth to water with simulated depth to water from the GAM, recalibration, and 100 recalibration realizations (gray lines). Simulated depth to water calculated as the difference between the land surface elevation and the simulated water level.

Table 3. Revisions to the adopted GMA 15 pumping file within Goliad County for the predictive simulations.

	Chicot		Evangeline		Burkeville		Jasper		GCAS	
Year	GMA	Rev.	GMA	Rev.	GMA	Rev.	GMA	Rev.	GMA	Rev.
2010	164	164	4,651	4,648	81	81	465	465	5,361	5,358
2020	400	419	6,004	5,000	171	425	58	254	6,633	6,098
2030	410	422	6,161	5,061	176	452	59	343	6,806	6,278
2040	417	426	6,264	5,122	179	479	60	432	6,920	6,459
2050	420	429	6,312	5,182	180	506	61	522	6,973	6,639
2060	431	433	6,440	5,243	184	533	62	611	7,117	6,820
2070	436	436	6,548	5,304	187	560	63	700	7,234	7,000
2080	436	436	6,548	5,304	187	560	63	700	7,234	7,000

Table 4. GCGCD average drawdown from 01/01/2000 (12/31/1999) through 12/31/2080.

Aquifer (GAM Layer)	GAM	Recalibration	Realizations*
Chicot (1)	-4	17	17
Evangeline (2)	-2	47	46
Burkeville (3)	4	35	35
Jasper (4)	8	35	35
GCAS (1-4)	3	38	37

*Value represents the average of all realizations

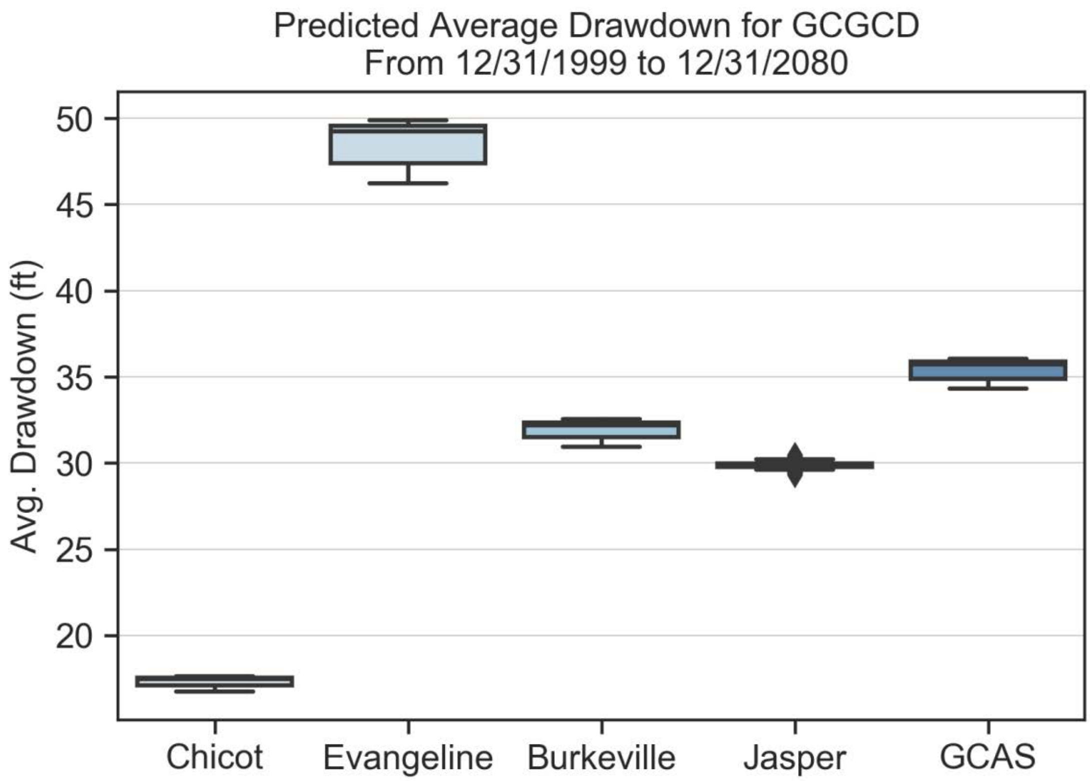


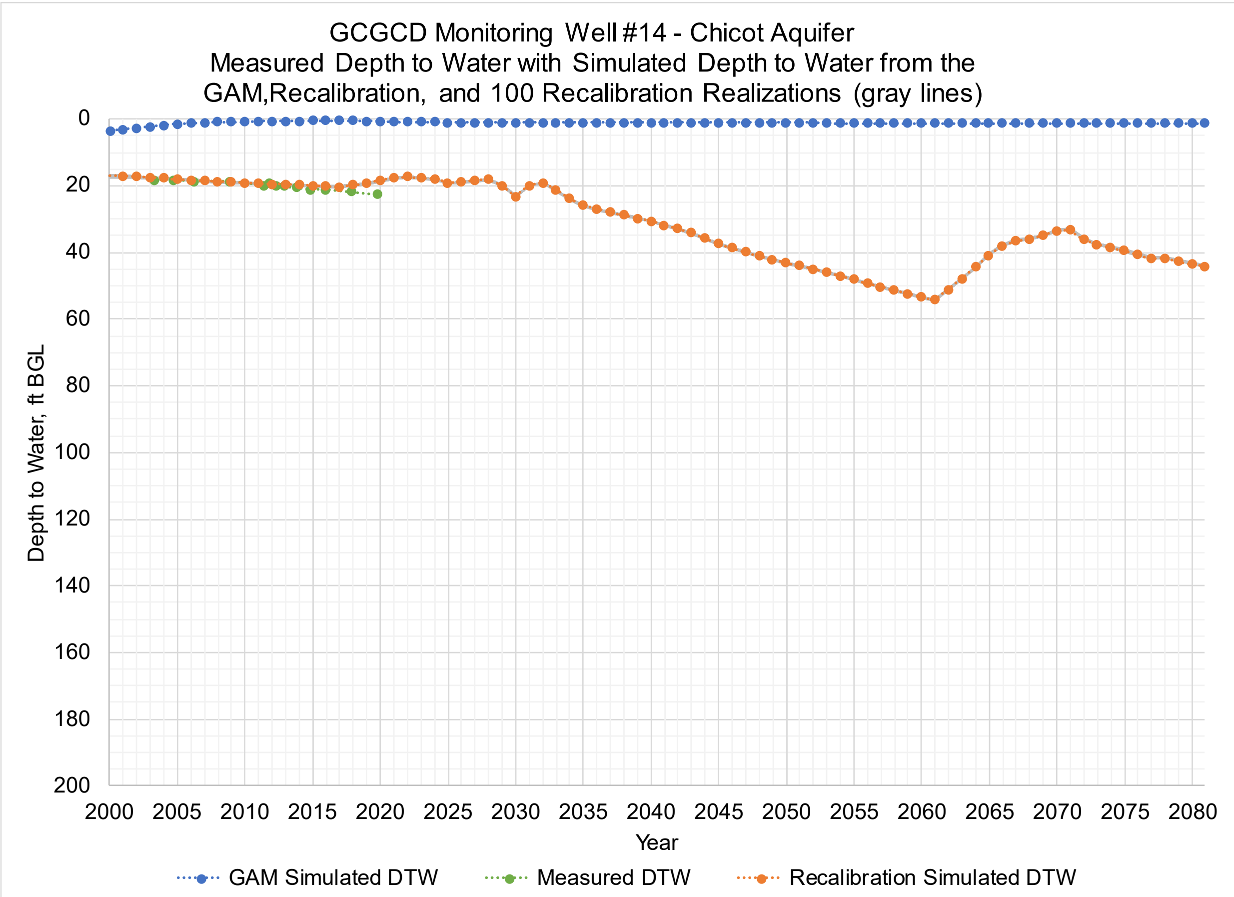
Figure 11. Box plot of the predicted average drawdown in GCGCD from predictions using the GMA 15 adopted pumping file in the model with the recalibration and realization hydraulic conductivity values.

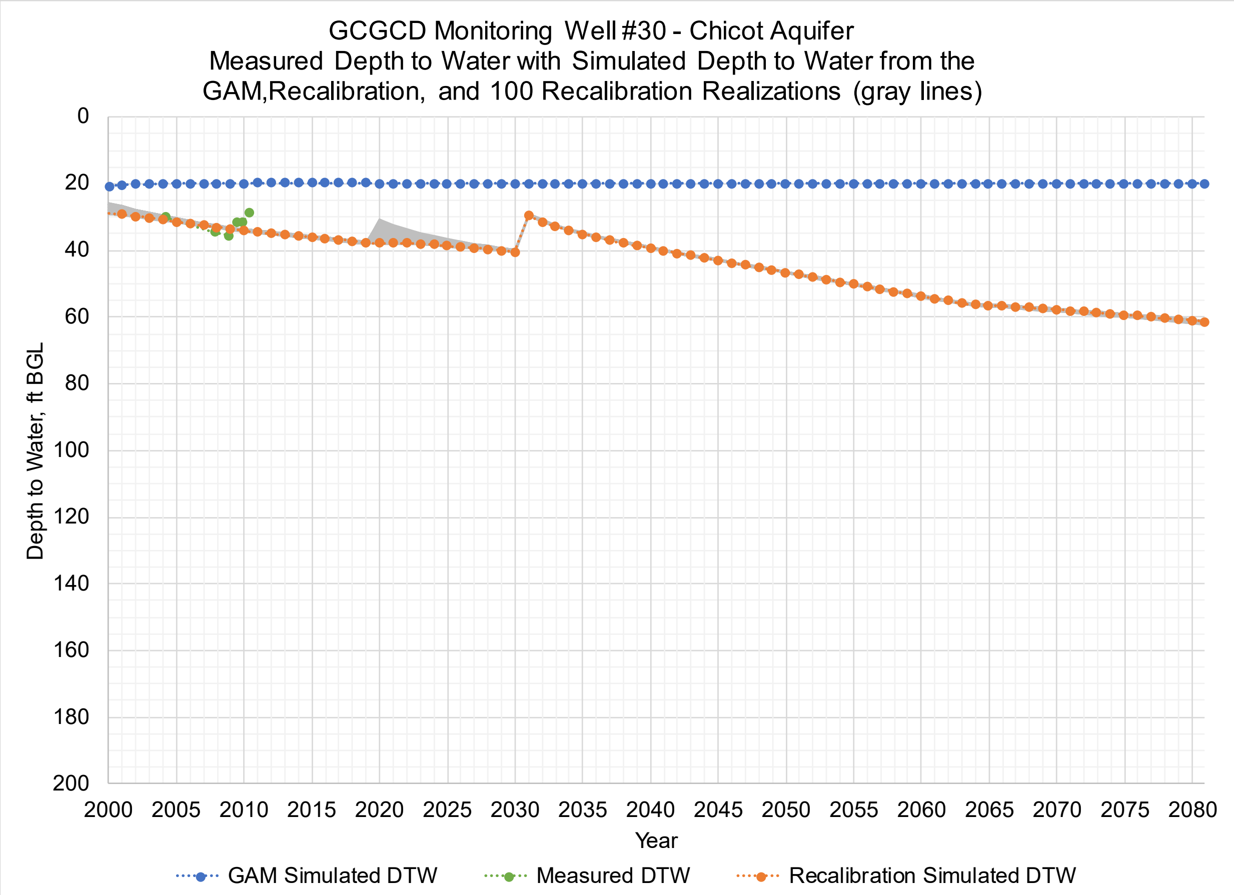
Table 5. Predicted drawdown between 12/31/1999 and 12/31/2080 at select GCGCD monitoring wells.

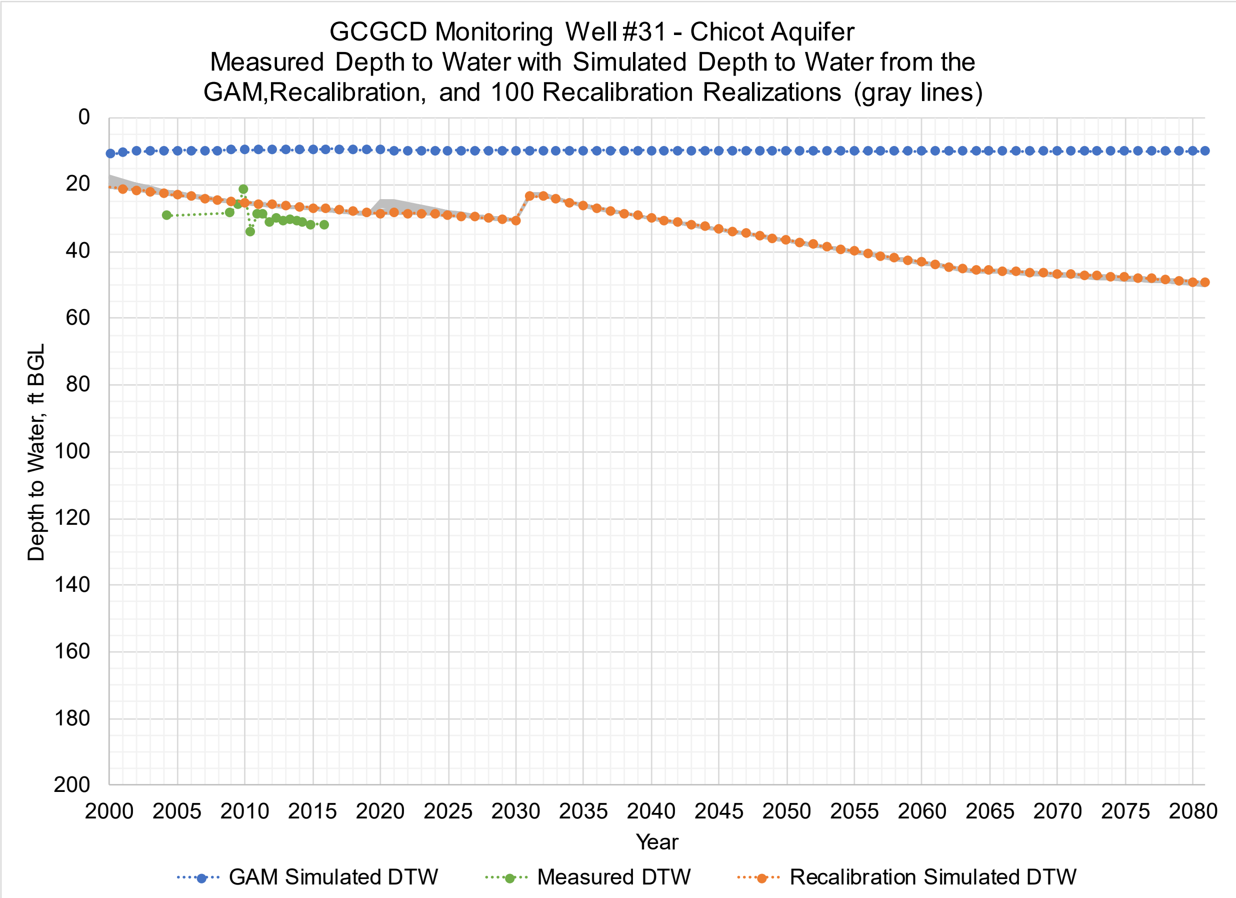
Aquifer (GAM Layer)	Monitoring Well	Predicted Drawdown	Realizations Minimum	Realizations Maximum
Chicot (1)	14	27	26	27
	34	33	32	36
	96	20	19	20
Evangeline (2)	4	81	70	81
	11	48	46	49
	15	33	28	32
	17	32	27	31
	37	41	37	41
	42	79	76	89
	43	83	75	83
	45	40	36	39
	73	94	81	95
Burkeville / Jasper (3 / 4)	45	40	36	39
	153	41	41	42
	164	38	38	39

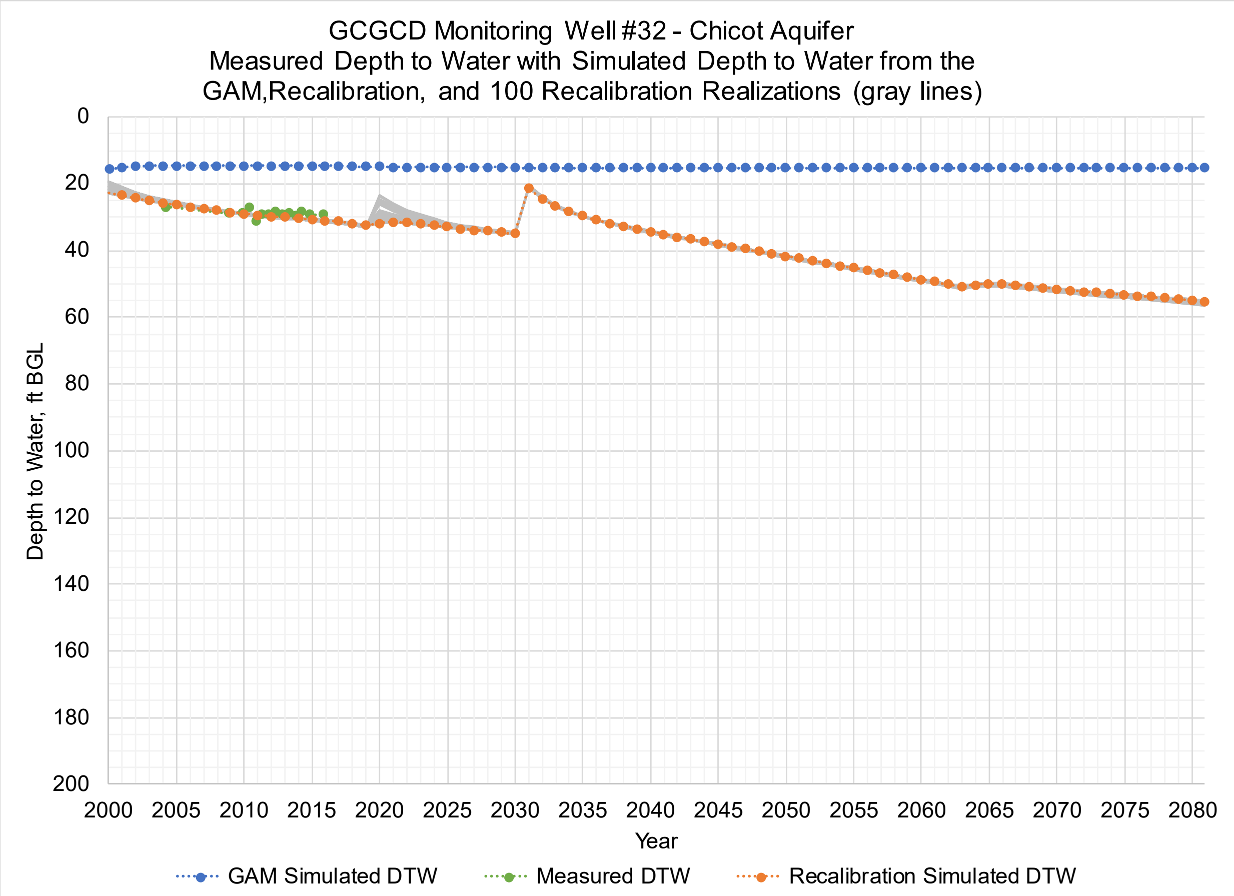
Attachment —
Measured depth to water with simulated depth to water from the GAM, recalibration, and 100 recalibration realizations (gray lines) at GCGCD monitoring well locations. Simulated depth to water represents the difference between the land surface elevation and the simulated water level.

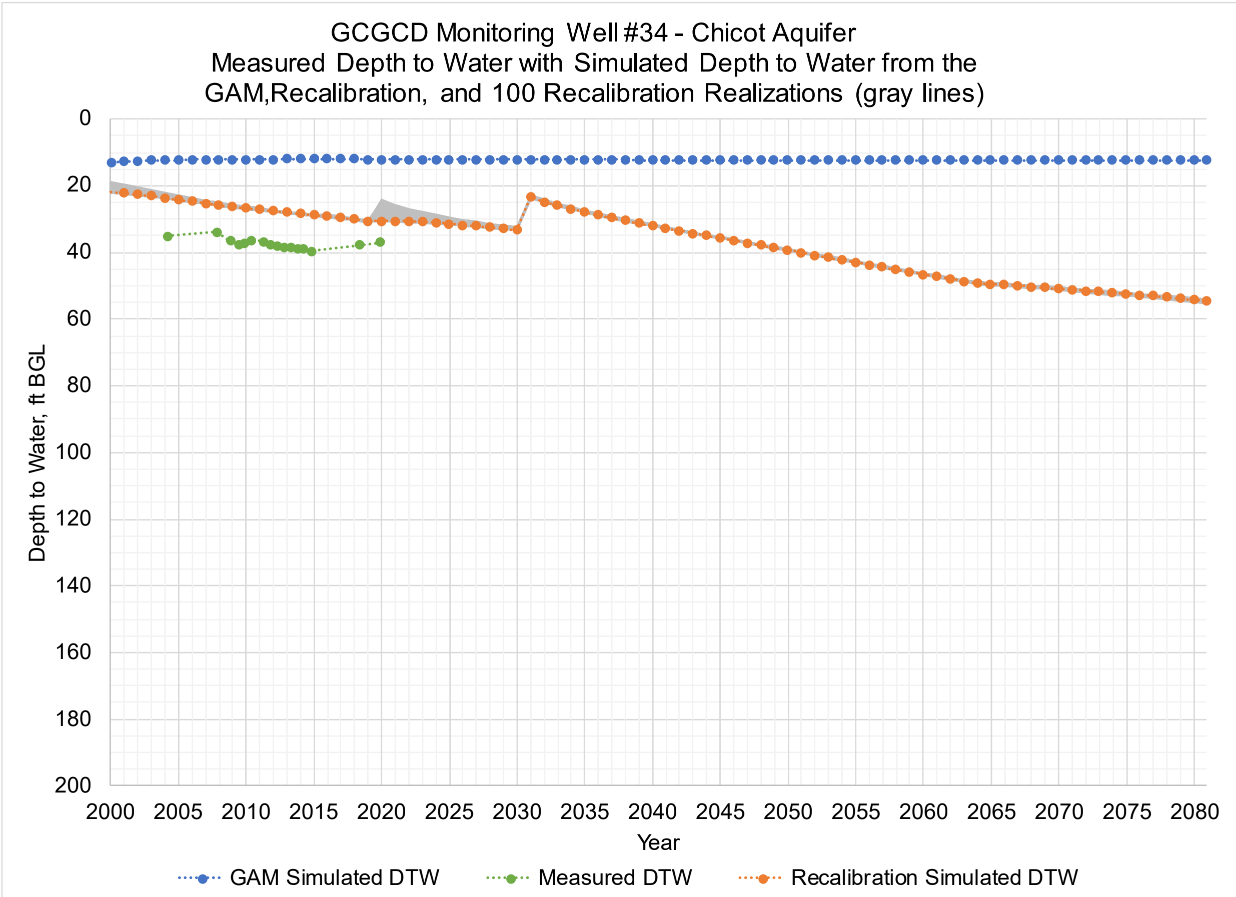
Chicot Aquifer Monitoring Wells

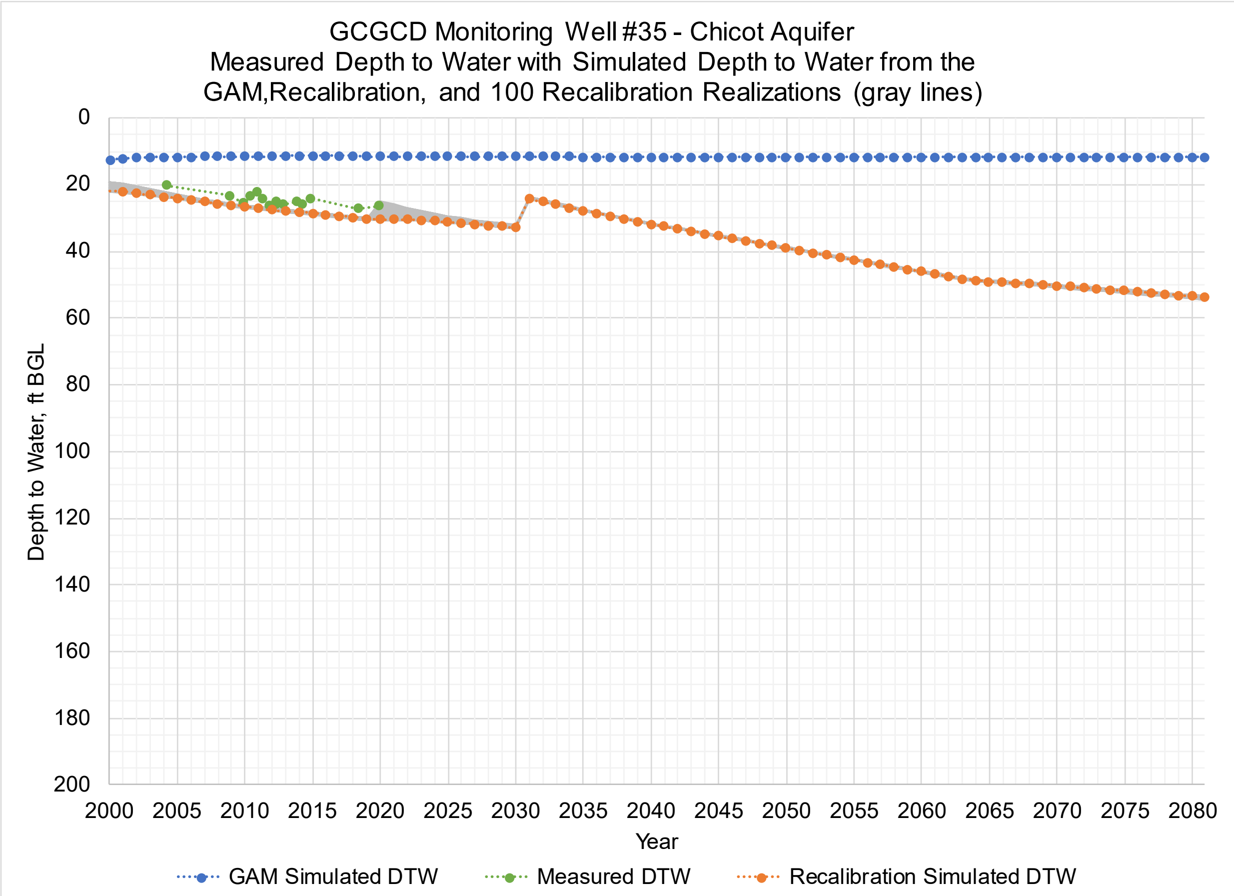

GCGCD Monitoring Well #14 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

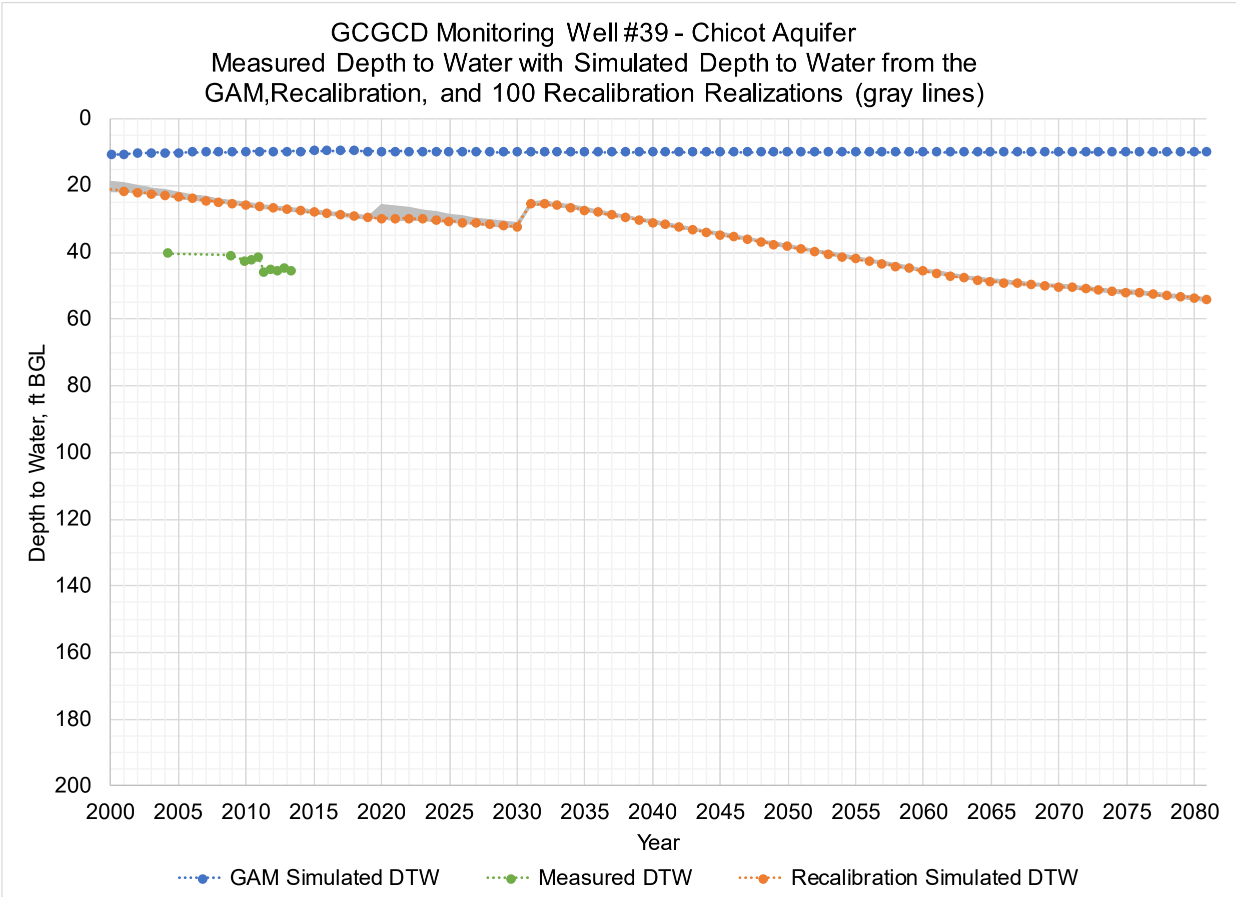

GCGCD Monitoring Well #30 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

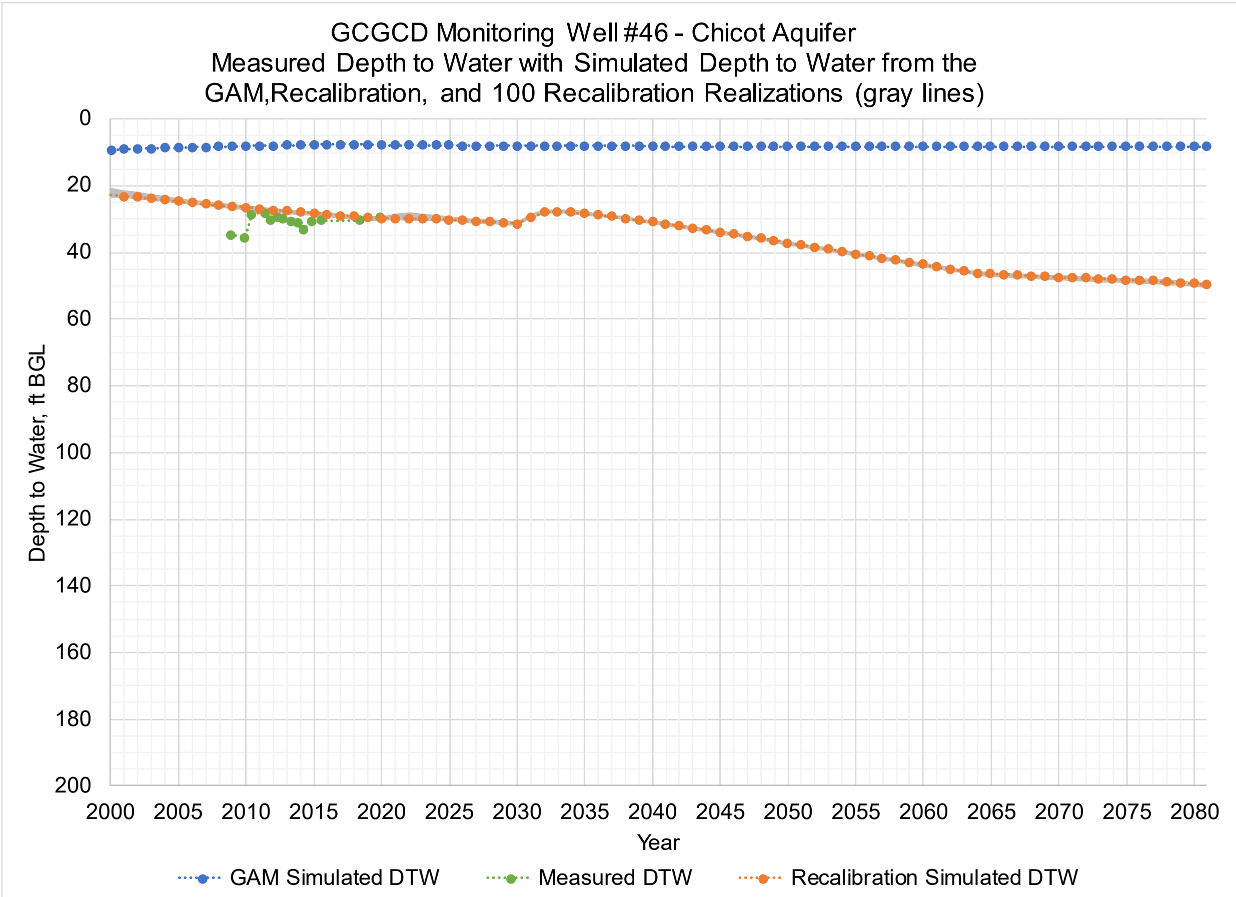

GCGCD Monitoring Well #31 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

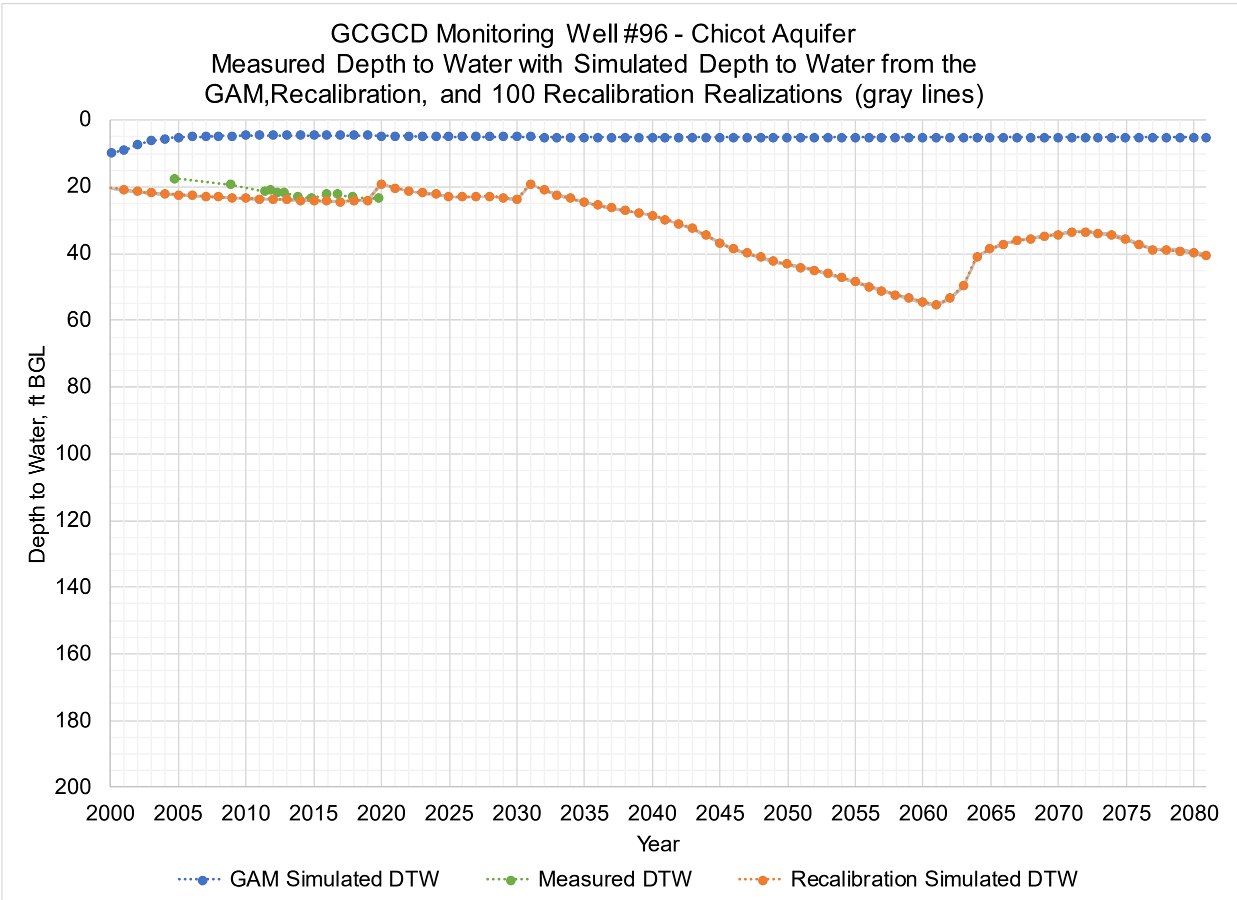

GCGCD Monitoring Well #32 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

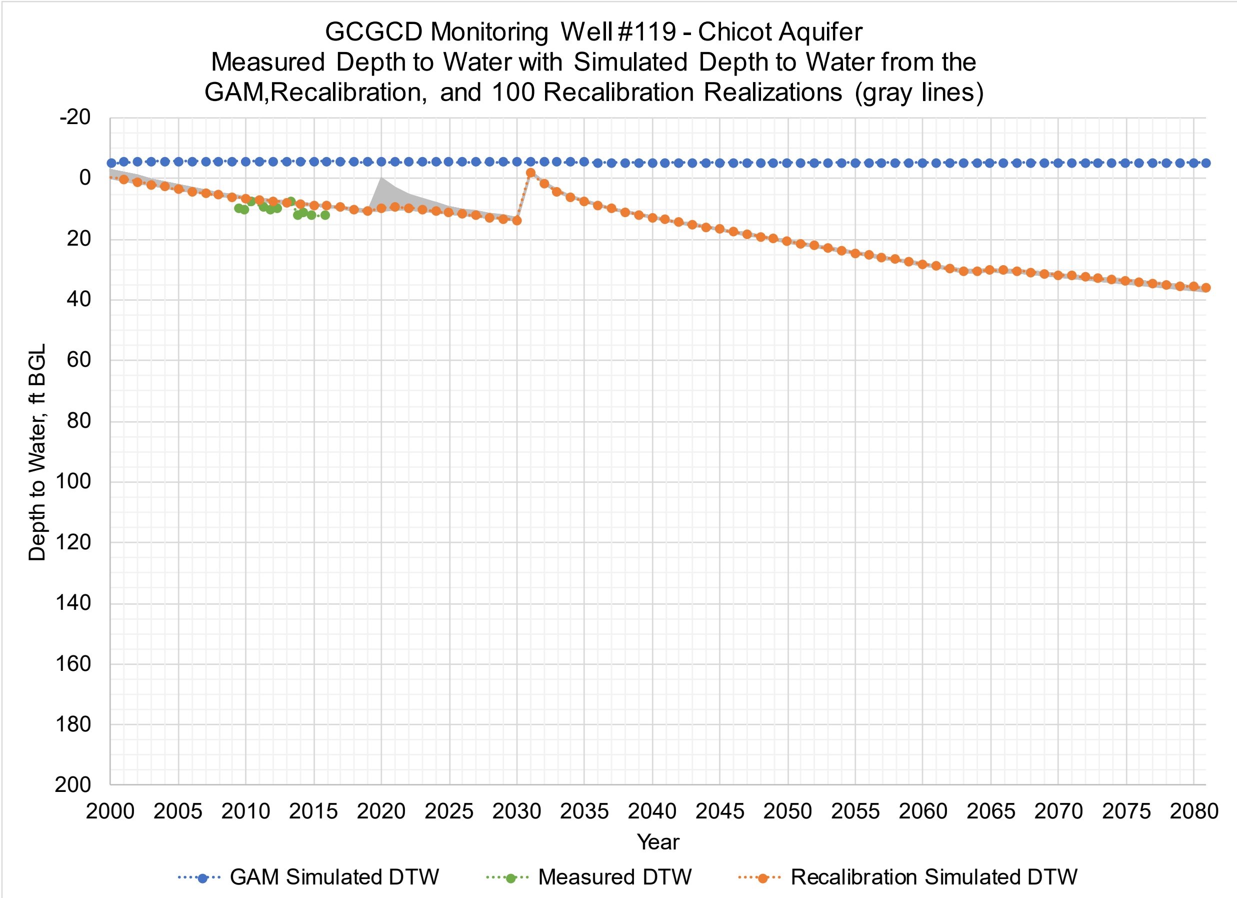

GCGCD Monitoring Well #34 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

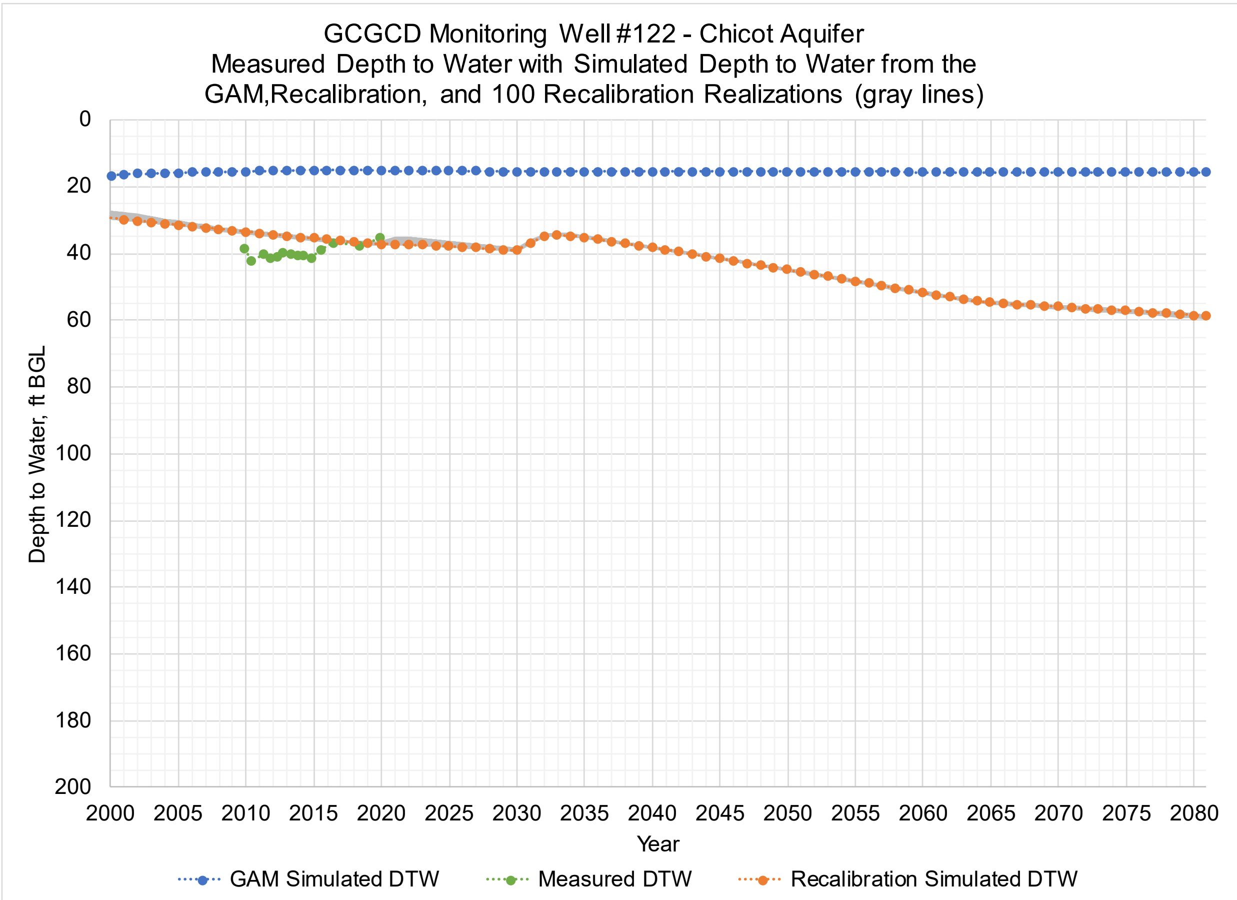

GCGCD Monitoring Well #35 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

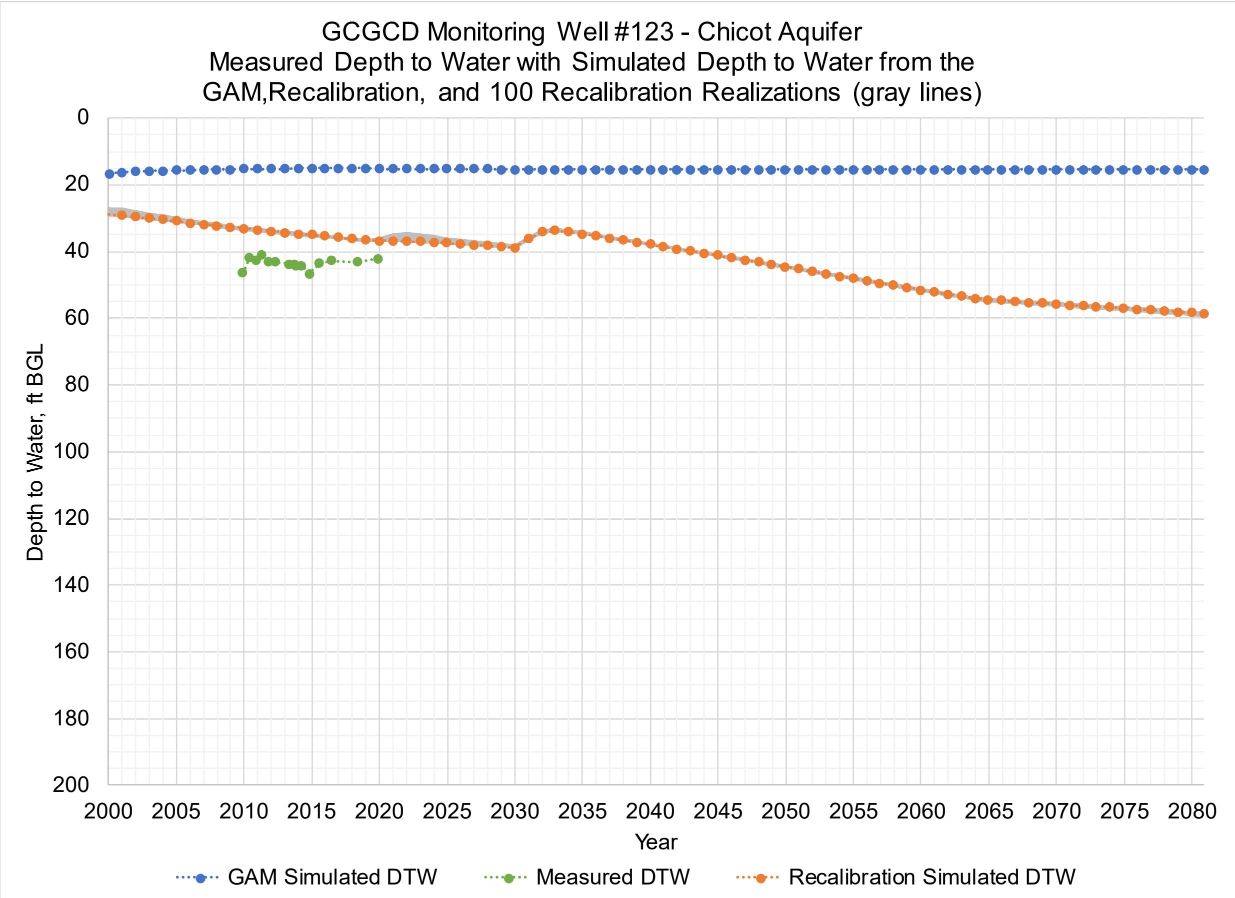

GCGCD Monitoring Well #39 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

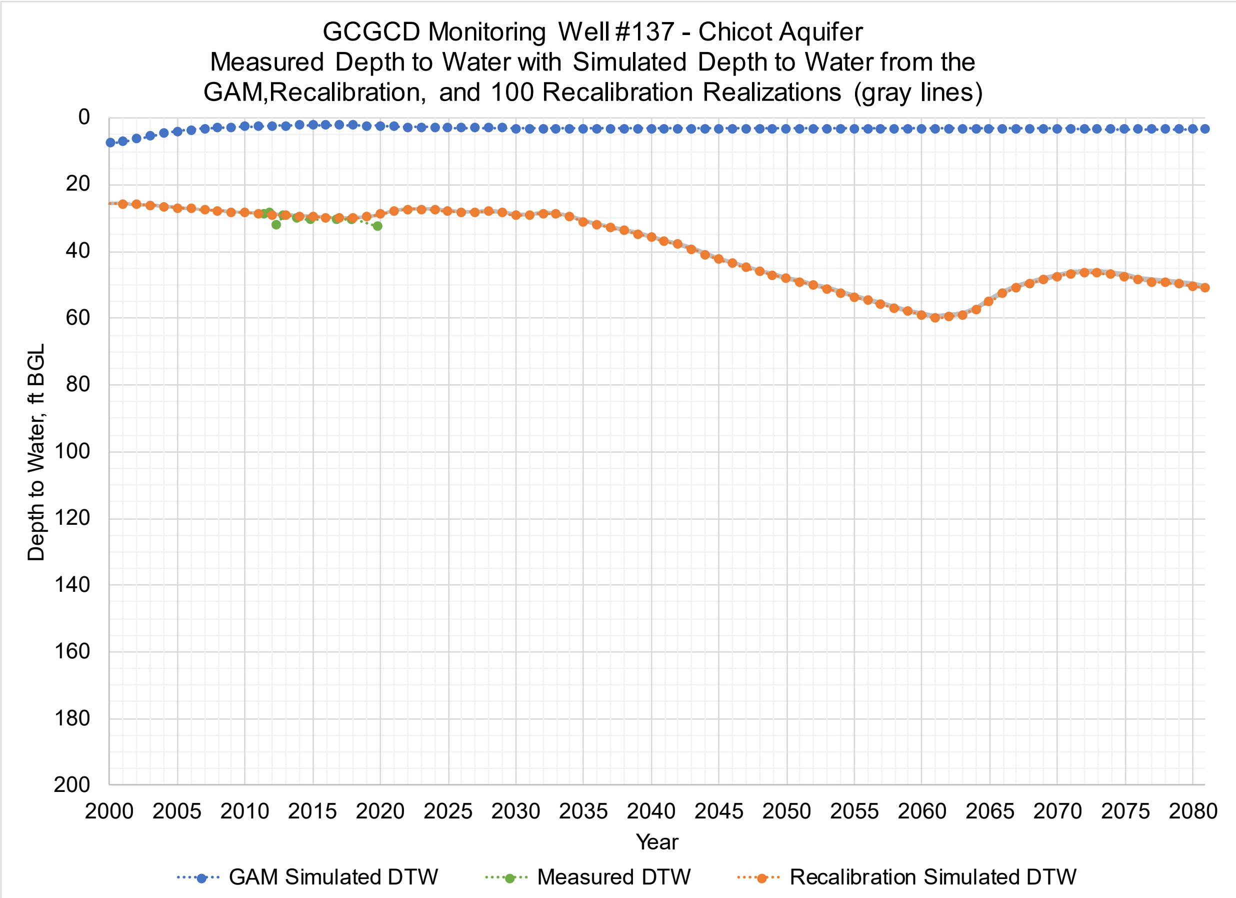

GCGCD Monitoring Well #46 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

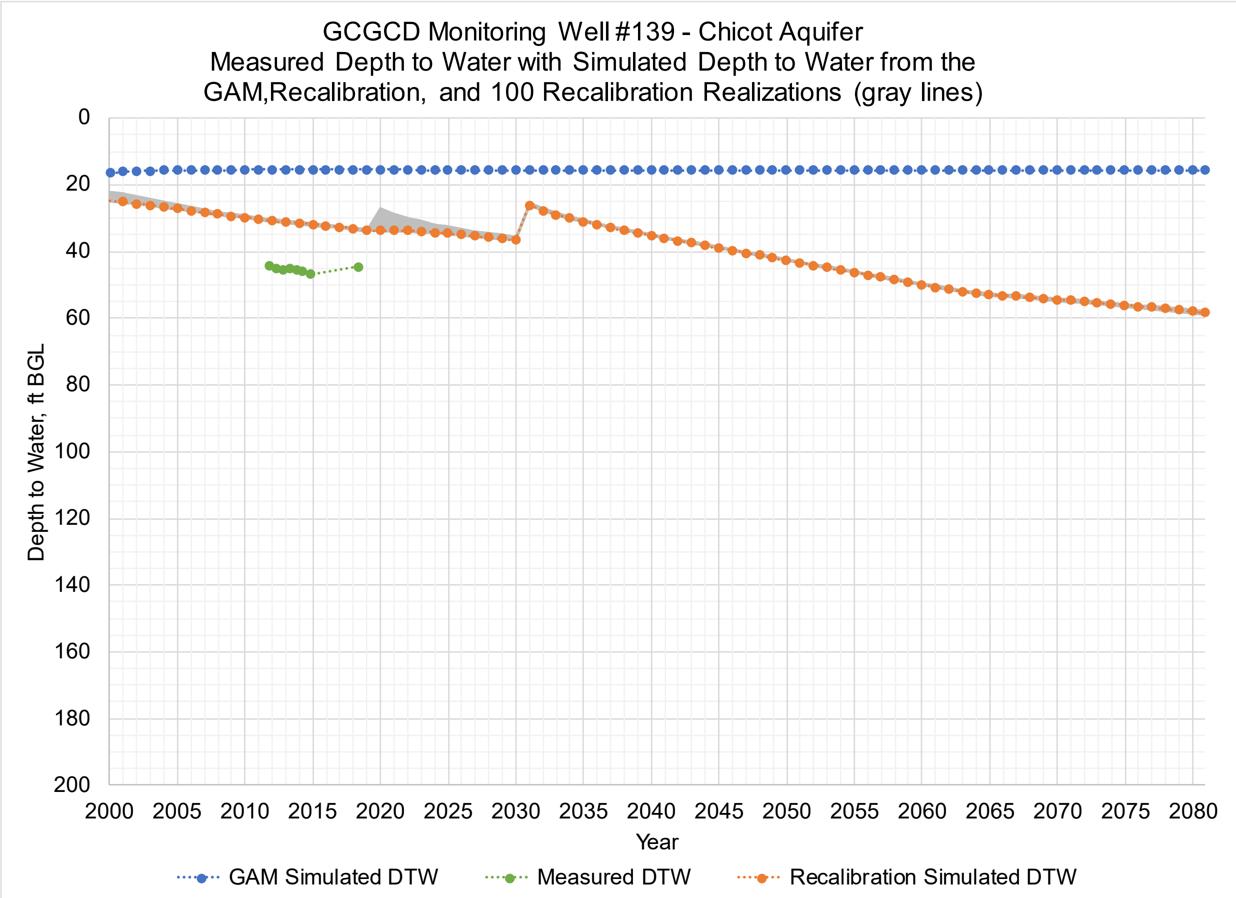

GCGCD Monitoring Well #96 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

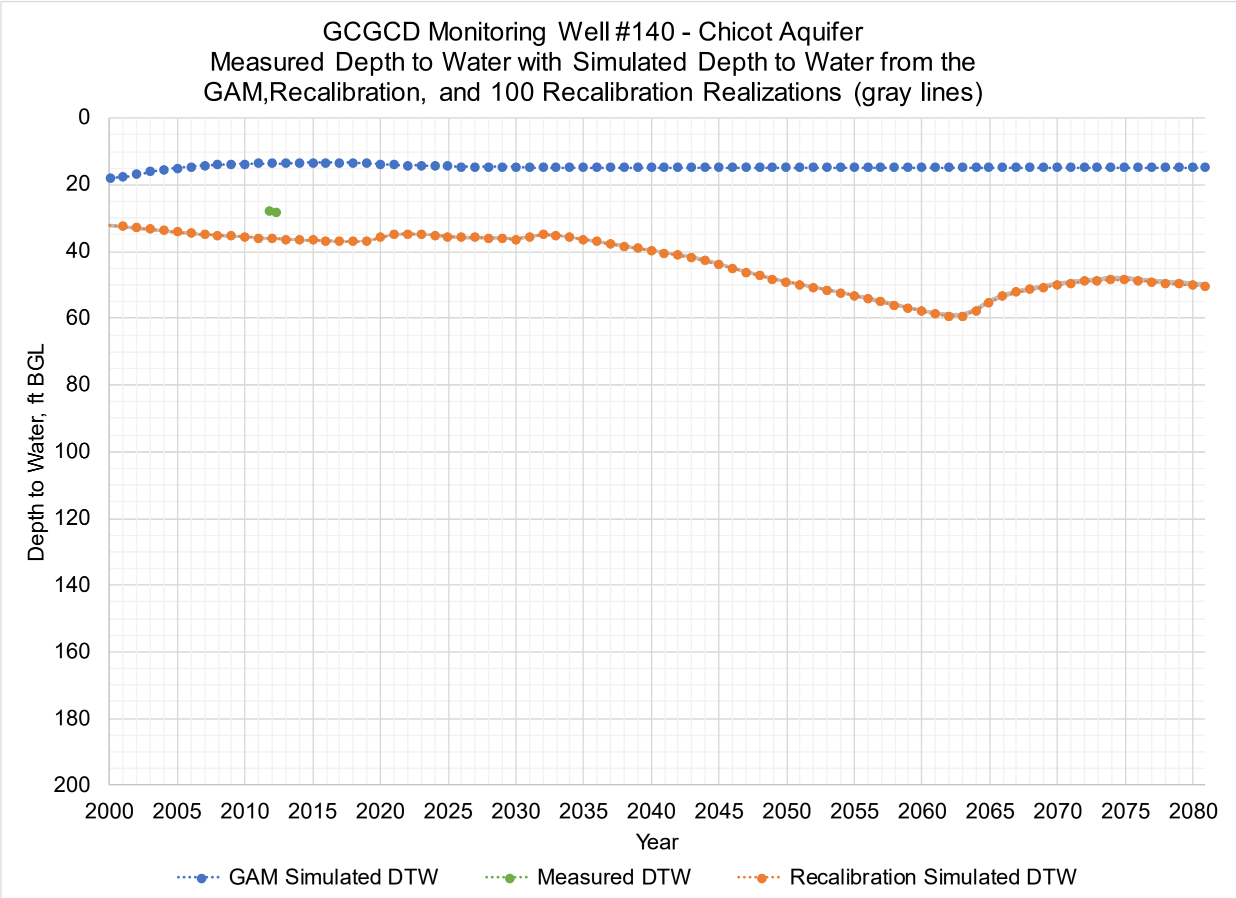

GCGCD Monitoring Well #119 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

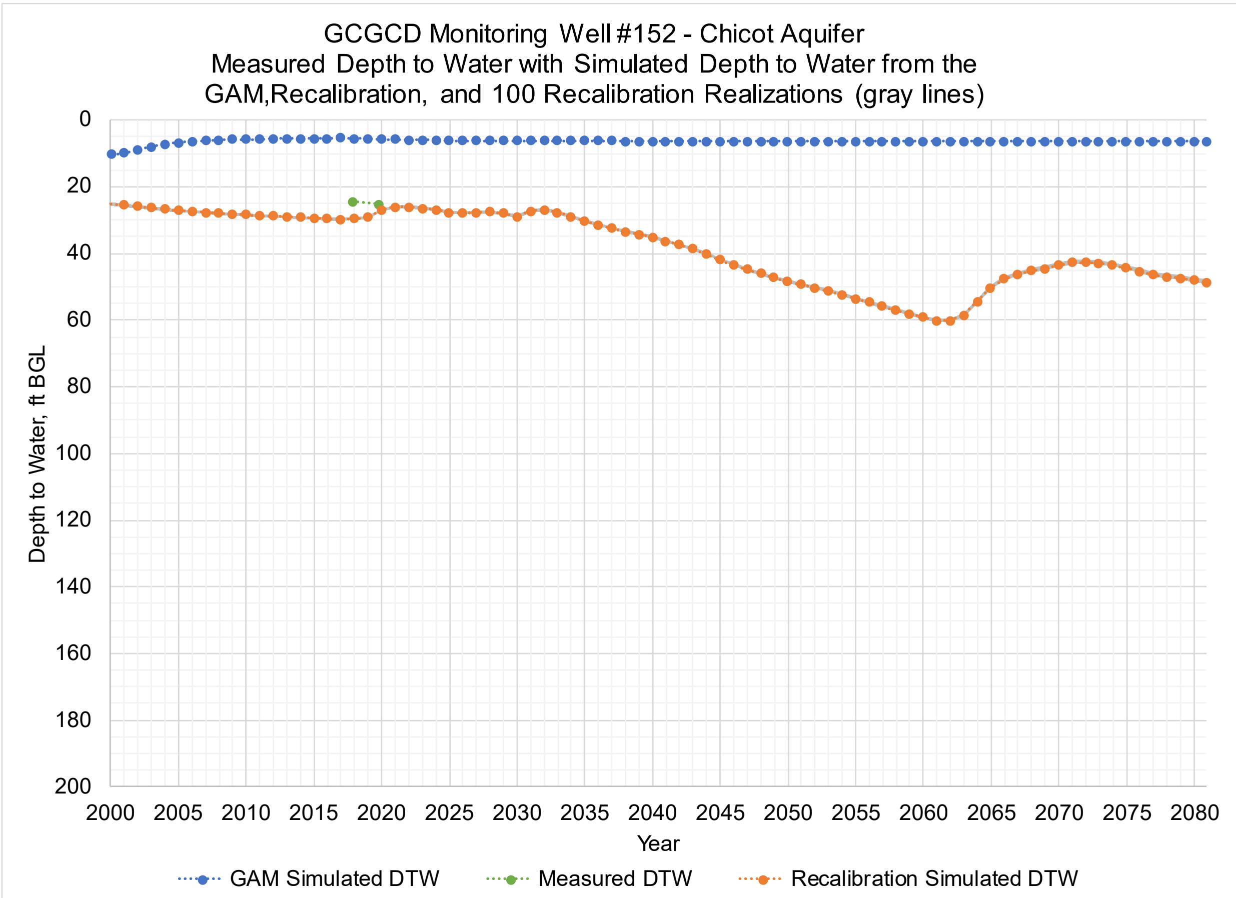

GCGCD Monitoring Well #122 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW


GCGCD Monitoring Well #123 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

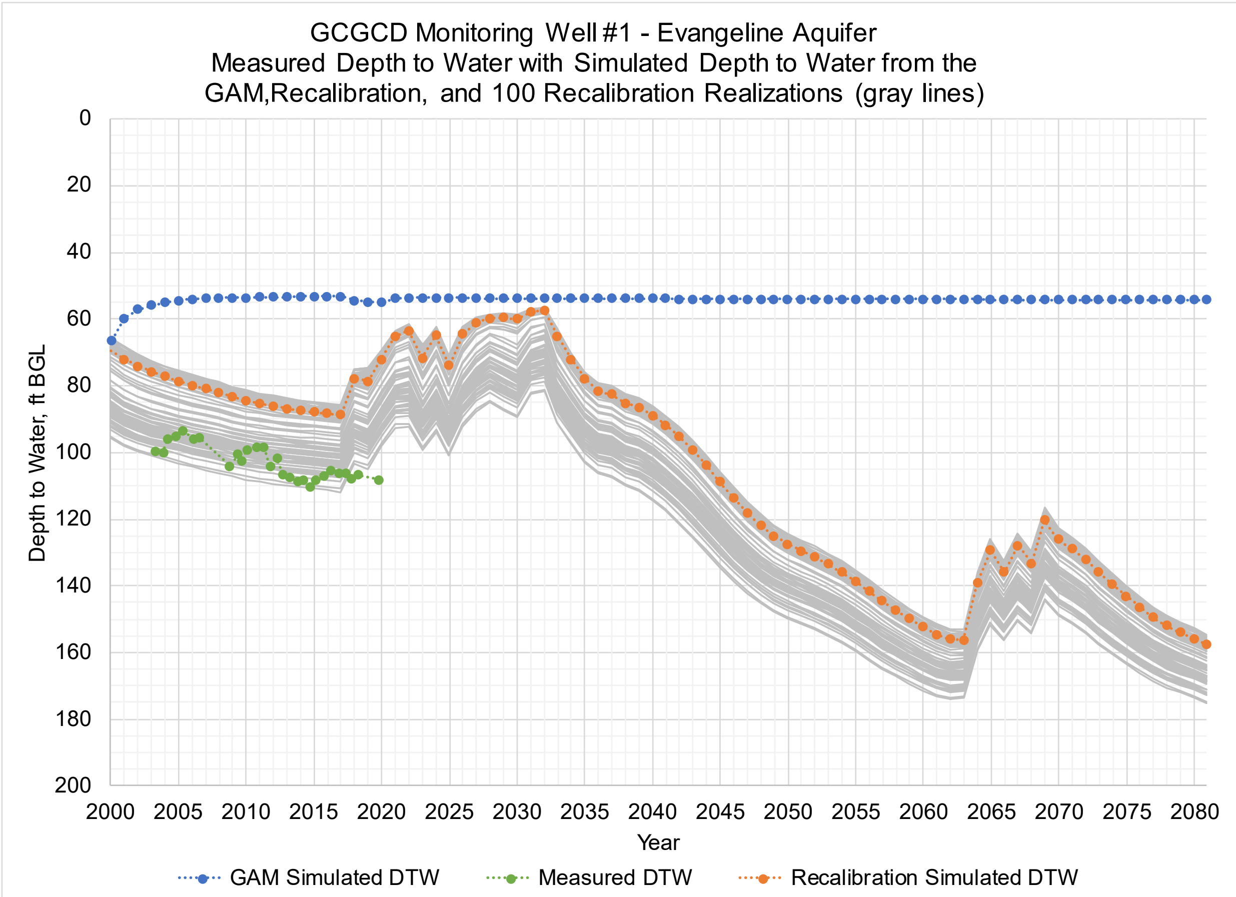

GCGCD Monitoring Well #137 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

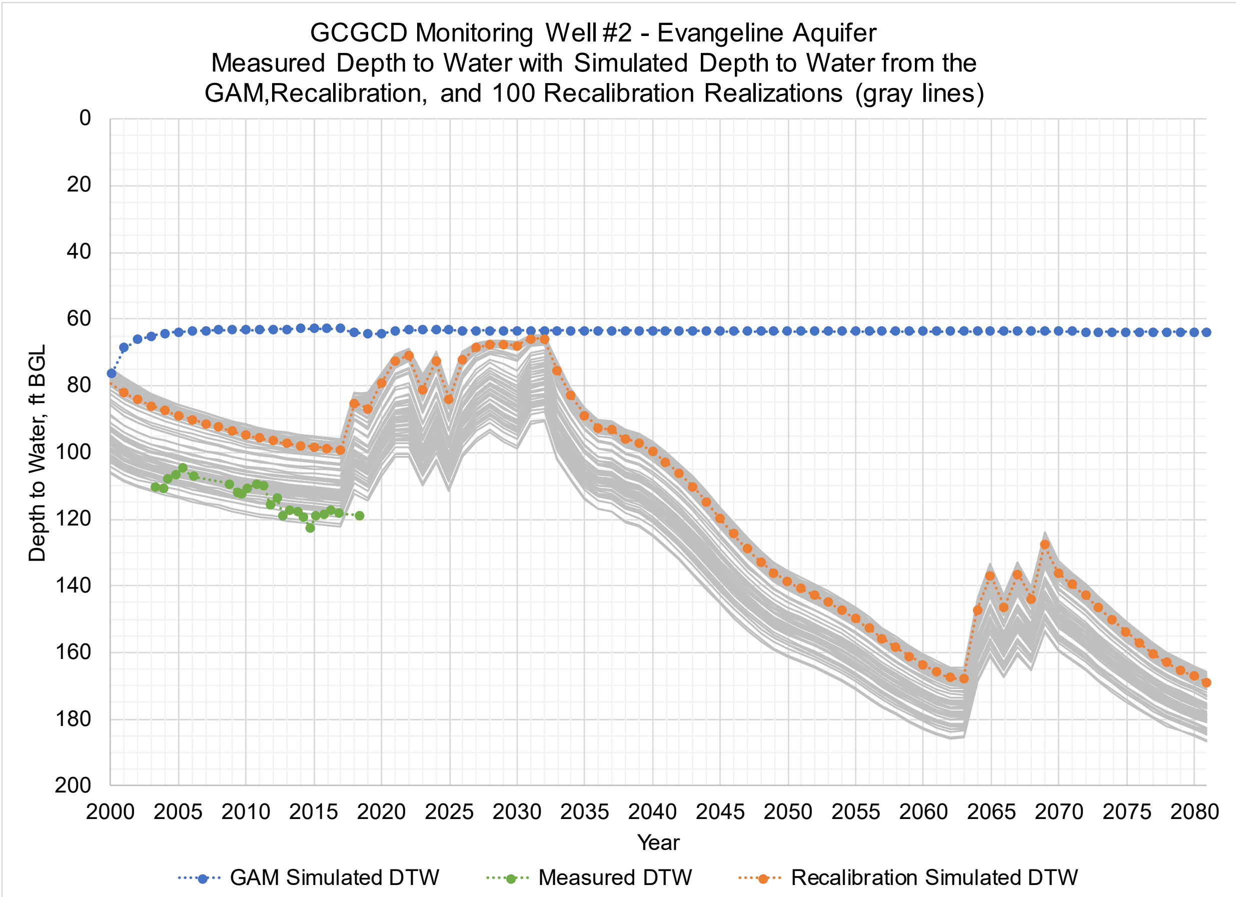

GCGCD Monitoring Well #139 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

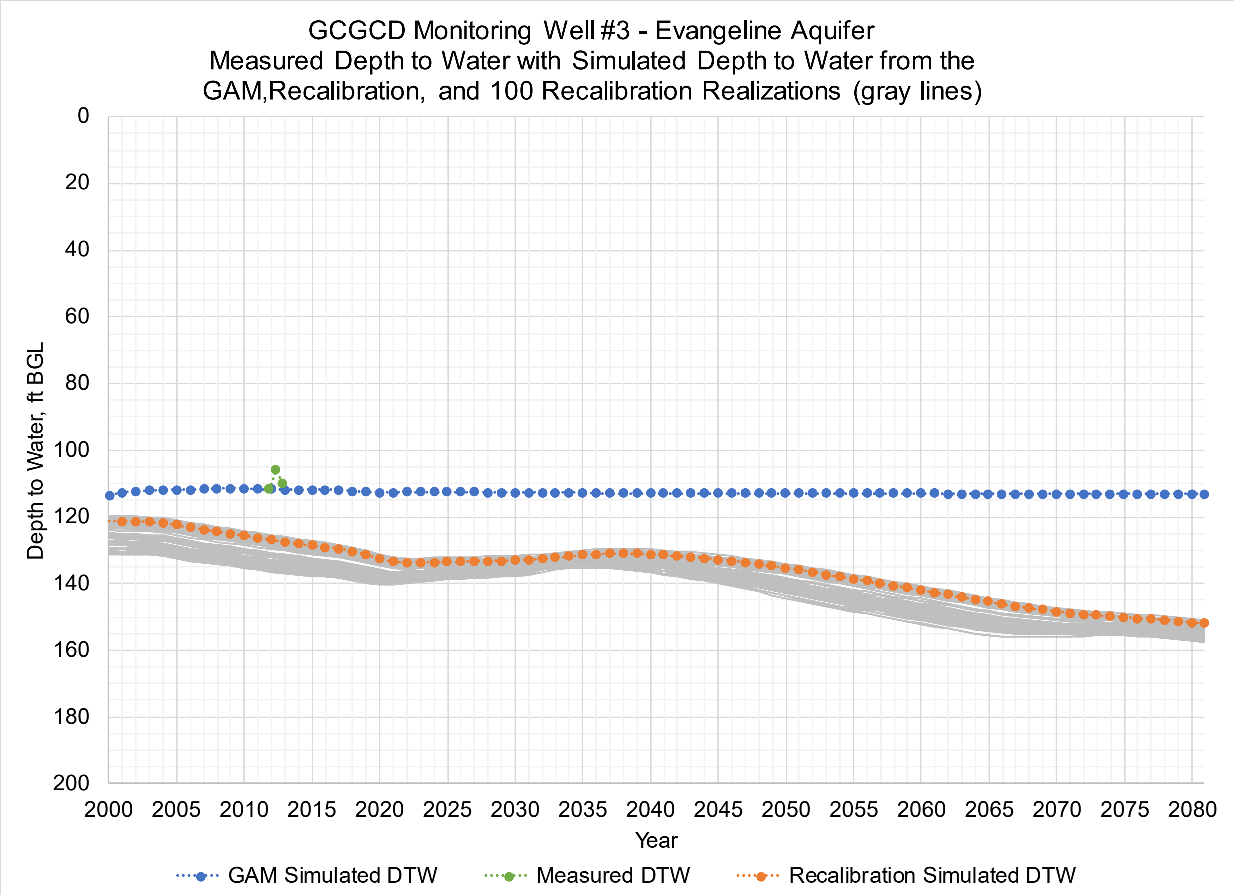

GCGCD Monitoring Well #140 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

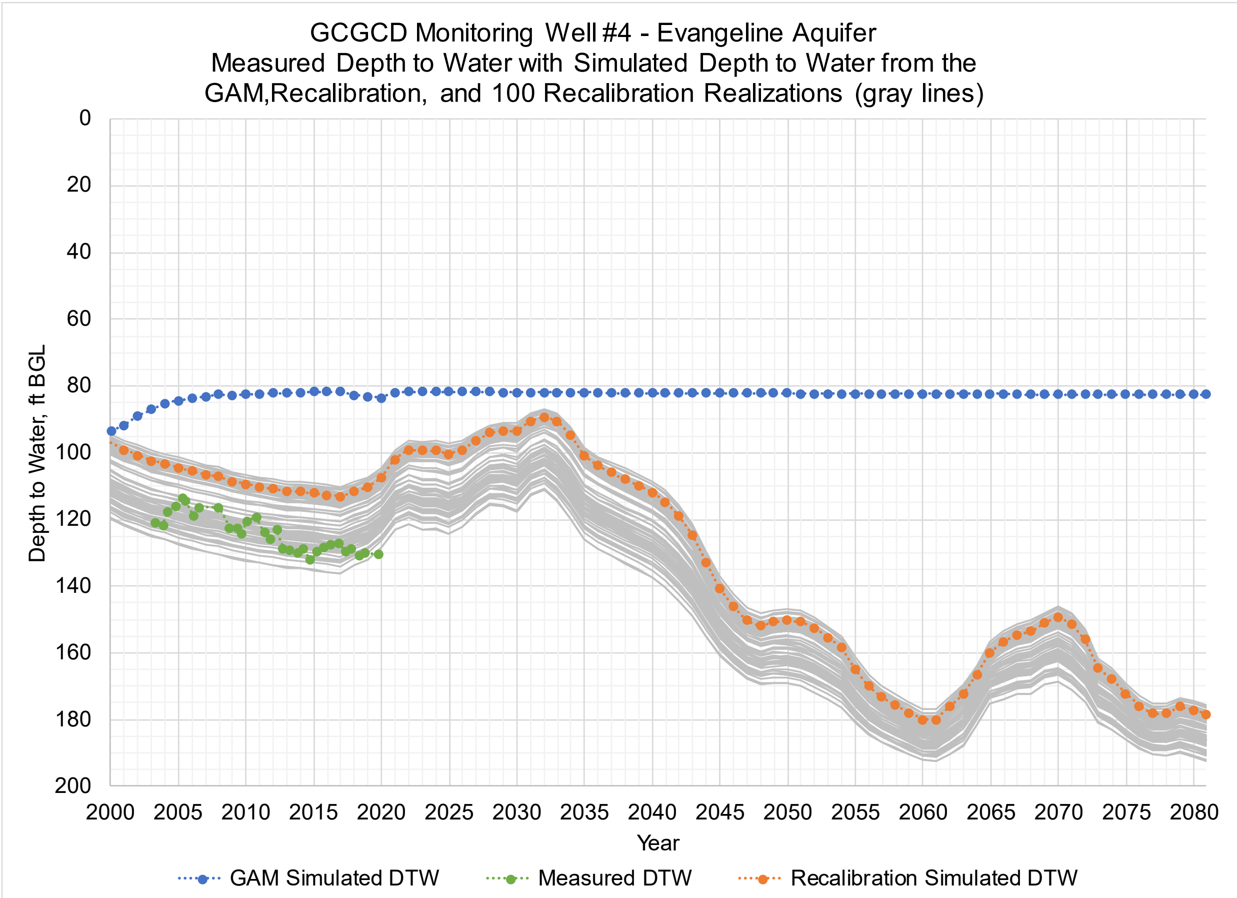

GCGCD Monitoring Well #152 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

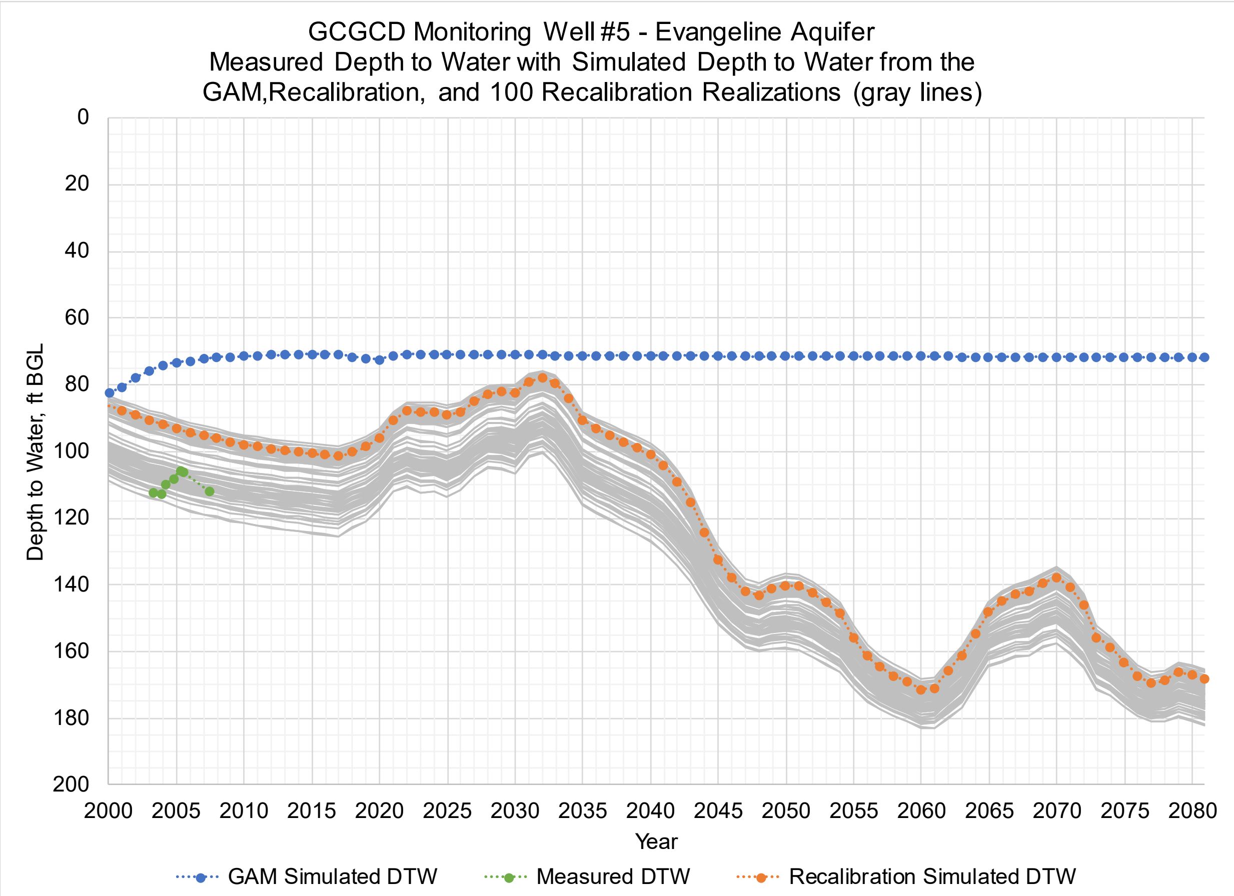
Evangeline Aquifer Monitoring Wells

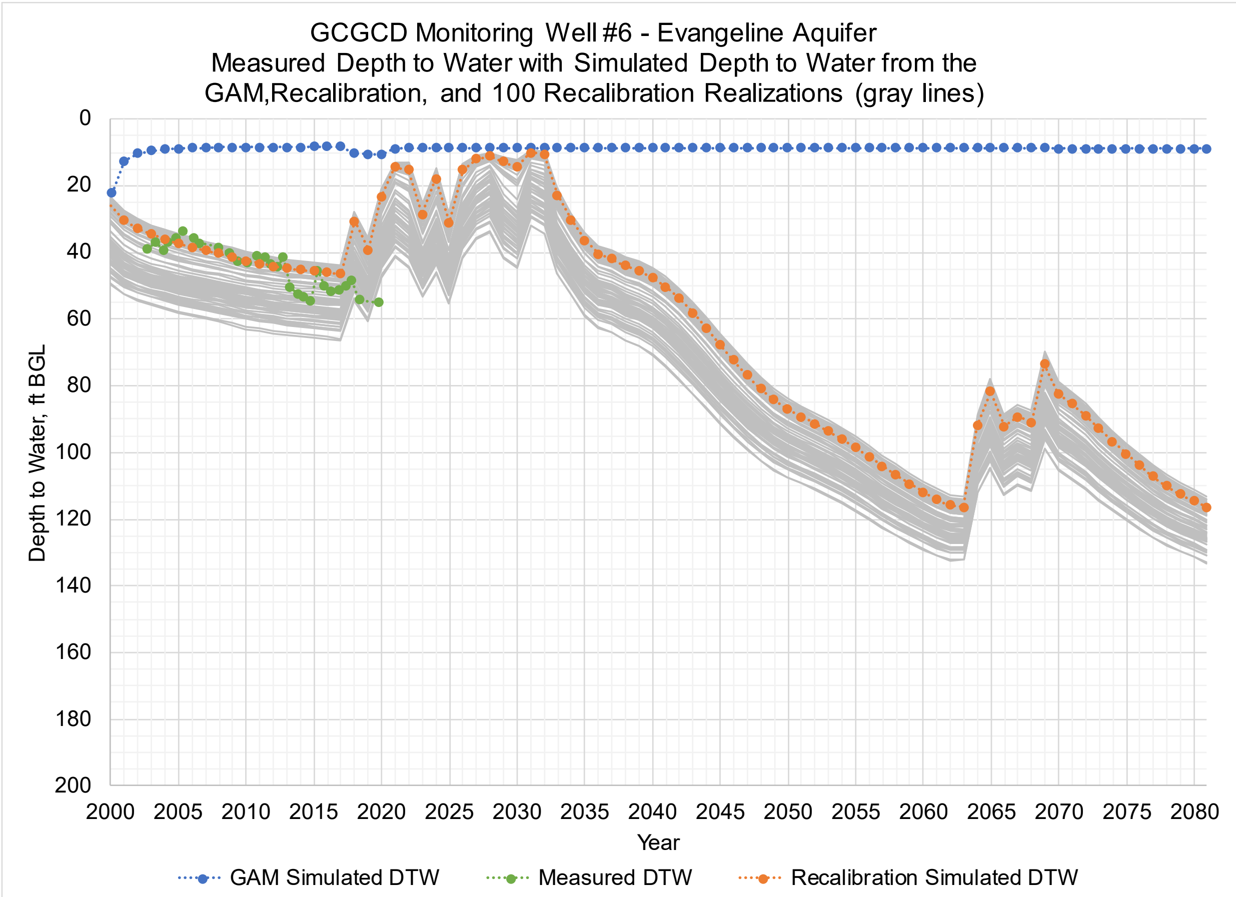

GCGCD Monitoring Well #1 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

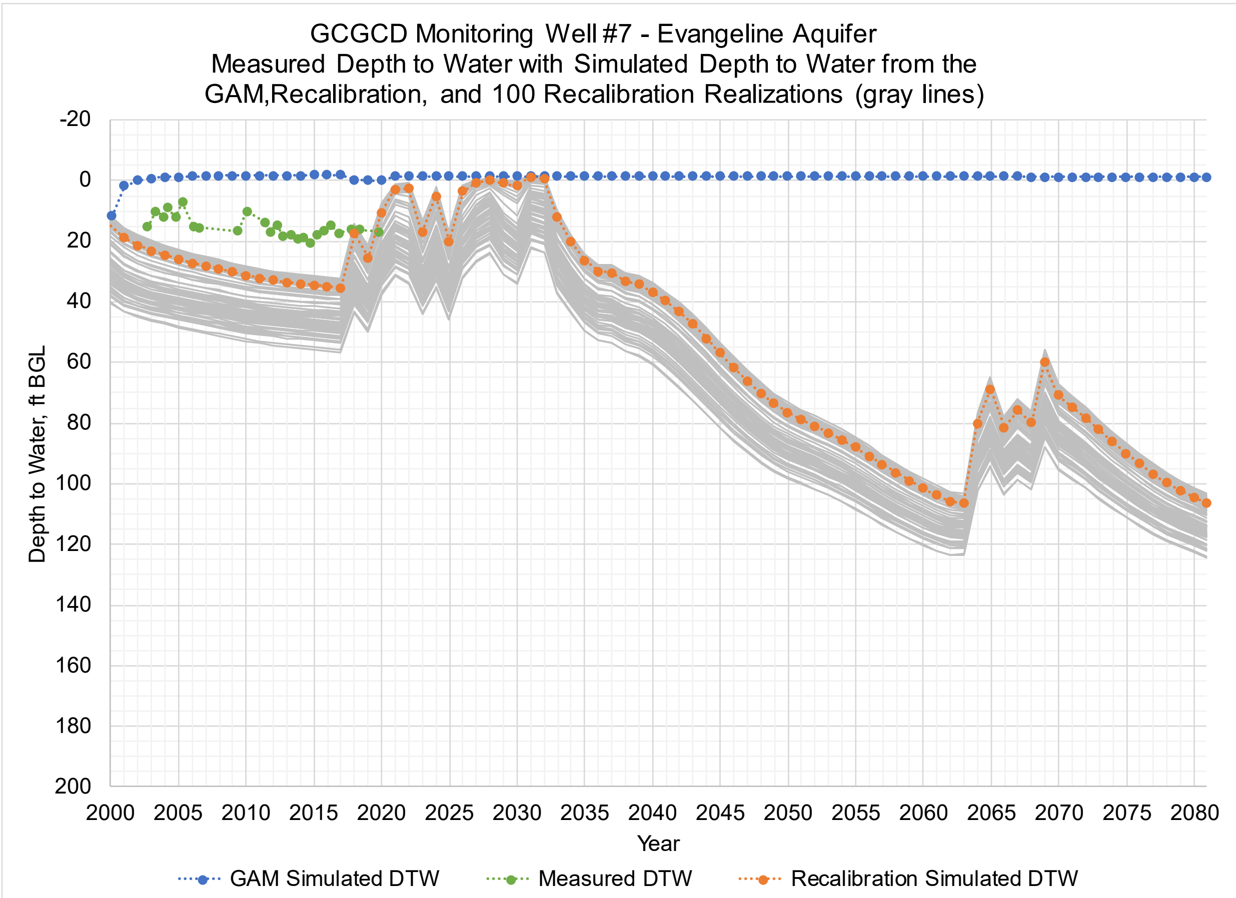

GCGCD Monitoring Well #2 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

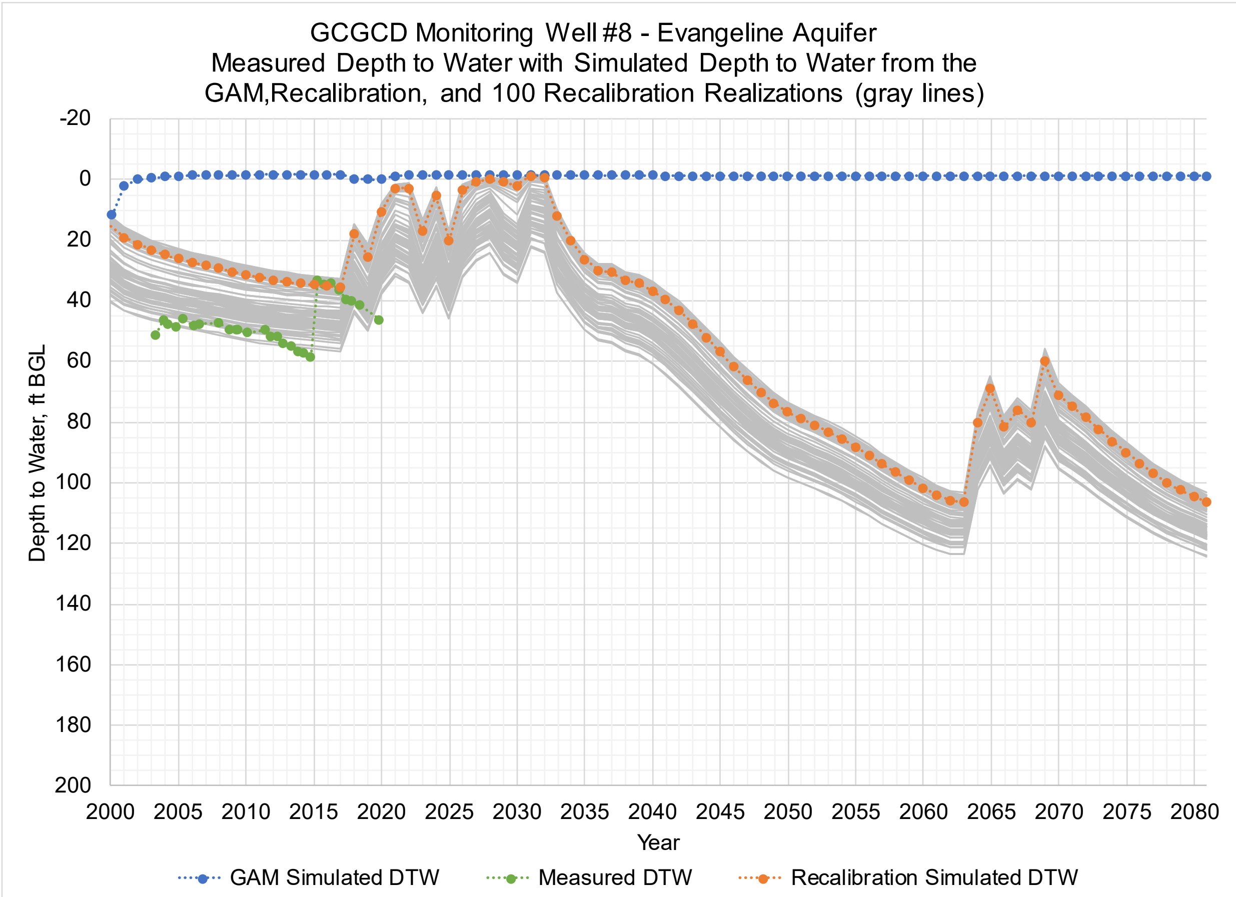

GCGCD Monitoring Well #3 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

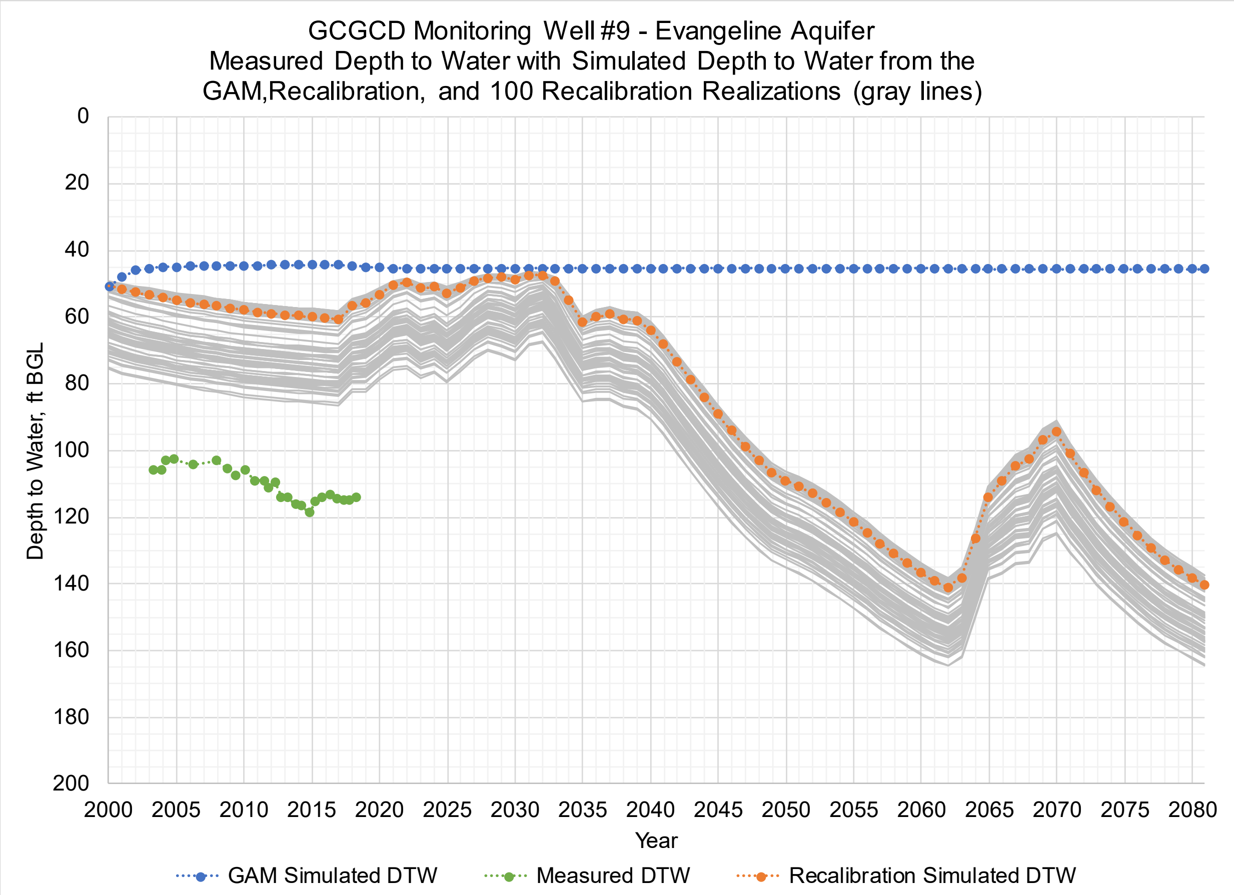

GCGCD Monitoring Well #4 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

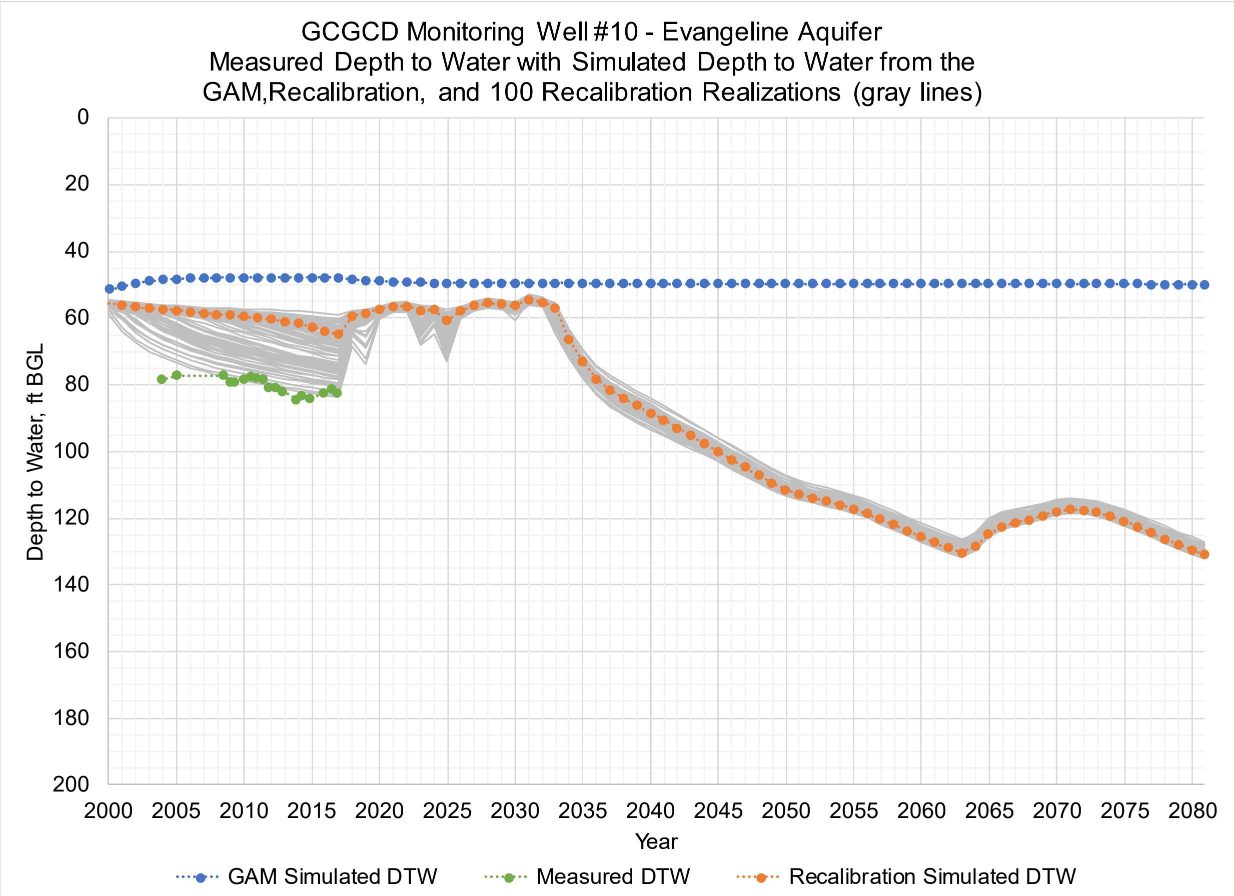

GCGCD Monitoring Well #5 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

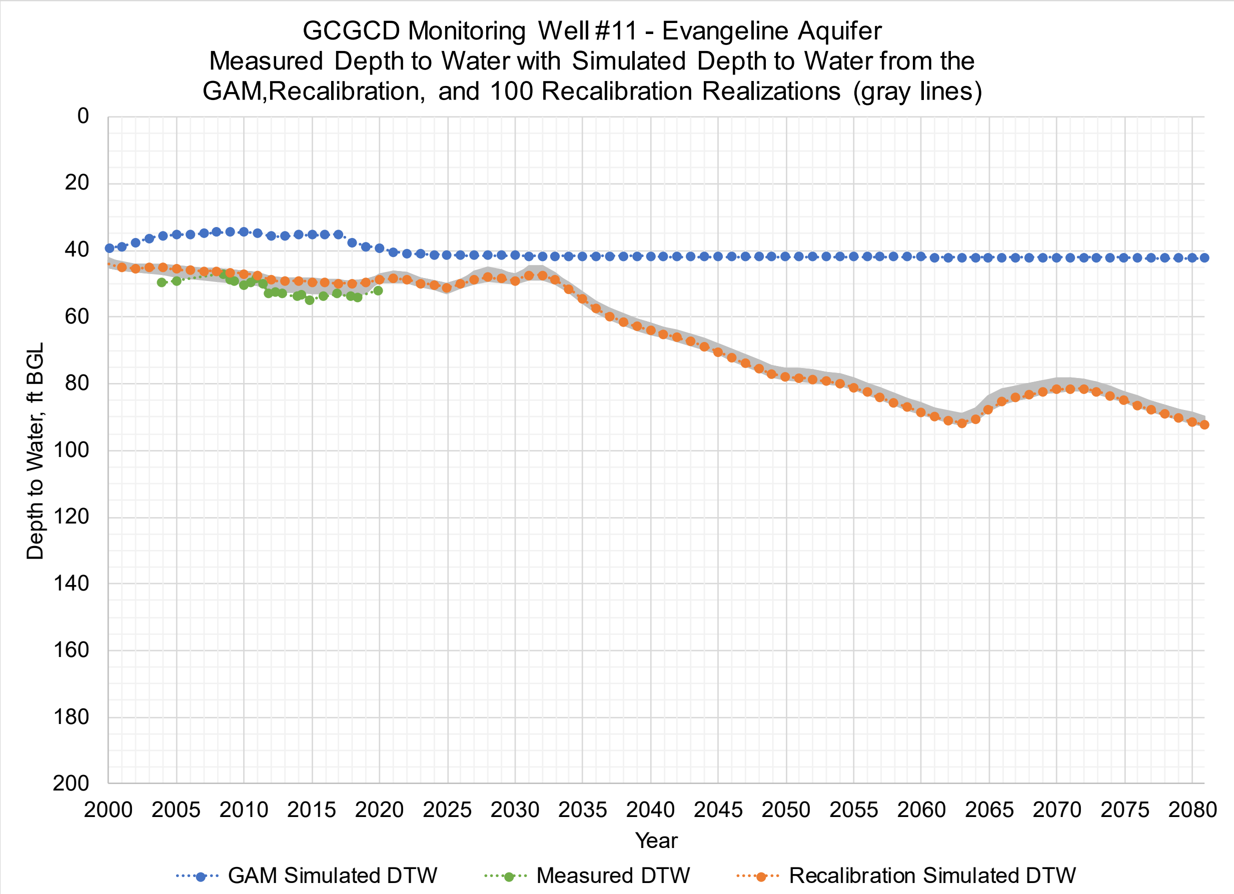

GCGCD Monitoring Well #6 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

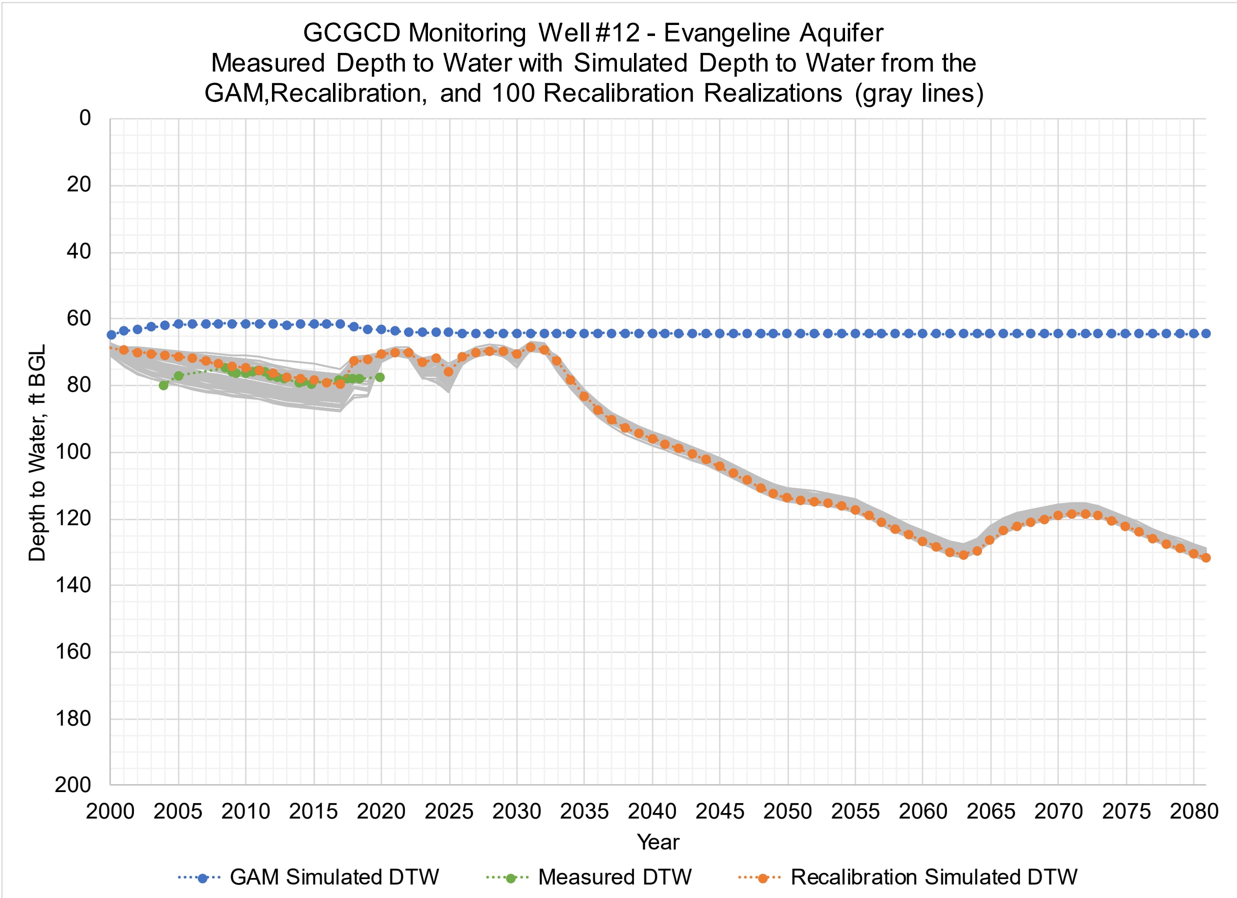

GCGCD Monitoring Well #7 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

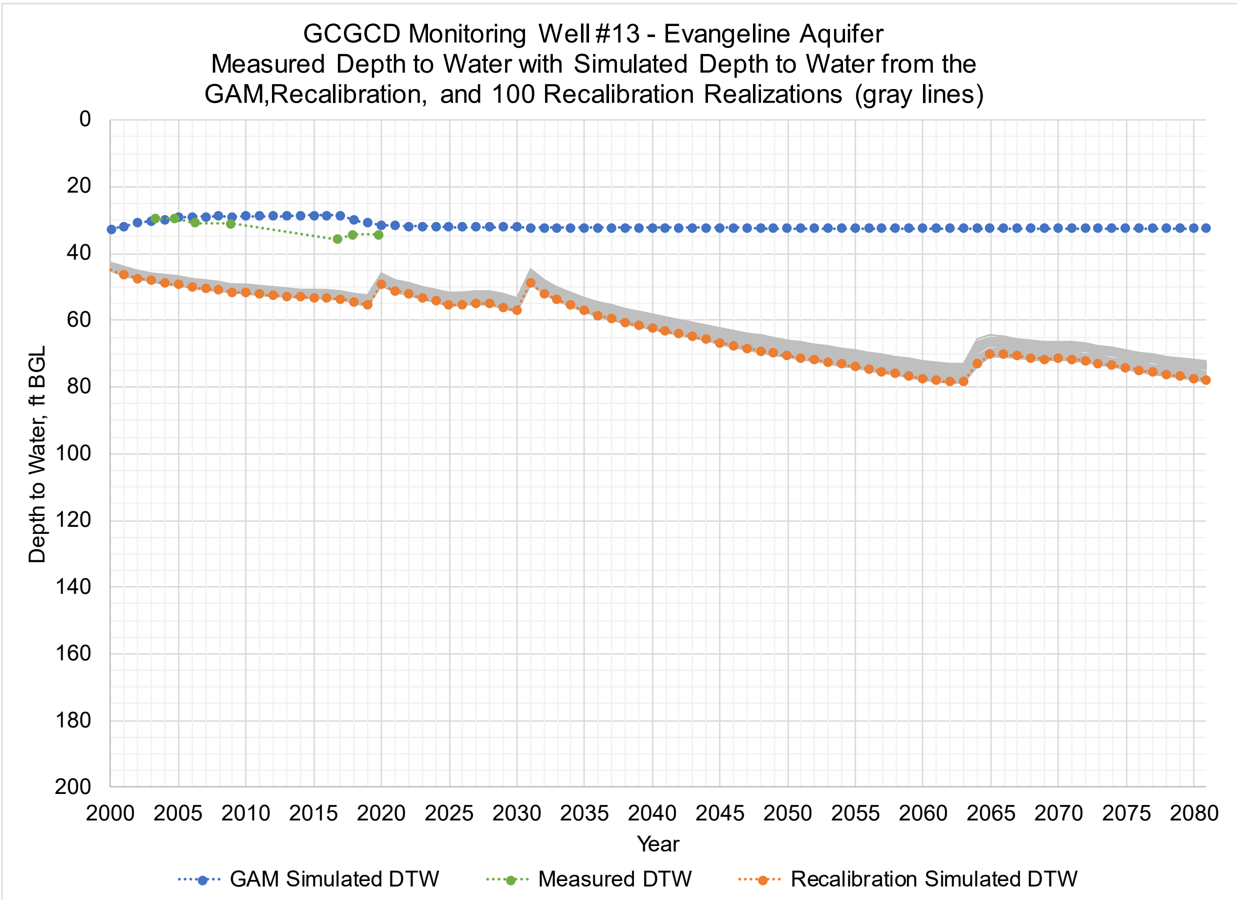

GCGCD Monitoring Well #8 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

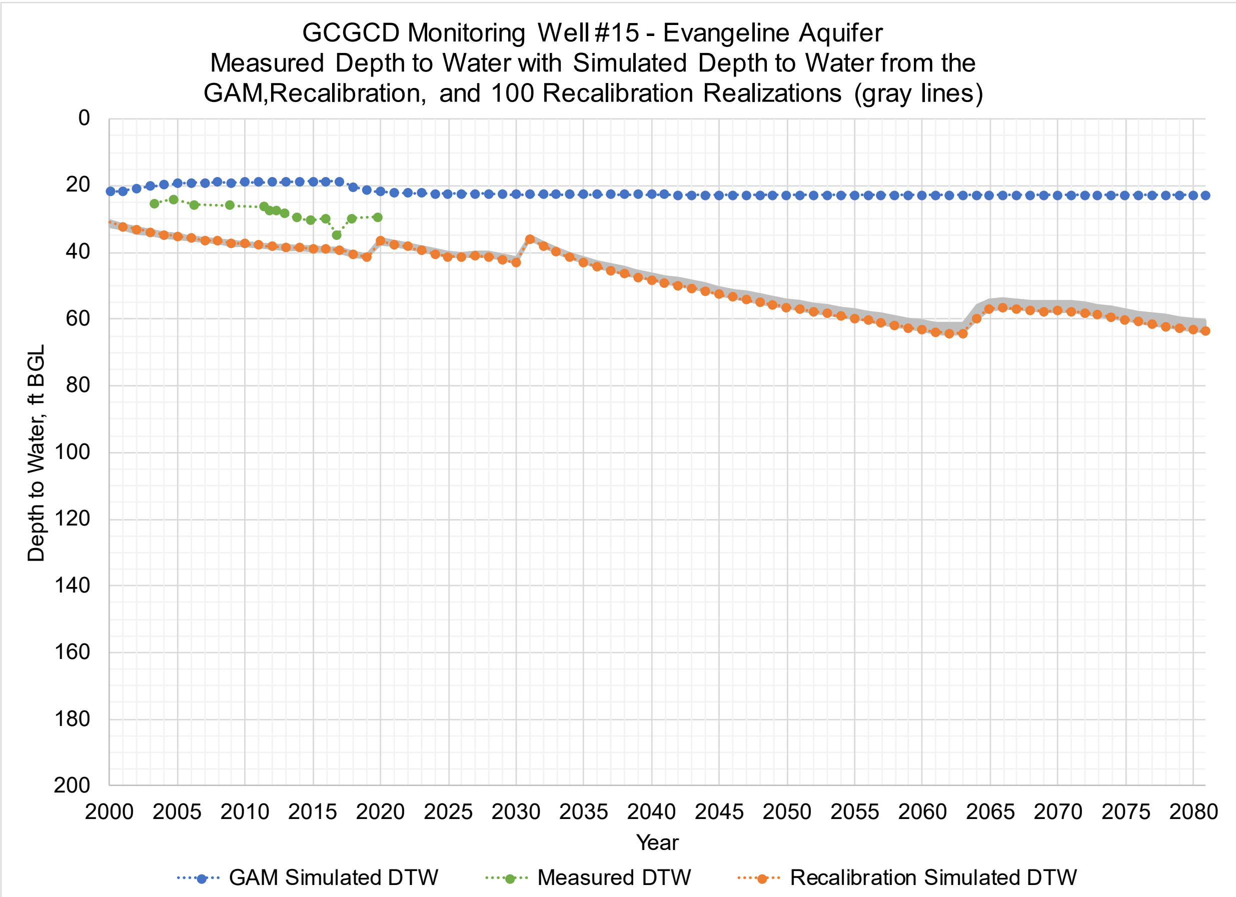

GCGCD Monitoring Well #9 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

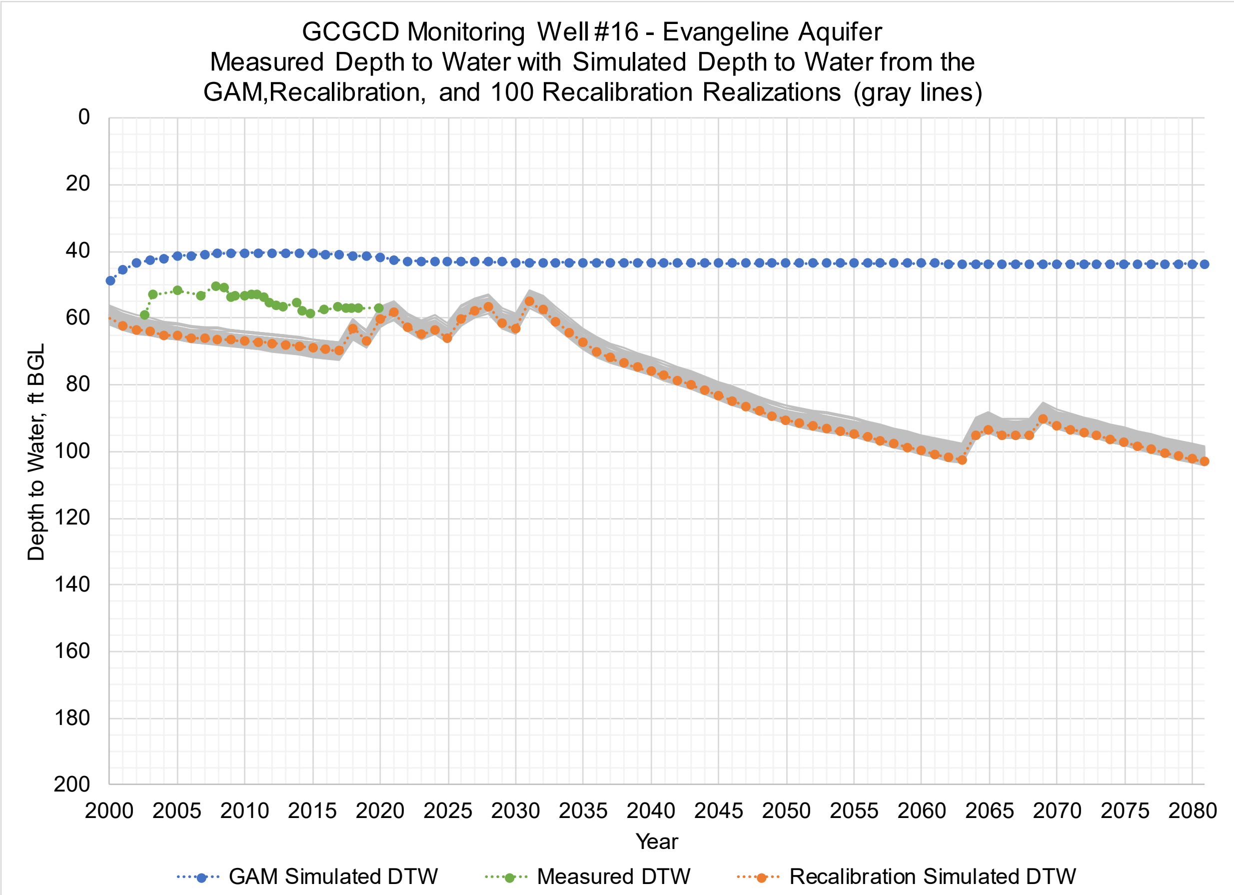

GCGCD Monitoring Well #10 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

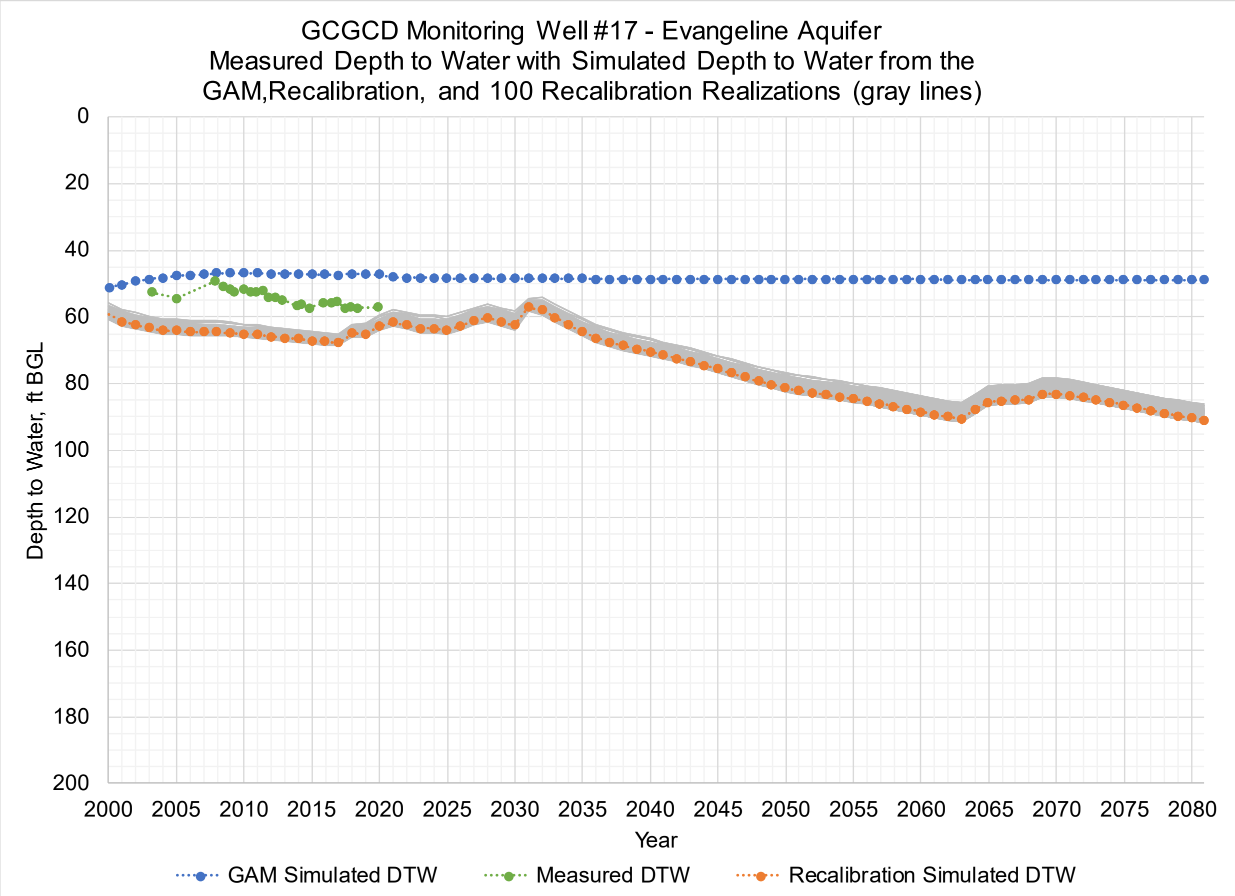

GCGCD Monitoring Well #11 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

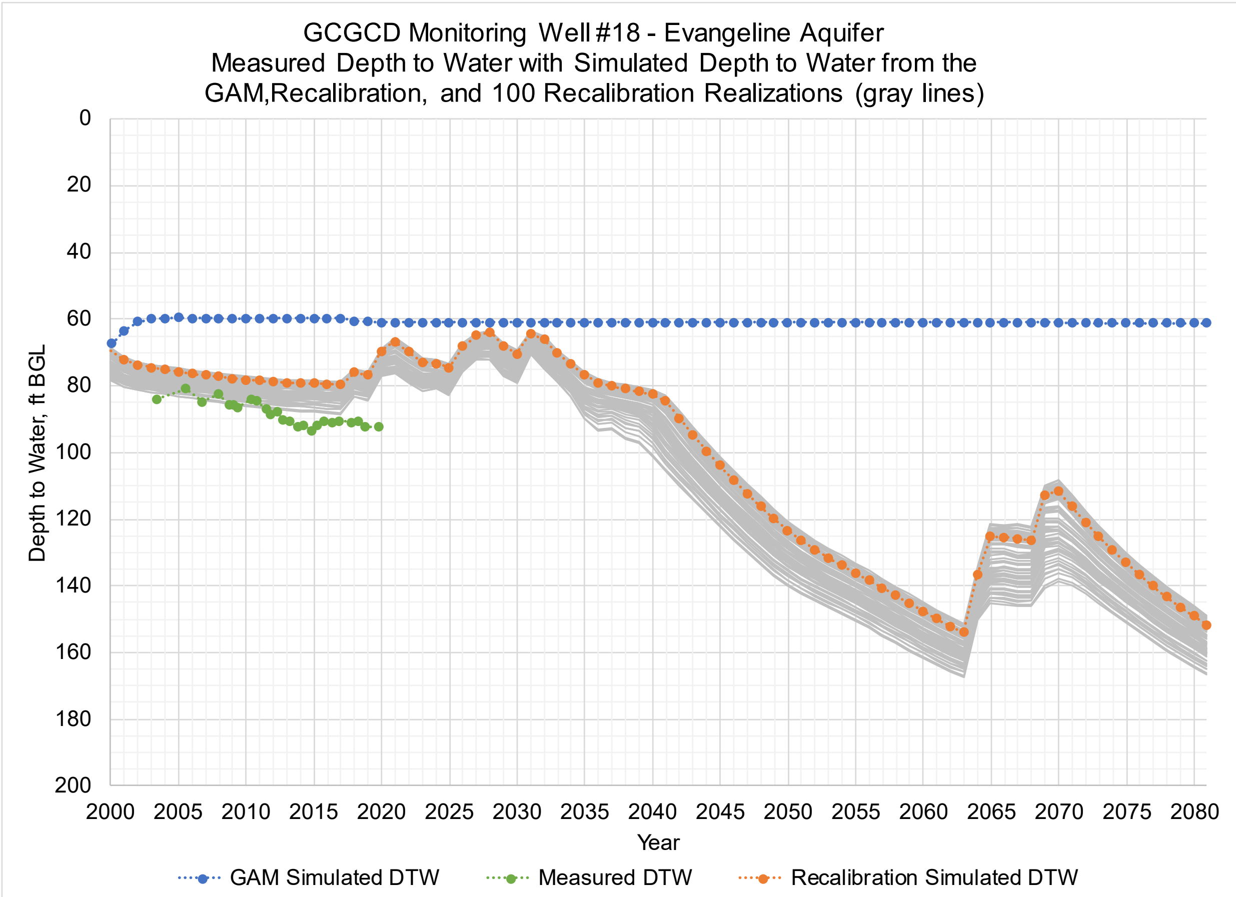

GCGCD Monitoring Well #12 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

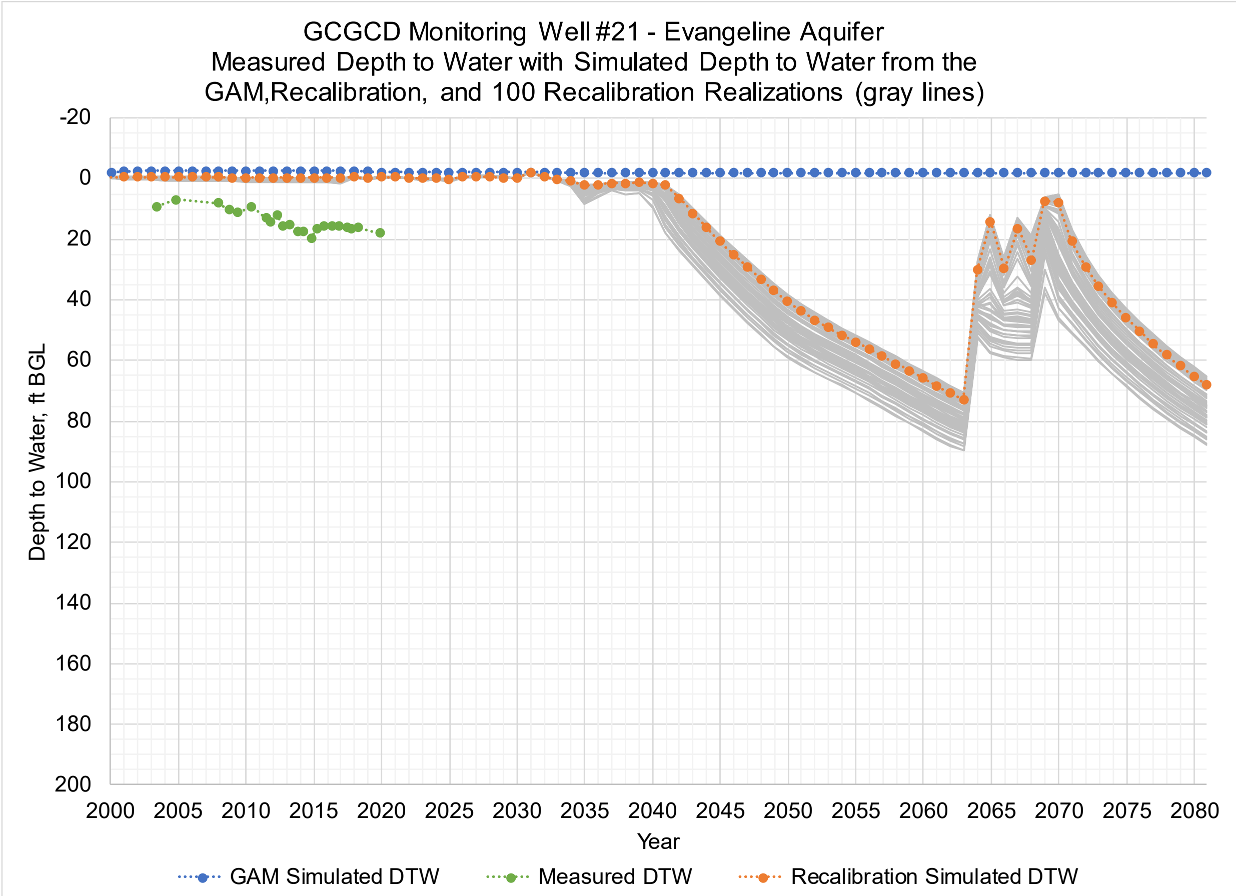

GCGCD Monitoring Well #13 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

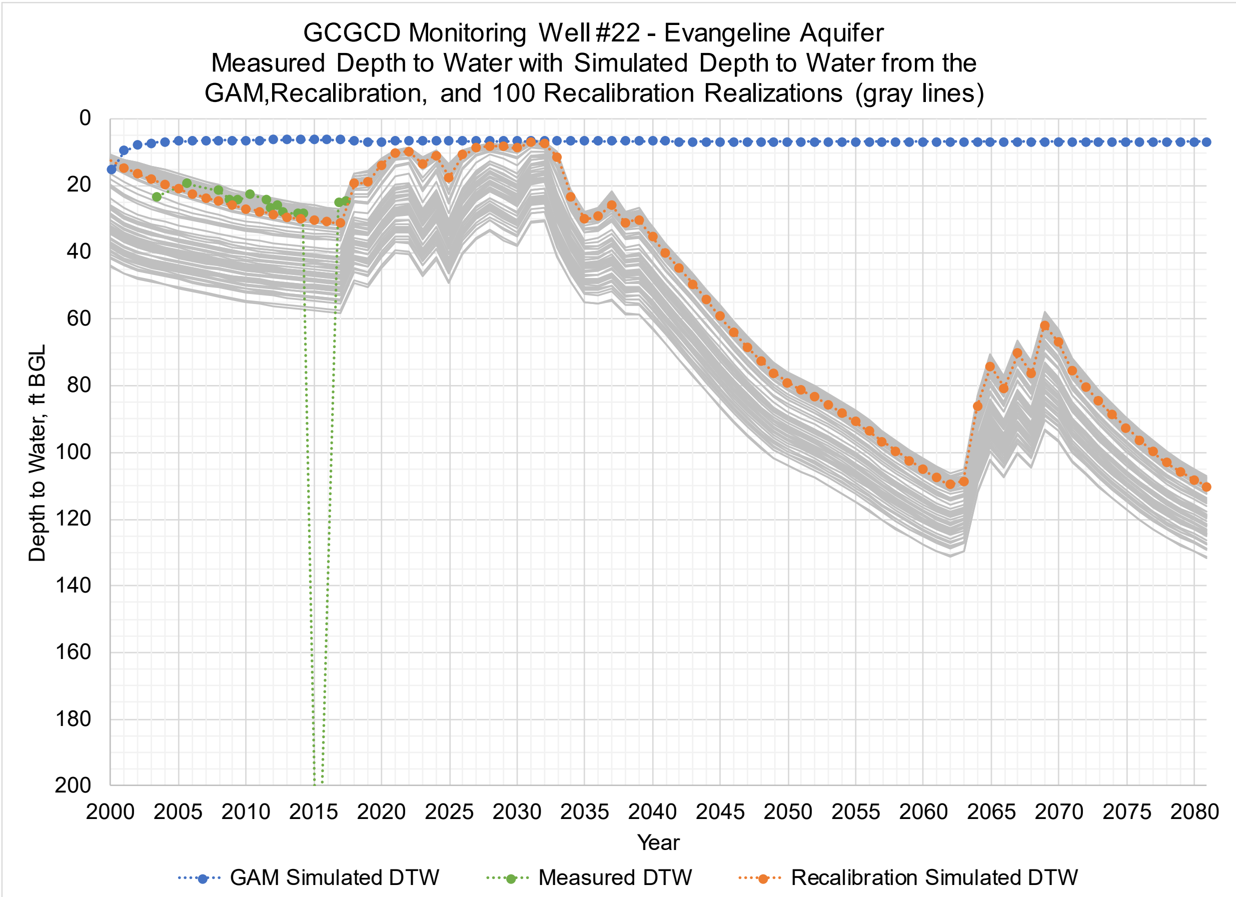

GCGCD Monitoring Well #15 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

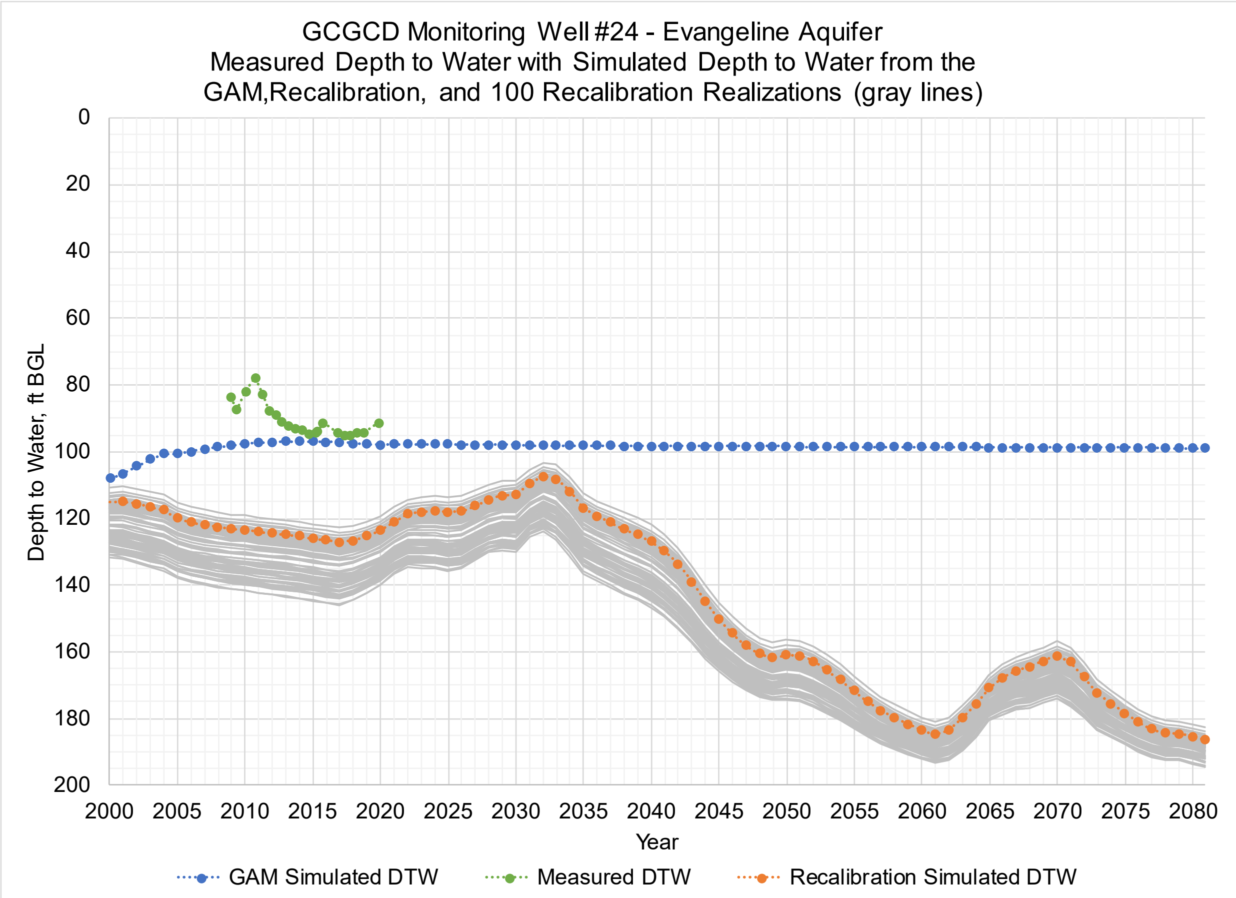

GCGCD Monitoring Well #16 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

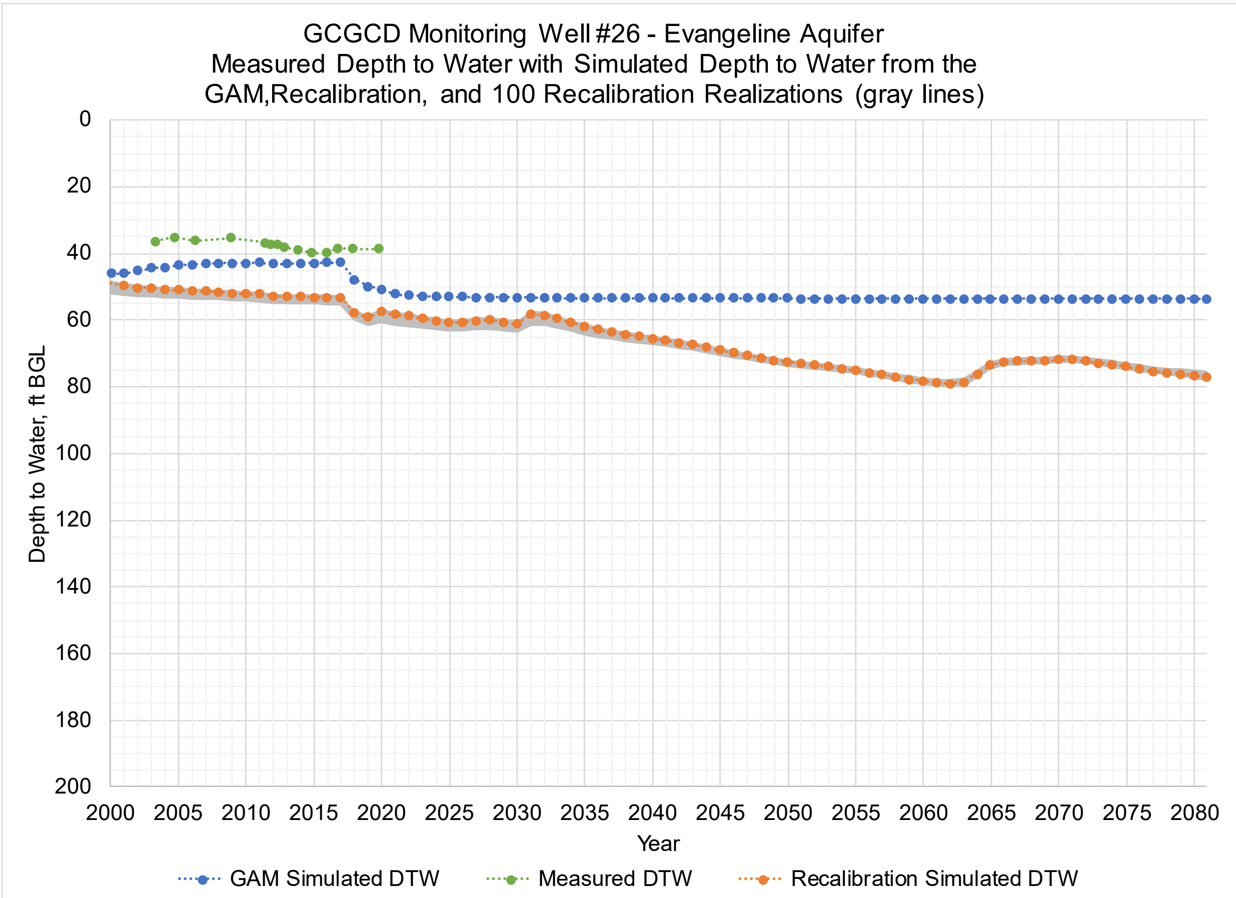

GCGCD Monitoring Well #17 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

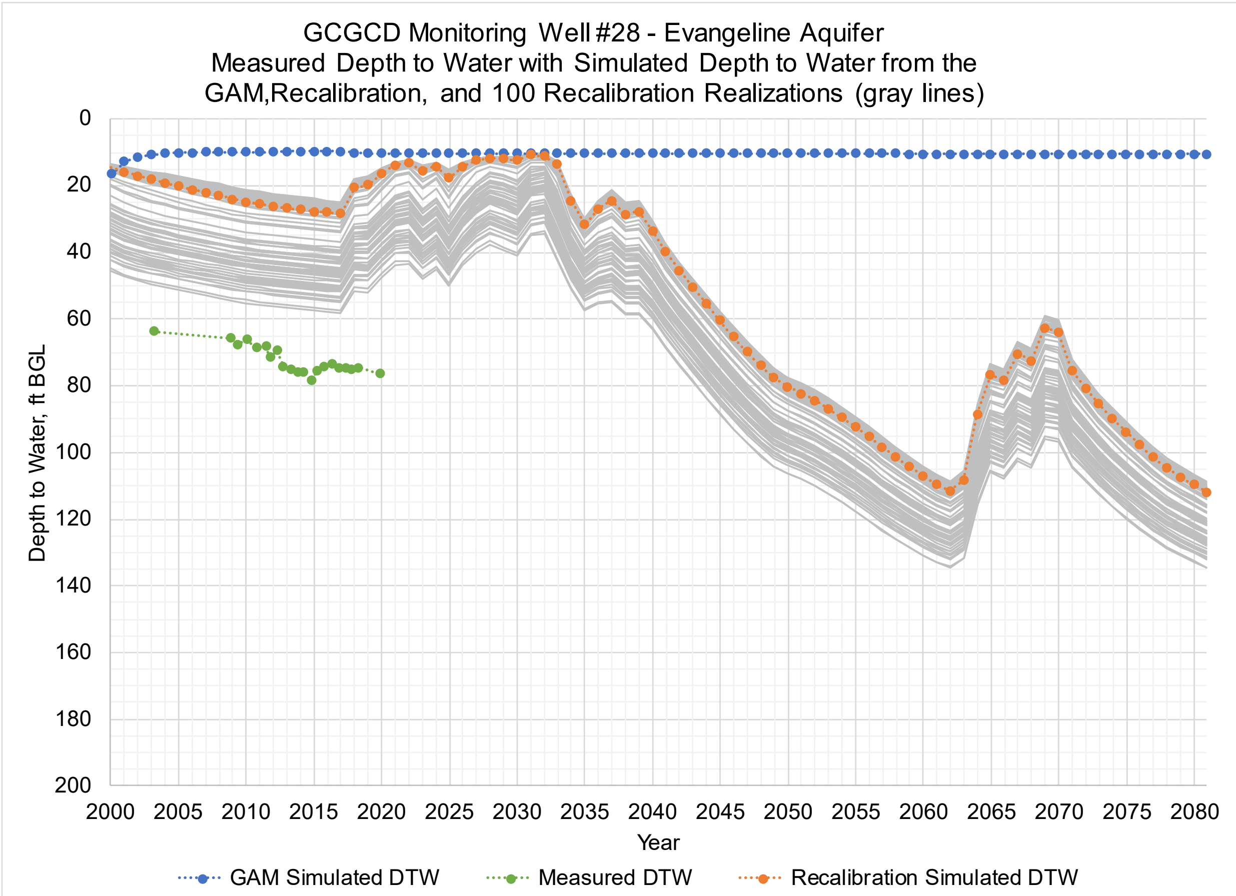

GCGCD Monitoring Well #18 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

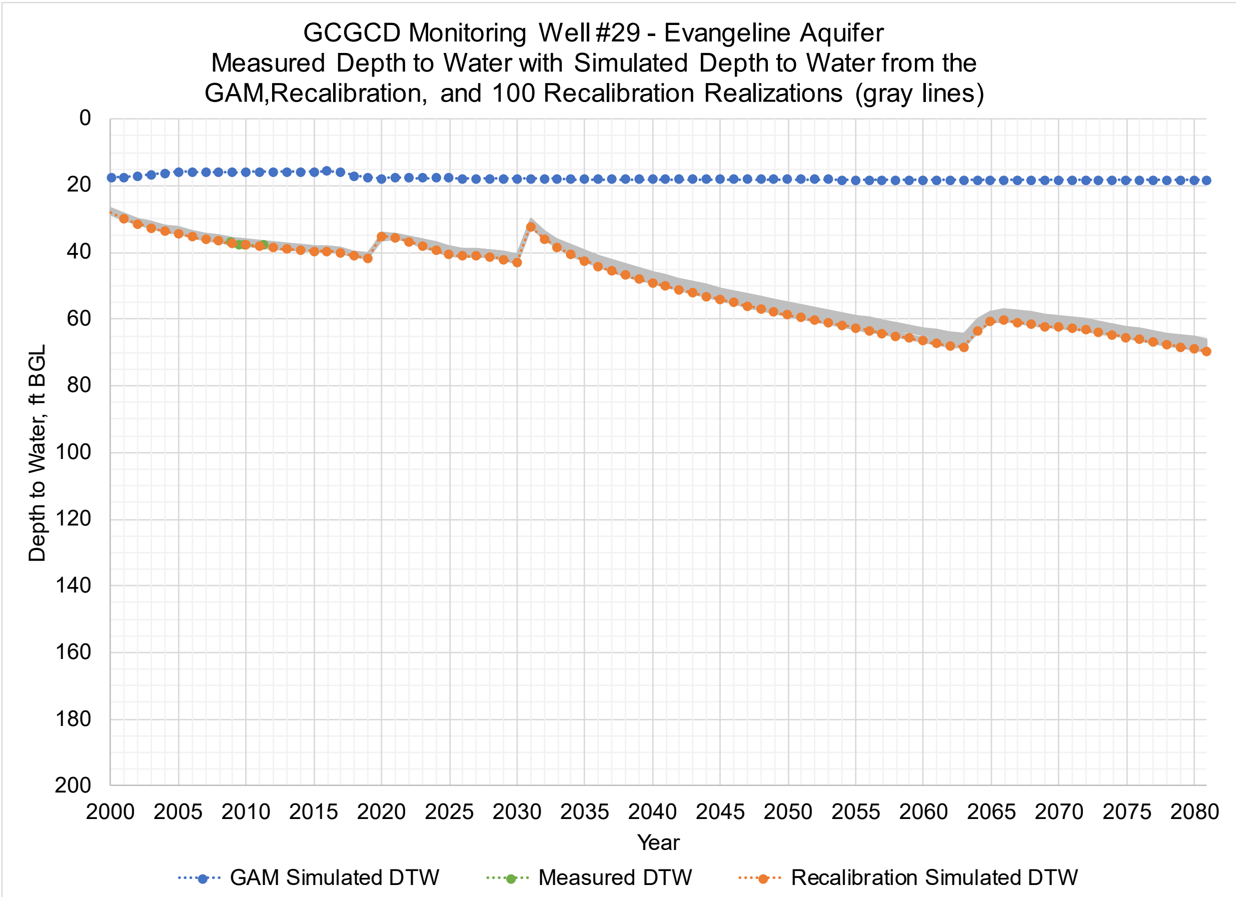

GCGCD Monitoring Well #21 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

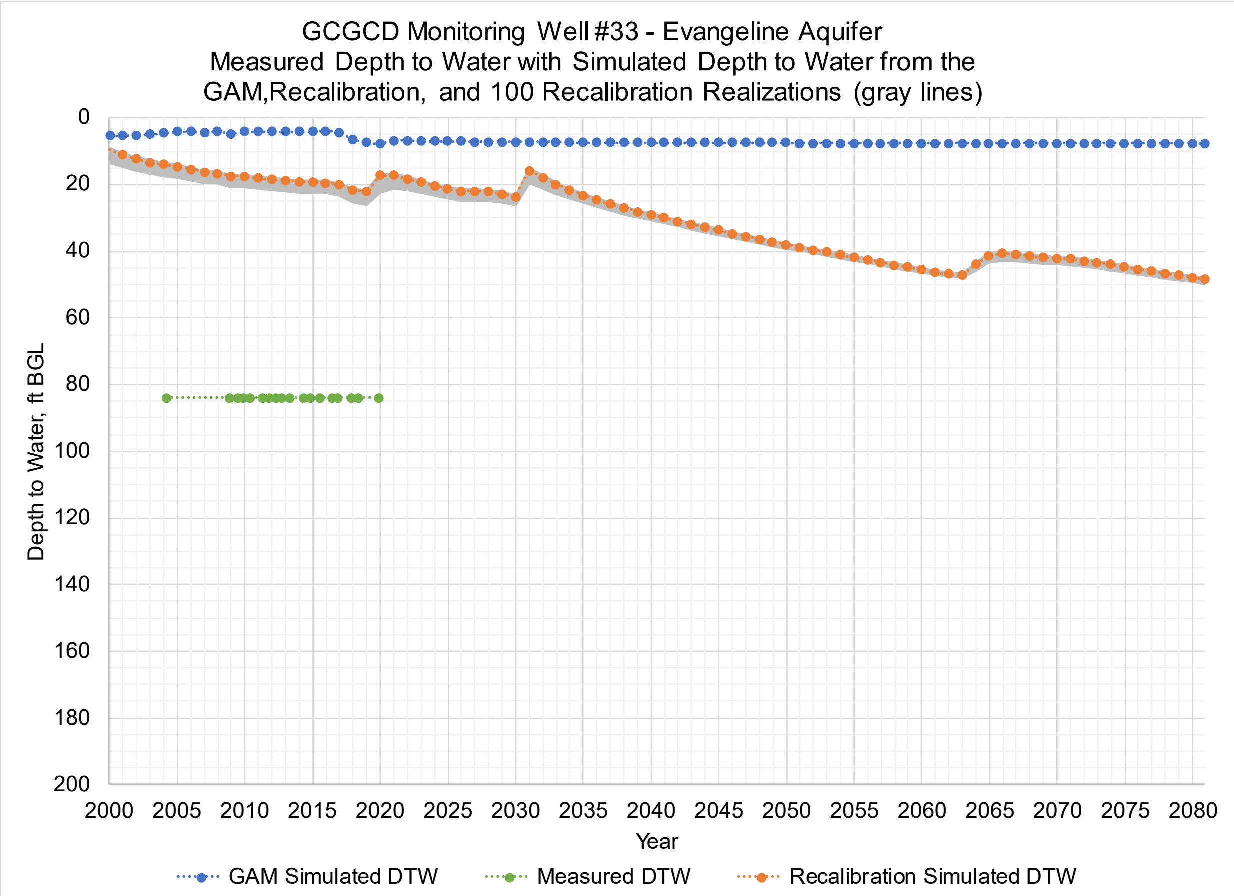

GCGCD Monitoring Well #22 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

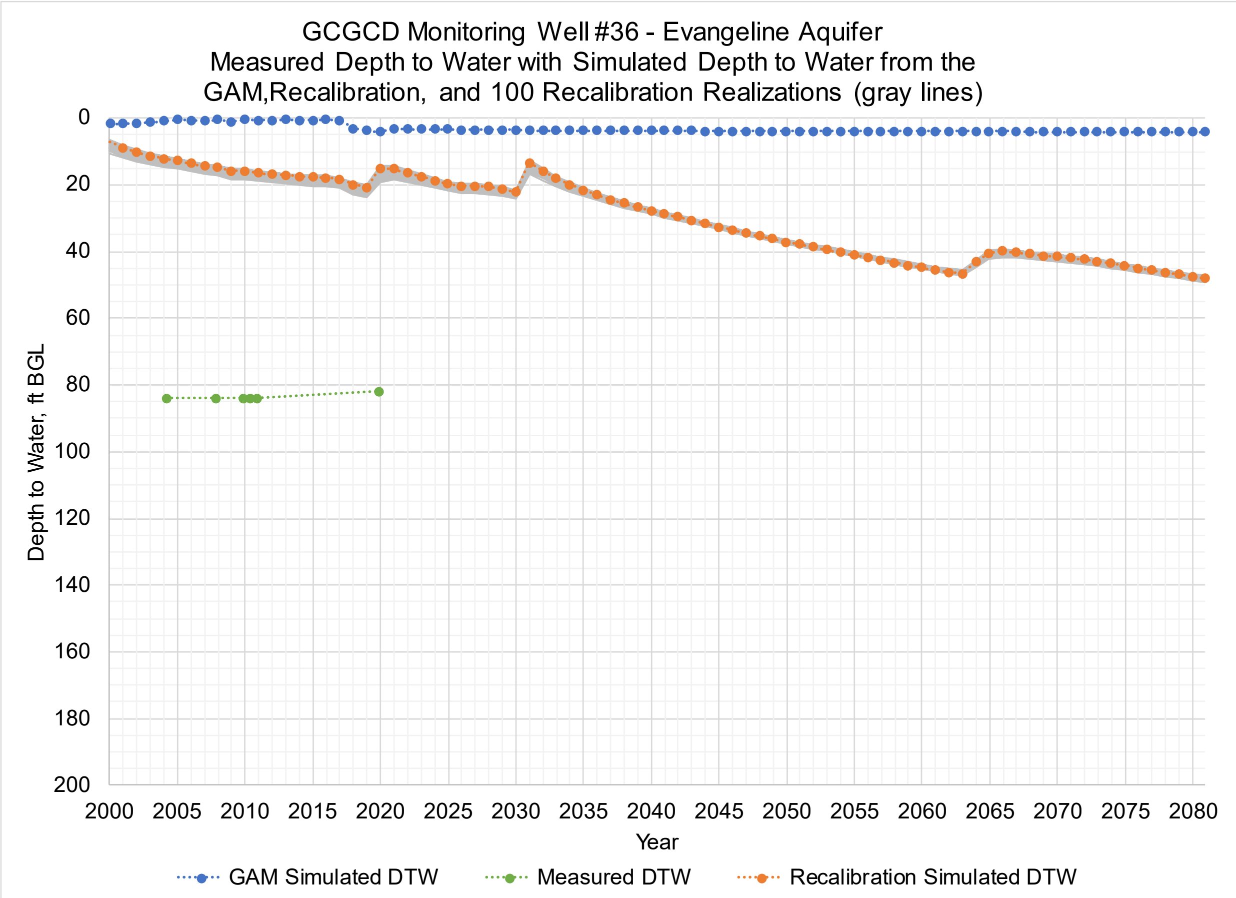

GCGCD Monitoring Well #24 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

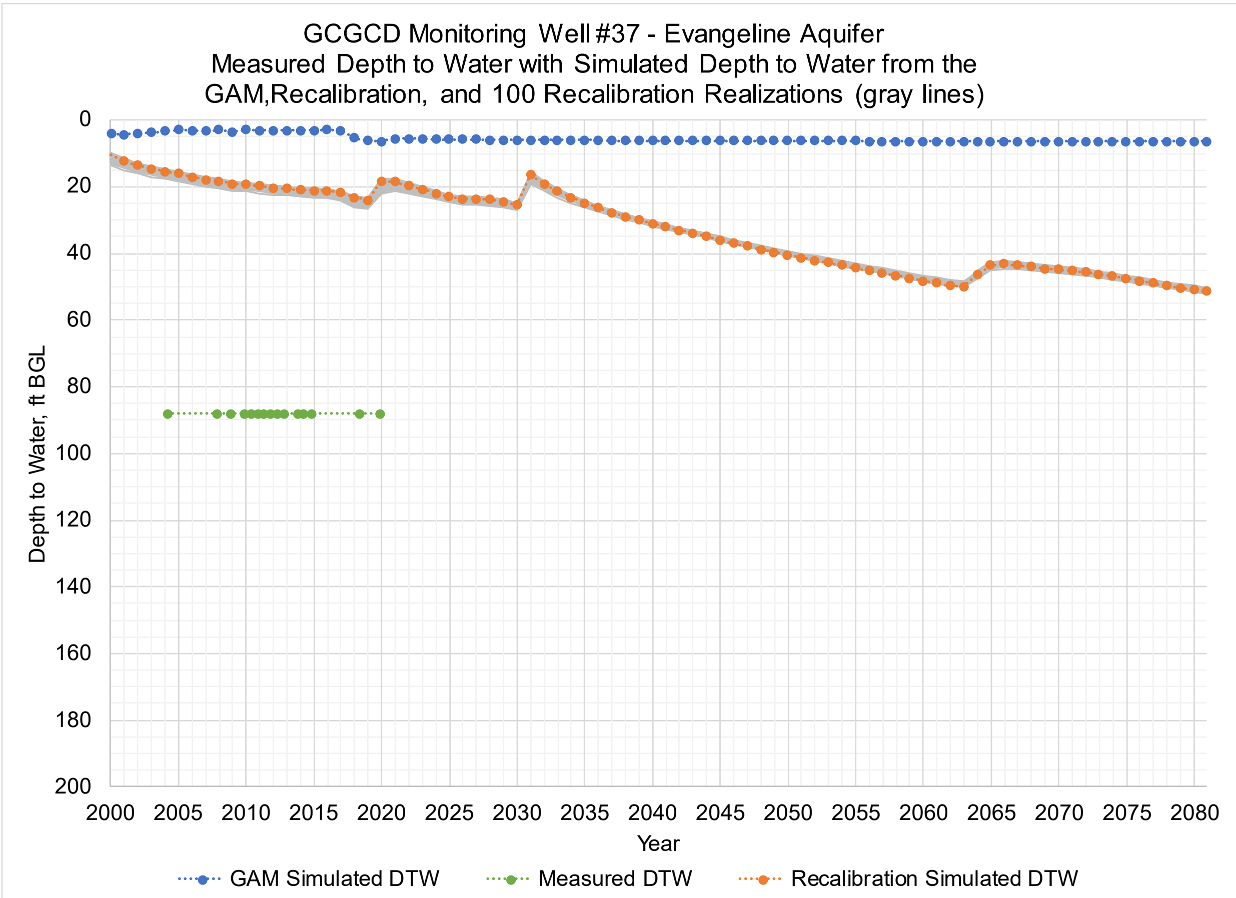

GCGCD Monitoring Well #26 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

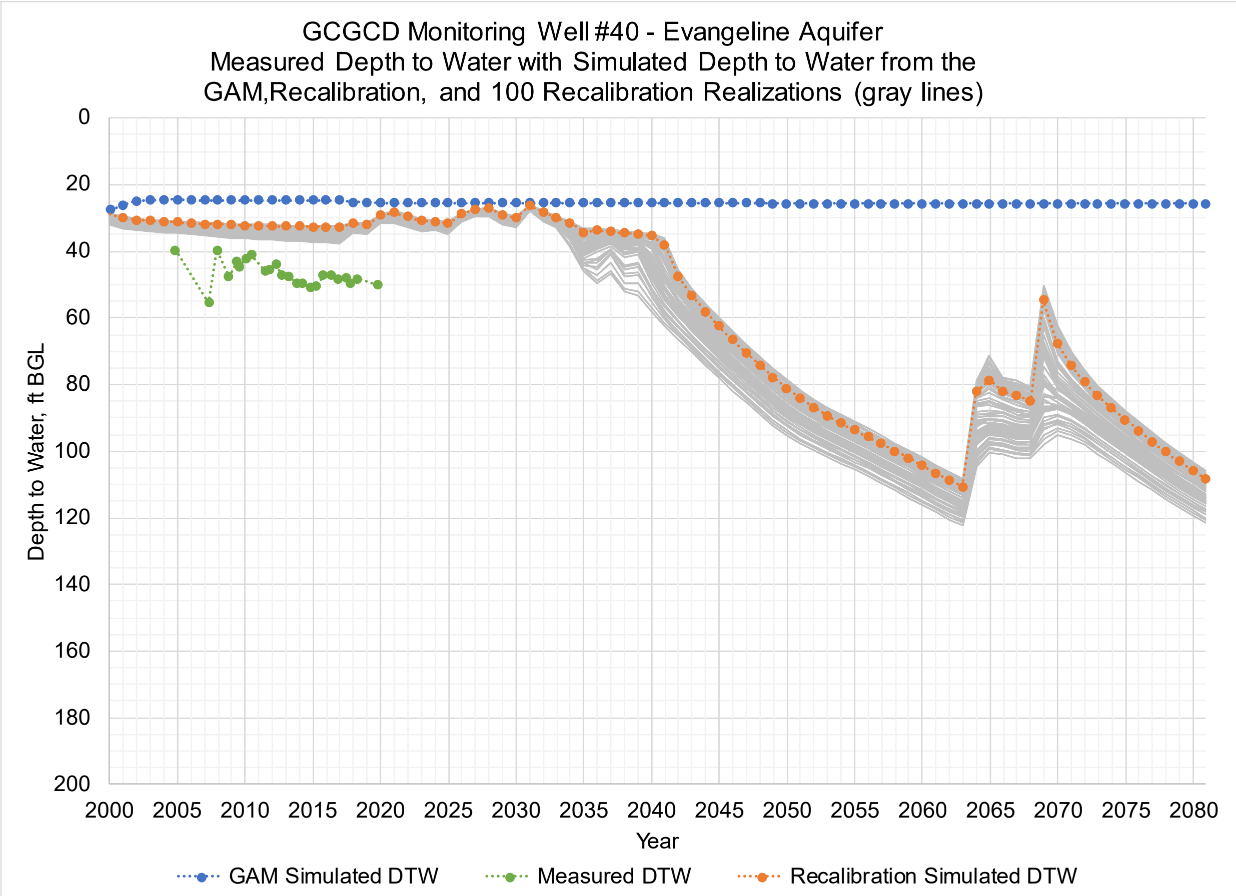

GCGCD Monitoring Well #28 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

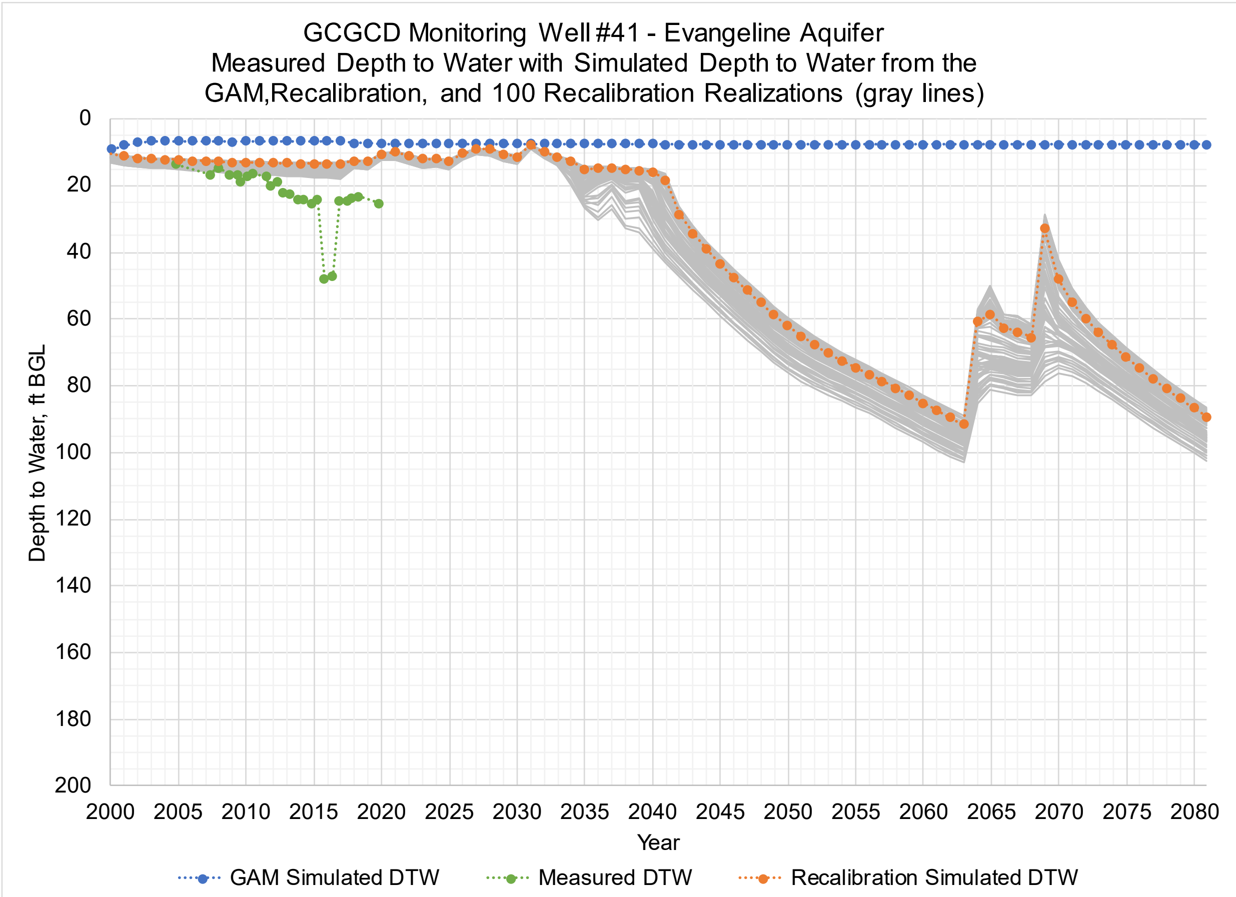

GCGCD Monitoring Well #29 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

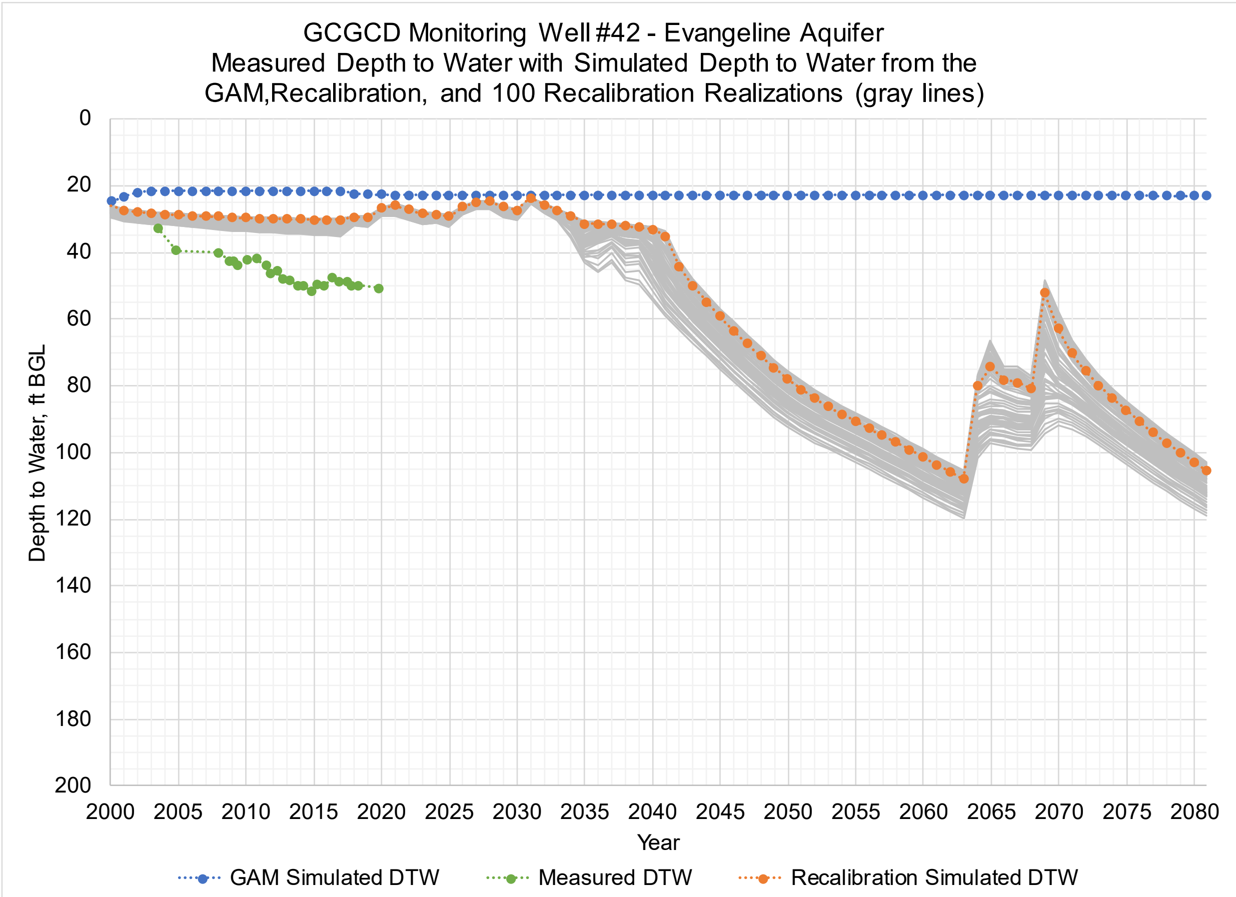

GCGCD Monitoring Well #33 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

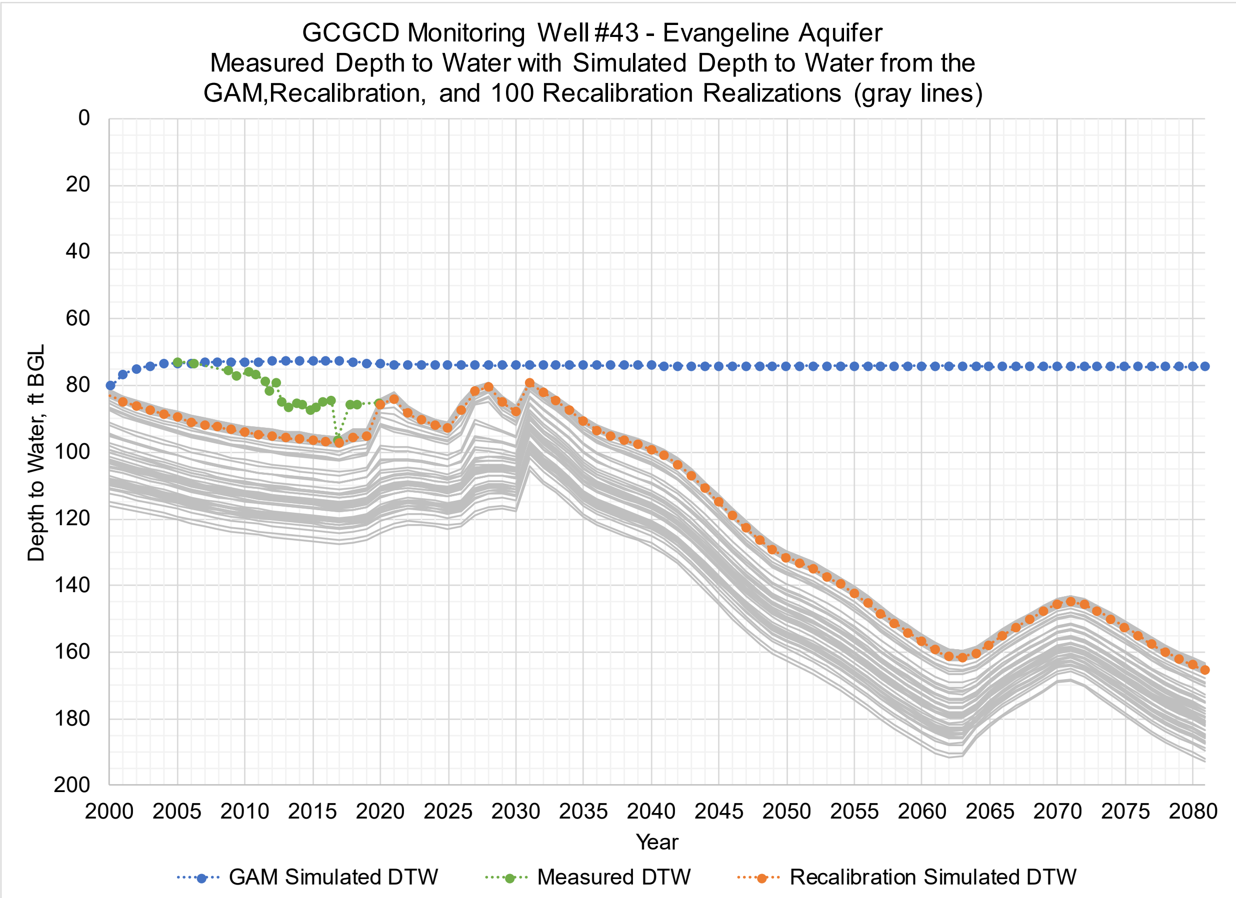

GCGCD Monitoring Well #36 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

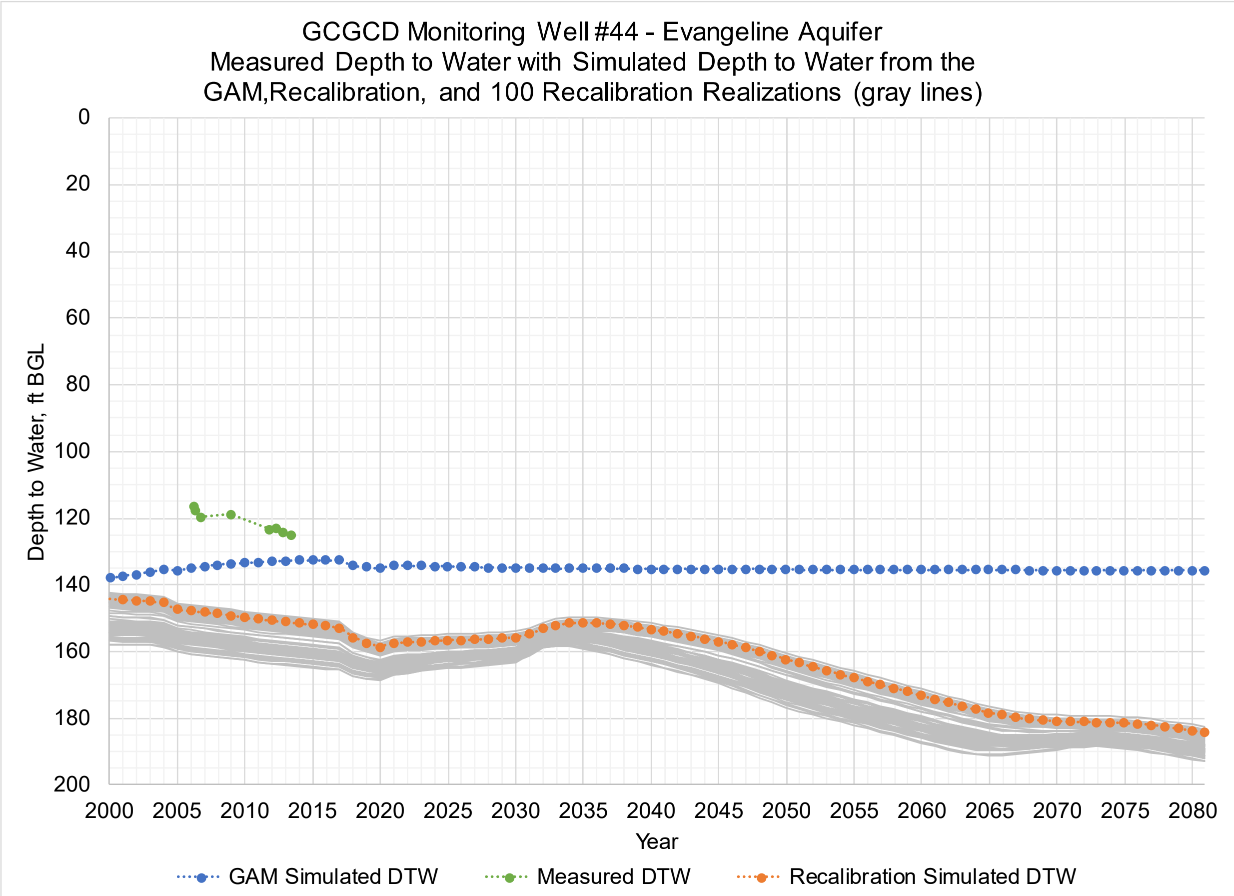

GCGCD Monitoring Well #37 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

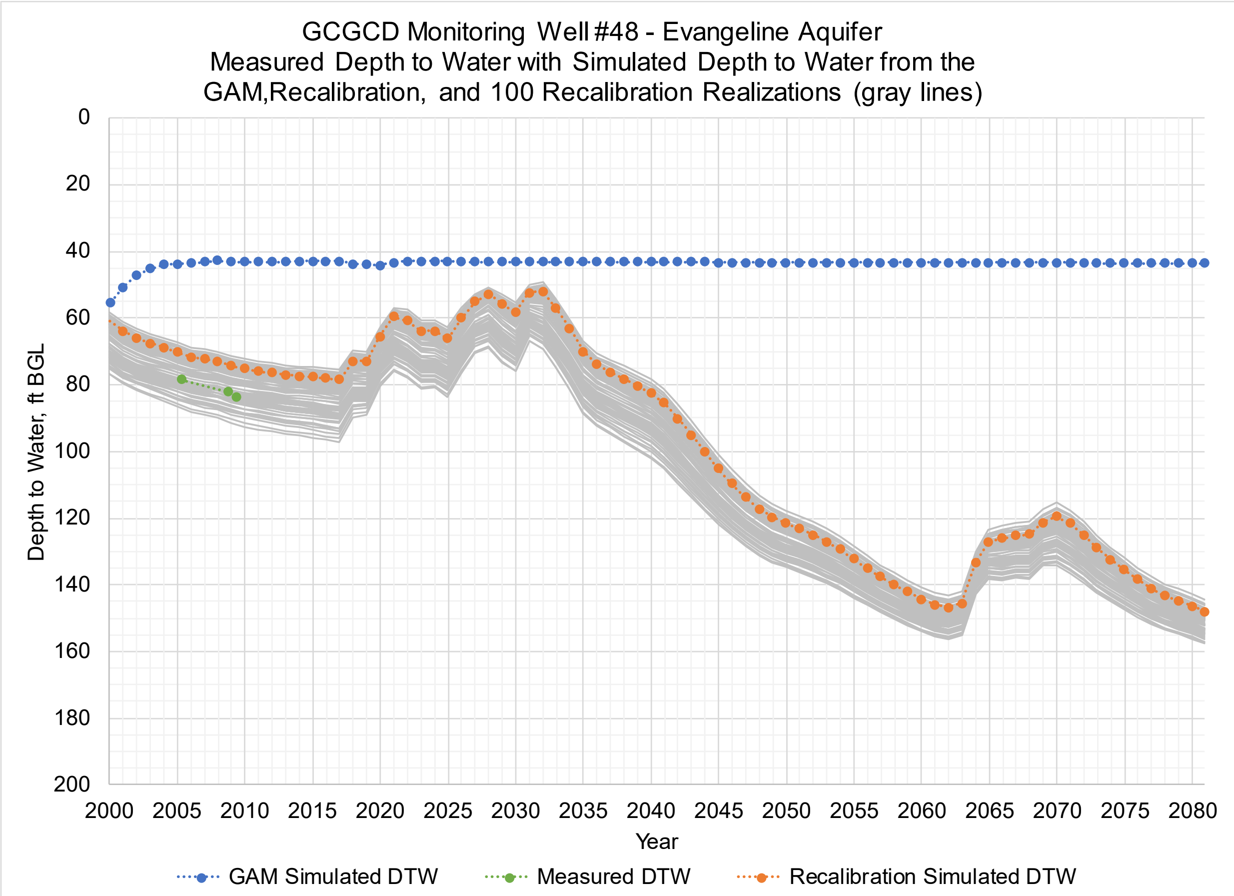

GCGCD Monitoring Well #40 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

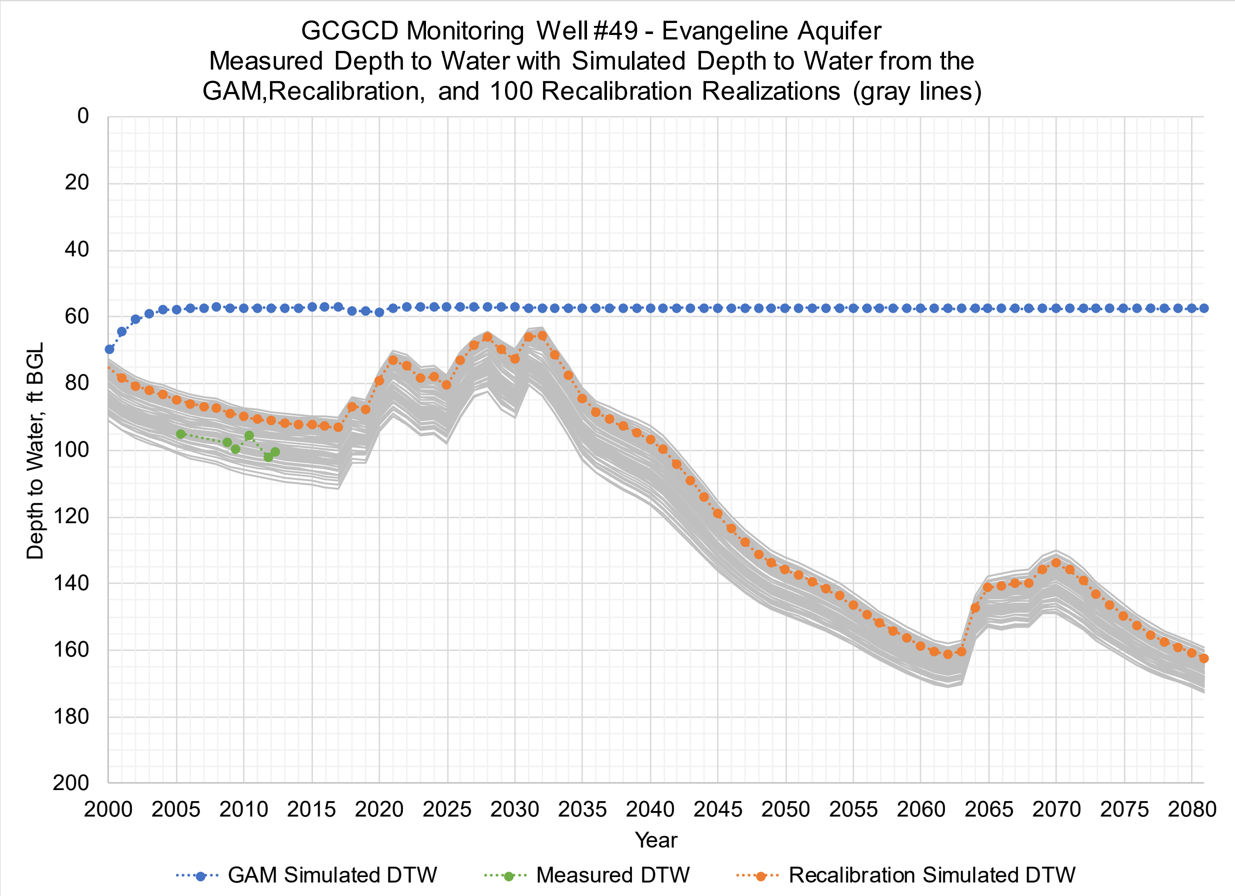

GCGCD Monitoring Well #41 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

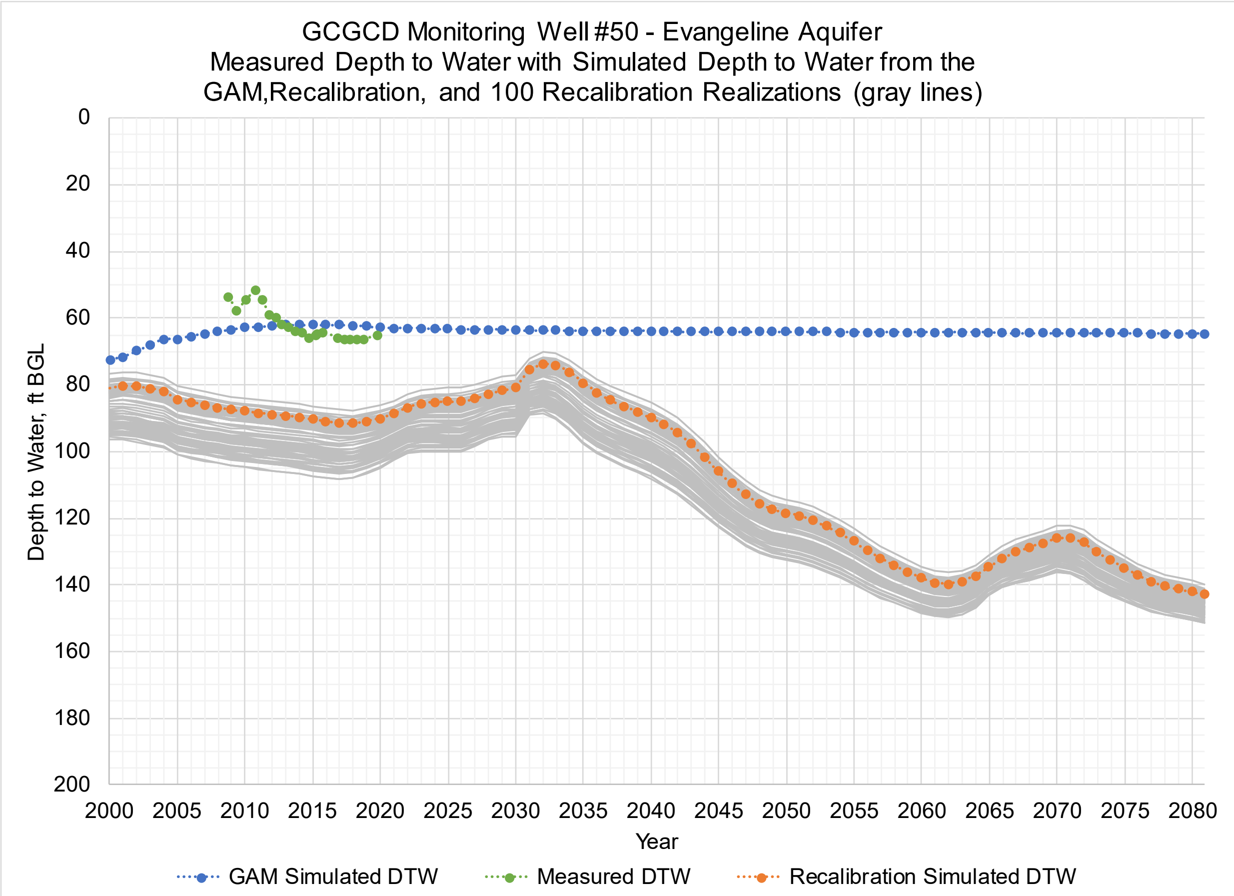

GCGCD Monitoring Well #42 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

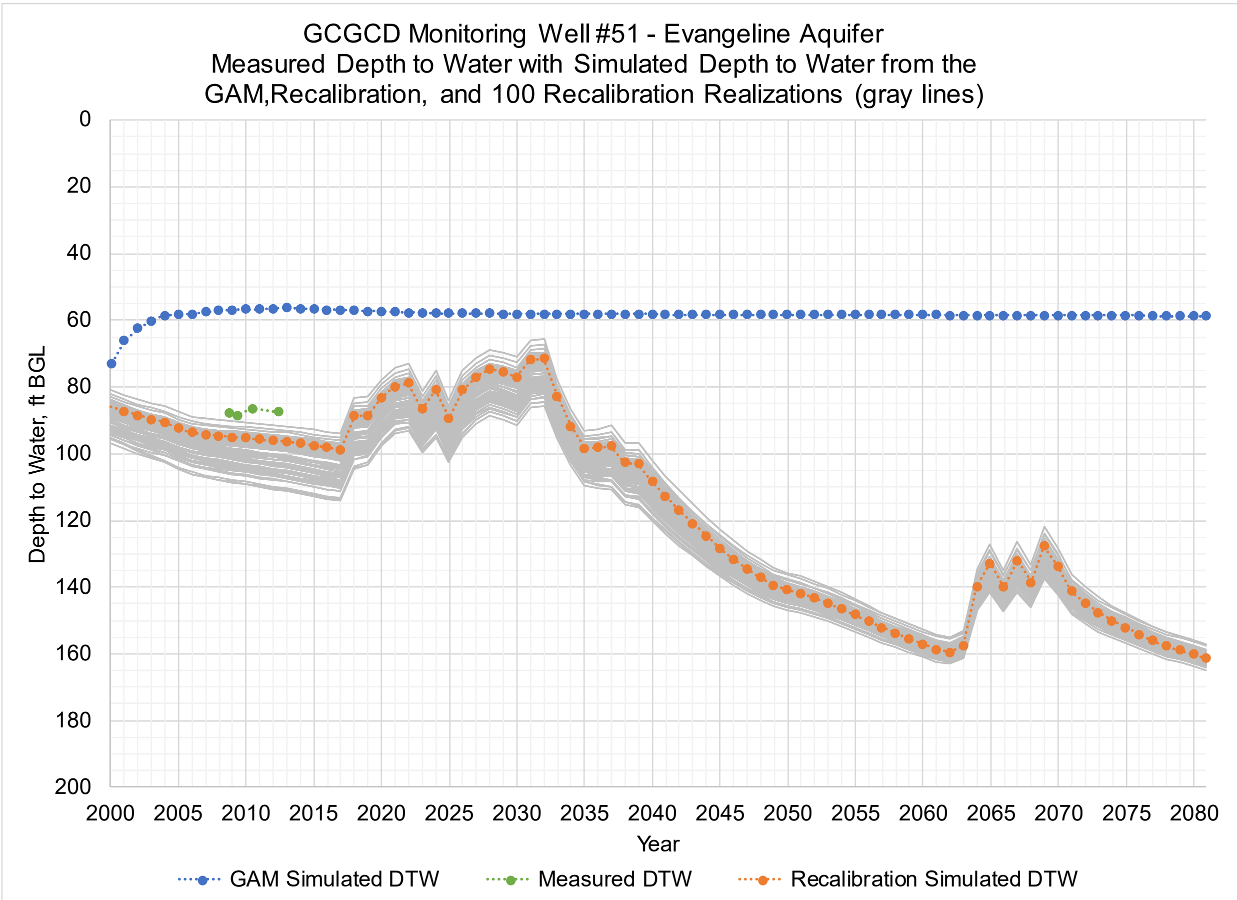

GCGCD Monitoring Well #43 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

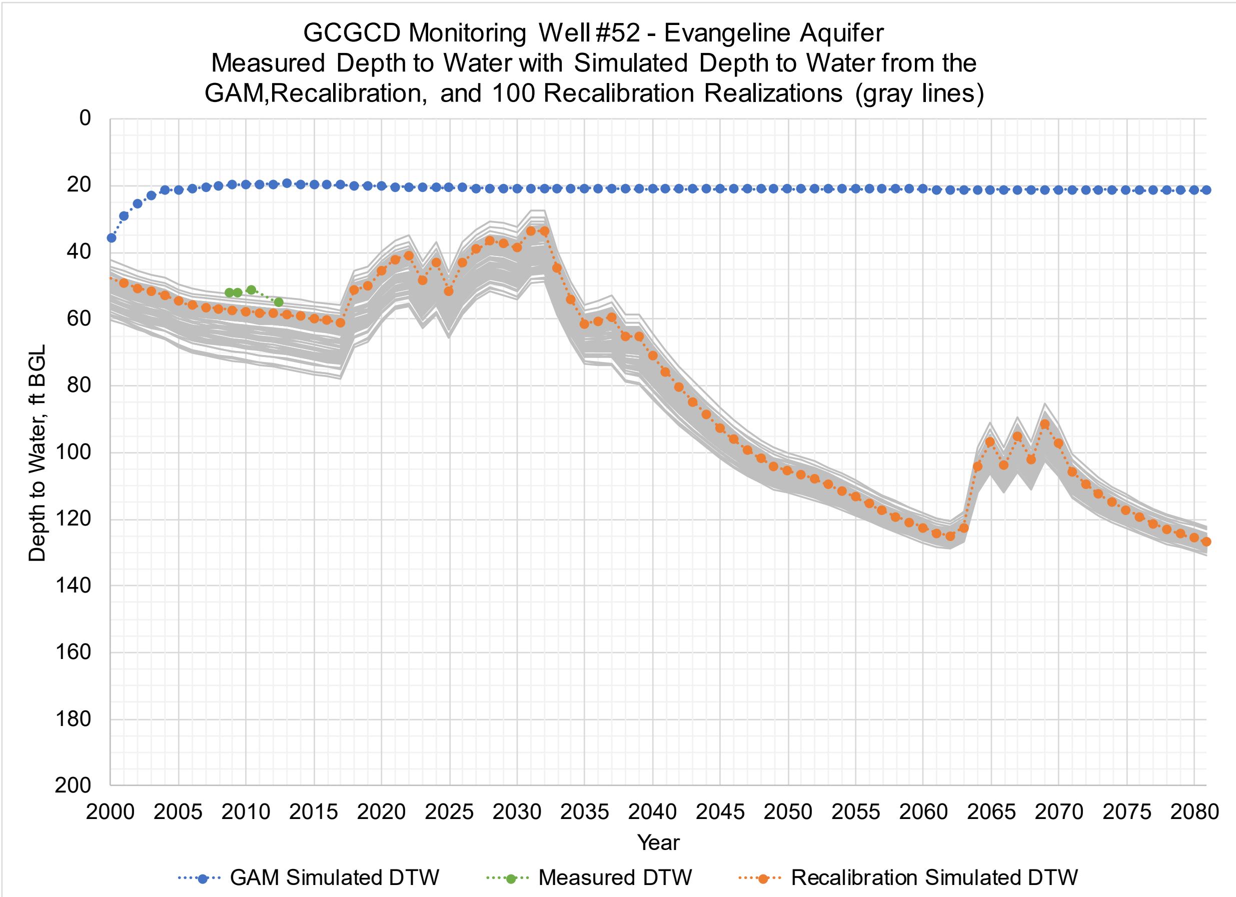

GCGCD Monitoring Well #44 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

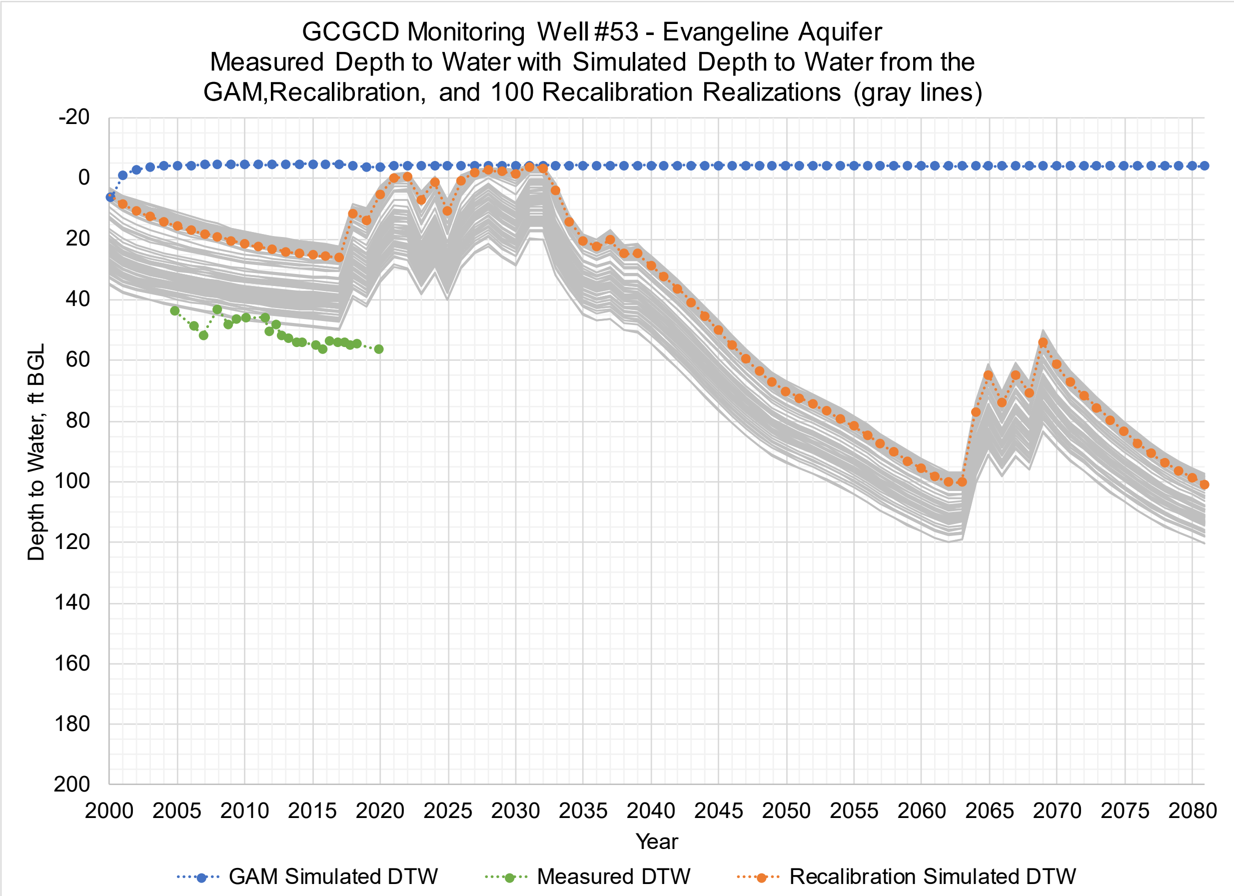

GCGCD Monitoring Well #48 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

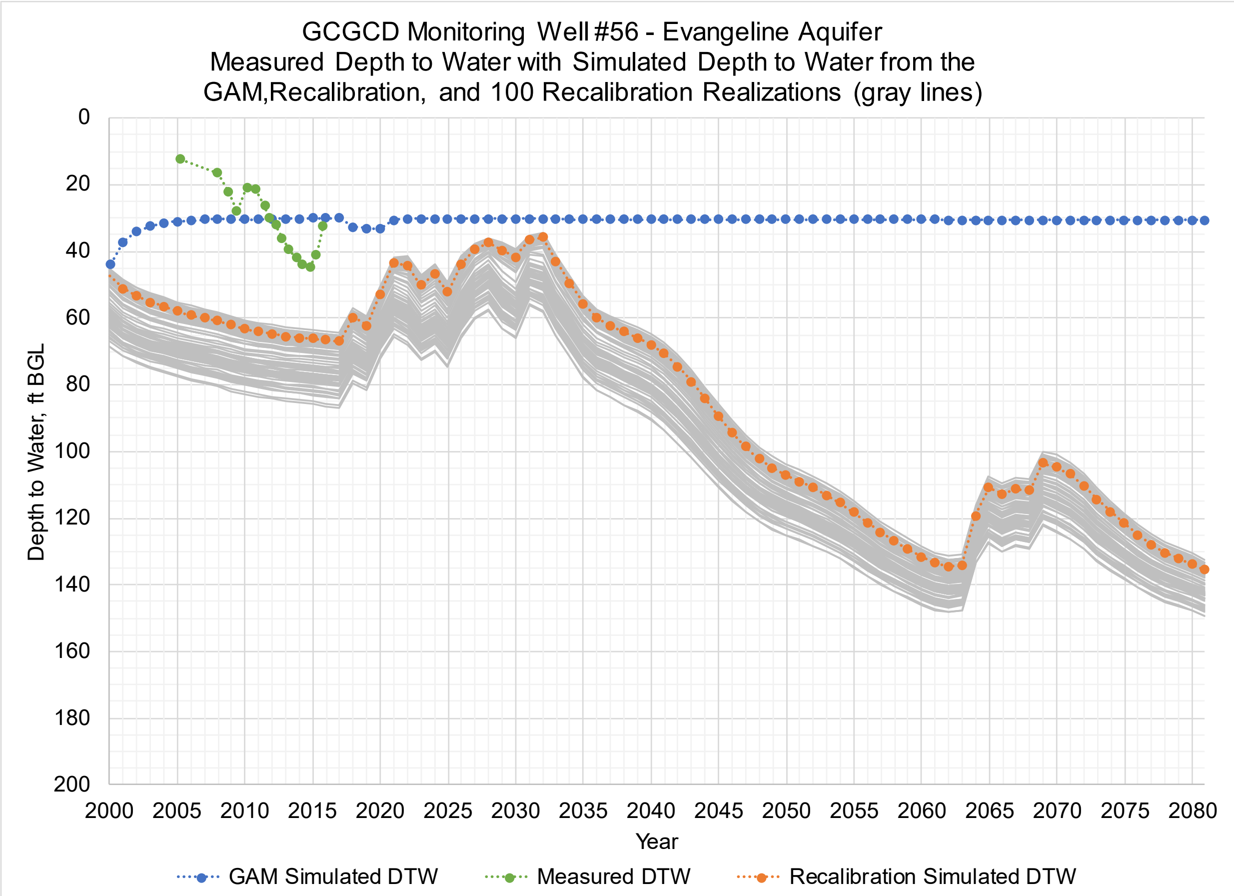

GCGCD Monitoring Well #49 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

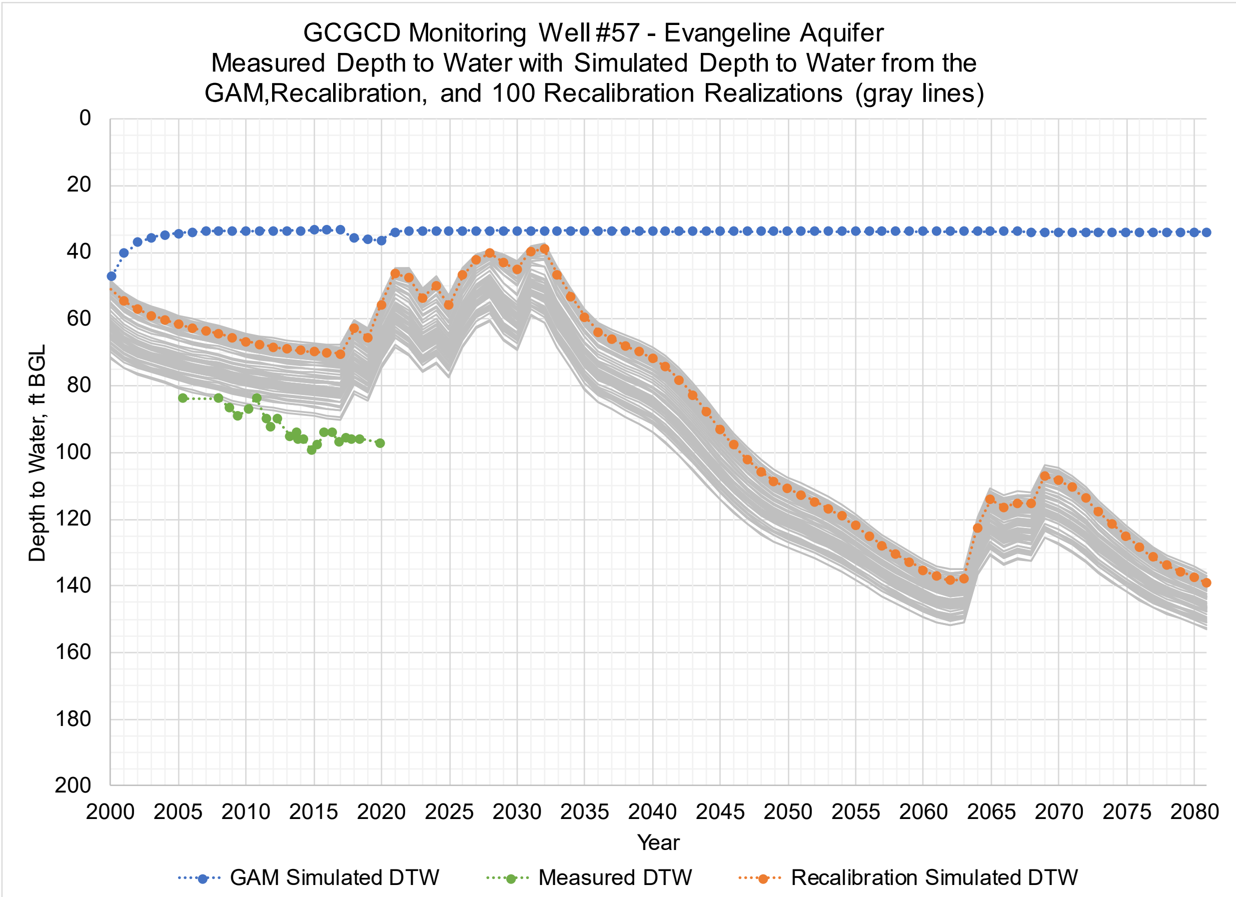

GCGCD Monitoring Well #50 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

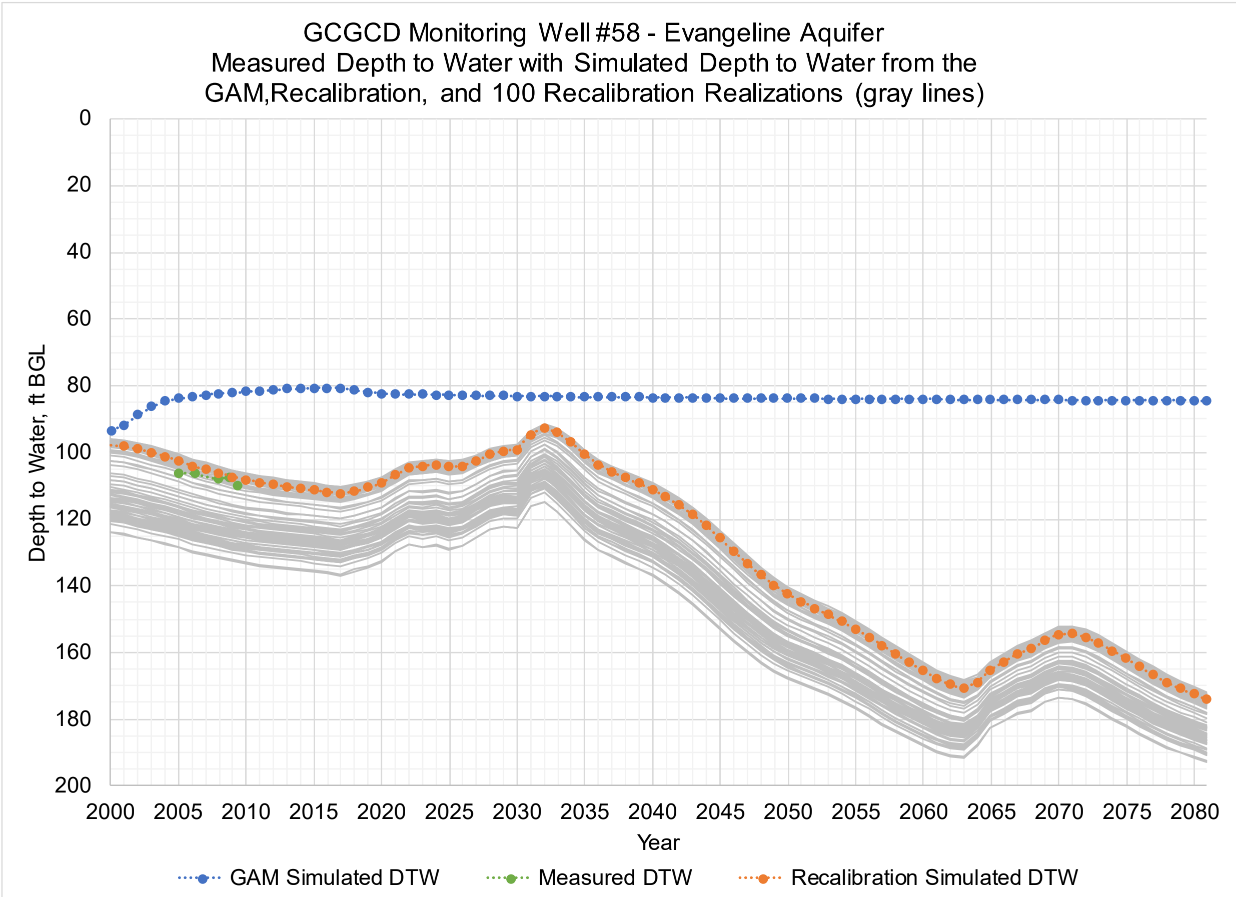

GCGCD Monitoring Well #51 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

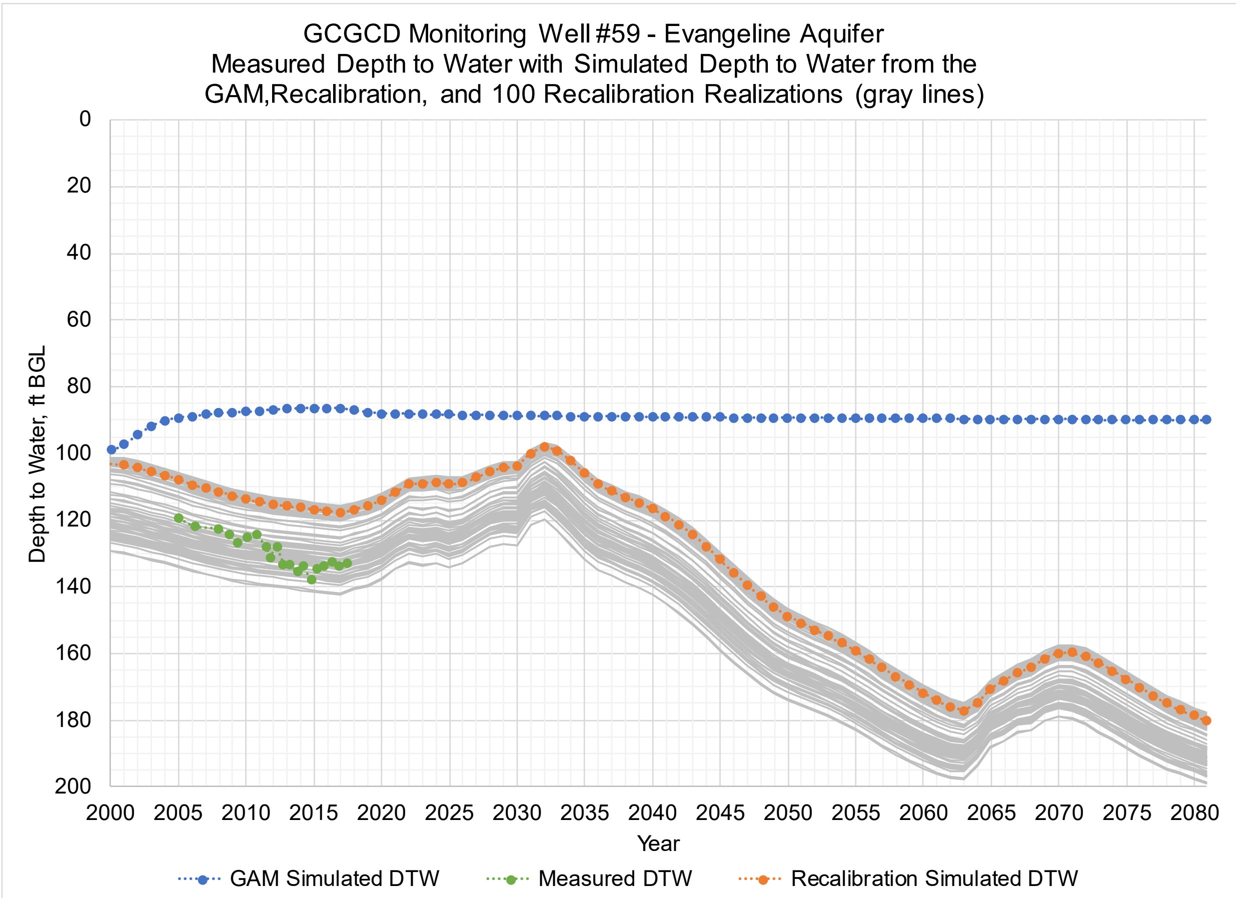

GCGCD Monitoring Well #52 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

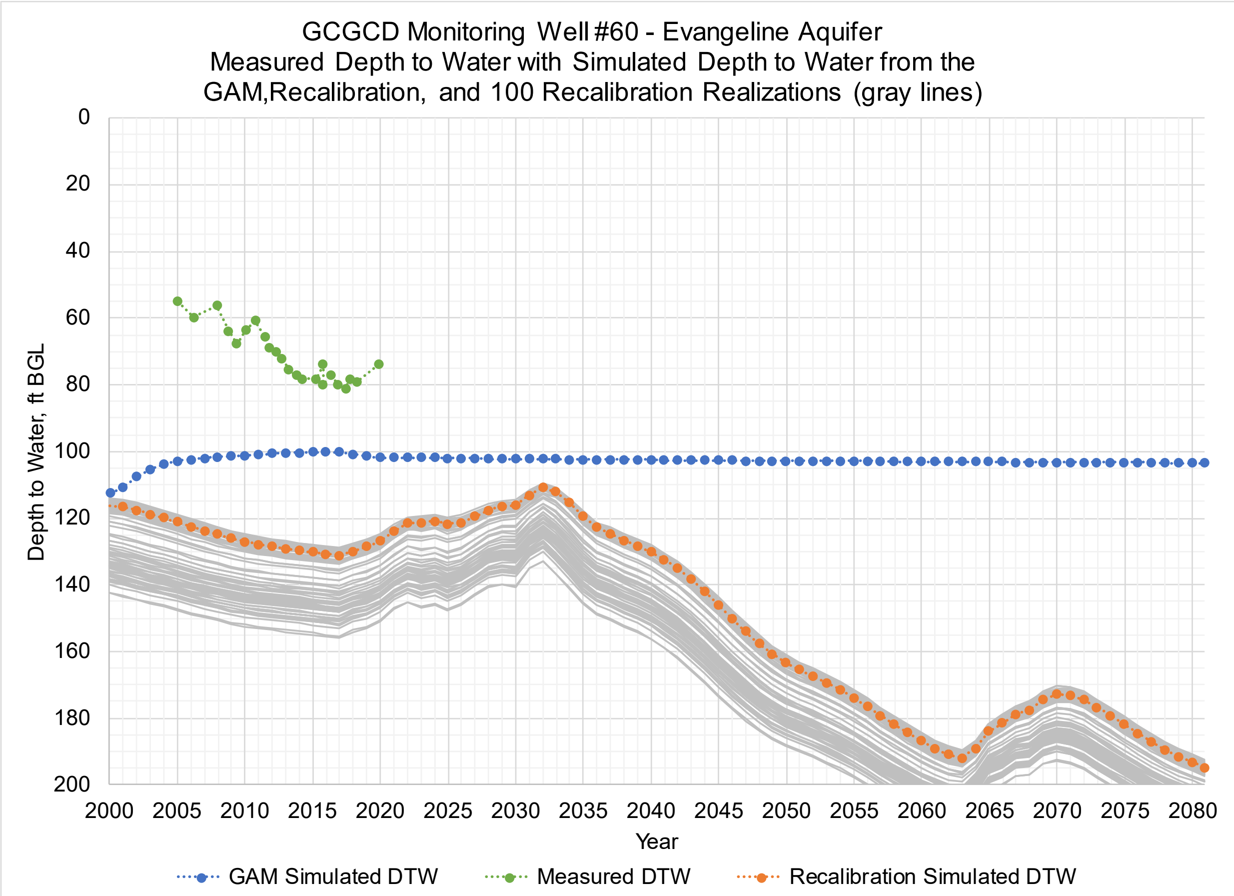

GCGCD Monitoring Well #53 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

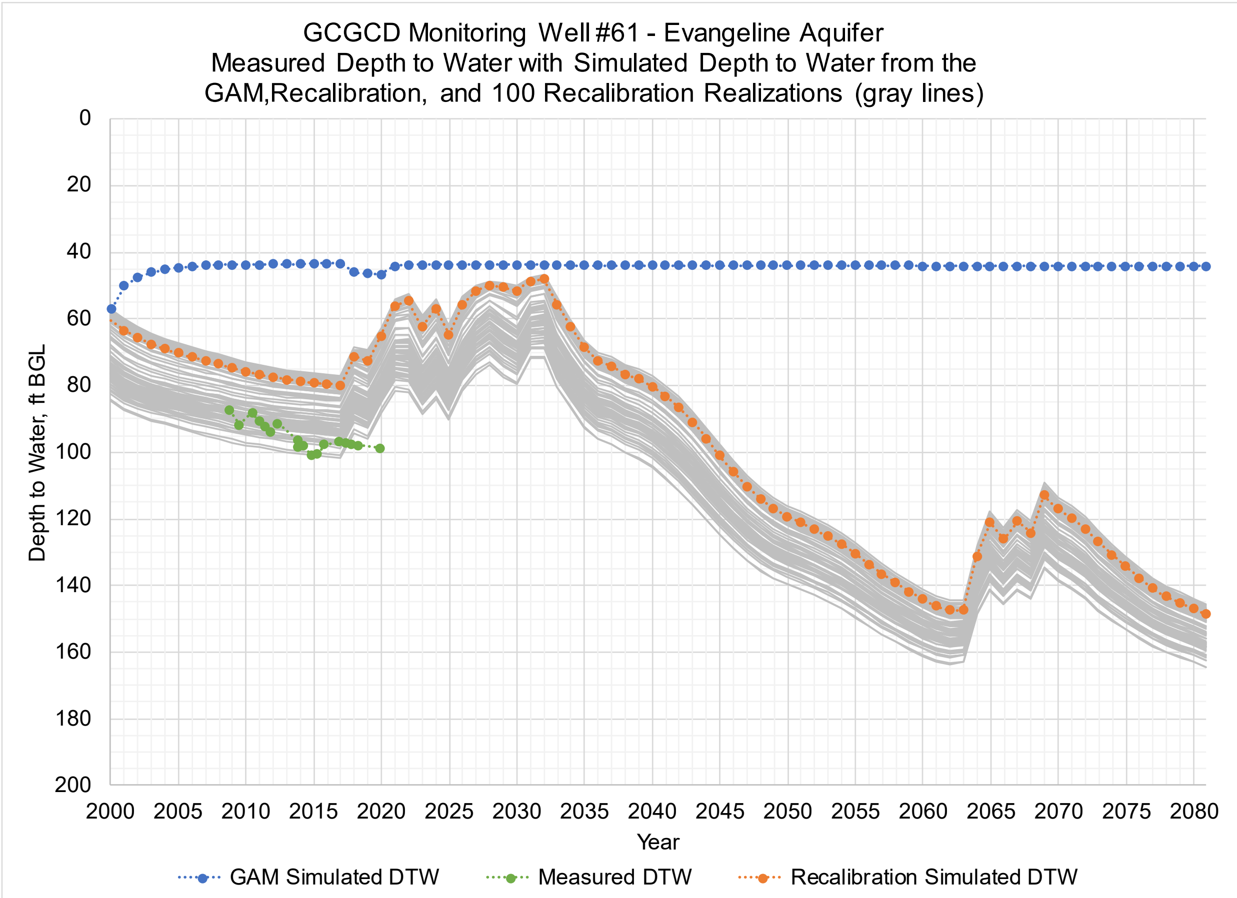

GCGCD Monitoring Well #56 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

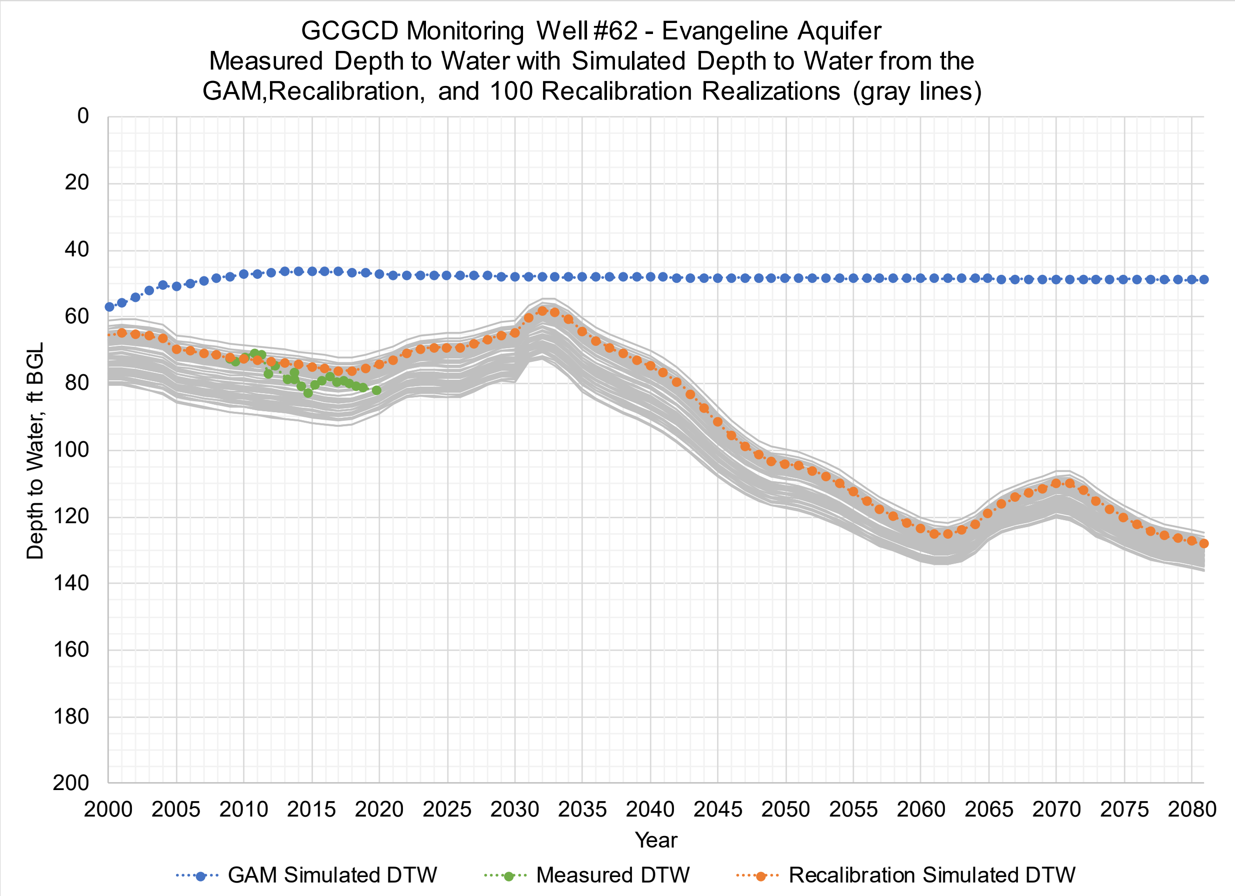

GCGCD Monitoring Well #57 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

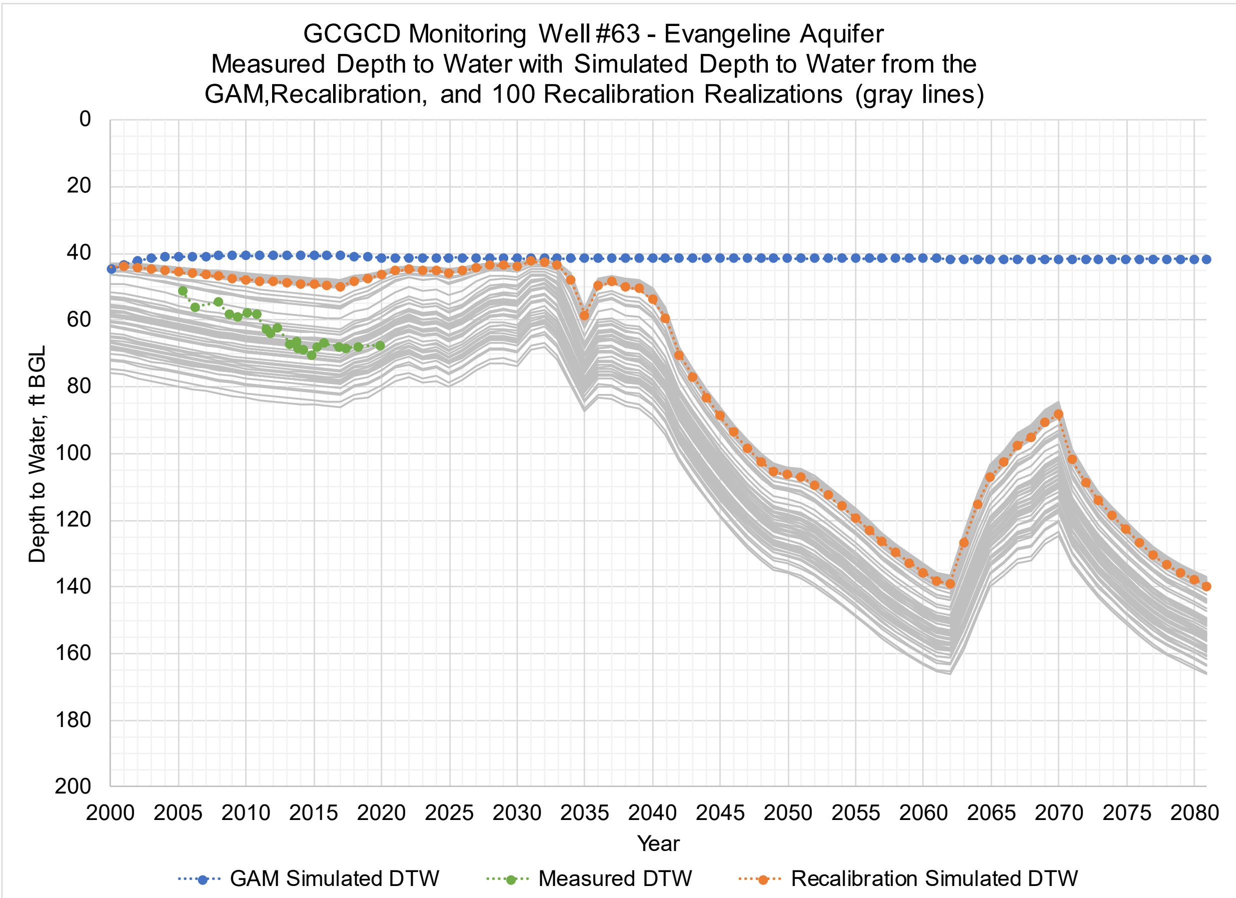

GCGCD Monitoring Well #58 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

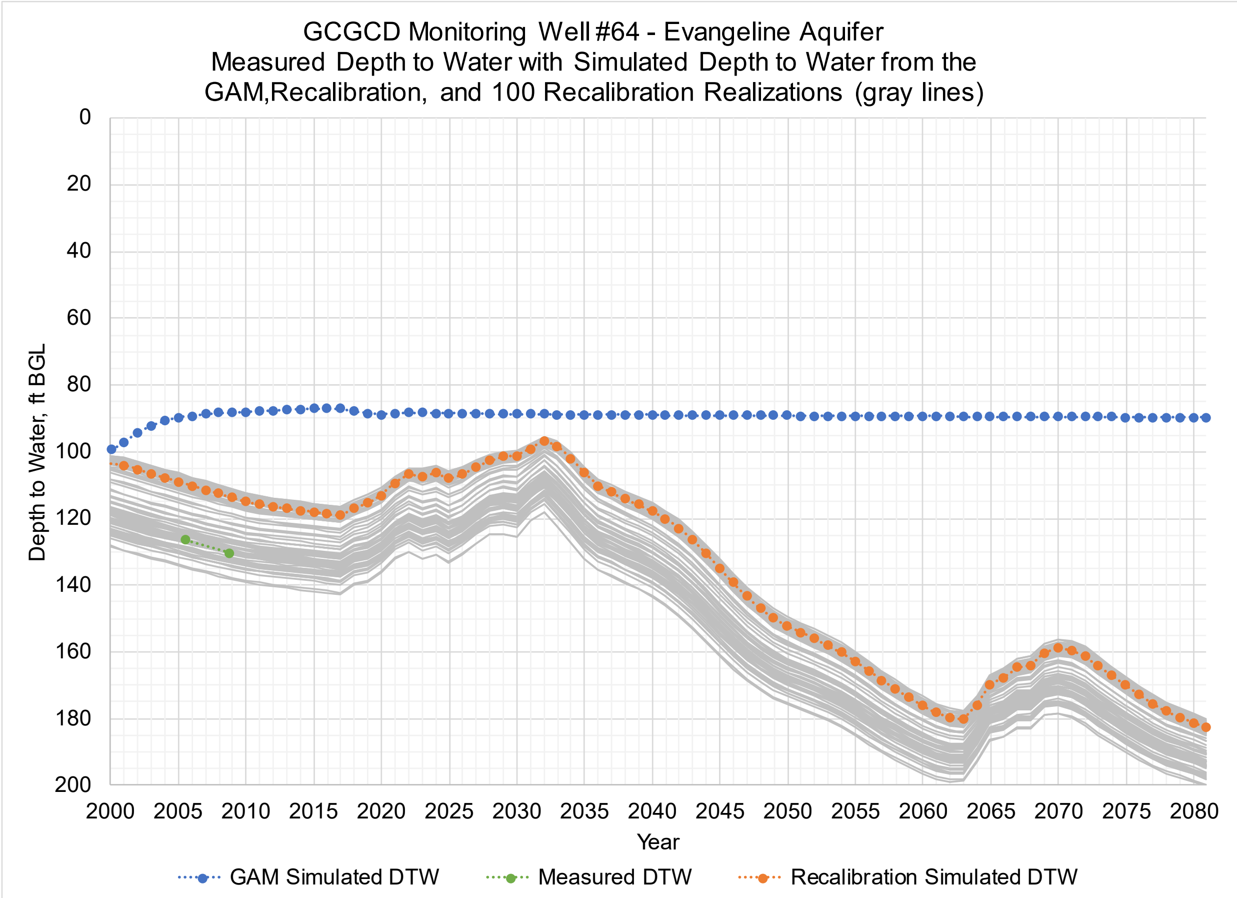

GCGCD Monitoring Well #59 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

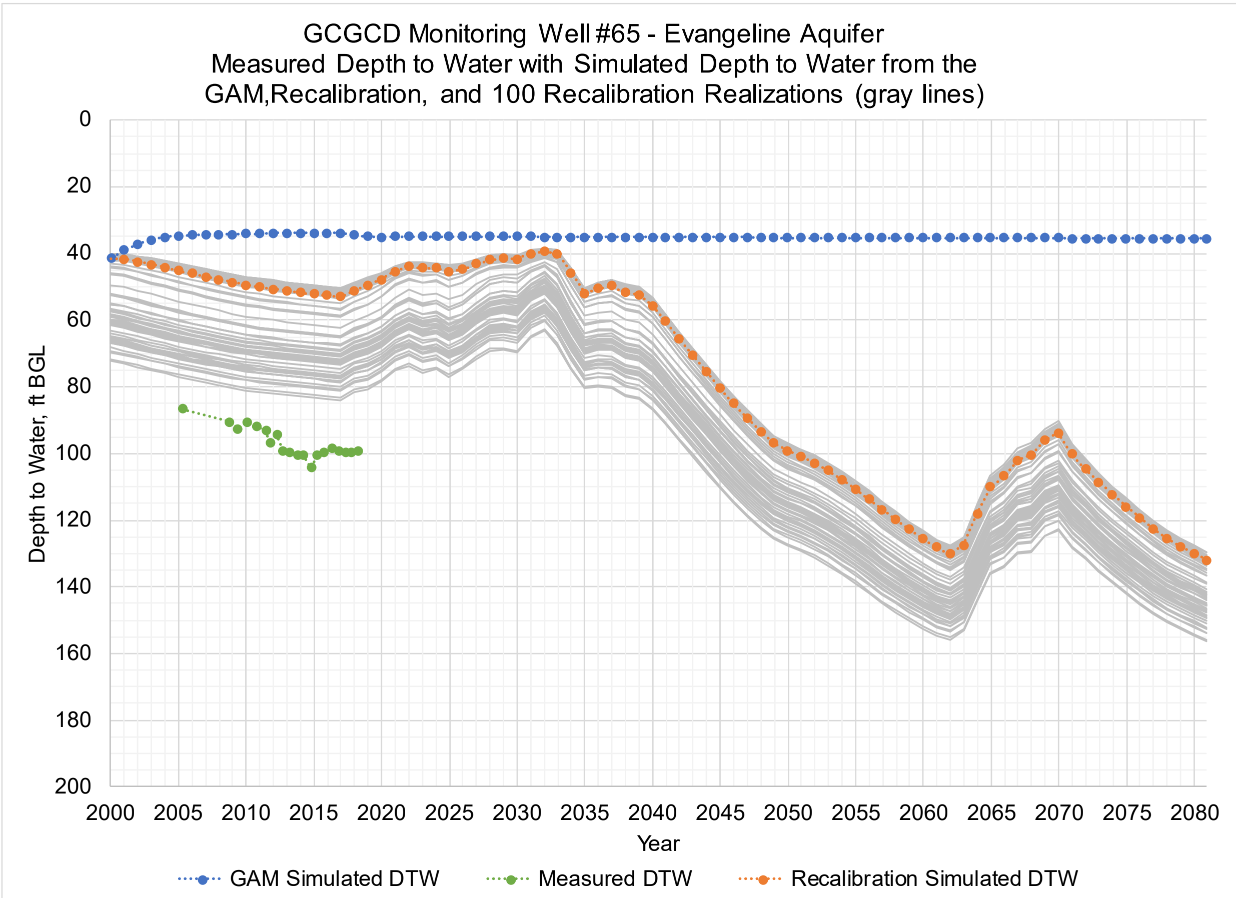

GCGCD Monitoring Well #60 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

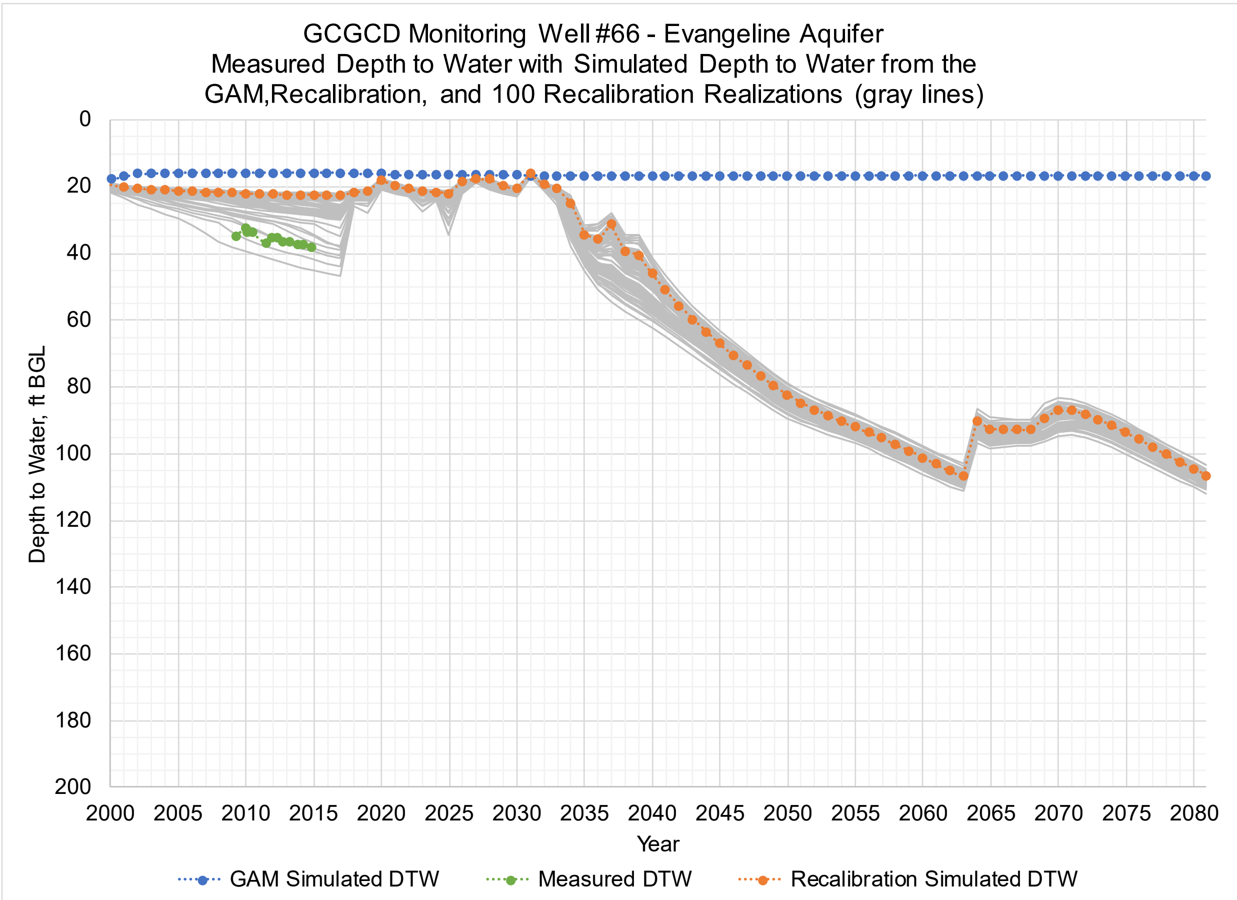

GCGCD Monitoring Well #61 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

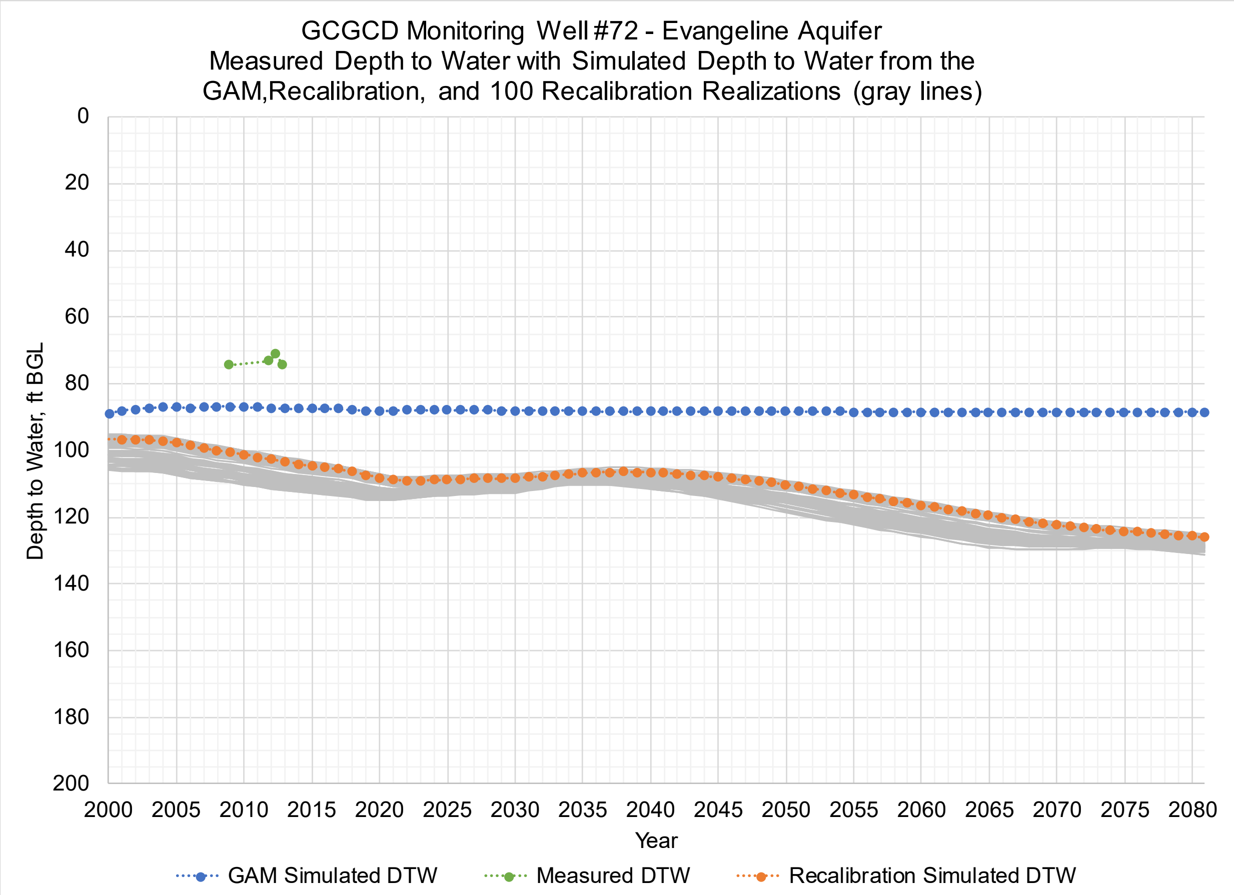

GCGCD Monitoring Well #62 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

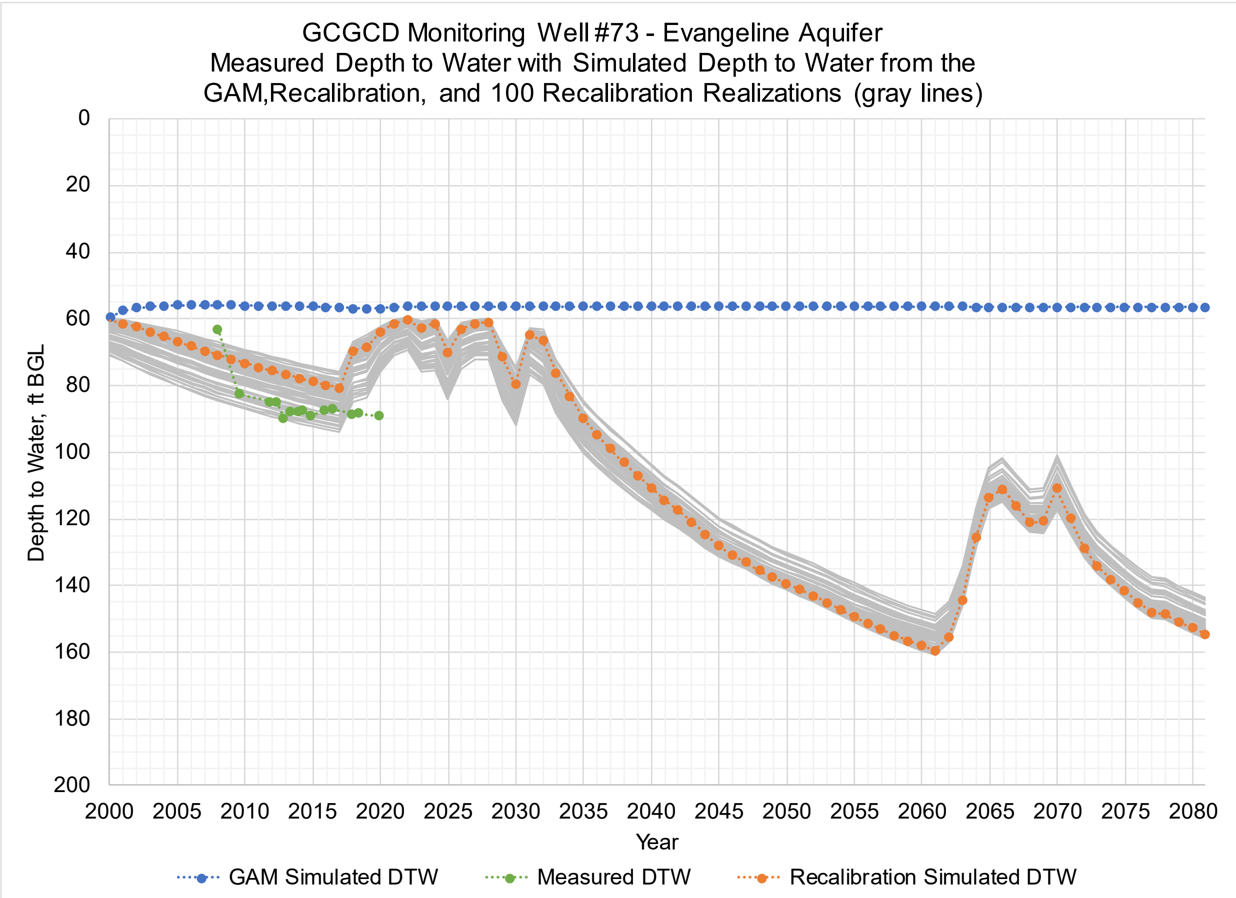

GCGCD Monitoring Well #63 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

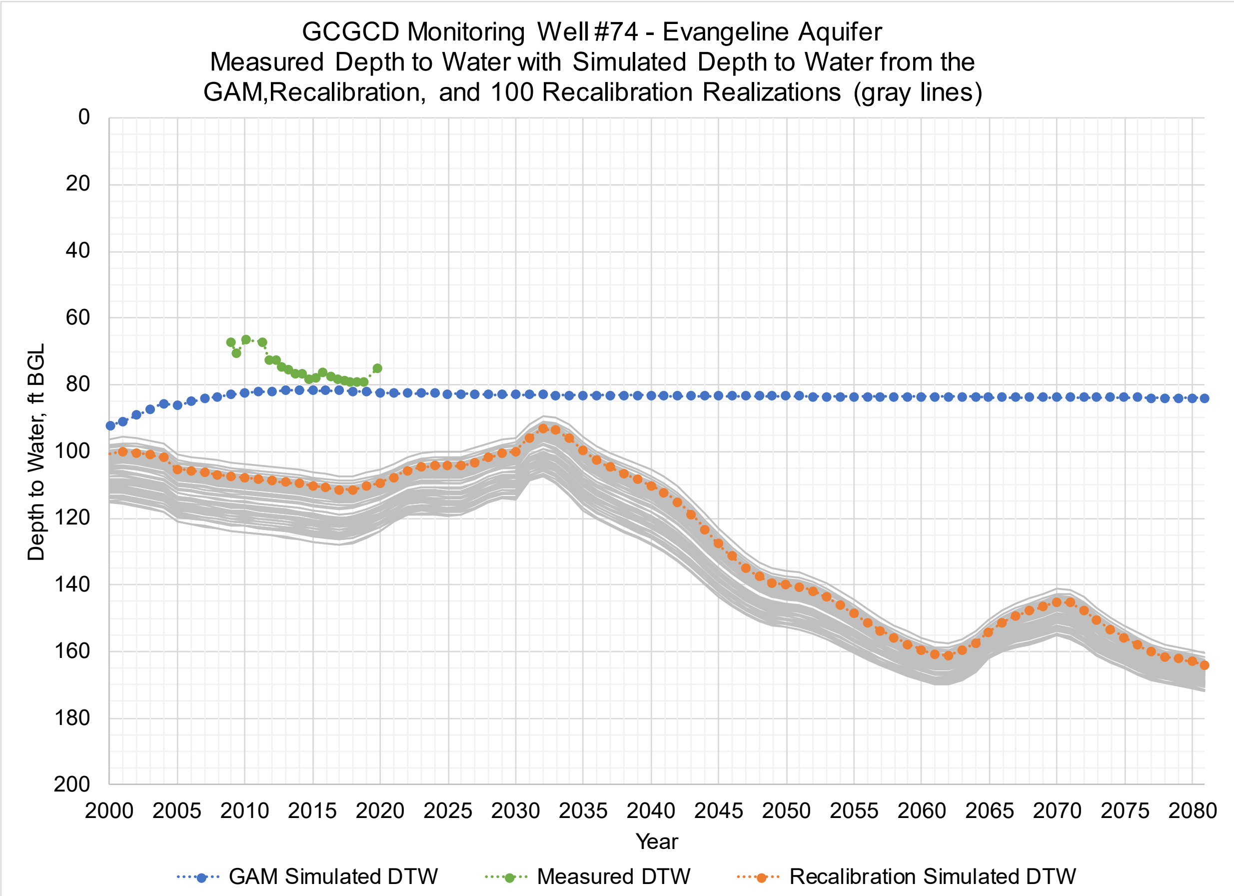

GCGCD Monitoring Well #64 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

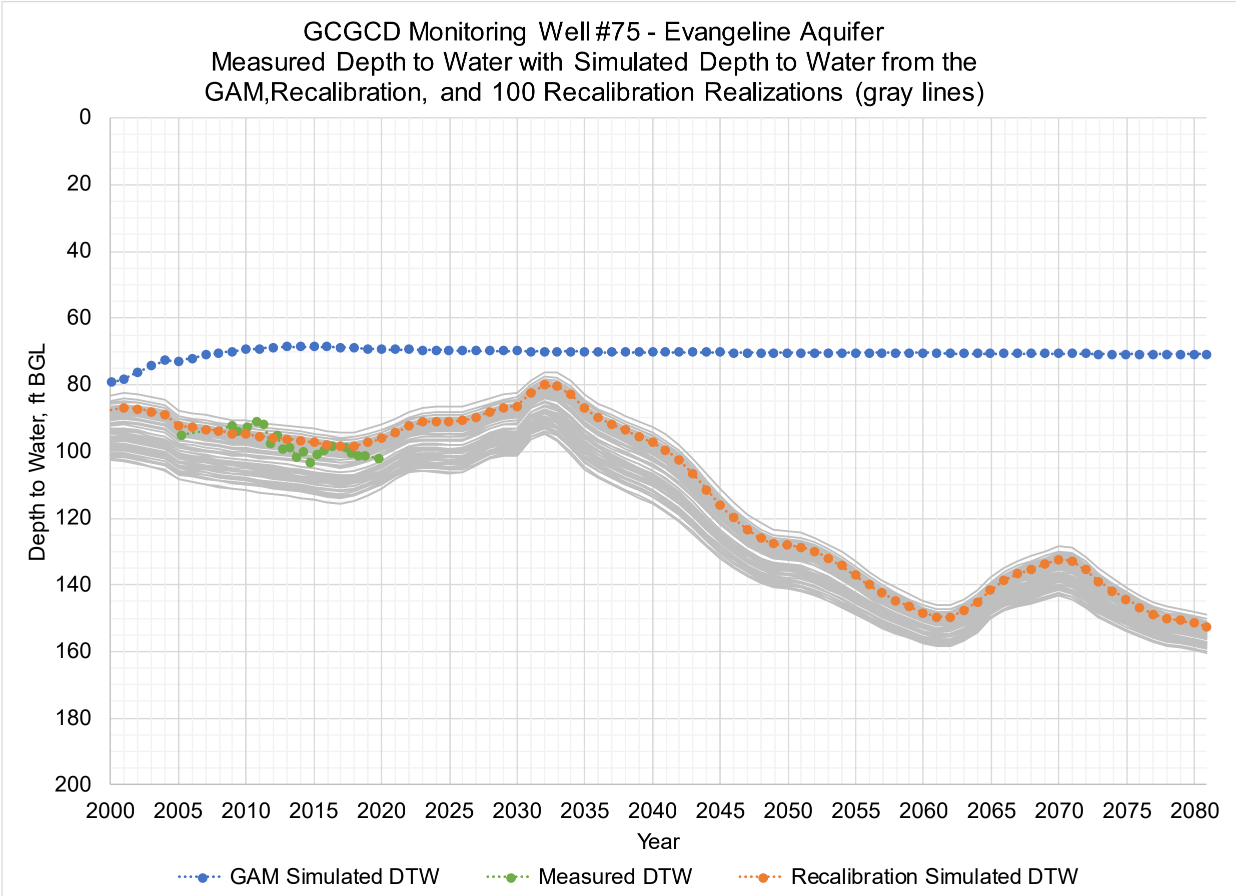

GCGCD Monitoring Well #65 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

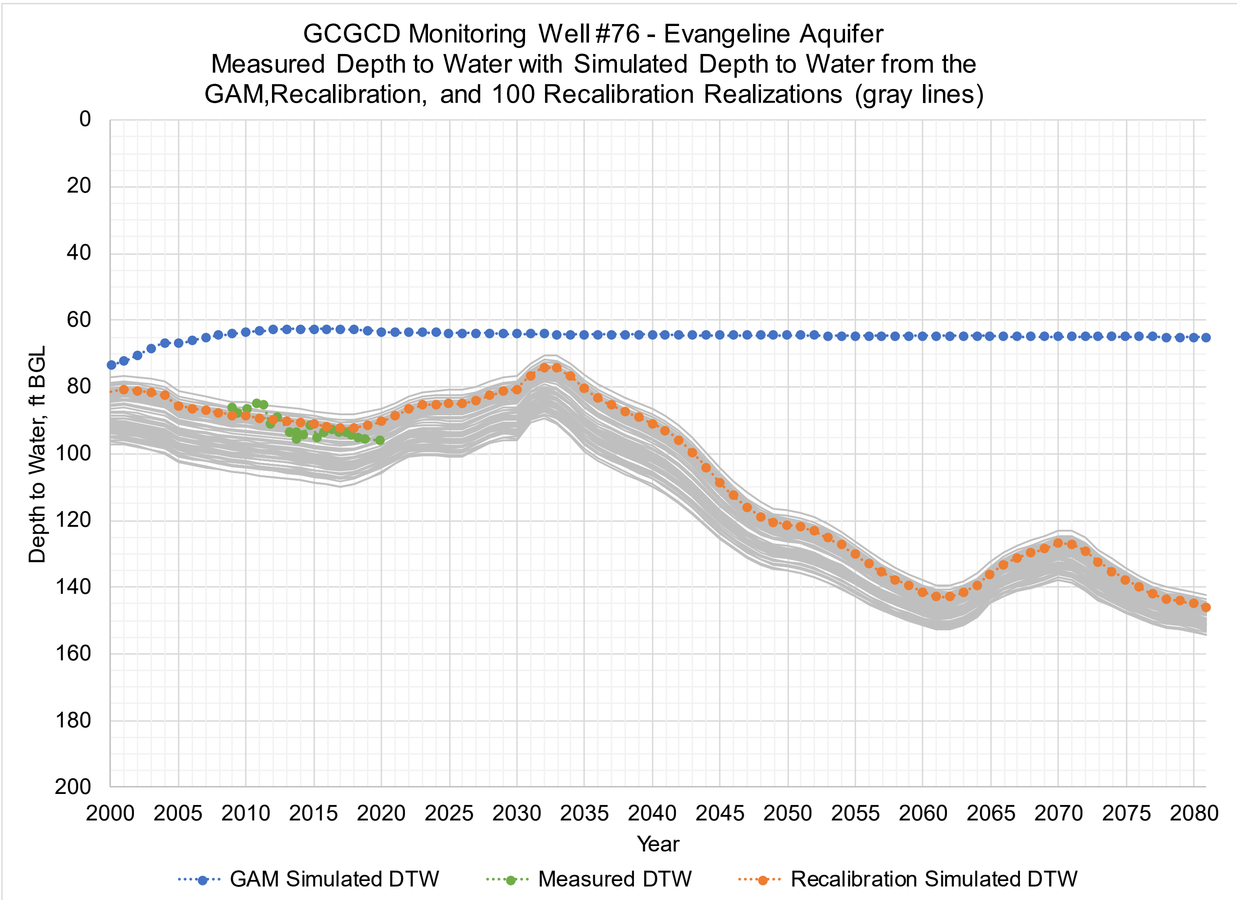

GCGCD Monitoring Well #66 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

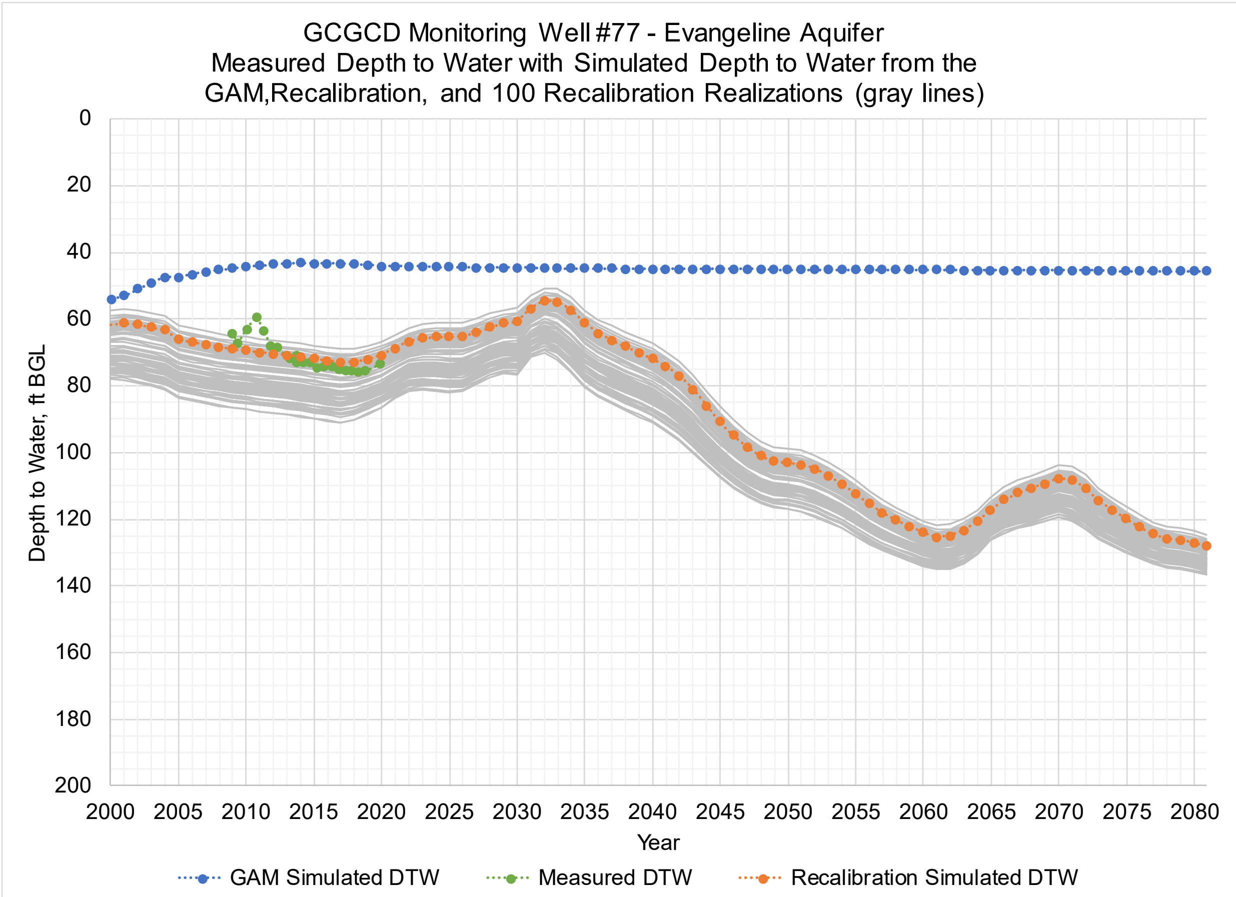

GCGCD Monitoring Well #72 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

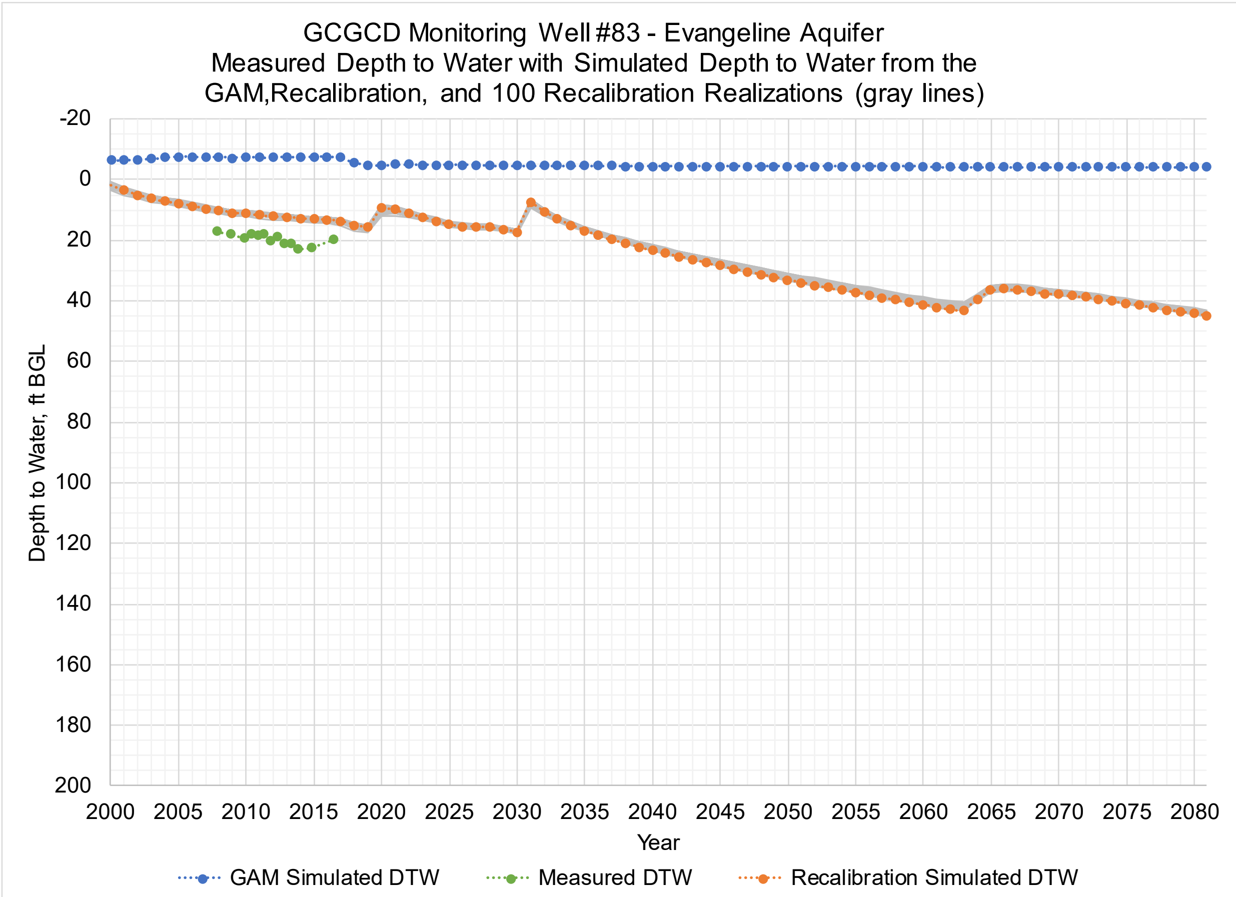

GCGCD Monitoring Well #73 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

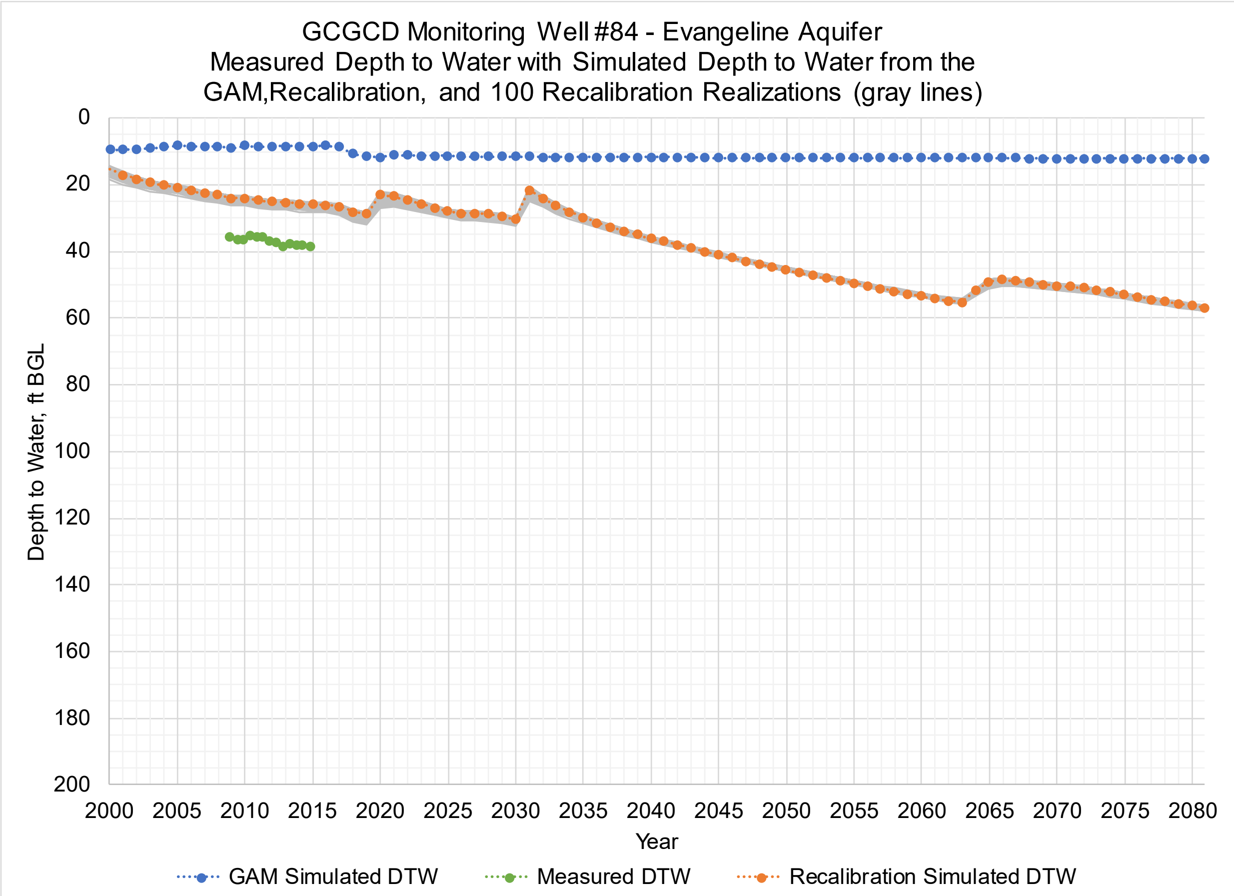

GCGCD Monitoring Well #74 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

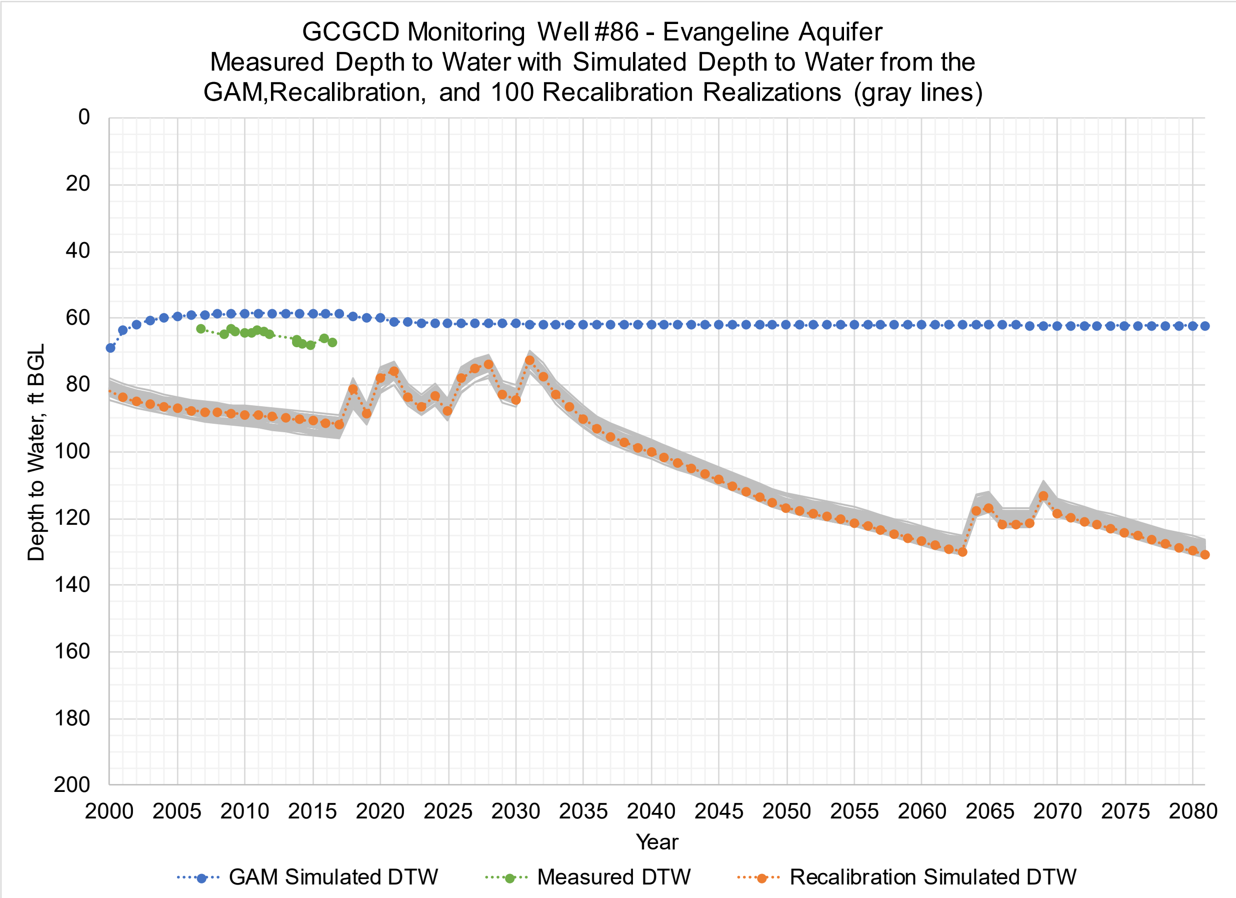

GCGCD Monitoring Well #75 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

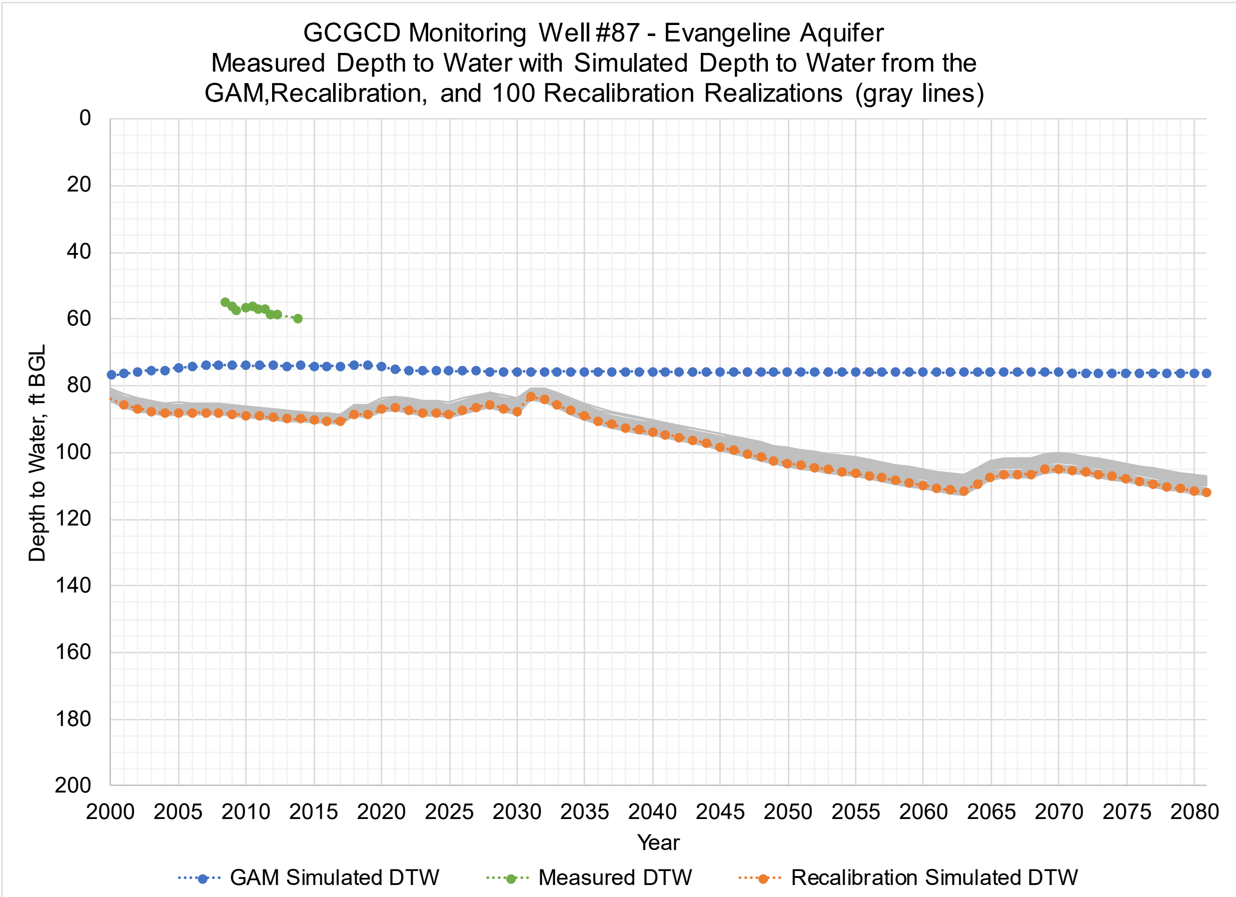

GCGCD Monitoring Well #76 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

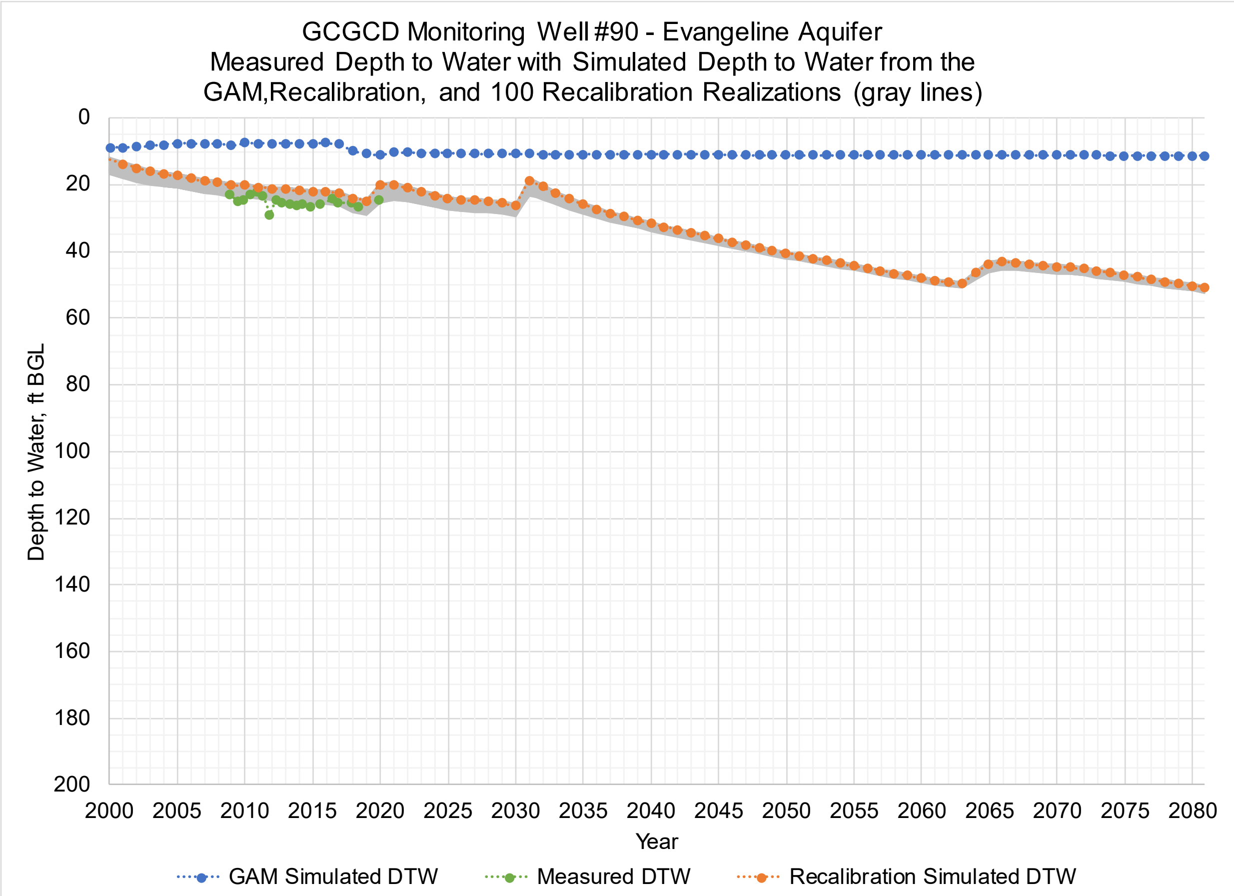

GCGCD Monitoring Well #77 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

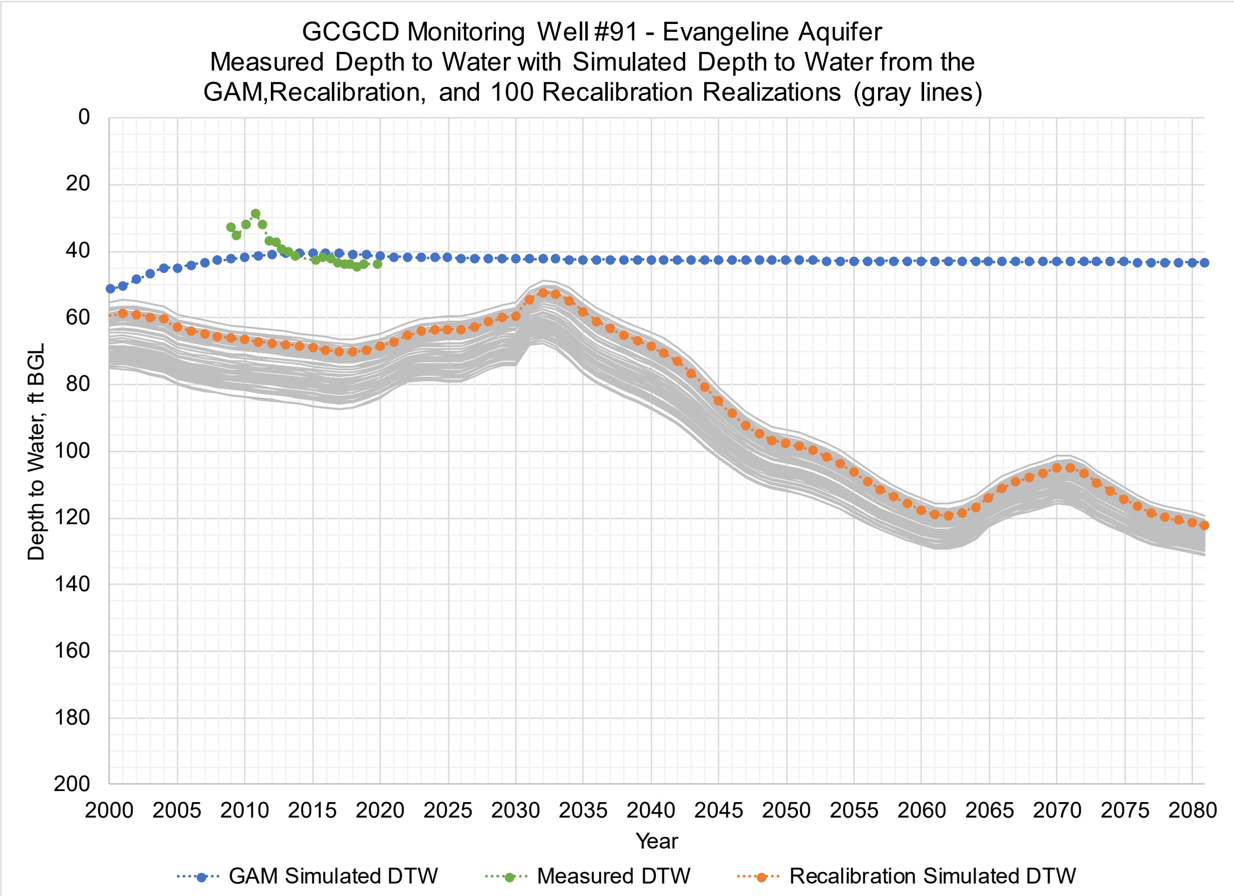

GCGCD Monitoring Well #83 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

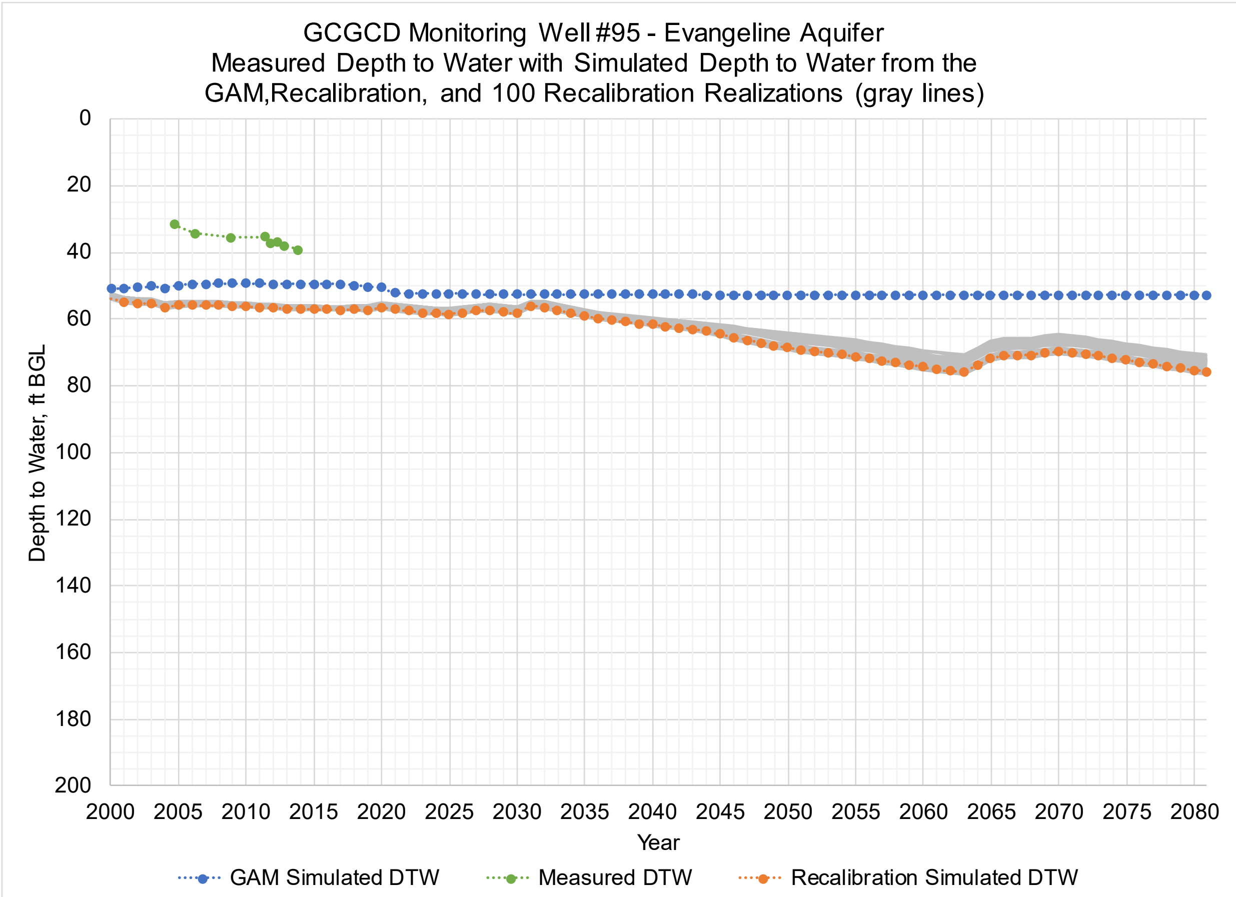

GCGCD Monitoring Well #84 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

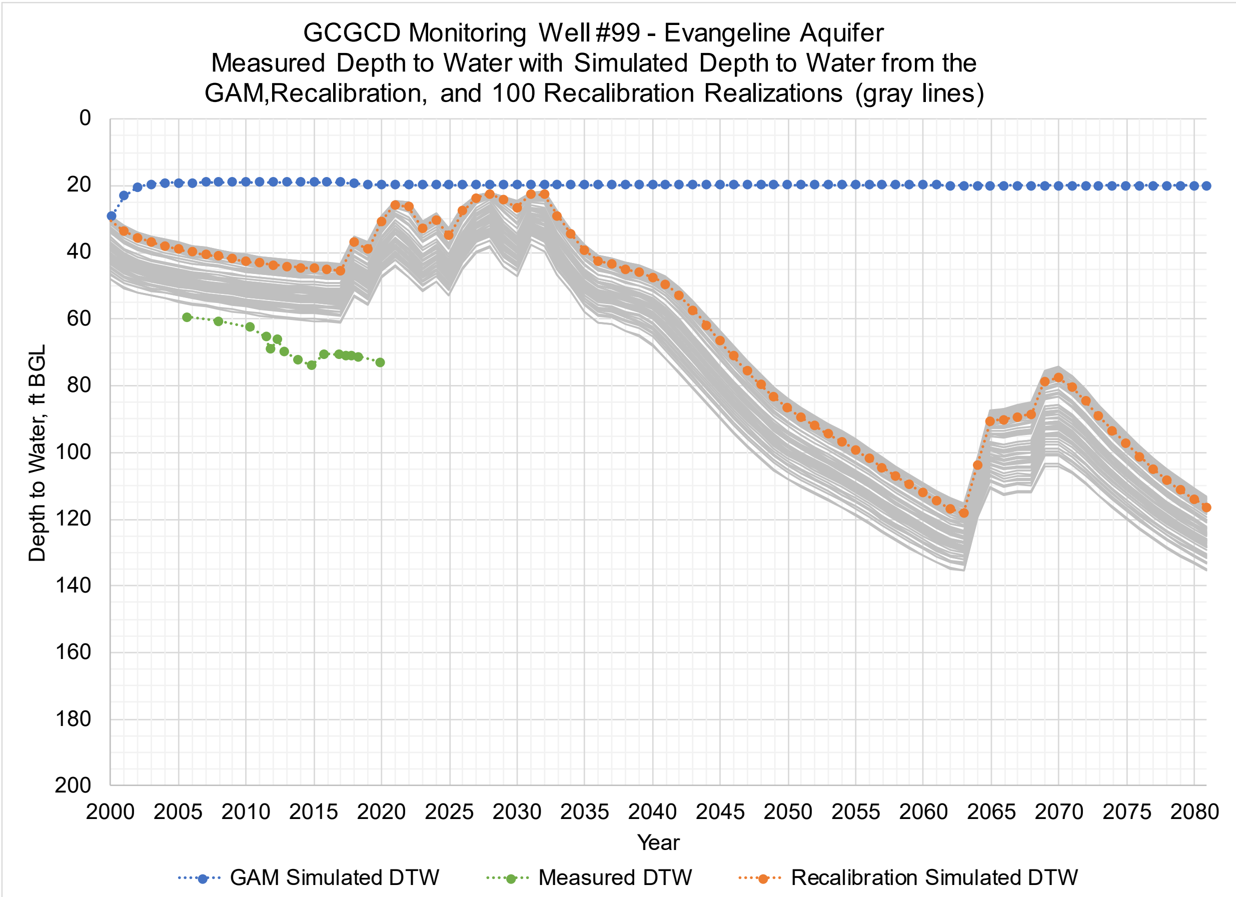

GCGCD Monitoring Well #86 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

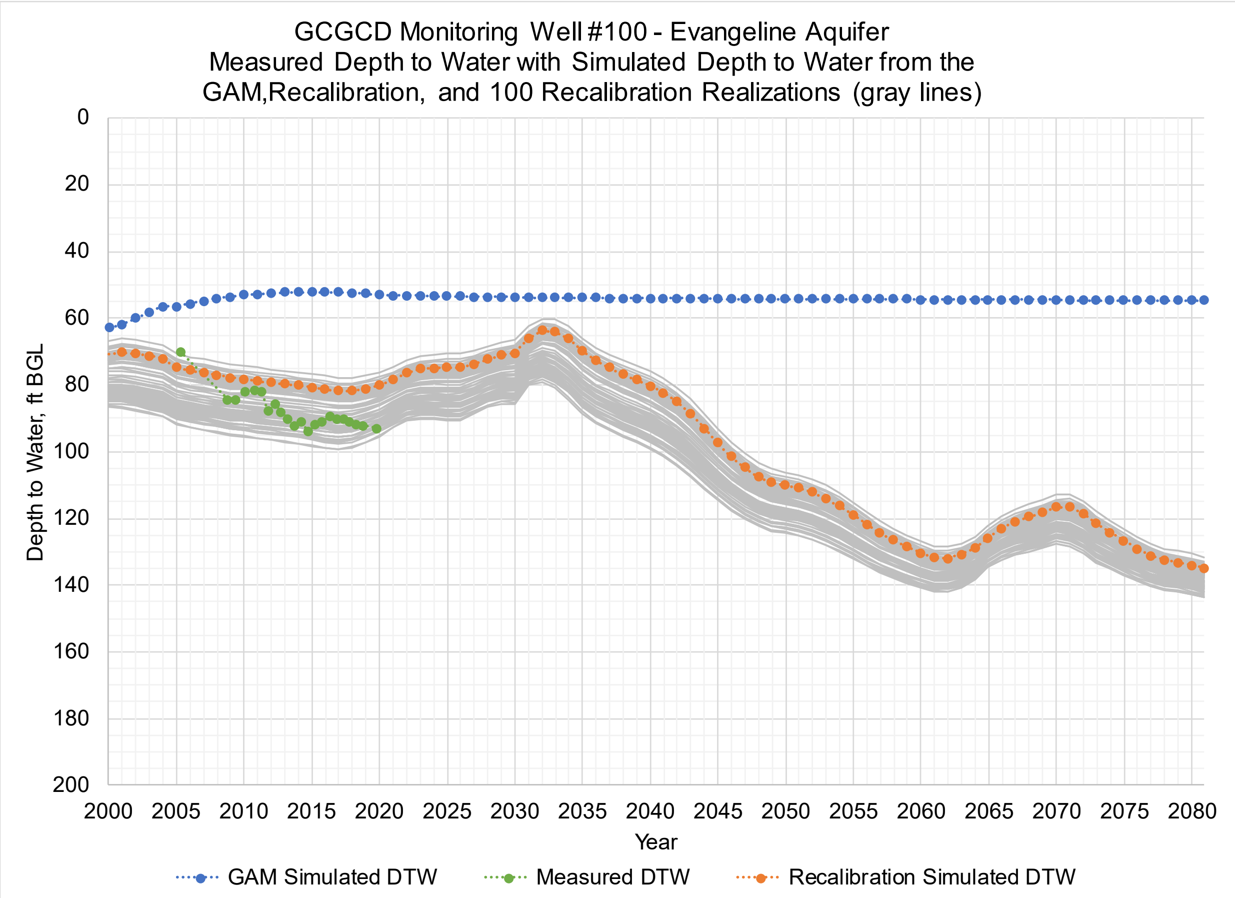

GCGCD Monitoring Well #87 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

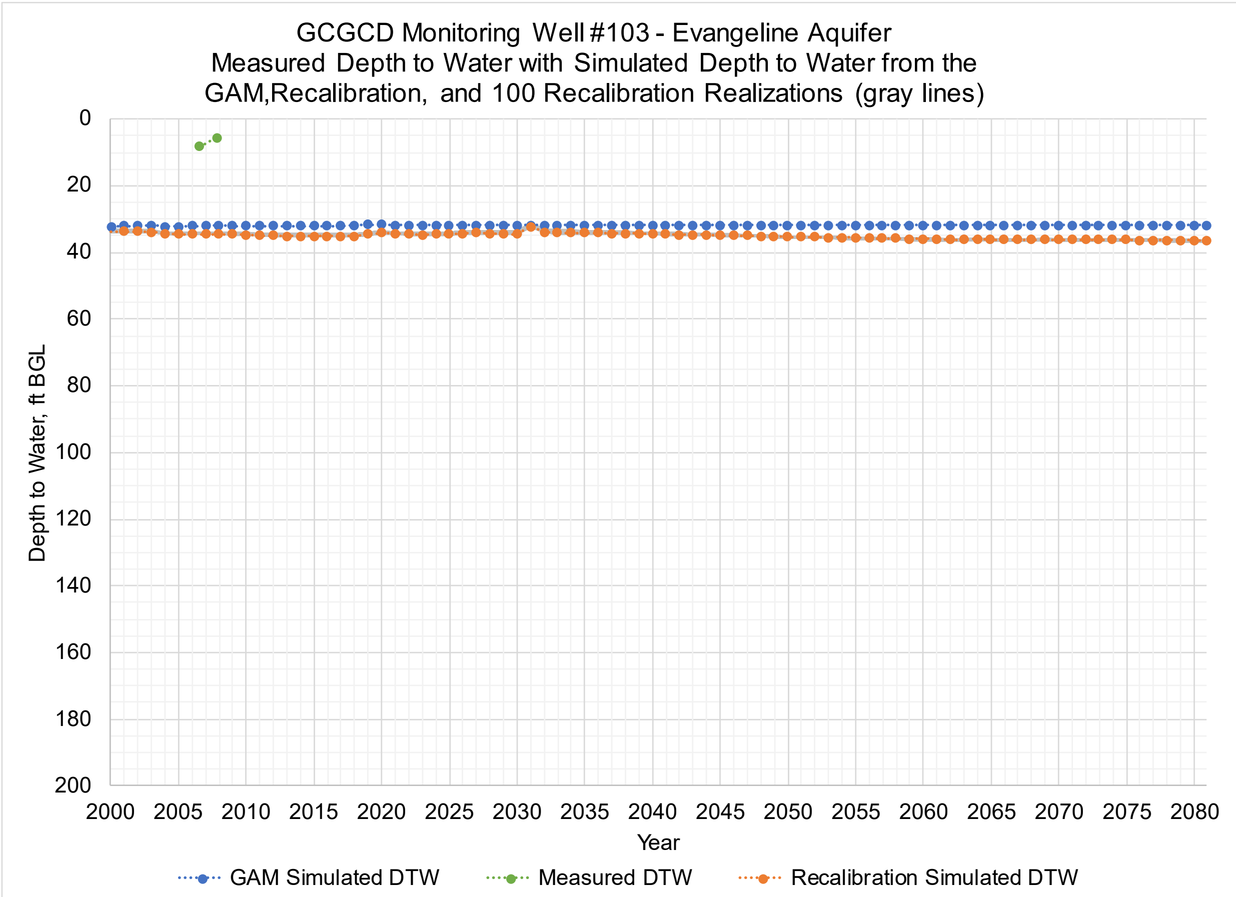

GCGCD Monitoring Well #90 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

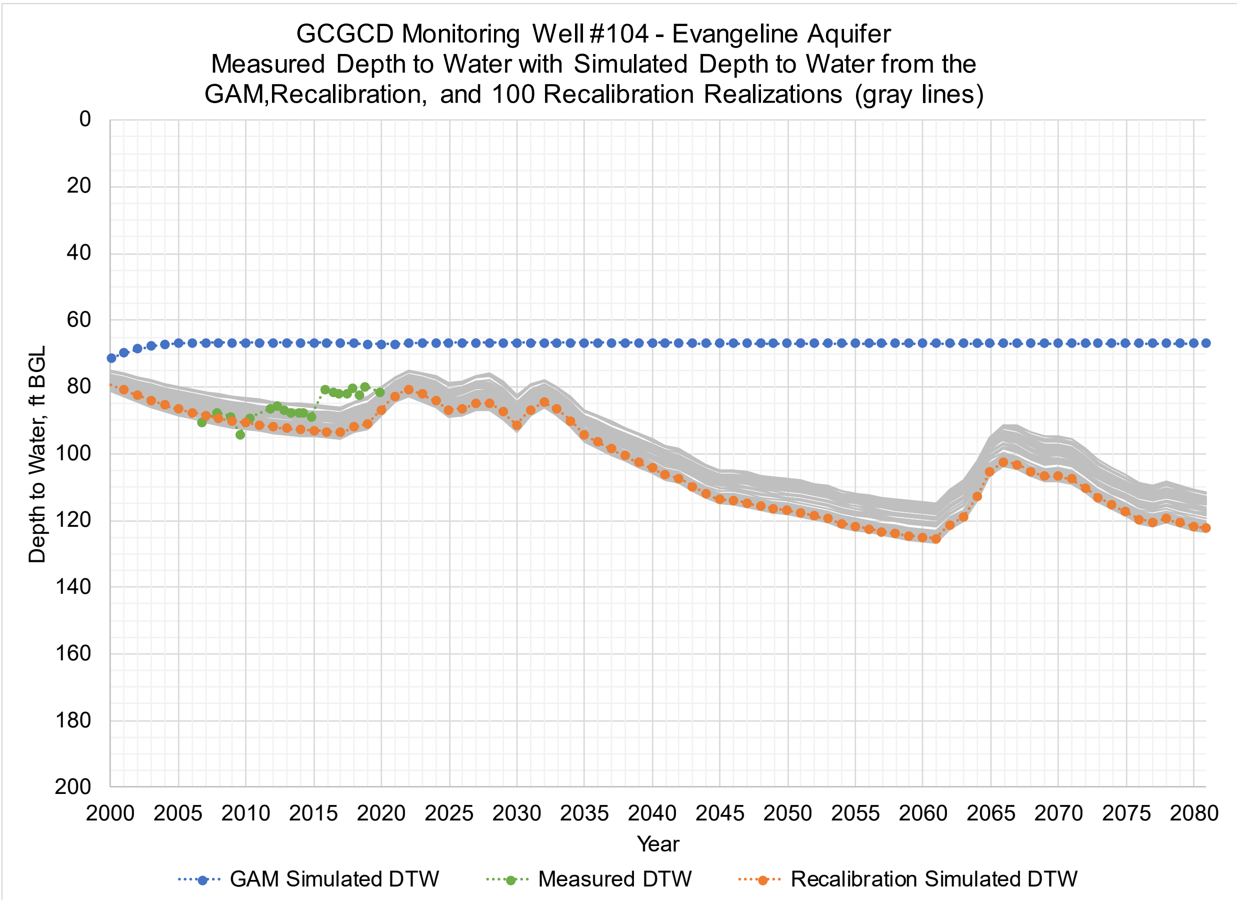

GCGCD Monitoring Well #91 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

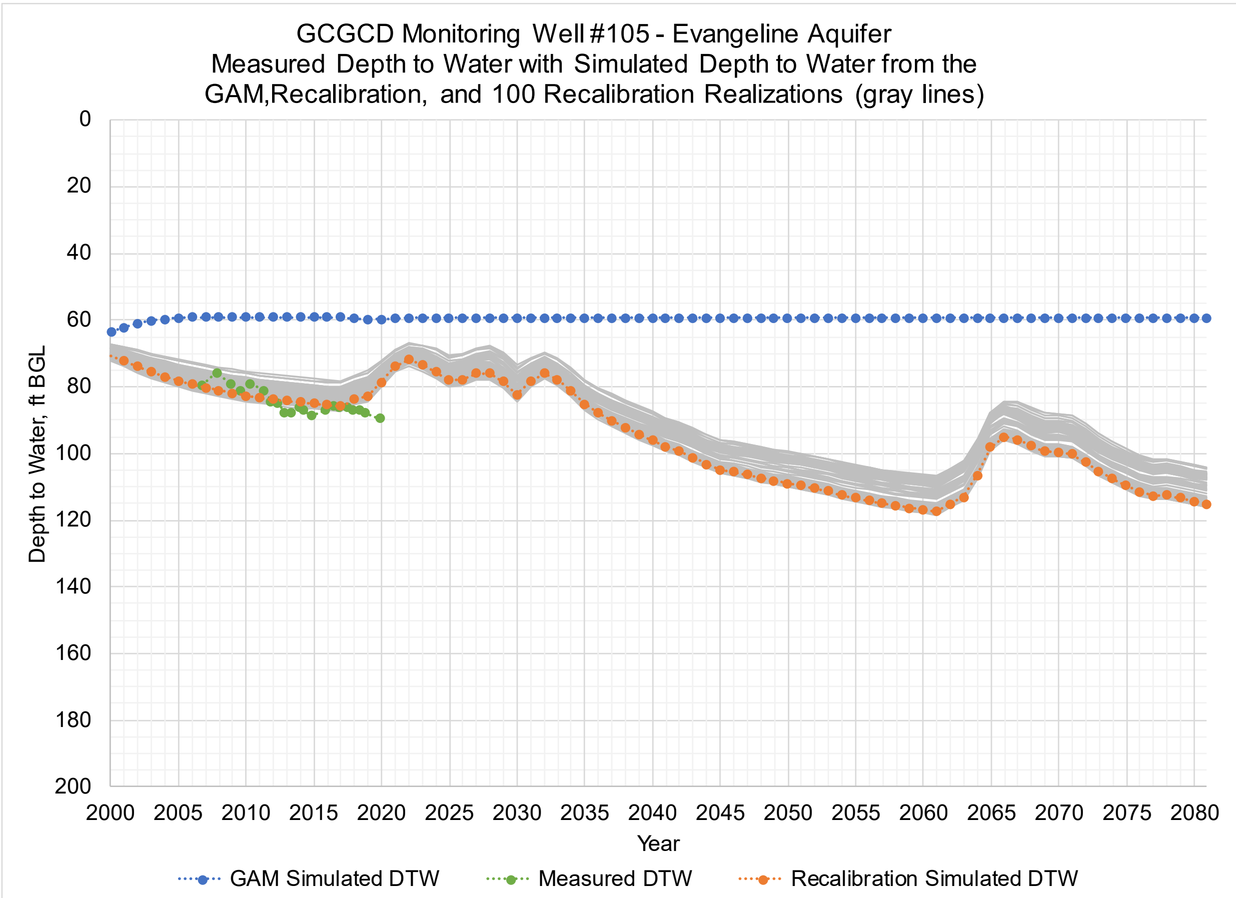

GCGCD Monitoring Well #95 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

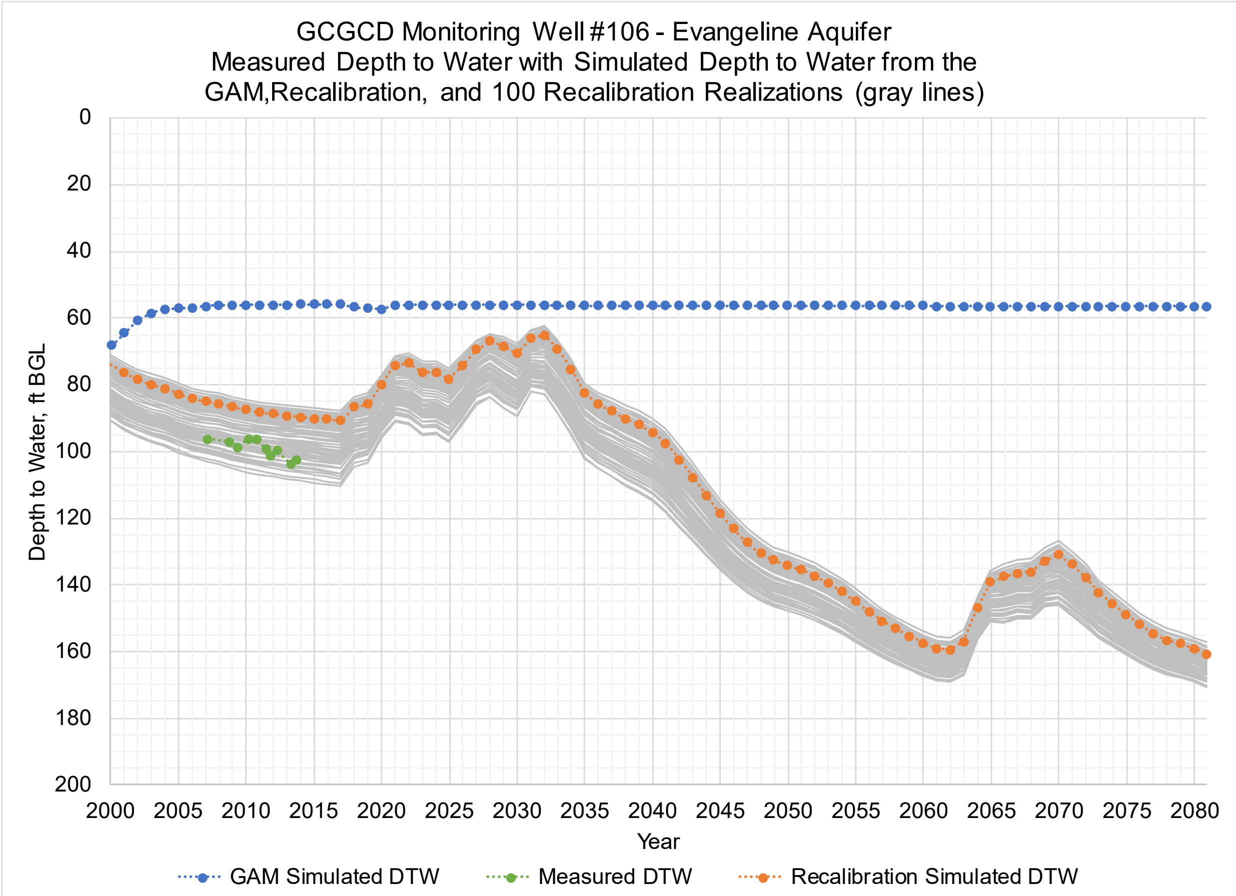

GCGCD Monitoring Well #99 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

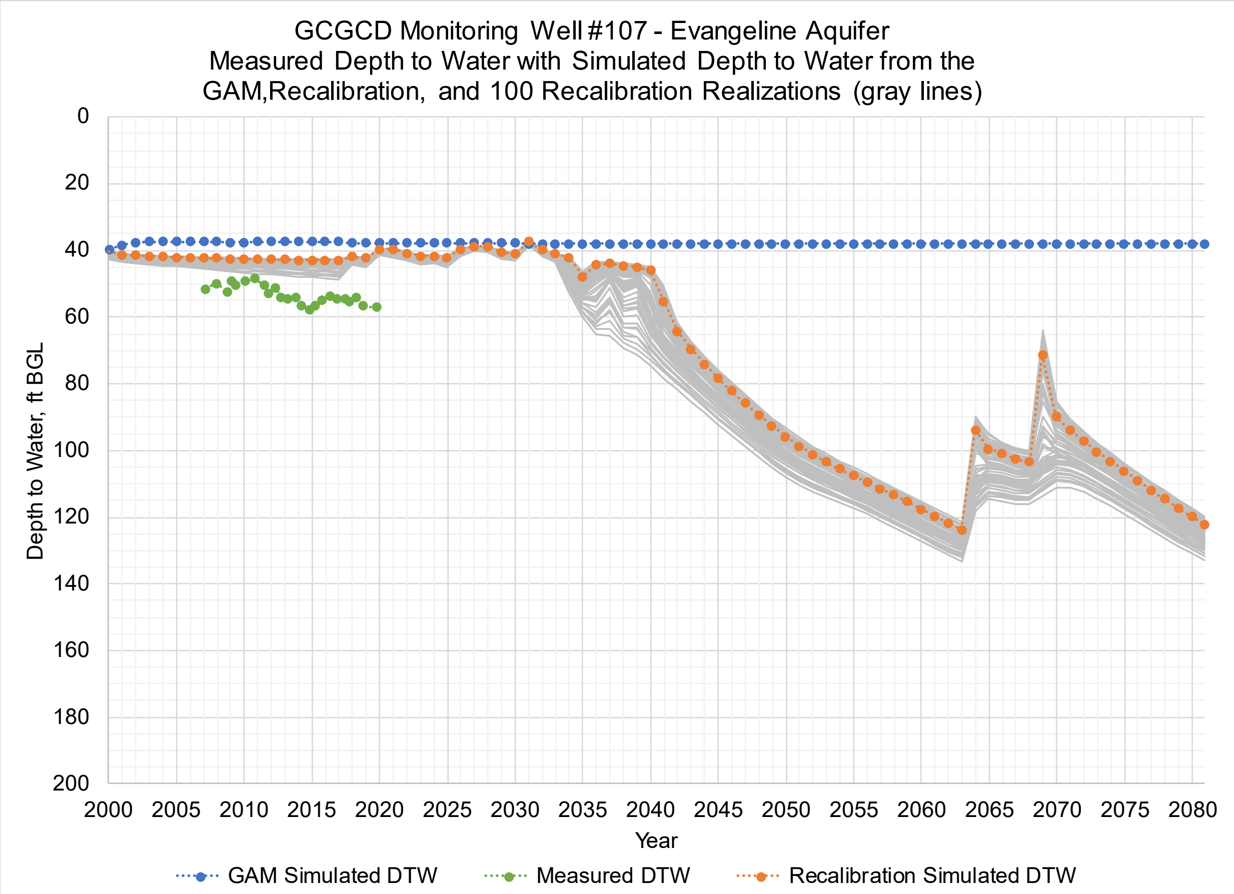

GCGCD Monitoring Well #100 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

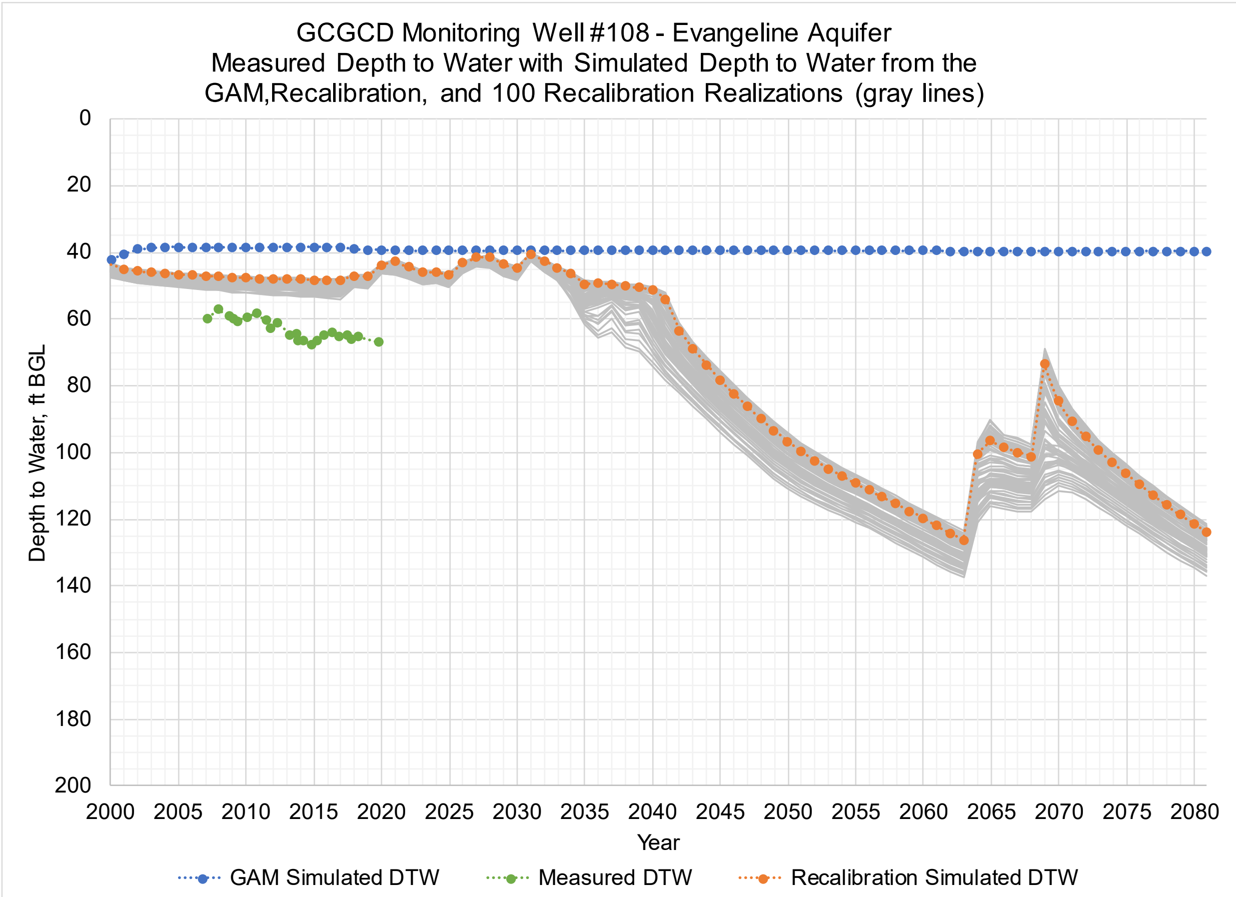

GCGCD Monitoring Well #103 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

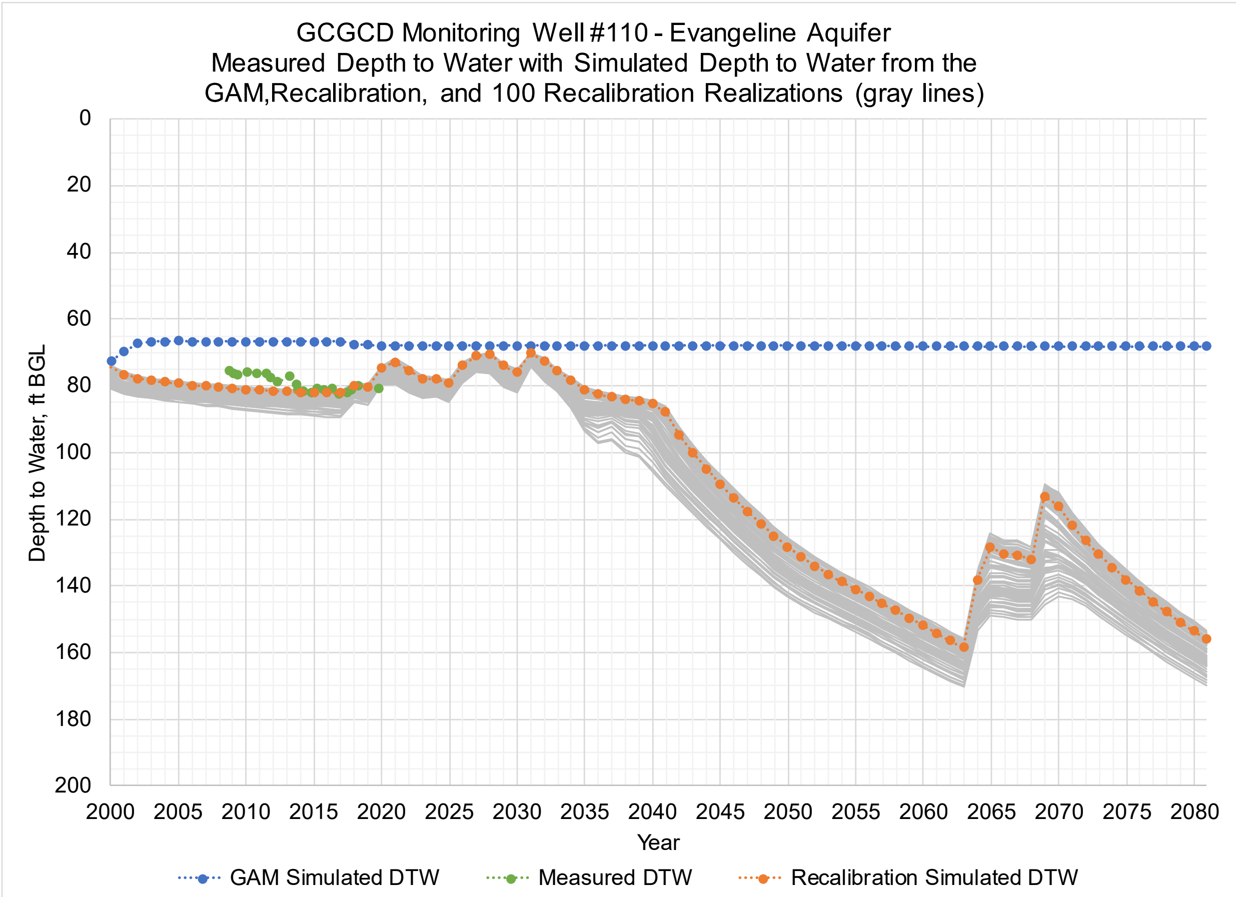

GCGCD Monitoring Well #104 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

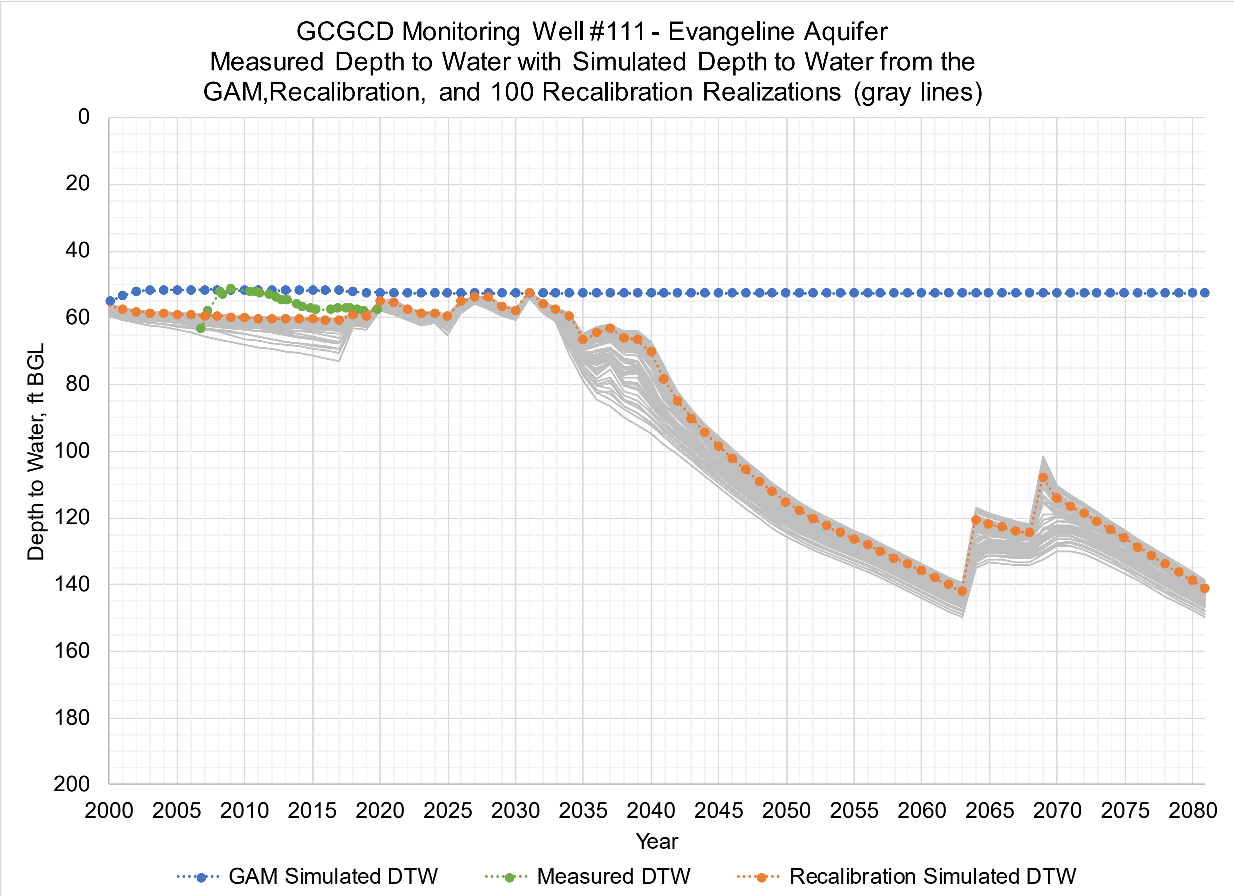

GCGCD Monitoring Well #105 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

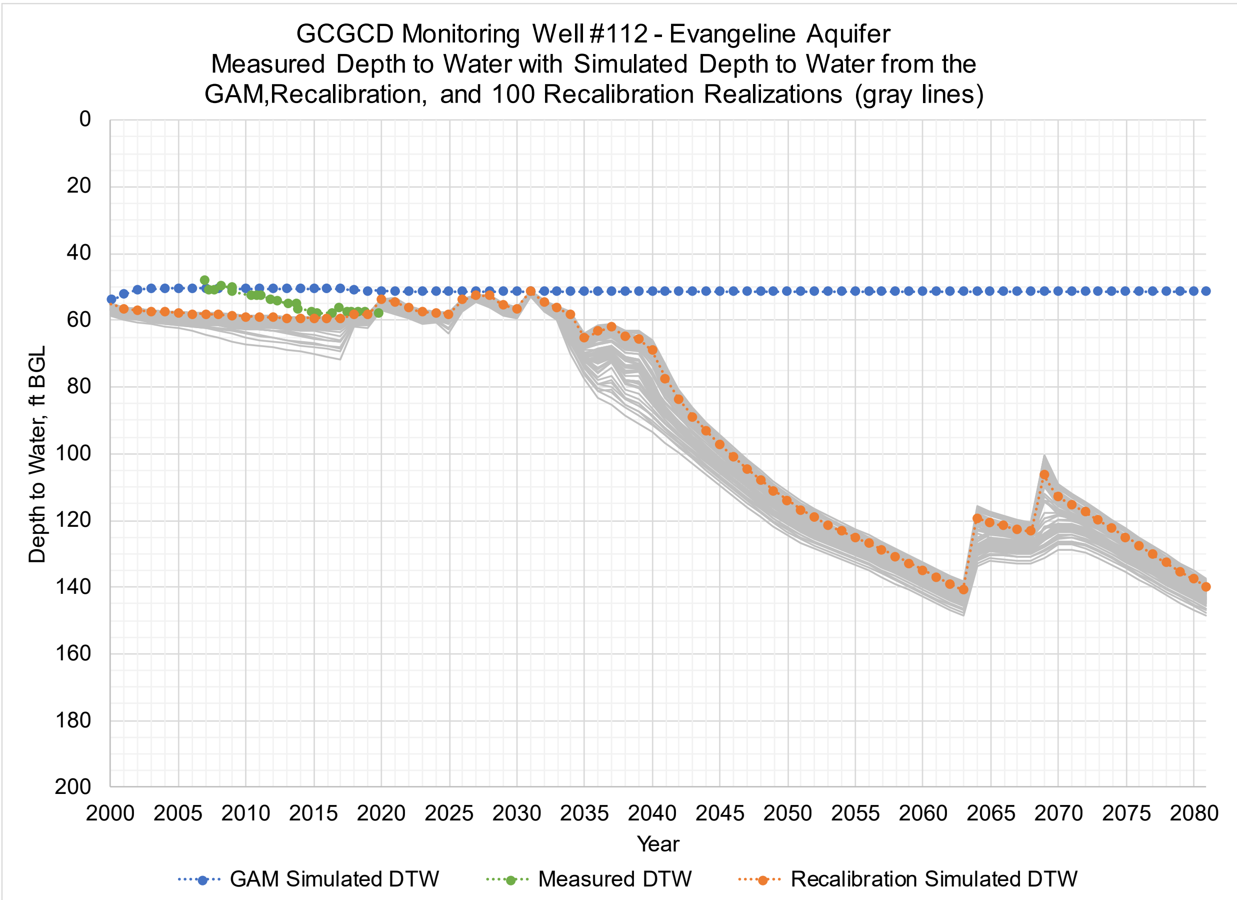

GCGCD Monitoring Well #106 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

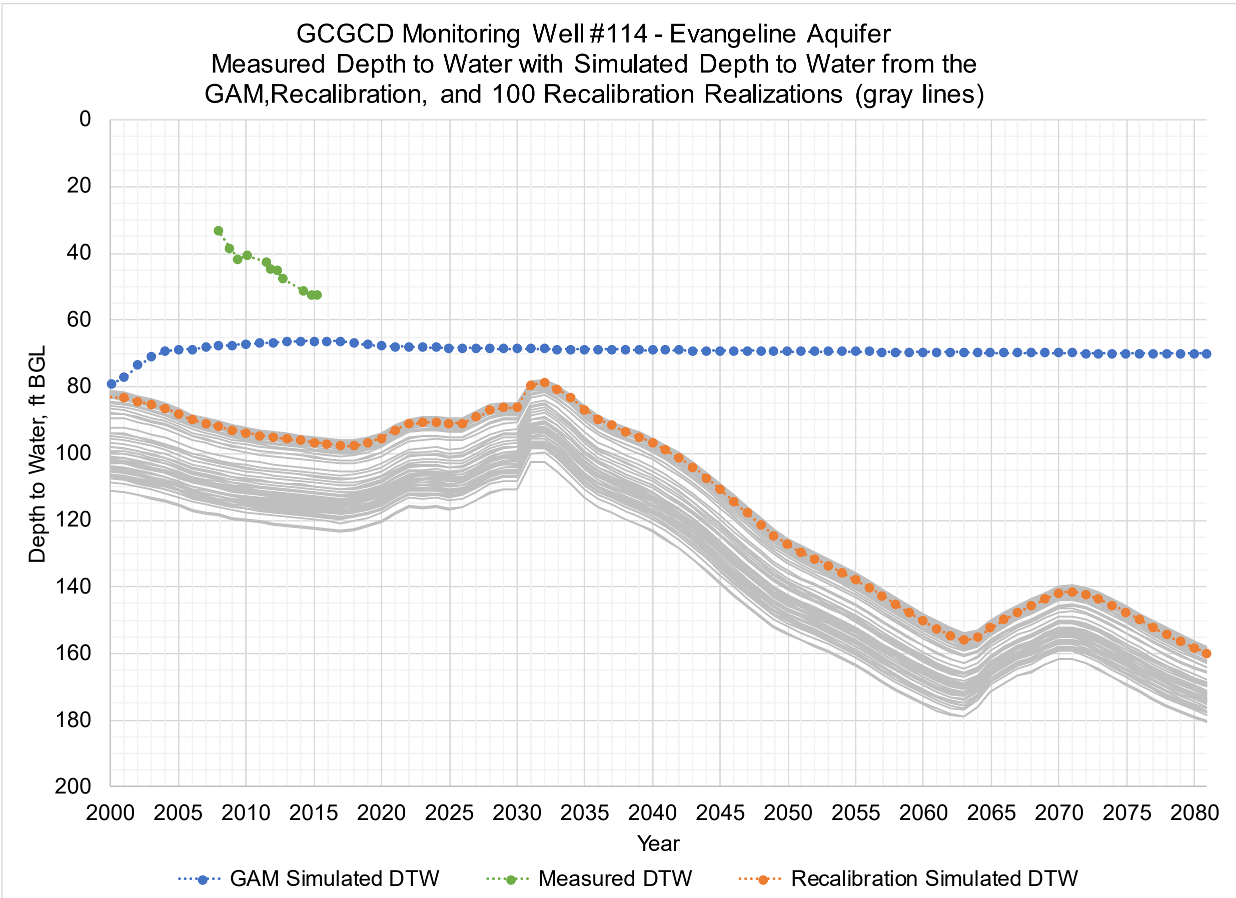

GCGCD Monitoring Well #107 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

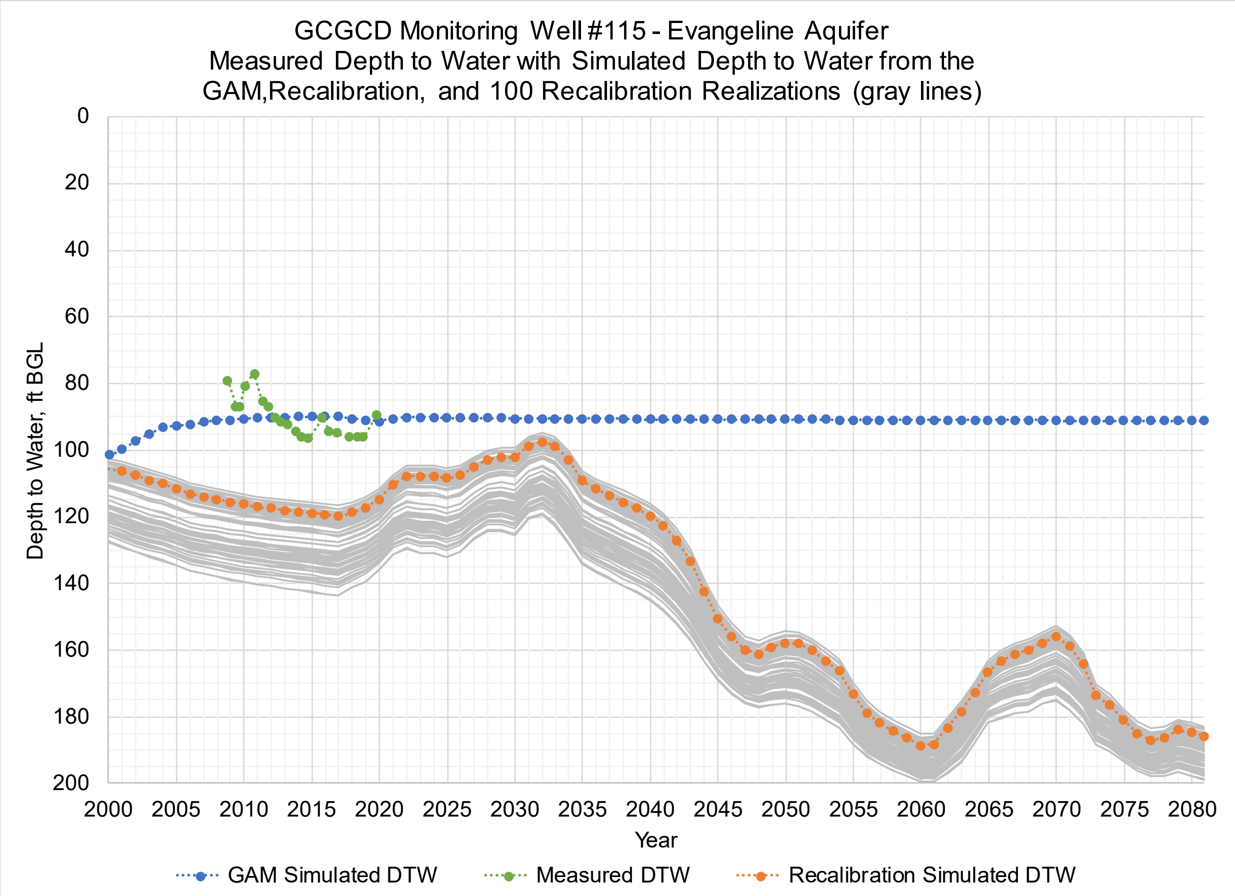

GCGCD Monitoring Well #108 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

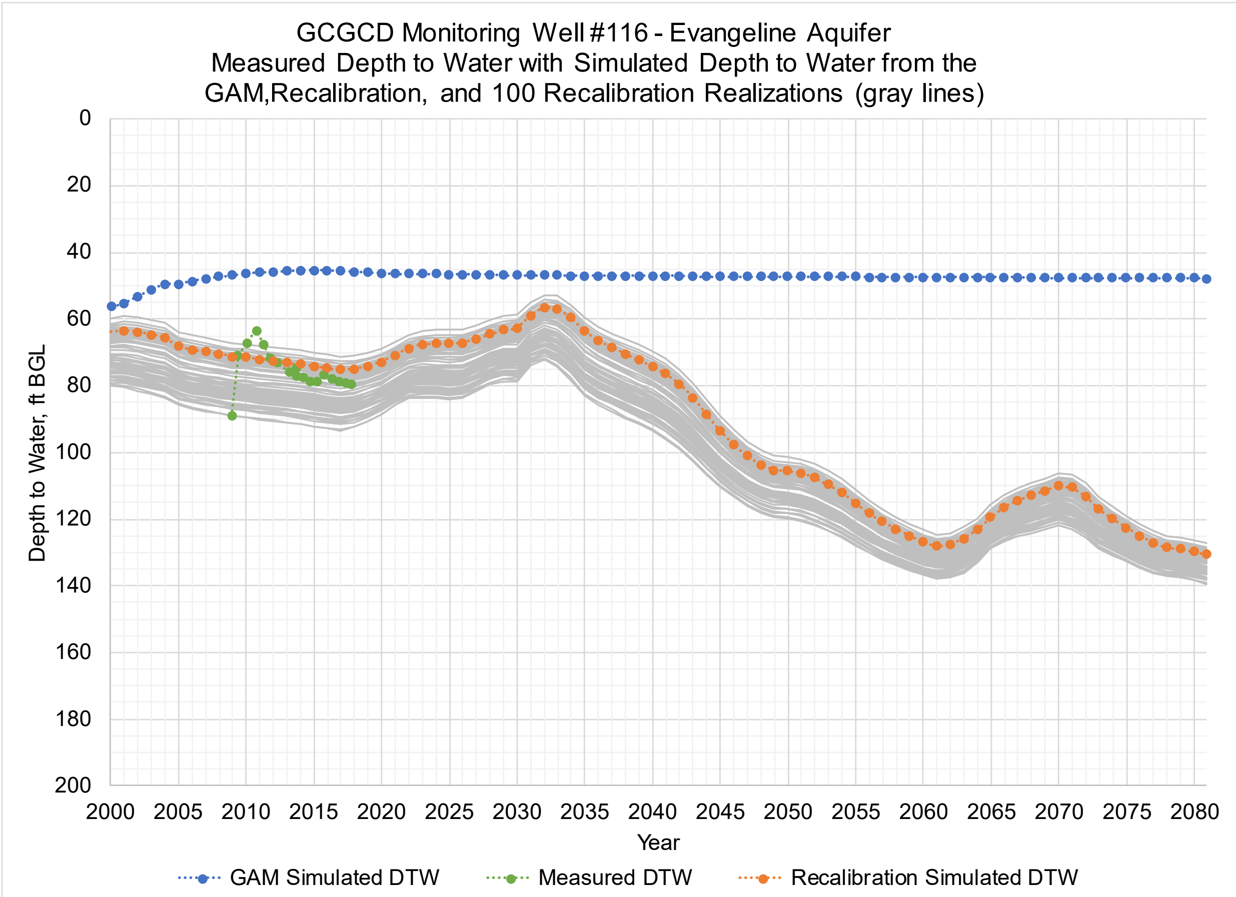

GCGCD Monitoring Well #110 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

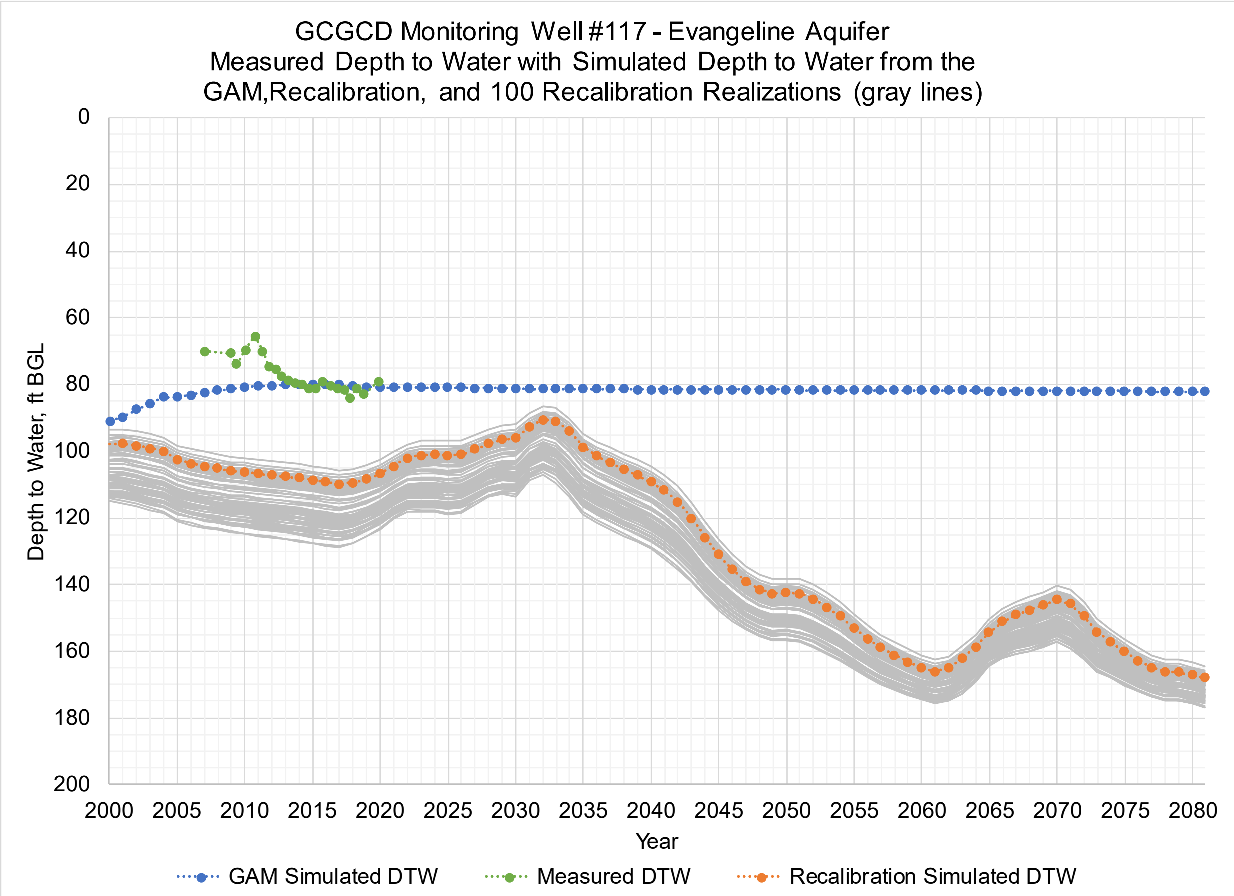

GCGCD Monitoring Well #111 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

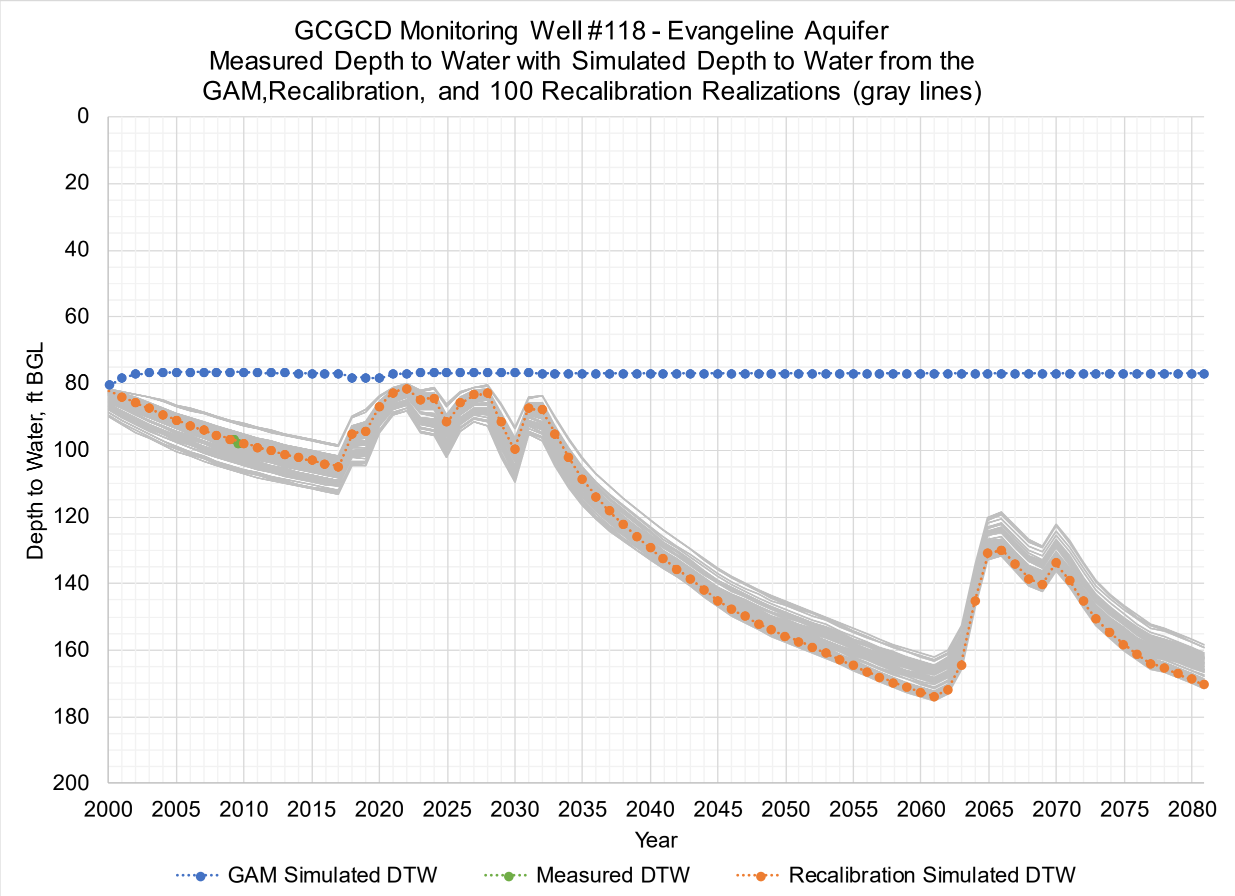

GCGCD Monitoring Well #112 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

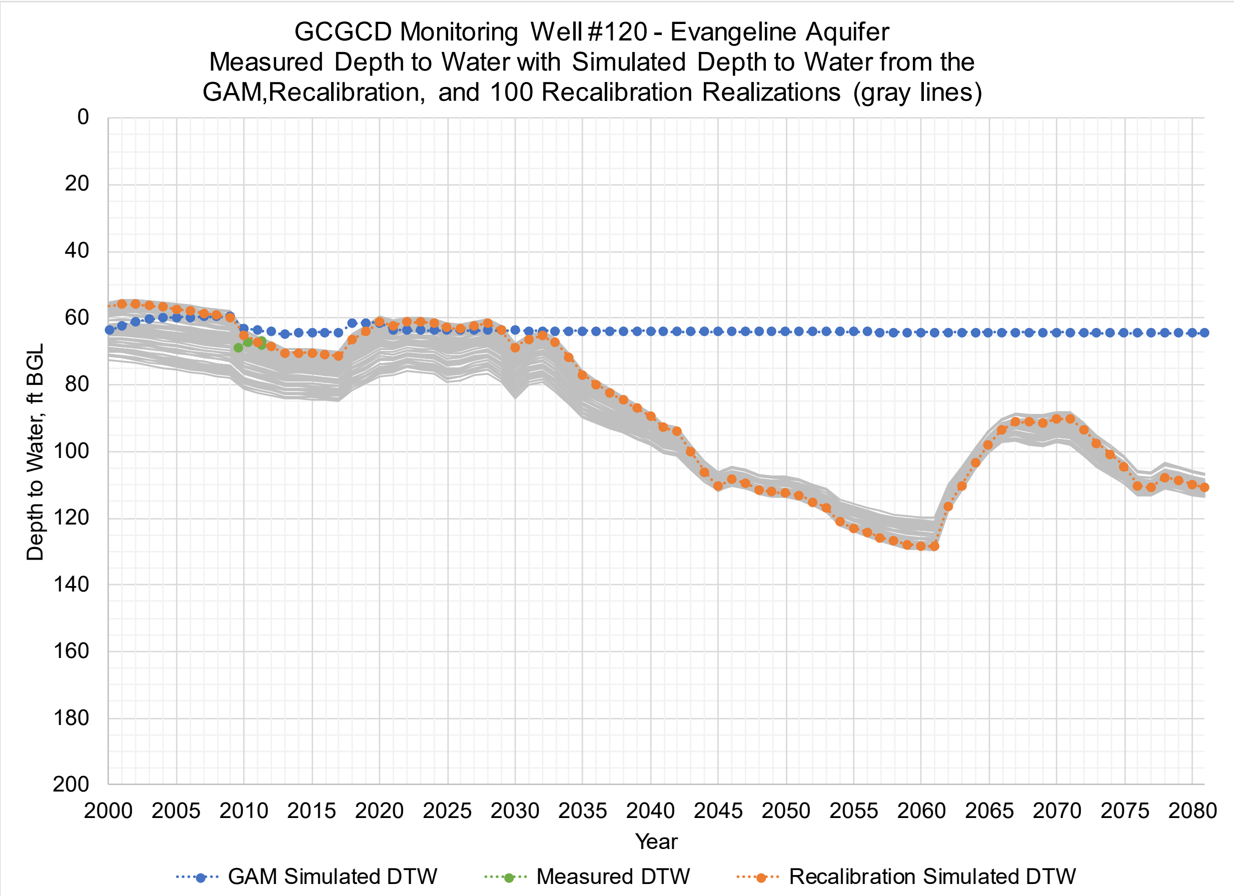

GCGCD Monitoring Well #114 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

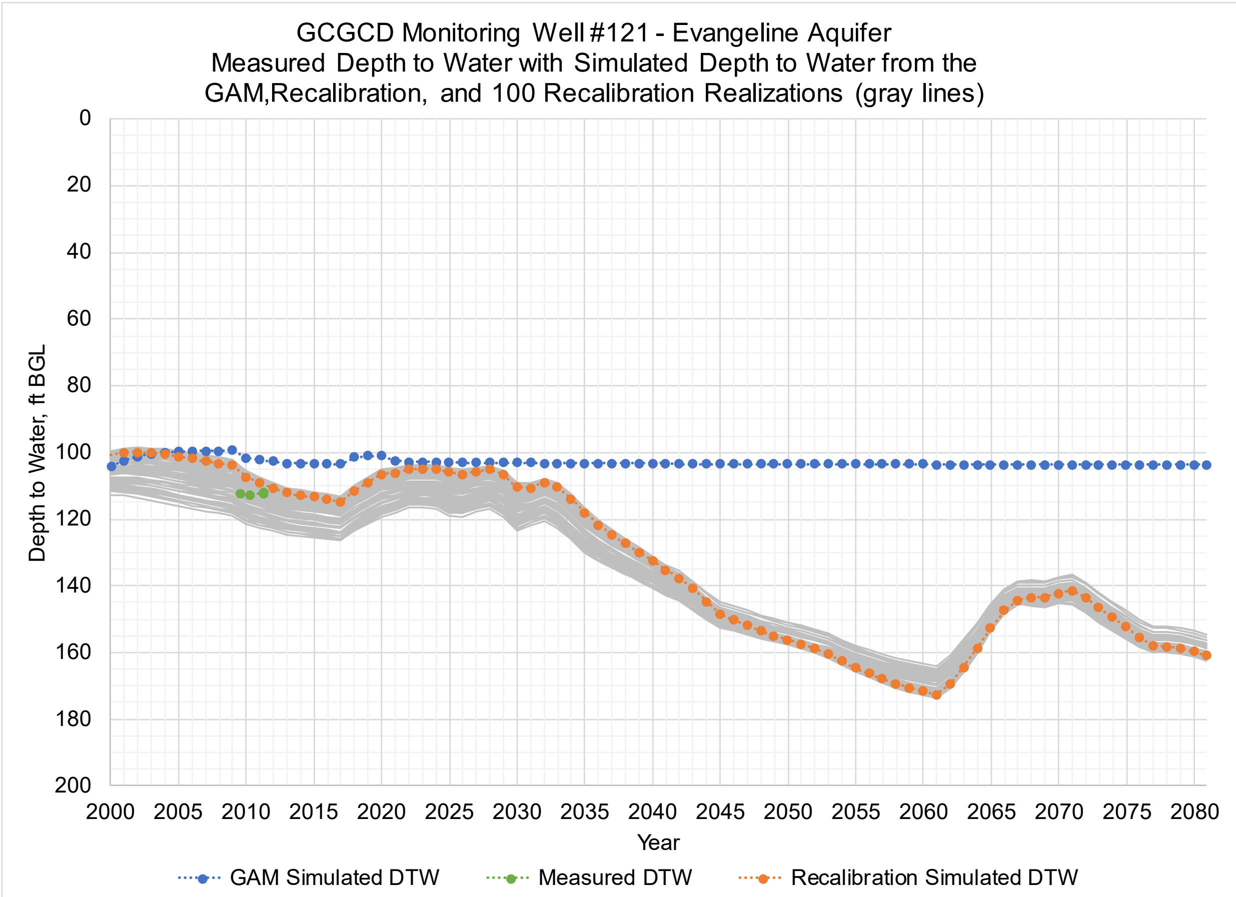

GCGCD Monitoring Well #115 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

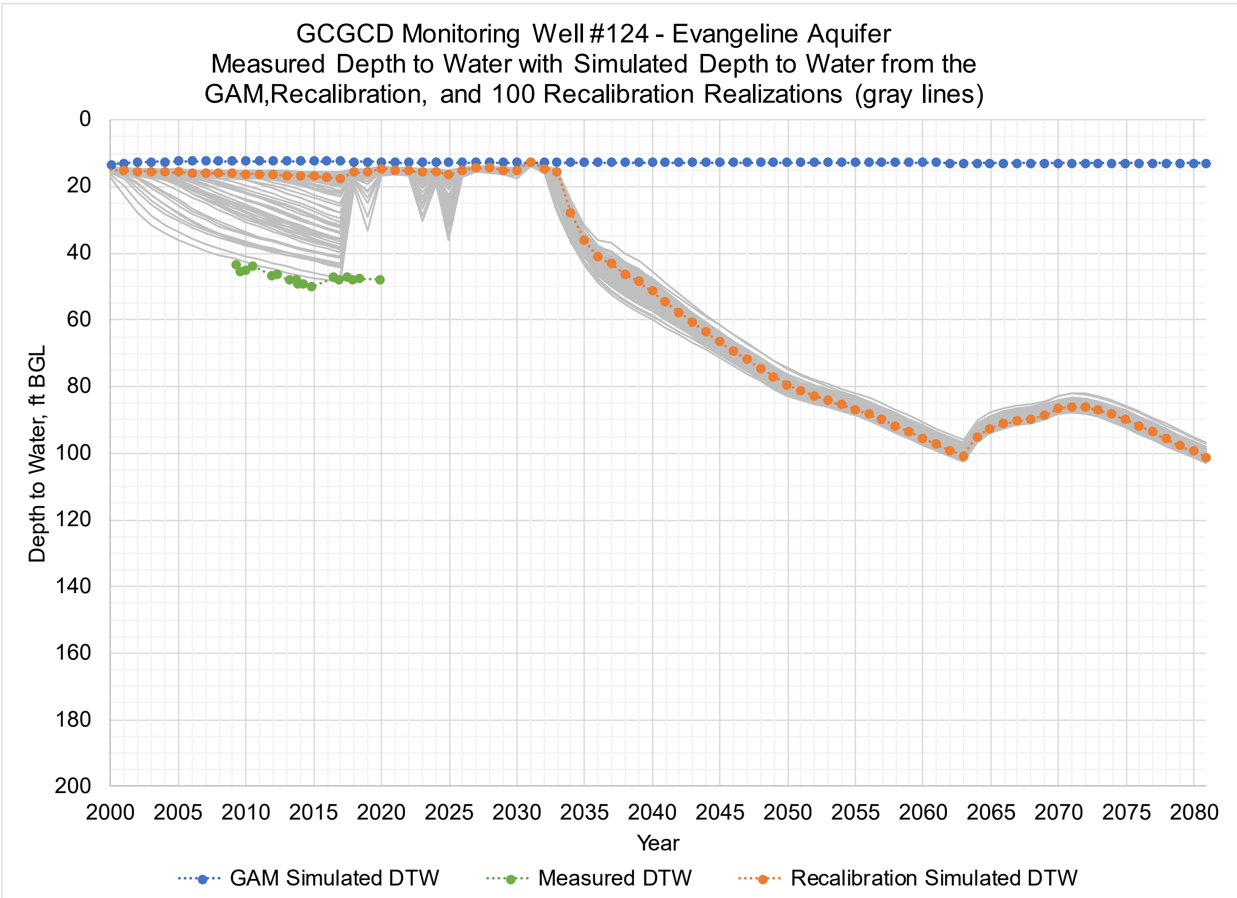

GCGCD Monitoring Well #116 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

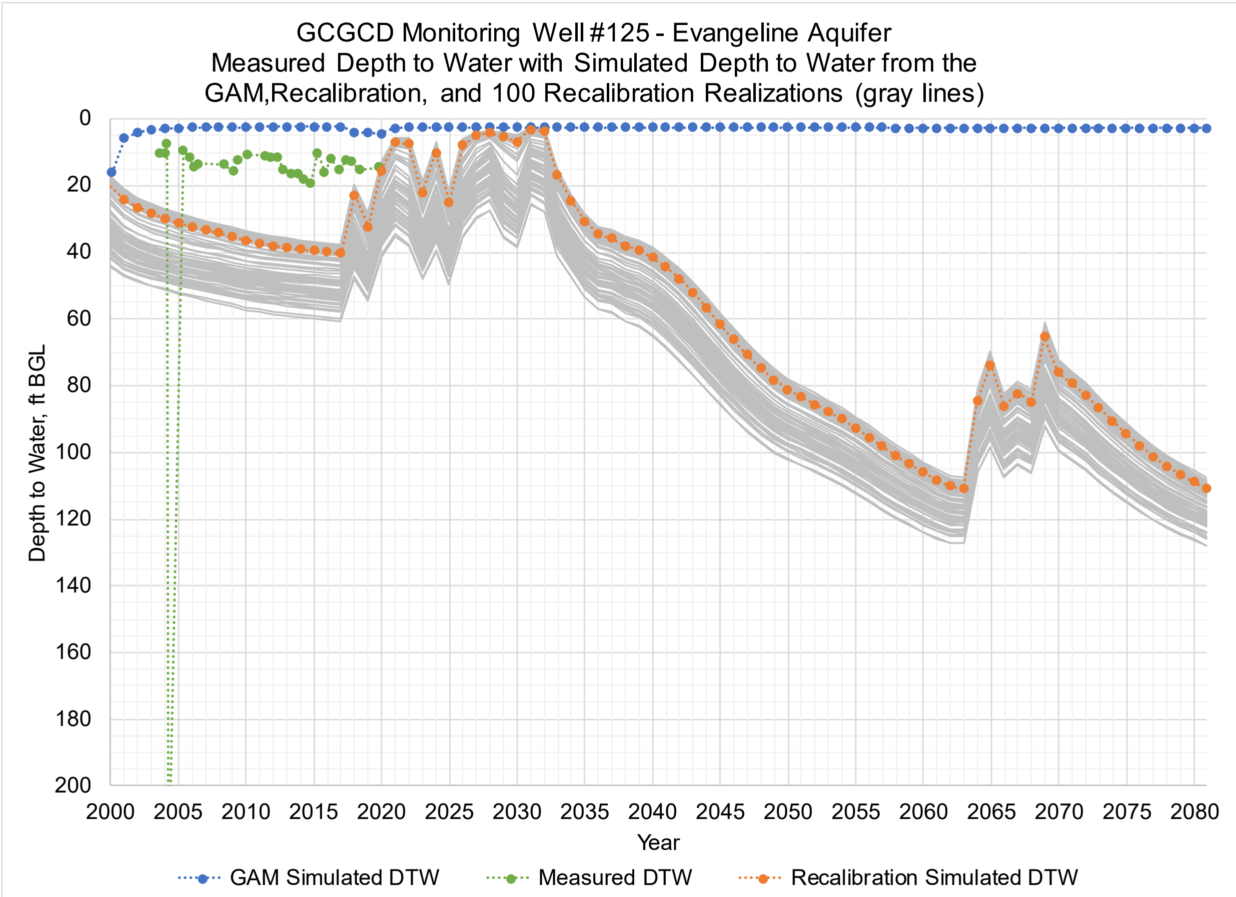

GCGCD Monitoring Well #117 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

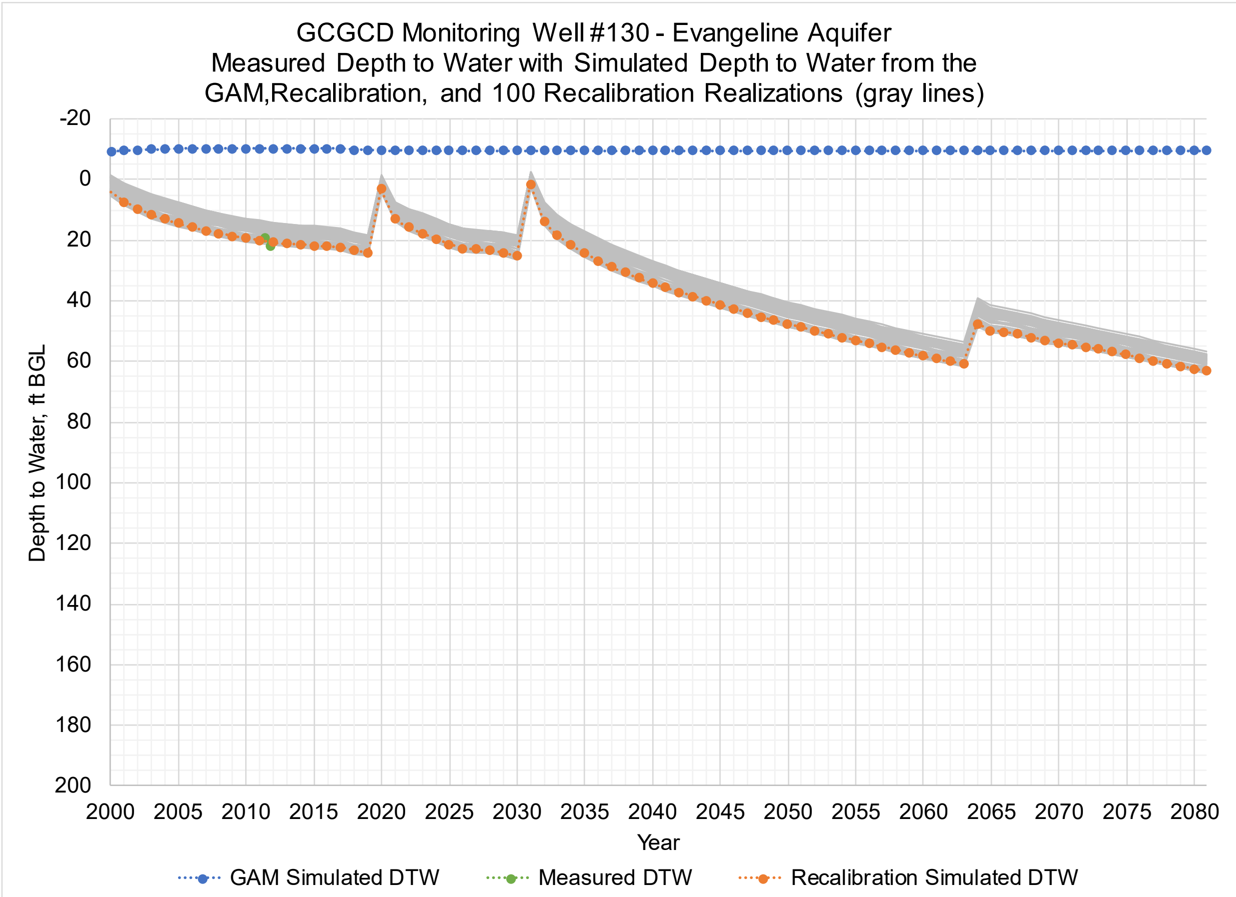

GCGCD Monitoring Well #118 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

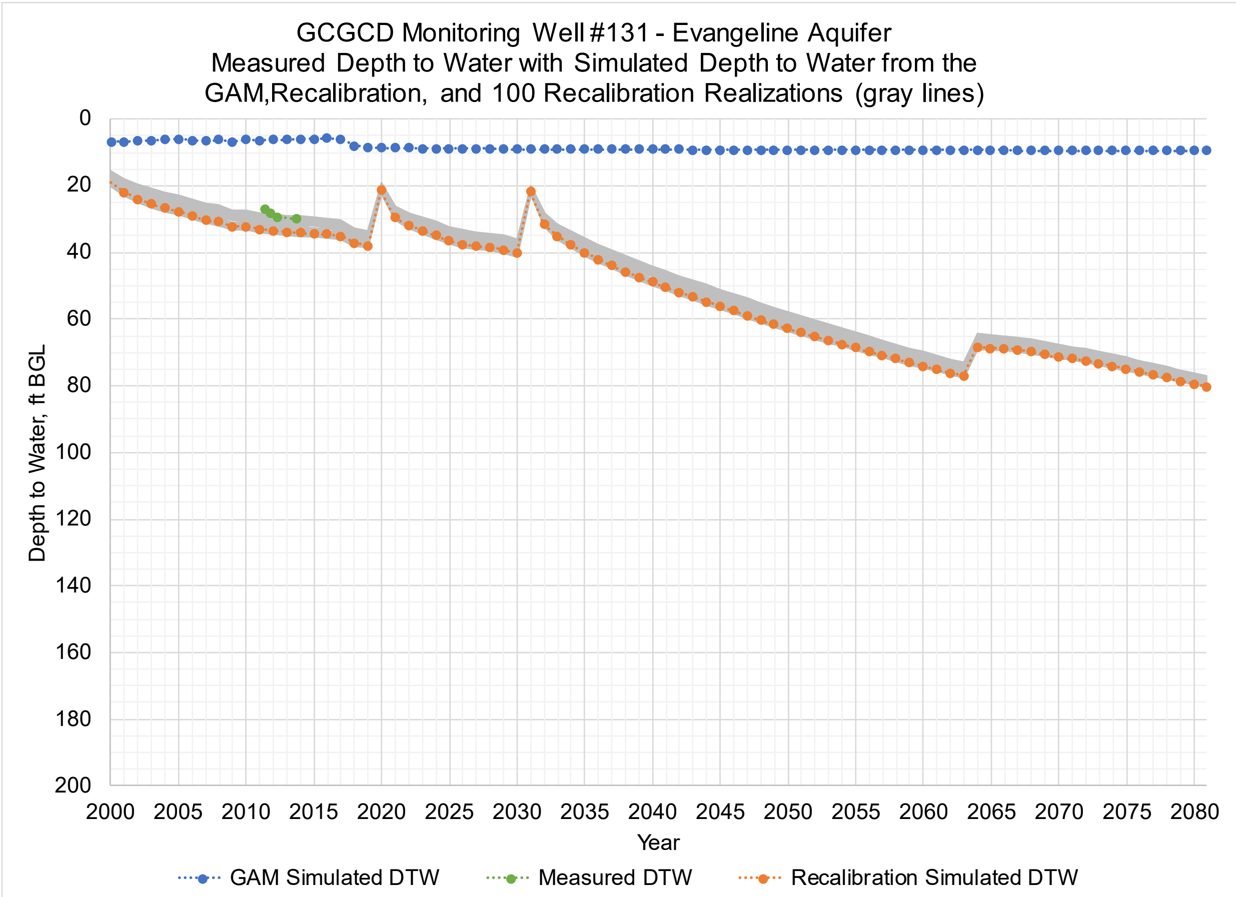

GCGCD Monitoring Well #120 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

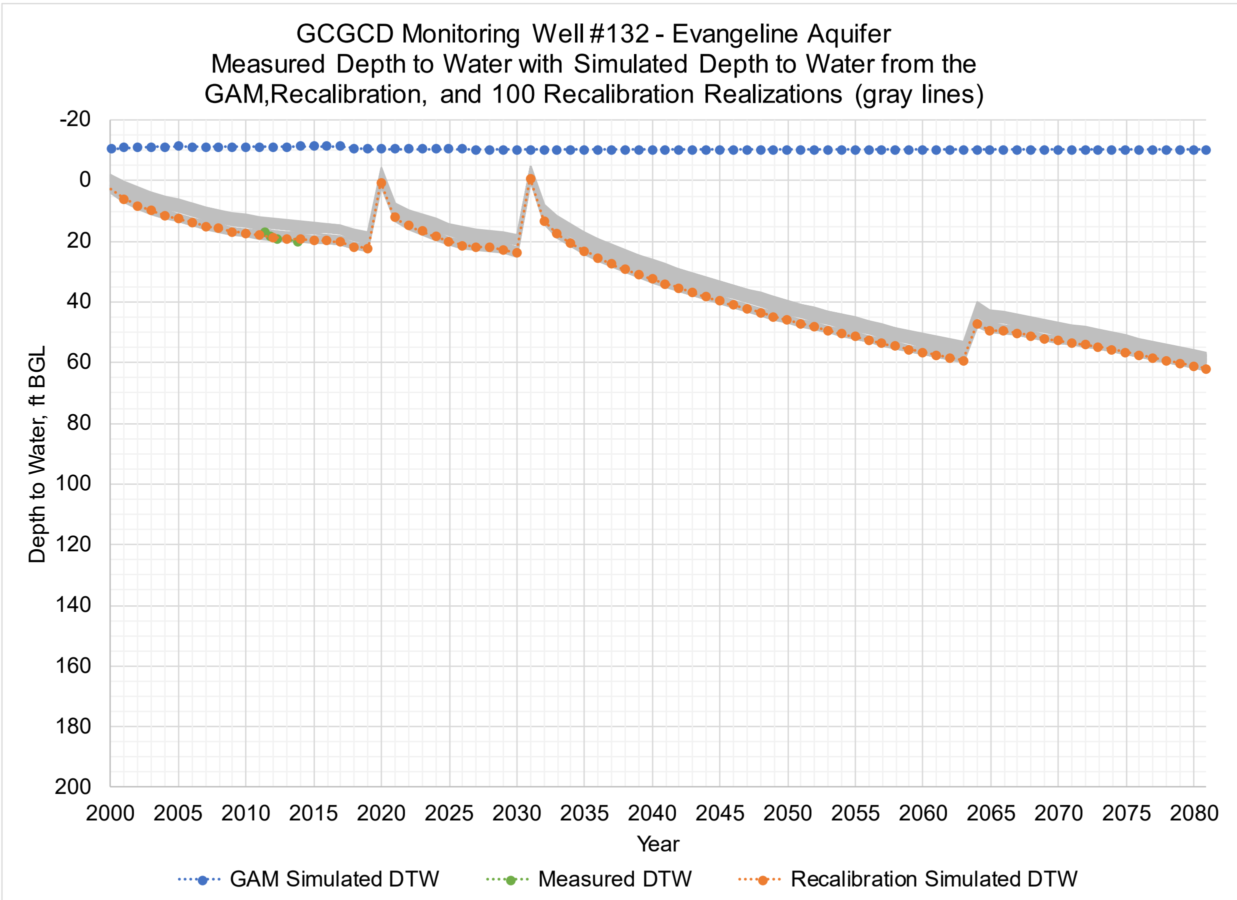

GCGCD Monitoring Well #121 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

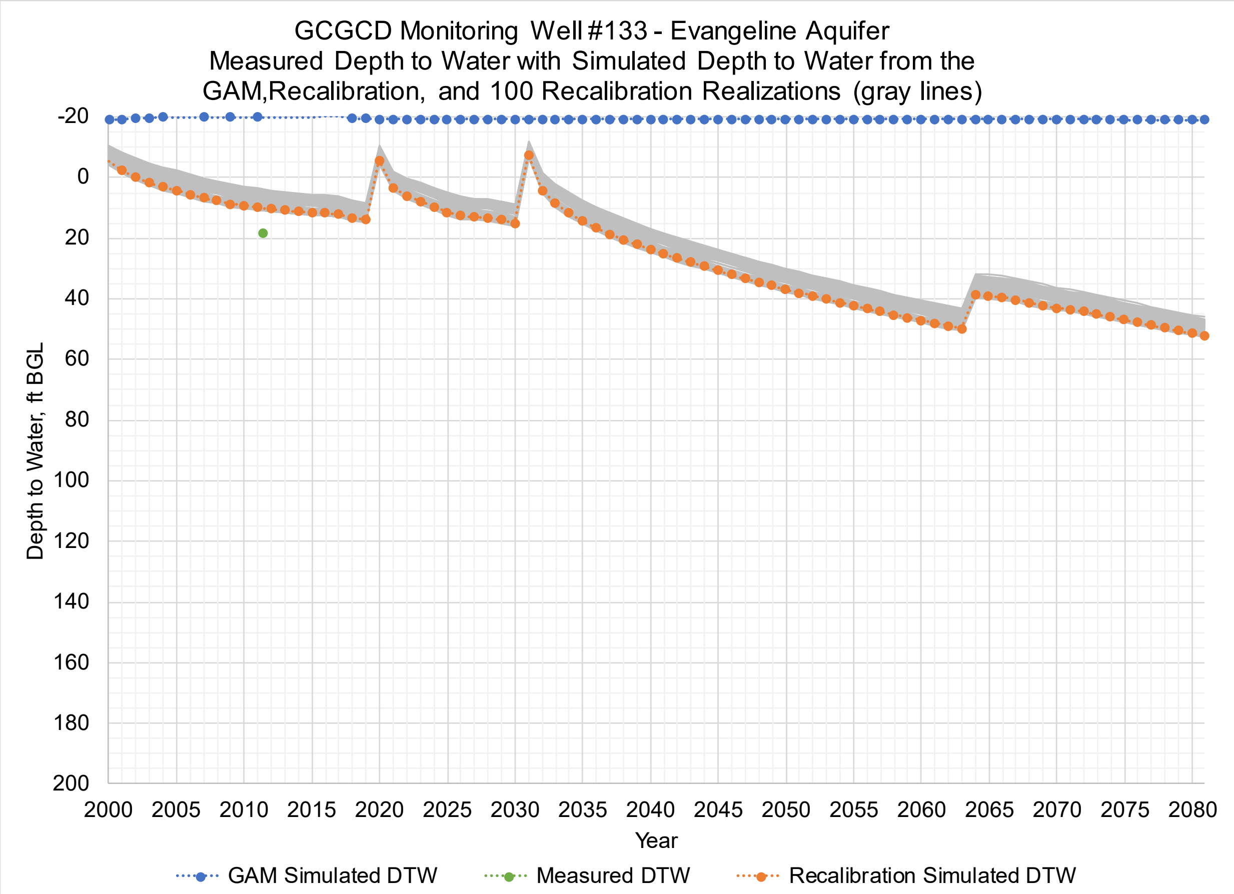

GCGCD Monitoring Well #124 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

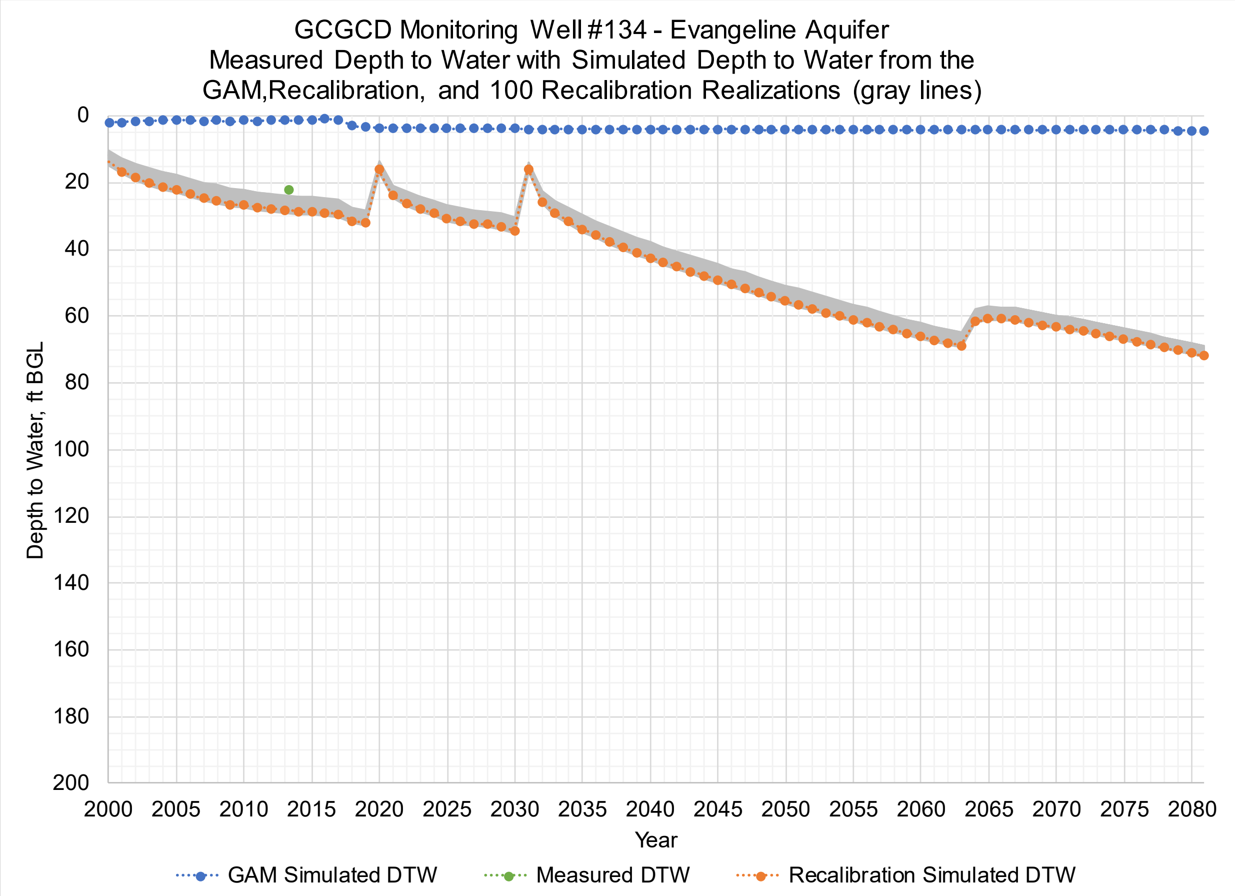

GCGCD Monitoring Well #125 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

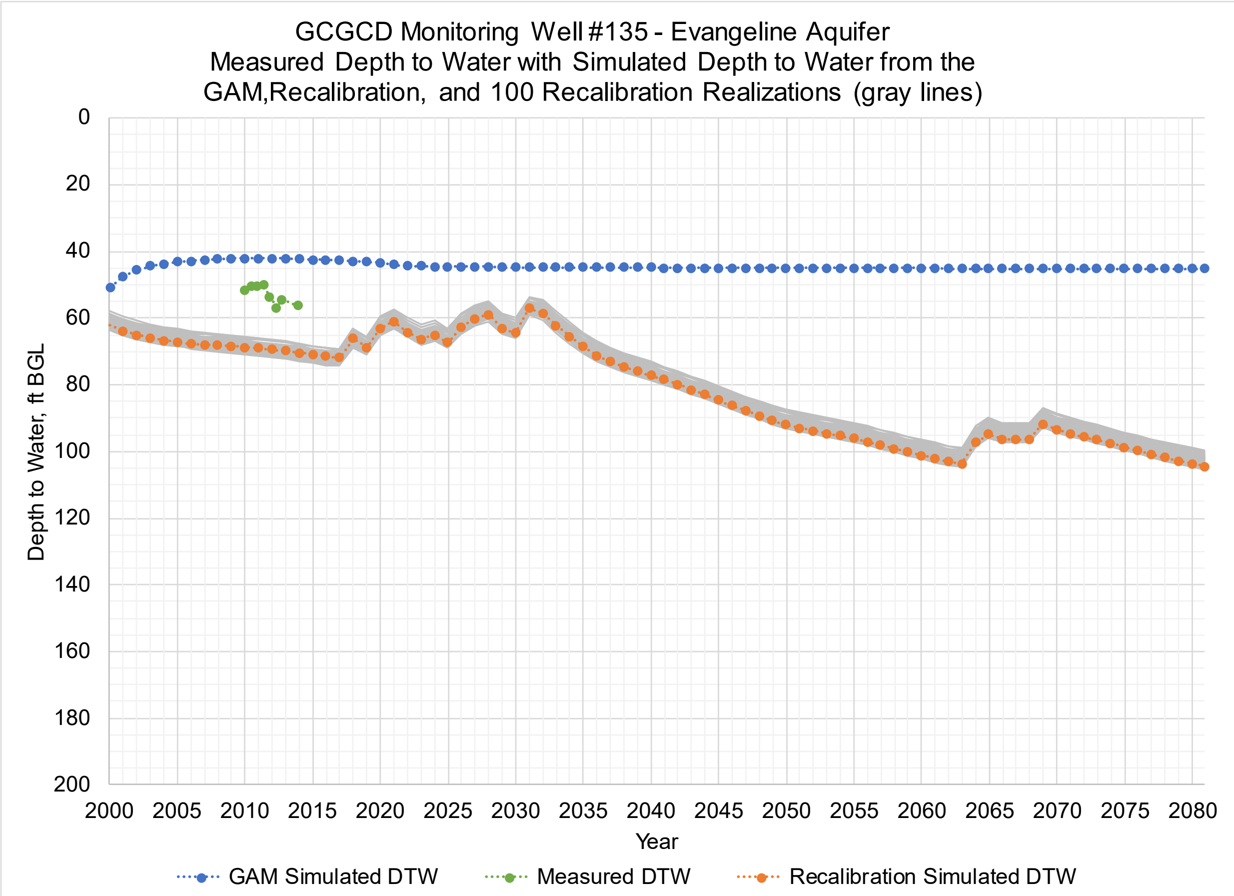

GCGCD Monitoring Well #130 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

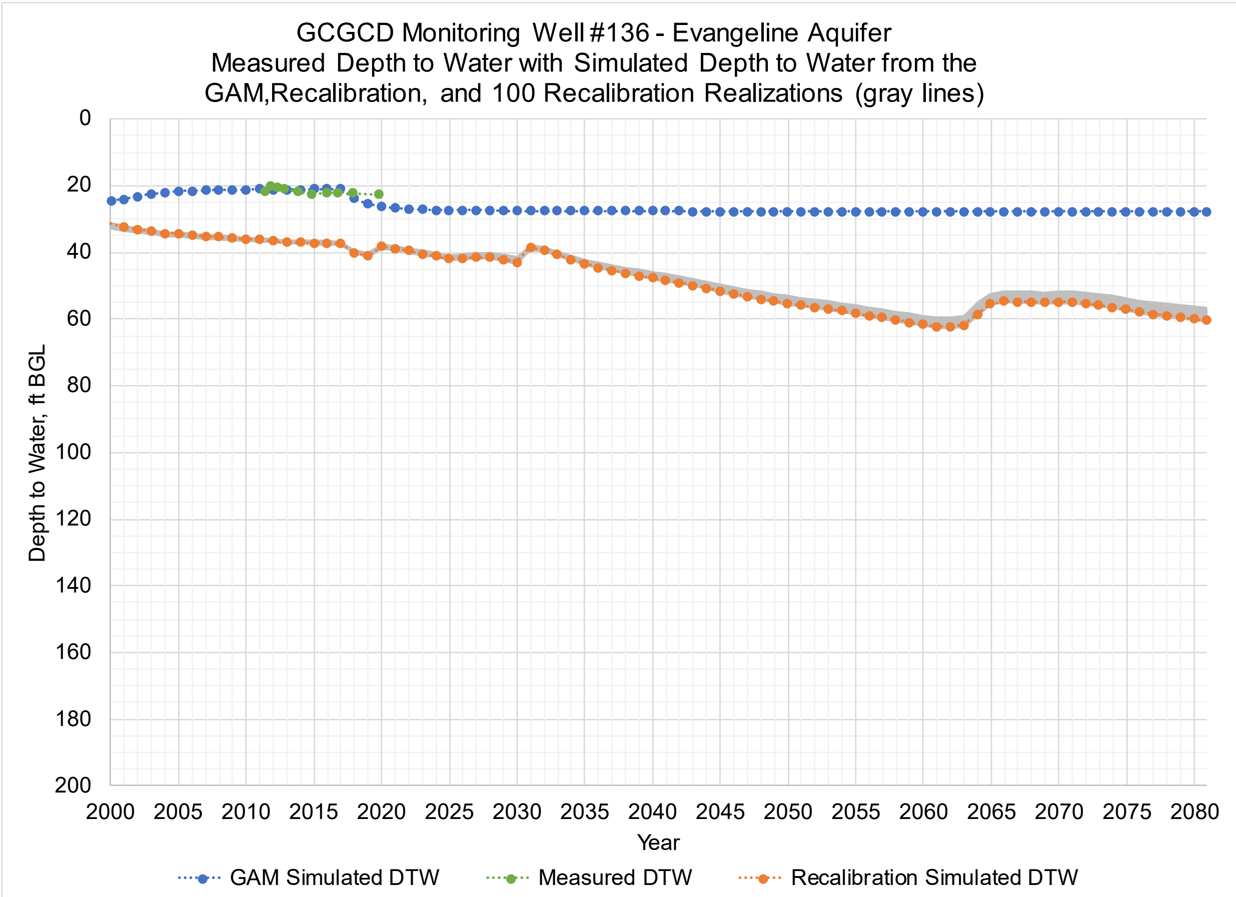

GCGCD Monitoring Well #131 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
0
20
40
60
80
100
120
140
160
180
200
Depth to Water, ft BGL
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

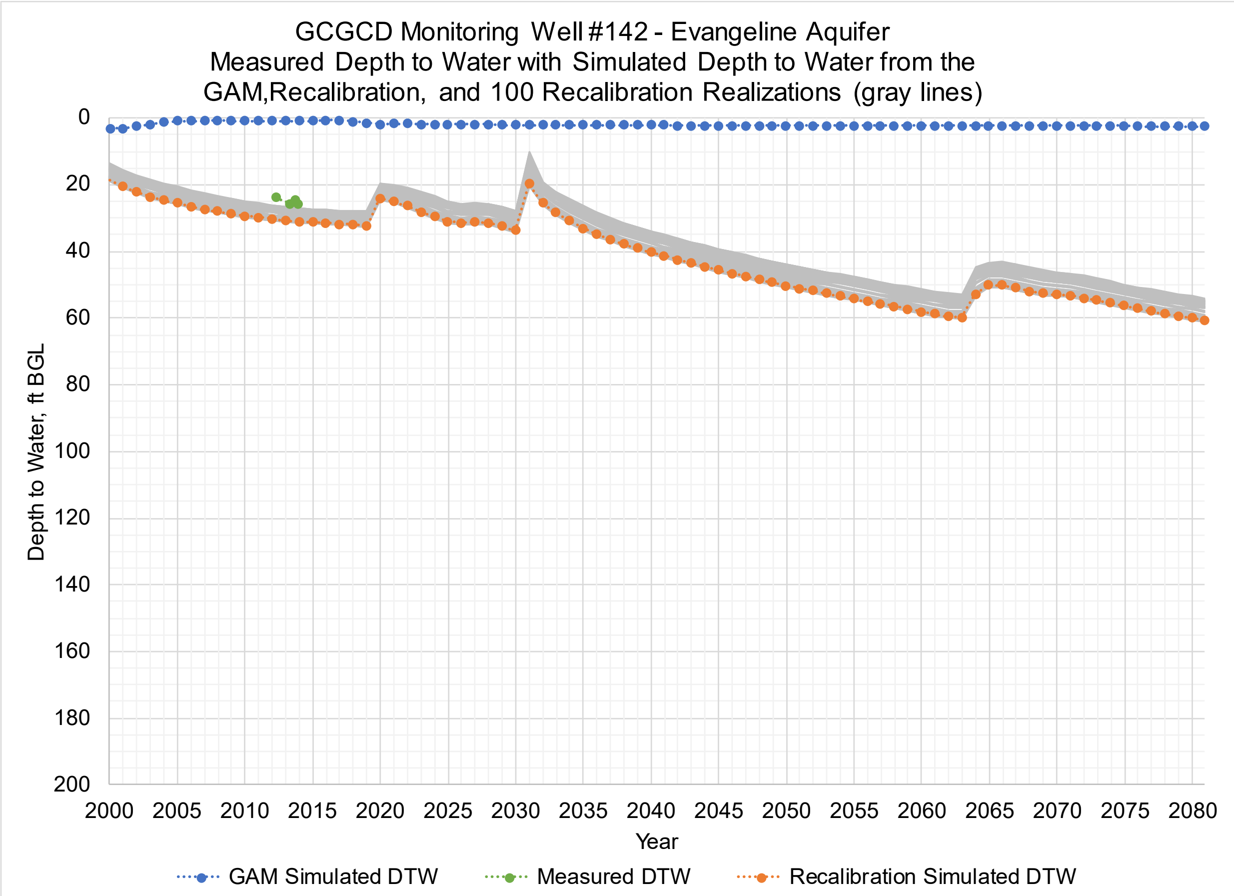

GCGCD Monitoring Well #132 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

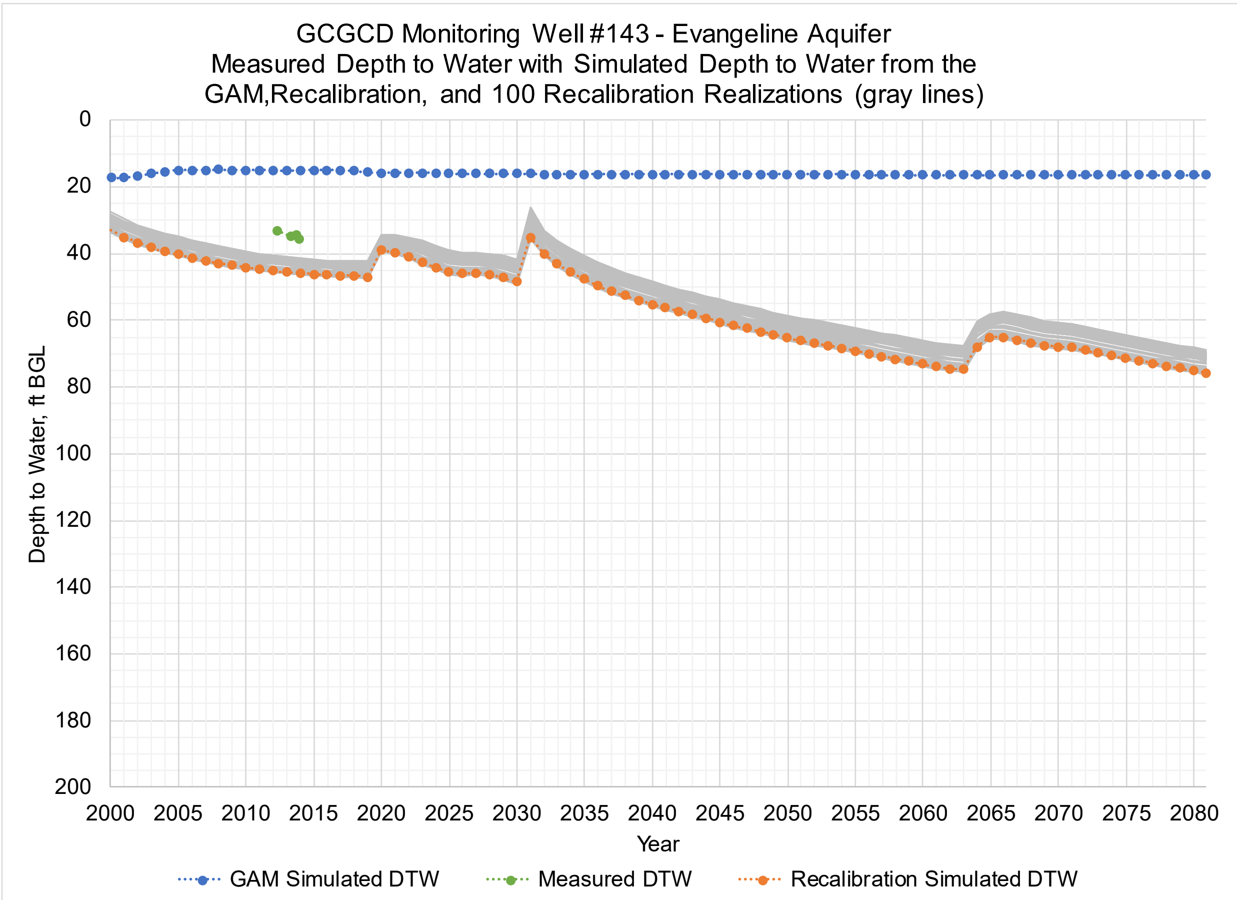

GCGCD Monitoring Well #133 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

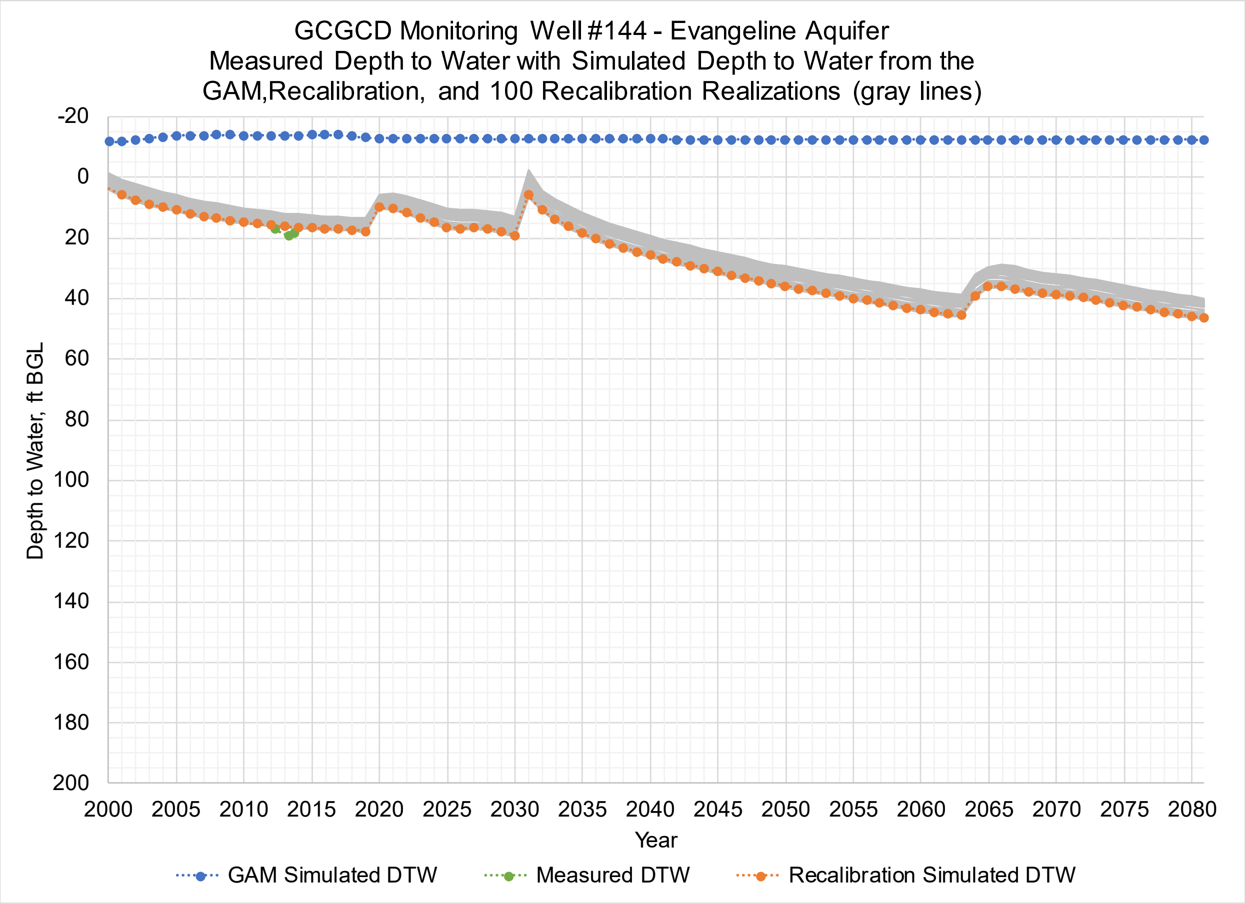

GCGCD Monitoring Well #134 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

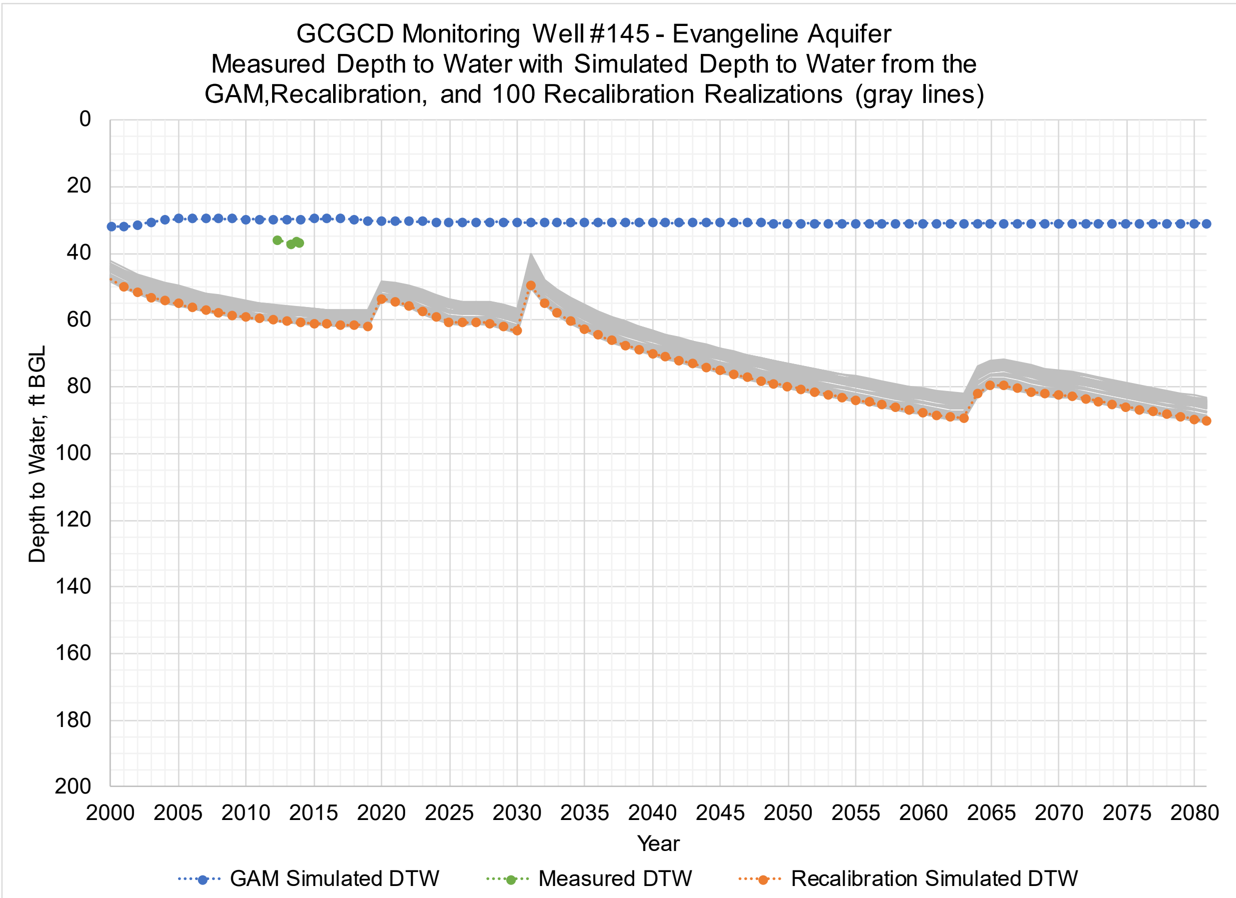

GCGCD Monitoring Well #135 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

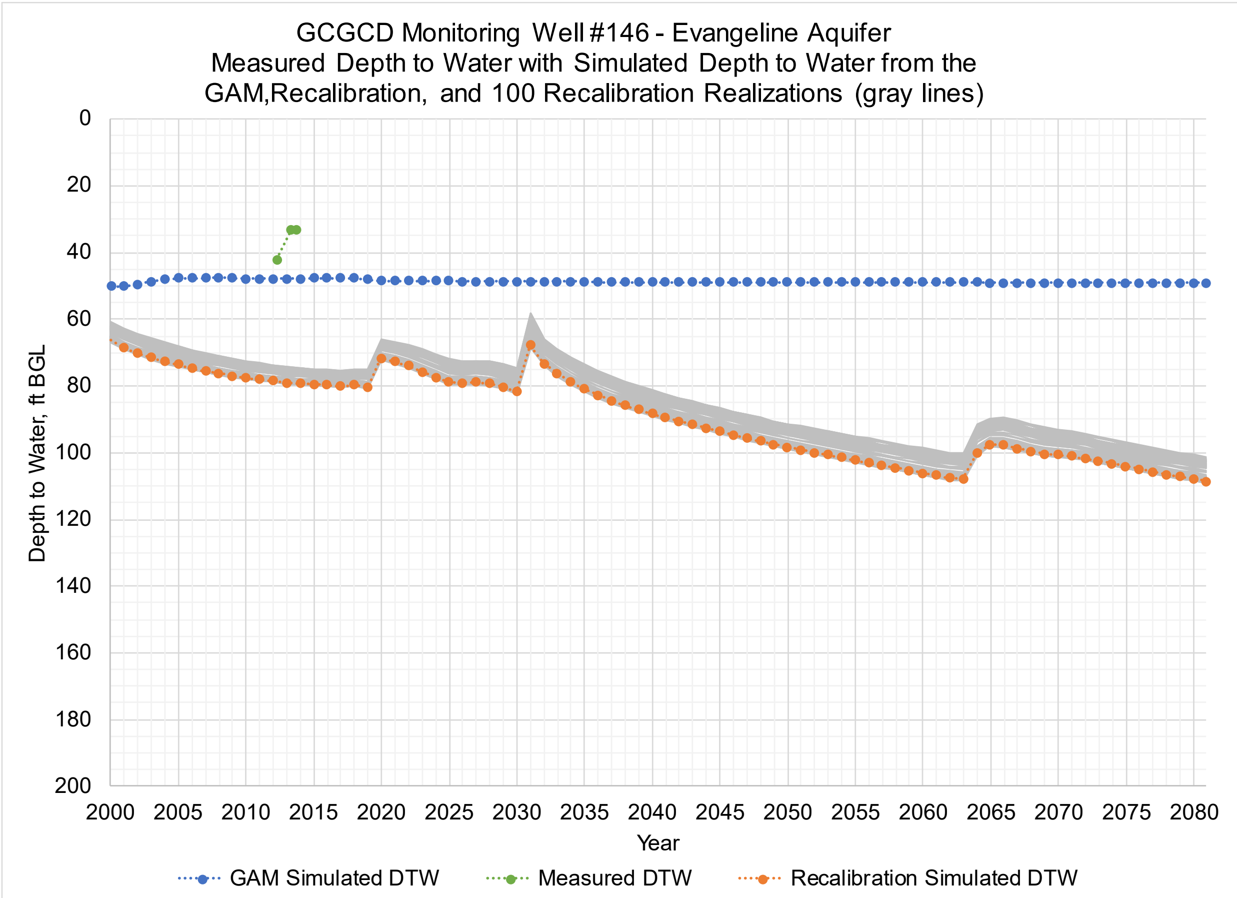

GCGCD Monitoring Well #136 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

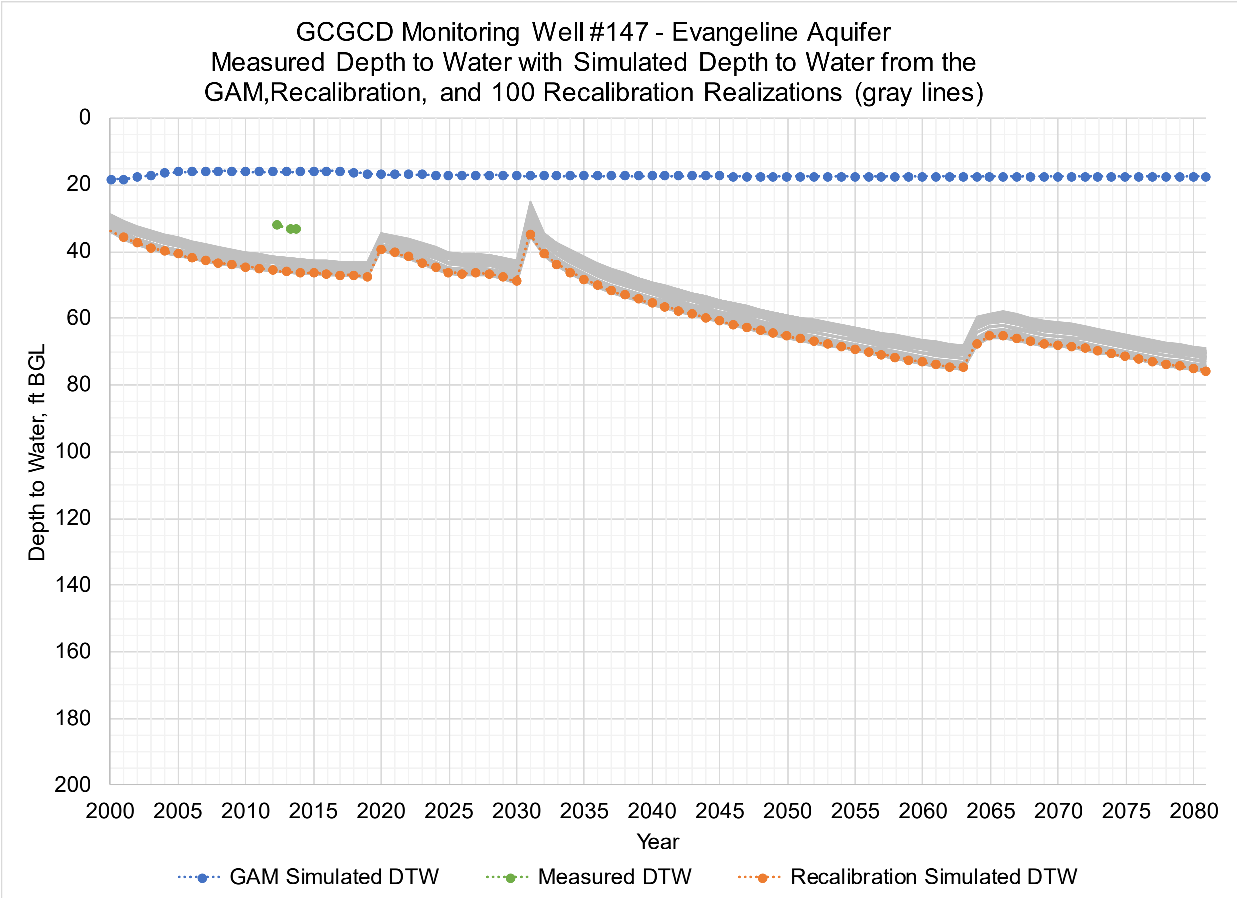

GCGCD Monitoring Well #142 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

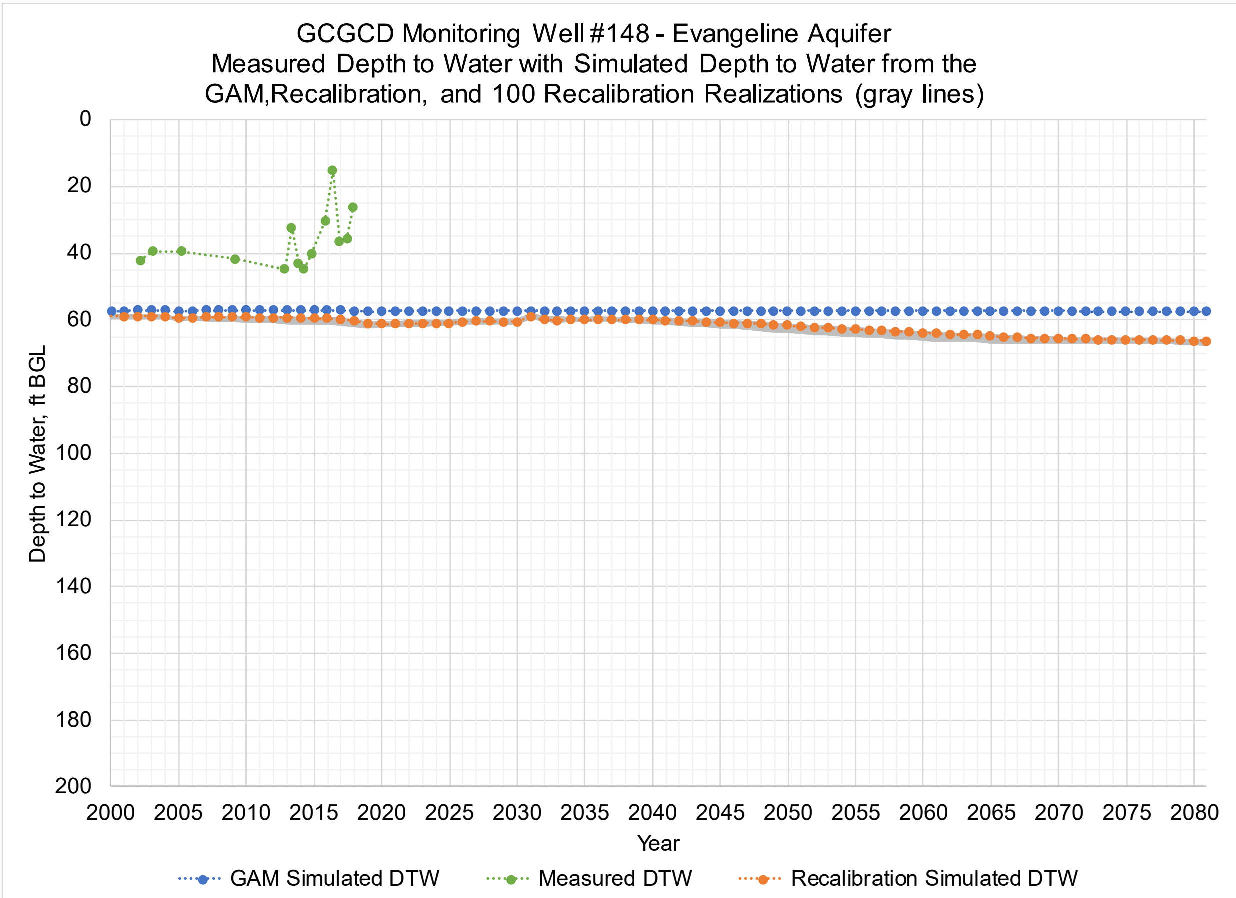

GCGCD Monitoring Well #143 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

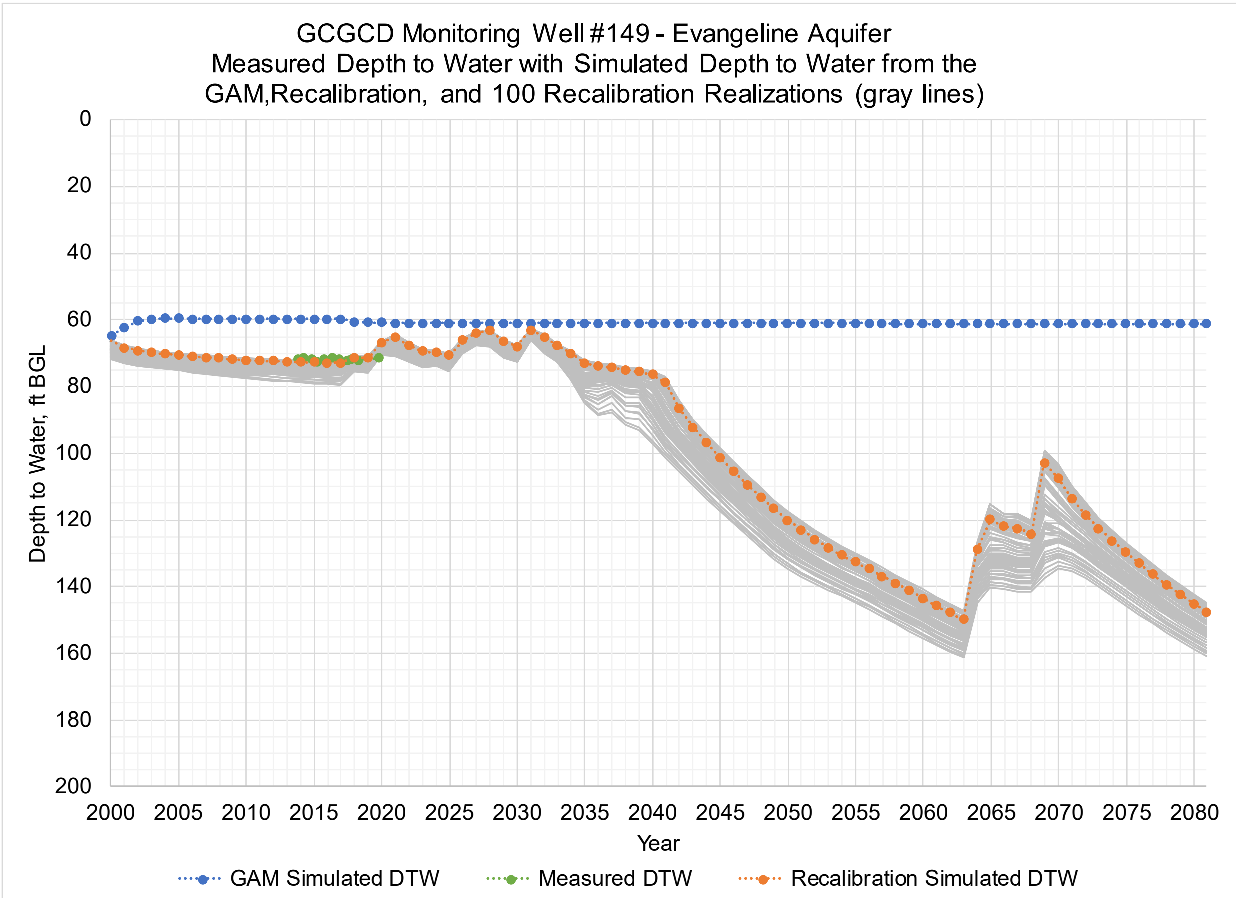

GCGCD Monitoring Well #144 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

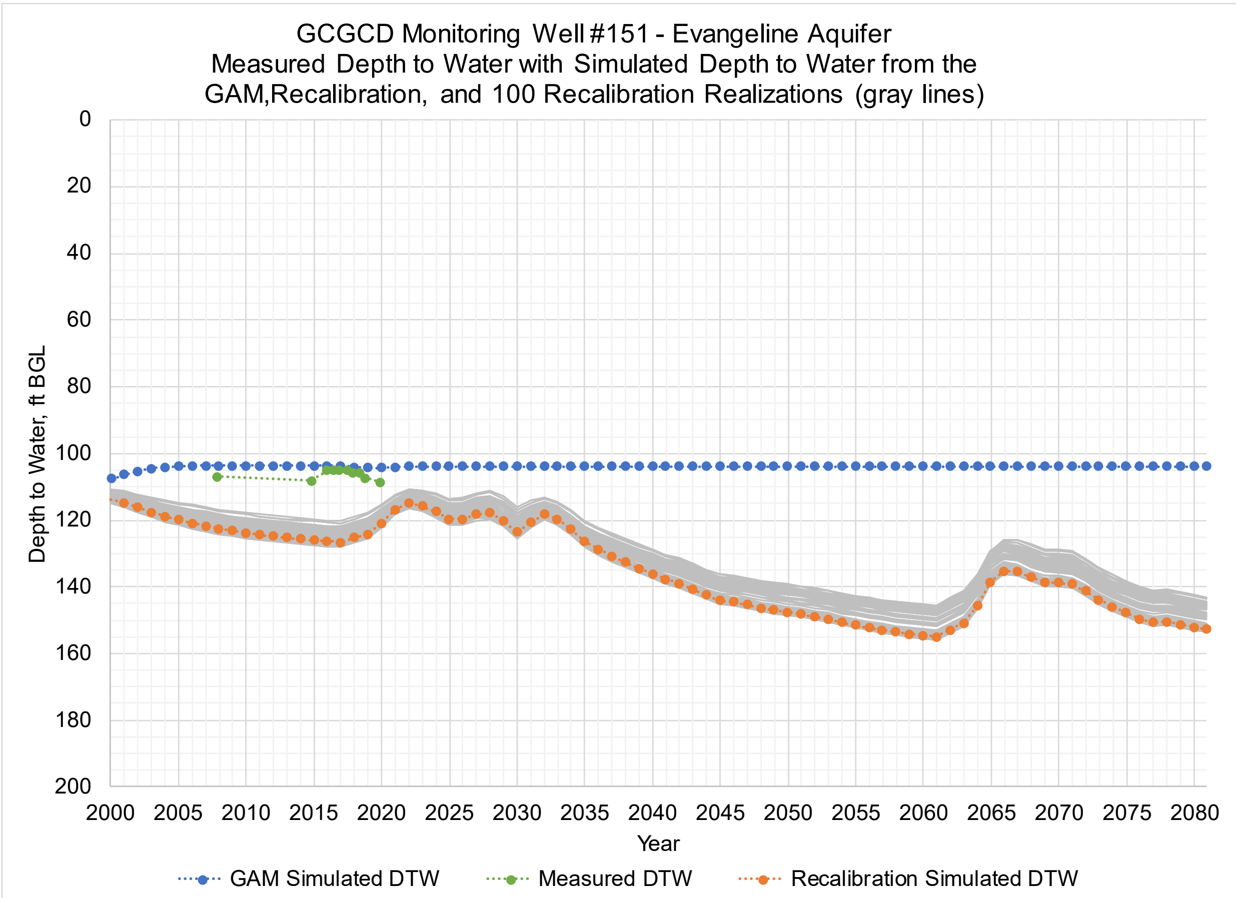

GCGCD Monitoring Well #145 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

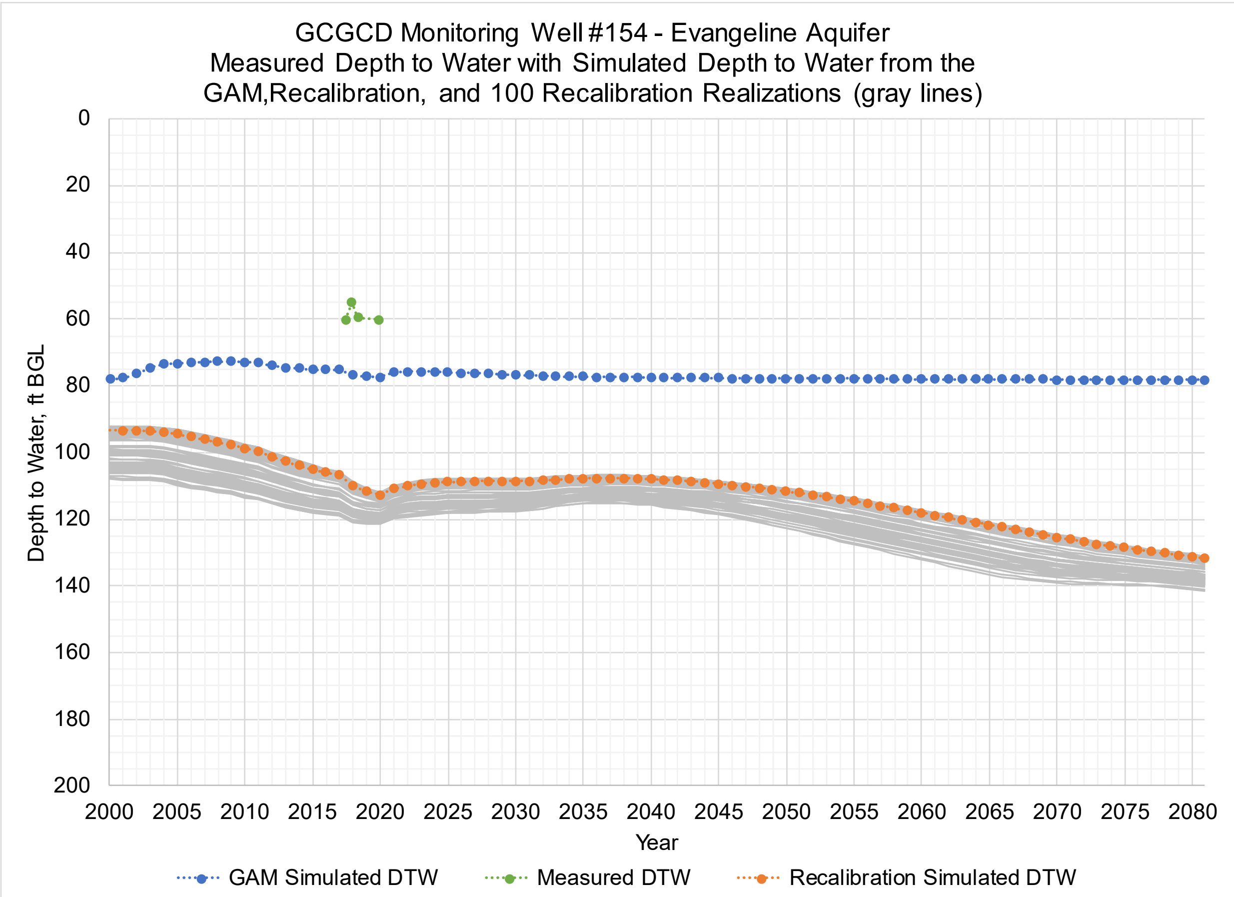

GCGCD Monitoring Well #146 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

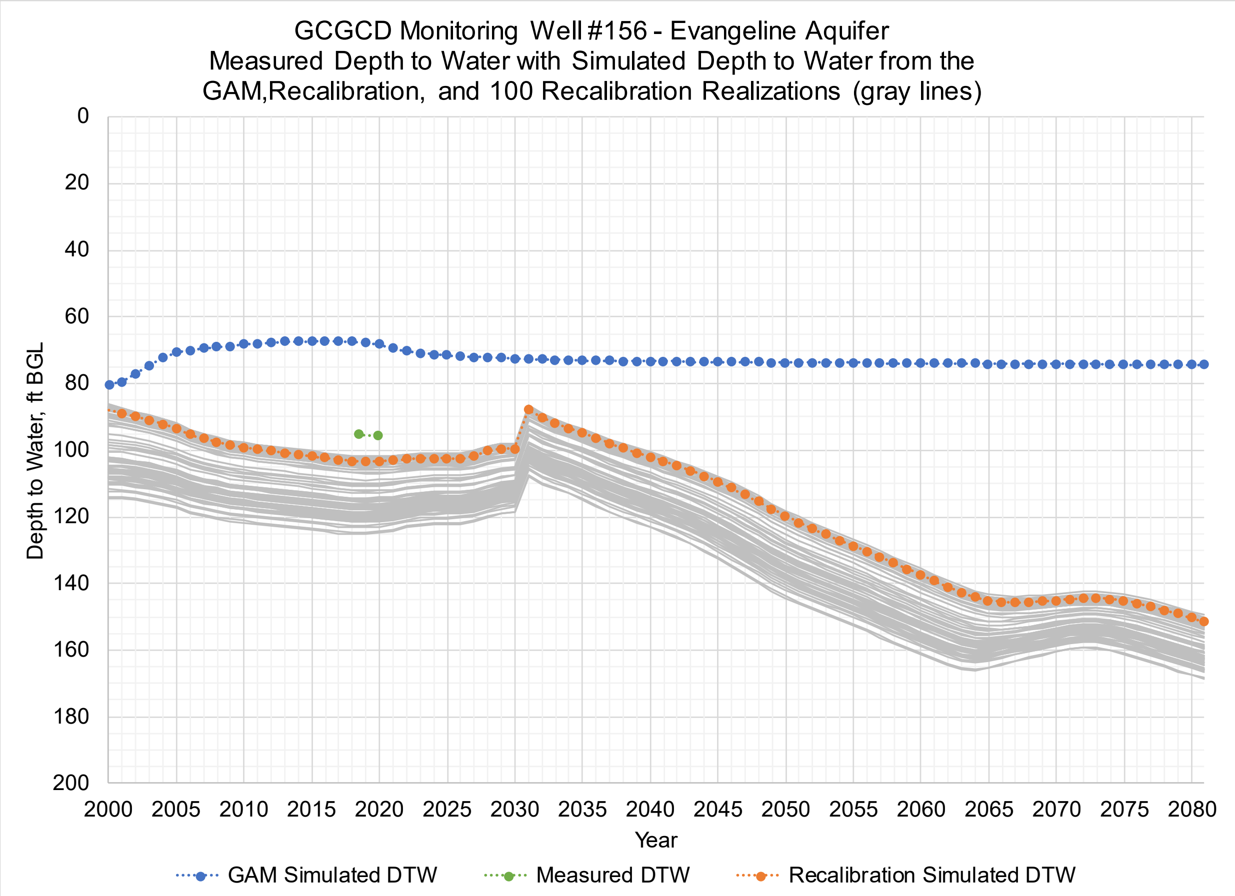

GCGCD Monitoring Well #147 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

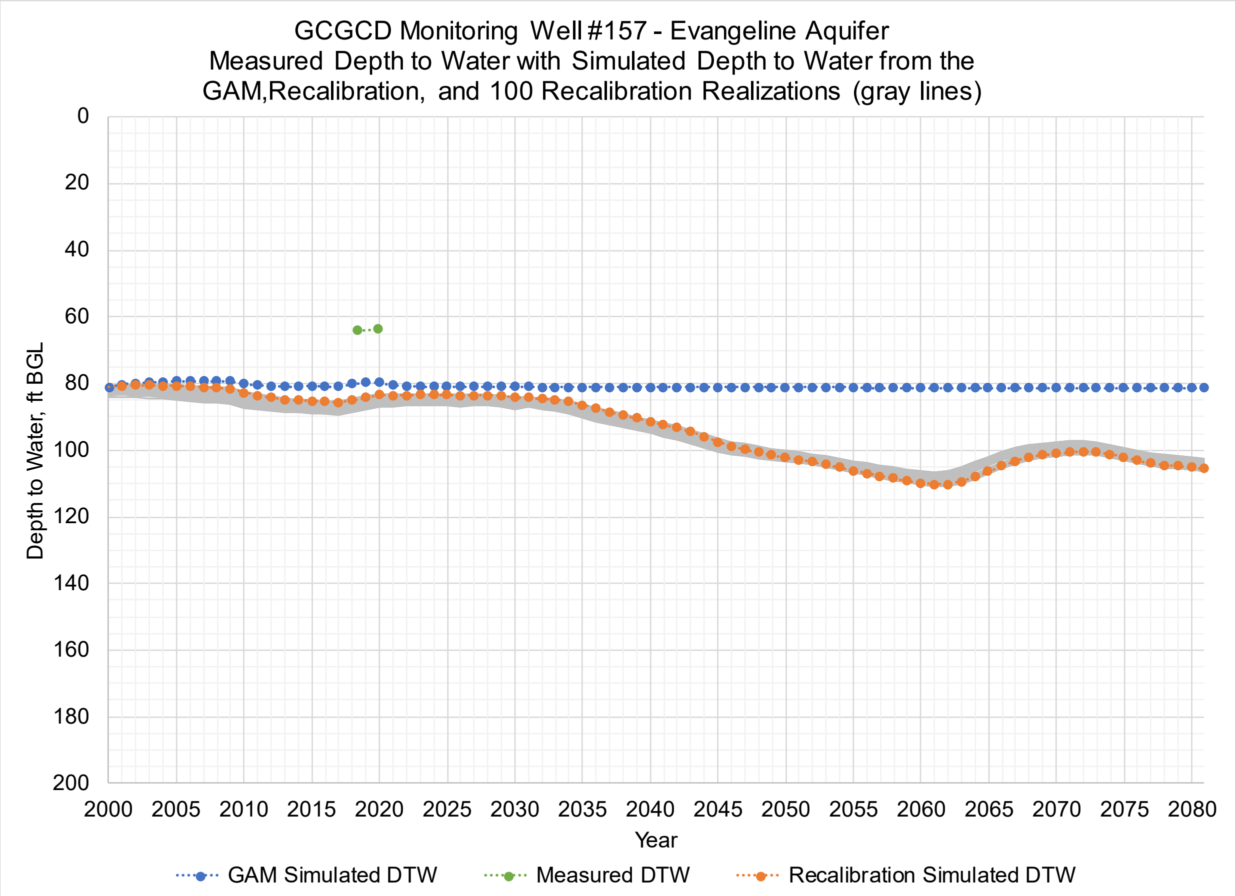

GCGCD Monitoring Well #148 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

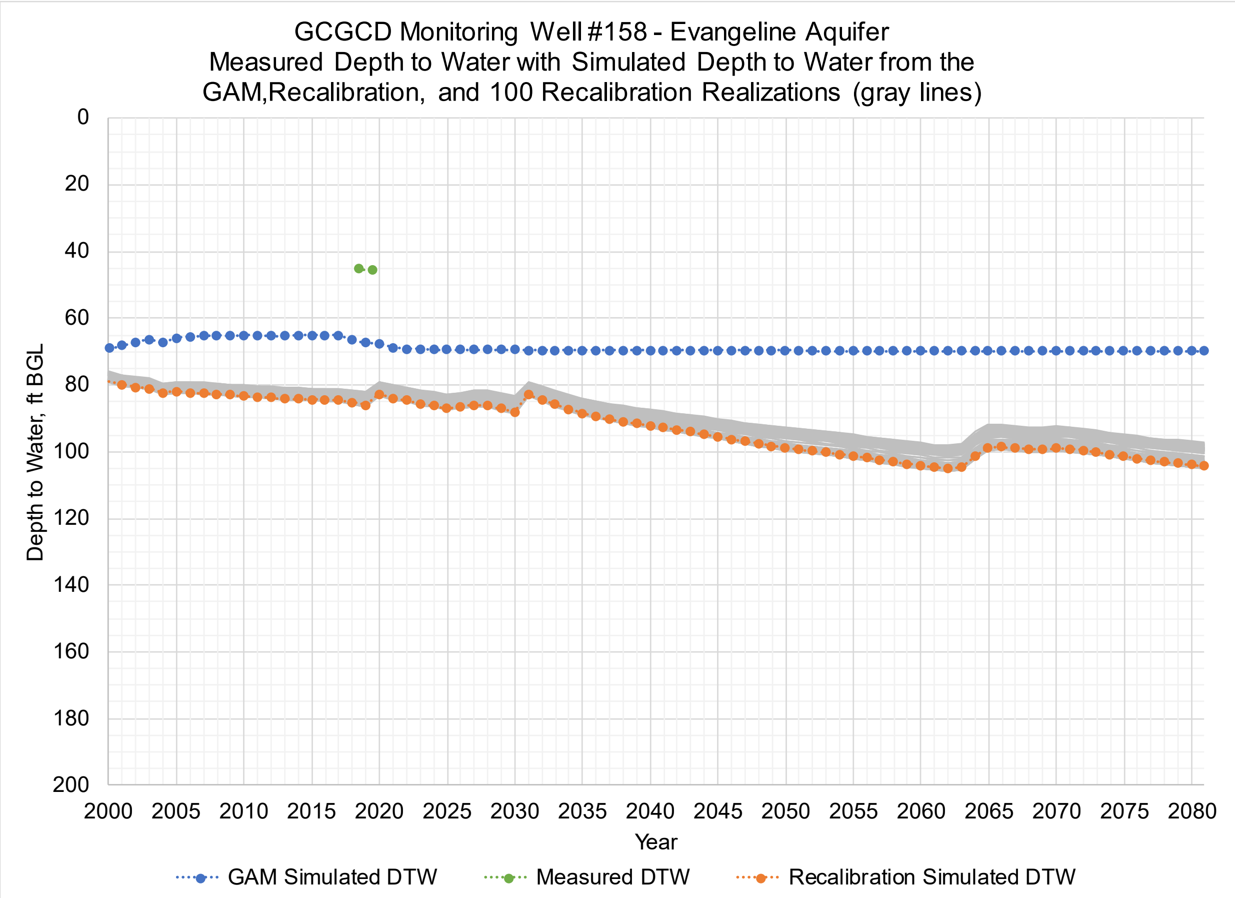

GCGCD Monitoring Well #149 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

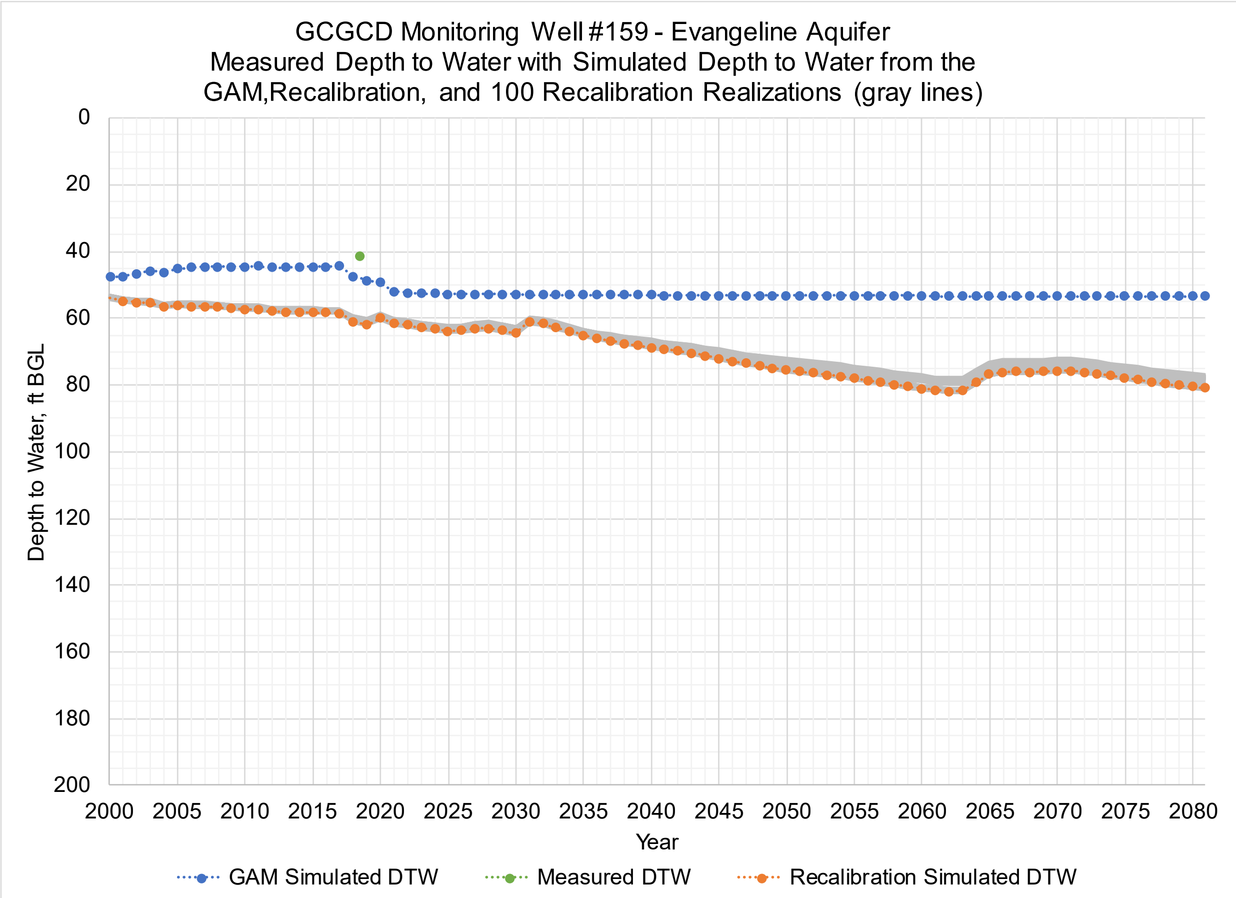

GCGCD Monitoring Well #151 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

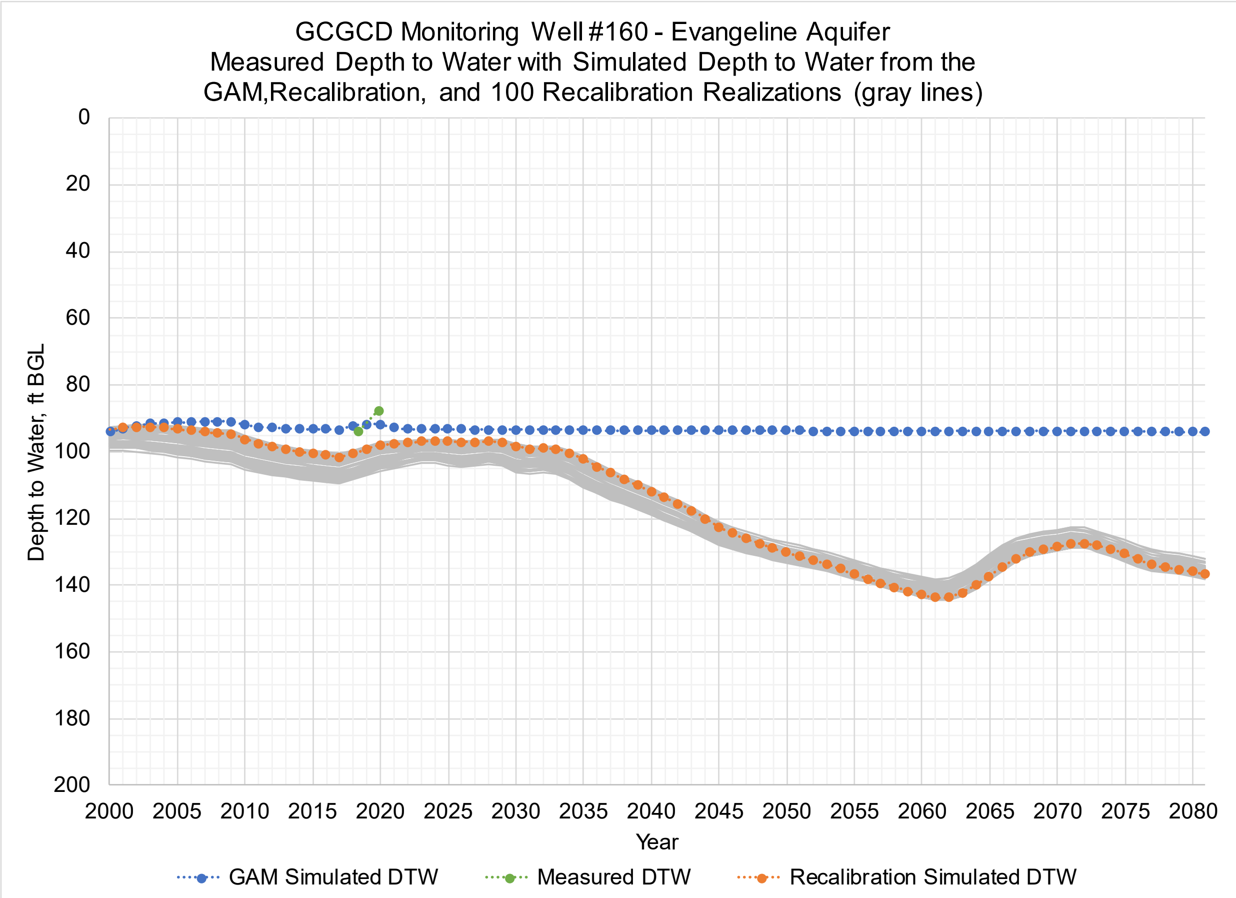

GCGCD Monitoring Well #154 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

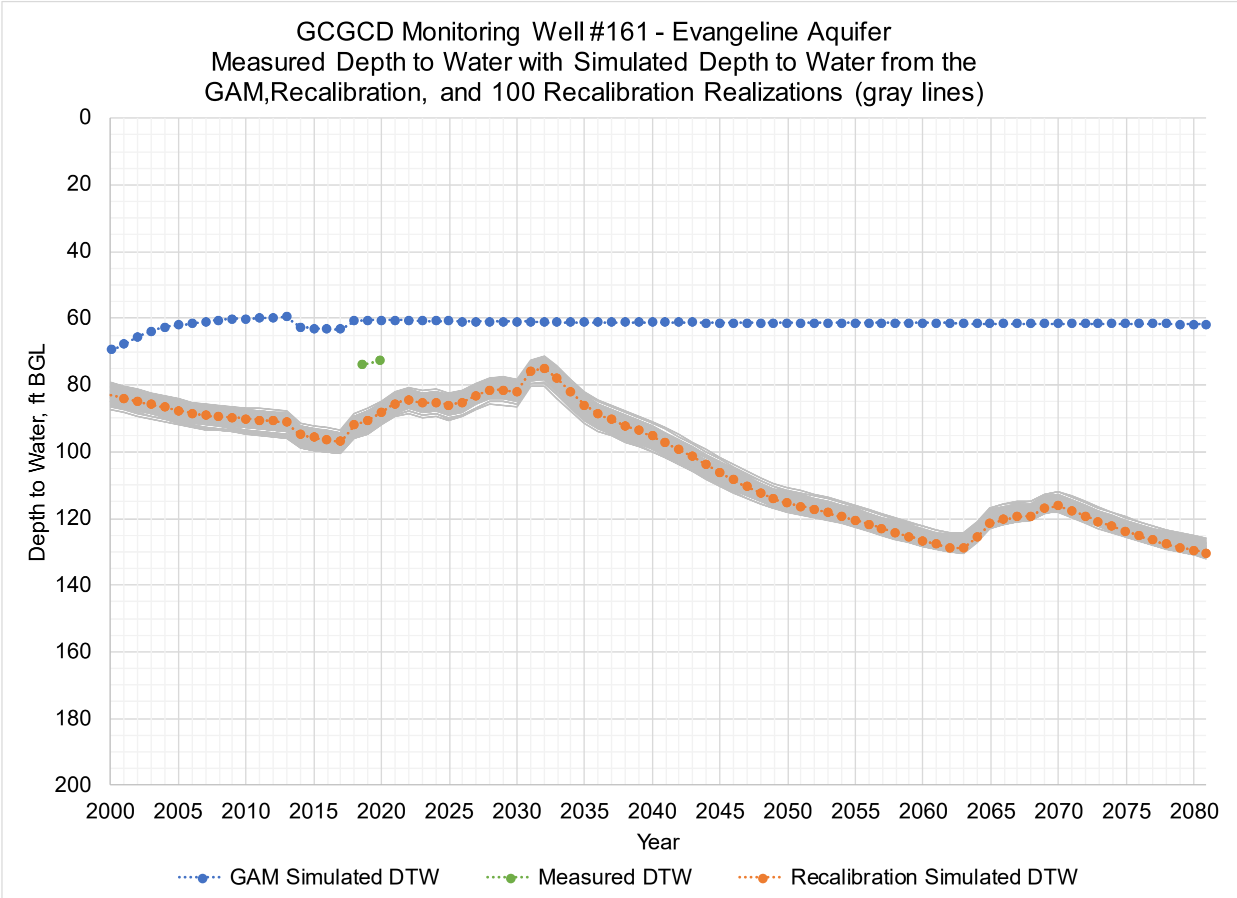

GCGCD Monitoring Well #156 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

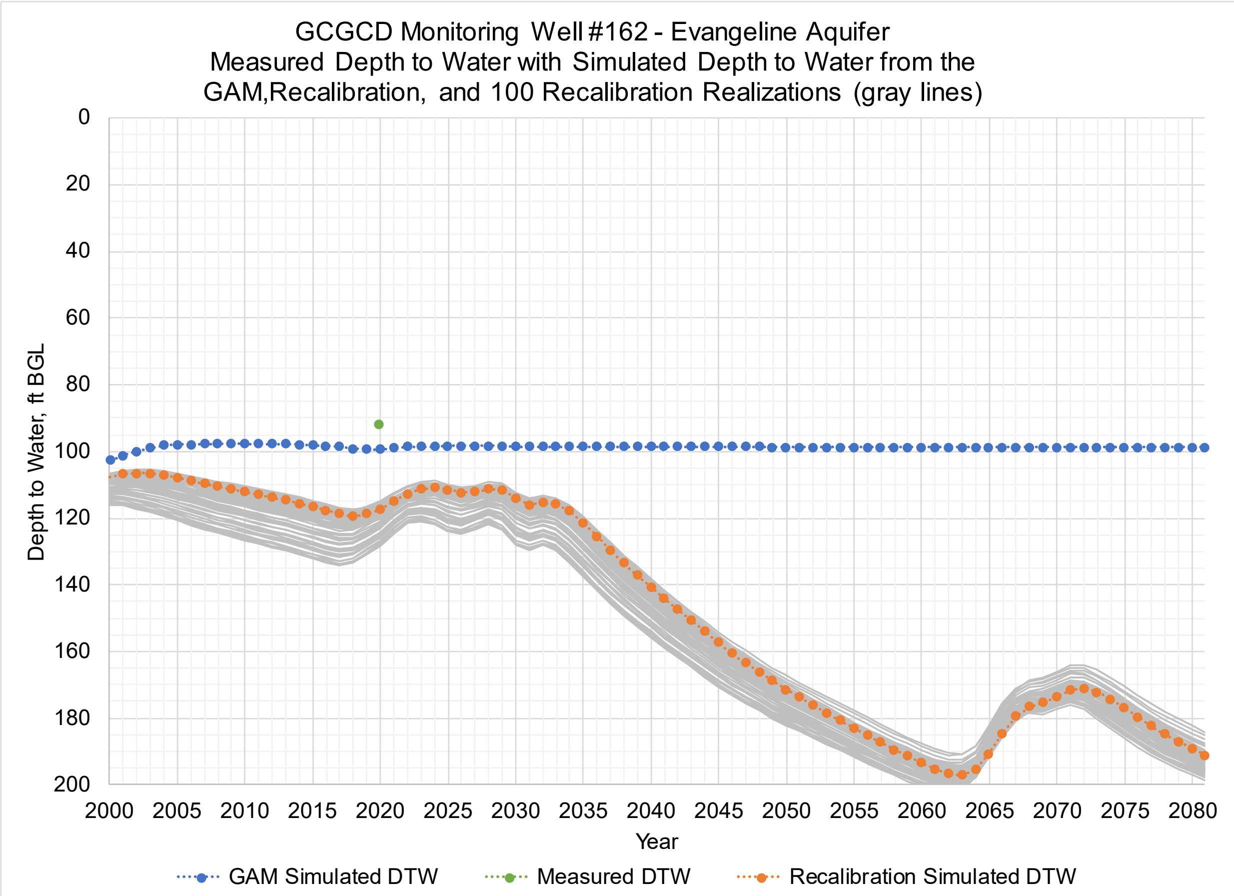

GCGCD Monitoring Well #157 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

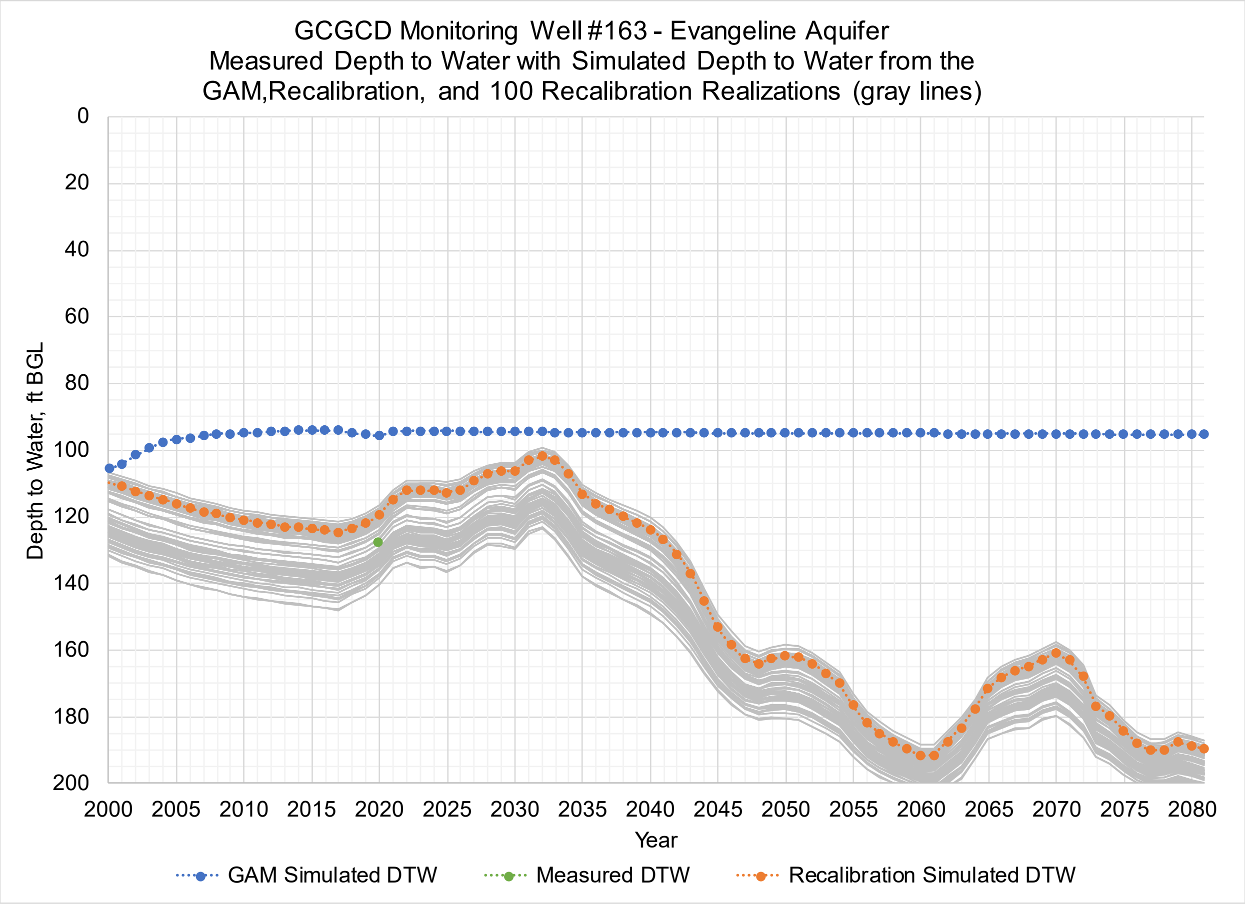

GCGCD Monitoring Well #158 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

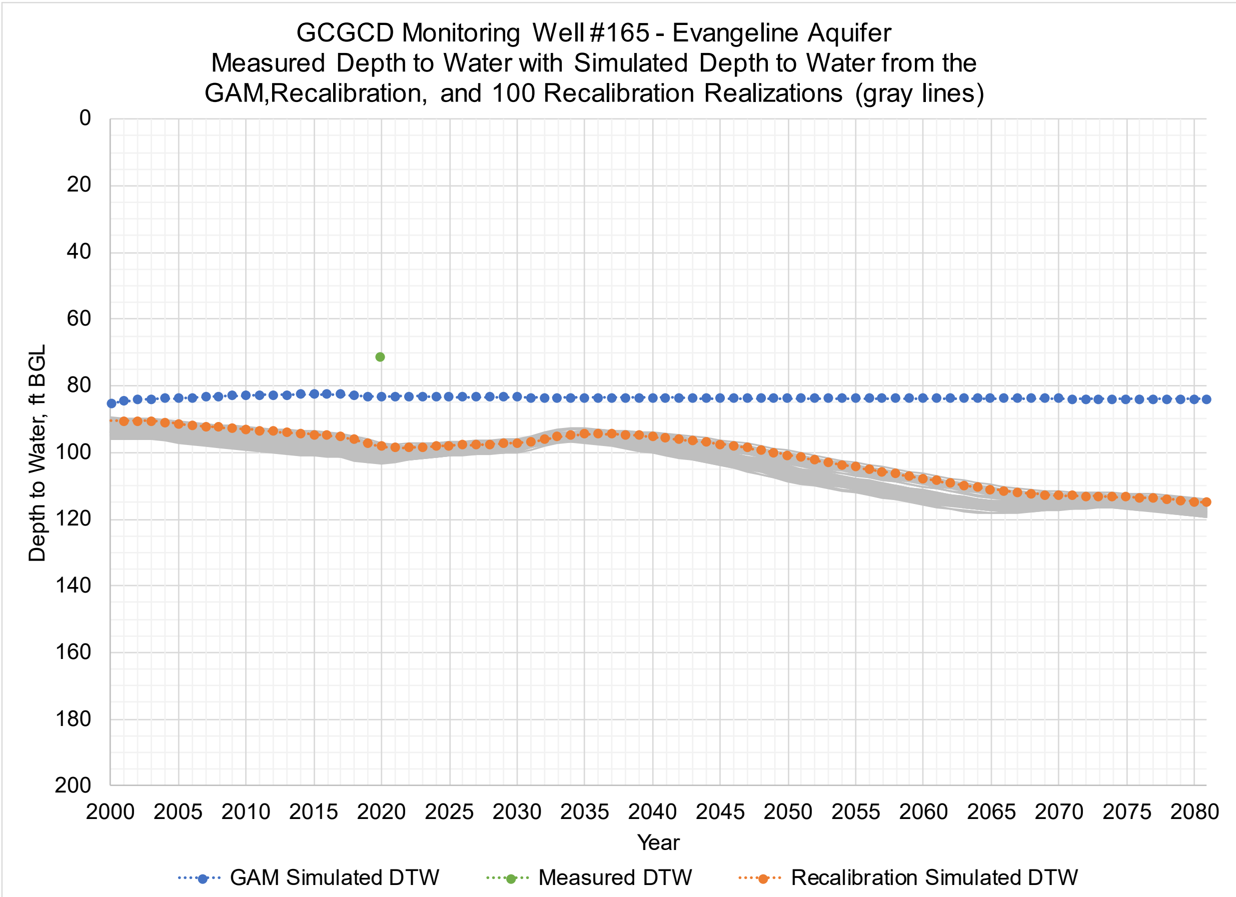

GCGCD Monitoring Well #159 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

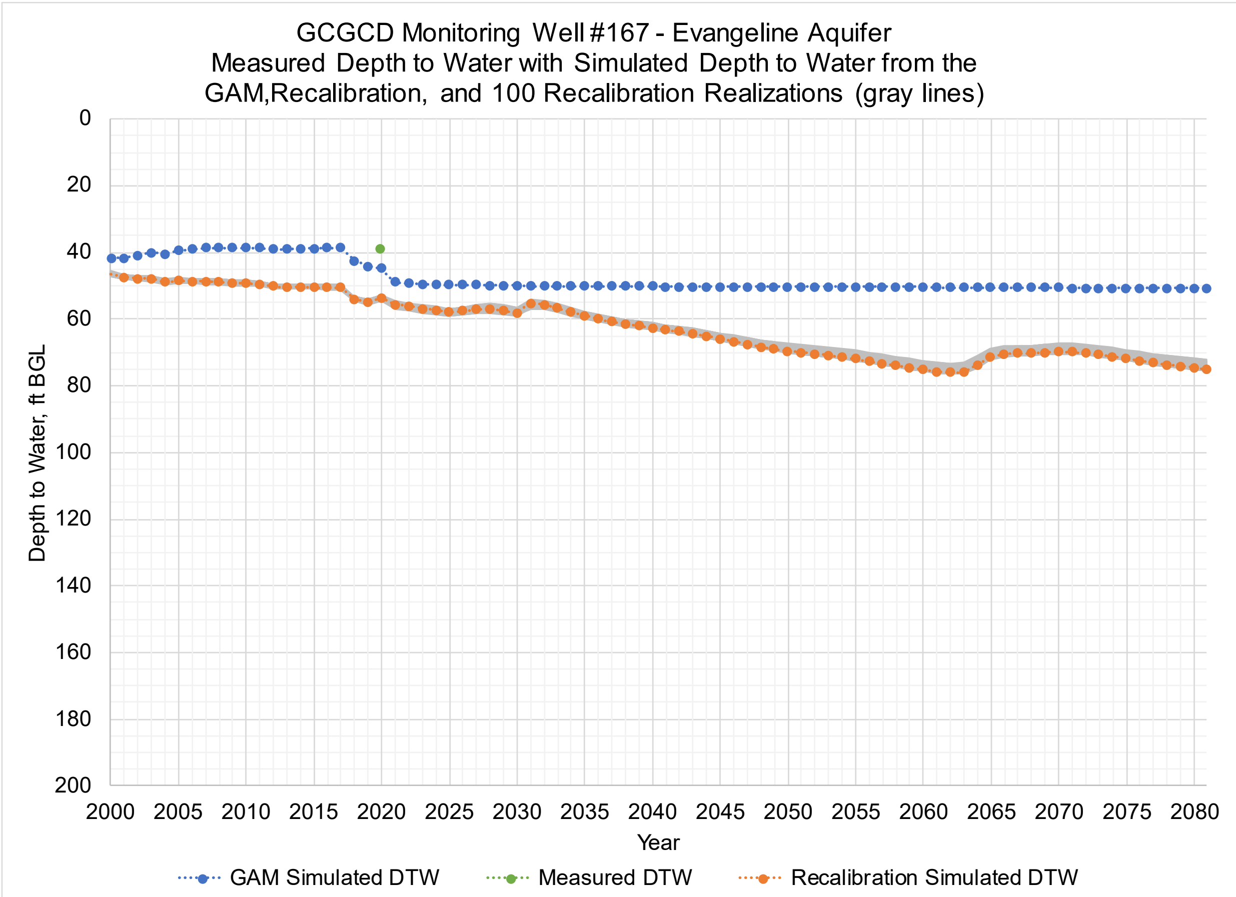

GCGCD Monitoring Well #160 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

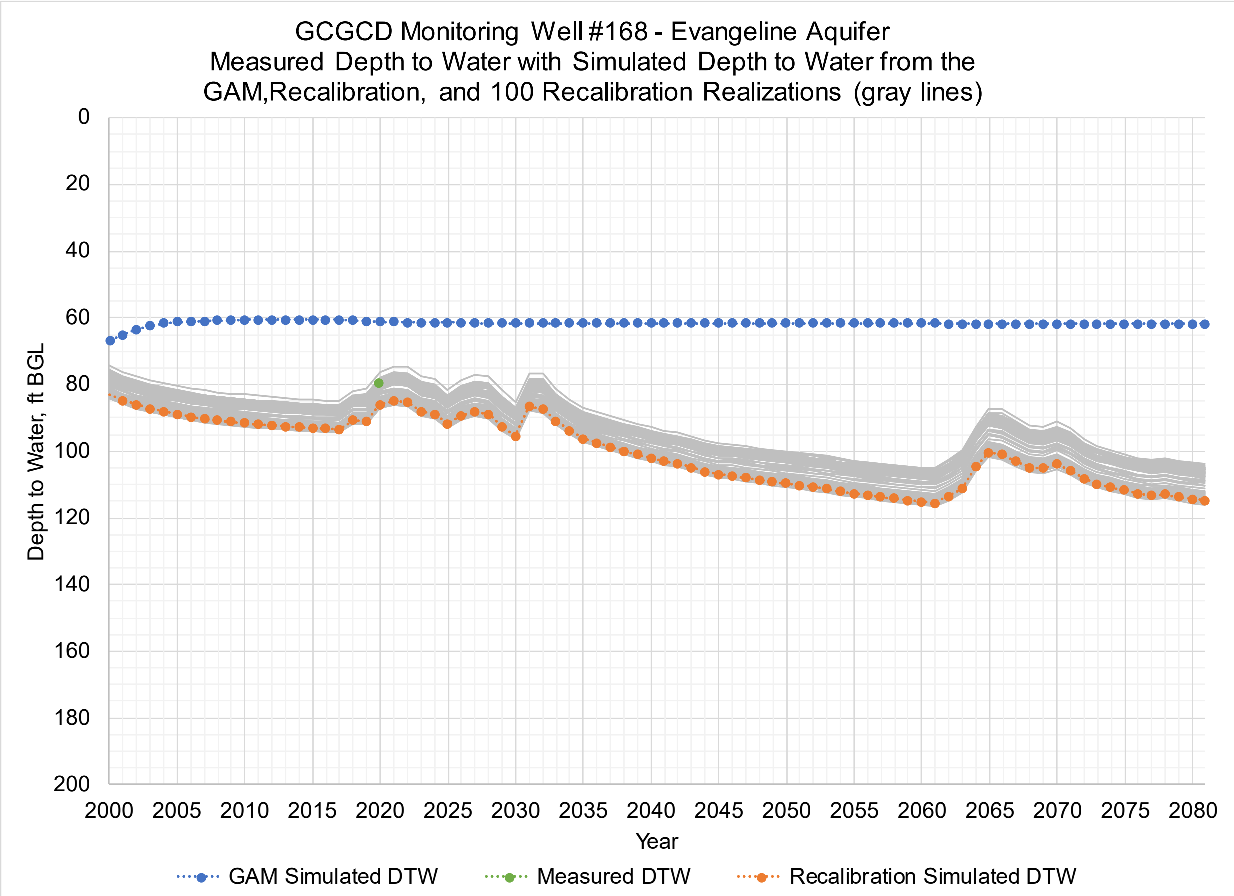

GCGCD Monitoring Well #161 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

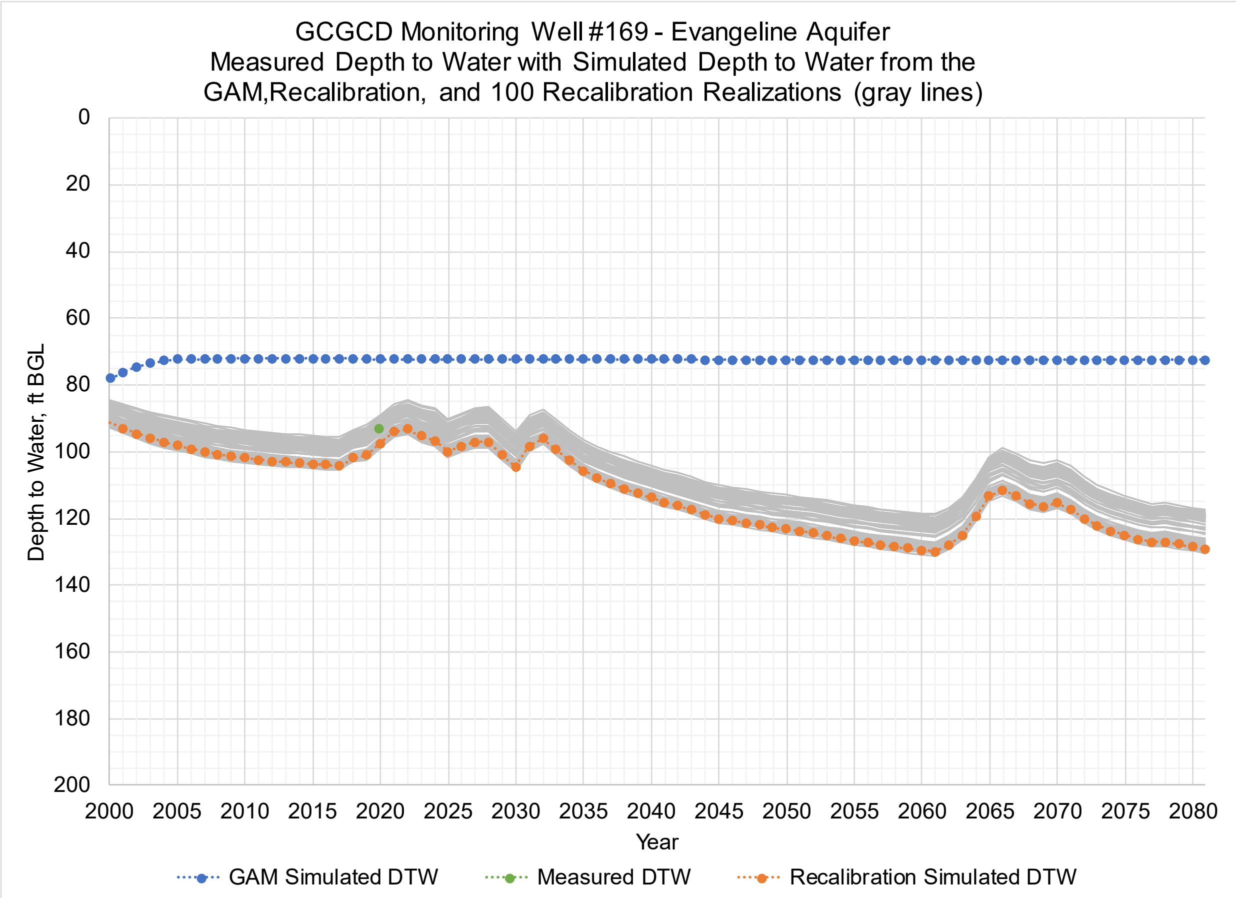

GCGCD Monitoring Well #162 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

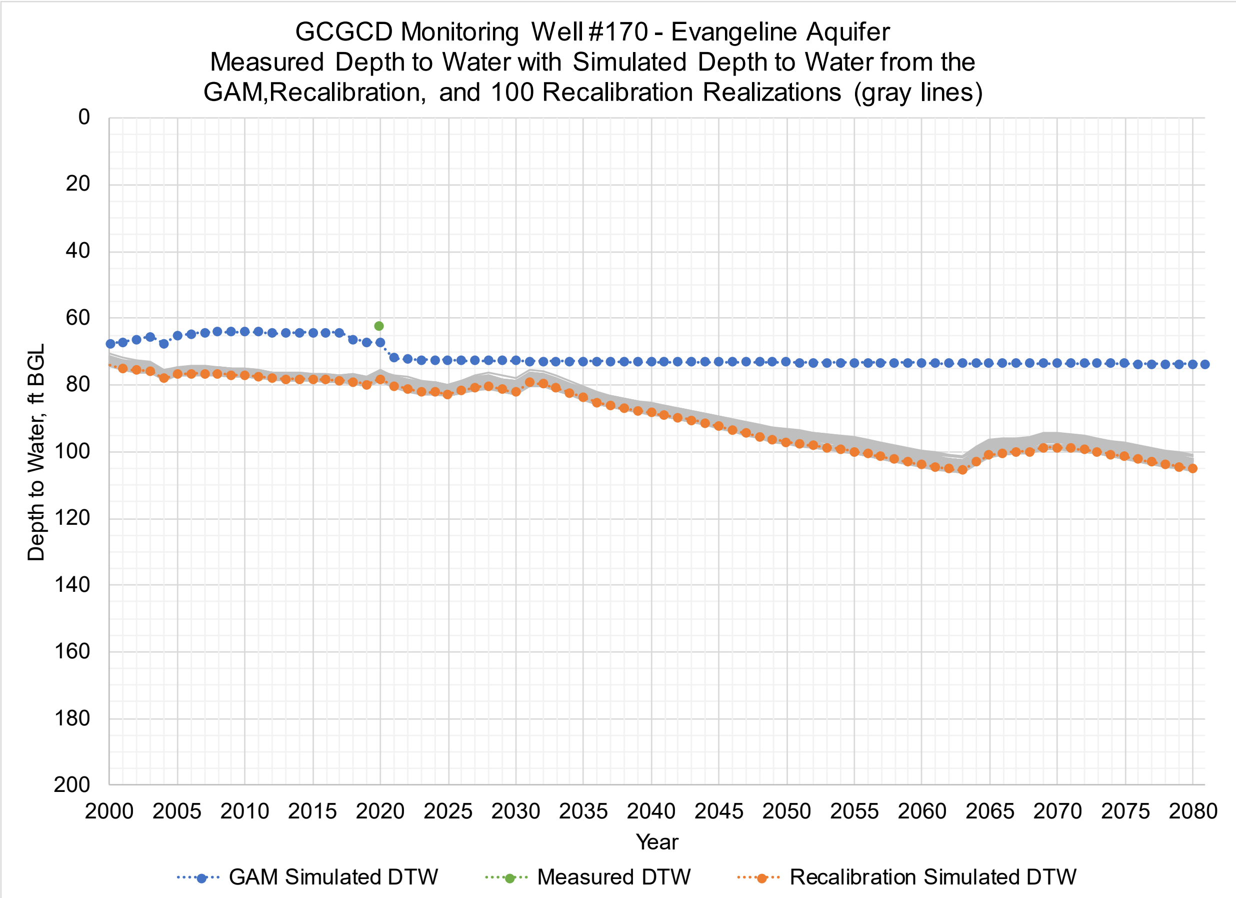

GCGCD Monitoring Well #163 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW


GCGCD Monitoring Well #165 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

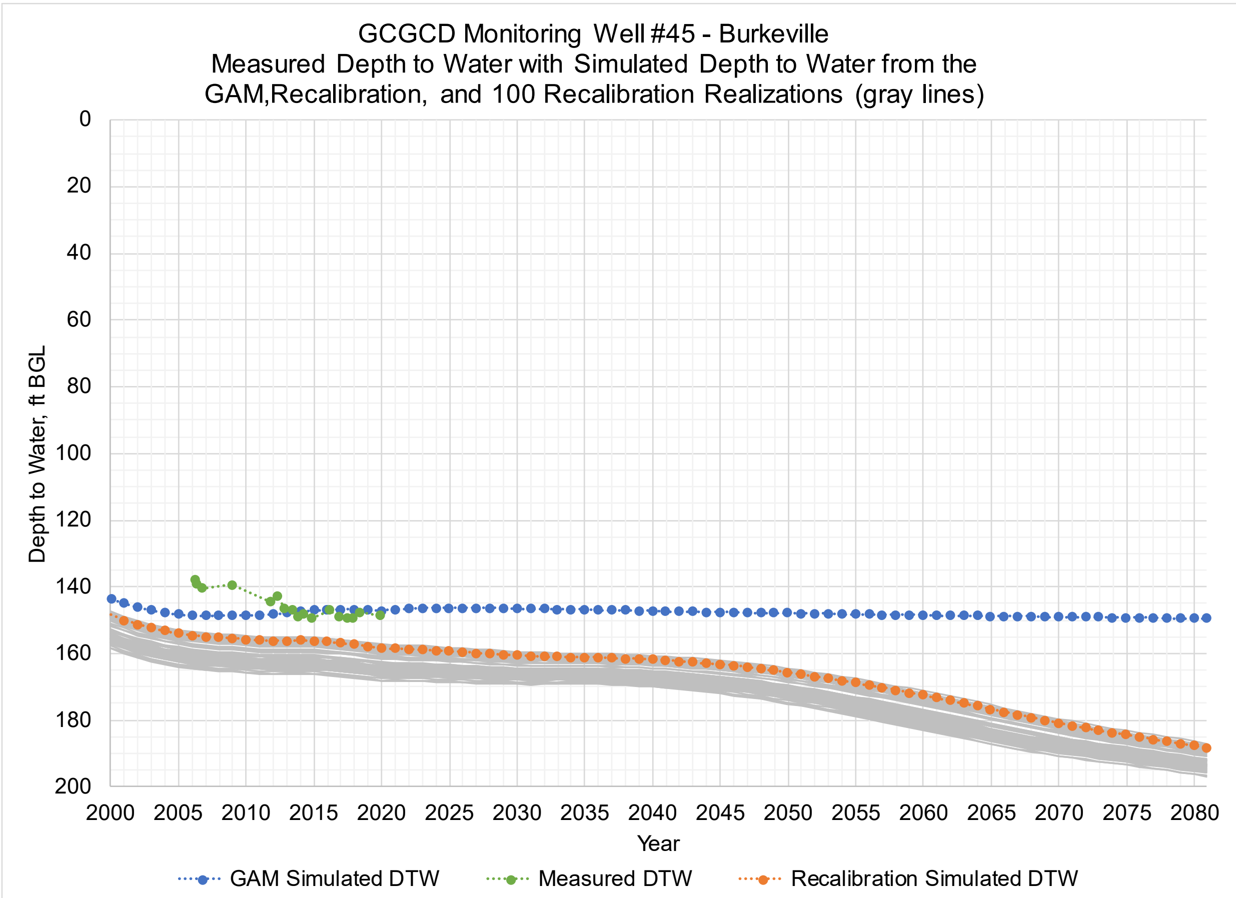

GCGCD Monitoring Well #167 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

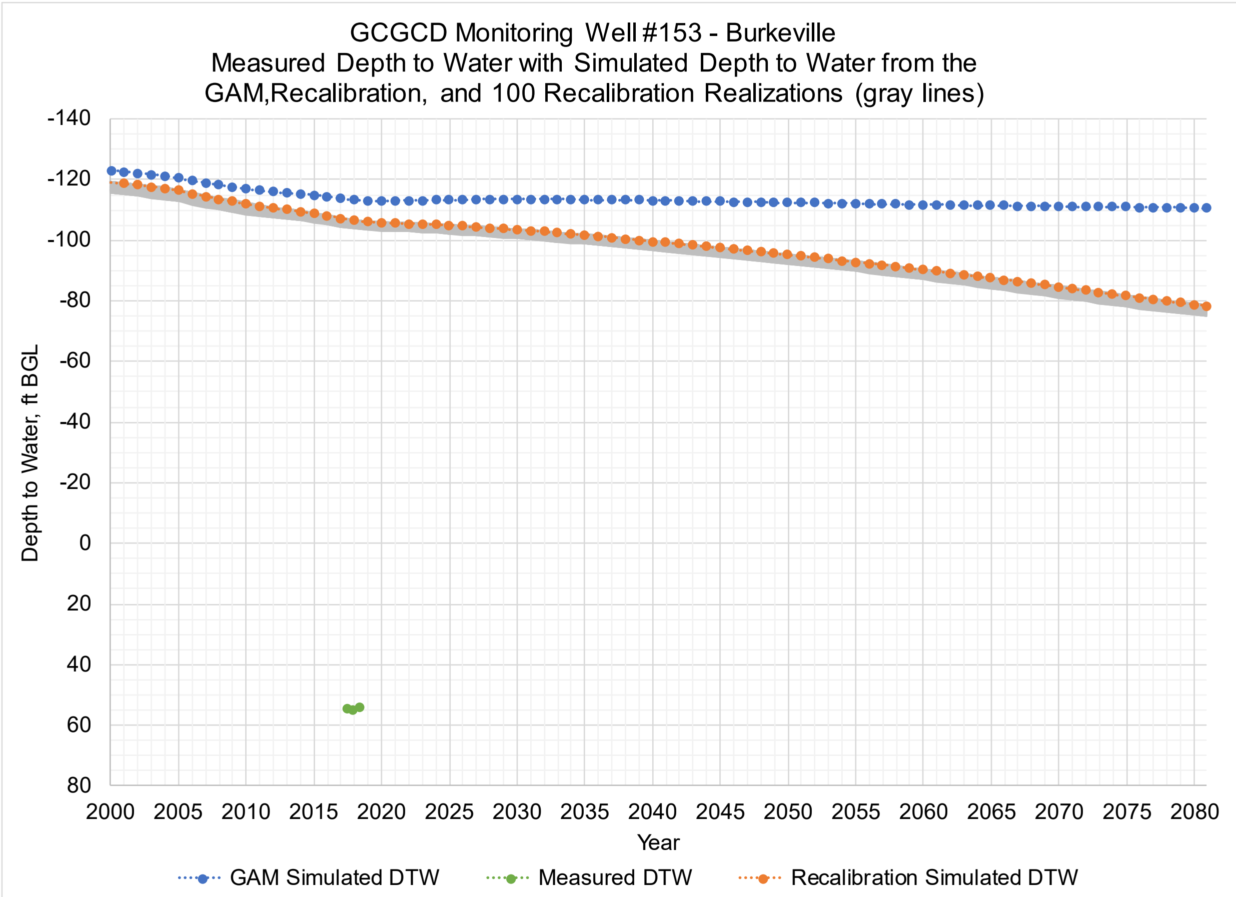

GCGCD Monitoring Well #168 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

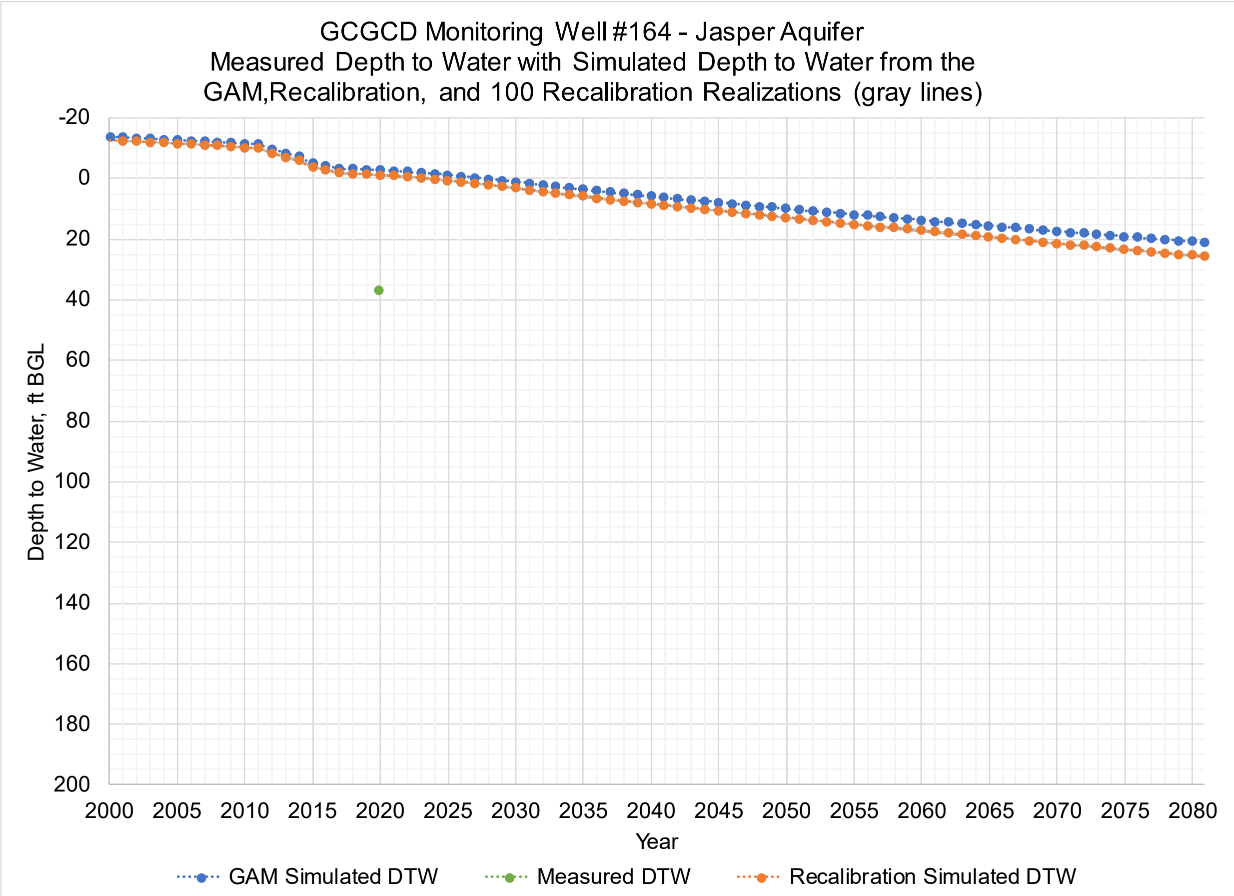

GCGCD Monitoring Well #169 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW


GCGCD Monitoring Well #170 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

Burkeville and Jasper Monitoring Wells


GCGCD Monitoring Well #45 - Burkeville
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW


GCGCD Monitoring Well #153 - Burkeville
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-140
-120
-100
-80
-60
-40
-20
0
20
40
60
80
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW


GCGCD Monitoring Well #164 - Jasper Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

APPENDIX 5 —
TECHNICAL MEMORANDA AND PRESENTATIONS ASSOCIATED WITH CONSIDERTION 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 15
FROM:	Michael R. Keester, P.G.
SUBJECT:	Discussion of Aquifer Uses and Conditions
DATE:	October 8, 2019 (Revised October 25, 2019)

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 15 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 (Young, 2016), 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,
- Central Gulf Coast GAM report (Waterstone, 2003; Chowdhury and others, 2004).

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 2000 through 2016. Table 1 summarizes the source of pumping information for each district/county. Domestic pumping estimates were based on estimates from the TWDB (TWDB, 2015). A summary of the historical pumping amounts for the geographical divisions of GMA 15 are provided in Table 2.

Most of the pumping from the Gulf Coast Aquifer System (GCAS) occurs in the northeast part of GMA 15. Pumping amounts decline across the GMA from the northeast to the southwest with the lowest average annual rates in Aransas and Calhoun counties. Figure 1 illustrates the distribution of the average amount of pumping from the GCAS from 2011 through 2016.

Total groundwater use in GMA 15 averaged just over 350,000 acre-feet per year from 2011 through 2016. Of the total use, irrigation was the dominant groundwater use within GMA 15 accounting for 83 percent of the average total annual use. Municipal or Public Supply was the second most common use followed by exempt use (combined domestic and livestock use). Table 3 summarizes the average annual groundwater use within each district/county by type for the period from 2011 through 2016. Table 4 summarizes the percent of each use within each district/county in GMA 15 for the period from 2011 through 2016.

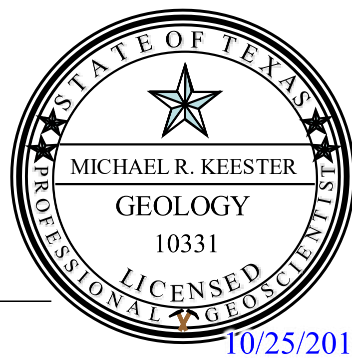
Based on information from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c), wells identified as domestic or livestock for the proposed use are most common throughout GMA 15. As reflected in the amount of groundwater pumping, most of the irrigation and public supply wells occur in the northeast portion of GMA 15. Using the aquifer code, depth, and/or completion data for each well in the databases, we determined the layer of the Gulf Coast Aquifer System in which each well was likely producing. We found that most of the irrigation and public supply wells are completed in the Chicot or Evangeline aquifers as the total groundwater production information suggests. Figure 2 through Figure 5 illustrate the wells completed in each layer of the Gulf Coast Aquifer System. Figure 6 illustrates the distribution of wells by type of use in each county within GMA 15.

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).

Pocket Seal



10/25/2019

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

References

Chowdhury, A.H., Wade, S., Mace, R.E., and Ridgeway, C., 2004, Groundwater Availability Model of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999: Model Report, 108 p.

Texas Water Development Board, 2015, Projected Exempt Groundwater Use Estimates for GMA 15, http://www.twdb.texas.gov/groundwater/management_areas/exempt_use/GMA_15_ExemptUse_2015.pdf, accessed February 2019.

Texas Water Development Board, 2019a, Groundwater Database Reports, http://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp, accessed February 2019.

Texas Water Development Board, 2019b, Historical Groundwater Pumpage - SumFinal_CountySumPumpage, http://www.twdb.texas.gov/waterplanning/waterusesurvey/historical-pumpage.asp, accessed February 2019.

Texas Water Development Board, 2019c, Submitted Drillers Reports Database Download, http://www.twdb.state.tx.us/groundwater/data/drillersdb.asp, accessed February 2019.

Waterstone, 2003, Groundwater Availability of the Central Gulf Coast Aquifer: Numerical Simulations to 2050 Central Gulf Coast, Texas:

Young, S., 2016, Desired Future Condition Explanatory Report for Groundwater Management Area 15: Report prepared for Groundwater Management Area 15, 52 p.

Table 1. Summary of source of pumping estimates for period from 2011 through 2016.

GCD/County	Source of Estimated Pumping Amount
Aransas County GCD/ Aransas County	TWDB Pumpage Estimates (TWDB, 2019b)
Bee GCD/ Bee County	TWDB Pumpage Estimates (TWDB, 2019b) with the GMA 15 portion equal to 40 percent of the total for Bee County
Calhoun County GCD/ Calhoun County	TWDB Pumpage Estimates (TWDB, 2019b)
Coastal Bend GCD/ Wharton County	TWDB Pumpage Estimates (TWDB, 2019b) for irrigation, municipal, manufacturing, and power uses for 2000 through 2005, and for all years for livestock and mining use. CBGCD data for 2006 through 2016 for irrigation, municipal, manufacturing, and power uses
Coastal Plains GCD/ Matagorda County	TWDB Pumpage Estimates (TWDB, 2019b) for irrigation, municipal, manufacturing, and power uses for 2000 through 2004, and for all years for livestock and mining use. CPGCD data for 2005 through 2016 for irrigation, municipal, manufacturing, and power uses
Colorado County GCD/ Colorado County	TWDB Pumpage Estimates (TWDB, 2019b)
Evergreen UWCD/ Karnes County	TWDB Pumpage Estimates (TWDB, 2019b) for irrigation, municipal, and livestock uses, and for 2000 through 2010 for mining use. EUWCD indicated O&G pumping started in 2011. For mining use, EUWCD reported values for 2014 through 2016 and the average of reported values for 2011 through 2013
Fayette County GCD/ Fayette County	For all use types and years, used pumping amounts from by the District
Goliad County GCD/ Goliad County	For all use types and years, used pumping amounts from by the District
ND Lavaca/ Lavaca County	TWDB Pumpage Estimates (TWDB, 2019b)
Pecan Valley GCD/ DeWitt County	TWDB Pumpage Estimates (TWDB, 2019b)
Refugio GCD/ Refugio County	TWDB Pumpage Estimates (TWDB, 2019b)
Texana GCD/ Jackson County	TWDB Pumpage Estimates (TWDB, 2019b)
Victoria County GCD/ Victoria County	TWDB Pumpage Estimates (TWDB, 2019b)

Table 2. Summary of GMA 15 historical pumping from the Gulf Coast Aquifer System (GCAS). For Bee County, the amount only reflects the portion of Bee County within GMA 15.

GMA 15 Historical Pumping, Acre-Feet per Year						
GCD/County	**Year**	**Chicot**	**Evangeline**	**Burkeville**	**Jasper**	**GCAS**
Aransas County GCD/ Aransas County	2000	613	0	0	0	613
	2005	635	1	0	0	636
	2010	713	2	0	0	715
	2011	776	2	0	0	778
	2012	780	2	0	0	782
	2013	754	1	0	0	755
	2014	821	1	0	0	822
	2015	756	1	0	0	757
	2016	806	1	0	0	807
Bee GCD/ Bee County	2000	11	1,108	164	664	1,947
	2005	56	1,850	134	507	2,547
	2010	80	2,117	108	391	2,696
	2011	80	1,594	116	401	2,191
	2012	59	1,963	105	380	2,507
	2013	56	1,587	97	332	2,072
	2014	60	1,455	91	304	1,910
	2015	61	1,266	81	261	1,669
	2016	61	1,551	87	271	1,970
Calhoun County GCD/ Calhoun County	2000	669	0	0	0	669
	2005	2,018	0	0	0	2,018
	2010	1,418	0	0	0	1,418
	2011	1,846	0	0	0	1,846
	2012	1,354	0	0	0	1,354
	2013	1,331	0	0	0	1,331
	2014	1,785	0	0	0	1,785
	2015	1,335	0	0	0	1,335
	2016	1,177	0	0	0	1,177
Coastal Bend GCD/ Wharton County	2000	126,127	9,429	0	0	135,556
	2005	148,999	9,349	0	0	158,348
	2010	122,613	7,851	0	0	130,464
	2011	179,142	10,684	0	0	189,826
	2012	141,829	10,800	0	0	152,629
	2013	152,021	14,492	0	0	166,513
	2014	142,619	13,962	0	0	156,581
	2015	109,929	11,197	0	0	121,126
	2016	101,128	10,522	0	0	111,650

Table 2. Summary of GMA 15 historical pumping (continued).

GMA 15 Historical Pumping, Acre-Feet per Year						
GCD/County	Year	Chicot	Evangeline	Burkeville	Jasper	GCAS
Coastal Plains GCD/ Matagorda County	2000	26,808	0	0	0	26,808
	2005	37,279	255	0	0	37,534
	2010	28,253	138	0	0	28,391
	2011	59,868	308	0	0	60,176
	2012	40,431	186	0	0	40,617
	2013	44,295	340	0	0	44,635
	2014	43,401	454	0	0	43,855
	2015	36,635	356	0	0	36,991
	2016	30,639	283	0	0	30,922
Colorado County GCD/ Colorado County	2000	11,255	16,351	50	432	28,088
	2005	13,673	14,774	52	492	28,991
	2010	25,160	27,497	45	740	53,442
	2011	26,019	28,917	44	720	55,700
	2012	14,554	16,327	51	576	31,508
	2013	10,863	12,158	49	444	23,514
	2014	14,196	16,423	65	608	31,292
	2015	11,978	14,777	57	720	27,532
	2016	10,798	13,539	61	781	25,179
Evergreen UWCD/ Karnes County	2000	0	11	16	3,410	3,437
	2005	0	19	77	3,604	3,700
	2010	0	25	75	3,341	3,441
	2011	0	77	279	5,608	5,964
	2012	0	59	214	5,368	5,641
	2013	0	54	210	5,477	5,741
	2014	0	68	268	6,723	7,059
	2015	0	32	126	3,666	3,824
	2016	0	44	176	4,885	5,105
Fayette County GCD/ Fayette County	2000	0	273	174	1,628	2,075
	2005	0	280	178	1,613	2,071
	2010	0	287	182	2,225	2,694
	2011	0	288	183	2,470	2,941
	2012	0	290	184	2,477	2,951
	2013	0	291	185	2,606	3,082
	2014	0	292	186	2,655	3,133
	2015	0	294	187	2,843	3,324
	2016	0	295	188	3,020	3,503

Table 2. Summary of GMA 15 historical pumping (continued).

GMA 15 Historical Pumping, Acre-Feet per Year						
GCD/County	Year	Chicot	Evangeline	Burkeville	Jasper	GCAS
Goliad County GCD/ Goliad County	2000	213	2,332	79	516	3,140
	2005	234	4,014	112	275	4,635
	2010	164	4,651	81	465	5,361
	2011	150	4,579	68	488	5,285
	2012	96	4,725	48	580	5,449
	2013	83	4,748	41	488	5,360
	2014	92	4,754	46	675	5,567
	2015	100	4,799	52	675	5,626
	2016	107	4,870	54	675	5,706
ND Bee/ Bee County	2000	0	0	155	155	310
	2005	0	0	113	526	639
	2010	0	0	76	354	430
	2011	0	0	83	386	469
	2012	0	0	78	362	440
	2013	0	0	72	335	407
	2014	0	0	65	302	367
	2015	0	0	54	252	306
	2016	0	0	55	257	312
ND Lavaca/ Lavaca County	2000	274	5,084	5	3,171	8,534
	2005	1,139	6,360	60	4,688	12,247
	2010	766	5,825	66	2,767	9,424
	2011	925	8,925	74	4,686	14,610
	2012	849	9,438	84	4,220	14,591
	2013	751	7,481	91	3,598	11,921
	2014	802	7,767	105	3,736	12,410
	2015	743	6,124	112	3,211	10,190
	2016	778	6,905	114	3,315	11,112
Pecan Valley GCD/ DeWitt County	2000	99	1,013	193	3,134	4,439
	2005	104	1,064	201	3,432	4,801
	2010	109	1,122	211	3,072	4,514
	2011	110	1,133	212	5,366	6,821
	2012	111	1,144	214	5,994	7,463
	2013	112	1,155	216	7,836	9,319
	2014	114	1,166	218	11,462	12,960
	2015	115	1,177	220	9,615	11,127
	2016	116	1,188	222	6,879	8,405

Table 2. Summary of GMA 15 historical pumping (continued).

GMA 15 Historical Pumping, Acre-Feet per Year						
GCD/County	**Year**	**Chicot**	**Evangeline**	**Burkeville**	**Jasper**	**GCAS**
Refugio GCD/ Refugio County	2000	1,893	267	0	0	2,160
	2005	2,007	468	0	0	2,475
	2010	1,623	409	0	0	2,032
	2011	3,417	705	0	0	4,122
	2012	2,295	485	0	0	2,780
	2013	2,144	543	0	0	2,687
	2014	1,757	537	0	0	2,294
	2015	1,459	455	0	0	1,914
	2016	1,827	594	0	0	2,421
Texana GCD/ Jackson County	2000	31,976	14,805	0	0	46,781
	2005	31,519	14,142	0	0	45,661
	2010	33,046	12,298	0	0	45,344
	2011	65,906	24,733	0	0	90,639
	2012	38,830	13,526	0	0	52,356
	2013	74,197	26,307	0	0	100,504
	2014	54,639	19,510	0	0	74,149
	2015	31,367	10,827	0	0	42,194
	2016	42,325	15,549	0	0	57,874
Victoria County GCD/ Victoria County	2000	4,766	20,025	0	0	24,791
	2005	3,774	8,480	0	0	12,254
	2010	5,999	9,382	0	0	15,381
	2011	12,250	22,115	0	0	34,365
	2012	8,109	13,679	0	0	21,788
	2013	7,176	11,170	0	0	18,346
	2014	7,818	12,430	0	0	20,248
	2015	5,994	9,436	0	0	15,430
	2016	6,697	9,828	0	0	16,525

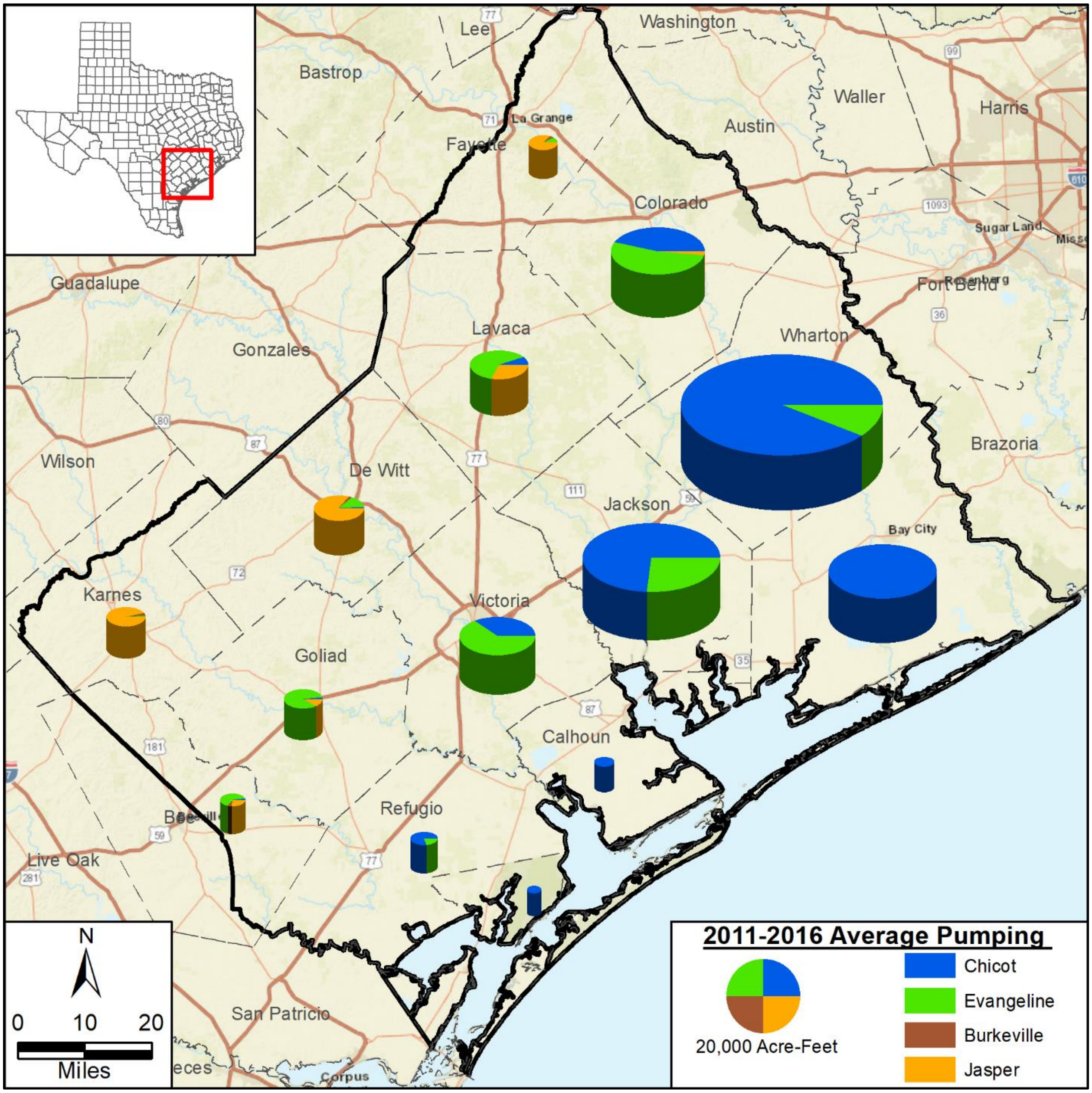


Figure 1. Average pumping from the Gulf Coast Aquifer System from 2011 through 2016. For Bee County, the amount only reflects the portion of Bee County within GMA 15.

Table 3. Summary of GMA 15 average groundwater use in acre-feet from 2011 through 2016. For Bee County, the amount only reflects the portion of Bee County within GMA 15.

GCD/County	Irrigation	Municipal	Livestock	Man./Pwr	Mining	Domestic
Aransas County GCD/ Aransas County	0	397	19	7	0	440
Bee GCD/ Bee County	1,055	710	220	0	0	208
Calhoun County GCD/ Calhoun County	280	703	196	0	0	324
Coastal Bend GCD/ Wharton County	139,632	4,307	869	2,319	0	1,823
Coastal Plains GCD/ Matagorda County	32,977	3,593	664	4,701	0	1,057
Colorado County GCD/ Colorado County	26,963	2,835	476	680	545	1,046
Evergreen UWCD/ Karnes County	441	2,332	337	0	2,270	198
Fayette County GCD/ Fayette County	459	405	118	96	211	357
Goliad County GCD/ Goliad County	2,921	1,059	710	172	134	552
ND Lavaca/ Lavaca County	7,403	2,295	1,678	112	0	1,200
Pecan Valley GCD/ DeWitt County	614	3,526	996	107	0	426
Refugio GCD/ Refugio County	987	1,094	400	0	0	251
Texana GCD/ Jackson County	66,505	717	569	1,303	0	573
Victoria County GCD/ Victoria County	12,578	4,637	606	1,803	0	1,785
Total	**292,815**	**28,609**	**7,858**	**11,300**	**3,161**	**10,240**

Table 4. Summary of GMA 15 percentage by type of groundwater use from 2011 through 2016. For Bee County, the distribution only reflects the portion of Bee County within GMA 15.

GCD/County	Irrigation	Municipal	Livestock	Man./Pwr	Mining	Domestic
Aransas County GCD/ Aransas County	0%	46%	2%	0%	0%	51%
Bee GCD/ Bee County	48%	32%	10%	0%	0%	10%
Calhoun County GCD/ Calhoun County	18%	46%	13%	0%	0%	22%
Coastal Bend GCD/ Wharton County	93%	3%	1%	0%	0%	1%
Coastal Plains GCD/ Matagorda County	76%	9%	2%	0%	0%	3%
Colorado County GCD/ Colorado County	81%	10%	2%	0%	2%	3%
Evergreen UWCD/ Karnes County	8%	43%	6%	0%	40%	4%
Fayette County GCD/ Fayette County	26%	24%	7%	7%	13%	23%
Goliad County GCD/ Goliad County	53%	19%	13%	0%	2%	10%
ND Lavaca/ Lavaca County	58%	18%	14%	0%	0%	10%
Pecan Valley GCD/ DeWitt County	11%	62%	17%	0%	0%	8%
Refugio GCD/ Refugio County	34%	41%	15%	0%	0%	10%
Texana GCD/ Jackson County	95%	1%	1%	0%	0%	1%
Victoria County GCD/ Victoria County	58%	21%	3%	0%	0%	9%
Total	**83%**	**8%**	**2%**	**3%**	**1%**	**3%**

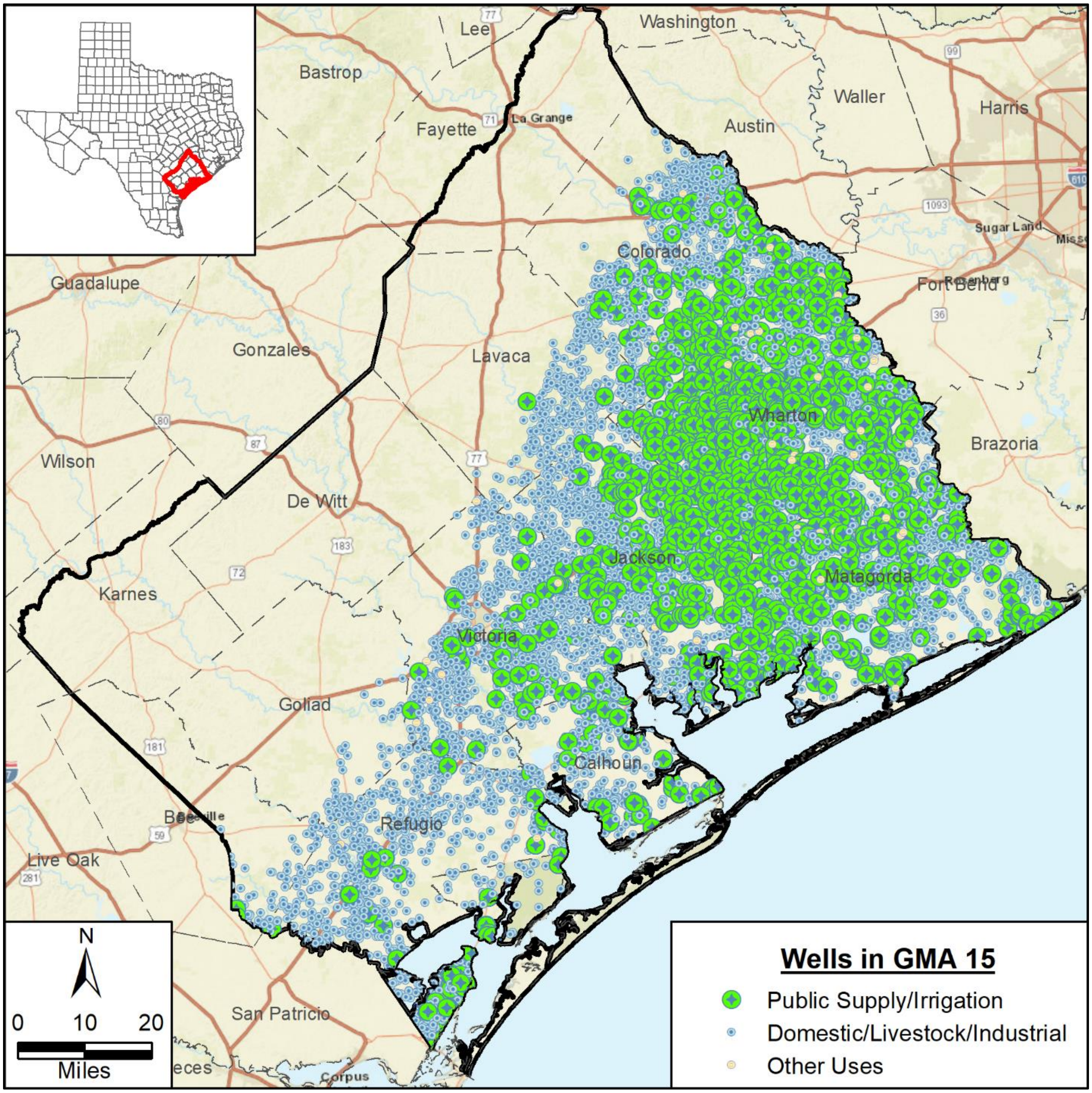


Figure 2. Wells from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c) completed in the Chicot Aquifer.

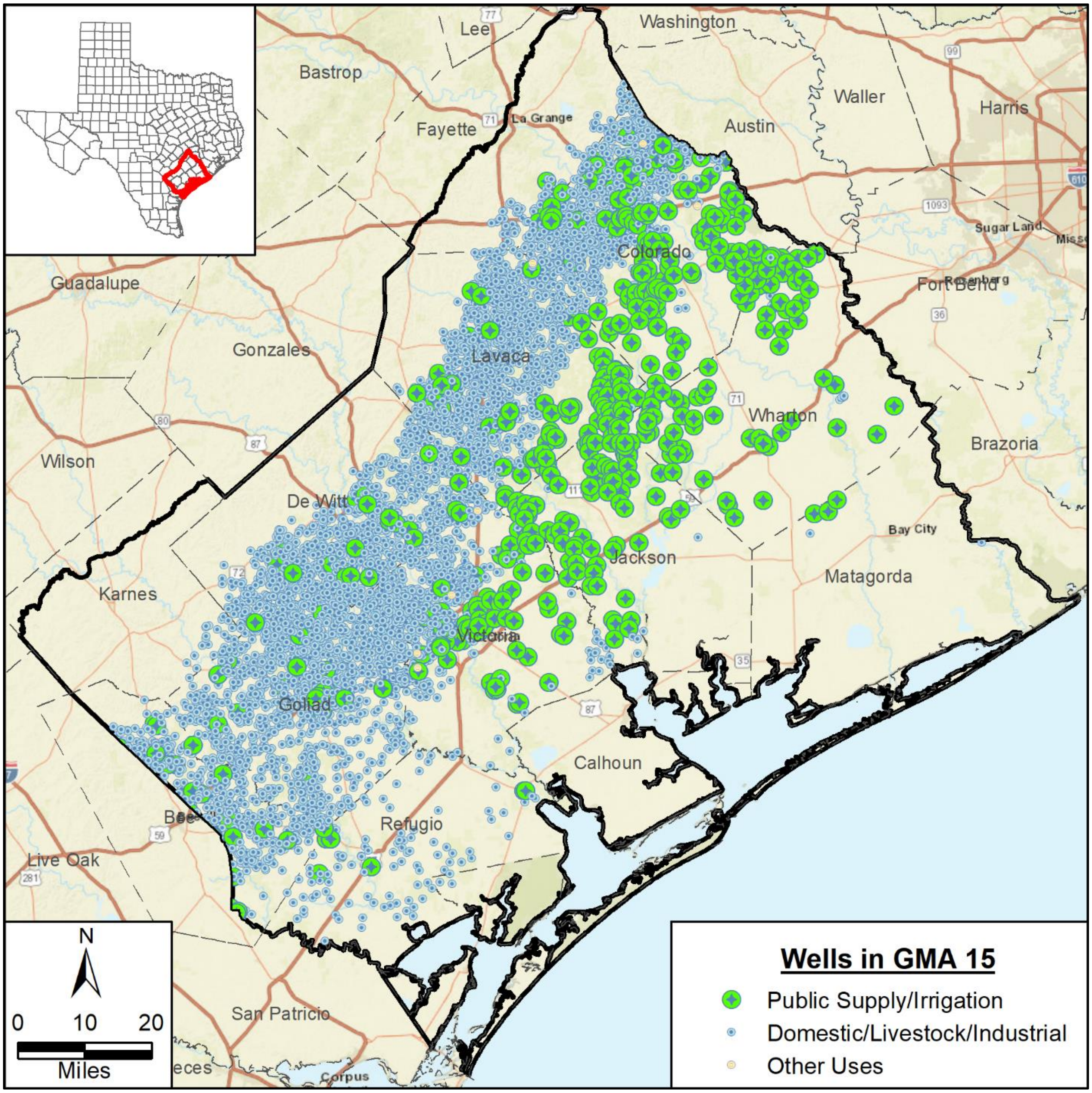


Figure 3. Wells from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c) completed in the Evangeline Aquifer.

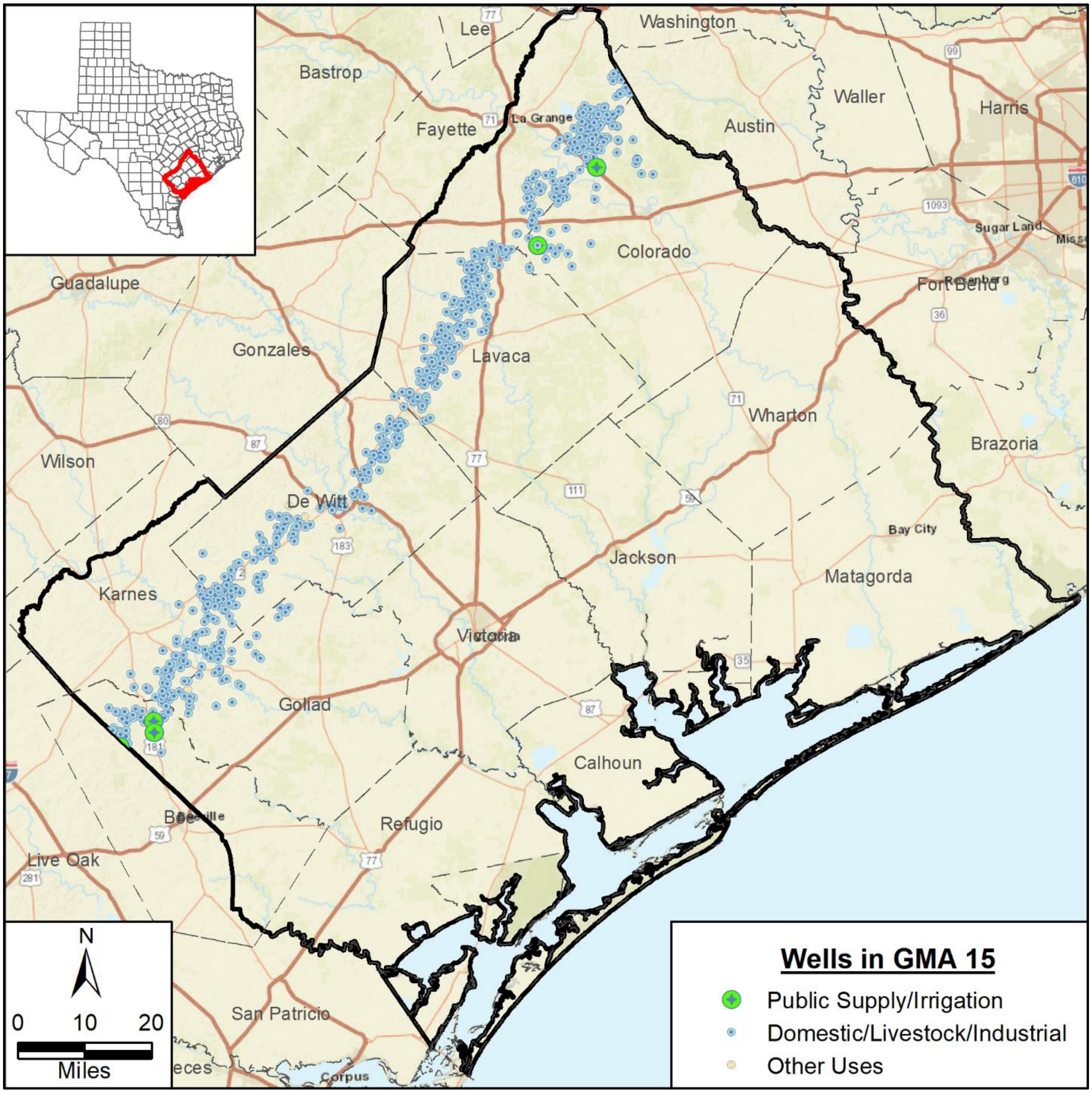


Figure 4. Wells from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c) completed in the Burkeville confining layer.

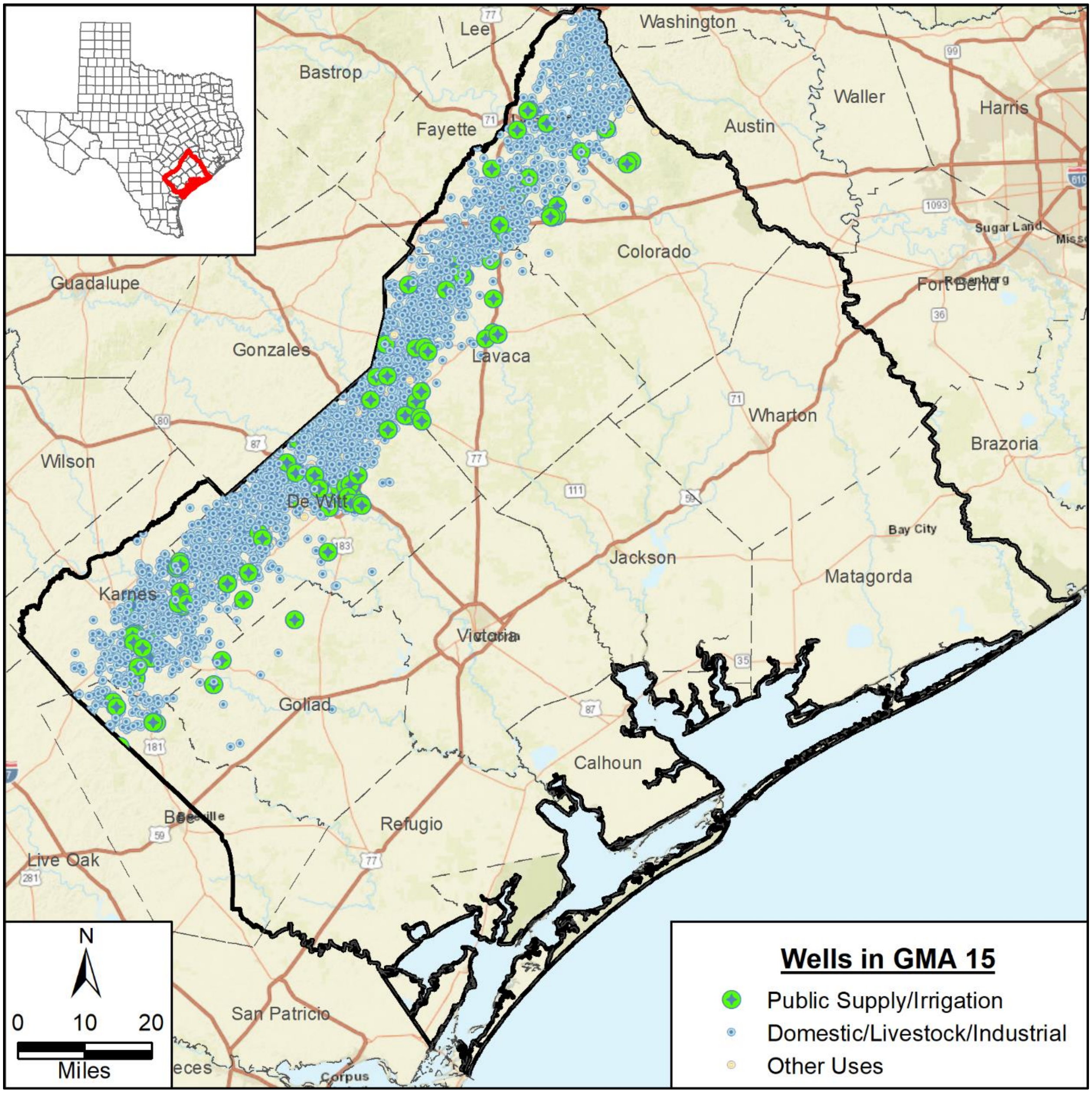


Figure 5. Wells from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c) completed in the Jasper Aquifer.

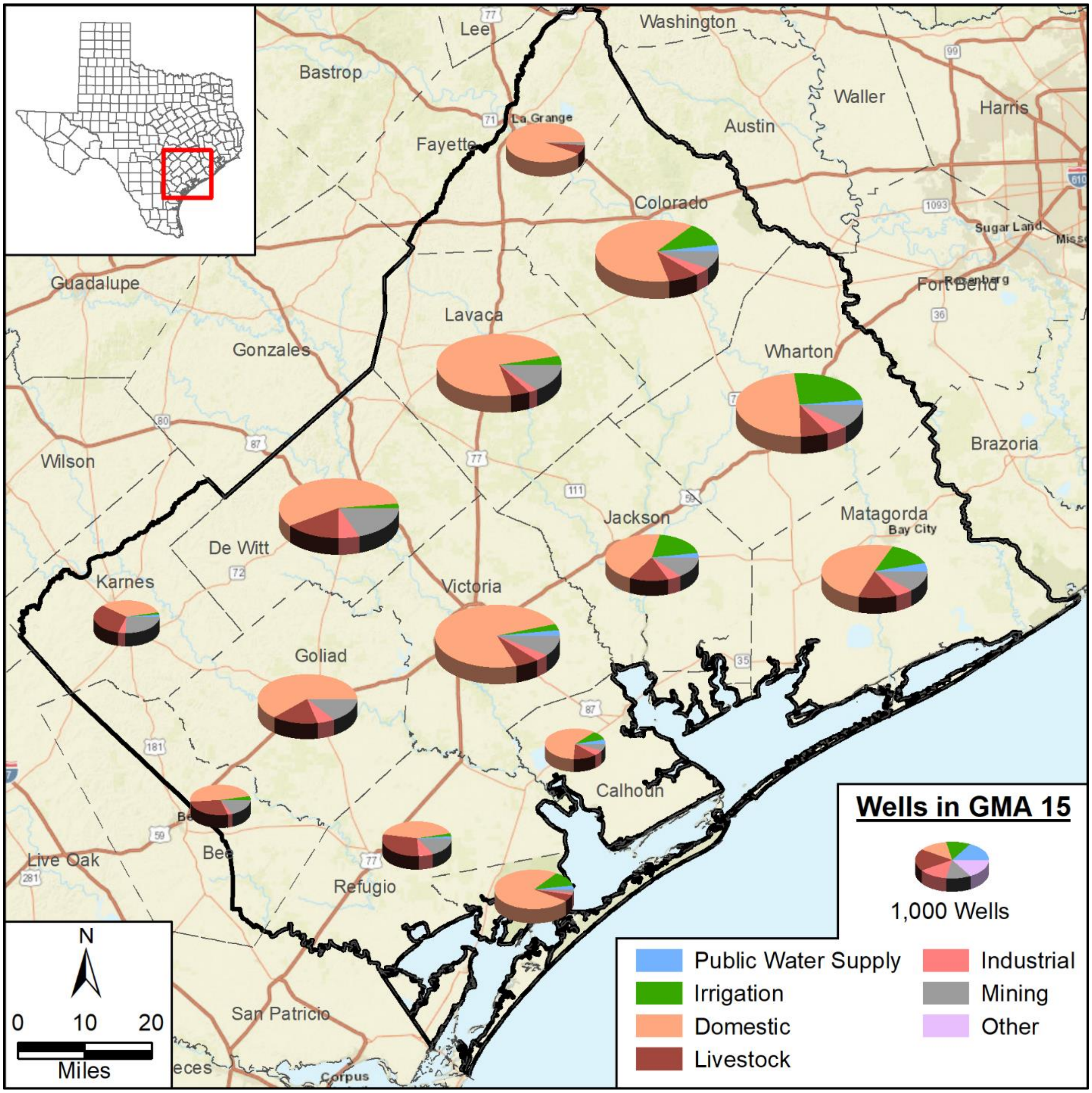


Figure 6. Distribution of wells in each county completed in the Gulf Coast Aquifer System by type of use from the TWDB Groundwater Database (TWDB, 2019a) and the Submitted Driller's Report database (TWDB, 2019c). For Bee County, the distribution only reflects the portion of Bee County within GMA 15.

Appendix 5.2 — Presentation Regarding Aquifer Uses and Conditions

Discussion of Aquifer Uses and Conditions

GMA 15 Agenda Item 7

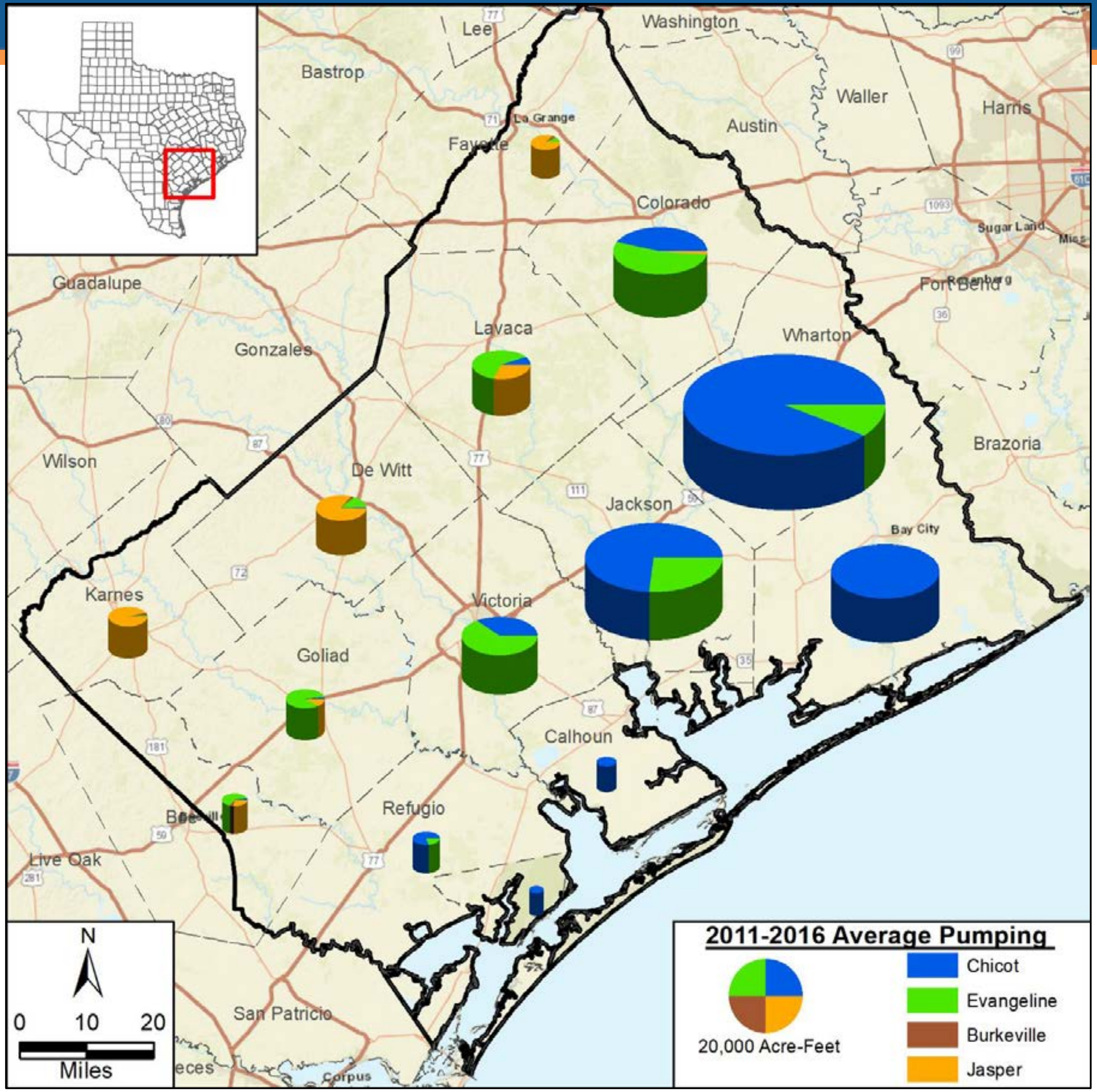
October 10, 2019

Considerations

- Texas Water Code Section 36.108(d)(1)
- Began through discussions with Districts as reflected in our January 10, 2019 project update
- Additional resources
  - Previous Explanatory Report
  - TWDB Groundwater Pumpage Estimates
  - TWDB Groundwater Database
  - TWDB Submitted Driller's Report Database
  - GAM Reports

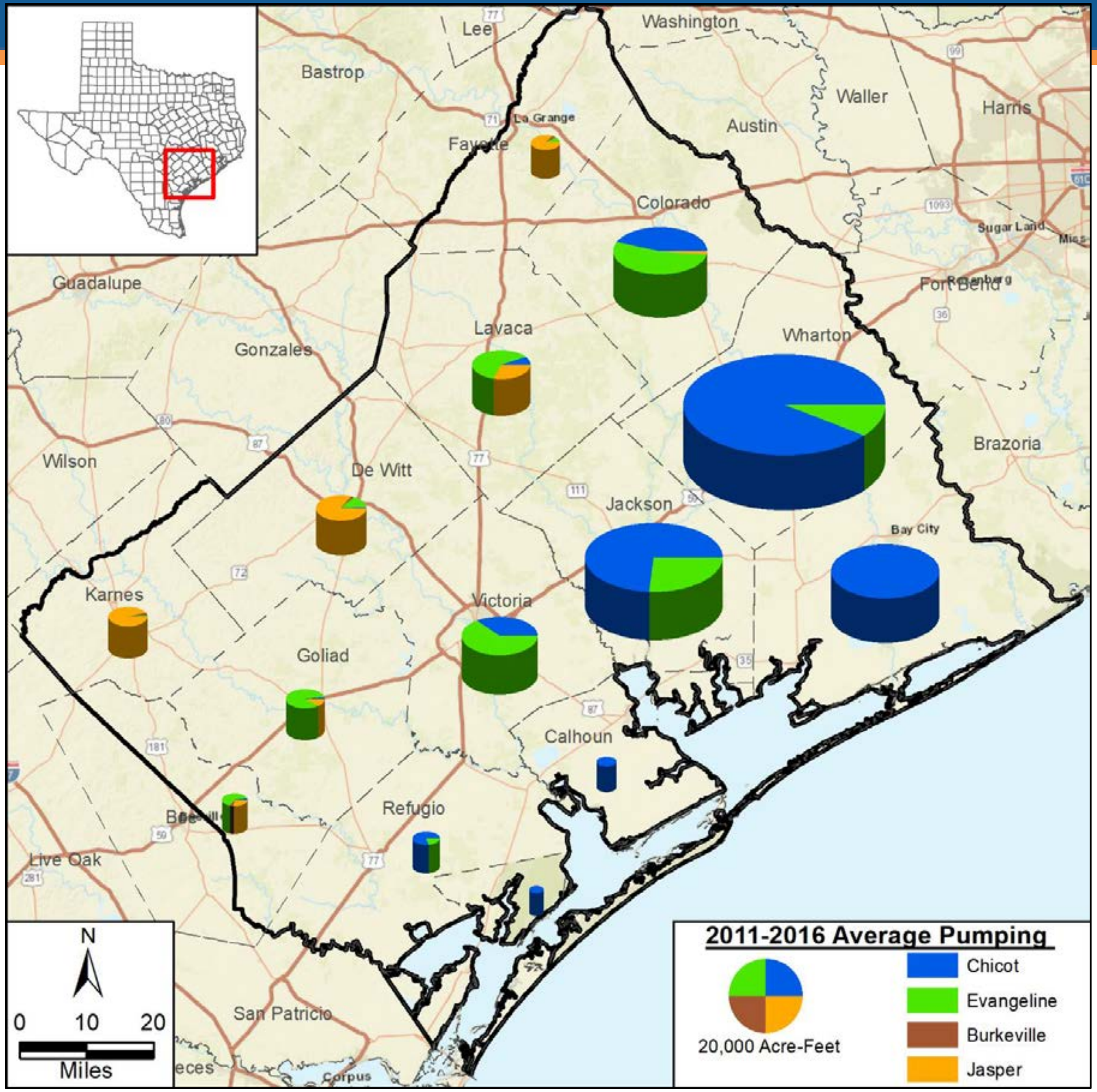
Groundwater Use

- No significant changes to use and conditions from previous round
- Use is primarily in northeast GMA 15
- Updated distribution based in available data



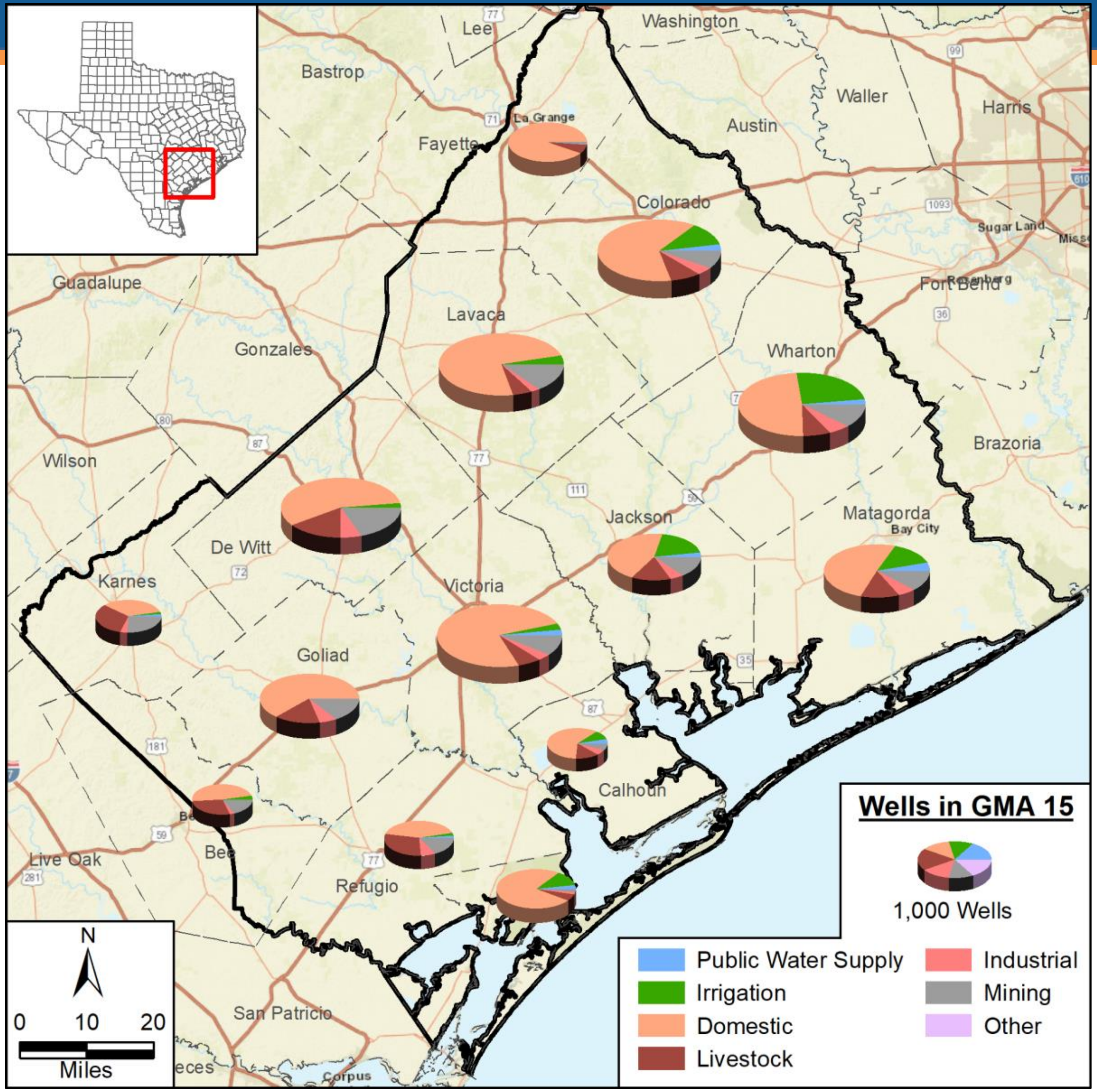
Groundwater Use

- Total average use from 2011-2016 was more than 350,000 ac-ft/yr
  - 83% for irrigation
  - 8% for municipal
  - 5 % for domestic and livestock
  - 3% for manufacturing and power
  - 1% for mining (primarily O&G related)
- Pumping is primarily from the Chicot



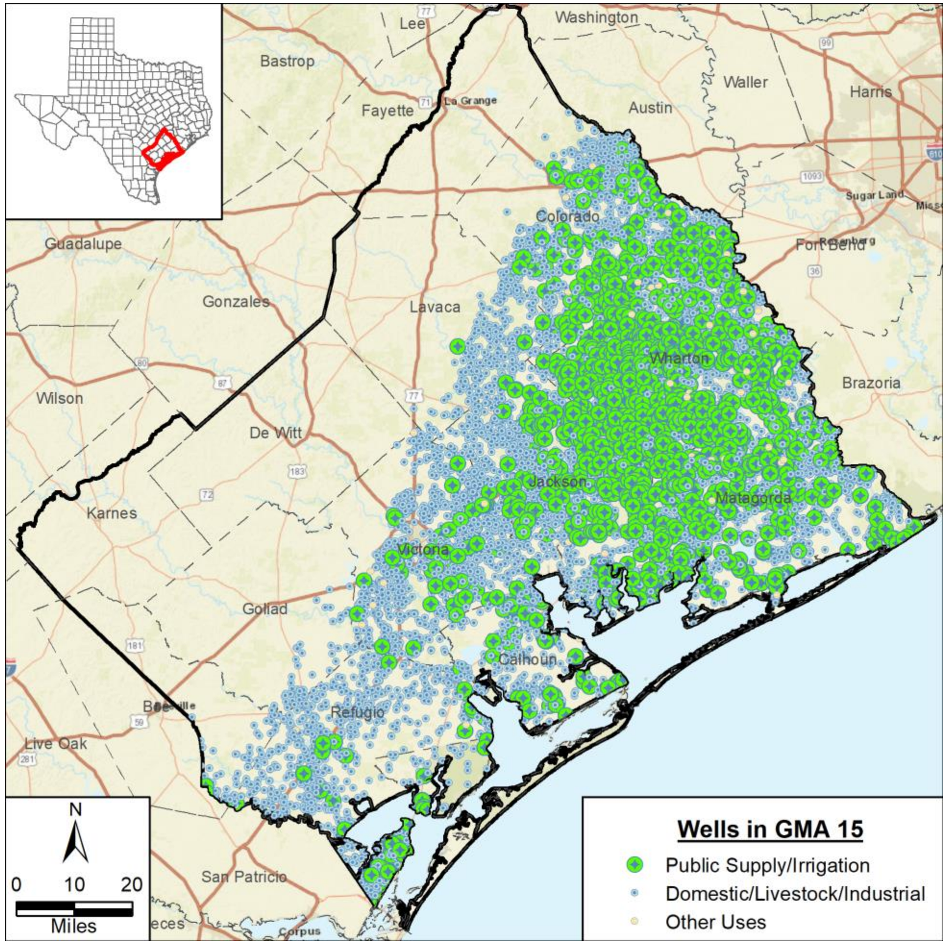
Production Wells

- Domestic and livestock wells are most common
- Irrigation wells are common in Colorado, Jackson, Matagorda, and Wharton counties
- Mining (includes fracking supply and rig supply) are common in many counties

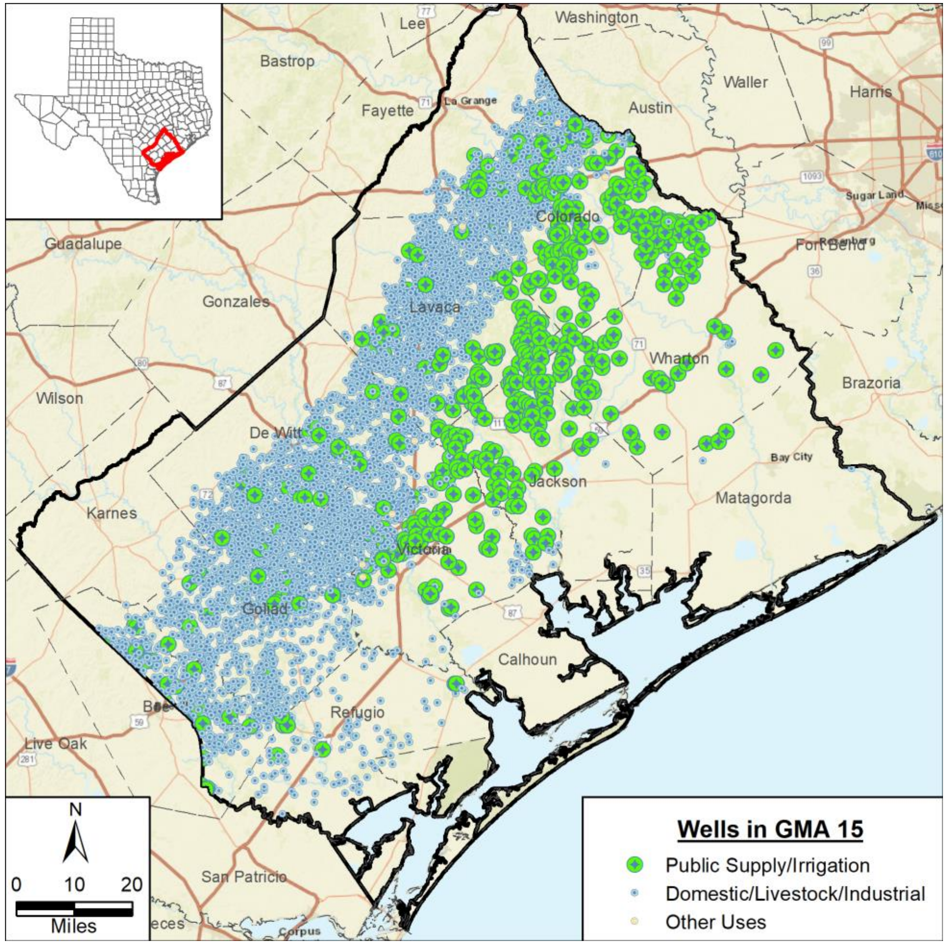


Production Wells by Layer

Chicot Aquifer Wells

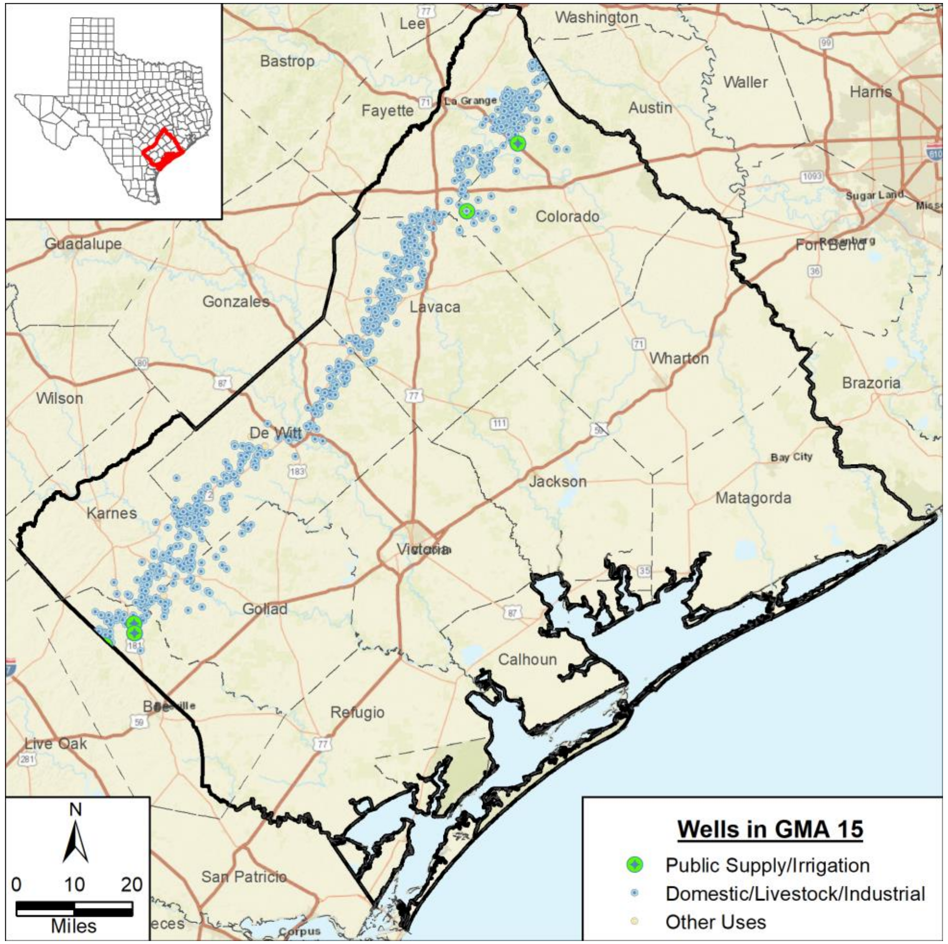


Evangeline Aquifer Wells

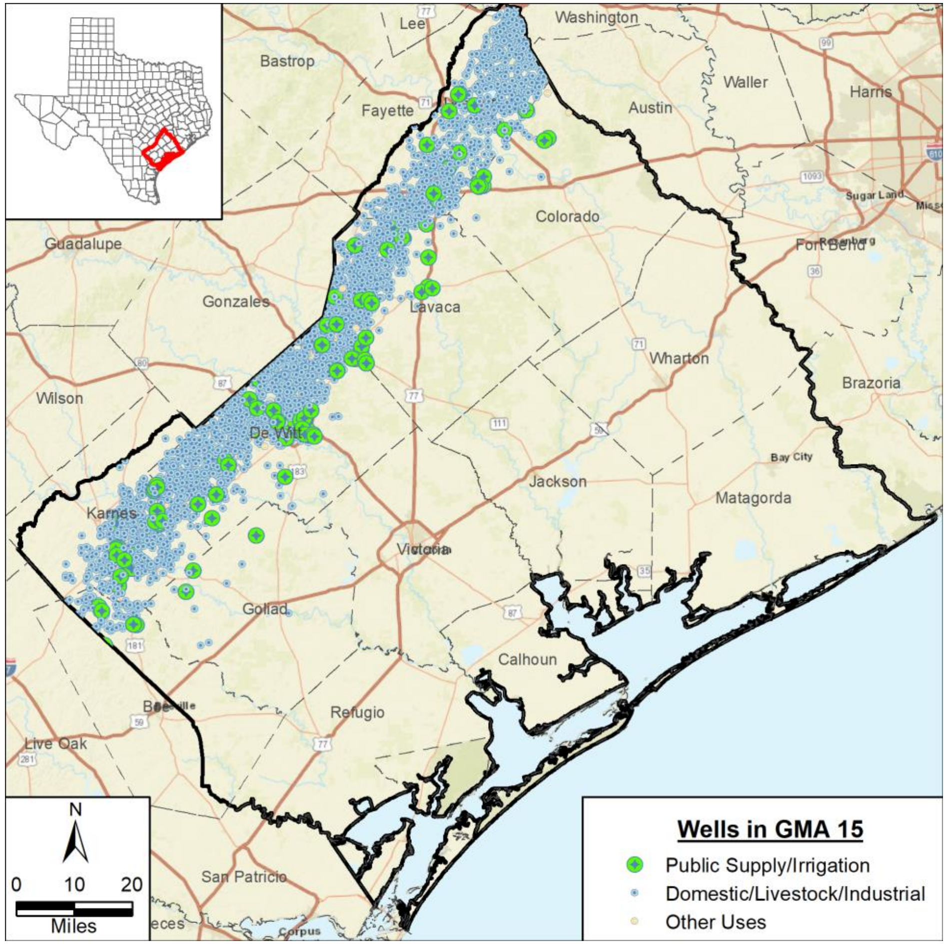


Production Wells by Layer

Burkeville Wells



Jasper Aquifer Wells



Summary

- Production from the GCAS average more than 350,000 ac-ft/yr from 2011 through 2016
- Chicot is the primary aquifer used for production
  - Shallow
  - Highly productive
  - Good quality water
- Domestic and livestock wells are most prevalent
- Irrigation is the highest type of use
- More details are available in the technical memorandum discussing aquifer uses and conditions

Discussion of Aquifer Uses and Conditions

GMA 15 Agenda Item 7

October 10, 2019

QUESTIONS/DISCUSSION

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

Meeting and project files available at: http://bit.ly/GMA_15_3rd_Round

Appendix 5.3 —
Discussion of Water Supply Needs and Water Management Strategies

TECHNICAL MEMORANDUM

TO: Groundwater Management Area 15

FROM: Michael R. Keester, P.G. and Velma Danielson

SUBJECT: Discussion of Water Supply Needs and Water Management Strategies

DATE: January 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 15 covers parts of Regional Water Planning Areas K, L, N, and P. Representatives from GMA 15 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 15 early in the process through our conversations with district representatives regarding the projected amount and locations of pumping. Through consultation with the regional and state water plans, district representatives 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 from each District within the pumping file used to evaluate potential DFCs.

According to the 2017 State Water Plan the projected demand for the counties (including the portion of Bee County in GMA 16) within GMA 15 is 1,225,528 acre-feet in 2020 and increases to 1,271,026 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 15 is 1,123,946 acre-feet in 2020 and decreases to 1,060,450 acre-feet in 2070. That is, revised projections for the current planning cycle indicate a decrease in the projected demand of 210,576 acre-feet in 2070 with the largest amount of reduction in demand occurring in Victoria County. Table 1 summarizes the projected water demand in 2070 for each county in GMA 15.

Most of the projected water demand is in the northeast portion of GMA 15. The projected demand is generally consistent with the distribution of pumping within the GMA. 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 supplies are projected to be 832,260 acre-feet in 2070 within the counties in GMA 15 with 416,051 (50%) of the total supplies coming from the Gulf Coast Aquifer System ("GCAS"). In several counties in GMA 15, the existing GCAS 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 469,347 acre-feet in 2070 within the counties in GMA 15 according to the 2017 State Water Plan. The strategies within the counties in GMA 15 to meet the need that is expected to be groundwater from the GCAS is 13,280 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
Aransas	3,588	4,040	452
Bee*	14,995	12,074	-2,921
Calhoun	89,788	73,004	-16,784
Colorado	156,585	168,138	11,553
DeWitt	8,615	7,358	-1,257
Fayette*	62,600	58,546	-4,054
Goliad	23,441	7,460	-15,981
Jackson	63,502	93,201	29,699
Karnes*	5,247	5,829	582
Lavaca	14,364	16,391	2,027
Matagorda	314,316	259,160	-55,156
Refugio	2,502	2,724	222
Victoria	163,073	79,066	-84,007
Wharton	348,410	273,459	-74,951
Total	1,271,026	1,060,450	-210,576

*Projected demands are for the entire county and not just the portion within GMA 15

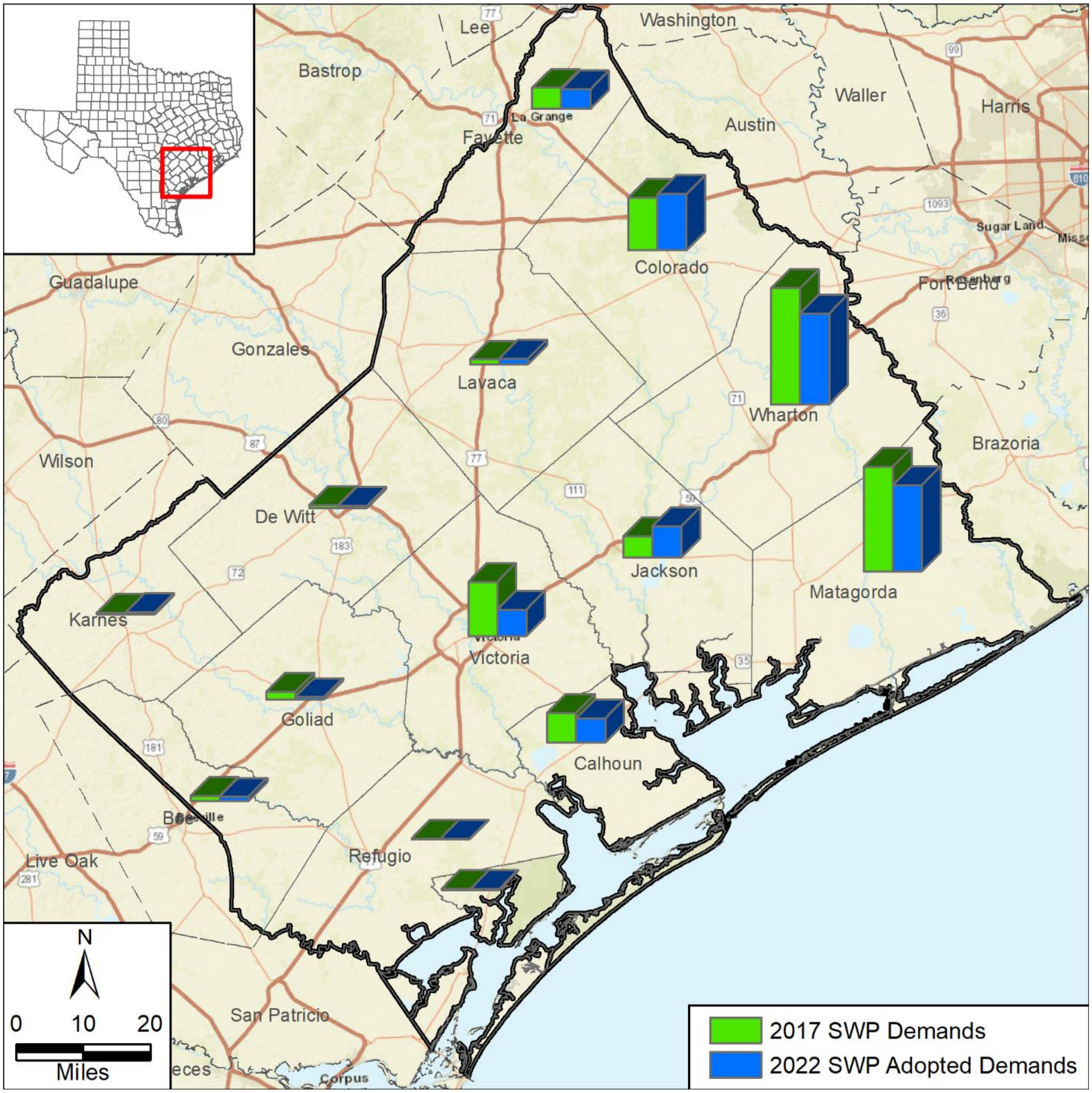


Figure 1. **Relative demands from the 2017 State Water Plan and adopted demands for the 2021 regional plans and 2022 State Water Plan.**

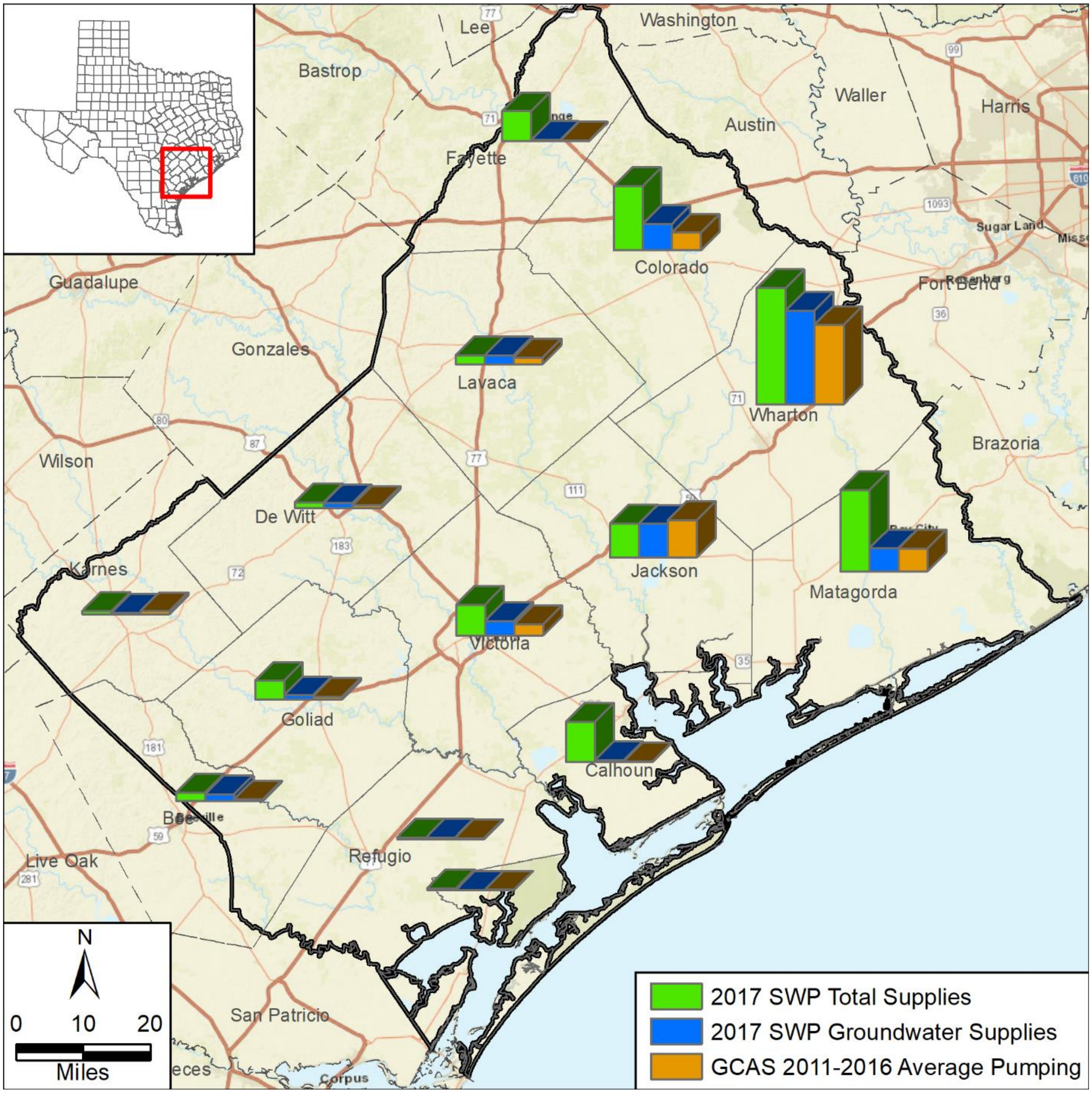


Figure 2. **Relative total and groundwater supplies from the 2017 State Water Plan along with the average GCAS actual groundwater pumping from 2011-2016.**

Table 2. 2017 State Water Plan year 2070 identified projected demands, total existing supplies, projected needs, and strategies using groundwater from the GCAS (all values in acre-feet).

County	Projected Demands	Total Supplies	Reported Needs**	GCAS Strategies
Aransas	3,588	3,686	0	—
Bee*	14,995	15,339	0	1,797
Calhoun	89,788	75,474	18,701	—
Colorado	156,585	119,440	38,205	226
DeWitt	8,615	10,152	2	119
Fayette*	62,600	56,374	8,750	2,174
Goliad	23,441	34,851	0	—
Jackson	63,502	63,770	0	—
Karnes*	5,247	5,721	402	190
Lavaca	14,364	16,919	0	—
Matagorda	314,316	151,963	164,999	—
Refugio	2,502	3,666	0	—
Victoria	163,073	57,643	105,471	8,574
Wharton	348,410	217,262	132,817	200
Total	1,271,026	832,260	469,347	13,280

*Projected demands are for the entire county and not just the portion within GMA 15
**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 Bee, Colorado, DeWitt, Fayette, Karnes, Victoria, and Wharton counties. For Fayette County, the strategies would result in an exceedance of the MAG when combined with the average actual pumping from 2011-2016 as discussed related to aquifer uses and conditions during the GMA 15 meeting on October 10, 2019. However, the projected MAG for the GCAS based on the current draft pumping scenario indicates groundwater would be available to meet the strategies in the 2017 State Water Plan. Table 3 compares the current MAG based on the adopted DFCs, average GCAS pumping from 2011-2016, the 2070 strategies for the GCAS, and the projected MAG based on the baseline pumping scenario adopted during the November 14, 2019 GMA 15 meeting.

Table 3. Current GCAS MAG values for counties within GMA 15, average GCAS pumping from 2011-2016, year 2070 strategies using groundwater from the GCAS, and projected GCAS MAG values based on the current GMA 15 pumping scenario.

County	Current GCAS MAG	Average Pumping 2011-2016	2070 Strategies	Projected 3rd Round GCAS MAG
Aransas	1,542	863	0	1,544
Bee	9,371	2,193	1,797	7,994
Calhoun	7,565	1,503	0	7,575
Colorado	72,536	32,545	226	72,635
DeWitt	14,485	5,669	119	17,795
Fayette	1,703	1,646	2,174	8,666
Goliad	11,539	5,548	0	7,234
Jackson	90,482	69,667	0	90,604
Karnes	2,751	5,578	190	2,956
Lavaca	20,239	12,688	0	20,411
Matagorda	38,828	42,992	0	38,881
Refugio	5,847	2,732	0	5,863
Victoria	59,963	21,409	8,574	60,044
Wharton	181,168	148,950	200	181,413
Total	518,019	353,983	13,280	523,616

As shown in Table 1, there is a decrease in the projected demand from the 2017 to the 2022 State Water Plan in many counties. With the decrease in projected demand in Victoria County, the 2070 GCAS strategy may no longer be necessary. However, there is an increase in demand in Colorado County which may result in an increase in the 2070 strategy. With the current and projected MAG, there does appear to be groundwater available from the GCAS to help meet the projected water demands.

If you have any questions, please let us know.

Appendix 5.4 —
Presentation Regarding Water Supply Needs and Water Management Strategies

LREWater, LLC
a Leonard Rice Engineers Company

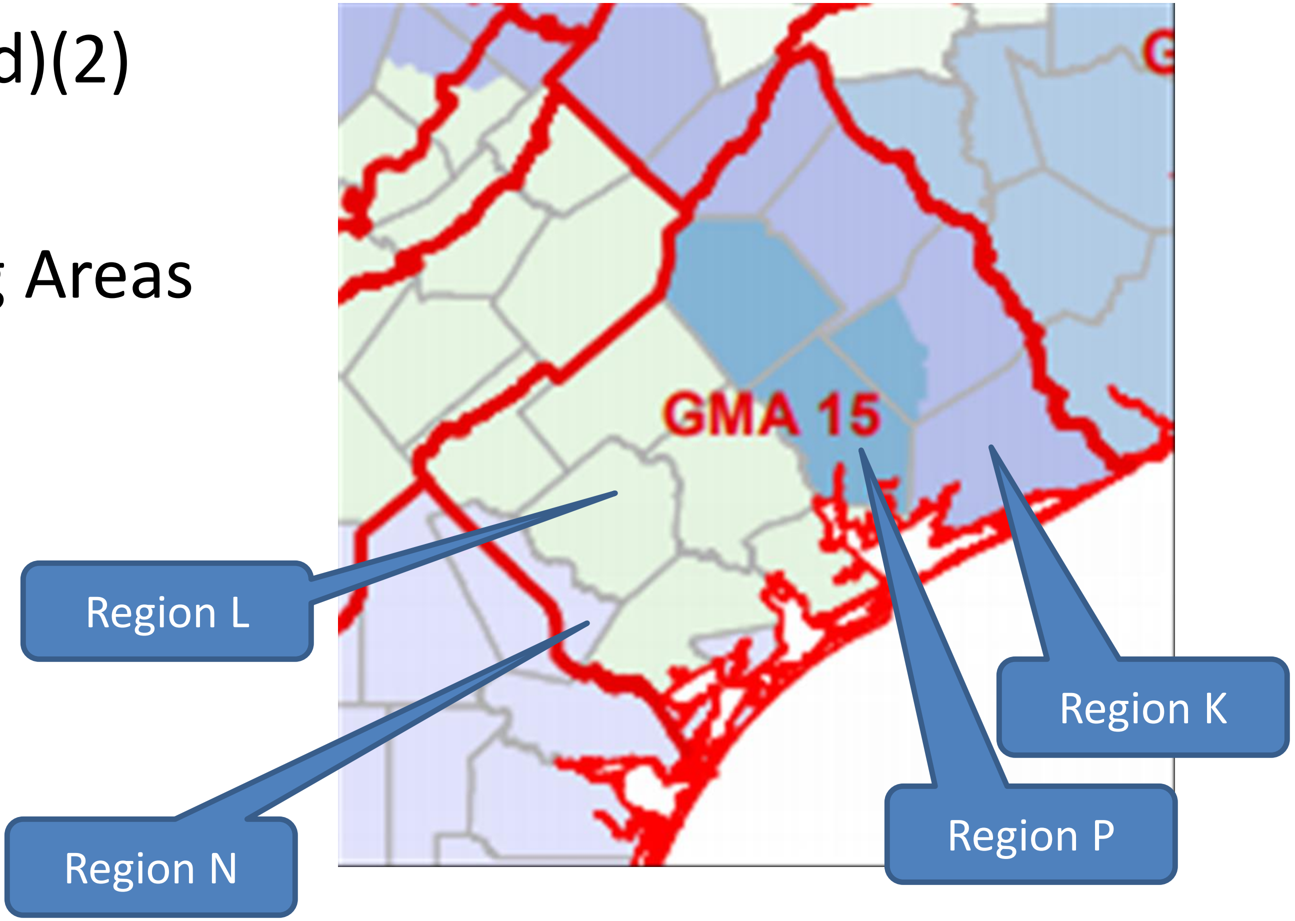
Discussion of Water Supply Needs and Water Management Strategies

GMA 15 Agenda Item 7

January 9, 2020

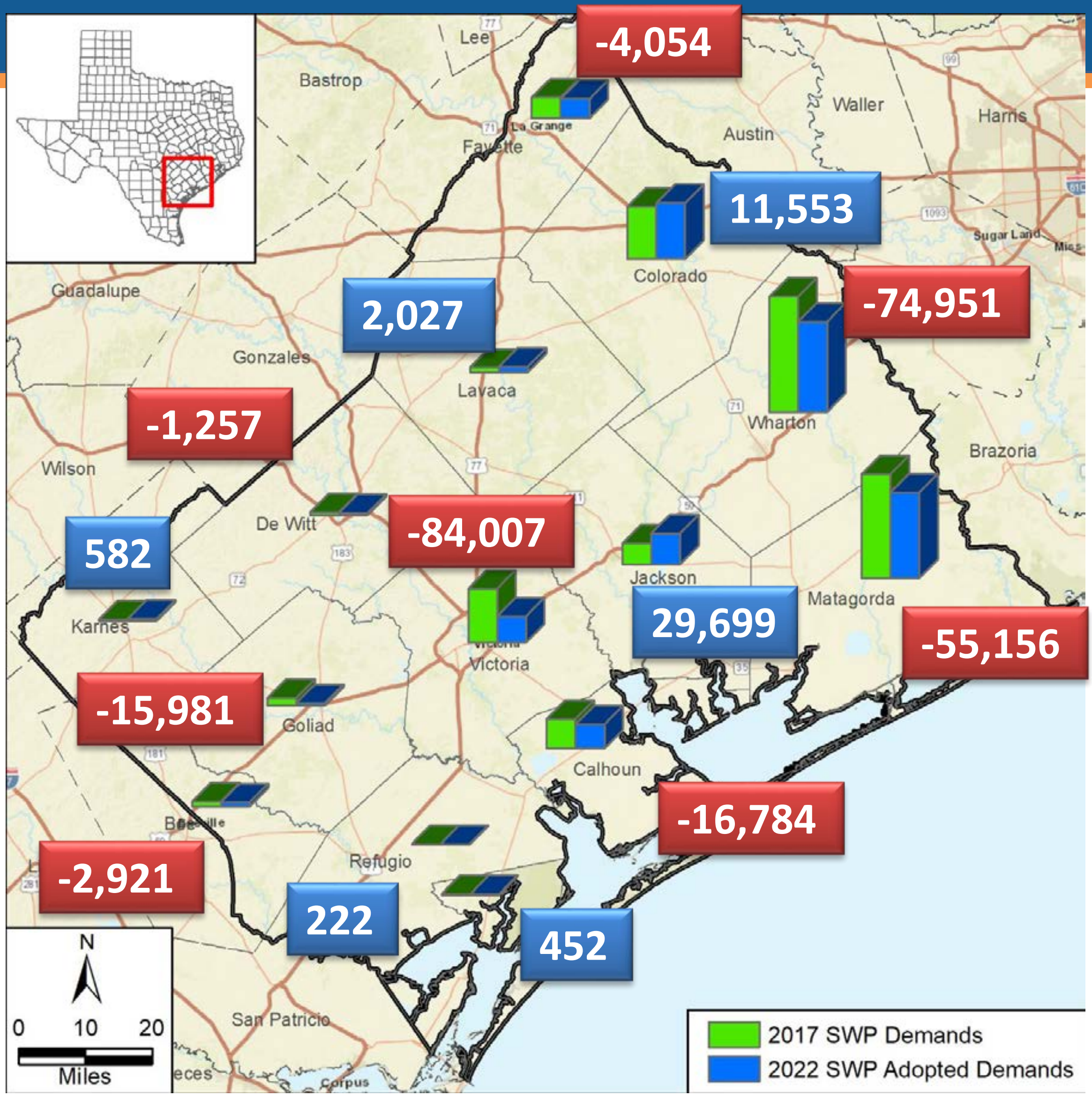
Considerations

- Texas Water Code Section 36.108(d)(2)
- Parts of 4 Regional Water Planning Areas



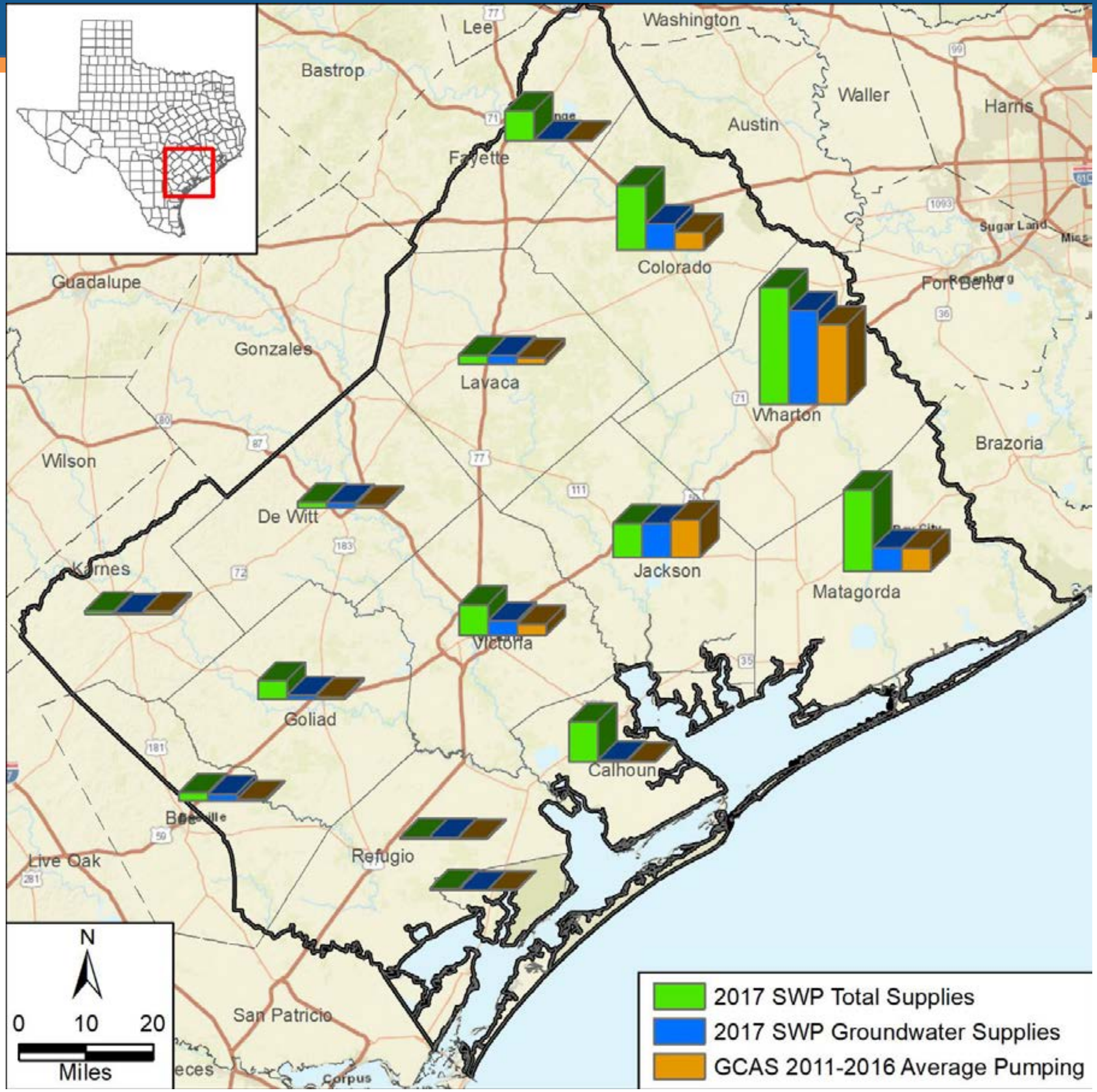
Water Demand

- Demand is highest in northeast GMA 15
- Overall decrease in projected 2070 demand from 2017 to 2022 plans
- Total decrease in projected 2070 demand is 210,576 acre-feet



2017 State Water Plan

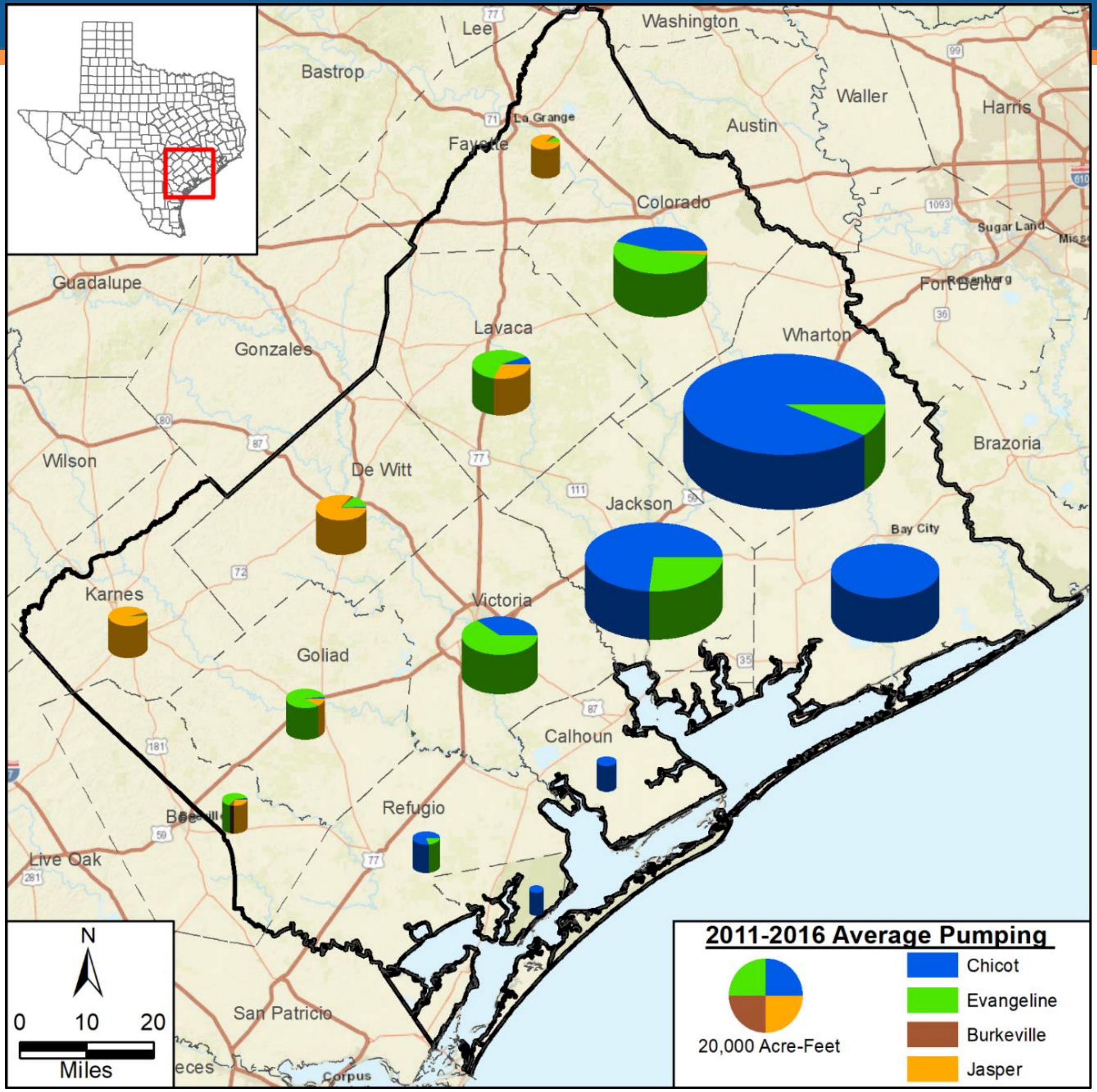
- 2070 projected water supplies: 832,260 acre-feet
  - 416,051 acre-feet from GCAS
  - Remainder is surface water
- 2070 projected water need: 469,347 acre-feet
- 2070 projected GCAS strategies: 13,280 acre-feet



LREWater, LLC
a Leonard Rice Engineers Company

Current Groundwater Use

- Total average use from 2011-2016: 353,983 acre-feet per year
- 2017 SWP 2070 projections
  - Supplies: 416,051 acre-feet
  - Strategies: 13,280 acre-feet
  - Total: 429,331 acre-feet
- Anticipated increase of about 75,000 acre-feet per year



MAG and 2017 State Water Plan Strategies

County	Current GCAS MAG	Average Pumping 2011-2016	2070 Strategies	Projected 3rd Round GCAS MAG
Aransas	1,542	863	0	1,544
Bee	9,371	2,193	1,797	7,994
Calhoun	7,565	1,503	0	7,575
Colorado	72,536	32,545	226	72,635
DeWitt	14,485	5,669	119	17,795
Fayette	1,703	1,646	2,174	8,666
Goliad	11,539	5,548	0	7,234
Jackson	90,482	69,667	0	90,604
Karnes	2,751	5,578	190	2,956
Lavaca	20,239	12,688	0	20,411
Matagorda	38,828	42,992	0	38,881
Refugio	5,847	2,732	0	5,863
Victoria	59,963	21,409	8,574	60,044
Wharton	181,168	148,950	200	181,413
Total	**518,019**	**353,983**	**13,280**	**523,616**

MAG and 2017 State Water Plan Strategies

County	Current GCAS MAG	Average Pumping 2011-2016	2070 Strategies	Projected 3rd Round GCAS MAG
Aransas	1,542	863	0	1,544
Bee	9,371	2,193	1,797	7,994
Calhoun	7,565	1,503	0	7,575
Colorado	72,536	32,545	226	72,635
DeWitt	14,485	5,669	119	17,795
Fayette	1,703	1,646	2,174	8,666
Goliad	11,539	5,548	0	7,234
Jackson	90,482	69,667	0	90,604
Karnes	2,751	5,578	190	2,956
Lavaca	20,239	12,688	0	20,411
Matagorda	38,828	42,992	0	38,881
Refugio	5,847	2,732	0	5,863
Victoria	59,963	21,409	8,574	60,044
Wharton	181,168	148,950	200	181,413
Total	**518,019**	**353,983**	**13,280**	**523,616**

MAG and 2017 State Water Plan Strategies

County	Current GCAS MAG	Average Pumping 2011-2016	2070 Strategies	Projected 3rd Round GCAS MAG
Aransas	1,542	863	0	1,544
Bee	9,371	2,193	1,797	7,994
Calhoun	7,565	1,503	0	7,575
Colorado	72,536	32,545	226	72,635
DeWitt	14,485	5,669	119	17,795
Fayette	1,703	1,646	2,174	8,666
Goliad	11,539	5,548	0	7,234
Jackson	90,482	69,667	0	90,604
Karnes	2,751	5,578	190	2,956
Lavaca	20,239	12,688	0	20,411
Matagorda	38,828	42,992	0	38,881
Refugio	5,847	2,732	0	5,863
Victoria	59,963	21,409	8,574	60,044
Wharton	181,168	148,950	200	181,413
Total	**518,019**	**353,983**	**13,280**	**523,616**

MAG and 2017 State Water Plan Strategies

County	Current GCAS MAG	Average Pumping 2011-2016	2070 Strategies	Projected 3rd Round GCAS MAG
Aransas	1,542	863	[illegible]	,544
Bee	9,371	2,193	[illegible]	,994
Calhoun	7,565	1,503	[illegible]	7,575
Colorado	72,536	32,545	226	72,635
DeWitt	14,485	5,669	119	17,795
Fayette	1,703	1,646	2,174	8,666
Goliad	11,539	5,548	0	7,234
Jackson	90,482	69,667	0	90,604
Karnes	2,751	5,578	190	2,956
Lavaca	20,239	12,688	0	20,411
Matagorda	38,828	42,992	0	38,881
Refugio	5,847	2,732	0	5,863
Victoria	59,963	21,409	8,574	60,044
Wharton	181,168	148,950	200	181,413
Total	**518,019**	**353,983**	**13,280**	**523,616**

Increased demand in 2022 plan may increase strategy

MAG and 2017 State Water Plan Strategies

County	Current GCAS MAG	Average Pumping 2011-2016	2070 Strategies	Projected 3rd Round GCAS MAG
Aransas	1,542	863	0	1,544
Bee	9,371	2,193	1,797	7,994
Calhoun	7,565	1,503	0	7,575
Colorado	72,536	32,545	226	72,635
DeWitt	14,485	5,669	119	17,795
Fayette	1,703	1,646	2,174	8,666
Goliad	11,539	5,548	0	7,234
Jackson	90,482	69,667	0	90,604
Karnes	2,751	5,578	190	2,956
Lavaca	20,239	12,688	[illegible]	[illegible],411
Matagorda	38,828	42,992	[illegible]	[illegible],881
Refugio	5,847	2,732	[illegible]	5,863
Victoria	59,963	21,409	8,574	60,044
Wharton	181,168	148,950	200	181,413
Total	**518,019**	**353,983**	**13,280**	**523,616**

Decreased demand in 2022 plan may decrease strategy

Summary

- Projected overall decrease in long-term water demand from the 2017 to the 2022 water plans
- Strategies may change due to changing projected demands
- Projected MAGs show groundwater is available from the GCAS
- Additional details provided in technical memorandum dated January 7, 2020

Discussion of Water Supply Needs and Water Management Strategies

GMA 15 Agenda Item 7

January 9, 2020

QUESTIONS/DISCUSSION

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

Meeting and project files available at: http://bit.ly/GMA_15_3rd_Round

Appendix 5.5 —
Discussion of Hydrological Conditions

TECHNICAL MEMORANDUM

TO: Groundwater Management Area 15

FROM: Michael R. Keester, P.G.

SUBJECT: Discussion of Hydrological Conditions

DATE: June 11, 2020

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 central Gulf Coast Aquifer System (Chowdhury 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 Anaya (2014) 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. Table 1 provides the TERS values for the Gulf Coast Aquifer System (GCAS) for counties within GMA 15.

Table 1. TERS by county for the GCAS within GMA 15 (Wade and Anaya, 2014). All values in acre-feet.

County	Total Storage	25% Total Storage	75% Total Storage
Aransas	5,500,000	1,375,000	4,125,000
Bee	12,000,000	3,000,000	9,000,000
Calhoun	17,000,000	4,250,000	12,750,000
Colorado	28,000,000	7,000,000	21,000,000
DeWitt	21,000,000	5,250,000	15,750,000
Fayette	3,900,000	975,000	2,925,000
Goliad	26,000,000	6,500,000	19,500,000
Jackson	45,000,000	11,250,000	33,750,000
Karnes	6,400,000	1,600,000	4,800,000
Lavaca	22,000,000	5,500,000	16,500,000
Matagorda	48,000,000	12,000,000	36,000,000
Refugio	23,000,000	5,750,000	17,250,000
Victoria	39,000,000	9,750,000	29,250,000
Wharton	72,000,000	18,000,000	54,000,000
Total	368,800,000	92,200,000	276,600,000

The values presented in Table 1 are unchanged from the values presented in the explanatory report from the previous planning round (Young, 2016). 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 central and southern portions of the GCAS, 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. The calibration period for the GAM starts with a pre-development period that extends from 1920 through 1940. During the pre-development period, the modelers did not include any pumping in the model and the resulting budget numbers reflect their understanding of flow through the GCAS prior to pumping occurring. Following the pre-development period, the calibration period continues through the end of 1999.

To evaluate the water budget, we looked at the pre-development period and three years in the calibration period (namely, 1981, 1990, 1999). The year 1981 represents the first full year simulated in the calibration period, year 1999 represents the end of the calibration period, and year 1990 is the midpoint between the two years. Table 2 provides the water budget values for the GCAS within GMA 15. Water budgets for the GCAS for each county/GCD in GMA 15 from the calibration period are provided in Attachment A.

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. As shown on Table 2, the GAM indicates that a large volume of water is coming from streams into the aquifer in 1981, which likely explains the increase in stored groundwater despite the highest pumping amount of the periods shown.

The most significant source of outflow from the aquifer is pumping. Modeled pumping amounts decreased from nearly 500,000 acre-feet in 1981 to approximately 364,000 acre-feet in 1999. As discussed related to aquifer uses and conditions during the GMA 15 meeting on October 10, 2019, average pumping from 2011-2016 in GMA 15 was about 354,000 acre-feet per year indicating a slight decline, but generally little change, in pumping since 1999.

As expected, review of the water budget information for the predictive period of the model (2000 through 2070) using the pumping file adopted during the November 14, 2019 GMA 15 meeting shows pumping continues to be the primary outflow from the GCAS within GMA 15 (see Table 3). We also observe an increase in the amount of water in storage in the first year of the predictive period which is primarily due to an increase in the recharge from the last year of the calibration period. Comparison of the leakage to and from streams shows a significant increase in the amount of water captured from streamflow though the values should be viewed as relative amounts since the GAM is not designed to provide a robust simulation of the stream/aquifer interaction. Water budgets for the GCAS for each county/GCD in GMA 15 from the predictive period are provided in Attachment B.

Table 2. Modeled water budgets for the GCAS in GMA 15 from the model calibration period.

Groundwater Management Area 15				
Inflows				
Source	**Pre-Dev.**	**1981**	**1990**	**1999**
Out of Storage	6,973	25,206	111,237	163,228
River Leakage	4,977	13,318	13,092	12,841
General Head Boundary	0	5,044	1,593	677
Recharge	154,203	247,767	157,565	87,105
Stream Leakage	253,035	725,463	352,020	375,036
In from Mexico	4,870	14,727	7,859	6,463
In from GMA 12	15	7	6	6
In from GMA 13	507	461	428	415
In from GMA 14	16,448	14,414	14,809	16,747
In from GMA 16	4,793	3,830	3,482	3,493
Total Inflows to the GCAS	445,820	1,050,236	662,091	666,011
Outflows				
Source	**Pre-Dev.**	**1981**	**1990**	**1999**
In to Storage	6,764	284,278	22,276	14,016
Pumping	0	499,443	410,146	364,081
Springs	3,662	1,811	1,333	1,584
Evapotranspiration	0	19,074	8,833	9,897
General Head Boundary	29,929	22,337	16,680	24,756
Stream Leakage	349,938	162,450	153,236	198,818
Out to Mexico	24,813	25,341	16,500	22,823
Out to GMA 12	36	19	18	16
Out to GMA 13	126	92	85	77
Out to GMA 14	24,485	28,301	26,811	23,841
Out to GMA 16	6,064	7,087	6,174	6,106
Total Outflows from the GCAS	445,817	1,050,234	662,091	666,015
GCAS Increase(+)/Decrease(-) in Storage	-209	259,073	-88,961	-149,212

Table 3. Modeled water budgets for the GCAS in GMA 15 from the model predictive period.

Groundwater Management Area 15								
Inflows								
Source	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Out of Storage	99,914	31,285	118,907	66,299	45,453	36,783	31,228	31,199
River Leakage	12,557	12,018	12,206	12,412	12,484	12,525	12,556	12,578
General Head Boundary	345	1,251	2,500	3,321	3,657	3,831	3,949	3,949
Recharge	204,597	204,597	204,597	204,595	204,595	204,595	204,594	204,591
Stream Leakage	398,081	382,917	434,398	456,833	464,327	469,482	473,558	473,757
In from Mexico	4,590	6,456	8,386	9,367	9,839	10,106	10,301	10,301
In from GMA 12	9	9	8	8	7	7	7	7
In from GMA 13	420	397	422	460	477	485	489	489
In from GMA 14	13,552	15,324	19,823	20,774	20,498	20,515	20,250	20,247
In from GMA 16	3,193	3,462	3,200	2,834	2,635	2,515	2,478	2,478
Total Inflows to the GCAS	737,258	657,715	804,448	776,903	763,972	760,846	759,410	759,595
Outflows								
Source	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
In to Storage	151,808	21,574	6,687	283	537	197	68	68
Pumping	289,114	305,486	529,154	529,350	522,580	522,850	523,171	523,444
Springs	2,325	3,275	2,973	2,816	2,779	2,763	2,755	2,755
Evapotranspiration	9,410	9,627	9,113	8,882	8,808	8,769	8,744	8,744
General Head Boundary	21,469	21,742	20,004	19,047	18,810	18,722	18,673	18,673
Stream Leakage	210,098	242,625	188,378	169,683	163,830	160,822	158,767	158,728
Out to Mexico	19,992	20,768	18,680	18,244	18,216	18,247	18,288	18,288
Out to GMA 12	16	15	13	13	12	12	12	12
Out to GMA 13	77	70	57	49	46	42	39	39
Out to GMA 14	26,014	25,499	22,376	21,039	20,509	20,173	20,432	20,431
Out to GMA 16	6,740	7,077	7,140	7,522	7,852	8,248	8,484	8,484
Total Outflows from the GCAS	737,064	657,758	804,577	776,926	763,977	760,847	759,432	759,665
GCAS Increase(+)/ Decrease(-) in Storage	51,893	-9,711	-112,220	-66,017	-44,916	-36,586	-31,159	-31,131

For the consideration of average annual recharge, we first looked at the water budgets from the GAM. For the calibration period, the recharge was highest in 1981 and lowest in 1999. For the predictive period, the recharge amount is relatively constant at a little more than 204,000 acre-feet per year. Commonly, the average recharge amount is referred to in units of inches per year (in/yr) and dividing the recharge volume by the area of GMA 15 we find that the average GCAS recharge rate from the GAM predictive period is 0.36 in/yr.

Scanlon and others (2012) used groundwater chloride data to develop estimates of regional recharge within the GCAS. Scanlon and others (2012) applied a chloride mass balance (CMB) equation to calculate the average annual recharge and results of their analysis indicate a value of 0.51 in/yr within GMA 15. However, as they note in their report, the CMB approach provides a lower bound on the actual recharge because many processes can add chloride to the system but there are none to remove it from the GCAS. That is, actual recharge may be higher than calculated using the CMB approach.

Both the GAM and the CMB approach provide estimates of recharge to the groundwater system. In particular, the methods provide estimates of water that infiltrates through the soil layers and reaches the water table. However, the methods don't account for all precipitation that infiltrates the subsurface and is potential recharge to the groundwater system. To develop an estimate of the amount of water that infiltrates into the subsurface to become potential groundwater recharge, we developed a soil-water-balance (SWB) model for the period from January 1, 1981 through December 31, 2018. For the model we used the SWB code developed by the USGS to evaluate the spatial and temporal variations in potential groundwater recharge (Westenbroek and others, 2010). Results from the SWB model show the average infiltration rate (that is, potential groundwater recharge) for the simulation period in GMA 15 is 2.87 in/yr.

In addition to the average rates for the entire period, the GAM and SWB model allow us to look at rates for specific periods of time. Figure 1 illustrates how the GAM recharge and SWB infiltration rates change annually. The SWB model calculates infiltration using several parameters, but the fluctuations shown on Figure 1 are primarily due to climatic (precipitation and temperature) fluctuations. While muted, the peaks and valleys that are prominent in the SWB model results are generally reflected in the GAM recharge values through the end of the GAM calibration period. This correlation is also evident on Figure 2 where we observe that the GAM recharge value is typically between 0 and 20 percent of the SWB infiltration rate with a median value of 13 percent. Attachment C provides charts similar to Figure 1 and Figure 2 for each county/GCD in GMA 15.

We also observe in Figure 1 that the GAM recharge value is lower than the CMB estimate of recharge to the GCAS. As shown on Figure 2, in only year (namely, 1997) is the GAM recharge amount for GMA 15 greater than the CMB recharge estimate. For the predictive period, the GAM recharge rate is 72 percent of the lower bound recharge value estimated by Scanlon and others (2012).

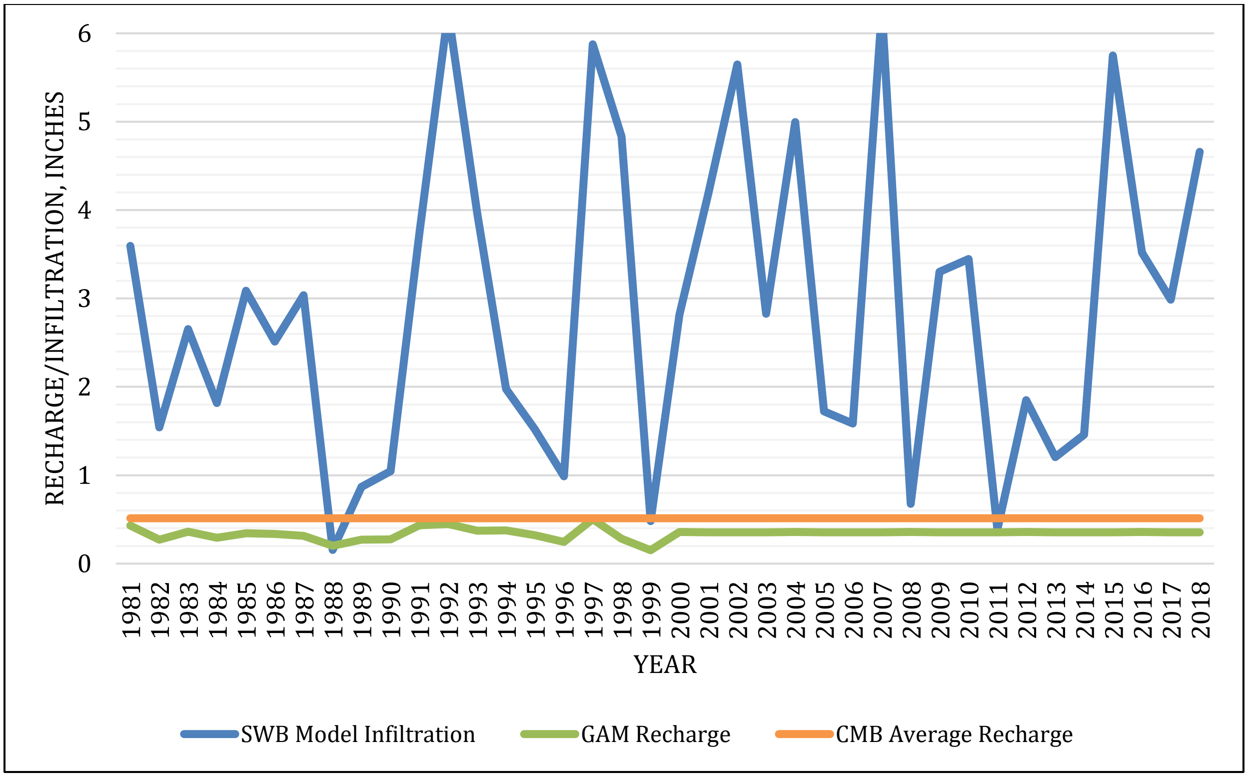


Figure 1. **GCAS SWB model infiltration, GAM recharge, and CMB recharge estimates.**

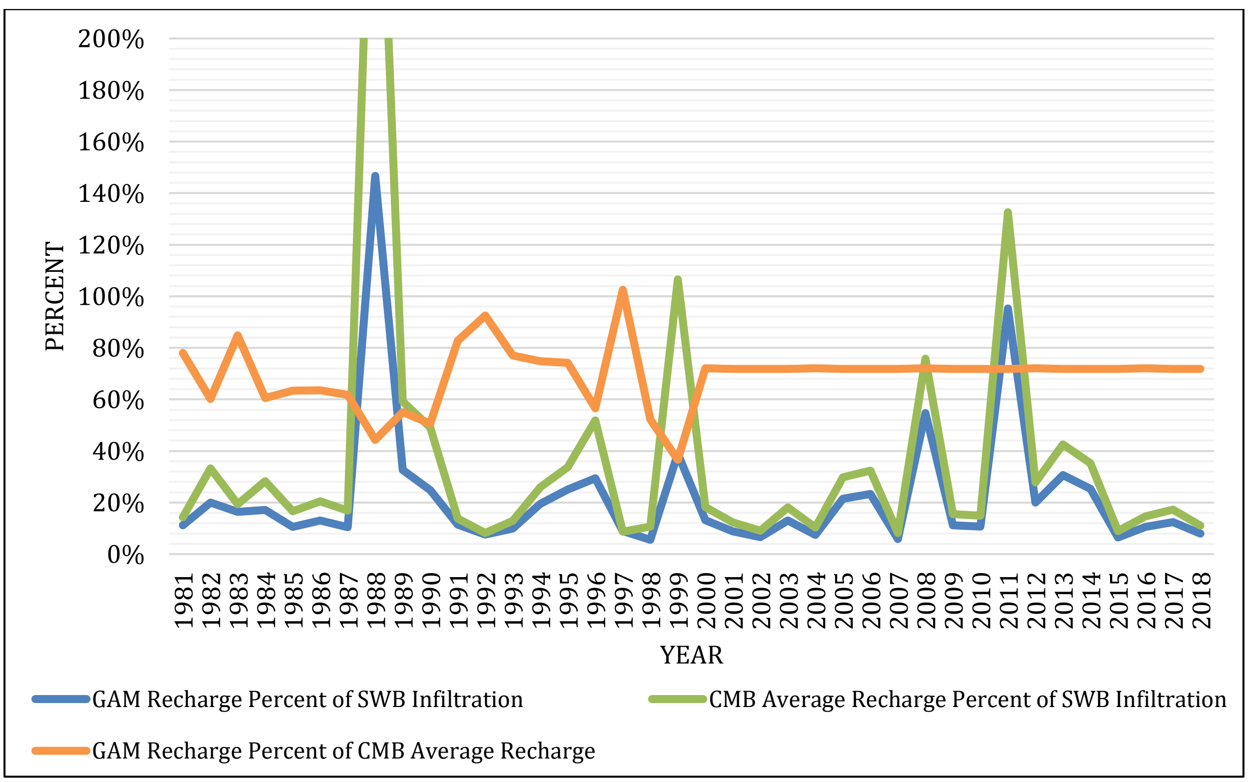


Figure 2. **Comparison of GCAS SWB model infiltration, GAM recharge, and CMB recharge estimates.**

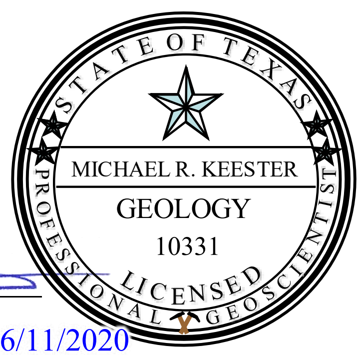
The CMB lower bound estimates of recharge indicate the GAM uses values that are lower than the actual recharge to the aquifer. Multiplying the CMB recharge rate by the area in GMA 15 indicates the lower bound recharge volume averages about 255,000 acre-feet per year. In addition, the mass balance approach used in the SWB model indicates recharge is highly variable based on climatic conditions and may be significantly greater than the average value during some years.

While we recognize that the recharge values in the GAM are lower than the best estimates of actual recharge, based on review of the TERS, inflows, and outflows it does not appear that pumping associated with potential DFCs simulated using the pumping file adopted on November 14, 2019 would have a negative impact on the overall hydrological conditions within GMA 15. The greatest simulated impact is an increase in captured streamflow, but the simulated impact should not be considered quantitative as the GAM was not designed to provide a robust simulation of the stream/aquifer interaction.

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).



06/11/2020

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

Attachment A –
GAM Calibration Period Water Budgets for the GCAS
for each County/GCD in GMA 15

Aransas County – ND Aransas

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	0	64	309	1,140
River Leakage	0	0	0	0
General Head Boundary	0	378	594	668
Recharge	77	148	93	47
Stream Leakage	2,156	4,628	1,576	1,476
Chicot - In from San Patricio County - San Patricio County GCD - GMA 16	306	183	169	217
Chicot - In from Refugio County - Refugio GCD - GMA 15	3,262	3,632	3,066	3,164
Chicot - In from County - Gulf of Mexico - GMA 0	557	1,298	995	1,155
Evangeline - In from Refugio County - Refugio GCD - GMA 15	116	101	103	110
Total Inflows to the GCAS	6,473	10,433	6,905	7,976

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	1	1,786	290	3
Pumping	0	1,119	1,408	1,610
Springs	10	13	5	7
Evapotranspiration	0	857	686	753
General Head Boundary	3,452	3,850	1,639	2,325
Stream Leakage	724	188	947	1,212
Chicot - Out to Refugio County - Refugio GCD - GMA 15	992	1,079	1,130	1,029
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	50	42	28	34
Chicot - Out to County - Gulf of Mexico - GMA 0	1,200	1,454	731	956
Evangeline - Out to Refugio County - Refugio GCD - GMA 15	45	44	41	48
Total Outflows from the GCAS	6,473	10,433	6,905	7,976

GCAS Increase(+)/Decrease(-) in Storage	0	1,722	-19	-1,137

Bee County – Bee GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	66	491	970	5,814
River Leakage	0	0	0	0
General Head Boundary	0	0	0	0
Recharge	12,451	15,744	11,921	399
Stream Leakage	5,741	6,178	6,541	7,603
Chicot - In from Bee County - Bee GCD - GMA 16	804	826	733	713
Chicot - In from Goliad County - Goliad County GCD - GMA 15	264	276	252	237
Chicot - In from Refugio County - Refugio GCD - GMA 15	209	203	85	136
Evangeline - In from Karnes County - Evergreen UWCD - GMA 15	117	130	131	135
Evangeline - In from Bee County - Bee GCD - GMA 16	2,449	1,676	1,465	1,399
Evangeline - In from Bee County - ND Bee - GMA 15	33	33	38	36
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	1,898	2,039	1,826	2,139
Evangeline - In from Refugio County - Refugio GCD - GMA 15	2	11	0	0
Burkeville - In from Karnes County - Evergreen UWCD - GMA 15	8	7	6	5
Burkeville - In from Bee County - Bee GCD - GMA 16	19	10	7	7
Burkeville - In from Bee County - ND Bee - GMA 15	2	2	2	2
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	20	23	23	23
Jasper - In from Karnes County - Evergreen UWCD - GMA 15	283	250	248	246
Jasper - In from Bee County - Bee GCD - GMA 16	58	6	4	9
Jasper - In from Bee County - ND Bee - GMA 15	27	25	25	24
Jasper - In from Goliad County - Goliad County GCD - GMA 15	108	220	234	208
Total Inflows to the GCAS	24,560	28,150	24,511	19,135

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	300	1,896	2,625	218
Pumping	0	1,030	1,501	1,019
Springs	1	1	0	0
Evapotranspiration	0	914	118	105
General Head Boundary	0	0	0	0
Stream Leakage	12,047	11,128	7,676	5,464
Chicot - Out to Bee County - Bee GCD - GMA 16	547	558	521	412
Chicot - Out to Goliad County - Goliad County GCD - GMA 15	111	112	84	76
Chicot - Out to San Patricio County - San Patricio County GCD - GMA 16	276	277	284	283
Chicot - Out to Refugio County - Refugio GCD - GMA 15	6,097	6,128	5,973	6,065
Evangeline - Out to Karnes County - Evergreen UWCD - GMA 15	21	22	27	27
Evangeline - Out to Bee County - Bee GCD - GMA 16	207	506	572	578
Evangeline - Out to Bee County - ND Bee - GMA 15	52	49	44	43
Evangeline - Out to Goliad County - Goliad County GCD - GMA 15	1,312	1,270	1,239	1,217
Evangeline - Out to San Patricio County - San Patricio County GCD - GMA 16	109	111	107	108
Evangeline - Out to Refugio County - Refugio GCD - GMA 15	2,902	2,988	2,889	2,862
Burkeville - Out to Karnes County - Evergreen UWCD - GMA 15	3	6	5	6
Burkeville - Out to Bee County - Bee GCD - GMA 16	9	28	28	20
Burkeville - Out to Bee County - ND Bee - GMA 15	3	3	2	2
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	17	15	15	15
Burkeville - Out to San Patricio County - San Patricio County GCD - GMA 16	1	1	1	1
Burkeville - Out to Refugio County - Refugio GCD - GMA 15	16	17	17	17
Jasper - Out to Karnes County - Evergreen UWCD - GMA 15	82	81	81	87
Jasper - Out to Bee County - Bee GCD - GMA 16	277	856	551	362
Jasper - Out to Bee County - ND Bee - GMA 15	26	23	22	22
Jasper - Out to Goliad County - Goliad County GCD - GMA 15	145	129	127	125
Total Outflows from the GCAS	24,560	28,150	24,511	19,135

GCAS Increase(+)/Decrease(-) in Storage	234	1,405	1,655	-5,596

Bee County – ND Bee

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	0	1	1	8
River Leakage	0	0	0	0
General Head Boundary	0	0	0	0
Recharge	13	17	13	0
Stream Leakage	0	0	0	0
Evangeline - In from Bee County - Bee GCD - GMA 15	52	49	44	43
Burkeville - In from Bee County - Bee GCD - GMA 15	3	3	2	2
Jasper - In from Bee County - Bee GCD - GMA 15	26	23	22	22
Total Inflows to the GCAS	94	92	83	76

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	0	2	2	0
Pumping	0	15	9	9
Springs	0	0	0	0
Evapotranspiration	0	0	0	0
General Head Boundary	0	0	0	0
Stream Leakage	32	15	7	4
Evangeline - Out to Bee County - Bee GCD - GMA 15	33	33	38	36
Burkeville - Out to Bee County - Bee GCD - GMA 15	2	2	2	2
Jasper - Out to Bee County - Bee GCD - GMA 15	27	25	25	24
Total Outflows from the GCAS	94	92	83	76

GCAS Increase(+)/Decrease(-) in Storage	0	1	0	-8

Calhoun County – Calhoun County GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	6	91	423	1,471
River Leakage	2,259	3,416	3,278	3,152
General Head Boundary	0	3,499	651	9
Recharge	1,940	3,907	2,504	1,213
Stream Leakage	7,731	6,880	2,636	2,429
Chicot - In from Victoria County - Victoria County GCD - GMA 15	7,610	1,359	2,219	3,457
Chicot - In from Jackson County - Texana GCD - GMA 15	2,337	2,627	1,347	3,180
Chicot - In from Refugio County - Refugio GCD - GMA 15	672	1,173	1,018	988
Chicot - In from County - Gulf of Mexico - GMA 0	2,439	6,952	2,875	2,546
Chicot - In from Matagorda County - Coastal Plains GCD - GMA 15	126	172	104	69
Chicot - In from Aransas County - Aransas County GCD - GMA 15	50	42	28	34
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	831	442	373	352
Evangeline - In from Jackson County - Texana GCD - GMA 15	373	0	0	9
Evangeline - In from Refugio County - Refugio GCD - GMA 15	70	478	315	265
Evangeline - In from County - Gulf of Mexico - GMA 0	410	966	652	350
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	1	1	1	1
Total Inflows to the GCAS	26,855	32,006	18,425	19,525

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	4	2,108	2,155	977
Pumping	0	10,391	2,966	1,399
Springs	1,160	547	509	560
Evapotranspiration	0	1,169	1,118	1,221
General Head Boundary	11,166	4,329	3,457	6,445
Stream Leakage	3,730	893	1,756	1,692
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	2,808	1,764	924	911
Chicot - Out to Jackson County - Texana GCD - GMA 15	135	2,385	1,396	793
Chicot - Out to Refugio County - Refugio GCD - GMA 15	237	114	117	119
Chicot - Out to County - Gulf of Mexico - GMA 0	7,029	5,944	2,472	4,545
Chicot - Out to Matagorda County - Coastal Plains GCD - GMA 15	101	41	7	6
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	27	434	245	186
Evangeline - Out to Jackson County - Texana GCD - GMA 15	0	710	441	159
Evangeline - Out to County - Gulf of Mexico - GMA 0	457	1,176	862	510
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	0	0	0	0
Total Outflows from the GCAS	26,855	32,006	18,425	19,526

GCAS Increase(+)/Decrease(-) in Storage	-2	2,018	1,732	-493

Colorado County – Colorado County GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	36	1,755	10,312	30,100
River Leakage	1,407	1,407	1,407	1,407
General Head Boundary	0	0	0	0
Recharge	27,057	44,193	27,887	3,550
Stream Leakage	18,999	62,232	36,291	32,533
Chicot - In from Lavaca County - ND Lavaca - GMA 15	2,165	6,976	6,174	5,746
Chicot - In from Austin County - Bluebonnet GCD - GMA 14	2,402	2,287	2,328	2,283
Chicot - In from Jackson County - Texana GCD - GMA 15	0	103	171	121
Chicot - In from Wharton County - Coastal Bend GCD - GMA 15	1,107	677	229	98
Evangeline - In from Fayette County - Fayette County GCD - GMA 15	279	817	724	541
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	1,419	5,350	4,642	4,924
Evangeline - In from Austin County - Bluebonnet GCD - GMA 14	2,636	2,848	2,340	2,414
Evangeline - In from Jackson County - Texana GCD - GMA 15	0	86	95	166
Evangeline - In from Wharton County - Coastal Bend GCD - GMA 15	97	582	483	495
Burkeville - In from Fayette County - Fayette County GCD - GMA 15	12	26	22	20
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	6	12	12	11
Burkeville - In from Austin County - Bluebonnet GCD - GMA 14	8	7	7	7
Burkeville - In from Jackson County - Texana GCD - GMA 15	0	0	0	0
Burkeville - In from Wharton County - Coastal Bend GCD - GMA 15	1	1	1	1
Jasper - In from Fayette County - Fayette County GCD - GMA 15	254	391	344	373
Jasper - In from Lavaca County - ND Lavaca - GMA 15	66	92	94	93
Jasper - In from Austin County - Bluebonnet GCD - GMA 14	90	75	78	78
Jasper - In from Wharton County - Coastal Bend GCD - GMA 15	3	2	2	2
Total Inflows to the GCAS	58,043	129,918	93,643	84,961

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	3,643	25,684	1,344	647
Pumping	0	61,456	48,466	33,201
Springs	7	14	14	13
Evapotranspiration	0	967	78	72
General Head Boundary	0	0	0	0
Stream Leakage	32,330	9,313	9,721	8,946
Chicot - Out to Lavaca County - ND Lavaca - GMA 15	1,667	1,259	251	859
Chicot - Out to Austin County - Bluebonnet GCD - GMA 14	1,359	1,761	1,318	1,145
Chicot - Out to Jackson County - Texana GCD - GMA 15	91	0	0	0
Chicot - Out to Wharton County - Coastal Bend GCD - GMA 15	8,996	14,341	16,743	19,338
Evangeline - Out to Fayette County - Fayette County GCD - GMA 15	158	19	17	27
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	2,707	1,002	1,006	1,448
Evangeline - Out to Austin County - Bluebonnet GCD - GMA 14	814	1,036	1,111	1,091
Evangeline - Out to Jackson County - Texana GCD - GMA 15	77	0	0	0
Evangeline - Out to Wharton County - Coastal Bend GCD - GMA 15	5,888	12,734	13,234	17,823
Burkeville - Out to Fayette County - Fayette County GCD - GMA 15	1	1	1	1
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	8	4	4	4
Burkeville - Out to Austin County - Bluebonnet GCD - GMA 14	3	5	4	4
Burkeville - Out to Jackson County - Texana GCD - GMA 15	0	0	0	0
Burkeville - Out to Wharton County - Coastal Bend GCD - GMA 15	28	36	39	42
Jasper - Out to Fayette County - Fayette County GCD - GMA 15	10	18	19	19
Jasper - Out to Lavaca County - ND Lavaca - GMA 15	59	46	45	46
Jasper - Out to Austin County - Bluebonnet GCD - GMA 14	38	55	55	54
Jasper - Out to Jackson County - Texana GCD - GMA 15	1	1	1	0
Jasper - Out to Wharton County - Coastal Bend GCD - GMA 15	154	166	173	180
Total Outflows from the GCAS	58,042	129,918	93,643	84,961

GCAS Increase(+)/Decrease(-) in Storage	3,607	23,929	-8,968	-29,453

DeWitt County – Pecan Valley GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	1,608	2,245	8,086	3,208
River Leakage	0	0	0	0
General Head Boundary	0	0	0	0
Recharge	7,295	9,069	7,166	6,899
Stream Leakage	10,491	13,915	6,476	11,870
Chicot - In from Victoria County - Victoria County GCD - GMA 15	0	38	0	10
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	177	178	64	173
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	1,018	1,016	1,141	981
Burkeville - In from Karnes County - Evergreen UWCD - GMA 15	0	0	0	0
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	3	3	2	3
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	3	2	3	2
Jasper - In from Gonzales County - Gonzales County UWCD - GMA 13	74	53	45	44
Jasper - In from Karnes County - Evergreen UWCD - GMA 15	174	121	97	96
Jasper - In from Gonzales County - ND Gonzales - GMA 13	200	155	149	148
Jasper - In from Lavaca County - ND Lavaca - GMA 15	240	167	211	254
Jasper - In from Goliad County - Goliad County GCD - GMA 15	154	152	157	154
Total Inflows to the GCAS	21,435	27,113	23,596	23,842

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	11	1,175	550	58
Pumping	0	3,745	4,324	3,908
Springs	0	0	0	0
Evapotranspiration	0	1,817	28	40
General Head Boundary	0	0	0	0
Stream Leakage	12,566	9,319	8,082	9,776
Chicot - Out to Lavaca County - ND Lavaca - GMA 15	205	49	116	167
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	1,136	1,498	1,458	1,366
Evangeline - Out to Karnes County - Evergreen UWCD - GMA 15	180	179	160	146
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	1,477	1,447	1,873	1,460
Evangeline - Out to Goliad County - Goliad County GCD - GMA 15	890	945	1,128	1,039
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	3,790	5,728	4,672	4,701
Burkeville - Out to Karnes County - Evergreen UWCD - GMA 15	9	12	12	12
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	6	5	5	5
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	6	7	6	7
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	15	21	19	19
Jasper - Out to Gonzales County - Gonzales County UWCD - GMA 13	33	29	29	28
Jasper - Out to Karnes County - Evergreen UWCD - GMA 15	390	431	442	424
Jasper - Out to Gonzales County - ND Gonzales - GMA 13	3	1	1	1
Jasper - Out to Lavaca County - ND Lavaca - GMA 15	42	96	85	81
Jasper - Out to Goliad County - Goliad County GCD - GMA 15	291	232	227	233
Jasper - Out to Victoria County - Victoria County GCD - GMA 15	386	380	378	372
Total Outflows from the GCAS	21,435	27,113	23,596	23,842

GCAS Increase(+)/Decrease(-) in Storage	-1,598	-1,071	-7,536	-3,150

Fayette County – Fayette County GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	2,141	3,143	2,440	3,050
River Leakage	0	405	276	257
General Head Boundary	0	0	0	0
Recharge	1,334	2,793	1,727	1,088
Stream Leakage	23	1,206	1,158	1,052
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	74	55	62	70
Evangeline - In from Austin County - Bluebonnet GCD - GMA 14	38	19	23	14
Evangeline - In from Colorado County - Colorado County GCD - GMA 15	158	19	17	27
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	3	3	4	4
Burkeville - In from Austin County - Bluebonnet GCD - GMA 14	2	1	1	1
Burkeville - In from Colorado County - Colorado County GCD - GMA 15	1	1	1	1
Jasper - In from Fayette County - Fayette County GCD - GMA 12	15	7	6	6
Jasper - In from Washington County - ND Washington - GMA 14	4	11	14	11
Jasper - In from Lavaca County - ND Lavaca - GMA 15	62	105	110	118
Jasper - In from Austin County - Bluebonnet GCD - GMA 14	42	27	25	19
Jasper - In from Colorado County - Colorado County GCD - GMA 15	10	18	19	19
Total Inflows to the GCAS	3,908	7,813	5,883	5,737

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	2	873	664	69
Pumping	0	2,497	2,797	3,284
Springs	1	0	0	0
Evapotranspiration	0	2,009	55	45
General Head Boundary	0	0	0	0
Stream Leakage	2,946	845	948	1,075
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	118	99	94	104
Evangeline - Out to Austin County - Bluebonnet GCD - GMA 14	16	16	16	21
Evangeline - Out to Colorado County - Colorado County GCD - GMA 15	279	817	724	541
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	5	3	2	2
Burkeville - Out to Austin County - Bluebonnet GCD - GMA 14	1	1	1	1
Burkeville - Out to Colorado County - Colorado County GCD - GMA 15	12	26	22	20
Jasper - Out to Fayette County - Fayette County GCD - GMA 12	36	19	18	16
Jasper - Out to Washington County - ND Washington - GMA 14	2	16	12	8
Jasper - Out to Lavaca County - ND Lavaca - GMA 15	193	159	145	135
Jasper - Out to Austin County - Bluebonnet GCD - GMA 14	43	42	41	43
Jasper - Out to Colorado County - Colorado County GCD - GMA 15	254	391	344	373
Total Outflows from the GCAS	3,908	7,813	5,883	5,737

GCAS Increase(+)/Decrease(-) in Storage	-2,140	-2,270	-1,776	-2,981

Goliad County – Goliad County GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	28	261	5,565	14,196
River Leakage	0	1,533	1,522	1,565
General Head Boundary	0	0	0	0
Recharge	18,205	29,584	16,865	649
Stream Leakage	18,120	22,388	6,605	12,297
Chicot - In from Bee County - Bee GCD - GMA 15	111	112	84	76
Chicot - In from Victoria County - Victoria County GCD - GMA 15	823	677	468	518
Evangeline - In from Karnes County - Evergreen UWCD - GMA 15	404	430	388	445
Evangeline - In from DeWitt County - Pecan Valley GCD - GMA 15	890	945	1,128	1,039
Evangeline - In from Bee County - Bee GCD - GMA 15	1,312	1,270	1,239	1,217
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	786	653	718	654
Evangeline - In from Refugio County - Refugio GCD - GMA 15	0	0	0	0
Burkeville - In from Karnes County - Evergreen UWCD - GMA 15	20	19	16	17
Burkeville - In from DeWitt County - Pecan Valley GCD - GMA 15	6	7	6	7
Burkeville - In from Bee County - Bee GCD - GMA 15	17	15	15	15
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	2	2	2	2
Burkeville - In from Refugio County - Refugio GCD - GMA 15	0	0	0	0
Jasper - In from Karnes County - Evergreen UWCD - GMA 15	216	148	134	128
Jasper - In from DeWitt County - Pecan Valley GCD - GMA 15	291	232	227	233
Jasper - In from Bee County - Bee GCD - GMA 15	145	129	127	125
Jasper - In from Victoria County - Victoria County GCD - GMA 15	72	70	71	70
Total Inflows to the GCAS	41,449	58,476	35,181	33,256

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	426	13,946	1,346	10
Pumping	0	1,193	1,364	1,233
Springs	15	22	6	4
Evapotranspiration	0	1,431	222	197
General Head Boundary	0	0	0	0
Stream Leakage	27,233	26,486	17,423	17,278
Chicot - Out to Bee County - Bee GCD - GMA 15	264	276	252	237
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	970	1,059	1,057	987
Chicot - Out to Refugio County - Refugio GCD - GMA 15	3,246	3,196	3,010	3,020
Evangeline - Out to Karnes County - Evergreen UWCD - GMA 15	13	12	11	10
Evangeline - Out to DeWitt County - Pecan Valley GCD - GMA 15	1,018	1,016	1,141	981
Evangeline - Out to Bee County - Bee GCD - GMA 15	1,898	2,039	1,826	2,139
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	3,139	4,100	4,299	3,919
Evangeline - Out to Refugio County - Refugio GCD - GMA 15	2,667	3,004	2,499	2,542
Burkeville - Out to Karnes County - Evergreen UWCD - GMA 15	0	0	0	0
Burkeville - Out to DeWitt County - Pecan Valley GCD - GMA 15	3	2	3	2
Burkeville - Out to Bee County - Bee GCD - GMA 15	20	23	23	23
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	17	18	19	19
Burkeville - Out to Refugio County - Refugio GCD - GMA 15	12	12	12	12
Jasper - Out to DeWitt County - Pecan Valley GCD - GMA 15	154	152	157	154
Jasper - Out to Bee County - Bee GCD - GMA 15	108	220	234	208
Jasper - Out to Victoria County - Victoria County GCD - GMA 15	247	269	276	282
Total Outflows from the GCAS	41,449	58,476	35,181	33,256

GCAS Increase(+)/Decrease(-) in Storage	398	13,685	-4,220	-14,186

Jackson County – Texana GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	0	2,810	19,275	14,430
River Leakage	0	4,215	4,212	4,074
General Head Boundary	0	512	258	0
Recharge	7,721	13,192	7,287	7,541
Stream Leakage	34,162	189,117	54,322	65,136
Chicot - In from Lavaca County - ND Lavaca - GMA 15	4,513	13,969	10,988	8,421
Chicot - In from Colorado County - Colorado County GCD - GMA 15	91	0	0	0
Chicot - In from Victoria County - Victoria County GCD - GMA 15	7,296	9,032	4,426	3,997
Chicot - In from Wharton County - Coastal Bend GCD - GMA 15	11,164	3,694	2,363	2,036
Chicot - In from Calhoun County - Calhoun County GCD - GMA 15	135	2,385	1,396	793
Chicot - In from County - Gulf of Mexico - GMA 0	288	1,535	842	395
Chicot - In from Matagorda County - Coastal Plains GCD - GMA 15	3,566	5,671	4,023	3,129
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	3,737	11,192	8,825	7,967
Evangeline - In from Colorado County - Colorado County GCD - GMA 15	77	0	0	0
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	1,003	3,683	2,839	1,790
Evangeline - In from Wharton County - Coastal Bend GCD - GMA 15	3,026	246	224	214
Evangeline - In from Calhoun County - Calhoun County GCD - GMA 15	0	710	441	159
Evangeline - In from County - Gulf of Mexico - GMA 0	67	968	599	241
Evangeline - In from Matagorda County - Coastal Plains GCD - GMA 15	1,004	1,678	1,105	796
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	12	21	22	21
Burkeville - In from Colorado County - Colorado County GCD - GMA 15	0	0	0	0
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	2	3	3	4
Burkeville - In from Wharton County - Coastal Bend GCD - GMA 15	7	3	3	2
Burkeville - In from Matagorda County - Coastal Plains GCD - GMA 15	1	0	0	0
Jasper - In from Lavaca County - ND Lavaca - GMA 15	121	149	155	158
Jasper - In from Colorado County - Colorado County GCD - GMA 15	1	1	1	0
Jasper - In from Victoria County - Victoria County GCD - GMA 15	37	15	16	19
Jasper - In from Wharton County - Coastal Bend GCD - GMA 15	41	23	20	17
Total Inflows to the GCAS	78,071	264,823	123,645	121,344

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	182	111,522	2,624	4,793
Pumping	0	130,642	96,549	53,403
Springs	165	16	42	123
Evapotranspiration	0	411	429	687
General Head Boundary	1,492	148	87	839
Stream Leakage	63,123	6,205	9,859	32,734
Chicot - Out to Lavaca County - ND Lavaca - GMA 15	274	241	336	355
Chicot - Out to Colorado County - Colorado County GCD - GMA 15	0	103	171	121
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	1,382	1,653	944	1,212
Chicot - Out to Wharton County - Coastal Bend GCD - GMA 15	0	2,082	3,356	7,299
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	2,337	2,627	1,347	3,180
Chicot - Out to County - Gulf of Mexico - GMA 0	2,753	2,544	978	2,821
Chicot - Out to Matagorda County - Coastal Plains GCD - GMA 15	4,316	2,125	1,671	3,025
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	22	125	105	163
Evangeline - Out to Colorado County - Colorado County GCD - GMA 15	0	86	95	166
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	556	707	540	550
Evangeline - Out to Wharton County - Coastal Bend GCD - GMA 15	0	3,475	4,403	9,562
Evangeline - Out to Calhoun County - Calhoun County GCD - GMA 15	373	0	0	9
Evangeline - Out to County - Gulf of Mexico - GMA 0	571	62	40	28
Evangeline - Out to Matagorda County - Coastal Plains GCD - GMA 15	504	3	29	242
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	0	0	0	0
Burkeville - Out to Colorado County - Colorado County GCD - GMA 15	0	0	0	0
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	1	4	3	2
Burkeville - Out to Wharton County - Coastal Bend GCD - GMA 15	0	1	1	2
Burkeville - Out to Matagorda County - Coastal Plains GCD - GMA 15	0	0	0	0
Jasper - Out to Victoria County - Victoria County GCD - GMA 15	19	40	37	28
Total Outflows from the GCAS	78,070	264,822	123,645	121,345

GCAS Increase(+)/Decrease(-) in Storage	182	108,712	-16,651	-9,637

Karnes County – Evergreen UWCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	1,860	2,786	3,601	3,351
River Leakage	0	0	0	0
General Head Boundary	0	0	0	0
Recharge	1,015	1,787	1,088	756
Stream Leakage	574	1,367	576	753
Evangeline - In from DeWitt County - Pecan Valley GCD - GMA 15	180	179	160	146
Evangeline - In from Bee County - Bee GCD - GMA 15	21	22	27	27
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	13	12	11	10
Burkeville - In from DeWitt County - Pecan Valley GCD - GMA 15	9	12	12	12
Burkeville - In from Bee County - Bee GCD - GMA 15	3	6	5	6
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	0	0	0	0
Jasper - In from Karnes County - Evergreen UWCD - GMA 13	5	4	4	4
Jasper - In from DeWitt County - Pecan Valley GCD - GMA 15	390	431	442	424
Jasper - In from Bee County - Bee GCD - GMA 15	82	81	81	87
Total Inflows to the GCAS	4,152	6,687	6,009	5,577

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	0	725	304	46
Pumping	0	2,257	3,136	2,515
Springs	15	8	6	5
Evapotranspiration	0	1,311	164	162
General Head Boundary	0	0	0	0
Stream Leakage	2,737	1,129	1,230	1,632
Evangeline - Out to Bee County - Bee GCD - GMA 15	117	130	131	135
Evangeline - Out to Goliad County - Goliad County GCD - GMA 15	404	430	388	445
Burkeville - Out to DeWitt County - Pecan Valley GCD - GMA 15	0	0	0	0
Burkeville - Out to Bee County - Bee GCD - GMA 15	8	7	6	5
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	20	19	16	17
Jasper - Out to Gonzales County - Gonzales County UWCD - GMA 13	22	17	15	15
Jasper - Out to Karnes County - Evergreen UWCD - GMA 13	14	8	8	7
Jasper - Out to Live Oak County - Live Oak UWCD - GMA 16	140	127	127	123
Jasper - Out to DeWitt County - Pecan Valley GCD - GMA 15	174	121	97	96
Jasper - Out to Bee County - Bee GCD - GMA 15	283	250	248	246
Jasper - Out to Goliad County - Goliad County GCD - GMA 15	216	148	134	128
Total Outflows from the GCAS	4,152	6,687	6,009	5,578

GCAS Increase(+)/Decrease(-) in Storage	-1,860	-2,062	-3,297	-3,305

Lavaca County – ND Lavaca

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	1,225	4,113	15,506	8,033
River Leakage	0	0	0	0
General Head Boundary	0	0	0	0
Recharge	15,837	29,487	15,096	15,534
Stream Leakage	11,276	53,308	18,088	21,791
Chicot - In from DeWitt County - Pecan Valley GCD - GMA 15	205	49	116	167
Chicot - In from Colorado County - Colorado County GCD - GMA 15	1,667	1,259	251	859
Chicot - In from Victoria County - Victoria County GCD - GMA 15	828	695	458	679
Chicot - In from Jackson County - Texana GCD - GMA 15	274	241	336	355
Evangeline - In from Fayette County - Fayette County GCD - GMA 15	118	99	94	104
Evangeline - In from DeWitt County - Pecan Valley GCD - GMA 15	1,477	1,447	1,873	1,460
Evangeline - In from Colorado County - Colorado County GCD - GMA 15	2,707	1,002	1,006	1,448
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	471	609	582	521
Evangeline - In from Jackson County - Texana GCD - GMA 15	22	125	105	163
Burkeville - In from Fayette County - Fayette County GCD - GMA 15	5	3	2	2
Burkeville - In from DeWitt County - Pecan Valley GCD - GMA 15	6	5	5	5
Burkeville - In from Colorado County - Colorado County GCD - GMA 15	8	4	4	4
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	2	2	2	2
Burkeville - In from Jackson County - Texana GCD - GMA 15	0	0	0	0
Jasper - In from Gonzales County - Gonzales County UWCD - GMA 13	5	5	4	3
Jasper - In from Fayette County - Fayette County GCD - GMA 15	193	159	145	135
Jasper - In from Gonzales County - ND Gonzales - GMA 13	223	243	226	216
Jasper - In from DeWitt County - Pecan Valley GCD - GMA 15	42	96	85	81
Jasper - In from Colorado County - Colorado County GCD - GMA 15	59	46	45	46
Jasper - In from Victoria County - Victoria County GCD - GMA 15	15	12	13	14
Total Inflows to the GCAS	36,666	93,010	54,043	51,622

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	1,043	22,129	799	1,116
Pumping	0	28,157	18,107	11,201
Springs	0	0	0	0
Evapotranspiration	0	778	36	37
General Head Boundary	0	0	0	0
Stream Leakage	22,538	2,989	3,134	10,703
Chicot - Out to Colorado County - Colorado County GCD - GMA 15	2,165	6,976	6,174	5,746
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	288	348	337	352
Chicot - Out to Jackson County - Texana GCD - GMA 15	4,513	13,969	10,988	8,421
Evangeline - Out to Fayette County - Fayette County GCD - GMA 15	74	55	62	70
Evangeline - Out to DeWitt County - Pecan Valley GCD - GMA 15	177	178	64	173
Evangeline - Out to Colorado County - Colorado County GCD - GMA 15	1,419	5,350	4,642	4,924
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	135	285	220	210
Evangeline - Out to Jackson County - Texana GCD - GMA 15	3,737	11,192	8,825	7,967
Burkeville - Out to Fayette County - Fayette County GCD - GMA 15	3	3	4	4
Burkeville - Out to DeWitt County - Pecan Valley GCD - GMA 15	3	3	2	3
Burkeville - Out to Colorado County - Colorado County GCD - GMA 15	6	12	12	11
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	1	2	1	1
Burkeville - Out to Jackson County - Texana GCD - GMA 15	12	21	22	21
Jasper - Out to Fayette County - Fayette County GCD - GMA 15	62	105	110	118
Jasper - Out to Gonzales County - ND Gonzales - GMA 13	54	36	32	26
Jasper - Out to DeWitt County - Pecan Valley GCD - GMA 15	240	167	211	254
Jasper - Out to Colorado County - Colorado County GCD - GMA 15	66	92	94	93
Jasper - Out to Victoria County - Victoria County GCD - GMA 15	10	13	13	13
Jasper - Out to Jackson County - Texana GCD - GMA 15	121	149	155	158
Total Outflows from the GCAS	36,666	93,010	54,043	51,622

GCAS Increase(+)/Decrease(-) in Storage	-182	18,016	-14,707	-6,917

Matagorda County – Coastal Plains GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	1	493	9,728	8,737
River Leakage	774	753	804	793
General Head Boundary	0	454	90	0
Recharge	12,489	21,917	16,850	26,842
Stream Leakage	34,930	87,859	64,324	47,572
Chicot - In from Jackson County - Texana GCD - GMA 15	4,316	2,125	1,671	3,025
Chicot - In from Wharton County - Coastal Bend GCD - GMA 15	12,726	4,845	5,379	6,039
Chicot - In from Calhoun County - Calhoun County GCD - GMA 15	101	41	7	6
Chicot - In from County - Gulf of Mexico - GMA 0	855	2,141	1,579	1,496
Chicot - In from Brazoria County - Brazoria County GCD - GMA 14	5,333	3,865	5,089	4,634
Evangeline - In from Jackson County - Texana GCD - GMA 15	504	3	29	242
Evangeline - In from Wharton County - Coastal Bend GCD - GMA 15	4,028	863	506	244
Evangeline - In from Brazoria County - Brazoria County GCD - GMA 14	347	1,059	923	675
Burkeville - In from Jackson County - Texana GCD - GMA 15	0	0	0	0
Burkeville - In from Wharton County - Coastal Bend GCD - GMA 15	17	10	9	8
Burkeville - In from Brazoria County - Brazoria County GCD - GMA 14	1	0	0	0
Total Inflows to the GCAS	76,424	126,425	106,988	100,314

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	6	9,776	254	685
Pumping	0	38,804	37,884	11,486
Springs	340	572	443	503
Evapotranspiration	0	3,566	3,300	3,780
General Head Boundary	8,096	8,419	6,901	10,088
Stream Leakage	46,998	25,434	29,998	44,044
Chicot - Out to Jackson County - Texana GCD - GMA 15	3,566	5,671	4,023	3,129
Chicot - Out to Wharton County - Coastal Bend GCD - GMA 15	20	8,726	3,201	1,556
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	126	172	104	69
Chicot - Out to County - Gulf of Mexico - GMA 0	8,172	9,352	7,844	9,932
Chicot - Out to Brazoria County - Brazoria County GCD - GMA 14	6,911	8,774	7,464	8,665
Evangeline - Out to Jackson County - Texana GCD - GMA 15	1,004	1,678	1,105	796
Evangeline - Out to Wharton County - Coastal Bend GCD - GMA 15	0	5,274	4,316	5,531
Evangeline - Out to Brazoria County - Brazoria County GCD - GMA 14	1,181	202	142	40
Burkeville - Out to Jackson County - Texana GCD - GMA 15	1	0	0	0
Burkeville - Out to Wharton County - Coastal Bend GCD - GMA 15	0	1	2	2
Burkeville - Out to Brazoria County - Brazoria County GCD - GMA 14	3	6	6	6
Total Outflows from the GCAS	76,423	126,425	106,988	100,315

GCAS Increase(+)/Decrease(-) in Storage	5	9,282	-9,475	-8,052

Refugio County – Refugio GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	0	4	1,701	10,517
River Leakage	0	0	0	0
General Head Boundary	0	0	0	0
Recharge	14,134	21,285	13,639	1,862
Stream Leakage	26,303	34,636	23,850	24,589
Chicot - In from Bee County - Bee GCD - GMA 15	6,097	6,128	5,973	6,065
Chicot - In from Goliad County - Goliad County GCD - GMA 15	3,246	3,196	3,010	3,020
Chicot - In from Victoria County - Victoria County GCD - GMA 15	1,894	1,220	1,006	1,070
Chicot - In from San Patricio County - San Patricio County GCD - GMA 16	940	925	908	958
Chicot - In from Calhoun County - Calhoun County GCD - GMA 15	237	114	117	119
Chicot - In from County - Gulf of Mexico - GMA 0	200	280	259	224
Chicot - In from Aransas County - Aransas County GCD - GMA 15	992	1,079	1,130	1,029
Evangeline - In from Bee County - Bee GCD - GMA 15	2,902	2,988	2,889	2,862
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	2,667	3,004	2,499	2,542
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	651	608	554	552
Evangeline - In from San Patricio County - San Patricio County GCD - GMA 16	217	203	195	190
Evangeline - In from County - Gulf of Mexico - GMA 0	46	72	57	56
Evangeline - In from Aransas County - Aransas County GCD - GMA 15	45	44	41	48
Burkeville - In from Bee County - Bee GCD - GMA 15	16	17	17	17
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	12	12	12	12
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	2	2	2	2
Burkeville - In from San Patricio County - San Patricio County GCD - GMA 16	0	0	0	0
Total Inflows to the GCAS	60,601	75,819	57,859	55,733

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	183	13,721	5,519	5
Pumping	0	1,868	1,398	1,243
Springs	135	221	81	105
Evapotranspiration	0	2,199	1,638	1,811
General Head Boundary	5,312	5,591	4,570	4,915
Stream Leakage	40,784	35,294	30,791	33,200
Chicot - Out to Bee County - Bee GCD - GMA 15	209	203	85	136
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	1,013	1,041	1,054	1,083
Chicot - Out to San Patricio County - San Patricio County GCD - GMA 16	3,673	3,787	3,174	3,408
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	672	1,173	1,018	988
Chicot - Out to County - Gulf of Mexico - GMA 0	3,806	4,649	3,388	3,652
Chicot - Out to Aransas County - Aransas County GCD - GMA 15	3,262	3,632	3,066	3,164
Evangeline - Out to Bee County - Bee GCD - GMA 15	2	11	0	0
Evangeline - Out to Goliad County - Goliad County GCD - GMA 15	0	0	0	0
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	459	918	771	756
Evangeline - Out to San Patricio County - San Patricio County GCD - GMA 16	824	833	806	808
Evangeline - Out to Calhoun County - Calhoun County GCD - GMA 15	70	478	315	265
Evangeline - Out to County - Gulf of Mexico - GMA 0	78	95	81	82
Evangeline - Out to Aransas County - Aransas County GCD - GMA 15	116	101	103	110
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	0	0	0	0
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	2	2	2	2
Burkeville - Out to San Patricio County - San Patricio County GCD - GMA 16	2	3	3	3
Total Outflows from the GCAS	60,601	75,819	57,859	55,734

GCAS Increase(+)/Decrease(-) in Storage	183	13,716	3,818	-10,512

Victoria County – Victoria County GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	0	2,275	14,213	17,271
River Leakage	0	1,053	1,056	1,056
General Head Boundary	0	200	0	0
Recharge	20,306	31,198	20,235	9,732
Stream Leakage	38,566	52,728	7,759	17,356
Chicot - In from Lavaca County - ND Lavaca - GMA 15	288	348	337	352
Chicot - In from DeWitt County - Pecan Valley GCD - GMA 15	1,136	1,498	1,458	1,366
Chicot - In from Goliad County - Goliad County GCD - GMA 15	970	1,059	1,057	987
Chicot - In from Jackson County - Texana GCD - GMA 15	1,382	1,653	944	1,212
Chicot - In from Refugio County - Refugio GCD - GMA 15	1,013	1,041	1,054	1,083
Chicot - In from Calhoun County - Calhoun County GCD - GMA 15	2,808	1,764	924	911
Chicot - In from County - Gulf of Mexico - GMA 0	0	494	0	0
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	135	285	220	210
Evangeline - In from DeWitt County - Pecan Valley GCD - GMA 15	3,790	5,728	4,672	4,701
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	3,139	4,100	4,299	3,919
Evangeline - In from Jackson County - Texana GCD - GMA 15	556	707	540	550
Evangeline - In from Refugio County - Refugio GCD - GMA 15	459	918	771	756
Evangeline - In from Calhoun County - Calhoun County GCD - GMA 15	27	434	245	186
Evangeline - In from County - Gulf of Mexico - GMA 0	7	21	0	0
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	1	2	1	1
Burkeville - In from DeWitt County - Pecan Valley GCD - GMA 15	15	21	19	19
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	17	18	19	19
Burkeville - In from Jackson County - Texana GCD - GMA 15	1	4	3	2
Burkeville - In from Refugio County - Refugio GCD - GMA 15	2	2	2	2
Burkeville - In from Calhoun County - Calhoun County GCD - GMA 15	0	0	0	0
Jasper - In from Lavaca County - ND Lavaca - GMA 15	10	13	13	13
Jasper - In from DeWitt County - Pecan Valley GCD - GMA 15	386	380	378	372
Jasper - In from Goliad County - Goliad County GCD - GMA 15	247	269	276	282
Jasper - In from Jackson County - Texana GCD - GMA 15	19	40	37	28
Total Inflows to the GCAS	75,277	108,252	60,531	62,386

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	679	25,779	1,319	3,091
Pumping	0	40,017	26,938	24,563
Springs	1,772	251	98	135
Evapotranspiration	0	1,273	610	647
General Head Boundary	411	0	26	144
Stream Leakage	49,342	21,744	17,684	19,796
Chicot - Out to Lavaca County - ND Lavaca - GMA 15	828	695	458	679
Chicot - Out to DeWitt County - Pecan Valley GCD - GMA 15	0	38	0	10
Chicot - Out to Goliad County - Goliad County GCD - GMA 15	823	677	468	518
Chicot - Out to Jackson County - Texana GCD - GMA 15	7,296	9,032	4,426	3,997
Chicot - Out to Refugio County - Refugio GCD - GMA 15	1,894	1,220	1,006	1,070
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	7,610	1,359	2,219	3,457
Chicot - Out to County - Gulf of Mexico - GMA 0	685	0	58	262
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	471	609	582	521
Evangeline - Out to Goliad County - Goliad County GCD - GMA 15	786	653	718	654
Evangeline - Out to Jackson County - Texana GCD - GMA 15	1,003	3,683	2,839	1,790
Evangeline - Out to Refugio County - Refugio GCD - GMA 15	651	608	554	552
Evangeline - Out to Calhoun County - Calhoun County GCD - GMA 15	831	442	373	352
Evangeline - Out to County - Gulf of Mexico - GMA 0	61	65	46	35
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	2	2	2	2
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	2	2	2	2
Burkeville - Out to Jackson County - Texana GCD - GMA 15	2	3	3	4
Burkeville - Out to Refugio County - Refugio GCD - GMA 15	2	2	2	2
Burkeville - Out to Calhoun County - Calhoun County GCD - GMA 15	1	1	1	1
Jasper - Out to Lavaca County - ND Lavaca - GMA 15	15	12	13	14
Jasper - Out to Goliad County - Goliad County GCD - GMA 15	72	70	71	70
Jasper - Out to Jackson County - Texana GCD - GMA 15	37	15	16	19
Total Outflows from the GCAS	75,277	108,252	60,531	62,387

GCAS Increase(+)/Decrease(-) in Storage	679	23,504	-12,895	-14,180

Wharton County – Coastal Bend GCD

Inflows

Source	Pre-Dev.	1981	1990	1999
Out of Storage	0	4,672	19,105	41,901
River Leakage	536	536	536	536
General Head Boundary	0	0	0	0
Recharge	14,330	23,446	15,197	10,992
Stream Leakage	43,963	189,023	121,817	128,577
Chicot - In from Austin County - Bluebonnet GCD - GMA 14	863	900	905	984
Chicot - In from Colorado County - Colorado County GCD - GMA 15	8,996	14,341	16,743	19,338
Chicot - In from Jackson County - Texana GCD - GMA 15	0	2,082	3,356	7,299
Chicot - In from Fort Bend County - Fort Bend Subsidence District - GMA 14	3,235	1,701	1,573	2,075
Chicot - In from Matagorda County - Coastal Plains GCD - GMA 15	20	8,726	3,201	1,556
Chicot - In from Brazoria County - Brazoria County GCD - GMA 14	47	258	103	0
Evangeline - In from Austin County - Bluebonnet GCD - GMA 14	615	716	784	968
Evangeline - In from Colorado County - Colorado County GCD - GMA 15	5,888	12,734	13,234	17,823
Evangeline - In from Jackson County - Texana GCD - GMA 15	0	3,475	4,403	9,562
Evangeline - In from Fort Bend County - Fort Bend Subsidence District - GMA 14	744	590	562	2,448
Evangeline - In from Matagorda County - Coastal Plains GCD - GMA 15	0	5,274	4,316	5,531
Evangeline - In from Brazoria County - Brazoria County GCD - GMA 14	0	9	12	96
Burkeville - In from Austin County - Bluebonnet GCD - GMA 14	1	1	1	1
Burkeville - In from Colorado County - Colorado County GCD - GMA 15	28	36	39	42
Burkeville - In from Jackson County - Texana GCD - GMA 15	0	1	1	2
Burkeville - In from Fort Bend County - Fort Bend Subsidence District - GMA 14	1	1	1	1
Burkeville - In from Matagorda County - Coastal Plains GCD - GMA 15	0	1	2	2
Burkeville - In from Brazoria County - Brazoria County GCD - GMA 14	0	0	0	0
Jasper - In from Austin County - Bluebonnet GCD - GMA 14	18	22	22	23
Jasper - In from Colorado County - Colorado County GCD - GMA 15	154	166	173	180
Jasper - In from Fort Bend County - Fort Bend Subsidence District - GMA 14	23	18	18	17
Total Inflows to the GCAS	79,462	268,728	206,103	249,954

Outflows

Source	Pre-Dev.	1981	1990	1999
In to Storage	284	53,156	2,482	2,298
Pumping	0	176,252	163,299	214,006
Springs	41	147	130	130
Evapotranspiration	0	373	351	340
General Head Boundary	0	0	0	0
Stream Leakage	32,808	11,468	13,981	11,261
Chicot - Out to Austin County - Bluebonnet GCD - GMA 14	707	686	654	389
Chicot - Out to Colorado County - Colorado County GCD - GMA 15	1,107	677	229	98
Chicot - Out to Jackson County - Texana GCD - GMA 15	11,164	3,694	2,363	2,036
Chicot - Out to Fort Bend County - Fort Bend Subsidence District - GMA 14	9,982	12,216	12,058	9,214
Chicot - Out to Matagorda County - Coastal Plains GCD - GMA 15	12,726	4,845	5,379	6,039
Chicot - Out to Brazoria County - Brazoria County GCD - GMA 14	879	532	805	1,425
Evangeline - Out to Austin County - Bluebonnet GCD - GMA 14	192	254	285	134
Evangeline - Out to Colorado County - Colorado County GCD - GMA 15	97	582	483	495
Evangeline - Out to Jackson County - Texana GCD - GMA 15	3,026	246	224	214
Evangeline - Out to Fort Bend County - Fort Bend Subsidence District - GMA 14	1,876	2,396	2,616	1,424
Evangeline - Out to Matagorda County - Coastal Plains GCD - GMA 15	4,028	863	506	244
Evangeline - Out to Brazoria County - Brazoria County GCD - GMA 14	398	110	32	0
Burkeville - Out to Austin County - Bluebonnet GCD - GMA 14	0	1	1	1
Burkeville - Out to Colorado County - Colorado County GCD - GMA 15	1	1	1	1
Burkeville - Out to Jackson County - Texana GCD - GMA 15	7	3	3	2
Burkeville - Out to Fort Bend County - Fort Bend Subsidence District - GMA 14	2	8	7	6
Burkeville - Out to Matagorda County - Coastal Plains GCD - GMA 15	17	10	9	8
Burkeville - Out to Brazoria County - Brazoria County GCD - GMA 14	2	2	2	2
Jasper - Out to Austin County - Bluebonnet GCD - GMA 14	5	15	14	13
Jasper - Out to Colorado County - Colorado County GCD - GMA 15	3	2	2	2
Jasper - Out to Jackson County - Texana GCD - GMA 15	41	23	20	17
Jasper - Out to Fort Bend County - Fort Bend Subsidence District - GMA 14	61	157	156	146
Jasper - Out to Brazoria County - Brazoria County GCD - GMA 14	8	11	10	10
Total Outflows from the GCAS	79,462	268,728	206,103	249,954

GCAS Increase(+)/Decrease(-) in Storage	284	48,484	-16,623	-39,603

Attachment B –
GAM Predictive Period Water Budgets for the GCAS for each County/GCD in GMA 15 based on Pumping File GMA15_2019_001_v1

Aransas County – ND Aransas

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	46	3	43	3	1	1	1	1
River Leakage	0	0	0	0	0	0	0	0
General Head Boundary	336	190	617	638	642	644	646	648
Recharge	110	110	110	110	110	110	110	110
Stream Leakage	2,598	2,373	2,390	2,400	2,400	2,401	2,401	2,401
Chicot - In from San Patricio County - San Patricio County GCD - GMA 16	180	198	231	215	207	201	197	194
Chicot - In from Refugio County - Refugio GCD - GMA 15	3,256	3,276	3,215	3,207	3,207	3,206	3,206	3,206
Chicot - In from County - Gulf of Mexico - GMA 0	885	808	1,196	1,196	1,196	1,196	1,196	1,196
Evangeline - In from Refugio County - Refugio GCD - GMA 15	112	117	93	93	93	93	93	93
Total Inflows to the GCAS	7,523	7,075	7,893	7,861	7,855	7,852	7,850	7,847

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	810	16	0	0	0	0	0	0
Pumping	613	724	1,543	1,543	1,543	1,543	1,543	1,543
Springs	8	9	9	9	9	9	9	9
Evapotranspiration	735	744	740	739	739	739	739	739
General Head Boundary	2,618	2,755	2,735	2,709	2,704	2,701	2,699	2,697
Stream Leakage	588	664	656	653	653	653	653	652
Chicot - Out to San Patricio County - San Patricio County GCD - GMA 16	7	7	0	0	0	0	0	0
Chicot - Out to Refugio County - Refugio GCD - GMA 15	998	999	1,010	1,013	1,013	1,014	1,014	1,014
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	35	35	37	37	37	37	37	37
Chicot - Out to County - Gulf of Mexico - GMA 0	1,060	1,070	1,104	1,100	1,099	1,098	1,098	1,097
Evangeline - Out to Refugio County - Refugio GCD - GMA 15	47	51	58	59	59	59	59	59
Total Outflows from the GCAS	7,520	7,075	7,893	7,861	7,855	7,852	7,850	7,847

GCAS Increase(+)/Decrease(-) in Storage	764	14	-43	-3	-1	-1	-1	-1

Bee County – Bee GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	1,240	610	1,709	713	475	382	362	336
River Leakage	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	11,191	11,191	11,191	11,191	11,191	11,191	11,191	11,191
Stream Leakage	8,698	7,525	9,175	9,258	9,449	9,668	9,652	9,489
Chicot - In from Bee County - Bee GCD - GMA 16	632	679	611	515	496	488	484	484
Chicot - In from Goliad County - Goliad County GCD - GMA 15	237	261	265	261	260	259	259	258
Chicot - In from Refugio County - Refugio GCD - GMA 15	158	204	205	201	198	199	268	358
Evangeline - In from Karnes County - Evergreen UWCD - GMA 15	129	123	140	140	140	140	140	140
Evangeline - In from Bee County - Bee GCD - GMA 16	1,321	1,543	1,306	1,081	1,007	980	974	976
Evangeline - In from Bee County - ND Bee - GMA 15	31	61	40	46	50	52	55	57
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	2,098	2,104	2,364	2,416	2,431	2,442	2,451	2,458
Evangeline - In from Refugio County - Refugio GCD - GMA 15	25	50	52	66	75	84	91	98
Burkeville - In from Karnes County - Evergreen UWCD - GMA 15	5	6	6	4	3	3	3	3
Burkeville - In from Bee County - Bee GCD - GMA 16	7	11	10	7	7	5	5	6
Burkeville - In from Bee County - ND Bee - GMA 15	0	0	0	2	2	2	2	2
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	23	23	23	22	22	22	21	21
Burkeville - In from Refugio County - Refugio GCD - GMA 15	0	0	0	0	0	0	0	0
Jasper - In from Karnes County - Evergreen UWCD - GMA 15	238	331	325	311	307	306	306	306
Jasper - In from Bee County - Bee GCD - GMA 16	12	34	60	42	44	46	47	48
Jasper - In from Bee County - ND Bee - GMA 15	79	0	18	23	22	22	21	20
Jasper - In from Goliad County - Goliad County GCD - GMA 15	204	213	161	148	138	131	127	124
Total Inflows to the GCAS	26,329	24,967	27,661	26,444	26,317	26,422	26,459	26,374

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	3,837	202	395	135	46	12	2	0
Pumping	1,945	2,694	8,001	8,001	8,001	7,980	7,980	7,980
Springs	0	0	0	0	0	0	0	0
Evapotranspiration	113	138	111	102	98	95	92	89
General Head Boundary	0	0	0	0	0	0	0	0
Stream Leakage	7,365	8,747	6,475	5,497	5,202	5,025	4,887	4,776
Chicot - Out to Bee County - Bee GCD - GMA 16	468	542	618	705	760	925	1,030	1,016
Chicot - Out to Goliad County - Goliad County GCD - GMA 15	77	101	89	88	88	87	87	87
Chicot - Out to San Patricio County - San Patricio County GCD - GMA 16	286	297	287	285	363	416	380	316
Chicot - Out to Refugio County - Refugio GCD - GMA 15	6,124	6,100	5,866	5,489	5,428	5,396	5,392	5,403
Evangeline - Out to Karnes County - Evergreen UWCD - GMA 15	23	22	23	23	23	23	23	23
Evangeline - Out to Bee County - Bee GCD - GMA 16	769	821	1,109	1,422	1,585	1,720	1,832	1,921
Evangeline - Out to Bee County - ND Bee - GMA 15	48	57	37	35	35	35	35	35
Evangeline - Out to Goliad County - Goliad County GCD - GMA 15	1,418	1,300	1,264	1,263	1,267	1,269	1,271	1,272
Evangeline - Out to San Patricio County - San Patricio County GCD - GMA 16	129	130	115	109	108	107	106	105
Evangeline - Out to Refugio County - Refugio GCD - GMA 15	2,826	2,849	2,754	2,718	2,704	2,695	2,689	2,684
Burkeville - Out to Karnes County - Evergreen UWCD - GMA 15	7	7	8	8	9	9	9	9
Burkeville - Out to Bee County - Bee GCD - GMA 16	21	19	14	14	14	17	19	21
Burkeville - Out to Bee County - ND Bee - GMA 15	51	69	8	2	2	2	2	2
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	15	14	12	13	14	14	14	14
Burkeville - Out to San Patricio County - San Patricio County GCD - GMA 16	1	1	1	1	1	1	1	1
Burkeville - Out to Refugio County - Refugio GCD - GMA 15	17	17	16	16	16	16	15	15
Jasper - Out to Karnes County - Evergreen UWCD - GMA 15	90	44	95	123	132	135	137	137
Jasper - Out to Bee County - Bee GCD - GMA 16	395	368	278	269	286	305	320	334
Jasper - Out to Bee County - ND Bee - GMA 15	183	370	26	22	20	19	18	18
Jasper - Out to Goliad County - Goliad County GCD - GMA 15	120	57	63	103	114	117	117	116
Total Outflows from the GCAS	26,325	24,967	27,665	26,443	26,315	26,420	26,458	26,374

	2000	2010	2020	2030	2040	2050	2060	2070
GCAS Increase(+)/Decrease(-) in Storage	2,597	-407	-1,315	-577	-429	-370	-359	-336

Bee County – ND Bee

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	143	2	1	1	0	1	1	1
River Leakage	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	12	12	12	12	12	12	12	12
Stream Leakage	0	6	5	10	13	16	18	20
Evangeline - In from Bee County - Bee GCD - GMA 15	48	57	37	35	35	35	35	35
Burkeville - In from Bee County - Bee GCD - GMA 15	51	69	8	2	2	2	2	2
Jasper - In from Bee County - Bee GCD - GMA 15	183	370	26	22	20	19	18	18
Total Inflows to the GCAS	437	517	90	81	83	85	87	89

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	7	26	23	2	0	0	0	0
Pumping	311	430	9	9	9	9	9	9
Springs	0	0	0	0	0	0	0	0
Evapotranspiration	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0
Stream Leakage	10	0	0	0	0	0	0	0
Evangeline - Out to Bee County - Bee GCD - GMA 15	31	61	40	46	50	52	55	57
Burkeville - Out to Bee County - Bee GCD - GMA 15	0	0	0	2	2	2	2	2
Jasper - Out to Bee County - Bee GCD - GMA 15	79	0	18	23	22	22	21	20
Total Outflows from the GCAS	437	517	90	81	83	85	87	89

GCAS Increase(+)/Decrease(-) in Storage	-137	23	22	2	0	-1	-1	-1

Calhoun County – Calhoun County GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	1,024	46	1,961	426	124	55	34	25
River Leakage	2,940	2,436	2,470	2,585	2,611	2,619	2,622	2,624
General Head Boundary	9	436	1,105	1,472	1,601	1,667	1,712	1,742
Recharge	2,776	2,776	2,776	2,776	2,776	2,776	2,776	2,776
Stream Leakage	2,085	5,952	3,944	2,911	3,039	3,079	3,096	3,106
Chicot - In from Victoria County - Victoria County GCD - GMA 15	3,549	7,564	7,280	7,684	7,531	7,477	7,452	7,437
Chicot - In from Jackson County - Texana GCD - GMA 15	1,943	1,811	3,351	3,263	3,206	3,176	3,155	3,142
Chicot - In from Refugio County - Refugio GCD - GMA 15	798	724	702	723	729	731	731	731
Chicot - In from County - Gulf of Mexico - GMA 0	2,138	2,941	3,819	4,187	4,320	4,388	4,438	4,471
Chicot - In from Matagorda County - Coastal Plains GCD - GMA 15	61	171	85	105	115	120	123	125
Chicot - In from Aransas County - Aransas County GCD - GMA 15	35	35	37	37	37	37	37	37
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	283	652	9	7	7	7	7	6
Evangeline - In from Jackson County - Texana GCD - GMA 15	20	116	0	0	0	0	0	0
Evangeline - In from Refugio County - Refugio GCD - GMA 15	220	111	82	114	120	123	125	126
Evangeline - In from County - Gulf of Mexico - GMA 0	202	190	676	748	777	797	813	825
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	1	1	1	0	0	0	0	0
Total Inflows to the GCAS	18,083	25,963	28,299	27,038	26,993	27,052	27,120	27,174

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	2,459	2,042	0	0	0	0	0	0
Pumping	668	1,417	7,570	7,570	7,570	7,570	7,570	7,570
Springs	797	1,091	1,056	1,001	989	985	983	982
Evapotranspiration	1,185	1,258	1,229	1,205	1,199	1,197	1,196	1,196
General Head Boundary	5,996	7,272	6,071	5,350	5,179	5,124	5,097	5,080
Stream Leakage	1,000	2,905	2,207	1,783	1,703	1,679	1,668	1,662
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	888	2,689	2,556	2,464	2,545	2,573	2,586	2,594
Chicot - Out to Jackson County - Texana GCD - GMA 15	368	1,385	954	1,226	1,338	1,397	1,436	1,462
Chicot - Out to Refugio County - Refugio GCD - GMA 15	216	233	234	231	230	229	229	229
Chicot - Out to County - Gulf of Mexico - GMA 0	3,771	5,099	4,220	3,881	3,839	3,846	3,864	3,878
Chicot - Out to Matagorda County - Coastal Plains GCD - GMA 15	30	98	26	48	58	63	67	70
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	322	130	796	768	774	779	782	785
Evangeline - Out to Jackson County - Texana GCD - GMA 15	22	0	477	501	522	537	548	557
Evangeline - Out to County - Gulf of Mexico - GMA 0	354	344	913	1,011	1,046	1,073	1,093	1,109
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	0	0	0	0	0	0	0	0
Total Outflows from the GCAS	18,077	25,964	28,310	27,040	26,993	27,052	27,120	27,174

	2000	2010	2020	2030	2040	2050	2060	2070
GCAS Increase(+)/Decrease(-) in Storage	1,435	1,996	-1,961	-426	-124	-55	-34	-25

Colorado County – Colorado County GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	7,670	10,956	22,637	11,410	7,769	5,813	4,509	3,624
River Leakage	1,407	1,407	1,407	1,407	1,407	1,407	1,407	1,407
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	37,601	37,601	37,601	37,601	37,601	37,601	37,601	37,601
Stream Leakage	33,331	31,825	38,386	47,364	50,182	51,699	52,763	53,502
Chicot - In from Lavaca County - ND Lavaca - GMA 15	5,383	4,418	5,130	6,077	6,438	6,649	6,790	6,888
Chicot - In from Austin County - Bluebonnet GCD - GMA 14	2,056	2,225	2,482	2,605	2,777	2,975	3,085	3,189
Chicot - In from Jackson County - Texana GCD - GMA 15	105	33	0	41	79	98	106	108
Chicot - In from Wharton County - Coastal Bend GCD - GMA 15	184	432	176	269	353	394	416	430
Evangeline - In from Fayette County - Fayette County GCD - GMA 15	456	428	634	662	637	619	606	597
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	3,114	3,049	4,765	5,016	5,141	5,222	5,282	5,327
Evangeline - In from Austin County - Bluebonnet GCD - GMA 14	2,037	2,749	4,019	4,100	4,123	4,136	4,143	4,150
Evangeline - In from Jackson County - Texana GCD - GMA 15	17	59	87	102	111	117	119	121
Evangeline - In from Wharton County - Coastal Bend GCD - GMA 15	184	208	514	523	535	543	547	548
Burkeville - In from Fayette County - Fayette County GCD - GMA 15	20	19	17	14	13	13	13	12
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	11	10	10	10	11	11	11	11
Burkeville - In from Austin County - Bluebonnet GCD - GMA 14	7	7	7	8	9	9	9	9
Burkeville - In from Jackson County - Texana GCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - In from Wharton County - Coastal Bend GCD - GMA 15	1	1	1	1	1	1	1	1
Jasper - In from Fayette County - Fayette County GCD - GMA 15	380	442	202	145	144	146	148	148
Jasper - In from Lavaca County - ND Lavaca - GMA 15	93	94	71	64	64	65	66	67
Jasper - In from Austin County - Bluebonnet GCD - GMA 14	79	77	88	92	97	103	108	112
Jasper - In from Jackson County - Texana GCD - GMA 15	0	0	0	0	0	0	1	1
Jasper - In from Wharton County - Coastal Bend GCD - GMA 15	2	2	3	3	3	3	3	3
Total Inflows to the GCAS	94,140	96,043	118,238	117,515	117,495	117,621	117,733	117,856

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	18,984	714	10	0	0	0	0	0
Pumping	28,069	53,405	72,586	72,586	72,586	72,586	72,586	72,586
Springs	7	6	5	5	4	4	4	4
Evapotranspiration	58	59	53	48	45	44	44	43
General Head Boundary	0	0	0	0	0	0	0	0
Stream Leakage	16,088	15,136	10,542	8,742	8,224	7,956	7,774	7,637
Chicot - Out to Lavaca County - ND Lavaca - GMA 15	409	351	214	182	163	153	147	142
Chicot - Out to Austin County - Bluebonnet GCD - GMA 14	1,523	1,588	1,450	1,433	1,434	1,438	1,444	1,449
Chicot - Out to Jackson County - Texana GCD - GMA 15	0	0	20	0	0	0	0	0
Chicot - Out to Wharton County - Coastal Bend GCD - GMA 15	16,565	15,165	17,587	18,755	19,261	19,649	19,925	20,135
Evangeline - Out to Fayette County - Fayette County GCD - GMA 15	86	71	14	6	4	5	5	5
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	1,960	1,905	1,296	1,147	1,067	1,004	959	925
Evangeline - Out to Austin County - Bluebonnet GCD - GMA 14	1,189	948	1,190	1,205	1,214	1,222	1,229	1,236
Evangeline - Out to Jackson County - Texana GCD - GMA 15	0	0	0	0	0	0	0	0
Evangeline - Out to Wharton County - Coastal Bend GCD - GMA 15	8,861	6,354	12,773	12,824	12,878	12,941	13,004	13,068
Burkeville - Out to Fayette County - Fayette County GCD - GMA 15	1	1	2	3	3	3	3	4
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	5	5	6	6	6	6	5	5
Burkeville - Out to Austin County - Bluebonnet GCD - GMA 14	5	4	5	5	5	5	5	5
Burkeville - Out to Jackson County - Texana GCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - Out to Wharton County - Coastal Bend GCD - GMA 15	42	40	40	40	41	41	41	42
Jasper - Out to Fayette County - Fayette County GCD - GMA 15	17	12	125	192	213	224	233	244
Jasper - Out to Lavaca County - ND Lavaca - GMA 15	46	52	107	130	133	131	128	124
Jasper - Out to Austin County - Bluebonnet GCD - GMA 14	54	52	45	41	41	41	42	43
Jasper - Out to Jackson County - Texana GCD - GMA 15	0	0	0	0	0	0	0	0
Jasper - Out to Wharton County - Coastal Bend GCD - GMA 15	181	186	170	158	156	156	156	157
Total Outflows from the GCAS	94,149	96,055	118,237	117,507	117,480	117,610	117,734	117,854

	2000	2010	2020	2030	2040	2050	2060	2070
GCAS Increase(+)/Decrease(-) in Storage	11,313	-10,242	-22,627	-11,410	-7,769	-5,813	-4,509	-3,624

DeWitt County – Pecan Valley GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	1,990	1,975	8,923	6,425	5,151	4,278	3,692	3,244
River Leakage	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	10,596	10,596	10,596	10,596	10,596	10,596	10,596	10,596
Stream Leakage	11,862	11,192	14,585	16,175	17,005	17,571	17,999	18,332
Chicot - In from Victoria County - Victoria County GCD - GMA 15	0	0	0	0	1	1	2	2
Evangeline - In from Karnes County - Evergreen UWCD - GMA 15	0	0	0	0	0	0	0	0
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	180	173	191	222	229	233	236	238
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	990	1,009	1,027	1,029	1,029	1,029	1,029	1,029
Burkeville - In from Karnes County - Evergreen UWCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	3	1	2	4	4	5	5	5
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	2	2	3	3	3	3	3	3
Jasper - In from Gonzales County - Gonzales County UWCD - GMA 13	48	46	52	62	67	69	70	72
Jasper - In from Karnes County - Evergreen UWCD - GMA 15	107	110	131	152	171	180	185	187
Jasper - In from Gonzales County - ND Gonzales - GMA 13	146	136	154	184	203	213	219	220
Jasper - In from Lavaca County - ND Lavaca - GMA 15	170	101	270	365	398	415	426	437
Jasper - In from Goliad County - Goliad County GCD - GMA 15	153	143	151	155	160	163	165	165
Jasper - In from Victoria County - Victoria County GCD - GMA 15	0	0	0	0	1	1	1	2
Total Inflows to the GCAS	26,249	25,485	36,083	35,373	35,018	34,758	34,628	34,533

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	1,975	370	208	4	1	1	0	0
Pumping	4,411	4,478	17,956	17,936	17,911	17,826	17,806	17,783
Springs	0	0	0	0	0	0	0	0
Evapotranspiration	80	85	69	67	66	66	65	65
General Head Boundary	0	0	0	0	0	0	0	0
Stream Leakage	9,655	10,692	7,774	7,221	6,990	6,862	6,782	6,724
Chicot - Out to Lavaca County - ND Lavaca - GMA 15	198	215	184	176	173	170	169	169
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	1,470	1,281	1,297	1,366	1,401	1,418	1,426	1,430
Evangeline - Out to Karnes County - Evergreen UWCD - GMA 15	130	161	155	148	147	146	146	145
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	1,372	1,489	1,366	1,298	1,277	1,266	1,259	1,254
Evangeline - Out to Goliad County - Goliad County GCD - GMA 15	1,028	945	841	835	836	836	836	837
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	4,712	4,370	4,970	5,107	5,170	5,202	5,219	5,230
Burkeville - Out to Karnes County - Evergreen UWCD - GMA 15	12	13	14	13	13	13	13	13
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	5	5	5	5	5	5	5	5
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	7	7	6	5	5	5	5	5
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	19	17	16	17	18	18	18	18
Jasper - Out to Gonzales County - Gonzales County UWCD - GMA 13	28	27	24	20	18	16	14	14
Jasper - Out to Karnes County - Evergreen UWCD - GMA 15	432	526	584	528	383	320	286	265
Jasper - Out to Gonzales County - ND Gonzales - GMA 13	1	1	0	0	0	0	0	0
Jasper - Out to Lavaca County - ND Lavaca - GMA 15	98	166	107	128	134	139	143	147
Jasper - Out to Goliad County - Goliad County GCD - GMA 15	243	277	219	189	170	160	155	152
Jasper - Out to Victoria County - Victoria County GCD - GMA 15	372	361	291	310	298	287	281	277
Total Outflows from the GCAS	26,248	25,485	36,085	35,373	35,016	34,756	34,629	34,534

	2000	2010	2020	2030	2040	2050	2060	2070
GCAS Increase(+)/Decrease(-) in Storage	-15	-1,605	-8,715	-6,421	-5,151	-4,277	-3,692	-3,244

Fayette County – Fayette County GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	4,678	2,736	6,026	5,235	4,957	4,874	4,914	4,886
River Leakage	247	257	300	361	398	426	451	472
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	2,080	2,080	2,080	2,079	2,079	2,079	2,079	2,077
Stream Leakage	296	296	612	961	1,212	1,425	1,632	1,830
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	74	74	59	57	57	57	57	57
Evangeline - In from Austin County - Bluebonnet GCD - GMA 14	24	24	25	23	19	15	12	9
Evangeline - In from Colorado County - Colorado County GCD - GMA 15	86	71	14	6	4	5	5	5
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	4	3	3	3	3	4	4	4
Burkeville - In from Austin County - Bluebonnet GCD - GMA 14	1	1	1	1	1	1	1	1
Burkeville - In from Colorado County - Colorado County GCD - GMA 15	1	1	2	3	3	3	3	4
Jasper - In from Fayette County - Fayette County GCD - GMA 12	9	9	8	8	7	7	7	7
Jasper - In from Washington County - ND Washington - GMA 14	13	17	25	26	26	25	23	21
Jasper - In from Lavaca County - ND Lavaca - GMA 15	114	78	96	121	135	147	159	174
Jasper - In from Austin County - Bluebonnet GCD - GMA 14	38	36	59	60	62	63	64	65
Jasper - In from Colorado County - Colorado County GCD - GMA 15	17	12	125	192	213	224	233	244
Total Inflows to the GCAS	7,682	5,695	9,434	9,137	9,178	9,356	9,643	9,856

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	569	95	47	0	0	0	0	0
Pumping	2,068	2,686	7,169	7,395	7,683	8,011	8,386	8,660
Springs	0	0	0	0	0	0	0	0
Evapotranspiration	46	39	30	25	21	20	20	20
General Head Boundary	0	0	0	0	0	0	0	0
Stream Leakage	3,817	1,637	1,008	593	390	271	206	167
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	102	106	110	100	95	92	89	86
Evangeline - Out to Austin County - Bluebonnet GCD - GMA 14	17	17	18	17	15	13	12	11
Evangeline - Out to Colorado County - Colorado County GCD - GMA 15	456	428	634	662	637	619	606	597
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	3	4	3	2	2	2	2	2
Burkeville - Out to Austin County - Bluebonnet GCD - GMA 14	1	1	1	1	1	1	1	1
Burkeville - Out to Colorado County - Colorado County GCD - GMA 15	20	19	17	14	13	13	13	12
Jasper - Out to Fayette County - Fayette County GCD - GMA 12	16	15	13	13	12	12	12	12
Jasper - Out to Washington County - ND Washington - GMA 14	7	5	3	2	1	0	0	0
Jasper - Out to Lavaca County - ND Lavaca - GMA 15	134	154	133	117	109	101	93	86
Jasper - Out to Austin County - Bluebonnet GCD - GMA 14	46	47	46	51	53	55	55	55
Jasper - Out to Colorado County - Colorado County GCD - GMA 15	380	442	202	145	144	146	148	148
Total Outflows from the GCAS	7,682	5,695	9,434	9,137	9,178	9,356	9,643	9,857

GCAS Increase(+)/Decrease(-) in Storage	-4,109	-2,641	-5,979	-5,235	-4,957	-4,874	-4,914	-4,886

Goliad County – Goliad County GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	971	718	1,748	592	431	351	356	325
River Leakage	1,512	1,464	1,491	1,502	1,505	1,505	1,506	1,507
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	18,503	18,503	18,503	18,503	18,503	18,503	18,503	18,503
Stream Leakage	21,634	19,339	19,641	19,715	19,757	19,790	19,820	19,853
Chicot - In from Bee County - Bee GCD - GMA 15	77	101	89	88	88	87	87	87
Chicot - In from Victoria County - Victoria County GCD - GMA 15	555	771	674	616	608	606	606	605
Evangeline - In from Karnes County - Evergreen UWCD - GMA 15	497	435	433	468	477	479	482	486
Evangeline - In from DeWitt County - Pecan Valley GCD - GMA 15	1,028	945	841	835	836	836	836	837
Evangeline - In from Bee County - Bee GCD - GMA 15	1,418	1,300	1,264	1,263	1,267	1,269	1,271	1,272
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	857	865	791	795	796	796	796	796
Burkeville - In from Karnes County - Evergreen UWCD - GMA 15	18	22	10	11	11	10	10	10
Burkeville - In from DeWitt County - Pecan Valley GCD - GMA 15	7	7	6	5	5	5	5	5
Burkeville - In from Bee County - Bee GCD - GMA 15	15	14	12	13	14	14	14	14
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - In from Refugio County - Refugio GCD - GMA 15	0	0	0	0	0	0	0	0
Jasper - In from Karnes County - Evergreen UWCD - GMA 15	137	170	118	76	69	68	68	68
Jasper - In from DeWitt County - Pecan Valley GCD - GMA 15	243	277	219	189	170	160	155	152
Jasper - In from Bee County - Bee GCD - GMA 15	120	57	63	103	114	117	117	116
Jasper - In from Victoria County - Victoria County GCD - GMA 15	70	72	66	69	70	70	70	70
Total Inflows to the GCAS	47,666	45,060	45,971	44,848	44,721	44,670	44,705	44,710

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	9,142	545	680	31	2	0	0	0
Pumping	3,138	5,357	6,629	6,802	6,916	6,969	7,112	7,229
Springs	6	12	11	8	8	8	8	8
Evapotranspiration	221	263	248	240	238	238	237	237
General Head Boundary	0	0	0	0	0	0	0	0
Stream Leakage	20,671	24,578	22,655	22,024	21,824	21,722	21,624	21,522
Chicot - Out to Bee County - Bee GCD - GMA 15	237	261	265	261	260	259	259	258
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	1,018	1,066	1,058	1,034	1,029	1,027	1,026	1,025
Chicot - Out to Refugio County - Refugio GCD - GMA 15	2,933	3,202	3,278	3,209	3,193	3,188	3,185	3,182
Evangeline - Out to Karnes County - Evergreen UWCD - GMA 15	13	13	10	9	8	8	8	8
Evangeline - Out to DeWitt County - Pecan Valley GCD - GMA 15	990	1,009	1,027	1,029	1,029	1,029	1,029	1,029
Evangeline - Out to Bee County - Bee GCD - GMA 15	2,098	2,104	2,364	2,416	2,431	2,442	2,451	2,458
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	3,943	3,310	4,205	4,237	4,235	4,233	4,223	4,212
Evangeline - Out to Refugio County - Refugio GCD - GMA 15	2,560	2,644	2,898	2,895	2,893	2,892	2,890	2,888
Burkeville - Out to Karnes County - Evergreen UWCD - GMA 15	0	0	0	1	1	1	1	1
Burkeville - Out to DeWitt County - Pecan Valley GCD - GMA 15	2	2	3	3	3	3	3	3
Burkeville - Out to Bee County - Bee GCD - GMA 15	23	23	23	22	22	22	21	21
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	18	18	18	18	18	18	19	19
Burkeville - Out to Refugio County - Refugio GCD - GMA 15	12	12	12	12	12	12	12	12
Jasper - Out to Karnes County - Evergreen UWCD - GMA 15	0	0	0	9	13	14	14	14
Jasper - Out to DeWitt County - Pecan Valley GCD - GMA 15	153	143	151	155	160	163	165	165
Jasper - Out to Bee County - Bee GCD - GMA 15	204	213	161	148	138	131	127	124
Jasper - Out to Victoria County - Victoria County GCD - GMA 15	282	284	283	285	288	291	293	295
Total Outflows from the GCAS	47,666	45,060	45,977	44,848	44,720	44,669	44,705	44,709

GCAS Increase(+)/Decrease(-) in Storage	8,171	-173	-1,068	-561	-428	-351	-356	-325

Jackson County – Texana GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	18,533	2,315	17,900	9,244	6,283	4,728	3,702	2,997
River Leakage	4,075	4,086	4,157	4,175	4,181	4,185	4,187	4,189
General Head Boundary	0	226	543	801	919	979	1,020	1,048
Recharge	11,751	11,751	11,751	11,751	11,751	11,751	11,751	11,751
Stream Leakage	51,655	51,961	59,234	61,423	61,490	61,203	60,620	59,706
Chicot - In from Lavaca County - ND Lavaca - GMA 15	8,013	6,675	7,784	8,673	9,470	10,335	11,277	12,407
Chicot - In from Colorado County - Colorado County GCD - GMA 15	0	0	20	0	0	0	0	0
Chicot - In from Victoria County - Victoria County GCD - GMA 15	4,500	6,533	8,496	7,774	7,457	7,331	7,278	7,256
Chicot - In from Wharton County - Coastal Bend GCD - GMA 15	2,147	1,601	1,384	1,358	1,354	1,331	1,308	1,289
Chicot - In from Calhoun County - Calhoun County GCD - GMA 15	368	1,385	954	1,226	1,338	1,397	1,436	1,462
Chicot - In from County - Gulf of Mexico - GMA 0	243	866	812	1,079	1,223	1,304	1,362	1,402
Chicot - In from Matagorda County - Coastal Plains GCD - GMA 15	2,792	3,149	2,434	2,415	2,398	2,370	2,347	2,336
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	8,036	6,918	8,111	8,477	8,688	8,835	8,938	9,010
Evangeline - In from Colorado County - Colorado County GCD - GMA 15	0	0	0	0	0	0	0	0
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	1,398	1,758	2,120	2,134	2,151	2,187	2,224	2,255
Evangeline - In from Wharton County - Coastal Bend GCD - GMA 15	455	760	252	246	240	237	234	232
Evangeline - In from Calhoun County - Calhoun County GCD - GMA 15	22	0	477	501	522	537	548	557
Evangeline - In from County - Gulf of Mexico - GMA 0	65	29	613	674	706	730	748	763
Evangeline - In from Matagorda County - Coastal Plains GCD - GMA 15	258	592	779	702	732	758	778	793
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	21	20	20	20	19	19	19	19
Burkeville - In from Colorado County - Colorado County GCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	4	5	4	4	4	4	4	4
Burkeville - In from Wharton County - Coastal Bend GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - In from Matagorda County - Coastal Plains GCD - GMA 15	0	0	0	0	0	0	0	0
Jasper - In from Lavaca County - ND Lavaca - GMA 15	159	160	117	90	79	74	72	71
Jasper - In from Colorado County - Colorado County GCD - GMA 15	0	0	0	0	0	0	0	0
Jasper - In from Victoria County - Victoria County GCD - GMA 15	20	31	42	44	44	46	49	53
Jasper - In from Wharton County - Coastal Bend GCD - GMA 15	17	16	17	16	14	12	11	10
Total Inflows to the GCAS	114,533	100,839	128,020	122,828	121,064	120,353	119,913	119,610

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	15,693	1,785	0	0	0	0	0	0
Pumping	46,749	45,313	90,542	90,542	90,542	90,542	90,542	90,542
Springs	120	124	86	73	66	62	60	58
Evapotranspiration	616	563	452	414	399	391	385	381
General Head Boundary	890	518	137	116	109	105	102	100
Stream Leakage	32,793	36,725	19,038	14,865	13,247	12,485	12,004	11,678
Chicot - Out to Lavaca County - ND Lavaca - GMA 15	344	272	209	269	311	337	350	355
Chicot - Out to Colorado County - Colorado County GCD - GMA 15	105	33	0	41	79	98	106	108
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	2,412	1,475	1,391	1,427	1,437	1,438	1,442	1,446
Chicot - Out to Wharton County - Coastal Bend GCD - GMA 15	6,122	5,789	4,315	3,469	3,453	3,558	3,633	3,679
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	1,943	1,811	3,351	3,263	3,206	3,176	3,155	3,142
Chicot - Out to County - Gulf of Mexico - GMA 0	2,325	1,966	544	451	417	404	398	394
Chicot - Out to Matagorda County - Coastal Plains GCD - GMA 15	3,117	3,372	2,363	2,202	1,998	1,853	1,753	1,688
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	77	90	111	128	142	152	159	164
Evangeline - Out to Colorado County - Colorado County GCD - GMA 15	17	59	87	102	111	117	119	121
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	547	495	602	618	621	623	624	625
Evangeline - Out to Wharton County - Coastal Bend GCD - GMA 15	550	116	4,647	4,654	4,717	4,777	4,822	4,856
Evangeline - Out to Calhoun County - Calhoun County GCD - GMA 15	20	116	0	0	0	0	0	0
Evangeline - Out to County - Gulf of Mexico - GMA 0	48	190	53	60	64	67	69	71
Evangeline - Out to Matagorda County - Coastal Plains GCD - GMA 15	3	10	90	116	127	143	159	173
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	0	0	0	0	0	0	0	0
Burkeville - Out to Colorado County - Colorado County GCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - Out to Wharton County - Coastal Bend GCD - GMA 15	2	1	1	2	2	3	3	4
Burkeville - Out to Matagorda County - Coastal Plains GCD - GMA 15	0	0	0	0	0	0	0	0
Jasper - Out to Lavaca County - ND Lavaca - GMA 15	0	0	1	2	2	3	3	3
Jasper - Out to Colorado County - Colorado County GCD - GMA 15	0	0	0	0	0	0	1	1
Jasper - Out to Victoria County - Victoria County GCD - GMA 15	27	22	22	21	20	20	20	20
Jasper - Out to Wharton County - Coastal Bend GCD - GMA 15	0	0	0	1	2	4	6	9
Total Outflows from the GCAS	114,524	100,848	128,045	122,839	121,076	120,359	119,918	119,617

GCAS Increase(+)/Decrease(-) in Storage	-2,840	-530	-17,900	-9,244	-6,283	-4,728	-3,702	-2,997

Karnes County – Evergreen UWCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	4,120	3,264	8,936	7,924	2,451	2,242	1,986	1,680
River Leakage	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	1,300	1,300	1,300	1,300	1,300	1,300	1,299	1,297
Stream Leakage	1,864	1,344	2,071	2,344	1,388	1,369	1,377	1,392
Evangeline - In from DeWitt County - Pecan Valley GCD - GMA 15	130	161	155	148	147	146	146	145
Evangeline - In from Bee County - Bee GCD - GMA 15	23	22	23	23	23	23	23	23
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	13	13	10	9	8	8	8	8
Burkeville - In from DeWitt County - Pecan Valley GCD - GMA 15	12	13	14	13	13	13	13	13
Burkeville - In from Bee County - Bee GCD - GMA 15	7	7	8	8	9	9	9	9
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	0	0	0	1	1	1	1	1
Jasper - In from Karnes County - Evergreen UWCD - GMA 13	4	4	6	9	8	8	7	7
Jasper - In from DeWitt County - Pecan Valley GCD - GMA 15	432	526	584	528	383	320	286	265
Jasper - In from Bee County - Bee GCD - GMA 15	90	44	95	123	132	135	137	137
Jasper - In from Goliad County - Goliad County GCD - GMA 15	0	0	0	9	13	14	14	14
Total Inflows to the GCAS	7,995	6,698	13,202	12,437	5,876	5,588	5,305	4,990

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	1,267	354	480	23	474	181	66	35
Pumping	3,435	3,439	10,731	10,547	3,405	3,400	3,228	2,954
Springs	5	4	1	0	0	0	0	0
Evapotranspiration	157	145	95	64	55	48	43	40
General Head Boundary	0	0	0	0	0	0	0	0
Stream Leakage	1,852	1,402	571	480	605	614	615	605
Evangeline - Out to DeWitt County - Pecan Valley GCD - GMA 15	0	0	0	0	0	0	0	0
Evangeline - Out to Bee County - Bee GCD - GMA 15	129	123	140	140	140	140	140	140
Evangeline - Out to Goliad County - Goliad County GCD - GMA 15	497	435	433	468	477	479	482	486
Burkeville - Out to DeWitt County - Pecan Valley GCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - Out to Bee County - Bee GCD - GMA 15	5	6	6	4	3	3	3	3
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	18	22	10	11	11	10	10	10
Jasper - Out to Gonzales County - Gonzales County UWCD - GMA 13	16	15	14	13	12	11	10	9
Jasper - Out to Karnes County - Evergreen UWCD - GMA 13	8	7	5	3	3	3	3	3
Jasper - Out to Live Oak County - Live Oak UWCD - GMA 16	124	137	143	144	144	144	145	145
Jasper - Out to DeWitt County - Pecan Valley GCD - GMA 15	107	110	131	152	171	180	185	187
Jasper - Out to Bee County - Bee GCD - GMA 15	238	331	325	311	307	306	306	306
Jasper - Out to Goliad County - Goliad County GCD - GMA 15	137	170	118	76	69	68	68	68
Total Outflows from the GCAS	7,995	6,699	13,202	12,438	5,876	5,588	5,305	4,991

	2000	2010	2020	2030	2040	2050	2060	2070
GCAS Increase(+)/Decrease(-) in Storage	-2,853	-2,911	-8,456	-7,900	-1,976	-2,061	-1,920	-1,646

Lavaca County – ND Lavaca

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	4,326	3,188	7,533	5,692	4,796	4,199	3,734	3,353
River Leakage	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	24,597	24,597	24,597	24,597	24,597	24,597	24,597	24,597
Stream Leakage	17,997	15,270	21,109	23,704	25,381	26,828	28,211	29,724
Chicot - In from DeWitt County - Pecan Valley GCD - GMA 15	198	215	184	176	173	170	169	169
Chicot - In from Colorado County - Colorado County GCD - GMA 15	409	351	214	182	163	153	147	142
Chicot - In from Victoria County - Victoria County GCD - GMA 15	697	790	804	756	728	715	708	705
Chicot - In from Jackson County - Texana GCD - GMA 15	344	272	209	269	311	337	350	355
Evangeline - In from Fayette County - Fayette County GCD - GMA 15	102	106	110	100	95	92	89	86
Evangeline - In from DeWitt County - Pecan Valley GCD - GMA 15	1,372	1,489	1,366	1,298	1,277	1,266	1,259	1,254
Evangeline - In from Colorado County - Colorado County GCD - GMA 15	1,960	1,905	1,296	1,147	1,067	1,004	959	925
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	611	643	541	526	522	522	523	525
Evangeline - In from Jackson County - Texana GCD - GMA 15	77	90	111	128	142	152	159	164
Burkeville - In from Fayette County - Fayette County GCD - GMA 15	3	4	3	2	2	2	2	2
Burkeville - In from DeWitt County - Pecan Valley GCD - GMA 15	5	5	5	5	5	5	5	5
Burkeville - In from Colorado County - Colorado County GCD - GMA 15	5	5	6	6	6	6	5	5
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	2	3	3	2	2	2	2	3
Burkeville - In from Jackson County - Texana GCD - GMA 15	0	0	0	0	0	0	0	0
Jasper - In from Gonzales County - Gonzales County UWCD - GMA 13	3	2	2	2	2	3	3	3
Jasper - In from Fayette County - Fayette County GCD - GMA 15	134	154	133	117	109	101	93	86
Jasper - In from Gonzales County - ND Gonzales - GMA 13	218	208	208	202	197	192	190	188
Jasper - In from DeWitt County - Pecan Valley GCD - GMA 15	98	166	107	128	134	139	143	147
Jasper - In from Colorado County - Colorado County GCD - GMA 15	46	52	107	130	133	131	128	124
Jasper - In from Victoria County - Victoria County GCD - GMA 15	14	16	21	26	28	28	29	29
Jasper - In from Jackson County - Texana GCD - GMA 15	0	0	1	2	2	3	3	3
Total Inflows to the GCAS	53,217	49,530	58,669	59,200	59,873	60,647	61,508	62,594

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	5,612	2,137	631	75	9	2	0	0
Pumping	8,522	9,393	20,413	20,413	20,408	20,408	20,401	20,398
Springs	0	0	0	0	0	0	0	0
Evapotranspiration	36	37	25	19	14	10	7	6
General Head Boundary	0	0	0	0	0	0	0	0
Stream Leakage	13,055	15,643	10,404	8,897	8,097	7,542	7,144	6,858
Chicot - Out to Colorado County - Colorado County GCD - GMA 15	5,383	4,418	5,130	6,077	6,438	6,649	6,790	6,888
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	350	316	325	343	353	357	359	360
Chicot - Out to Jackson County - Texana GCD - GMA 15	8,013	6,675	7,784	8,673	9,470	10,335	11,277	12,407
Evangeline - Out to Fayette County - Fayette County GCD - GMA 15	74	74	59	57	57	57	57	57
Evangeline - Out to DeWitt County - Pecan Valley GCD - GMA 15	180	173	191	222	229	233	236	238
Evangeline - Out to Colorado County - Colorado County GCD - GMA 15	3,114	3,049	4,765	5,016	5,141	5,222	5,282	5,327
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	228	197	214	224	228	231	232	233
Evangeline - Out to Jackson County - Texana GCD - GMA 15	8,036	6,918	8,111	8,477	8,688	8,835	8,938	9,010
Burkeville - Out to Fayette County - Fayette County GCD - GMA 15	4	3	3	3	3	4	4	4
Burkeville - Out to DeWitt County - Pecan Valley GCD - GMA 15	3	1	2	4	4	5	5	5
Burkeville - Out to Colorado County - Colorado County GCD - GMA 15	11	10	10	10	11	11	11	11
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	1	1	1	1	1	1	1	1
Burkeville - Out to Jackson County - Texana GCD - GMA 15	21	20	20	20	19	19	19	19
Jasper - Out to Gonzales County - Gonzales County UWCD - GMA 13	0	0	0	0	0	0	0	0
Jasper - Out to Fayette County - Fayette County GCD - GMA 15	114	78	96	121	135	147	159	174
Jasper - Out to Gonzales County - ND Gonzales - GMA 13	25	20	14	13	13	13	12	10
Jasper - Out to DeWitt County - Pecan Valley GCD - GMA 15	170	101	270	365	398	415	426	437
Jasper - Out to Colorado County - Colorado County GCD - GMA 15	93	94	71	64	64	65	66	67
Jasper - Out to Victoria County - Victoria County GCD - GMA 15	13	12	10	9	9	9	9	9
Jasper - Out to Jackson County - Texana GCD - GMA 15	159	160	117	90	79	74	72	71
Total Outflows from the GCAS	53,217	49,531	58,665	59,196	59,869	60,643	61,507	62,591

	2000	2010	2020	2030	2040	2050	2060	2070
GCAS Increase(+)/Decrease(-) in Storage	1,286	-1,051	-6,902	-5,617	-4,787	-4,197	-3,734	-3,353

Matagorda County – Coastal Plains GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	19,022	1,287	5,328	1,485	994	796	660	553
River Leakage	784	788	790	791	791	792	792	792
General Head Boundary	0	398	236	410	494	540	571	594
Recharge	22,358	22,358	22,358	22,358	22,358	22,358	22,358	22,358
Stream Leakage	43,683	50,718	59,124	61,155	61,741	62,165	62,491	62,747
Chicot - In from Jackson County - Texana GCD - GMA 15	3,117	3,372	2,363	2,202	1,998	1,853	1,753	1,688
Chicot - In from Wharton County - Coastal Bend GCD - GMA 15	6,096	5,419	5,524	5,652	5,622	5,580	5,548	5,530
Chicot - In from Calhoun County - Calhoun County GCD - GMA 15	30	98	26	48	58	63	67	70
Chicot - In from County - Gulf of Mexico - GMA 0	716	1,318	965	1,177	1,310	1,384	1,436	1,475
Chicot - In from Brazoria County - Brazoria County GCD - GMA 14	4,817	5,275	4,964	4,819	4,793	4,779	4,770	4,762
Evangeline - In from Jackson County - Texana GCD - GMA 15	3	10	90	116	127	143	159	173
Evangeline - In from Wharton County - Coastal Bend GCD - GMA 15	889	1,429	478	492	498	501	501	500
Evangeline - In from Brazoria County - Brazoria County GCD - GMA 14	195	226	1,373	1,318	1,294	1,275	1,255	1,231
Burkeville - In from Jackson County - Texana GCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - In from Wharton County - Coastal Bend GCD - GMA 15	8	8	8	7	7	6	6	5
Burkeville - In from Brazoria County - Brazoria County GCD - GMA 14	0	0	0	0	0	0	0	0
Total Inflows to the GCAS	101,719	92,707	103,627	102,031	102,085	102,235	102,367	102,478

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	8,357	686	10	0	0	0	0	0
Pumping	26,790	28,372	38,855	38,855	38,855	38,855	38,855	38,855
Springs	288	265	253	245	243	242	241	240
Evapotranspiration	3,284	3,154	3,057	3,026	3,017	3,012	3,008	3,005
General Head Boundary	6,940	5,861	5,832	5,740	5,704	5,685	5,672	5,662
Stream Leakage	35,996	32,009	30,433	29,345	29,085	28,928	28,815	28,725
Chicot - Out to Jackson County - Texana GCD - GMA 15	2,792	3,149	2,434	2,415	2,398	2,370	2,347	2,336
Chicot - Out to Wharton County - Coastal Bend GCD - GMA 15	426	2,578	3,398	3,311	3,489	3,687	3,845	3,967
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	61	171	85	105	115	120	123	125
Chicot - Out to County - Gulf of Mexico - GMA 0	8,220	7,569	7,465	7,403	7,416	7,425	7,432	7,437
Chicot - Out to Brazoria County - Brazoria County GCD - GMA 14	7,181	7,193	7,514	7,557	7,566	7,570	7,572	7,573
Evangeline - Out to Jackson County - Texana GCD - GMA 15	258	592	779	702	732	758	778	793
Evangeline - Out to Wharton County - Coastal Bend GCD - GMA 15	551	223	3,489	3,243	3,392	3,518	3,620	3,706
Evangeline - Out to Brazoria County - Brazoria County GCD - GMA 14	444	872	64	87	74	65	57	52
Burkeville - Out to Jackson County - Texana GCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - Out to Wharton County - Coastal Bend GCD - GMA 15	2	2	2	2	3	3	4	4
Burkeville - Out to Brazoria County - Brazoria County GCD - GMA 14	6	6	5	5	5	6	6	6
Total Outflows from the GCAS	101,596	92,702	103,675	102,044	102,096	102,243	102,373	102,486

GCAS Increase(+)/Decrease(-) in Storage	-10,664	-601	-5,318	-1,485	-994	-796	-660	-553

Refugio County – Refugio GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	537	29	1,076	197	133	104	107	97
River Leakage	0	0	0	0	0	0	0	0
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	14,552	14,552	14,552	14,552	14,552	14,552	14,552	14,552
Stream Leakage	29,906	27,743	29,272	29,756	29,852	29,908	29,959	30,021
Chicot - In from Bee County - Bee GCD - GMA 15	6,124	6,100	5,866	5,489	5,428	5,396	5,392	5,403
Chicot - In from Goliad County - Goliad County GCD - GMA 15	2,933	3,202	3,278	3,209	3,193	3,188	3,185	3,182
Chicot - In from Victoria County - Victoria County GCD - GMA 15	1,150	1,768	1,422	1,240	1,226	1,224	1,223	1,222
Chicot - In from San Patricio County - San Patricio County GCD - GMA 16	933	892	881	874	776	697	672	649
Chicot - In from Calhoun County - Calhoun County GCD - GMA 15	216	233	234	231	230	229	229	229
Chicot - In from County - Gulf of Mexico - GMA 0	276	255	215	217	216	216	216	215
Chicot - In from Aransas County - Aransas County GCD - GMA 15	998	999	1,010	1,013	1,013	1,014	1,014	1,014
Evangeline - In from Bee County - Bee GCD - GMA 15	2,826	2,849	2,754	2,718	2,704	2,695	2,689	2,684
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	2,560	2,644	2,898	2,895	2,893	2,892	2,890	2,888
Evangeline - In from Victoria County - Victoria County GCD - GMA 15	566	645	441	432	430	430	429	428
Evangeline - In from San Patricio County - San Patricio County GCD - GMA 16	108	105	100	99	99	98	98	97
Evangeline - In from County - Gulf of Mexico - GMA 0	53	47	46	48	49	50	50	50
Evangeline - In from Aransas County - Aransas County GCD - GMA 15	47	51	58	59	59	59	59	59
Burkeville - In from Bee County - Bee GCD - GMA 15	17	17	16	16	16	16	15	15
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	12	12	12	12	12	12	12	12
Burkeville - In from Victoria County - Victoria County GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - In from San Patricio County - San Patricio County GCD - GMA 16	0	0	0	0	0	0	0	0
Total Inflows to the GCAS	63,814	62,147	64,135	63,061	62,883	62,780	62,792	62,820

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	6,473	319	0	0	0	0	0	0
Pumping	2,158	2,031	5,859	5,859	5,859	5,859	5,859	5,859
Springs	110	125	115	112	111	111	111	111
Evapotranspiration	1,832	1,886	1,859	1,849	1,847	1,846	1,845	1,845
General Head Boundary	4,860	5,032	4,961	4,902	4,893	4,889	4,886	4,884
Stream Leakage	33,521	38,079	35,681	34,604	34,394	34,260	34,157	34,060
Chicot - Out to Bee County - Bee GCD - GMA 15	158	204	205	201	198	199	268	358
Chicot - Out to Victoria County - Victoria County GCD - GMA 15	1,080	985	1,051	1,052	1,052	1,052	1,052	1,052
Chicot - Out to San Patricio County - San Patricio County GCD - GMA 16	3,549	3,703	3,684	3,680	3,686	3,698	3,730	3,754
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	798	724	702	723	729	731	731	731
Chicot - Out to County - Gulf of Mexico - GMA 0	3,786	3,837	3,707	3,697	3,698	3,696	3,695	3,694
Chicot - Out to Aransas County - Aransas County GCD - GMA 15	3,256	3,276	3,215	3,207	3,207	3,206	3,206	3,206
Evangeline - Out to Bee County - Bee GCD - GMA 15	25	50	52	66	75	84	91	98
Evangeline - Out to Victoria County - Victoria County GCD - GMA 15	768	529	1,901	1,934	1,940	1,942	1,943	1,944
Evangeline - Out to San Patricio County - San Patricio County GCD - GMA 16	989	1,051	888	890	901	911	918	924
Evangeline - Out to Calhoun County - Calhoun County GCD - GMA 15	220	111	82	114	120	123	125	126
Evangeline - Out to County - Gulf of Mexico - GMA 0	86	83	71	73	74	74	74	74
Evangeline - Out to Aransas County - Aransas County GCD - GMA 15	112	117	93	93	93	93	93	93
Burkeville - Out to Bee County - Bee GCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	0	0	0	0	0	0	0	0
Burkeville - Out to Victoria County - Victoria County GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - Out to San Patricio County - San Patricio County GCD - GMA 16	3	3	3	3	3	3	3	4
Total Outflows from the GCAS	63,788	62,147	64,130	63,059	62,881	62,779	62,791	62,819

	2000	2010	2020	2030	2040	2050	2060	2070
GCAS Increase(+)/Decrease(-) in Storage	5,936	290	-1,076	-197	-133	-104	-107	-97

Victoria County – Victoria County GCD

Inflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	697	585	13,693	4,545	2,248	1,373	978	767
River Leakage	1,056	1,044	1,056	1,056	1,056	1,056	1,056	1,056
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	25,564	25,564	25,564	25,564	25,564	25,564	25,564	25,564
Stream Leakage	62,980	43,366	52,235	56,423	57,244	57,618	57,805	57,911
Chicot - In from Lavaca County - ND Lavaca - GMA 15	350	316	325	343	353	357	359	360
Chicot - In from DeWitt County - Pecan Valley GCD - GMA 15	1,470	1,281	1,297	1,366	1,401	1,418	1,426	1,430
Chicot - In from Goliad County - Goliad County GCD - GMA 15	1,018	1,066	1,058	1,034	1,029	1,027	1,026	1,025
Chicot - In from Jackson County - Texana GCD - GMA 15	2,412	1,475	1,391	1,427	1,437	1,438	1,442	1,446
Chicot - In from Refugio County - Refugio GCD - GMA 15	1,080	985	1,051	1,052	1,052	1,052	1,052	1,052
Chicot - In from Calhoun County - Calhoun County GCD - GMA 15	888	2,689	2,556	2,464	2,545	2,573	2,586	2,594
Evangeline - In from Lavaca County - ND Lavaca - GMA 15	228	197	214	224	228	231	232	233
Evangeline - In from DeWitt County - Pecan Valley GCD - GMA 15	4,712	4,370	4,970	5,107	5,170	5,202	5,219	5,230
Evangeline - In from Goliad County - Goliad County GCD - GMA 15	3,943	3,310	4,205	4,237	4,235	4,233	4,223	4,212
Evangeline - In from Jackson County - Texana GCD - GMA 15	547	495	602	618	621	623	624	625
Evangeline - In from Refugio County - Refugio GCD - GMA 15	768	529	1,901	1,934	1,940	1,942	1,943	1,944
Evangeline - In from Calhoun County - Calhoun County GCD - GMA 15	322	130	796	768	774	779	782	785
Evangeline - In from County - Gulf of Mexico - GMA 0	13	0	44	41	42	42	43	43
Burkeville - In from Lavaca County - ND Lavaca - GMA 15	1	1	1	1	1	1	1	1
Burkeville - In from DeWitt County - Pecan Valley GCD - GMA 15	19	17	16	17	18	18	18	18
Burkeville - In from Goliad County - Goliad County GCD - GMA 15	18	18	18	18	18	18	19	19
Burkeville - In from Jackson County - Texana GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - In from Refugio County - Refugio GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - In from Calhoun County - Calhoun County GCD - GMA 15	0	0	0	0	0	0	0	0
Jasper - In from Lavaca County - ND Lavaca - GMA 15	13	12	10	9	9	9	9	9
Jasper - In from DeWitt County - Pecan Valley GCD - GMA 15	372	361	291	310	298	287	281	277
Jasper - In from Goliad County - Goliad County GCD - GMA 15	282	284	283	285	288	291	293	295
Jasper - In from Jackson County - Texana GCD - GMA 15	27	22	22	21	20	20	20	20
Total Inflows to the GCAS	108,788	88,124	113,605	108,870	107,595	107,176	107,005	106,921

Outflows

Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	46,712	6,023	46	12	4	1	0	0
Pumping	24,774	15,370	60,003	60,003	60,003	60,003	60,003	60,003
Springs	973	1,630	1,430	1,355	1,339	1,334	1,331	1,330
Evapotranspiration	802	1,012	922	880	874	872	871	870
General Head Boundary	165	306	267	230	221	218	216	215
Stream Leakage	20,716	41,054	27,638	23,704	22,973	22,730	22,611	22,531
Chicot - Out to Lavaca County - ND Lavaca - GMA 15	697	790	804	756	728	715	708	705
Chicot - Out to DeWitt County - Pecan Valley GCD - GMA 15	0	0	0	0	1	1	2	2
Chicot - Out to Goliad County - Goliad County GCD - GMA 15	555	771	674	616	608	606	606	605
Chicot - Out to Jackson County - Texana GCD - GMA 15	4,500	6,533	8,496	7,774	7,457	7,331	7,278	7,256
Chicot - Out to Refugio County - Refugio GCD - GMA 15	1,150	1,768	1,422	1,240	1,226	1,224	1,223	1,222
Chicot - Out to Calhoun County - Calhoun County GCD - GMA 15	3,549	7,564	7,280	7,684	7,531	7,477	7,452	7,437
Chicot - Out to County - Gulf of Mexico - GMA 0	317	562	562	523	516	516	516	517
Evangeline - Out to Lavaca County - ND Lavaca - GMA 15	611	643	541	526	522	522	523	525
Evangeline - Out to Goliad County - Goliad County GCD - GMA 15	857	865	791	795	796	796	796	796
Evangeline - Out to Jackson County - Texana GCD - GMA 15	1,398	1,758	2,120	2,134	2,151	2,187	2,224	2,255
Evangeline - Out to Refugio County - Refugio GCD - GMA 15	566	645	441	432	430	430	429	428
Evangeline - Out to Calhoun County - Calhoun County GCD - GMA 15	283	652	9	7	7	7	7	6
Evangeline - Out to County - Gulf of Mexico - GMA 0	26	47	41	45	47	48	49	50
Burkeville - Out to Lavaca County - ND Lavaca - GMA 15	2	3	3	2	2	2	2	3
Burkeville - Out to Goliad County - Goliad County GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - Out to Jackson County - Texana GCD - GMA 15	4	5	4	4	4	4	4	4
Burkeville - Out to Refugio County - Refugio GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - Out to Calhoun County - Calhoun County GCD - GMA 15	1	1	1	0	0	0	0	0
Jasper - Out to Lavaca County - ND Lavaca - GMA 15	14	16	21	26	28	28	29	29
Jasper - Out to DeWitt County - Pecan Valley GCD - GMA 15	0	0	0	0	1	1	1	2
Jasper - Out to Goliad County - Goliad County GCD - GMA 15	70	72	66	69	70	70	70	70
Jasper - Out to Jackson County - Texana GCD - GMA 15	20	31	42	44	44	46	49	53
Total Outflows from the GCAS	108,766	88,123	113,627	108,868	107,587	107,171	107,005	106,919

GCAS Increase(+)/Decrease(-) in Storage	46,015	5,438	-13,648	-4,533	-2,244	-1,372	-978	-767

Wharton County – Coastal Bend GCD

Inflows

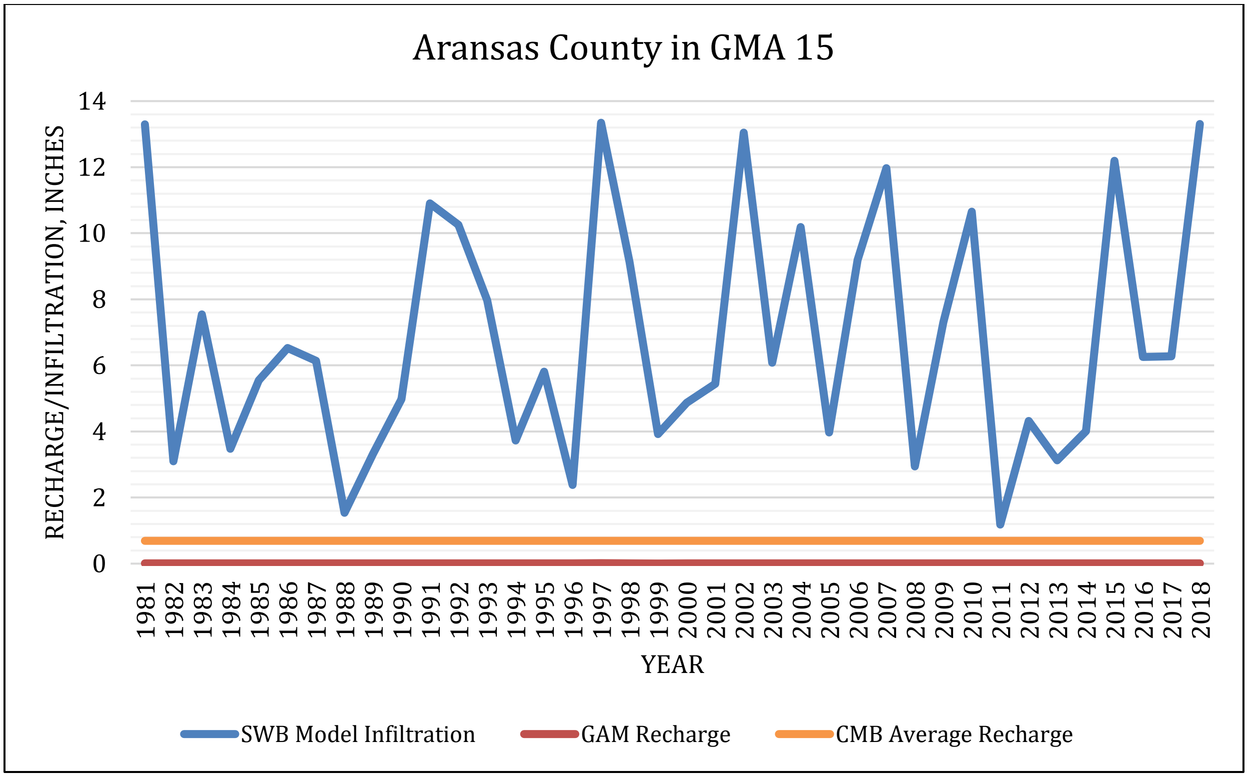
Source	2000	2010	2020	2030	2040	2050	2060	2070
Out of Storage	34,917	3,570	21,392	12,408	9,640	7,586	6,193	5,198
River Leakage	536	536	536	536	536	536	536	536
General Head Boundary	0	0	0	0	0	0	0	0
Recharge	21,604	21,604	21,604	21,604	21,604	21,604	21,604	21,604
Stream Leakage	109,491	114,007	122,616	123,235	124,173	124,743	125,716	126,473
Chicot - In from Austin County - Bluebonnet GCD - GMA 14	944	898	947	1,347	1,702	1,975	2,127	2,265
Chicot - In from Colorado County - Colorado County GCD - GMA 15	16,565	15,165	17,587	18,755	19,261	19,649	19,925	20,135
Chicot - In from Jackson County - Texana GCD - GMA 15	6,122	5,789	4,315	3,469	3,453	3,558	3,633	3,679
Chicot - In from Fort Bend County - Fort Bend Subsidence District - GMA 14	1,807	2,476	2,247	2,755	2,275	2,112	1,865	1,688
Chicot - In from Matagorda County - Coastal Plains GCD - GMA 15	426	2,578	3,398	3,311	3,489	3,687	3,845	3,967
Chicot - In from Brazoria County - Brazoria County GCD - GMA 14	136	104	127	136	139	141	142	143
Evangeline - In from Austin County - Bluebonnet GCD - GMA 14	749	594	1,187	1,229	1,247	1,258	1,271	1,284
Evangeline - In from Colorado County - Colorado County GCD - GMA 15	8,861	6,354	12,773	12,824	12,878	12,941	13,004	13,068
Evangeline - In from Jackson County - Texana GCD - GMA 15	550	116	4,647	4,654	4,717	4,777	4,822	4,856
Evangeline - In from Fort Bend County - Fort Bend Subsidence District - GMA 14	610	581	2,130	2,131	1,791	1,490	1,206	952
Evangeline - In from Matagorda County - Coastal Plains GCD - GMA 15	551	223	3,489	3,243	3,392	3,518	3,620	3,706
Evangeline - In from Brazoria County - Brazoria County GCD - GMA 14	0	0	109	86	101	114	126	137
Burkeville - In from Austin County - Bluebonnet GCD - GMA 14	1	1	1	1	1	1	1	1
Burkeville - In from Colorado County - Colorado County GCD - GMA 15	42	40	40	40	41	41	41	42
Burkeville - In from Jackson County - Texana GCD - GMA 15	2	1	1	2	2	3	3	4
Burkeville - In from Fort Bend County - Fort Bend Subsidence District - GMA 14	1	1	1	1	1	1	1	1
Burkeville - In from Matagorda County - Coastal Plains GCD - GMA 15	2	2	2	2	3	3	4	4
Jasper - In from Austin County - Bluebonnet GCD - GMA 14	23	21	20	22	23	24	24	25
Jasper - In from Colorado County - Colorado County GCD - GMA 15	181	186	170	158	156	156	156	157
Jasper - In from Jackson County - Texana GCD - GMA 15	0	0	0	1	2	4	6	9
Jasper - In from Fort Bend County - Fort Bend Subsidence District - GMA 14	17	10	12	14	16	18	19	20
Total Inflows to the GCAS	204,137	174,858	219,349	211,964	210,646	209,943	209,890	209,953

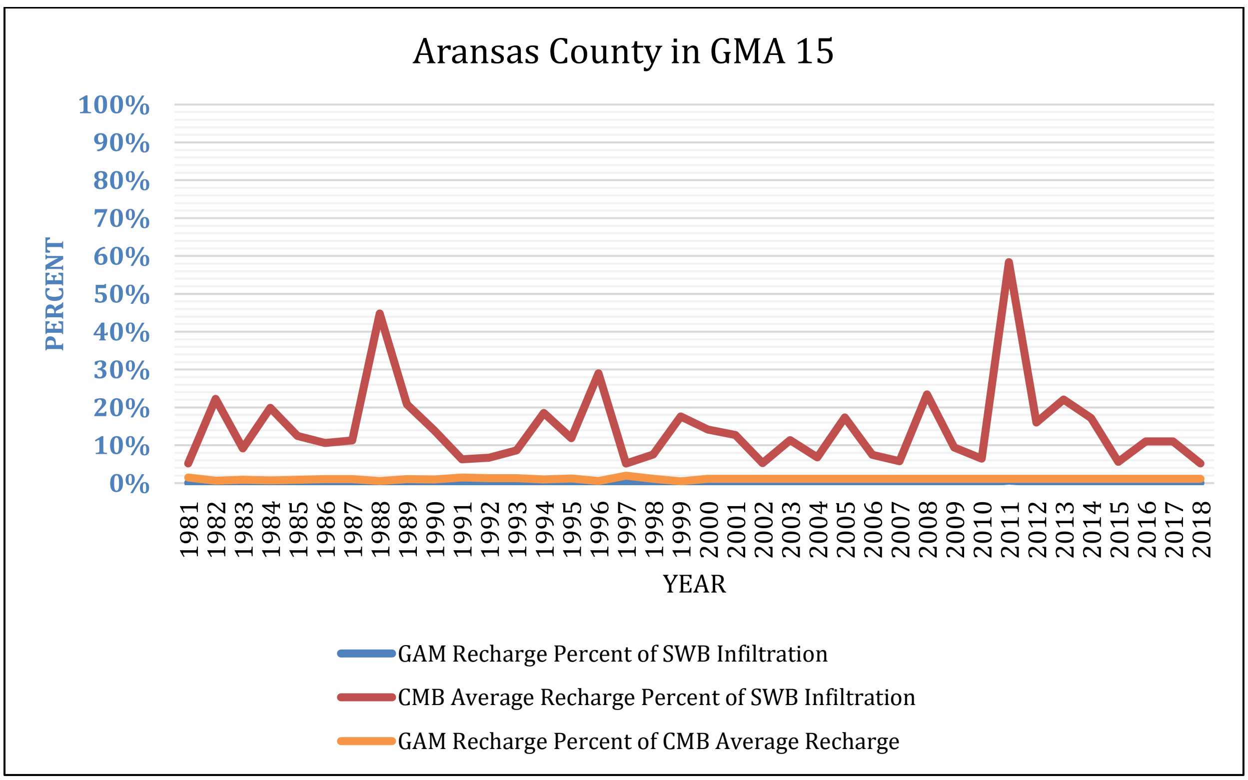
Outflows

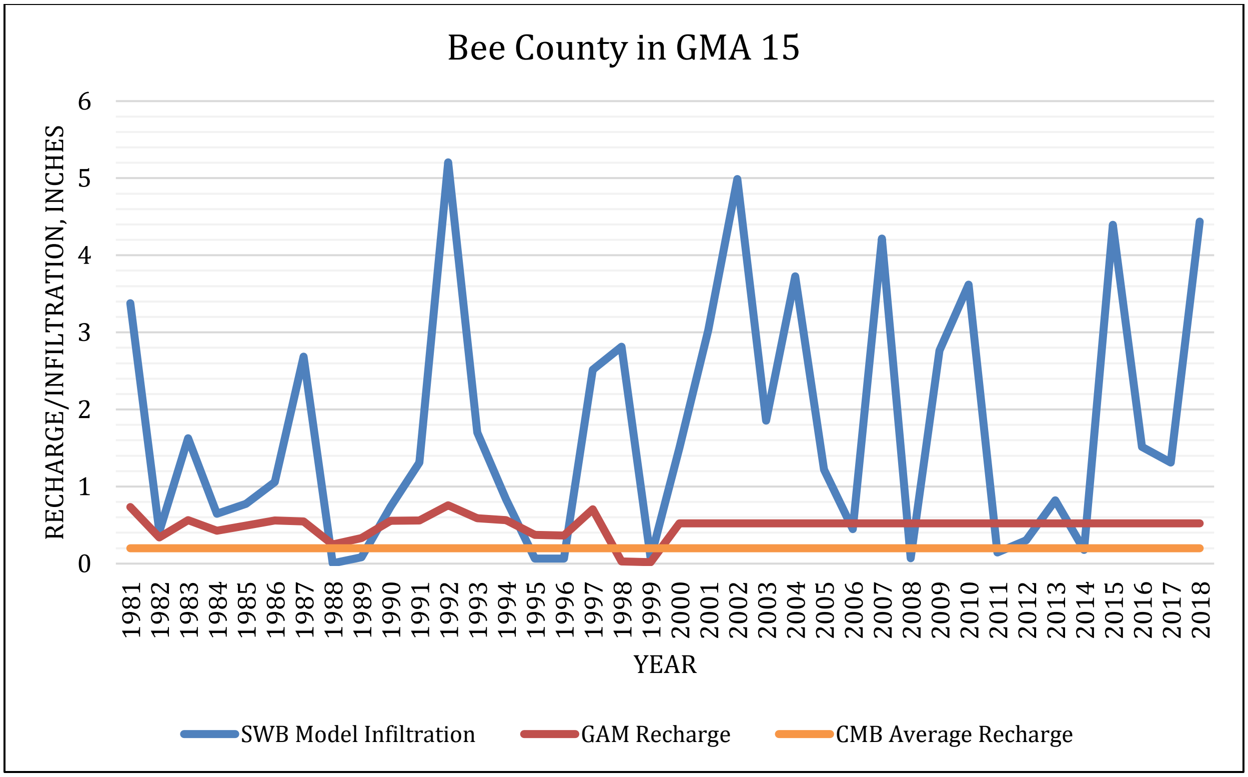
Source	2000	2010	2020	2030	2040	2050	2060	2070
In to Storage	29,912	6,259	4,156	0	0	0	0	0
Pumping	135,464	130,375	181,290	181,290	181,290	181,290	181,290	181,290
Springs	10	9	8	8	8	8	8	8
Evapotranspiration	244	244	225	203	194	192	190	189
General Head Boundary	0	0	0	0	0	0	0	0
Stream Leakage	12,970	13,352	13,298	11,276	10,444	10,098	9,827	9,631
Chicot - Out to Austin County - Bluebonnet GCD - GMA 14	564	682	359	113	147	126	447	687
Chicot - Out to Colorado County - Colorado County GCD - GMA 15	184	432	176	269	353	394	416	430
Chicot - Out to Jackson County - Texana GCD - GMA 15	2,147	1,601	1,384	1,358	1,354	1,331	1,308	1,289
Chicot - Out to Fort Bend County - Fort Bend Subsidence District - GMA 14	10,509	9,678	9,853	8,717	8,164	7,840	7,745	7,706
Chicot - Out to Matagorda County - Coastal Plains GCD - GMA 15	6,096	5,419	5,524	5,652	5,622	5,580	5,548	5,530
Chicot - Out to Brazoria County - Brazoria County GCD - GMA 14	748	793	797	790	788	786	785	784
Evangeline - Out to Austin County - Bluebonnet GCD - GMA 14	350	267	5	6	14	21	33	47
Evangeline - Out to Colorado County - Colorado County GCD - GMA 15	184	208	514	523	535	543	547	548
Evangeline - Out to Jackson County - Texana GCD - GMA 15	455	760	252	246	240	237	234	232
Evangeline - Out to Fort Bend County - Fort Bend Subsidence District - GMA 14	3,001	2,953	899	868	841	836	855	939
Evangeline - Out to Matagorda County - Coastal Plains GCD - GMA 15	889	1,429	478	492	498	501	501	500
Evangeline - Out to Brazoria County - Brazoria County GCD - GMA 14	195	275	0	0	0	0	0	0
Burkeville - Out to Austin County - Bluebonnet GCD - GMA 14	0	0	1	0	0	0	0	0
Burkeville - Out to Colorado County - Colorado County GCD - GMA 15	1	1	1	1	1	1	1	1
Burkeville - Out to Jackson County - Texana GCD - GMA 15	2	2	2	2	2	2	2	2
Burkeville - Out to Fort Bend County - Fort Bend Subsidence District - GMA 14	5	3	5	5	5	5	5	5
Burkeville - Out to Matagorda County - Coastal Plains GCD - GMA 15	8	8	8	7	7	6	6	5
Burkeville - Out to Brazoria County - Brazoria County GCD - GMA 14	2	2	2	2	2	2	2	2
Jasper - Out to Austin County - Bluebonnet GCD - GMA 14	13	7	10	12	12	11	10	10
Jasper - Out to Colorado County - Colorado County GCD - GMA 15	2	2	3	3	3	3	3	3
Jasper - Out to Jackson County - Texana GCD - GMA 15	17	16	17	16	14	12	11	10
Jasper - Out to Fort Bend County - Fort Bend Subsidence District - GMA 14	144	97	99	114	121	123	123	122
Jasper - Out to Brazoria County - Brazoria County GCD - GMA 14	10	8	7	7	7	7	6	6
Total Outflows from the GCAS	204,126	174,883	219,371	211,979	210,663	209,954	209,903	209,972

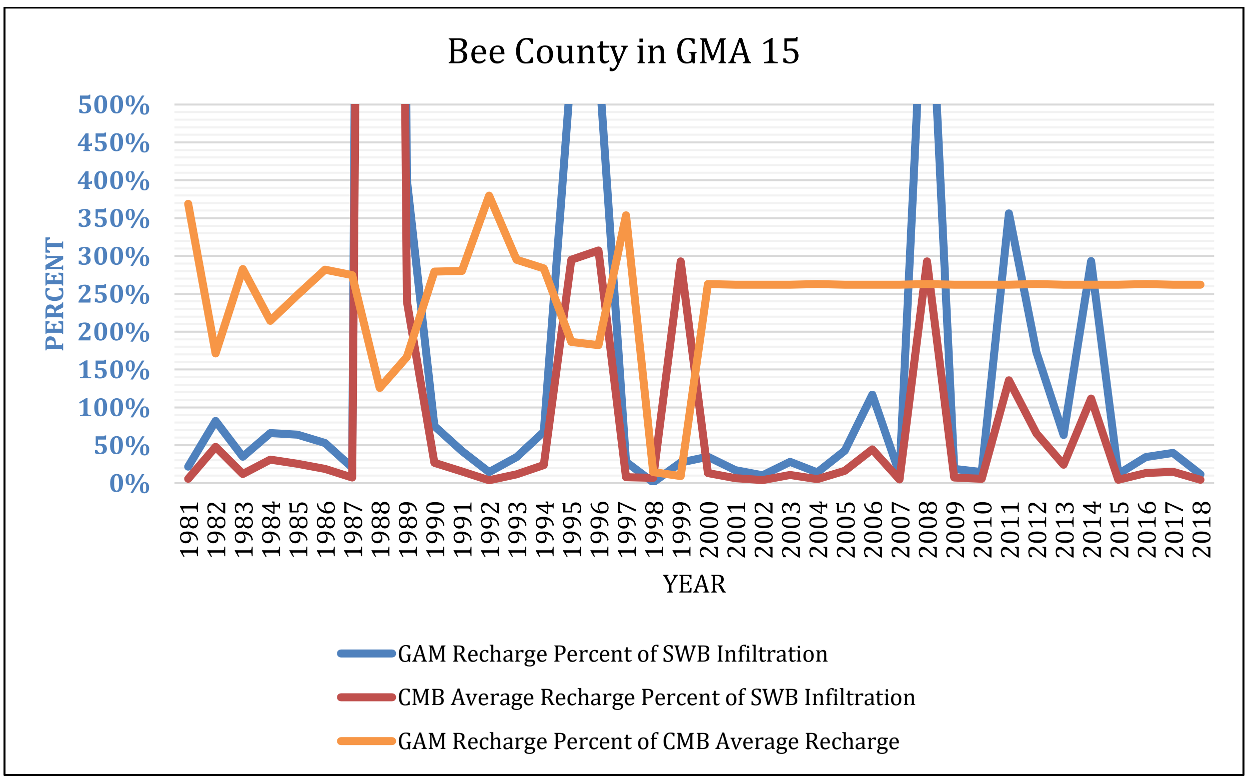
GCAS Increase(+)/Decrease(-) in Storage	-5,006	2,689	-17,235	-12,408	-9,640	-7,586	-6,193	-5,198

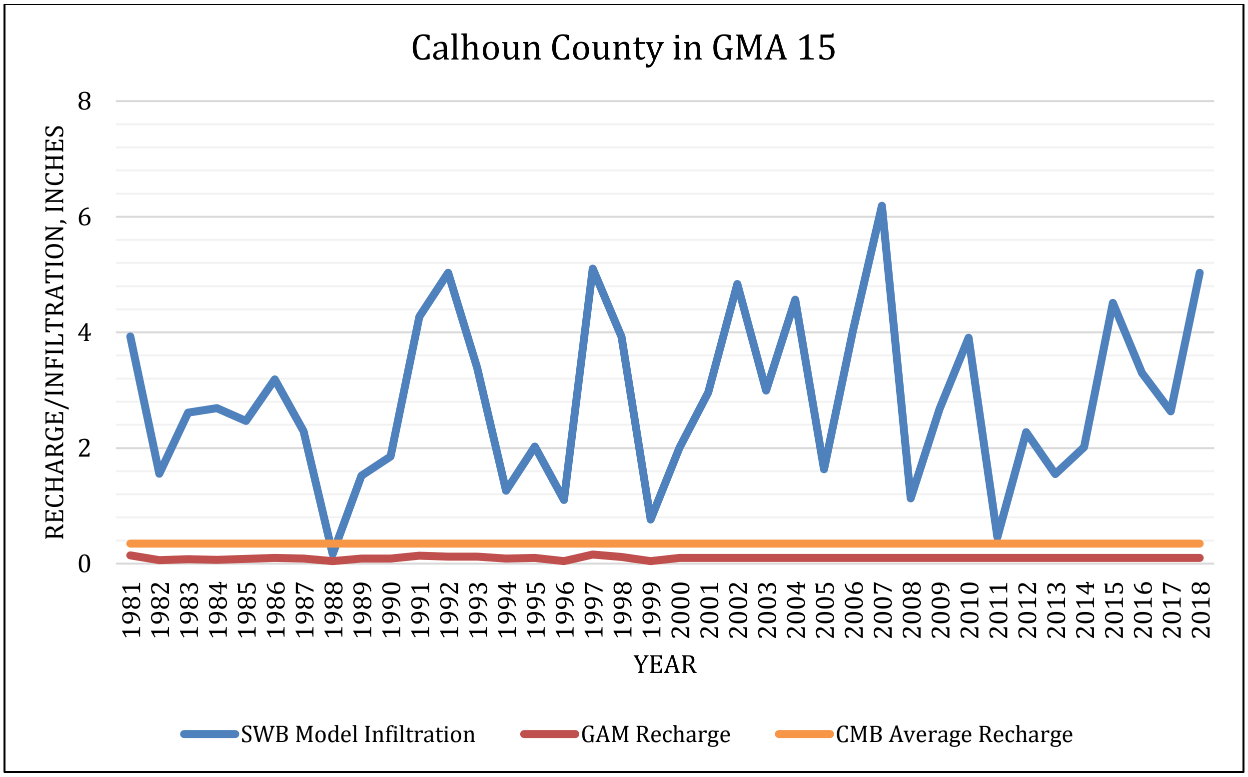
Attachment C –
Comparison of Infiltration and Recharge Estimates for the GCAS for each County/GCD in GMA 15

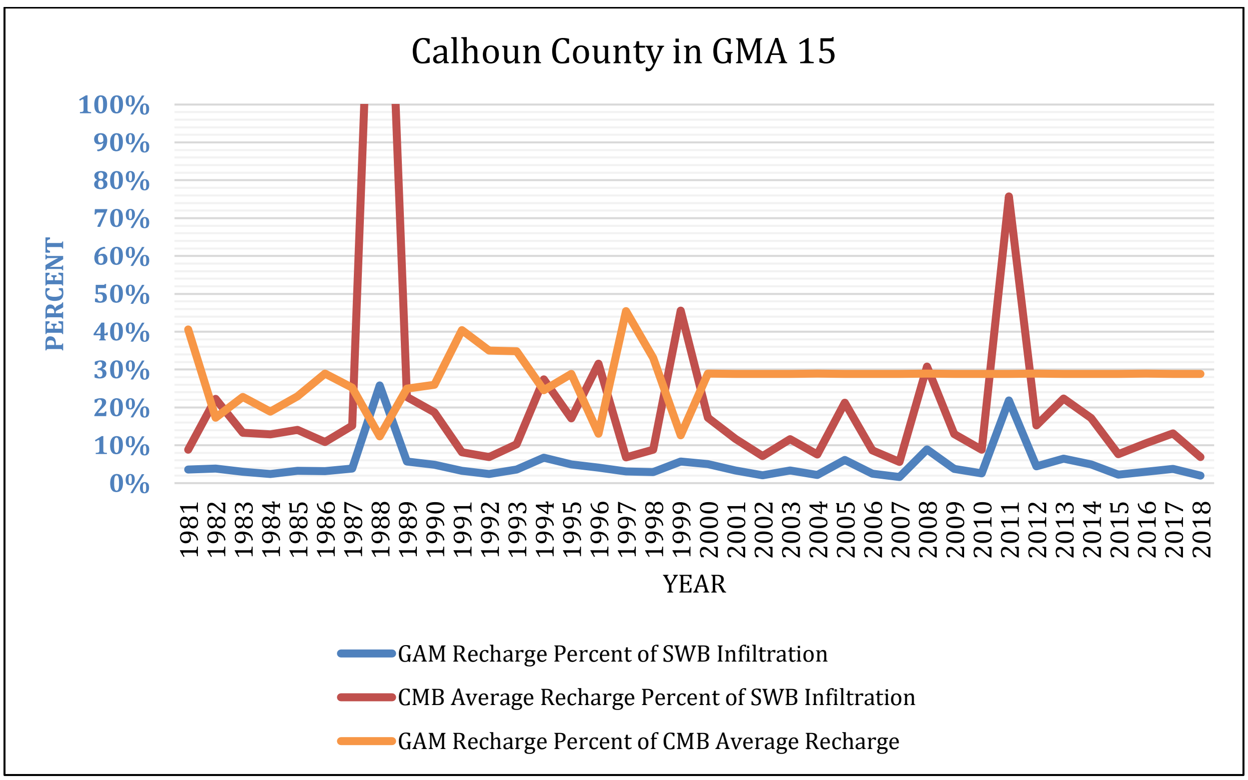

Aransas County in GMA 15
RECHARGE/INFILTRATION, INCHES
14
12
10
8
6
4
2
0
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

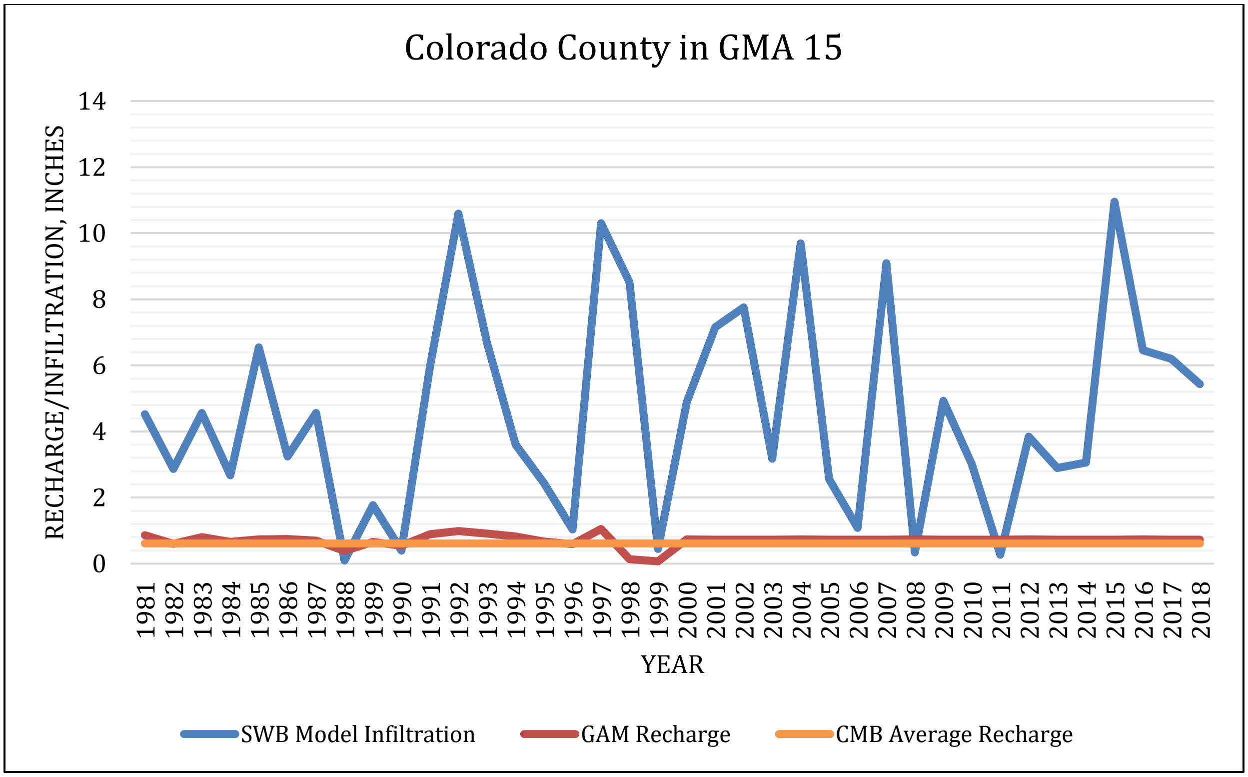

Aransas County in GMA 15
PERCENT
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

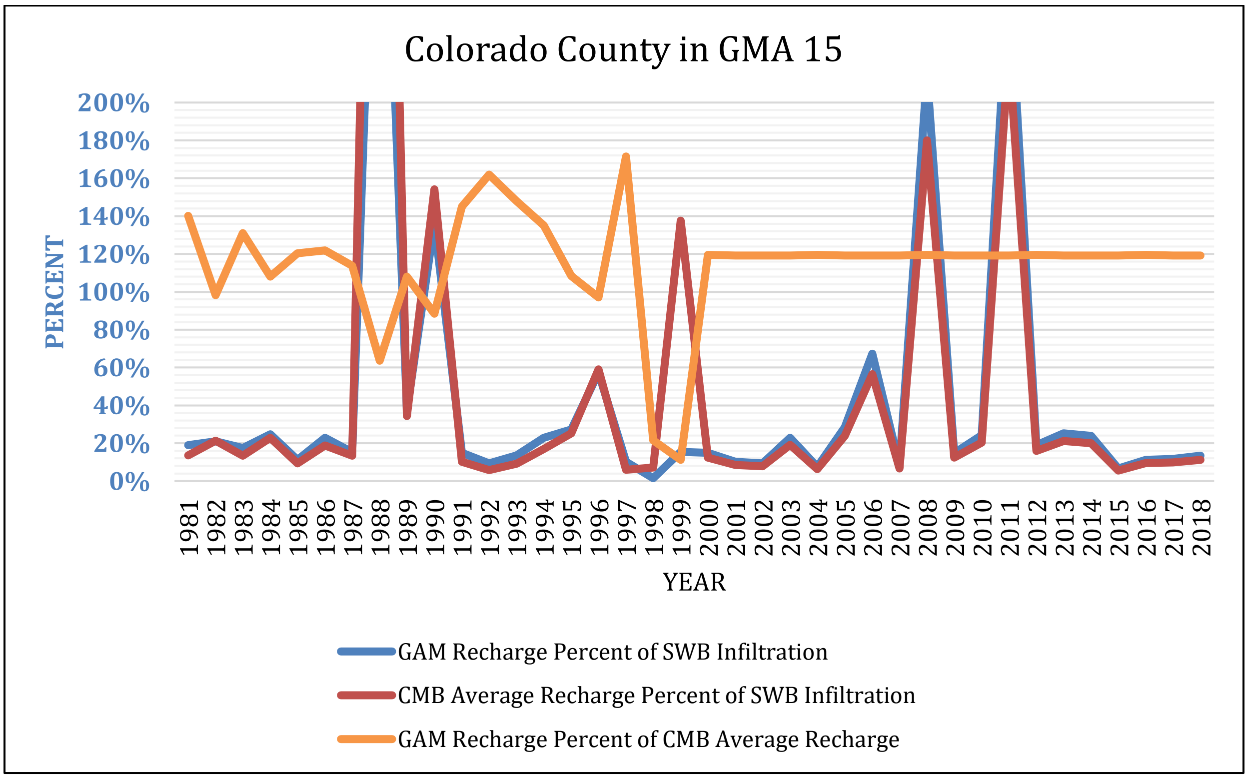

Bee County in GMA 15
RECHARGE/INFILTRATION, INCHES
6
5
4
3
2
1
0
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

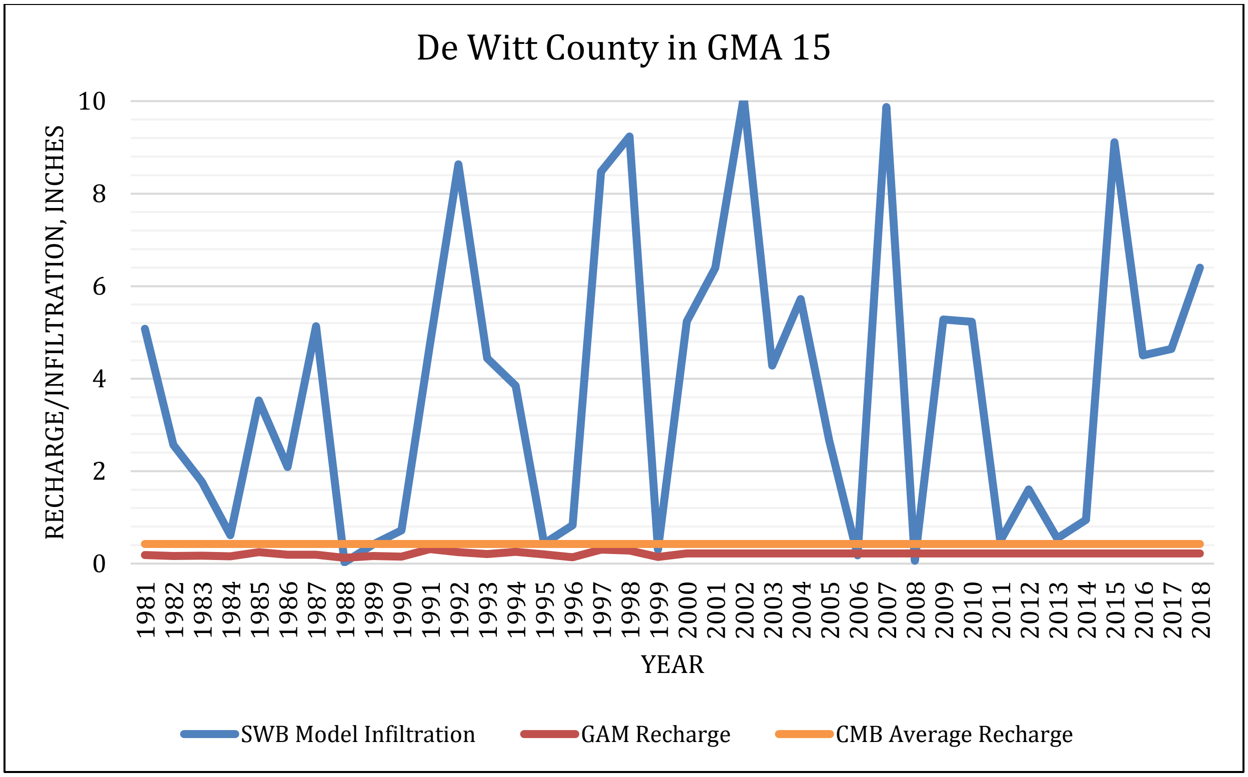

Bee County in GMA 15
PERCENT
500%
450%
400%
350%
300%
250%
200%
150%
100%
50%
0%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

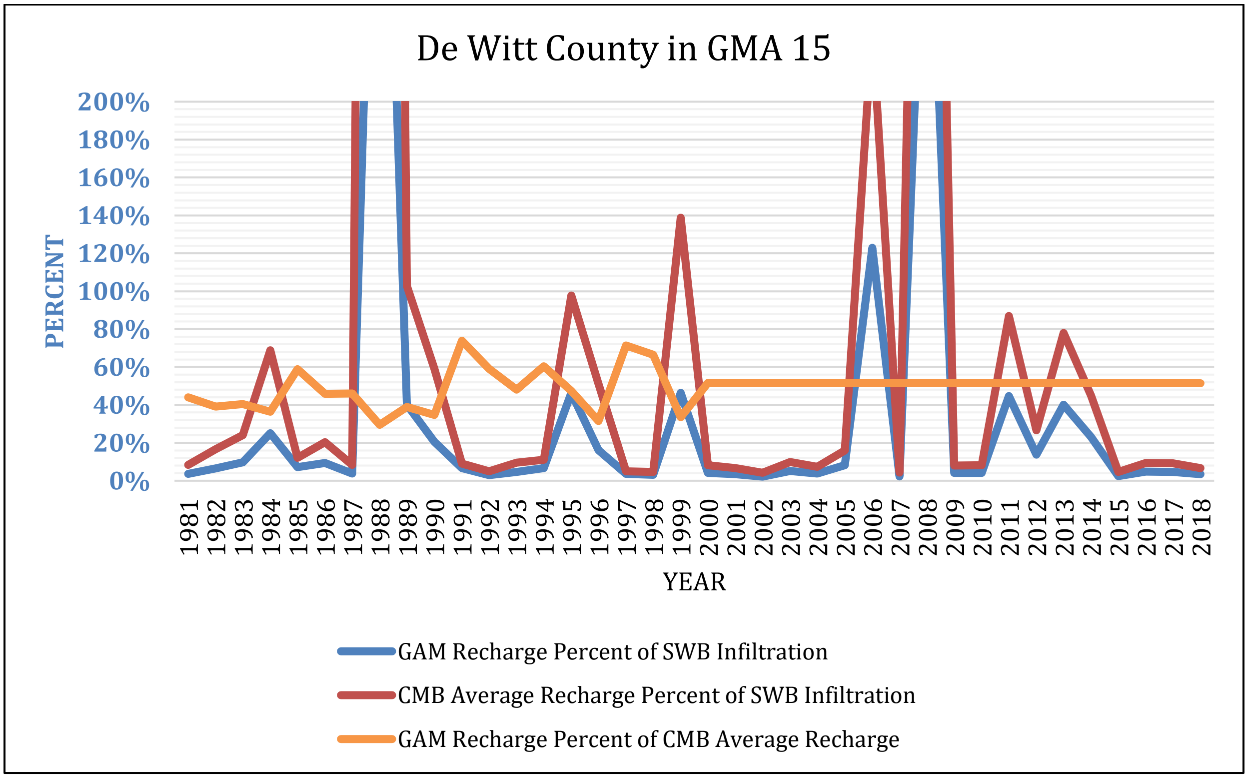

Calhoun County in GMA 15
RECHARGE/INFILTRATION, INCHES
8
6
4
2
0
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

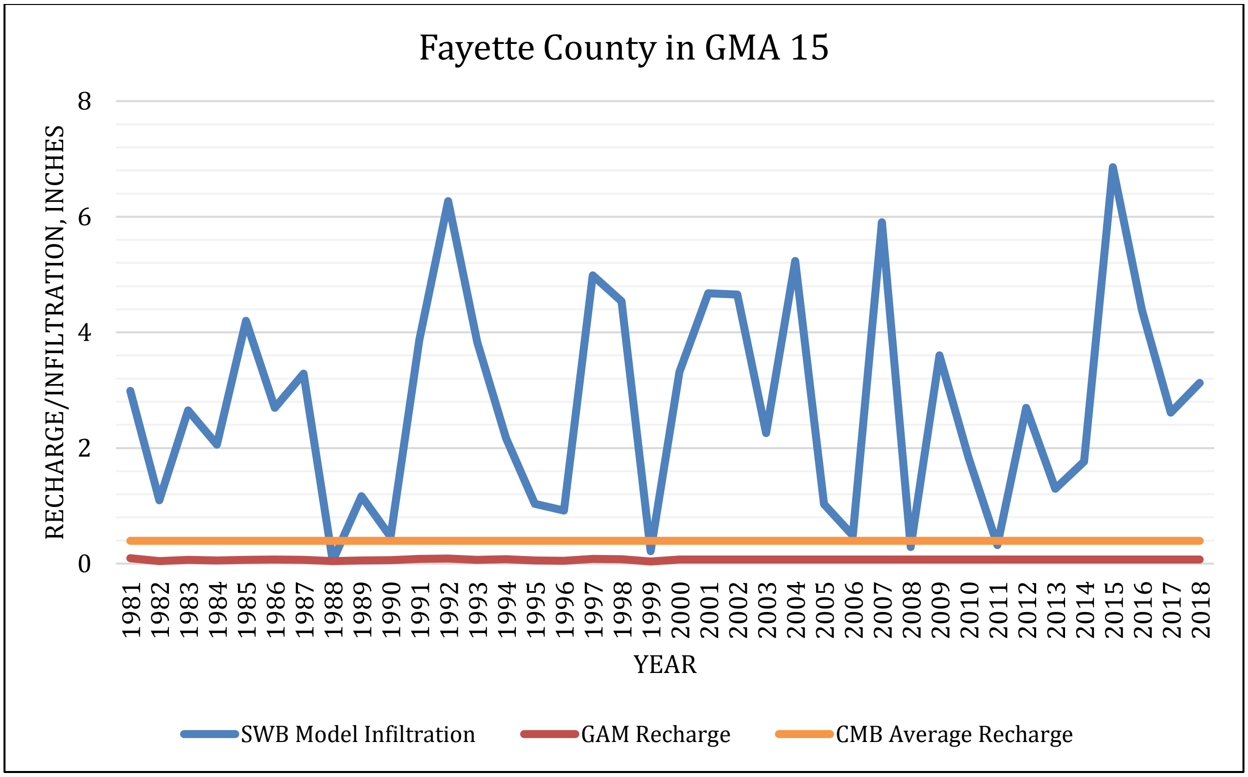

Calhoun County in GMA 15
PERCENT
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

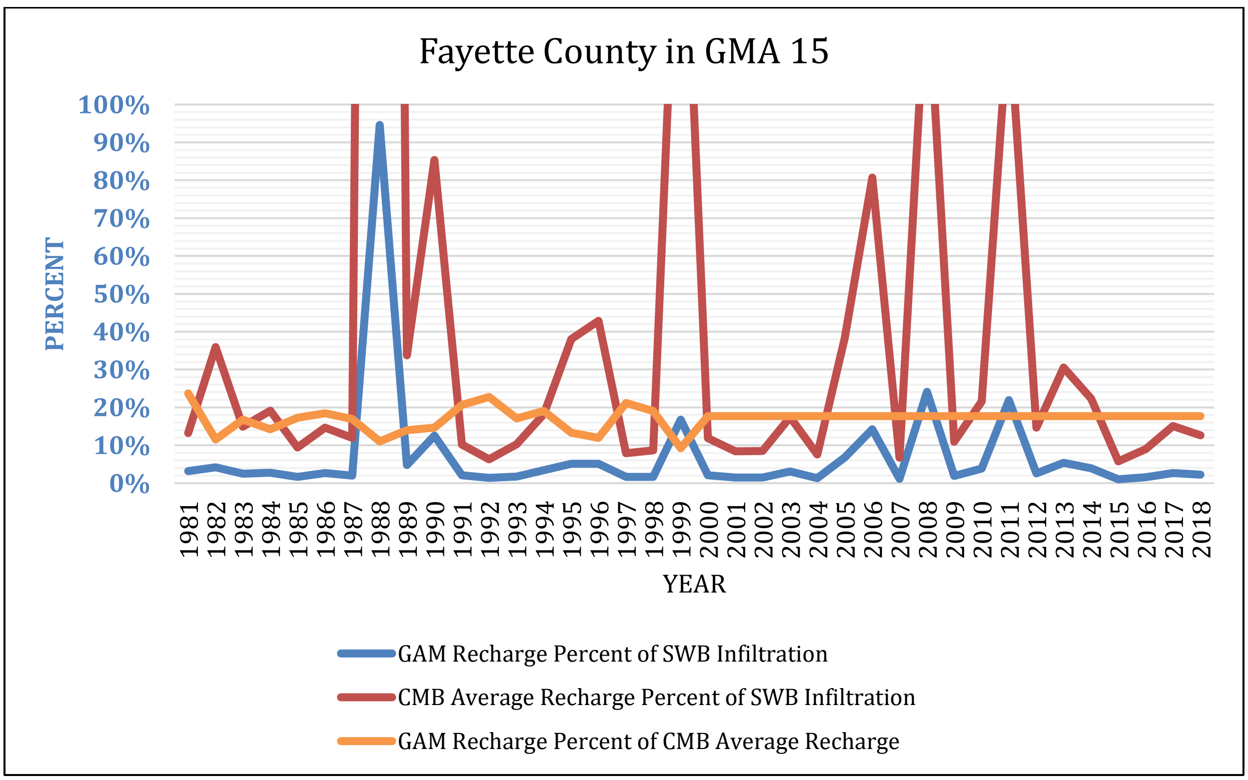

Colorado County in GMA 15
RECHARGE/INFILTRATION, INCHES
14
12
10
8
6
4
2
0
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

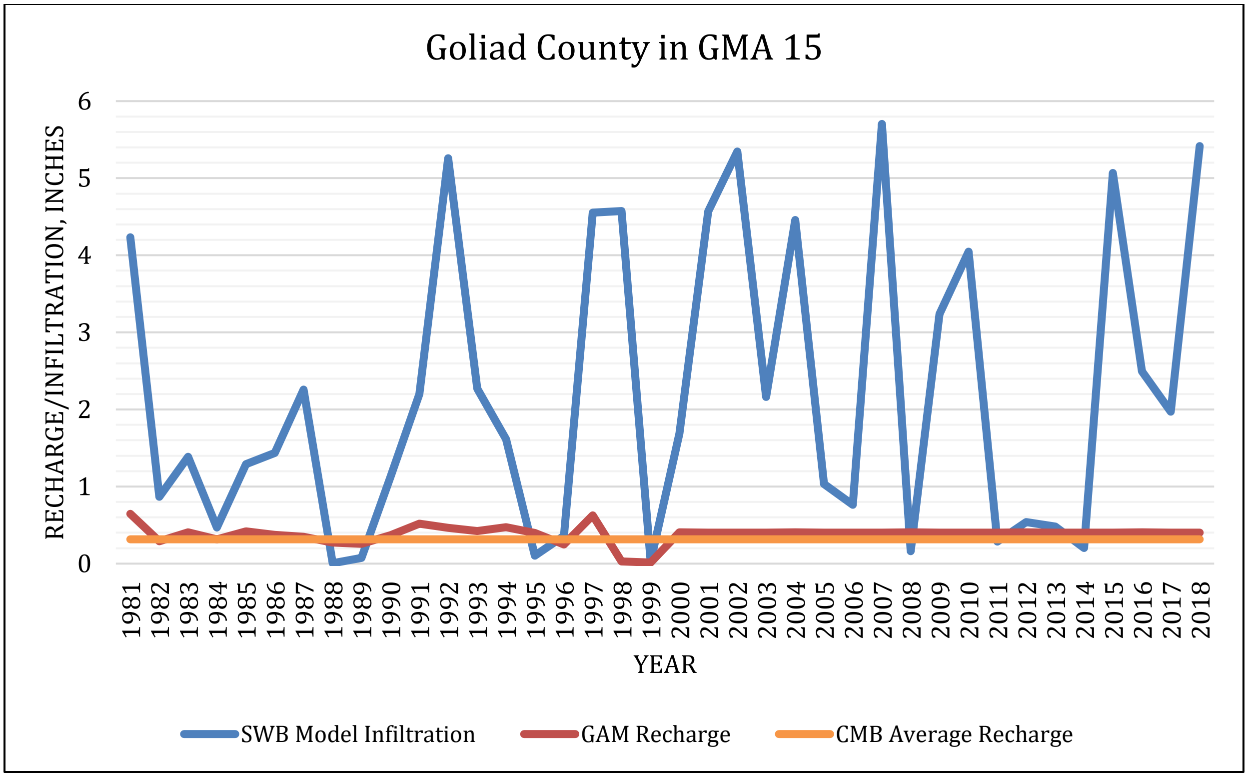

Colorado County in GMA 15
PERCENT
200%
180%
160%
140%
120%
100%
80%
60%
40%
20%
0%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

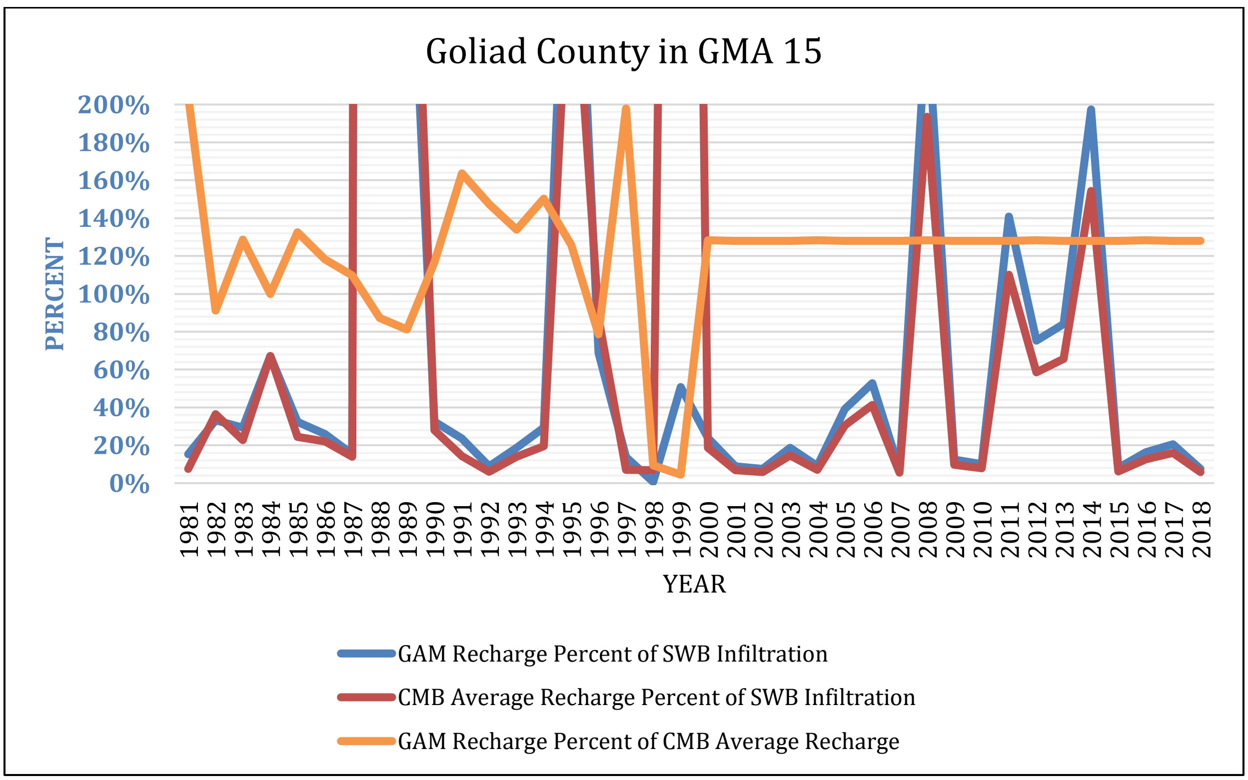

De Witt County in GMA 15
RECHARGE/INFILTRATION, INCHES
0
2
4
6
8
10
YEAR
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

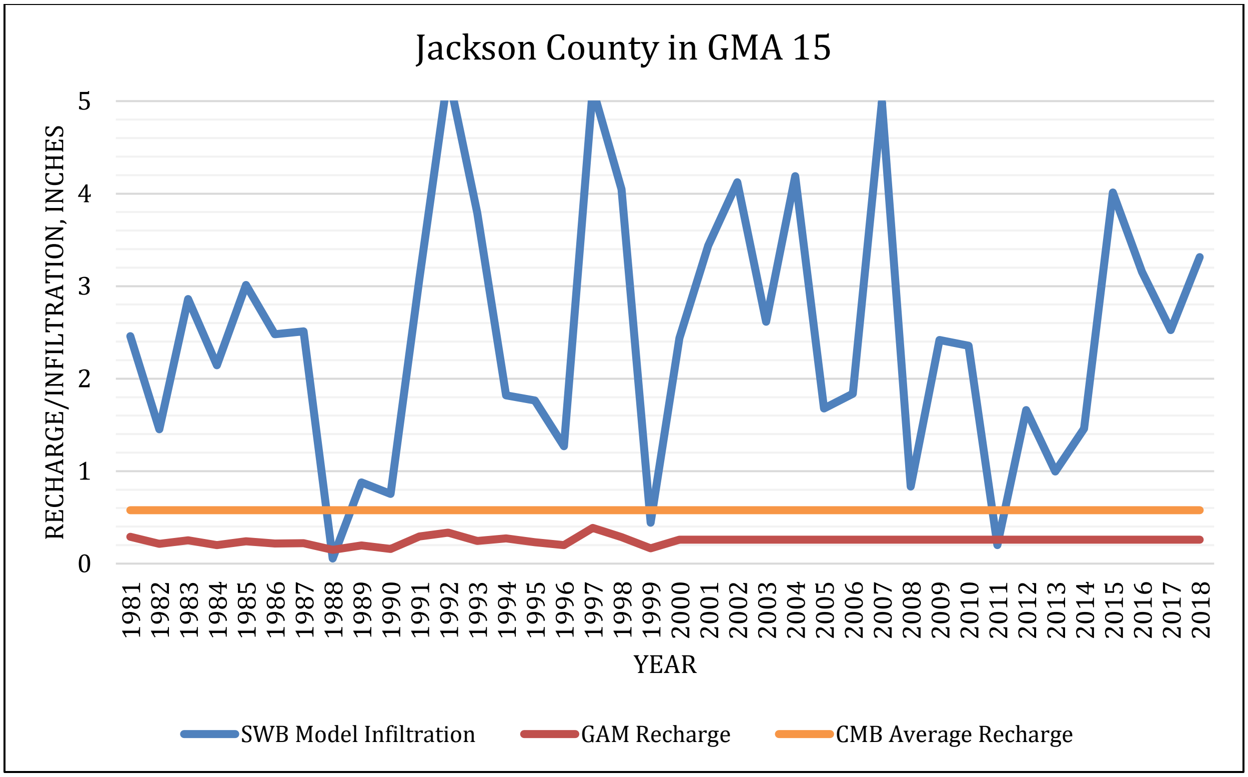

De Witt County in GMA 15
PERCENT
0%
20%
40%
60%
80%
100%
120%
140%
160%
180%
200%
YEAR
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

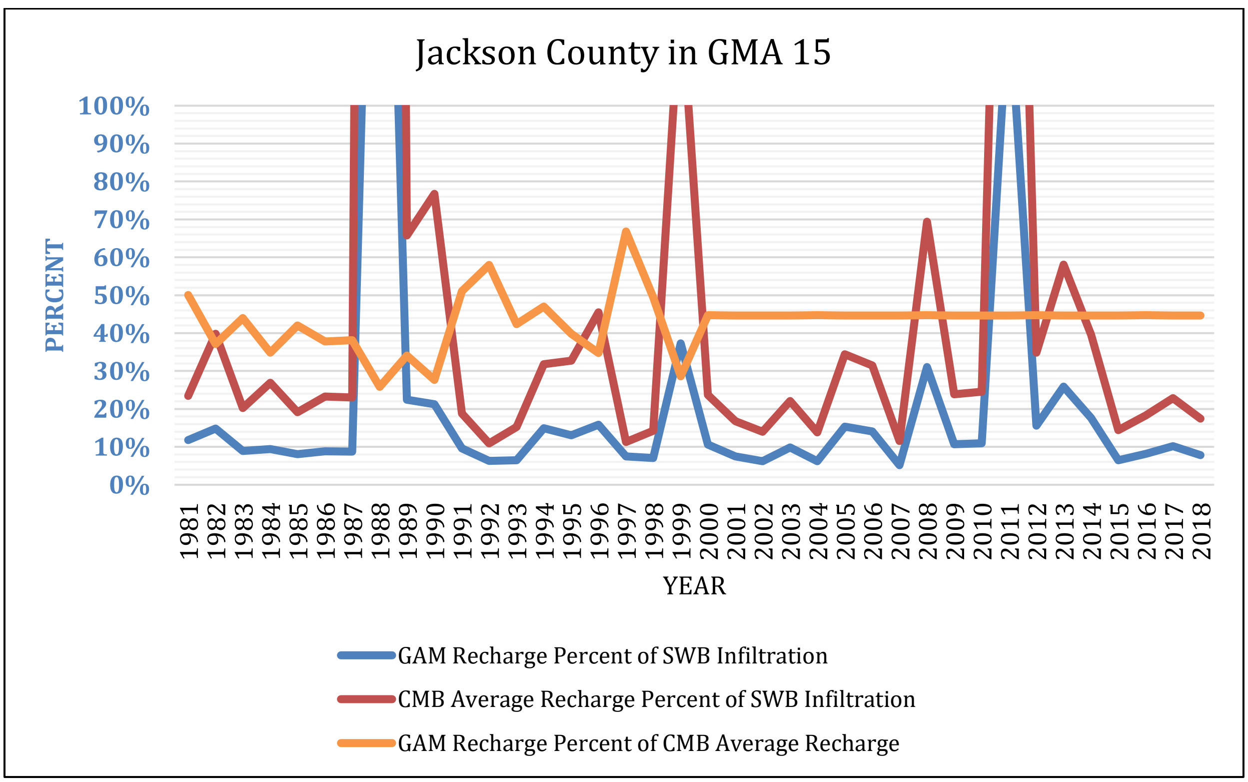

Fayette County in GMA 15
RECHARGE/INFILTRATION, INCHES
8
6
4
2
0
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

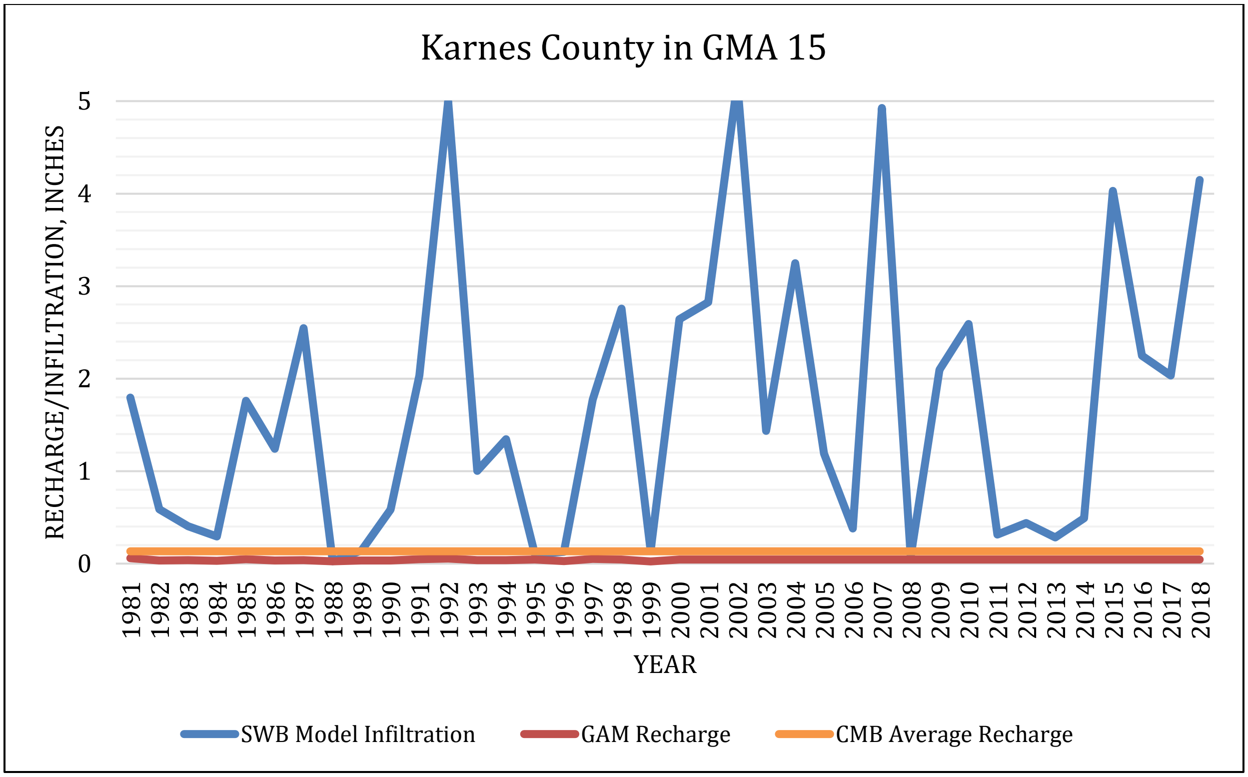

Fayette County in GMA 15
PERCENT
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

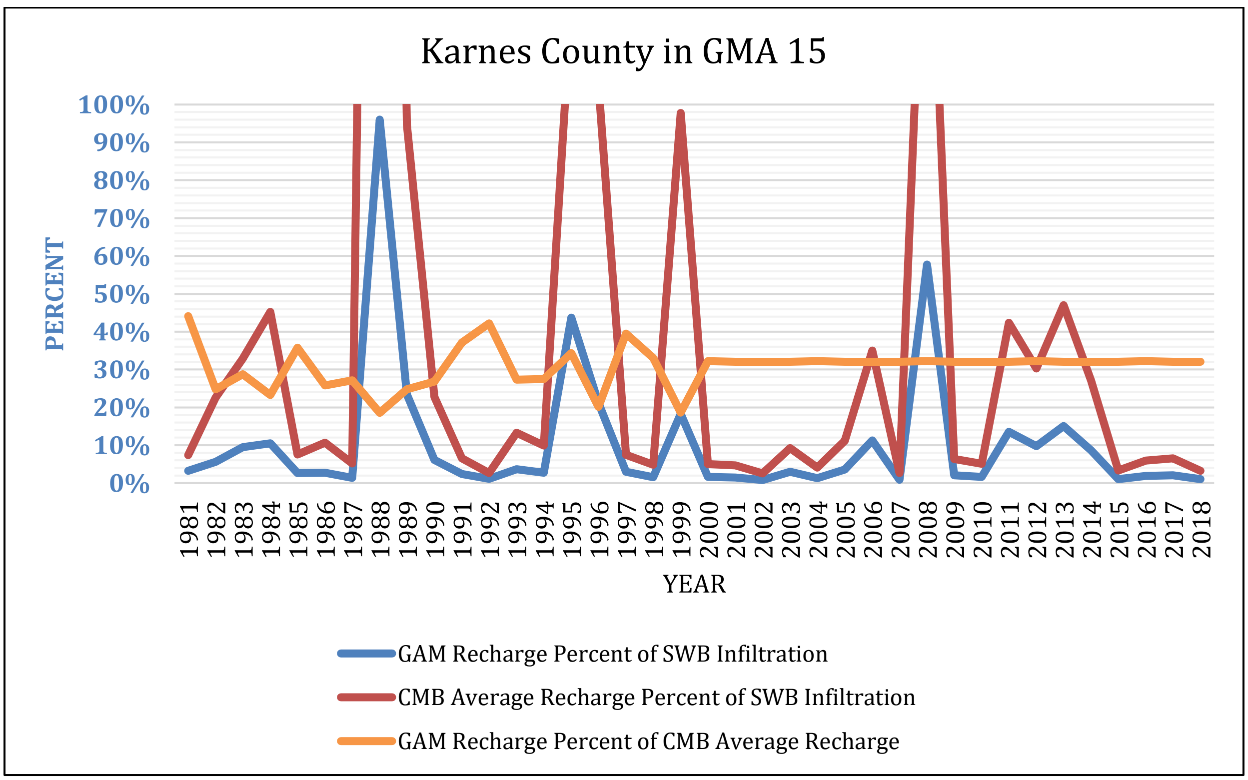

Goliad County in GMA 15
RECHARGE/INFILTRATION, INCHES
0
1
2
3
4
5
6
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

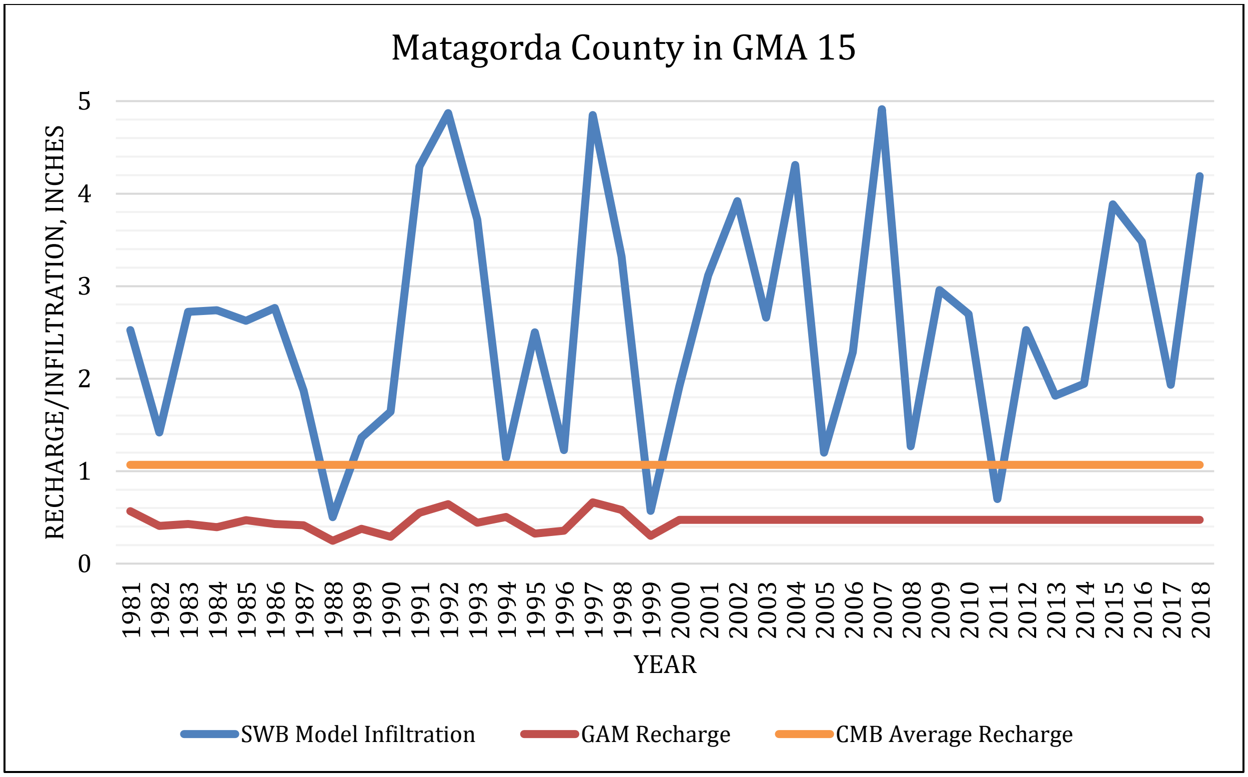

Goliad County in GMA 15
PERCENT
200%
180%
160%
140%
120%
100%
80%
60%
40%
20%
0%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

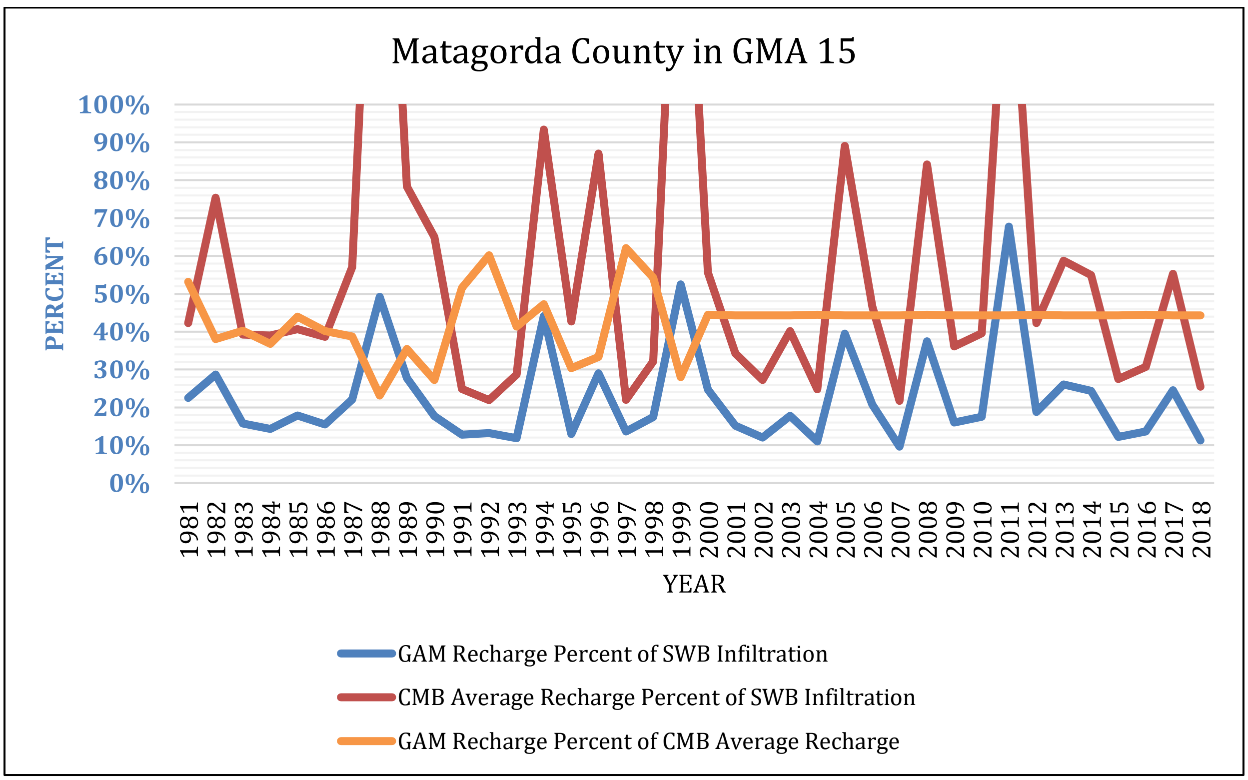

Jackson County in GMA 15
RECHARGE/INFILTRATION, INCHES
0
1
2
3
4
5
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

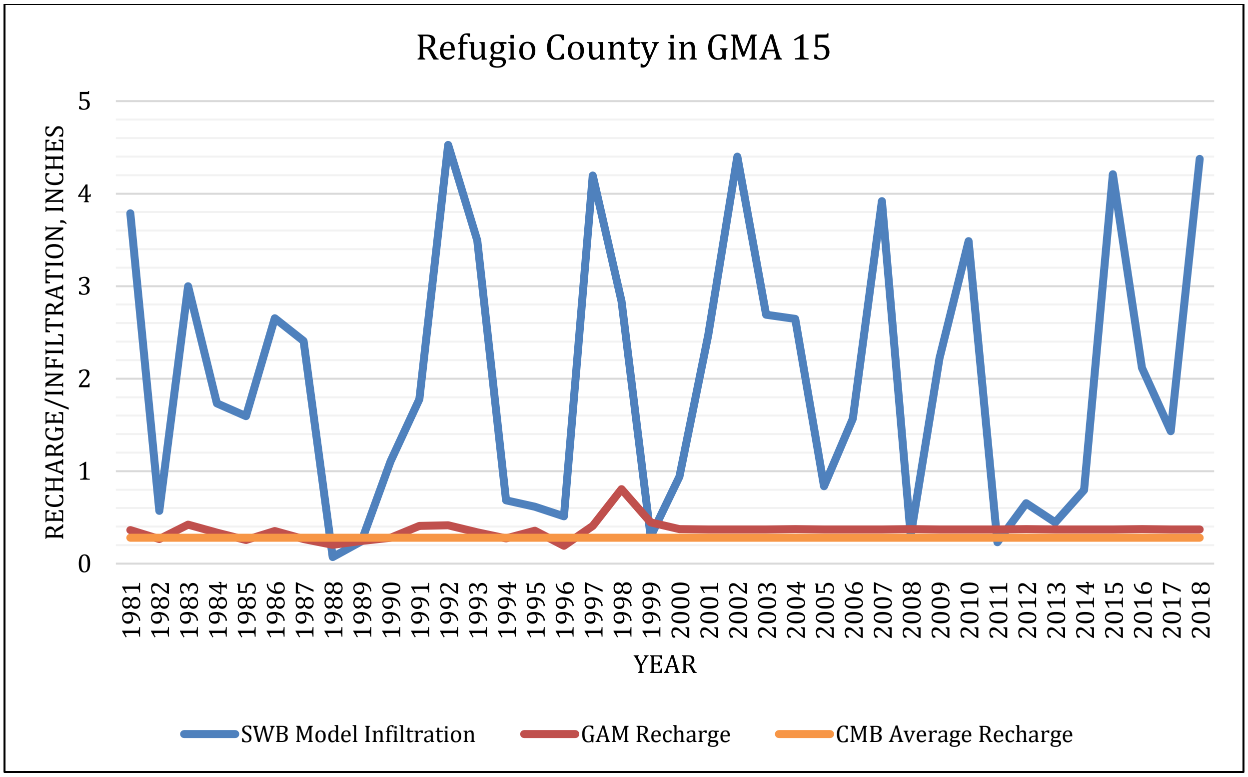

Jackson County in GMA 15
PERCENT
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

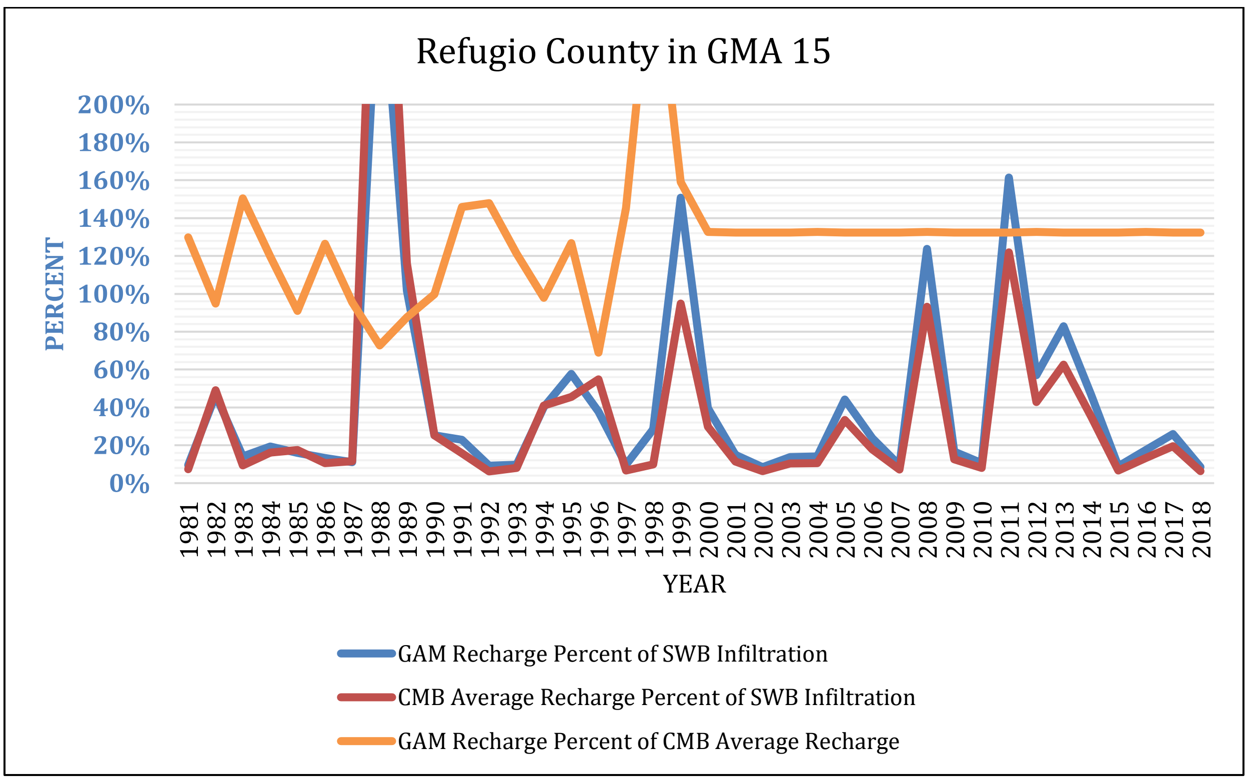

Karnes County in GMA 15
RECHARGE/INFILTRATION, INCHES
0
1
2
3
4
5
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

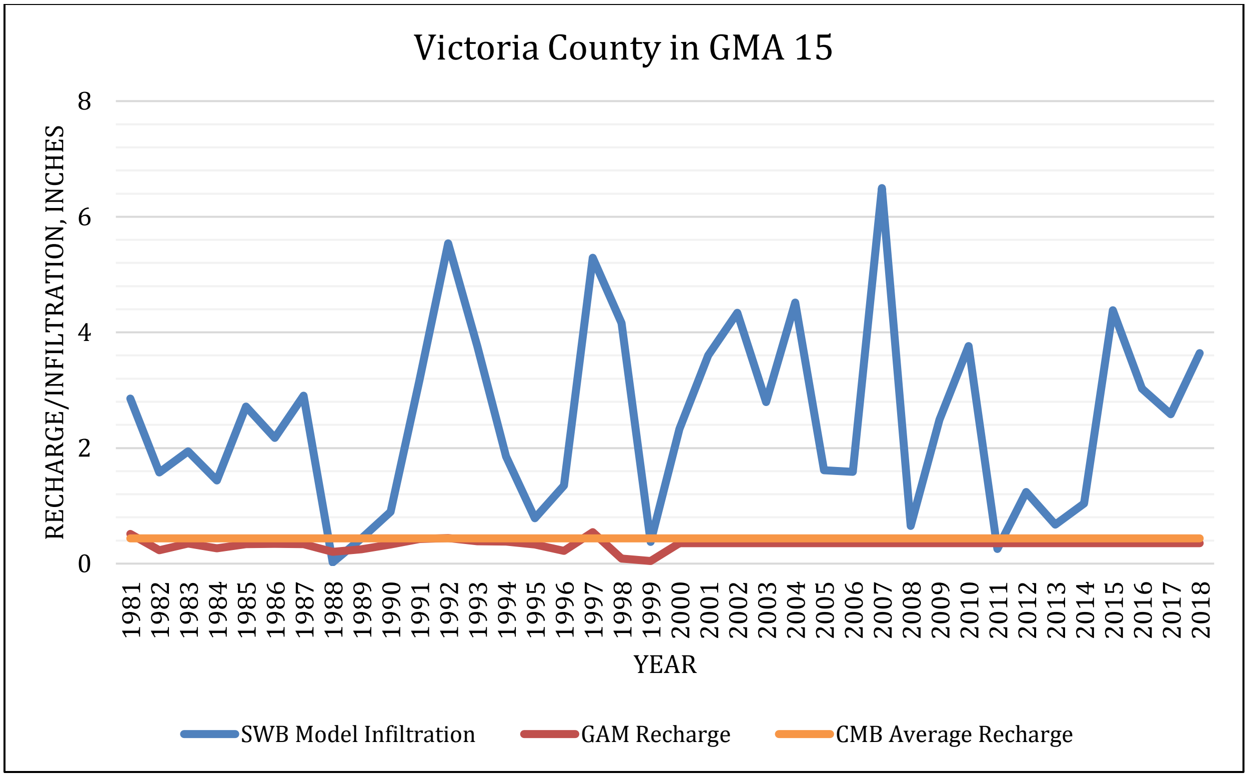

Karnes County in GMA 15
PERCENT
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

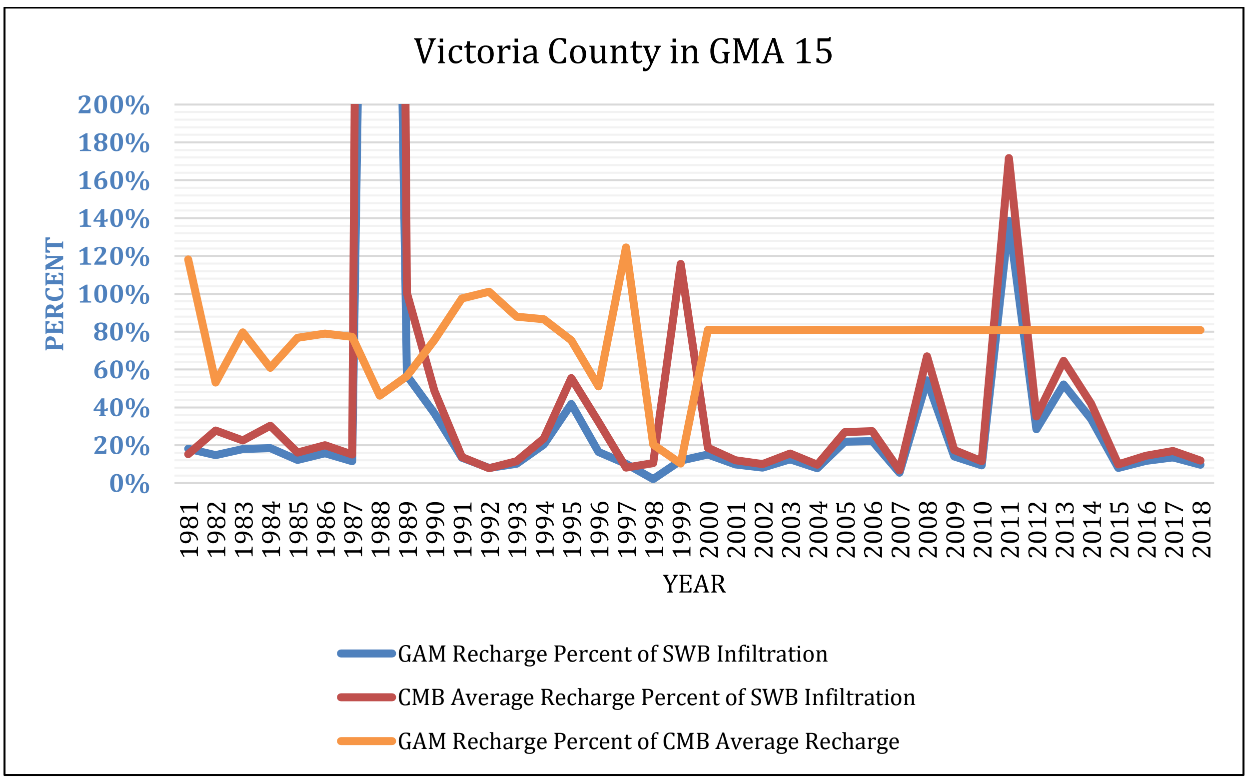

Matagorda County in GMA 15
RECHARGE/INFILTRATION, INCHES
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge

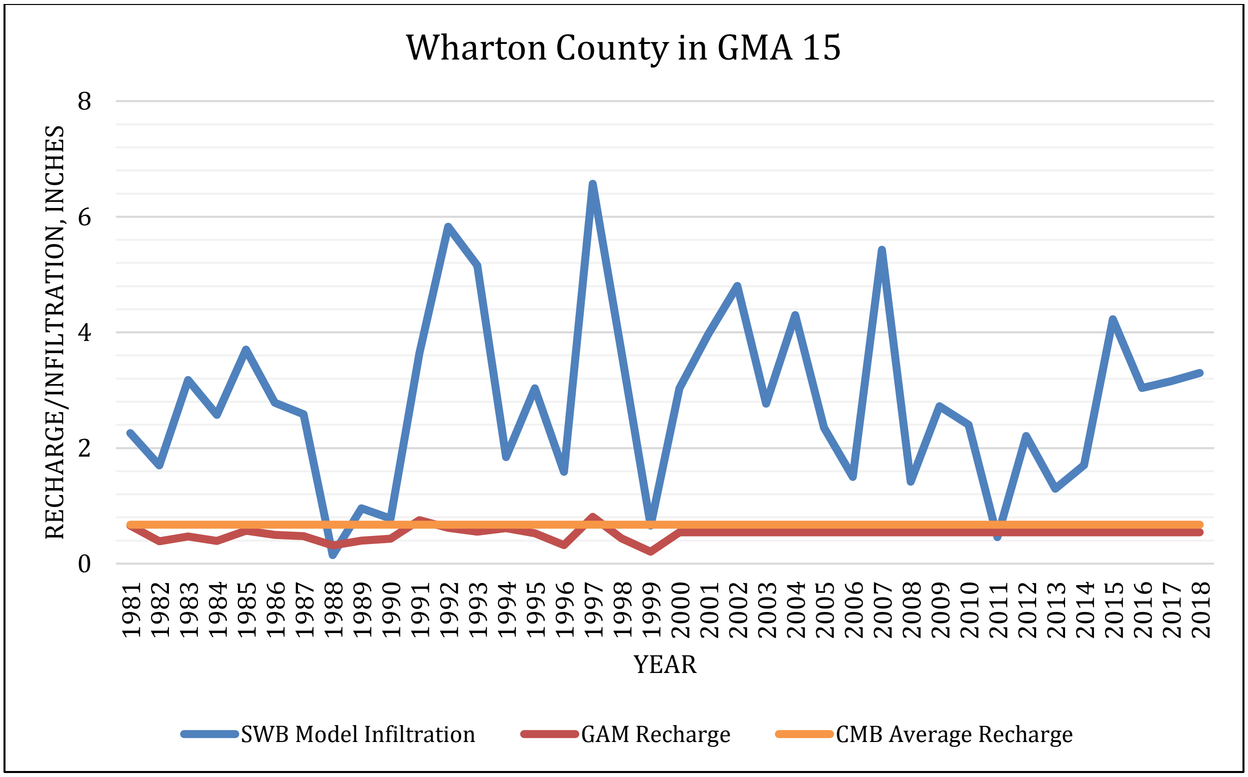

Matagorda County in GMA 15
PERCENT
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

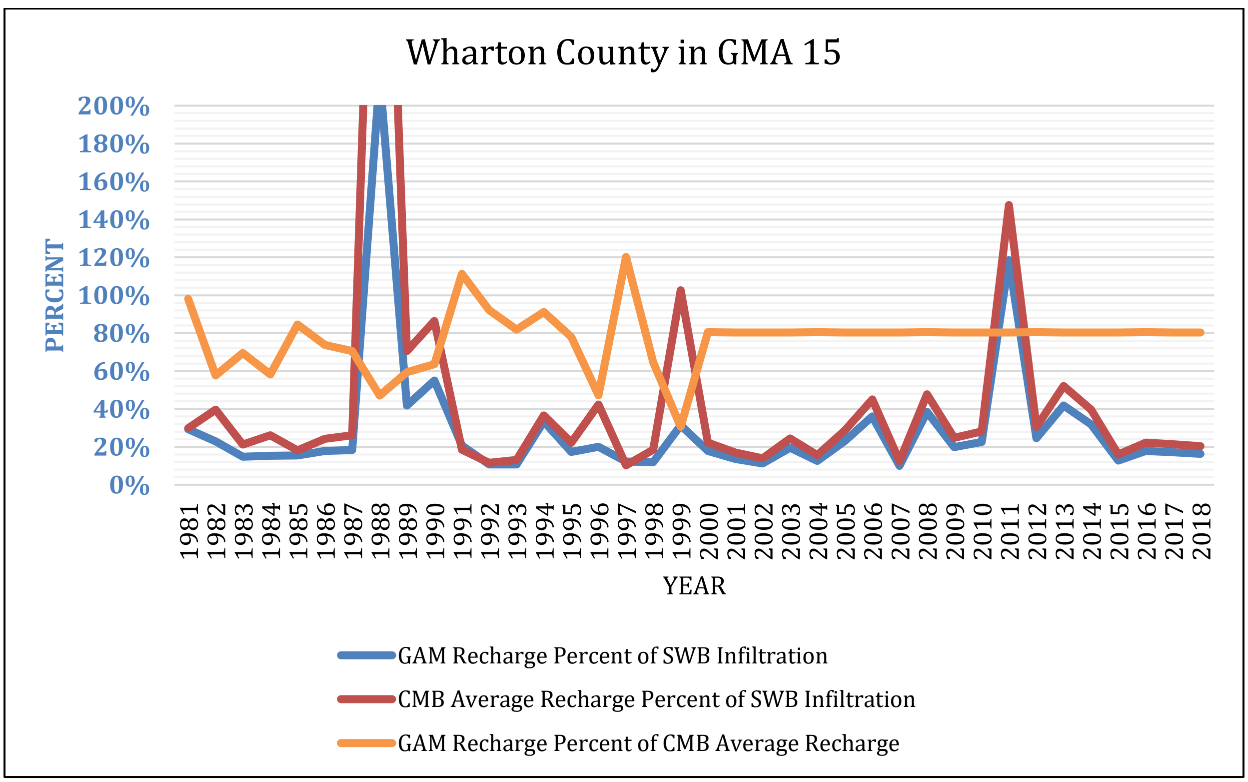

Refugio County in GMA 15
RECHARGE/INFILTRATION, INCHES
0
1
2
3
4
5
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge


Refugio County in GMA 15
PERCENT
0%
20%
40%
60%
80%
100%
120%
140%
160%
180%
200%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge


Victoria County in GMA 15
RECHARGE/INFILTRATION, INCHES
8
6
4
2
0
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge


Victoria County in GMA 15
PERCENT
200%
180%
160%
140%
120%
100%
80%
60%
40%
20%
0%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge


Wharton County in GMA 15
RECHARGE/INFILTRATION, INCHES
8
6
4
2
0
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
SWB Model Infiltration
GAM Recharge
CMB Average Recharge


Wharton County in GMA 15
PERCENT
200%
180%
160%
140%
120%
100%
80%
60%
40%
20%
0%
1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR
GAM Recharge Percent of SWB Infiltration
CMB Average Recharge Percent of SWB Infiltration
GAM Recharge Percent of CMB Average Recharge

Appendix 5.6 —
Presentation Regarding Hydrological Conditions

DISCUSSION OF HYDROLOGICAL CONDITIONS

GMA 15 Agenda Item 7

June 11, 2020

CONSIDERATION

- Texas Water Code Section 36.108(d)(3)
- Total Estimated Recoverable Storage (TERS)
- Recharge
- Inflows
- Discharge

LRE WATER

TERS

- Calculated by TWDB
- Total for GMA 15 = 368.8 million acre-feet
  - ➢ 25% = 92.2 million acre-feet
  - ➢ 75% = 276.6 million acre-feet
- Based on GAM structure and properties
- No consideration for water quality
- Will likely change with new model

INFLOWS/OUTFLOWS

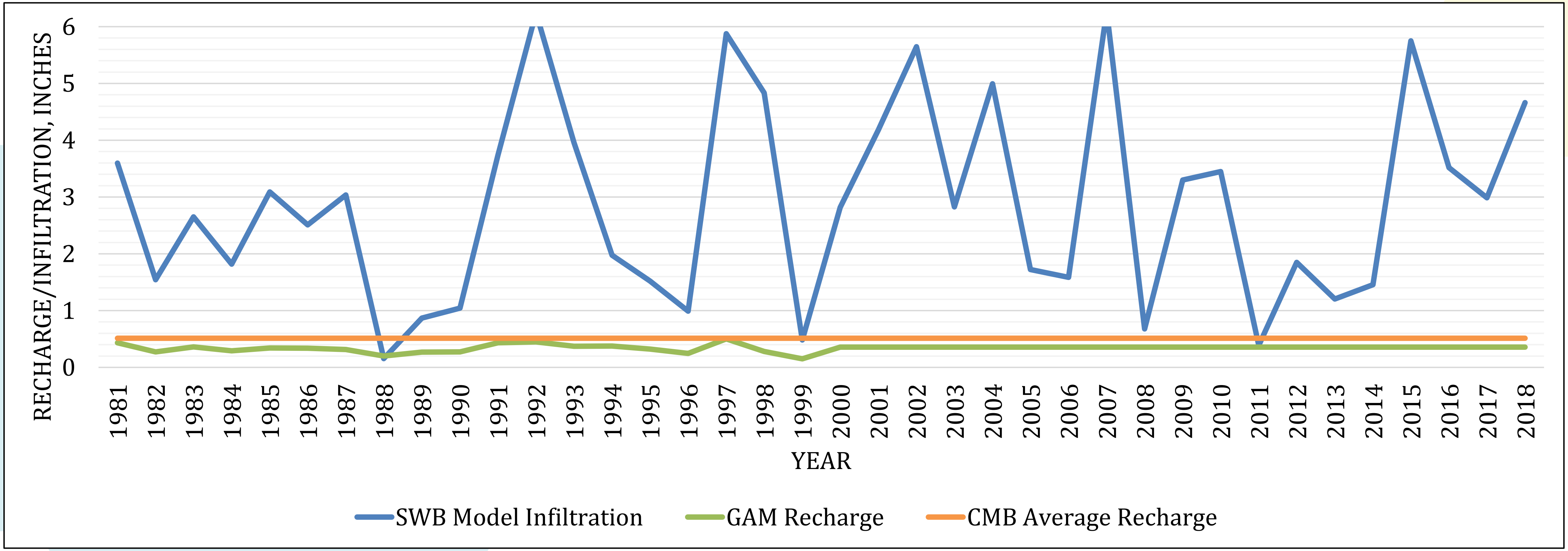
- Estimates based on model results
- Primary outflow is pumping (> 350,000 acre-feet per year)
- Stream leakage is the highest inflow (net inflow > 150,000 acre-feet per year)
  - Highly uncertain
  - Does not accurately reflect other recent research by TWDB

RECHARGE

- Average of more than 200,000 acre-feet per year in predictive model (0.36 inches per year)
- Chloride mass balance research indicates average recharge of 0.51 inches per year
  - Approach provides lower bound
  - Actual may be higher
- Soil-water-balance modeling potential average recharge of 2.87 inches per year
  - Does not account for shallow flow paths or shallow capture
  - Actual may be lower

LRE WATER

RECHARGE COMPARISONS



LRE WATER

DISCUSSION

- Pumping will continue to be the greatest outflow
  - Adopted 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
- Adopted pumping file impacts do not appear to be significant with respect to the GMA 15 hydrological conditions

LRE WATER

QUESTIONS/DISCUSSION

Discussion of Hydrological Conditions

GMA 15 Agenda Item 7
June 11, 2020

Meeting and project files available at: http://bit.ly/GMA_15_3rd_Round

Appendix 5.7 —
Discussion of Environmental Impacts

Technical Memorandum

To:	Groundwater Management Area 15
From:	Michael R. Keester, P.G.
Date:	June 11, 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. As noted in the explanatory report for the 2016 Joint Planning, the primary environmental factor of interest in GMA 15 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.

Chowdhury and others (2004) and Young (2016) both discuss the limitations of the existing models 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 a significant 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 Gulf Coast Aquifer System an estimated 3,810,000 acre-feet of groundwater discharges annually to surface water. Most of the discharge is in the eastern portion of the aquifer near Louisiana with an average annual groundwater discharge of about 650,000 acre-feet occurring in the counties in GMA 15. Table 1 provides the estimated baseflow values for counties in GMA 15.

Table 1. Estimated groundwater flow from the Gulf Coast Aquifer System to surface water by county in GMA 15 (Anaya and others, 2016).

County	Outcrop Area (Square Miles)	Average Baseflow (Arce-Feet per Year)	Median Baseflow (Arce-Feet per Year)
Aransas	193	7,172	724
Bee	880	14,996	2,608
Calhoun	424	30,427	3,115
Colorado	974	46,293	9,925
DeWitt	910	61,579	18,619
Fayette	560	21,372	4,999
Goliad	860	31,804	7,679
Jackson	851	56,943	7,752
Karnes	566	18,401	5,941
Lavaca	970	52,161	9,635
Matagorda	1,122	146,704	40,642
Refugio	777	29,123	2,970
Victoria	889	56,508	8,042
Wharton	1,094	81,140	16,880
Total	11,070	654,625	139,532

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.

While the GAM is not well suited for assessing the impacts of groundwater production on surface water flows, we observe from the modeling results that average drawdowns are not very high for the adopted pumping scenario. The average drawdown values for the model layer representing the outcrop area in each county is less than 15 feet in all counties and generally less than 10 feet. While there may be some diminishment in baseflow contribution due to declining water levels associated with pumping, we do not anticipate a significant decline due to the potential DFCs associated with the adopted pumping file.

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).

STATE OF TEXAS
MICHAEL R. KEESTER
GEOLOGY
10331
LICENSED
PROFESSIONAL GEOSCIENTIST

Michael R. Keester, P.G.
Senior Project Manager | Hydrogeologist
06/11/2020

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.

Chowdhury, A.H., Wade, S., Mace, R.E., and Ridgeway, C., 2004, Groundwater Availability Model of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999: Model Report, 108 p.

Young, S., 2016, Desired Future Condition Explanatory Report for Groundwater Management Area 15: Report prepared for Groundwater Management Area 15, 52 p.

Appendix 5.8 —
Presentation Regarding Environmental Impacts

DISCUSSION OF ENVIRONMENTAL IMPACTS

GMA 15 Agenda Item 7

June 11, 2020

LRE WATER

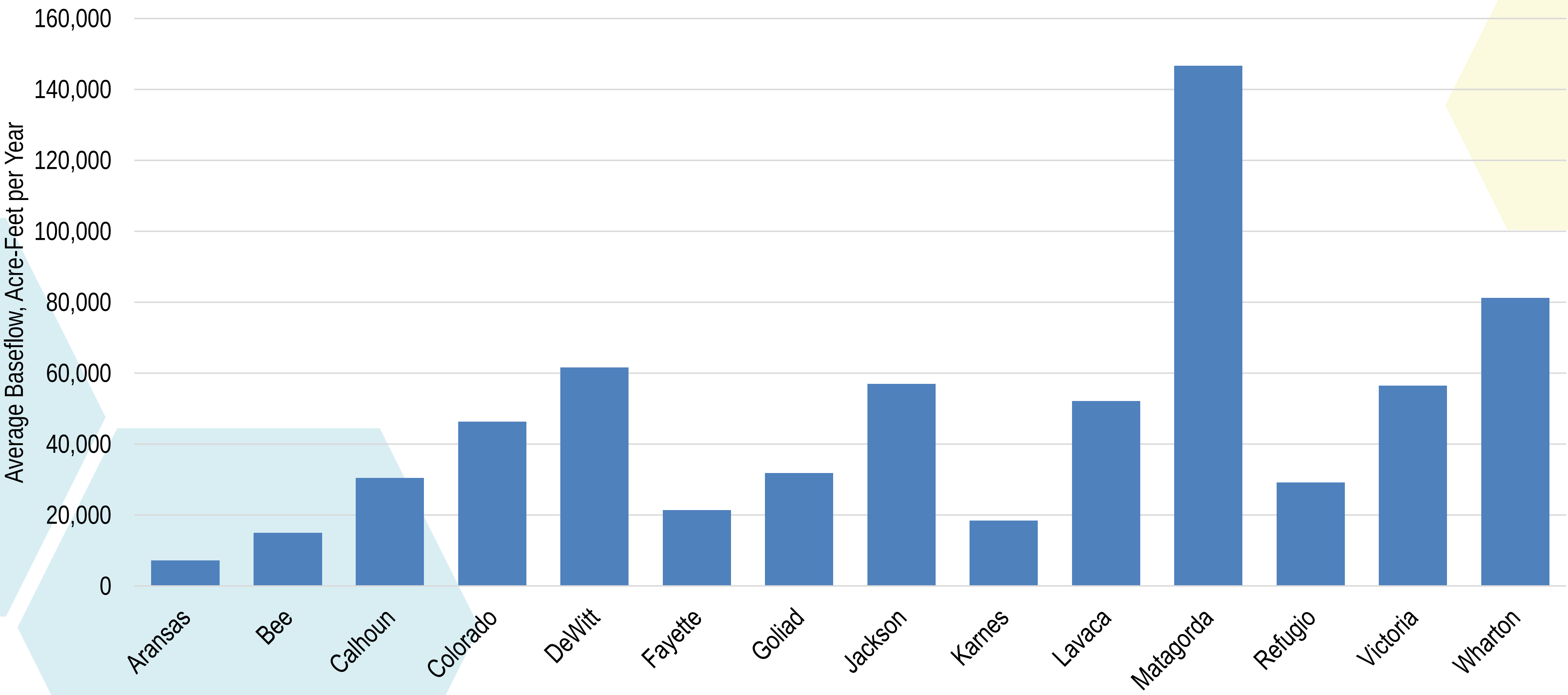
CONSIDERATION

- 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 3.81 million acre-feet per year of groundwater discharges from the GCAS to surface water
  - ➢ Approximately 650,000 acre-feet per year in GMA 15

AVERAGE BASEFLOW



DISCUSSION

- Estimated baseflow is much greater than represented in the GAM
- Average drawdown in outcrop areas in GMA 15 is generally less than 10 feet
- Some possible decline in baseflow associated with water level declines
- Environmental impacts associated with the adopted pumping file are not likely to be substantial

QUESTIONS/DISCUSSION

Discussion of Environmental Impacts

GMA 15 Agenda Item 7
June 11, 2020

Meeting and project files available at: http://bit.ly/GMA_15_3rd_Round

Appendix 5.9 —
Discussion of Subsidence Impacts

Technical Memorandum

To:	Groundwater Management Area 15
From:	Michael R. Keester, P.G.
Date:	June 11, 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 report for the 2016 Joint Planning, land subsidence has occurred within GMA 15 and will likely continue to occur. Young (2016) describes that much of GMA 15 has experienced at least two feet of subsidence since 1950.

Ratzlaff (1982) documented the occurrence of local and regional subsidence in many areas along the Texas Gulf Coast. Localized subsidence tended to be associated with oil and gas and/or mining activities. With regard to regional subsidence, in addition to the well documented subsidence in Houston-Galveston area, he documented regional subsidence of more than one foot in Jackson and Matagorda counties due to groundwater withdrawals for rice irrigation (Ratzlaff, 1982).

With continued utilization of the groundwater resources we can expect that subsidence will continue to occur. As expected based on the observed subsidence in the Gulf Coast area, the Gulf Coast Aquifer System has the highest risk of all Texas aquifers for subsidence due to groundwater pumping (Furnans and others, 2018). 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.

Clay thickness within the Gulf Coast Aquifer System commonly exceeds 300 feet and is characterized as an easily deformed plastic clay (Furnans and others, 2018). 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 20,000 well locations within GMA 15. Figure 1 illustrates the subsidence risk at well locations in and near GMA 15.

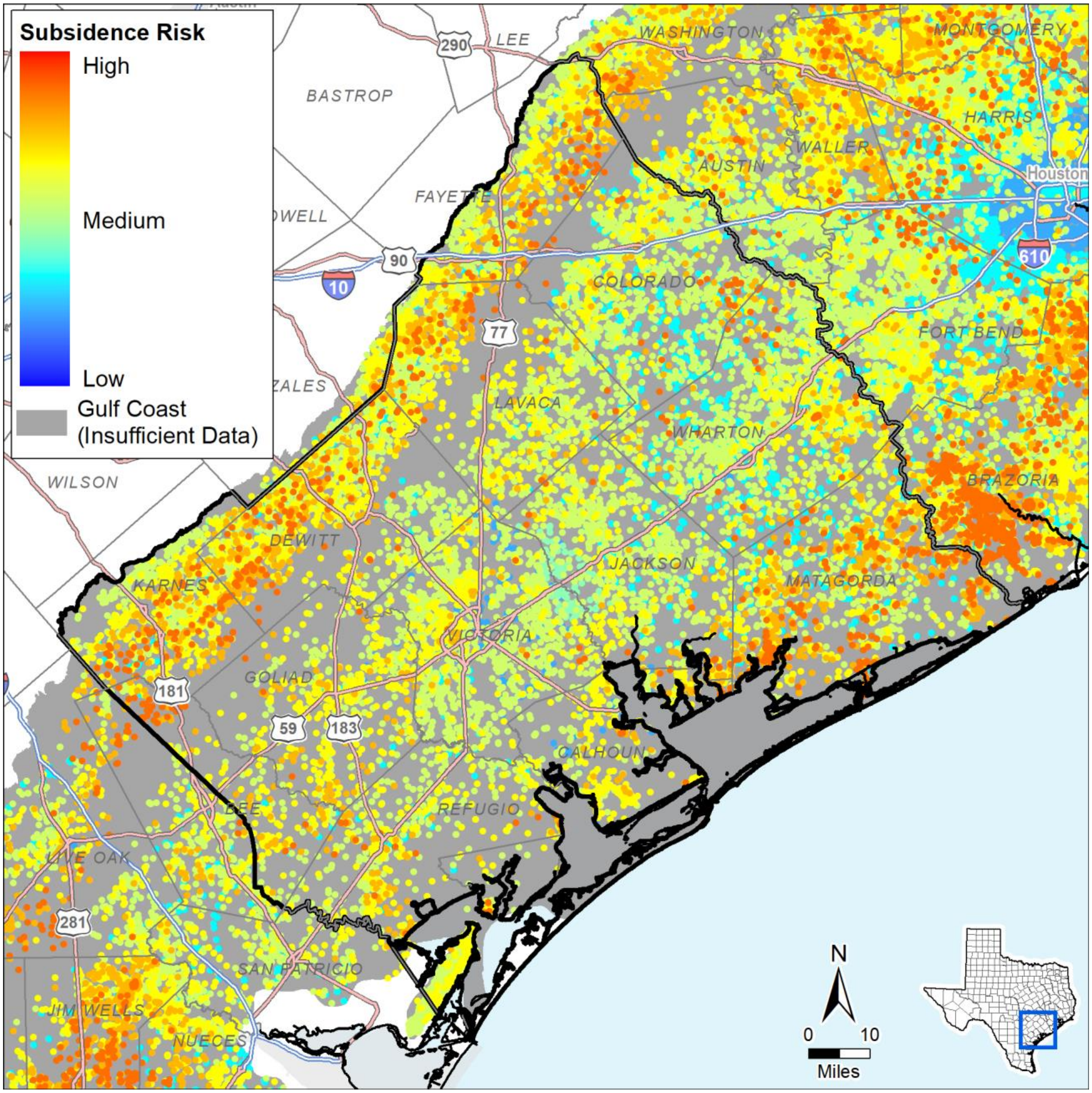


Figure 1. Gulf Coast Aquifer System subsidence risk vulnerability at well locations. Modified from Furnans and others (Furnans and others, 2018).

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 medium to high risk for subsidence. Evaluation of the risk assessment at the well locations indicates more than 25 percent of the well locations (third quartile) in GMA 15 have a subsidence risk value of 6.1 or more. Table 1 provides summary statistics for the subsidence risk values for each county in GMA 15. Figure 2 is a box and whisker plot illustrating the total weighted subsidence risk statistics for the Gulf Coast Aquifer System for each county in GMA 15.

Table 1. Total weighted subsidence risk statistics for the Gulf Coast Aquifer System for each county in GMA 15. Statistics calculated from datasets developed by Furnans and others (2018) updated with simulated water levels from the adopted pumping scenario.

County	Number of Wells Analyzed	Mean Weighted Risk	Standard Deviation of Risk	Minimum Risk	First Quartile Risk	Median Risk	Third Quartile Risk	Maximum Risk
Aransas	1,084	5.7	0.8	3.1	5.6	5.8	5.8	8.4
Bee	247	6.5	1.1	3.1	5.8	6.7	7.3	8.6
Calhoun	1,120	5.2	1.5	2.8	5.3	5.5	6.3	8.6
Colorado	1,830	5.4	1.3	2.8	5.6	5.8	5.8	8.9
DeWitt	1,855	5.5	1.1	2.8	5.0	5.6	5.9	8.4
Fayette	1,166	5.4	1.2	2.8	5.0	5.2	6.1	8.1
Goliad	633	6.1	0.9	2.8	5.5	6.3	6.6	8.6
Jackson	1,221	5.5	1.2	2.3	5.5	5.8	5.8	8.6
Karnes	1,069	5.6	1.1	2.7	5.0	5.9	5.9	8.0
Lavaca	1,466	5.7	1.0	2.8	5.0	5.8	5.9	8.6
Matagorda	2,112	6.0	1.7	3.1	5.6	5.8	7.5	8.6
Refugio	918	5.3	1.5	3.1	3.1	5.6	6.6	8.6
Victoria	2,921	4.9	1.3	2.3	3.0	5.3	5.5	8.3
Wharton	2,302	5.3	1.3	3.0	3.3	5.8	5.8	8.6
GMA 15	19,944	5.5	1.3	2.3	5.0	5.8	6.1	8.9

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 adopted pumping scenario, we updated the calculations and the results for the potential desired future conditions and the results are not significantly different from the results reported by Furnans and others (2018). The Gulf Coast Aquifer System will continue to have a medium to high risk for future subsidence.

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 adopted pumping scenario. 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 each county in GMA 15, respectively. Figure 4 and Figure 5 illustrate the statistical values for the minimum and maximum predicted subsidence.

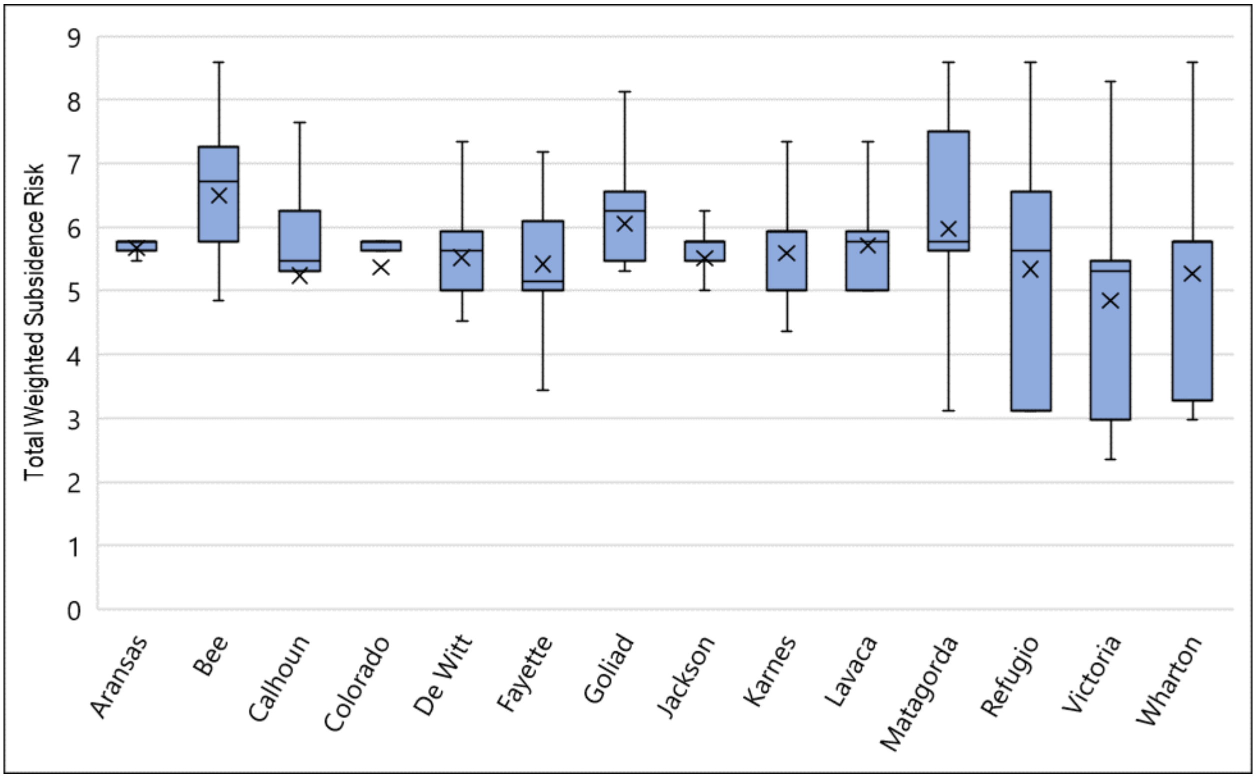


Figure 2. Box and whisker plot of the total weighted subsidence risk for the Gulf Coast Aquifer System for each county in GMA 15. Prepared from datasets developed by Furnans and others (2018).

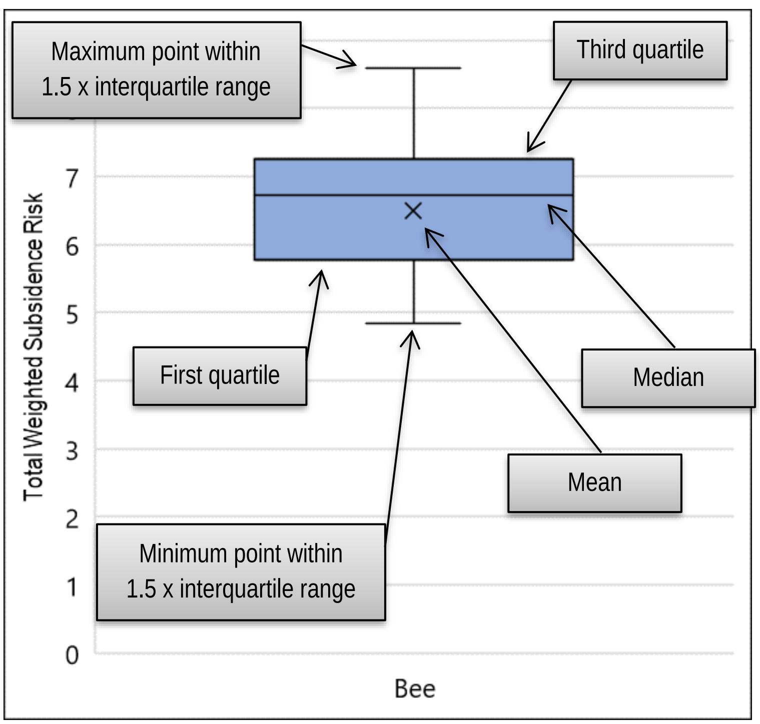


Figure 3. Legend illustrating the parts of the box and whisker plot. Interquartile range is the difference between the third and first quartile. Outliers beyond the whiskers are not shown.

Table 2. Minimum predicted subsidence in 2080 due to compaction of the Gulf Coast Aquifer System due to water level declines for each county in GMA 15. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the adopted pumping scenario.

County	Number of Wells	Mean	Standard Deviation	Minimum	First Quartile	Median	Third Quartile	Maximum Risk
Aransas	1,084	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Bee	247	0.2	0.3	0.0	0.0	0.1	0.2	1.8
Calhoun	1,120	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Colorado	1,830	0.1	0.3	0.0	0.0	0.0	0.1	4.5
DeWitt	1,855	0.2	0.3	-0.1	0.0	0.0	0.3	3.1
Fayette	1,166	0.5	0.7	-0.1	0.0	0.2	0.7	5.8
Goliad	633	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Jackson	1,221	0.0	0.1	0.0	0.0	0.0	0.0	1.5
Karnes	1,069	0.3	0.4	0.0	0.0	0.1	0.4	2.9
Lavaca	1,466	0.2	0.4	0.0	0.0	0.1	0.3	3.5
Matagorda	2,112	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Refugio	918	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Victoria	2,921	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Wharton	2,302	0.0	0.2	0.0	0.0	0.0	0.0	6.8
GMA 15	19,944	0.1	0.3	-0.1	0.0	0.0	0.0	6.8

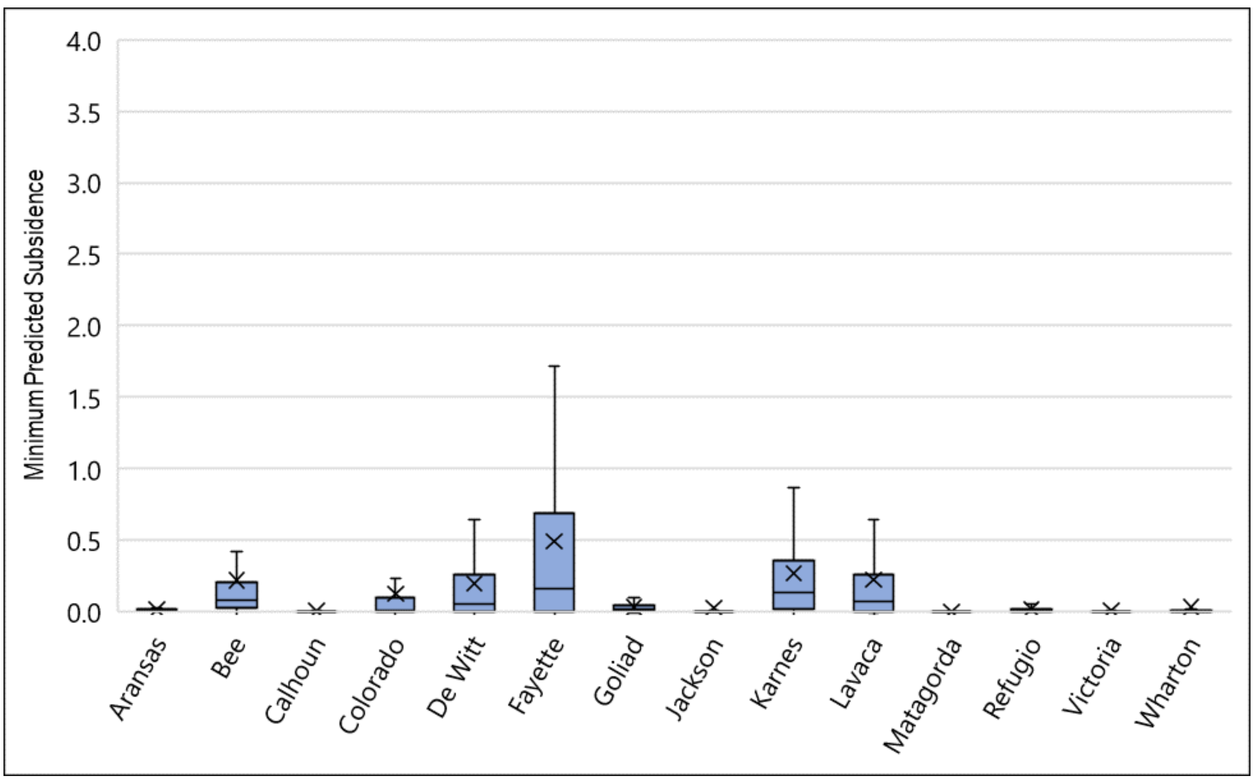


Figure 4. Box and whisker plot of the minimum predicted subsidence in 2080 due to compaction of the Gulf Coast Aquifer System due to water level declines for each county in GMA 15.

Table 3. Maximum predicted subsidence in 2080 due to compaction of the Gulf Coast Aquifer System due to water level declines for each county in GMA 15. Predicted subsidence calculated using datasets developed by Furnans and others (2018) updated with simulated water levels from the adopted pumping scenario.

County	Number of Wells	Mean	Standard Deviation	Minimum	First Quartile	Median	Third Quartile	Maximum Risk
Aransas	1,084	0.0	0.1	0.0	0.0	0.0	0.1	1.4
Bee	247	0.7	0.8	-0.1	0.1	0.4	1.0	6.3
Calhoun	1,120	0.0	0.1	0.0	0.0	0.0	0.0	1.0
Colorado	1,830	0.7	1.9	-0.2	0.0	0.0	0.4	32.1
DeWitt	1,855	0.4	0.7	-0.2	0.0	0.1	0.5	6.2
Fayette	1,166	1.0	1.5	-0.1	0.0	0.3	1.4	11.5
Goliad	633	0.1	0.2	0.0	0.0	0.1	0.2	1.8
Jackson	1,221	0.1	0.5	0.0	0.0	0.0	0.0	9.8
Karnes	1,069	0.5	0.7	-0.1	0.0	0.3	0.7	5.7
Lavaca	1,466	0.6	1.1	-0.1	0.0	0.2	0.8	17.7
Matagorda	2,112	0.0	0.1	0.0	0.0	0.0	0.0	2.9
Refugio	918	0.1	0.2	0.0	0.0	0.0	0.1	4.0
Victoria	2,921	0.0	0.1	-0.1	0.0	0.0	0.0	4.2
Wharton	2,302	0.2	1.5	0.0	0.0	0.0	0.0	51.2
GMA 15	19,944	0.3	1.0	-0.2	0.0	0.0	0.1	51.2

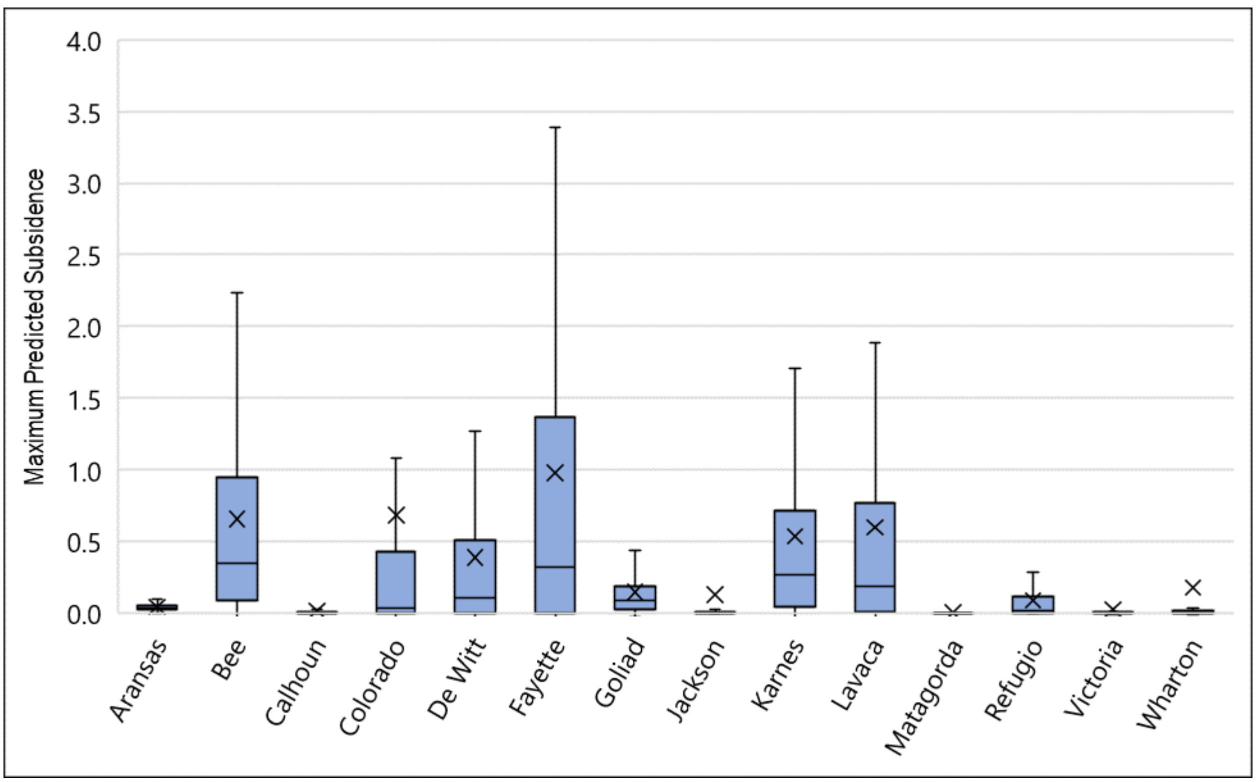


Figure 5. Box and whisker plot of the maximum predicted subsidence in 2080 due to compaction of the Gulf Coast Aquifer System due to water level declines for each county in GMA 15.

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, 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 adopted pumping scenario.

Subsidence is known to occur along the Texas Gulf Coast. As water levels in the Gulf Coast Aquifer System decline, we can anticipate compaction of the aquifer sediments and corresponding land surface subsidence. Based on historical subsidence, aquifer characteristics, and predicted water level declines, we do not expect future subsidence within GMA 15 to more than one foot during the planning period.

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).

STATE OF TEXAS
MICHAEL R. KEESTER
GEOLOGY
10331
LICENSED
PROFESSIONAL GEOSCIENTIST

Michael R. Keester, P.G.
Senior Project Manager | Hydrogeologist

06/11/2020

References

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.

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.

Ratzlaff, K.W., 1982, Land-Surface Subsidence in the Texas Coastal Region: Report 272, 26 p.

Young, S., 2016, Desired Future Condition Explanatory Report for Groundwater Management Area 15: Report prepared for Groundwater Management Area 15, 52 p.

Appendix 5.10 —
Presentation Regarding Subsidence Impacts

DISCUSSION OF SUBSIDENCE IMPACTS

GMA 15 Agenda Item 7

June 11, 2020

LRE WATER

CONSIDERATION

- Texas Water Code Section 36.108(d)(5)
- Impact on subsidence as it relates to potential DFCs
- Not possible to model with the GAM

SUBSIDENCE

- Occurs when aquifer material compresses
- Documented occurrence in the past
  - Jackson and Matagorda counties
  - Associated with pumping for rice irrigation
- Expected to occur in the future
- 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

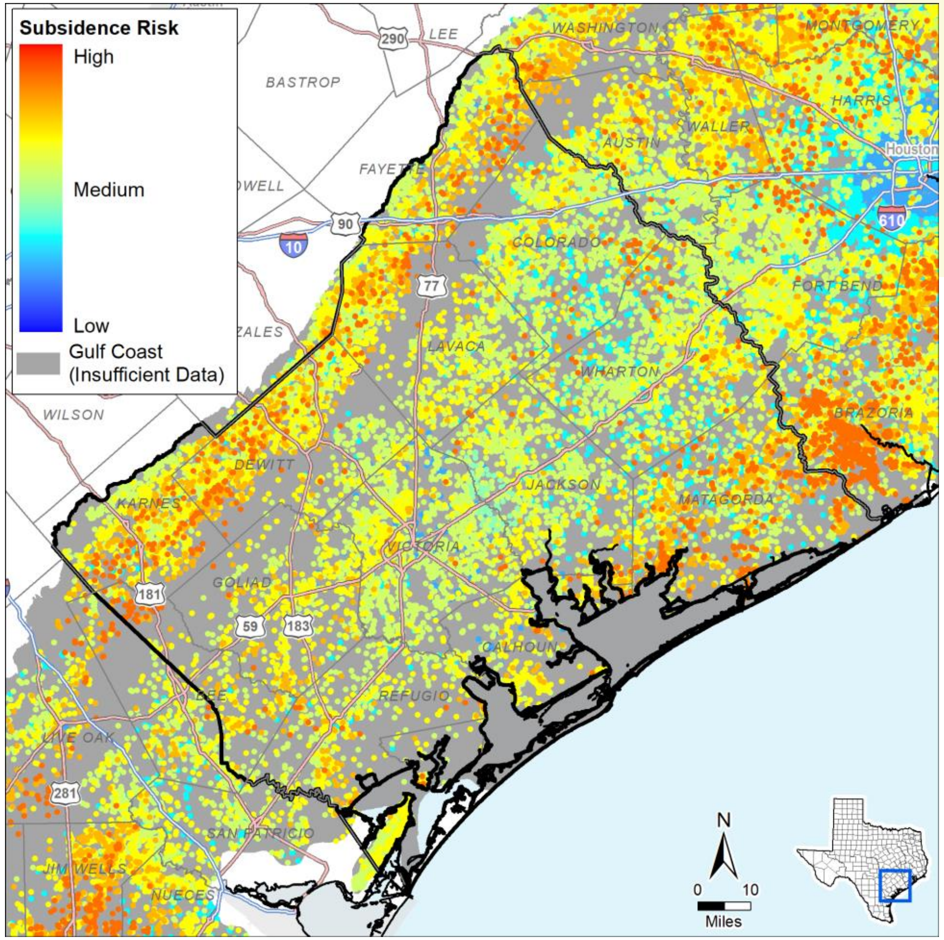
SUBSIDENCE RISK

- 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
  - Total thickness commonly more than 300 feet in GCAS

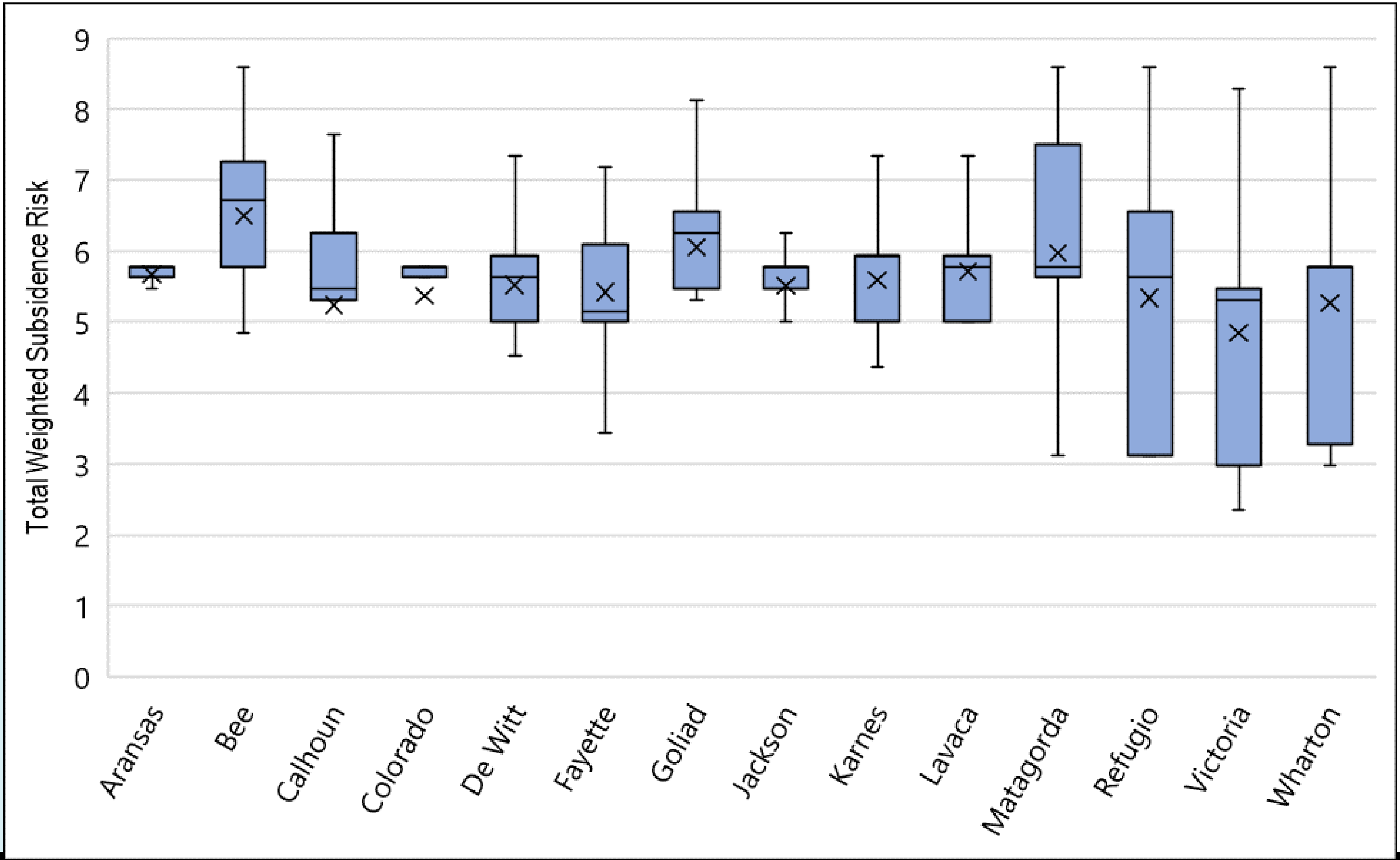
LRE WATER

SUBSIDENCE RISK

- Approximately 20,000 wells evaluated
- Risk values range from 0 to 10
- Generally medium to high risk
- 25% of locations have risk value of 6.1 or more



SUBSIDENCE RISK

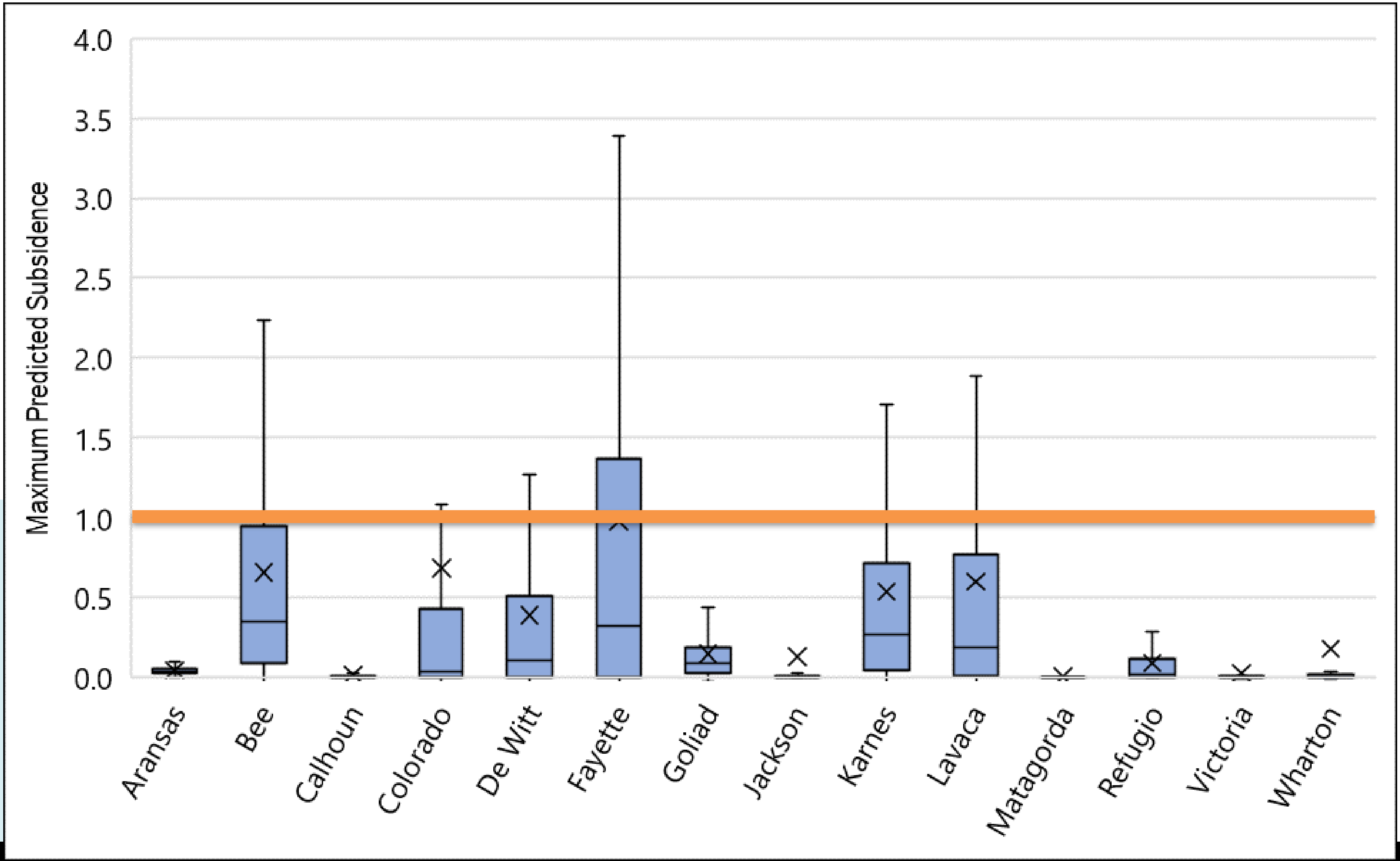


POTENTIAL SUBSIDENCE

- 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 provides a reasonable range

LRE WATER

MAXIMUM PREDICTED SUBSIDENCE



LRE WATER

DISCUSSION

- Subsidence is documented within GMA 15
- Due to the characteristics of the GCAS, future subsidence is expected
- Future subsidence likely to be less the 1 foot during DFC period

LRE WATER

QUESTIONS/DISCUSSION

Discussion of Subsidence Impacts

GMA 15 Agenda Item 7
June 11, 2020

Meeting and project files available at: http://bit.ly/GMA_15_3rd_Round

LRE WATER

Appendix 5.11 —
Discussion of Socioeconomic Impacts

LRE WATER
CONNECTING WATER TO LIFE

Technical Memorandum

To:	Groundwater Management Area 15
From:	Michael R. Keester, P.G. Velma Danielson, Blanton & Associates
Date:	January 14, 2021
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 analysis 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 estimates 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 K, L, N, and P, the four RWPGs that cover some portion of GMA 15. TWDB staff has also prepared information for use by RWPGs for the 2021 RWPG initially prepared 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 15 and representatives of the GMA 15 GCDs are appointed to the four RWPGs. These members receive information related to these planning groups' meetings and regularly attend and contribute to these RWPGs. Also, GMA 15 routinely includes an item on their meeting agendas to receive reports and consider possible action related to reports and communication from GMA 15's member GCDs and GMA 15 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

Because no quantitative analytical tool is available to assess the socioeconomic impact of the DFCs, during the previous round of planning the members of GMA 15 had qualitative discussions to consider the proposed impacts that may occur (Young, 2016). These discussions, which were held during public meetings on July 15, 2015 and April 29, 2016, and through a questionnaire process, considered both positive and negative impacts. The questionnaire covered various topics related to DFC joint planning considerations. Questionnaire topic 4 specifically addressed socioeconomic (and private property rights) impacts. Questionnaire items related to socioeconomic impacts were:

- Describe the major social consequences, especially negative impacts, you would anticipate if the adopted DFC was not properly balanced (i.e., too lax or too restrictive).

- Describe the major economic consequences, especially negative impacts, you would anticipate if the adopted DFC was not properly balanced (i.e., too lax or too restrictive).

During the GMA 15 meetings on July 15, 2015 and April 29, 2016, the group discussed the GCD responses to the questionnaire regarding various topics related to DFC joint planning. In those responses, GCDs expressed concerns about the economic impact of water-level drawdown and water-use restrictions. Below is a summary of the questionnaire responses received related to socioeconomic impacts (Young, 2016):

- Potential Impacts if DFC was too lax:
    - Aquifer level declines would be expected, resulting in shallower wells eventually needing to be replaced and increased energy costs.
    - Wells could go dry, requiring landowners to drill deeper wells.
    - Principle consideration for DFC in 2070 was water level drawdown. Water quality would be a principle consideration if residents were forced to drill deeper wells.

    - Domestic/livestock and small non-municipal well producers would face significant issues with existing water wells, well drilling and operational costs would increase significantly to produce groundwater from deeper formations, and subsidence and saltwater intrusion could likely to occur or increase.
- Potential Impacts if DFC was too restrictive:
    - May trigger GCD action (e.g., water use restrictions) that could cripple local economy, which is heavily dependent on the agricultural industry.
    - Less pumping could impact irrigation, mining, and commercial use wells.
    - For economic development (especially for large-scale projects) property values would significantly diminish and existing business expansion would be curtailed.
- Other Comments/Observations:
    - No socioeconomic impacts if DFCs not properly balanced – If resulting MAG amounts from the second round were higher, the aquifers within Fayette County are not productive enough such that this level of production could occur; current MAGs could not be lowered significantly either.

In addition to the items summarized above, the GMA 15 Explanatory Report highlighted GCD concerns expressed through the questionnaire process that the economic impacts from lower water levels could result in two types of added costs: 1) the cost to deepen the well; and 2) increased pumping costs. The Goliad County GCD performed a preliminary cost impact analysis for drilling a replacement well or drilling a new well that would need to be deeper because an existing water source was no longer productive. The cost of a new or replacement well drilled at a greater depth was estimated to be $8,000 ($6,500 for a well drilled to a depth of 50 to 100 feet, plus $1,500 for an additional depth of 75 feet). Goliad County GCD also estimated that for each drop of 10 feet of water level for wells that pump a cumulative total of 7,000 acre-feet per year, the additional annual pumping cost would be approximately $1,000,000 (GCGCD, 2014).

Lastly, GMA 15 noted that the nature of socioeconomic impacts from proposed DFCs was unique from one GCD to another within a common GMA. This conclusion was based on the fact that while two or more GCDs may share a common DFC, the methods adopted by the individual GCDs to achieve the DFC through local regulatory plans would vary, thereby resulting in differences in socioeconomic impacts.

In summary, GMA 15 did not anticipate that the adoption of the DFCs would have adverse socioeconomic impacts in GMA 15 during the planning horizon. GMA 15 concluded that the DFCs would provide a balance between the highest practicable level of groundwater production and the conservation, preservation, protection, recharge and prevention of waste of groundwater, and control of subsidence in the management area based upon a review of the TWDB socioeconomic impact analysis for Regions K, L, N, and P, and all of the considerations discussed during the second round of joint planning as outlined in this memorandum.

2022 DFCs Socioeconomic Impacts Factor Discussion

The LRE Water Team notes that all the qualitative items discussed by GMA 15 during the second round of joint planning continue to be relevant considerations for the 2022 DFC joint planning cycle. All the points raised by GMA 15 GCDs regarding potential impacts to water levels resulting from DFCs that are either too lax and allow for more pumping, or are too restrictive and allow for less pumping, continue to be issues to be considered in this joint planning cycle.

For a quantitative estimate of the socioeconomic impacts, we reviewed the information developed by Dr. John Ellis (2019a; 2019b; 2019c; 2019d) for the 2021 regional water plans for Regions K, L, N, and P. 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; 2019d) indicates that the highest income and job losses in the next two decades would be associated with not meeting mining water needs. However, over through 2070 the highest losses would be from not meeting manufacturing water use needs followed by needs for power generation. Not meeting municipal water use needs does not result in high income losses, but does result in high job losses through 2070.

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 Gulf Coast Aquifer System (GCAS) which were discussed during the GMA 15 meeting on January 9, 2020 and summarized in the technical memorandum dated January 7, 2020 (http://bit.ly/GMA_15_3rd_Round). Some of these GCAS 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 GCAS strategies, we used the total strategies to calculate the income losses and job losses per acre-foot of water in the strategy and then multiplied the value by the GCAS 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 GCAS strategies from the 2017 State Water Plan along with an indication of the socioeconomic impact associated with the potential DFCs and corresponding MAG. Figure 3 and Table 3 provide the estimated income losses associated with not meeting the projected water needs with GCAS strategies. Figure 4 and Table 4 provide the estimated job losses associated with not meeting the projected water needs with GCAS strategies.

The projected income losses associated with the mining water needs are much greater than those associated with the other water use needs. However, job losses associated with not meeting municipal water needs are greater than for other uses. Once again, these estimated socioeconomic impacts are relative to one another. As Ellis (2019a; 2019b; 2019c; 2019d) 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 GCAS strategies, there is no estimated socioeconomic impact associated with the potential DFCs.

If you have any questions, please let us 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 Lavaca (Region P) Regional Water Planning Area: Prepared in Support of the 2021 Region P Regional Water Plan, 22 p.

Ellis, J.R., 2019c, Socioeconomic Impacts of Projected Water Shortages for the Lower Colorado (Region K) Regional Water Planning Area: Prepared in Support of the 2021 Region K Regional Water Plan, 23 p.

Ellis, J.R., 2019d, 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.

Goliad County Groundwater Conservation District, 2014, Economic Impact of DFC in Goliad County: Letter dated November 13, 2014 from Barbara Smith, General Manager to GMA 15, Mr. Tim Andruss, 2 p.

Young, S., 2016, Desired Future Condition Explanatory Report for Groundwater Management Area 15: Report prepared for Groundwater Management Area 15, 52 p.

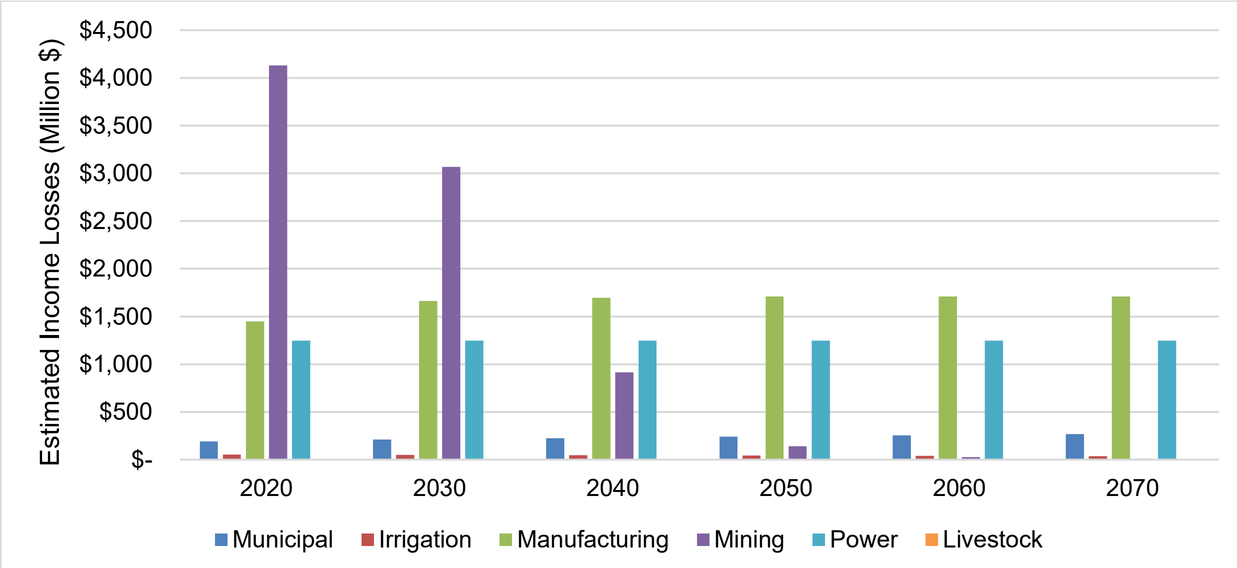


Figure 1. **Summary of estimated income losses within GMA 15 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 15). Values from Ellis (2019a; 2019b; 2019c; 2019d).**

Table 1. **Summary of estimated income losses (million $) within GMA 15 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 15). Values from Ellis (2019a; 2019b; 2019c; 2019d).**

Use	2020	2030	2040	2050	2060	2070
Municipal	$ 190.44	$ 212.17	$ 225.80	$ 239.55	$ 255.73	$ 267.25
Irrigation	$ 54.79	$ 50.42	$ 46.81	$ 42.98	$ 39.22	$ 35.93
Manufacturing	$ 1,447.95	$ 1,661.74	$ 1,695.46	$ 1,708.23	$ 1,708.23	$ 1,708.23
Mining	$ 4,130.67	$ 3,067.76	$ 915.53	$ 140.63	$ 27.37	$ 10.08
Power	$ 1,245.88	$ 1,245.88	$ 1,245.88	$ 1,245.88	$ 1,245.88	$ 1,245.88
Livestock	$ 3.26	$ 3.26	$ 3.26	$ 3.26	$ 3.26	$ 3.26

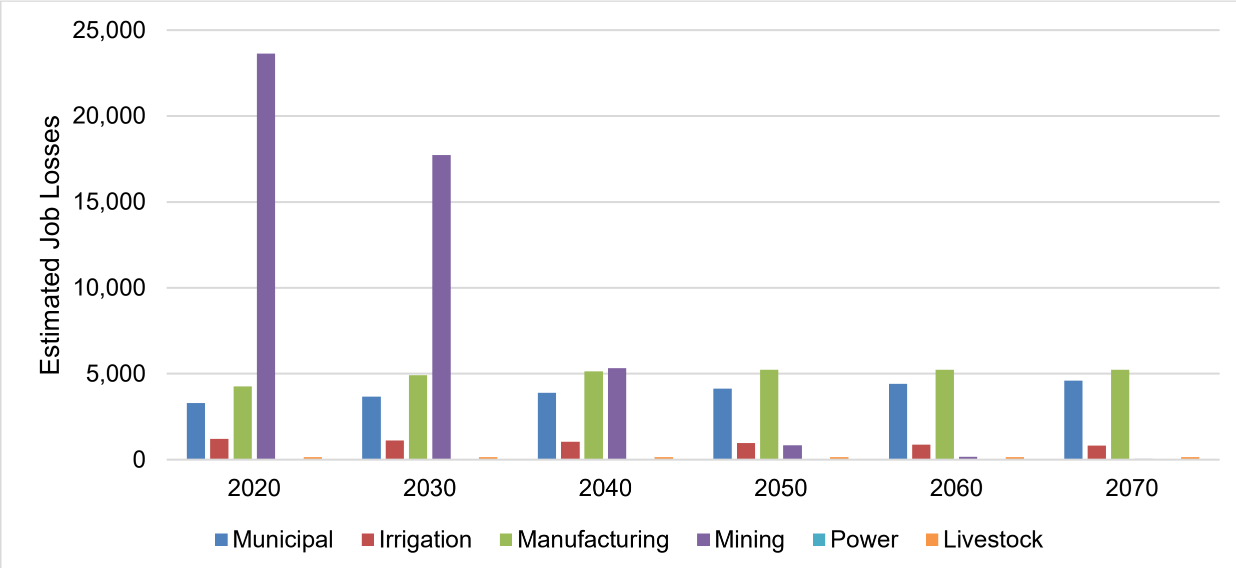


Figure 2. **Summary of estimated job losses within GMA 15 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 15). Values from Ellis (2019a; 2019b; 2019c; 2019d).**

Table 2. **Summary of estimated job losses within GMA 15 if projected water needs are not met. Estimates are for whole counties (including areas outside of GMA 15). Values from Ellis (2019a; 2019b; 2019c; 2019d).**

Use	2020	2030	2040	2050	2060	2070
Municipal	3,291	3,661	3,894	4,129	4,405	4,601
Irrigation	1,214	1,121	1,041	959	883	811
Manufacturing	4,270	4,914	5,137	5,224	5,224	5,224
Mining	23,643	17,732	5,328	829	164	61
Power	0	0	0	0	0	0
Livestock	147	147	147	147	147	147

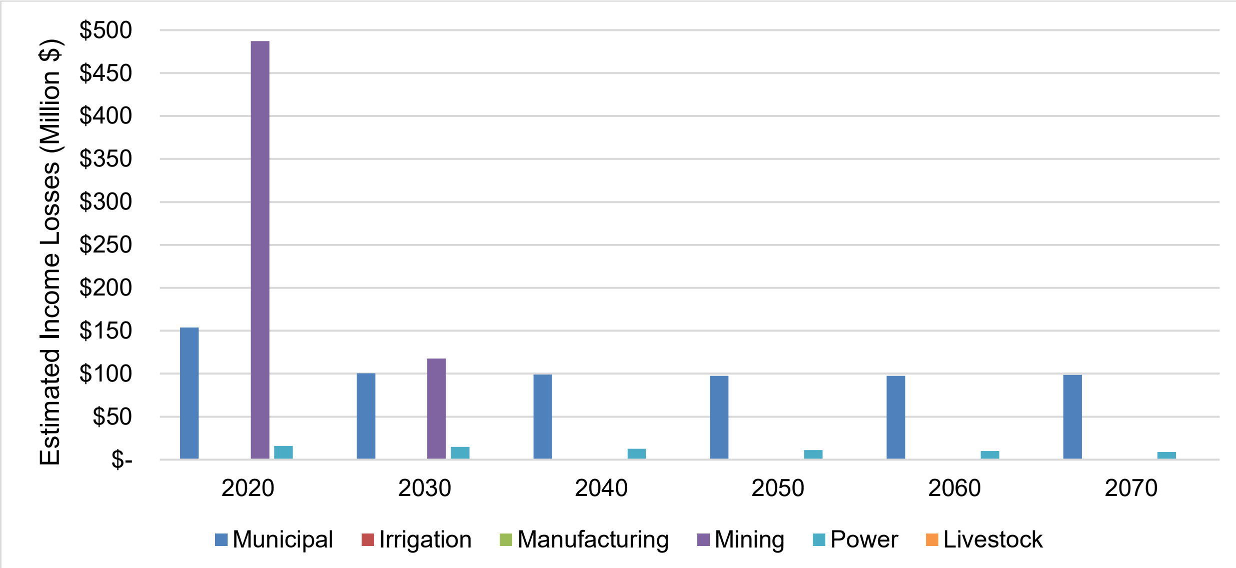


Figure 3. **Summary of estimated income losses within GMA 15 if projected water needs associated with Gulf Coast Aquifer System strategies are not met. Estimates are for whole counties (including areas outside of GMA 15).**

Table 3. **Summary of estimated income losses (million $) within GMA 15 if projected water needs associated with Gulf Coast Aquifer System strategies are not met. Estimates are for whole counties (including areas outside of GMA 15).**

Use	2020	2030	2040	2050	2060	2070
Municipal	$ 153.65	$ 100.49	$ 99.17	$ 97.67	$ 97.65	$ 98.54
Irrigation	$ -	$ -	$ -	$ -	$ -	$ -
Manufacturing	$ -	$ 0.71	$ 0.71	$ 0.71	$ 0.71	$ 0.71
Mining	$ 487.34	$ 117.79	$ -	$ -	$ -	$ -
Power	$ 16.03	$ 14.71	$ 12.64	$ 11.08	$ 9.86	$ 8.89
Livestock	NS	NS	NS	NS	NS	NS

“NS” = no strategies

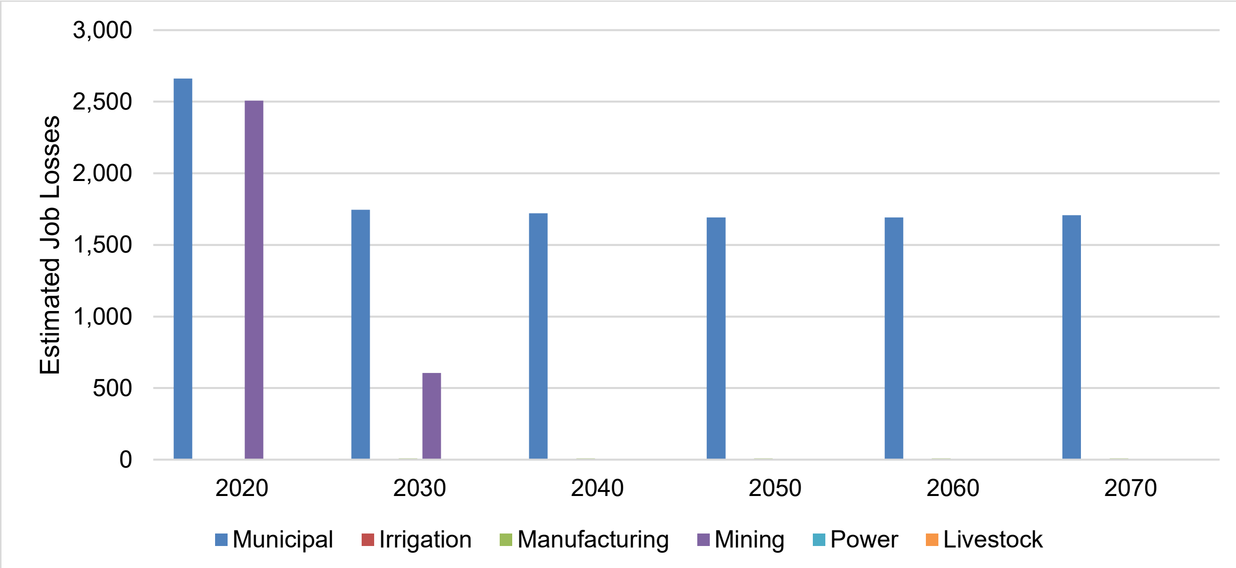


Figure 4. **Summary of estimated job losses within GMA 15 if projected water needs associated with Gulf Coast Aquifer System strategies are not met. Estimates are for whole counties (including areas outside of GMA 15).**

Table 4. **Summary of estimated job losses within GMA 15 if projected water needs associated with Gulf Coast Aquifer System strategies are not met. Estimates are for whole counties (including areas outside of GMA 15).**

Use	2020	2030	2040	2050	2060	2070
Municipal	2,663	1,745	1,720	1,692	1,691	1,707
Irrigation	0	0	0	0	0	0
Manufacturing	0	8	8	8	8	8
Mining	2,507	606	0	0	0	0
Power	0	0	0	0	0	0
Livestock	NS	NS	NS	NS	NS	NS

“NS” = no strategies

Table 5. **Summary of estimated income losses (million $) for counties within GMA 15 if projected water needs are not met. Values from Ellis (2019a; 2019b; 2019c; 2019d).**

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Aransas	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
Bee*	N	Municipal	$ 11.44	$ 12.80	$ 12.87	$ 12.62	$ 13.39	$ 13.43
		Irrigation	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	$ 62.11	$ 58.32	$ 45.42	$ 23.86	$ 13.07	$ 8.10
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Calhoun	L	Municipal	NI	NI	$ -	$ 0.06	$ 0.15	$ 0.29
		Irrigation	$ 2.32	$ 2.32	$ 2.32	$ 2.32	$ 2.32	$ 2.32
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	$ 13.51	$ 14.10	$ 10.57	$ 7.05	$ 2.68	$ 1.01
		Power	NI	NI	NI	NI	NI	NI
		Livestock	$ 3.26	$ 3.26	$ 3.26	$ 3.26	$ 3.26	$ 3.26
Colorado	K	Municipal	$ 0.04	$ 0.05	$ 0.06	$ 0.12	$ 0.22	$ 0.35
		Irrigation	$ 10.44	$ 8.86	$ 7.41	$ 6.09	$ 4.90	$ 3.84
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	$ 344.66	$ 344.66	$ 344.66	$ 344.66	$ 344.66	$ 344.66
		Livestock	NI	NI	NI	NI	NI	NI
De Witt	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	$ 0.26	$ 0.26	$ 0.19	$ 0.19	NI	NI
		Manufacturing	NI	$ 0.65	NI	NI	NI	NI
		Mining	$ 1,674.17	$ 1,554.31	$ 115.83	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Fayette*	K	Municipal	$ 9.48	$ 14.22	$ 16.01	$ 17.61	$ 19.13	$ 20.33
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	$ 0.71	$ 0.71	$ 0.71	$ 0.71	$ 0.71
		Mining	$ 504.09	$ 121.04	NI	NI	NI	NI
		Power	$ 256.40	$ 256.40	$ 256.40	$ 256.40	$ 256.40	$ 256.40
		Livestock	NI	NI	NI	NI	NI	NI
Goliad	L	Municipal	$ 0.18	$ 0.14	$ 0.11	$ 0.11	$ 0.10	$ 0.10
		Irrigation	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03
		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
Jackson	P	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
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	NI	NI	$ 34.37	$ 47.14	$ 47.14	$ 47.14
		Mining	$ 1,876.79	$ 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

Table 5 (cont.). Summary of estimated income losses (million $) for counties within GMA 15 if projected water needs are not met. Values from Ellis (2019a; 2019b; 2019c; 2019d).

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Lavaca	P	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
Matagorda	K	Municipal	NI	NI	NI	NI	$ 0.03	$ 0.16
		Irrigation	$ 20.75	$ 19.88	$ 19.04	$ 18.21	$ 17.41	$ 16.64
		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
Refugio	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
Victoria	L	Municipal	$ 164.14	$ 179.88	$ 192.09	$ 204.46	$ 216.14	$ 226.15
		Irrigation	$ 1.44	$ 1.44	$ 1.44	$ 1.44	$ 1.44	$ 1.44
		Manufacturing	$ 1,447.95	$ 1,660.38	$ 1,660.38	$ 1,660.38	$ 1,660.38	$ 1,660.38
		Mining	NI	NI	NI	NI	NI	NI
		Power	$ 644.82	$ 644.82	$ 644.82	$ 644.82	$ 644.82	$ 644.82
		Livestock	NI	NI	NI	NI	NI	NI
Wharton	K	Municipal	NI	NI	NI	NI	NI	$ 0.02
		Irrigation	$ 17.51	$ 15.68	$ 13.96	$ 12.37	$ 10.88	$ 9.51
		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
	P	Municipal	NI	NI	NI	NI	NI	$ 0.02
		Irrigation	$ 1.88	$ 1.79	$ 1.71	$ 1.62	$ 1.53	$ 1.44
		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 15		Municipal	$ 190.44	$ 212.17	$ 225.80	$ 239.55	$ 255.73	$ 267.25
		Irrigation	$ 54.79	$ 50.42	$ 46.81	$ 42.98	$ 39.22	$ 35.93
		Manufacturing	$ 1,447.95	$ 1,661.74	$ 1,695.46	$ 1,708.23	$ 1,708.23	$ 1,708.23
		Mining	$ 4,130.67	$ 3,067.76	$ 915.53	$ 140.63	$ 27.37	$ 10.08
		Power	$ 1,245.88	$ 1,245.88	$ 1,245.88	$ 1,245.88	$ 1,245.88	$ 1,245.88
		Livestock	$ 3.26	$ 3.26	$ 3.26	$ 3.26	$ 3.26	$ 3.26

"NI" = No estimated impact

*Estimates for whole county includes area outside of GMA 15

Table 6. Summary of estimated job losses for counties within GMA 15 if projected water needs are not met. Values from Ellis (2019a; 2019b; 2019c; 2019d).

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Aransas	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
Bee*	N	Municipal	222	248	250	245	258	259
		Irrigation	1	1	1	1	1	1
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	371	348	271	143	78	48
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Calhoun	L	Municipal	NI	NI	0	1	3	5
		Irrigation	54	54	54	54	54	54
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	96	100	75	50	19	7
		Power	NI	NI	NI	NI	NI	NI
		Livestock	147	147	147	147	147	147
Colorado	K	Municipal	1	1	1	2	4	6
		Irrigation	221	188	157	129	104	81
		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
De Witt	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	0	0	0	0	NI	NI
		Manufacturing	NI	9	NI	NI	NI	NI
		Mining	9,704	9,010	671	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Fayette*	K	Municipal	150	225	253	279	303	322
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	8	8	8	8	8
		Mining	2,593	623	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Goliad	L	Municipal	3	2	2	2	2	2
		Irrigation	1	1	1	1	1	1
		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
Jackson	P	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
Karnes*	L	Municipal	89	88	80	79	113	110
		Irrigation	2	2	12	12	12	12
		Manufacturing	NI	NI	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

Table 6 (cont.). Summary of estimated job losses for counties within GMA 15 if projected water needs are not met. Values from Ellis (2019a; 2019b; 2019c; 2019d).

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Lavaca	P	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
Matagorda	K	Municipal	NI	NI	NI	NI	0	3
		Irrigation	503	482	461	441	422	403
		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
Refugio	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
Victoria	L	Municipal	2,826	3,097	3,308	3,521	3,722	3,894
		Irrigation	33	33	33	33	33	33
		Manufacturing	4,270	4,897	4,897	4,897	4,897	4,897
		Mining	NI	NI	NI	NI	NI	NI
		Power	0	0	0	0	0	0
		Livestock	NI	NI	NI	NI	NI	NI
Wharton	K	Municipal	NI	NI	NI	NI	NI	0
		Irrigation	360	323	287	255	224	196
		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
	P	Municipal	NI	NI	NI	NI	NI	0
		Irrigation	39	37	35	33	32	30
		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 15		Municipal	3,291	3,661	3,894	4,129	4,405	4,601
		Irrigation	1,214	1,121	1,041	959	883	811
		Manufacturing	4,270	4,914	5,137	5,224	5,224	5,224
		Mining	23,643	17,732	5,328	829	164	61
		Power	0	0	0	0	0	0
		Livestock	147	147	147	147	147	147

"NI" = No estimated impact

*Estimates for whole county includes area outside of GMA 15

Table 7. Summary of estimated income losses (million $) for counties within GMA 15 if projected water needs associated with Gulf Coast Aquifer System strategies are not met.

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Aransas	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
Bee*	N	Municipal	$ 10.71	$ 10.73	$ 9.82	$ 8.98	$ 9.55	$ 9.57
		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
Calhoun	L	Municipal	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	NS	NS	NS	NS	NS	NS
Colorado	K	Municipal	$ 0.01	$ 0.01	$ 0.01	$ 0.02	$ 0.04	$ 0.05
		Irrigation	$ -	$ -	$ -	$ -	$ -	$ -
		Manufacturing	NI	NI	NI	NI	NI	NI
		Mining	NI	NI	NI	NI	NI	NI
		Power	NS	NS	NS	NS	NS	NS
		Livestock	NI	NI	NI	NI	NI	NI
De Witt	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NS	NS	NS	NS	NI	NI
		Manufacturing	NI	NS	NI	NI	NI	NI
		Mining	NS	NS	NS	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Fayette*	K	Municipal	$ 4.41	$ 6.23	$ 6.71	$ 6.94	$ 7.11	$ 7.20
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	$ 0.71	$ 0.71	$ 0.71	$ 0.71	$ 0.71
		Mining	$ 487.34	$ 117.79	NI	NI	NI	NI
		Power	$ 16.03	$ 14.71	$ 12.64	$ 11.08	$ 9.86	$ 8.89
		Livestock	NI	NI	NI	NI	NI	NI
Goliad	L	Municipal	$ -	$ -	$ -	$ -	$ -	$ -
		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
Jackson	P	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
Karnes*	L	Municipal	$ 1.08	$ 0.93	$ 0.76	$ 0.69	$ 1.01	$ 0.89
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	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

Table 7 (cont.). Summary of estimated income losses (million $) for counties within GMA 15 if projected water needs associated with Gulf Coast Aquifer System strategies are not met.

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Lavaca	P	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
Matagorda	K	Municipal	NI	NI	NI	NI	$ -	$ -
		Irrigation	$ -	$ -	$ -	$ -	$ -	$ -
		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
Refugio	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
Victoria	L	Municipal	$ 137.45	$ 82.59	$ 81.87	$ 81.04	$ 79.95	$ 80.82
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	$ -	$ -	$ -	$ -	$ -	$ -
		Mining	NI	NI	NI	NI	NI	NI
		Power	$ -	$ -	$ -	$ -	$ -	$ -
		Livestock	NI	NI	NI	NI	NI	NI
Wharton	K	Municipal	NI	NI	NI	NI	NI	$ -
		Irrigation	$ -	$ -	$ -	$ -	$ -	$ -
		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
	P	Municipal	NI	NI	NI	NI	NI	$ -
		Irrigation	$ -	$ -	$ -	$ -	$ -	$ -
		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 15		Municipal	$ 153.65	$ 100.49	$ 99.17	$ 97.67	$ 97.65	$ 98.54
		Irrigation	$ -	$ -	$ -	$ -	$ -	$ -
		Manufacturing	$ -	$ 0.71	$ 0.71	$ 0.71	$ 0.71	$ 0.71
		Mining	$ 487.34	$ 117.79	$ -	$ -	$ -	$ -
		Power	$ 16.03	$ 14.71	$ 12.64	$ 11.08	$ 9.86	$ 8.89
		Livestock	NS	NS	NS	NS	NS	NS

"NI" = No estimated impact
"NS" = No strategies
*Estimates for whole county includes area outside of GMA 15

Table 8. Summary of estimated job losses for counties within GMA 15 if projected water needs associated with Gulf Coast Aquifer System strategies are not met.

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Aransas	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
Bee*	N	Municipal	208	208	191	174	184	185
		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
Calhoun	L	Municipal	NI	NI	0	0	0	0
		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	NS	NS	NS	NS	NS	NS
Colorado	K	Municipal	0	0	0	0	1	1
		Irrigation	0	0	0	0	0	0
		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
De Witt	L	Municipal	NI	NI	NI	NI	NI	NI
		Irrigation	NS	NS	NS	NS	NI	NI
		Manufacturing	NI	NS	NI	NI	NI	NI
		Mining	NS	NS	NS	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Fayette*	K	Municipal	70	99	106	110	113	114
		Irrigation	NI	NI	NI	NI	NI	NI
		Manufacturing	NI	8	8	8	8	8
		Mining	2,507	606	NI	NI	NI	NI
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI
Goliad	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	NI	NI	NI	NI	NI	NI
Jackson	P	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
Karnes*	L	Municipal	19	16	13	12	17	15
		Irrigation	NS	NS	NS	NS	NS	NS
		Manufacturing	NI	NI	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

Table 8 (cont.). Summary of estimated job losses for counties within GMA 15 if projected water needs associated with Gulf Coast Aquifer System strategies are not met.

County	Region	Water Use	2020	2030	2040	2050	2060	2070
Lavaca	P	Municipal	NI	NI	NI	NI	NI	NI
Lavaca	P	Irrigation	NI	NI	NI	NI	NI	NI
Lavaca	P	Manufacturing	NI	NI	NI	NI	NI	NI
Lavaca	P	Mining	NI	NI	NI	NI	NI	NI
Lavaca	P	Power	NI	NI	NI	NI	NI	NI
Lavaca	P	Livestock	NI	NI	NI	NI	NI	NI
Matagorda	K	Municipal	NI	NI	NI	NI	0	0
Matagorda	K	Irrigation	0	0	0	0	0	0
Matagorda	K	Manufacturing	NI	NI	NI	NI	NI	NI
Matagorda	K	Mining	NI	NI	NI	NI	NI	NI
Matagorda	K	Power	NI	NI	NI	NI	NI	NI
Matagorda	K	Livestock	NI	NI	NI	NI	NI	NI
Refugio	L	Municipal	NI	NI	NI	NI	NI	NI
Refugio	L	Irrigation	NI	NI	NI	NI	NI	NI
Refugio	L	Manufacturing	NI	NI	NI	NI	NI	NI
Refugio	L	Mining	NI	NI	NI	NI	NI	NI
Refugio	L	Power	NI	NI	NI	NI	NI	NI
Refugio	L	Livestock	NI	NI	NI	NI	NI	NI
Victoria	L	Municipal	2,366	1,422	1,410	1,396	1,377	1,392
Victoria	L	Irrigation	NS	NS	NS	NS	NS	NS
Victoria	L	Manufacturing	0	0	0	0	0	0
Victoria	L	Mining	NI	NI	NI	NI	NI	NI
Victoria	L	Power	0	0	0	0	0	0
Victoria	L	Livestock	NI	NI	NI	NI	NI	NI
Wharton	K	Municipal	NI	NI	NI	NI	NI	0
Wharton	K	Irrigation	0	0	0	0	0	0
Wharton	K	Manufacturing	NI	NI	NI	NI	NI	NI
Wharton	K	Mining	NI	NI	NI	NI	NI	NI
Wharton	K	Power	NI	NI	NI	NI	NI	NI
Wharton	K	Livestock	NI	NI	NI	NI	NI	NI
Wharton	P	Municipal	NI	NI	NI	NI	NI	0
Wharton	P	Irrigation	0	0	0	0	0	0
Wharton	P	Manufacturing	NI	NI	NI	NI	NI	NI
Wharton	P	Mining	NI	NI	NI	NI	NI	NI
Wharton	P	Power	NI	NI	NI	NI	NI	NI
Wharton	P	Livestock	NI	NI	NI	NI	NI	NI
GMA 15		Municipal	2,663	1,745	1,720	1,692	1,691	1,707
GMA 15		Irrigation	0	0	0	0	0	0
GMA 15		Manufacturing	0	8	8	8	8	8
GMA 15		Mining	2,507	606	0	0	0	0
GMA 15		Power	0	0	0	0	0	0
GMA 15		Livestock	NS	NS	NS	NS	NS	NS

"NI" = No estimated impact
"NS" = No strategies
*Estimates for whole county includes area outside of GMA 15

Appendix 5.12 —
Presentation Regarding Socioeconomic Impacts

DISCUSSION OF SOCIOECONOMIC IMPACTS

October 8, 2020

LRE WATER

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 (K, L, N, and P) to indirectly assess socioeconomic impacts related to DFCs and expected MAG

2016 CONSIDERATIONS SUMMARY

- DFC too lax
  - **Replacement of “dry” wells**
  - Increased energy costs
  - Water quality degradation
  - Subsidence
- DFC too restrictive
  - Less groundwater availability
  - Decreased property values

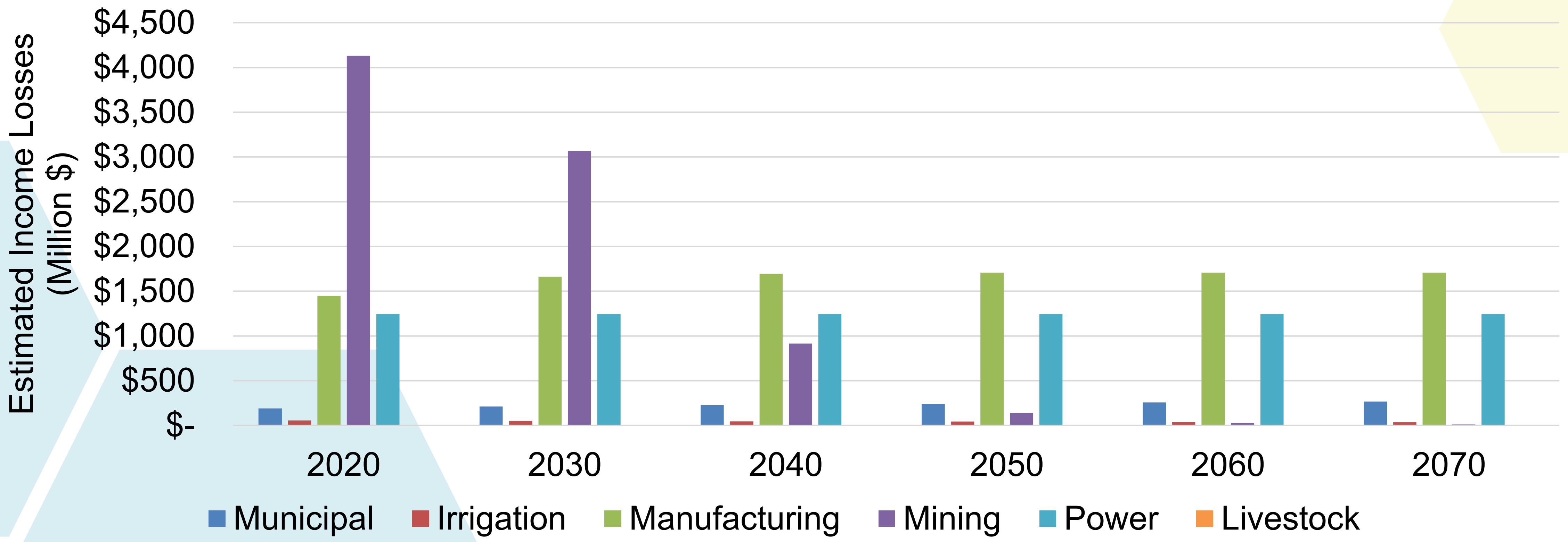
LRE WATER

CURRENT CONSIDERATIONS

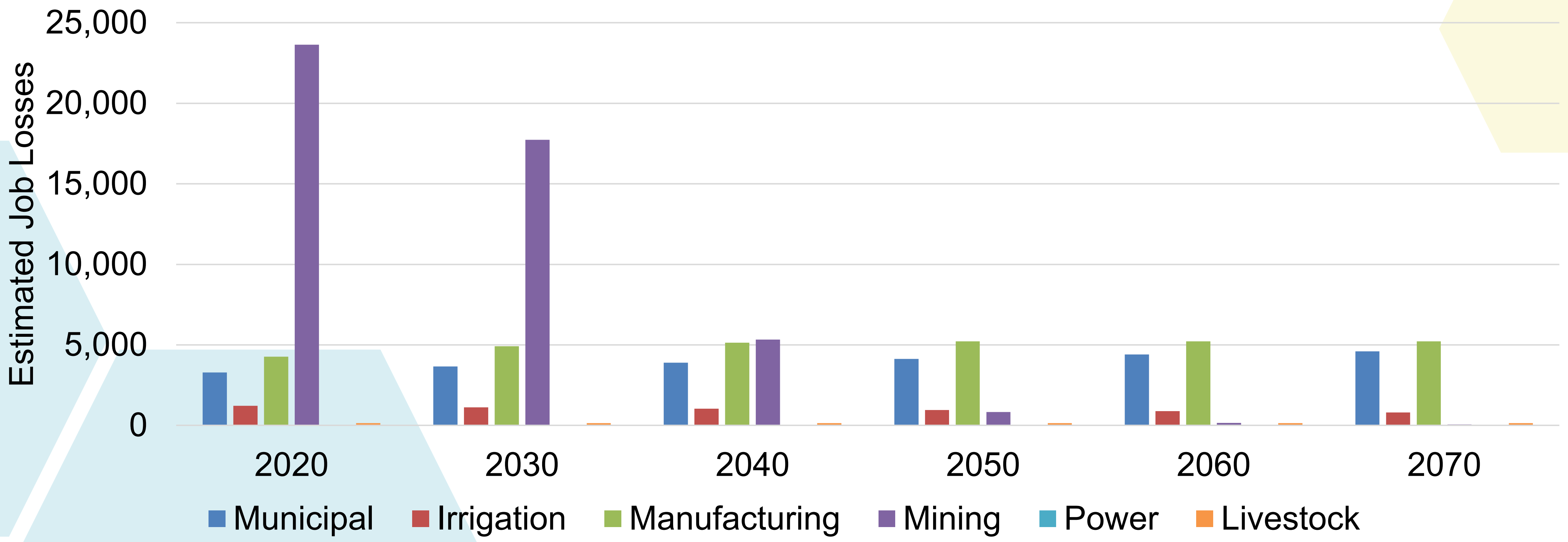
- 2016 considerations are still applicable
- 2021 RWPG socioeconomic impacts
  - Income losses
  - Job losses
- Estimated socioeconomic impacts from GCAS strategies using impact per acre-foot

LRE WATER

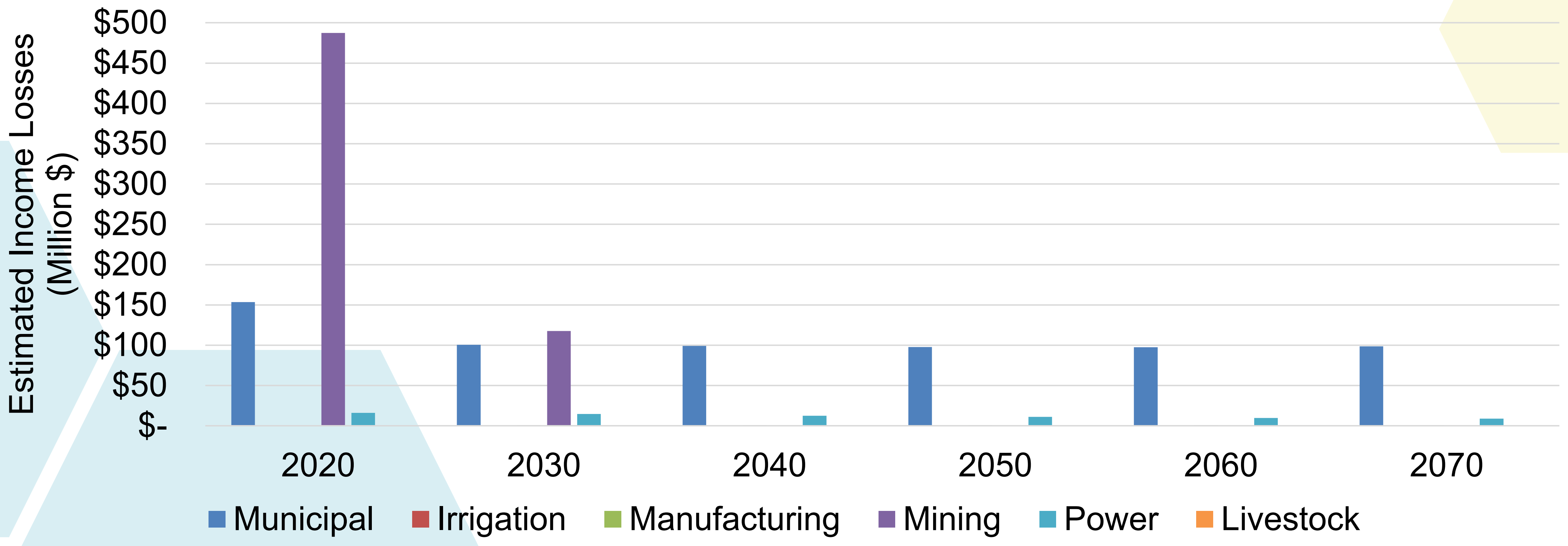
GMA 15 ESTIMATED INCOME LOSSES OF NOT MEETING PROJECTED WATER NEEDS



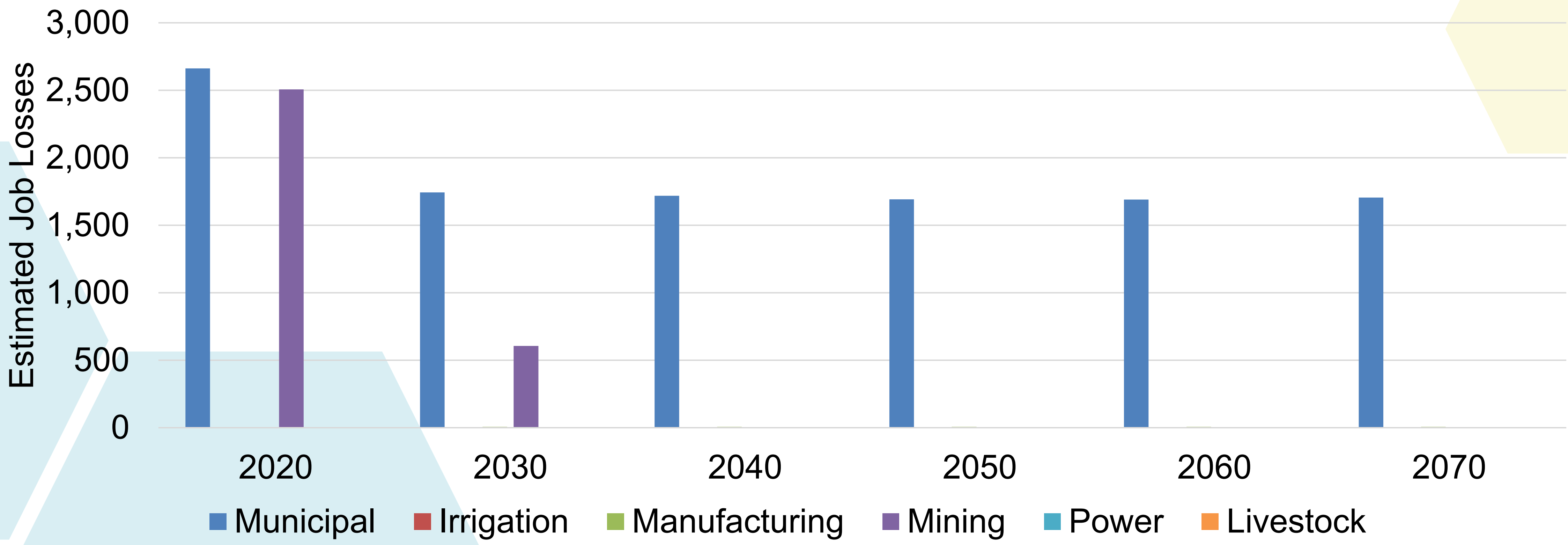
GMA 15 ESTIMATED JOB LOSSES OF NOT MEETING PROJECTED WATER NEEDS



GMA 15 ESTIMATED INCOME LOSSES OF NOT MEETING PROJECTED WATER NEEDS ASSOCIATED WITH GCAS STRATEGIES



GMA 15 ESTIMATED JOB LOSSES OF NOT MEETING PROJECTED WATER NEEDS ASSOCIATED WITH GCAS STRATEGIES



GCAS SOCIOECONOMIC IMPACTS

- Municipal needs largest impacts
  - Victoria County
  - Bee County
  - Fayette County
- Fayette County
  - Manufacturing
  - Mining
  - Power
- RWPG data suggests little socioeconomic impact related to irrigation
  - Current strategies tied to surface water sources, not GCAS MAG

QUESTIONS/COMMENTS

Discussion of Socioeconomic Impacts

October 8, 2020

Appendix 5.13 —
Discussion of the Impacts of Desired Future Conditions on the Interests and Rights in Private Property

Technical Memorandum

To:	Groundwater Management Area 15
From:	Michael R. Keester, P.G. Velma Danielson, Blanton & Associates
Date:	January 14, 2021
Project:	2021 Joint Planning
Subject:	Discussion of the Impacts of Desired Future Conditions on the Interests and Rights in Private Property

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."

In its considerations in the 2016 joint planning cycle, the Groundwater Management Area 15 (GMA 15) members recognized that the primary vehicle by which private property rights were protected was each GCD's Management Plan and Rules. Because local conditions varied – hydrogeological, environmental, and socioeconomic conditions – across GMA 15, the manner in which each GCD protected private property rights varied (Young, 2016).

2016 DFCs Private Property Impacts Factor Discussion

In the 2016 joint planning cycle, GMA 15 members considered private property rights through review of their GCD Management Plans and relevant court cases. Additionally, they discussed private property rights by reviewing responses to a questionnaire, specifically the perceived positive and negative impacts of the proposed DFCs on private property rights. The discussion focused on whether the DFCs did or did not achieve 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 (Young, 2016).

Topic 4 in the questionnaire distributed during the previous round of joint planning asked the GMA 15 members to respond to the following: *Describe the consequences related to private property rights, especially negative impacts you would anticipate if the DFC is not properly balanced (such as too lax or too restrictive).* At the GMA 15 meetings on July 15, 2015 and April 29, 2016, the members discussed their responses. As stated in the Explanatory Report, the members responded that there would be undesirable consequences that affect individual landowners if the DFCs are too lax or too restrictive (Young, 2016). Below are those responses as presented by Dr. Steve Young at the July 15, 2015 meeting:

- If the DFCs are too lax:
    - May cause landowners that needed to replace their wells, begin to question their rights or legal ramification for damages caused by other permitted pumping.
    - The principle consideration in establishing a DFC for 2070 is water level drawdown. Water quality is also a principle consideration and could become a critical issue if residents were forced to drill deeper wells in order to have an adequate supply of drinking water.
    - Potentially, groundwater production may negatively impact the availability and quality of groundwater resources of adjacent and near-by property owners.
- If the DFCs are too restrictive:
    - Could lead to permit cutbacks and landowner takings claims against the Districts.
    - Less pumping could impact irrigation use, mining, and commercial use wells in the County.
    - Landowners may realize significant limitations regarding the development of groundwater resources associated with their property.

One additional comment submitted by one GMA 15 member further noted:

> “We do not feel there will be any socio-economic or private property rights impacts if the DFCs are not properly balanced (neither too lax or too restrictive). Even if the modeled available groundwater numbers (MAGs) that come out of the current round of joint groundwater planning are significantly higher than previous MAGs, the aquifers within Fayette County are not productive enough that this type of production would actually occur. And current MAGs cannot be lowered significantly so that would not appear to be a valid concern for our district either at this time.”

After further discussion, the majority of the GMA 15 members did not anticipate that the adoption of the DFCs would impact the hydrological conditions significantly affecting personal property rights. However, Goliad County GCD stated that the adoption of the proposed DFCs could significantly impact the interests and rights in private property within Goliad County (Young, 2016).

2022 DFCs Private Property Impacts Factor Discussion

The LRE Water Team notes that the qualitative concerns discussed by GMA 15 during the second round of joint planning generally continue to be relevant considerations for the 2022 DFC joint planning cycle. Many, if not all, of the concerns regarding the consequences from adopting DFCs that are too lax or too restrictive and not properly balanced, as expressed in the questionnaire responses, remain applicable in the 2022 joint planning cycle.

The adopted 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 15 members adopted a predictive pumping scenario that reasonable reflects the highest practicable level of groundwater production. While it may be possible to produce greater amounts of groundwater from the Gulf Coast Aquifer System, for this consideration we 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 15 members were able to evaluate the model results for various scenarios to assess the DFC balance. In addition, incorporating the uncertainty of the model predictions into the results from the adopted pumping scenario helps to improve how well the potential DFCs will achieve the balance.

With regard to private property rights and the ownership of groundwater, the pumping scenarios considered by GMA 15 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 the model results using one of the GMA 15 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 is too lax or too restrictive.

If you have any questions, please let us know.

References

Young, S., 2016, Desired Future Condition Explanatory Report for Groundwater Management Area 15: Report prepared for Groundwater Management Area 15, 52 p.

Appendix 5.14 —
Presentation Regarding Impacts of Desired Future Conditions on the Interests and Rights in Private Property

DISCUSSION OF PRIVATE PROPERTY RIGHTS

October 8, 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

2016 CONSIDERATIONS SUMMARY

- DFC too lax
  - ➢ **Replacement of "dry" wells**
  - ➢ Water quality degradation
  - ➢ **Impacts on neighbor's groundwater** availability

- DFC too restrictive
  - ➢ Takings claims
  - ➢ Less groundwater availability
  - ➢ Decreased property values

Highest Practicable Level of Groundwater Production

Conservation, Preservation, Protection, Recharging, and Prevention of Waste of Groundwater, and Control of Subsidence

CURRENT CONSIDERATIONS

- 2016 considerations are still applicable
- 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

DISCUSSION

- Balance test considered through scenario evaluations
  - Predicted pumping
  - Water level changes
  - Uncertainty of results
- Previous round considerations remain applicable
- No significant impact on private property rights is apparent

QUESTIONS/COMMENTS

Discussion of Private Property Rights

October 8, 2020

LRE WATER

Appendix 5.15 —
Discussion of Feasibility of Achieving the DFCs

LRE WATER
CONNECTING WATER TO LIFE

Technical Memorandum

To:	Groundwater Management Area 15
From:	Michael R. Keester, P.G. Velma Danielson, Blanton & Associates
Date:	January 14, 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." Considering the feasibility of achieving a proposed DFC requires a clear understanding of what is meant by feasibility and how it will be assessed. During the previous round of joint planning, as Young (2016) describes, GMA 15 considered the proposed DFCs feasible if they were consistent with the GAM results. However, the feasibility of achieving the proposed DFCs could also be considered relative to measured water levels.

Young (2016) summarized the origin of the concept of reviewing the feasibility of achieving the DFCs as dating back to rules adopted by the TWDB for handling DFC petitions. As Dr. Young (2016) summarized, the TWDB would consider if a DFC was physically possible from a hydrological perspective. However, when applying the consideration to the review of DFC petitions, as long as the DFC could be modeled using the TWDB's adopted GAM, then the DFC was considered to be reasonable. Extending the TWDB's consideration of DFC reasonableness within the context of a petition to considering "the feasibility of achieving the desired future condition" suggests that if the DFCs can be modeled using the TWDB's adopted GAM, then they are feasible.

Summary of Second Round of DFC Joint Planning Considerations

During the previous round of joint planning, questionnaire responses from several member districts suggested using water level measurements to assess compliance with the adopted DFCs. Two of the responses to the questionnaire indicated that a variance of 25 percent between the GAM predicted average drawdown and the measured water level change would be acceptable. This variance was deemed appropriate based on the inherit uncertainty in the GAM with regard to its ability to predict drawdown.

Dr. Young (2016) presented several sources of information documenting the known error and uncertainty in the GAM. He also presented information related to ongoing studies in support of the development of the new GAM for GMAs 15 and 16. While the information presented is very helpful in understanding the issues associated with the GAM and the work that is being conducted to improve its ability to model the hydrogeologic conditions, it does not quantitatively consider how measured water levels have been changing recently relative to the predictions of the GAM.

Third Round of DFC Joint Planning Considerations

As Dr. Young (2016) summarized, in practice the test for the reasonableness of DFCs was whether or not they could be modeled with the TWDB adopted GAM for the aquifer(s). For the this third round of joint planning we looked to further the consideration by looking more closely at whether proposed DFCs were physically possible from a hydrological perspective. To investigate the question of how measured water level change compares with the GAM predictions, we began by reviewing wells located within GMA 15 that are identified as a “current observation well” or “recorder well” in the TWDB Groundwater Database (TWDB, 2020). Of the 323 wells identified, we filtered out 117 wells due to factors such as having too few measurements, no recent measurements, only recent measurements, or being in a location where the model cell goes dry. For the remaining 206 wells, we obtained the reported water level measurements along with the simulated water levels associated with the pumping file adopted for use during the November 15, 2019 GMA 15 meeting (ID: GMA15_2019_001_v1). 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. However, for GMA 15 the DFCs are stated in terms of average drawdown across a geographic area. Evaluating how well the model matches measured water levels may indicate that drawdown is also reasonably predicted, but comparing the trend of the measured and modeled water levels allows one 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 while the simulated water level decline trend may be 0.5 feet per year. 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). As shown in Supplementary Table 2, the largest range (-2.45 to 3.50 feet per year) in trends is from wells completed in the Jasper Aquifer in Lavaca County. For most counties with multiple observation wells, there is a mix of trends with some wells showing water level rise (positive trend) and some wells showing water level decline (negative trend). For the Gulf Coast Aquifer System (GCAS), the average trend for GMA 15 indicates relatively stable water levels. Figure 2 illustrates the trends in measured water levels across GMA 15. 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 2020 as this period was comparable to the period for which measured water levels were available. In addition, beyond the year 2020 the predictive pumping would have a greater influence on the estimated trend in simulated water levels. Supplementary Table 3 shows how the range in trends is generally smaller for the simulated water levels in comparison to the measured water levels. Also, the average simulated water level trend for GMA 15 shows a slightly higher decline rate than the measured water levels. Of note, for the GCAS there are three counties (Goliad, Refugio, and Victoria) where the measured water levels indicate a decline in water levels but the simulated water level trend indicates rising water levels and three counties (Colorado, Jackson, and Matagorda) where the opposite is the case.

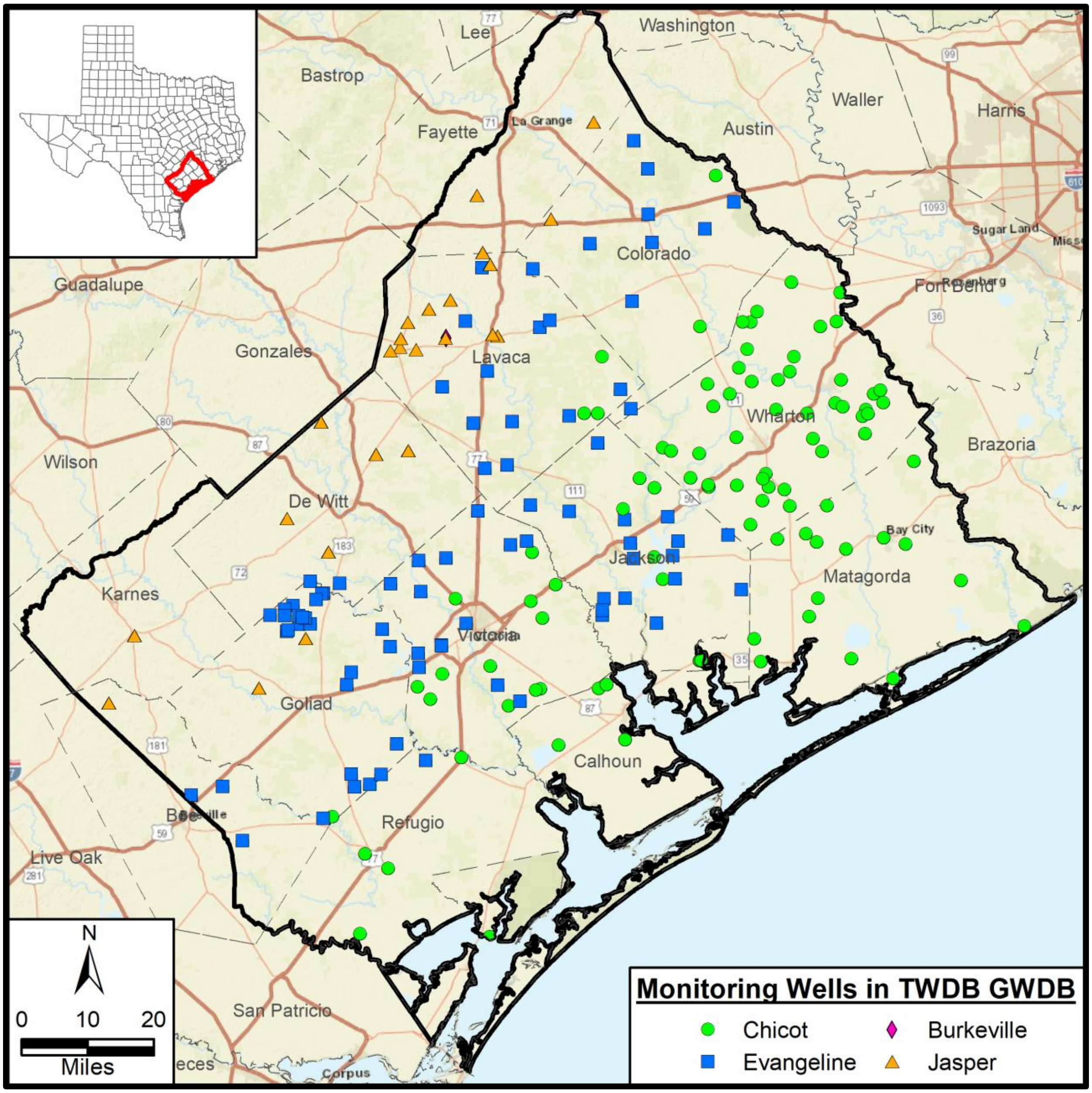


Figure 1. **Location of observation wells in the TWDB Groundwater Database (TWDB, 2020) located in each county and hydrogeologic unit of the Gulf Coast Aquifer System within GMA 15.**

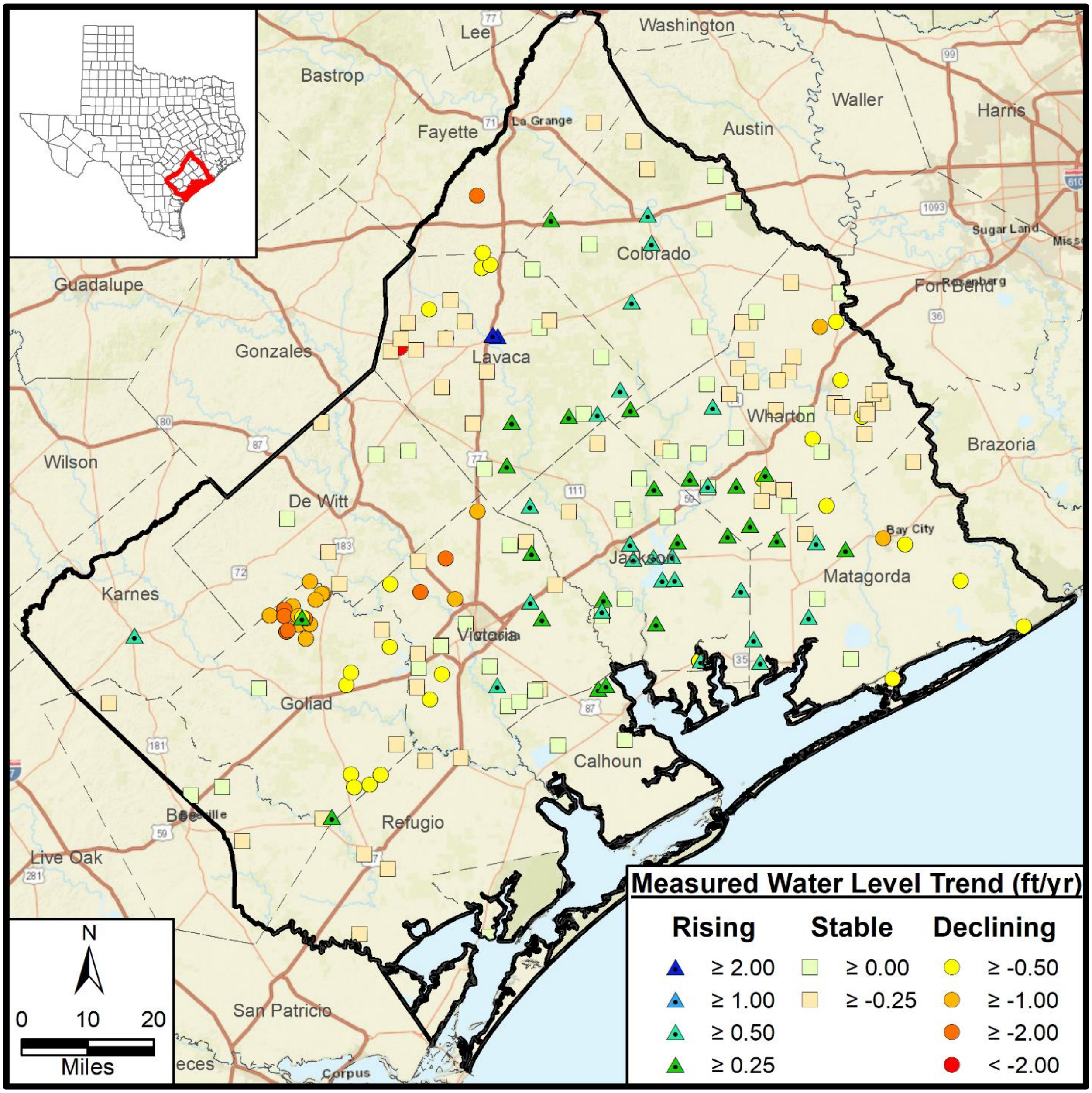


Figure 2. **Average trend of measured water levels in feet per year (ft/yr) from observation wells in the TWDB Groundwater Database (TWDB, 2020) located in each county and hydrogeologic unit of the Gulf Coast Aquifer System within GMA 15.**

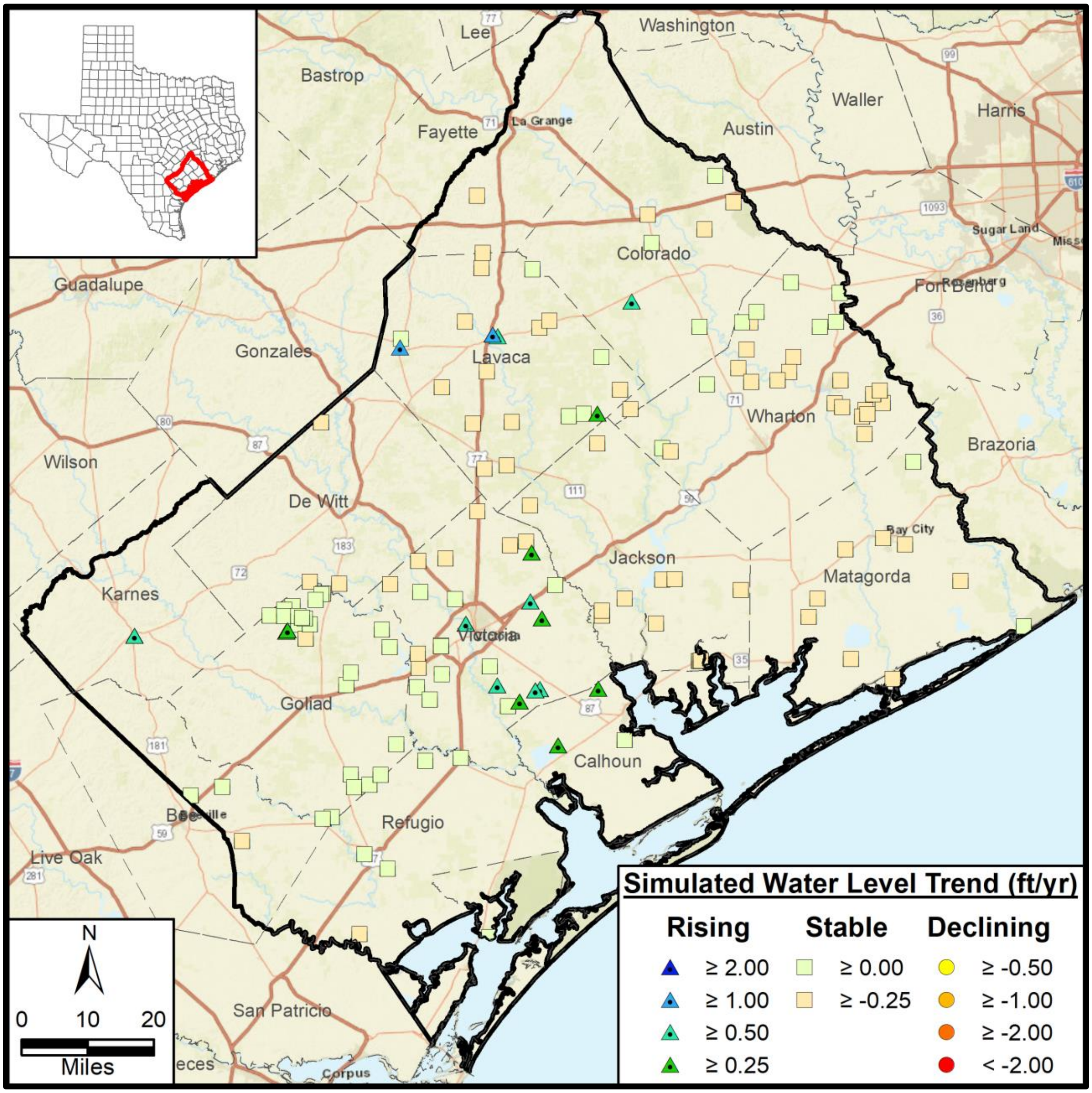


Figure 3. **Average trend of simulated water levels in feet per year (ft/yr) at observation well locations in each county and hydrogeologic unit of the Gulf Coast Aquifer System within GMA 15.**

With the simulated GMA 15 pumping in the model 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 counties with trends that are of opposite sign (that is, negative measured trend and positive simulated trend), such as the six counties listed above, the results suggest the GAM is not reasonably predicting future drawdown. To visualize the measured and simulated water level trends as well as the differences in trends, we prepared maps illustrating the average values for each county in GMA 15 (Appendix B). In Appendix B we also provide a brief summary of our observations for each aquifer within the GCAS and the GCAS as a whole.

For areas or aquifers with a rising measured water level trend and a declining simulated water level trend, the potential DFCs appear to be easily achievable. However for areas or aquifers where the measured water level trend is declining, but the simulated water level trend is rising, physically achieving a potential drawdown DFC would be more challenging. Similarly, even if the trend is the same, the difference between the trends could make physically achieving a potential drawdown DFC difficult. To help address these difficulties and the feasibility of potential drawdown-based DFCs, a variance should be applied similar to the variance used during the previous round of joint planning.

To quantify the potential variance from the measured water level, we calculated the root mean square error (RMSE) between the average measured water level trend and the average simulated water level trend (Table 1). These values provide an indication of how well the trends match and the potential error we can expect from predicted values. One simple way to quantify the variance for a potential drawdown-based DFC is to use the RMSE as an error bound on the average drawdown. For example, the Evangeline in De Witt County has a RMSE of 0.08 ft/yr which would result in a variance of 6.4 feet after 80 years.

Review of the RMSE values in Table 1 indicates that the greatest error is generally associated with wells completed in the Jasper Aquifer. When considering the full GCAS, the overall results could be skewed by the generally larger error associated with the Jasper. In addition, in areas with few wells (see Supplementary Table 1) or poor spatial distribution of wells (see Figure 1), the error may not accurately reflect the variance for the overall aquifer system. Conducting the analysis with additional observation well locations and the associated water-level measurements from those locations will improve the assessment of the ability of the GAM to simulate the trends in measured water levels.

Table 2 provides the average drawdown at the end of 2080 using the adopted pumping file. The table also provides the range of the potential average drawdown values based on the RMSE for the trends (Table 1). In areas with a large RMSE value, such as the Jasper Aquifer in Lavaca County, there is large range for the variance. With the overall RMSE for the GCAS in GMA 15 being nearly 0.7 ft/yr, we can expect a large range for most areas though some locations, such as the GCAS in Refugio County, do show a relatively small variance in average drawdown. Appendix C contains fan charts that illustrate how the variance increases across the predictive period.

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	Chicot	Evangeline	Burkeville	Jasper	GCAS
Aransas	0.03	—	—	—	0.03
Bee	—	0.05	—	0.18	0.10
Calhoun	0.16	—	—	—	0.16
Colorado	0.14	0.42	—	1.14	0.49
De Witt	—	0.08	—	0.75	0.69
Fayette	—	—	—	0.88	0.88
Goliad	0.18	0.81	—	0.58	0.78
Jackson	0.74	0.69	—	—	0.70
Karnes	—	—	—	0.23	0.23
Lavaca	0.34	0.29	0.27	1.59	1.04
Matagorda	0.73	—	—	—	0.73
Refugio	0.08	0.12	—	—	0.09
Victoria	0.38	0.55	—	—	0.48
Wharton	0.60	—	—	—	0.60
GMA 15	**0.57**	**0.62**	**0.27**	**1.19**	**0.69**

Table 2. **Average drawdown (feet) on 12/31/2080 from 01/01/2000 and the estimated variance (in parenthesis) calculated using the RMSE between the average measured water level trend and the simulated water level trend (Table 1). "—" indicates hydrogeologic unit is not present in the county. If RMSE was not available for a hydrogeologic unit, the value for the GCAS was applied.**

County	Chicot	Evangeline	Burkeville	Jasper	GCAS
Aransas	0 (-2 to 2)	6 (3 to 8)	—	—	0 (-2 to 2)
Bee*	8 (0 to 16)	16 (12 to 21)	11 (3 to 19)	5 (-10 to 19)	10 (2 to 18)
Calhoun	-1 (-15 to 12)	10 (-3 to 23)	3 (-10 to 16)	—	3 (-11 to 16)
Colorado	12 (1 to 24)	26 (-8 to 60)	24 (-16 to 63)	28 (-64 to 121)	23 (-17 to 63)
De Witt	0 (-56 to 56)	5 (-2 to 11)	19 (-37 to 75)	34 (-26 to 95)	21 (-35 to 77)
Fayette	—	11 (-60 to 83)	43 (-28 to 114)	53 (-18 to 124)	44 (-27 to 116)
Goliad	-4 (-19 to 10)	-2 (-67 to 64)	4 (-59 to 68)	8 (-39 to 55)	3 (-60 to 66)
Jackson	15 (-44 to 75)	20 (-36 to 76)	14 (-43 to 71)	22 (-35 to 79)	18 (-40 to 75)
Karnes	—	-1 (-19 to 17)	22 (3 to 40)	25 (7 to 43)	22 (3 to 40)
Lavaca	7 (-21 to 35)	7 (-16 to 30)	17 (-5 to 39)	32 (-96 to 161)	18 (-66 to 102)
Matagorda	5 (-55 to 64)	17 (-42 to 76)	16 (-43 to 75)	—	10 (-49 to 69)
Refugio	0 (-7 to 6)	7 (-3 to 17)	3 (-5 to 10)	—	3 (-4 to 10)
Victoria	-4 (-35 to 27)	6 (-38 to 50)	5 (-34 to 43)	8 (-30 to 47)	3 (-35 to 42)
Wharton	15 (-34 to 63)	12 (-37 to 61)	24 (-25 to 73)	27 (-21 to 76)	19 (-29 to 68)
GMA 15	**6** **(-40 to 52)**	**12** **(-39 to 62)**	**16** **(-6 to 38)**	**24** **(-72 to 121)**	**14** **(-42 to 71)**

*Average drawdown is for all of Bee County, not just the portion in GMA 15

During the previous round of planning, the DFCs were considered feasible if the model results were within 3.5 feet (5.0 feet for Goliad County) of the proposed DFC. This variance allowed the TWDB to simulate the DFCs and develop the resulting modeled available groundwater. Evaluation of the measured water level trends compared to the modeled water level trends, since January 1, 2000, suggest a greater variance on the model results may be needed for managing the groundwater resources. Application of a greater variance may allow for results from water level monitoring (that is, real world measurements) to be more consistent with the DFCs (that is, the physical possibility of achieving the DFCs), particularly in areas where there is a declining measured water level trend and a rising simulated water level trend. Table 2 provides one possible variance on the predicted average drawdown for management purposes, though other evaluation methods may provide differing values.

With this stated, we encourage the GMA 15 members to carefully evaluate and discuss the differences between measured water levels and model results as you collect additional water level measurements. Evaluation of new data will not only determine the achievement of your DFCs, but will also help refine the appropriate variance on the predicted average drawdown over the long-term. Also, with these additional water level measurements, the GMA 15 members may decide to update 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. In the mean-time, a smaller variance than shown in Table 1 (such as those used during the previous round of planning) would also be sufficient for this 3rd round of joint planning, the DFC development process, and TWDB modeling to produce modeled available groundwater values.

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).

STATE OF TEXAS
MICHAEL R. KEESTER
GEOLOGY
10331
PROFESSIONAL LICENSED GEOSCIENTIST

01/14/2021

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.

Texas Water Development Board, 2020, Groundwater Database Reports, http://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp, accessed September 2020.

Young, S., 2016, Desired Future Condition Explanatory Report for Groundwater Management Area 15: Report prepared for Groundwater Management Area 15, 52 p.

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 hydrogeologic unit of the Gulf Coast Aquifer System (GCAS) within GMA 15.

County	Chicot	Evangeline	Burkeville	Jasper	GCAS
Aransas	1	0	0	0	1
Bee	0	3	0	1	4
Calhoun	4	0	0	0	4
Colorado	2	10	0	1	13
De Witt	0	1	0	6	7
Fayette	0	0	0	3	3
Goliad	1	27	0	2	30
Jackson	7	17	0	0	24
Karnes	0	0	0	1	1
Lavaca	3	12	1	11	27
Matagorda	16	0	0	0	16
Refugio	4	1	0	0	5
Victoria	12	14	0	0	26
Wharton	45	0	0	0	45
GMA 15	**95**	**85**	**1**	**25**	**206**

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 hydrogeologic unit of the Gulf Coast Aquifer System (GCAS) within GMA 15. Range of trends in measured water levels provided in parentheses (minimum to maximum). "—" indicates no data for calculating a trend or only a single well and no range in trends available. Negative values indicate a declining water level trend while positive values indicate a rising water level trend.

County	Chicot	Evangeline	Burkeville	Jasper	GCAS
Aransas	0.03 (–)	—	—	—	0.03 (–)
Bee	—	0.02 (-0.07 to 0.07)	—	-0.18 (–)	-0.03 (-0.18 to 0.07)
Calhoun	0.20 (0.08 to 0.32)	—	—	—	0.20 (0.08 to 0.32)
Colorado	0.02 (0.01 to 0.03)	0.23 (-0.04 to 0.75)	—	0.26 (–)	0.20 (-0.04 to 0.75)
De Witt	—	-0.08 (–)	—	0.00 (-0.23 to 0.18)	-0.01 (-0.23 to 0.18)
Fayette	—	—	—	-0.72 (-1.54 to -0.16)	-0.72 (-1.54 to -0.16)
Goliad	0.26 (–)	-0.61 (-1.62 to 0.28)	—	-0.42 (-0.94 to 0.10)	-0.56 (-1.62 to 0.28)
Jackson	0.34 (-0.33 to 0.80)	0.35 (-0.15 to 0.84)	—	—	0.35 (-0.33 to 0.84)
Karnes	—	—	—	0.82 (–)	0.82 (–)
Lavaca	0.37 (0.01 to 0.90)	0.04 (-0.43 to 0.53)	-0.57 (–)	0.15 (-2.45 to 3.50)	0.10 (-2.45 to 3.50)
Matagorda	0.07 (-0.82 to 0.96)	—	—	—	0.07 (-0.82 to 0.96)
Refugio	-0.06 (-0.10 to -0.01)	-0.05 (–)	—	—	-0.06 (-0.10 to -0.01)
Victoria	-0.02 (-0.59 to 0.54)	-0.19 (-1.23 to 0.65)	—	—	-0.11 (-1.23 to 0.65)
Wharton	-0.02 (-0.51 to 0.56)	—	—	—	-0.02 (-0.51 to 0.56)
GMA 15	**0.05 (-0.82 to 0.96)**	**-0.12 (-1.62 to 0.84)**	**-0.57 (–)**	**-0.02 (-2.45 to 3.50)**	**-0.03 (-2.45 to 3.50)**

Supplementary Table 3. Average trend of simulated water levels in feet per year (ft/yr) at observation well locations in each county and hydrogeologic unit of the Gulf Coast Aquifer System (GCAS) within GMA 15. Range of trends in simulated water levels provided in parentheses (minimum to maximum). "—" indicates no corresponding measured data for calculating a trend or only a single well and no range in trends available. Negative values indicate a declining water level trend while positive values indicate a rising water level trend.

County	Chicot	Evangeline	Burkeville	Jasper	GCAS
Aransas	0.01 (–)	—	—	—	0.01 (–)
Bee	—	0.04 (-0.01 to 0.11)	—	-0.36 (–)	-0.06 (-0.36 to 0.11)
Calhoun	0.27 (0.08 to 0.38)	—	—	—	0.27 (0.08 to 0.38)
Colorado	0.13 (0.05 to 0.21)	-0.06 (-0.54 to 0.49)	—	-0.89 (–)	-0.10 (-0.89 to 0.49)
De Witt	—	0.00 (–)	—	-0.53 (-1.26 to -0.17)	-0.45 (-1.26 to 0.00)
Fayette	—	—	—	-0.36 (-0.75 to -0.16)	-0.36 (-0.75 to -0.16)
Goliad	0.08 (–)	0.06 (0.00 to 0.30)	—	-0.26 (-0.30 to -0.22)	0.04 (-0.30 to 0.30)
Jackson	-0.27 (-0.56 to -0.08)	-0.27 (-0.52 to -0.08)	—	—	-0.27 (-0.56 to -0.08)
Karnes	—	—	—	0.59 (–)	0.59 (–)
Lavaca	0.19 (0.07 to 0.31)	-0.06 (-0.12 to 0.04)	-0.30 (–)	0.12 (-0.89 to 1.91)	0.03 (-0.89 to 1.91)
Matagorda	-0.26 (-0.75 to 0.02)	—	—	—	-0.26 (-0.75 to 0.02)
Refugio	0.01 (0.00 to 0.02)	0.07 (–)	—	—	0.02 (0.00 to 0.07)
Victoria	0.29 (0.05 to 0.64)	0.11 (-0.15 to 0.93)	—	—	0.19 (-0.15 to 0.93)
Wharton	-0.32 (-1.05 to 0.19)	—	—	—	-0.32 (-1.05 to 0.19)
GMA 15	**-0.16 (-1.05 to 0.64)**	**-0.03 (-0.54 to 0.93)**	**-0.30 (–)**	**-0.16 (-1.26 to 1.91)**	**-0.11 (-1.26 to 1.91)**

Appendix B –
Maps Illustrating the Differences in Trends

For the Chicot Aquifer, the average measured trend for each county was either stable or rising (Figure 4). However, the average simulated trend for three of the counties was declining (Figure 5). The greatest difference (more than 0.50 ft/yr) between measured and simulated water level trends for the Chicot Aquifer is in Jackson County (Figure 6). Four counties have the measured and simulated water level trends in the Chicot Aquifer in opposite directions (Figure 7).

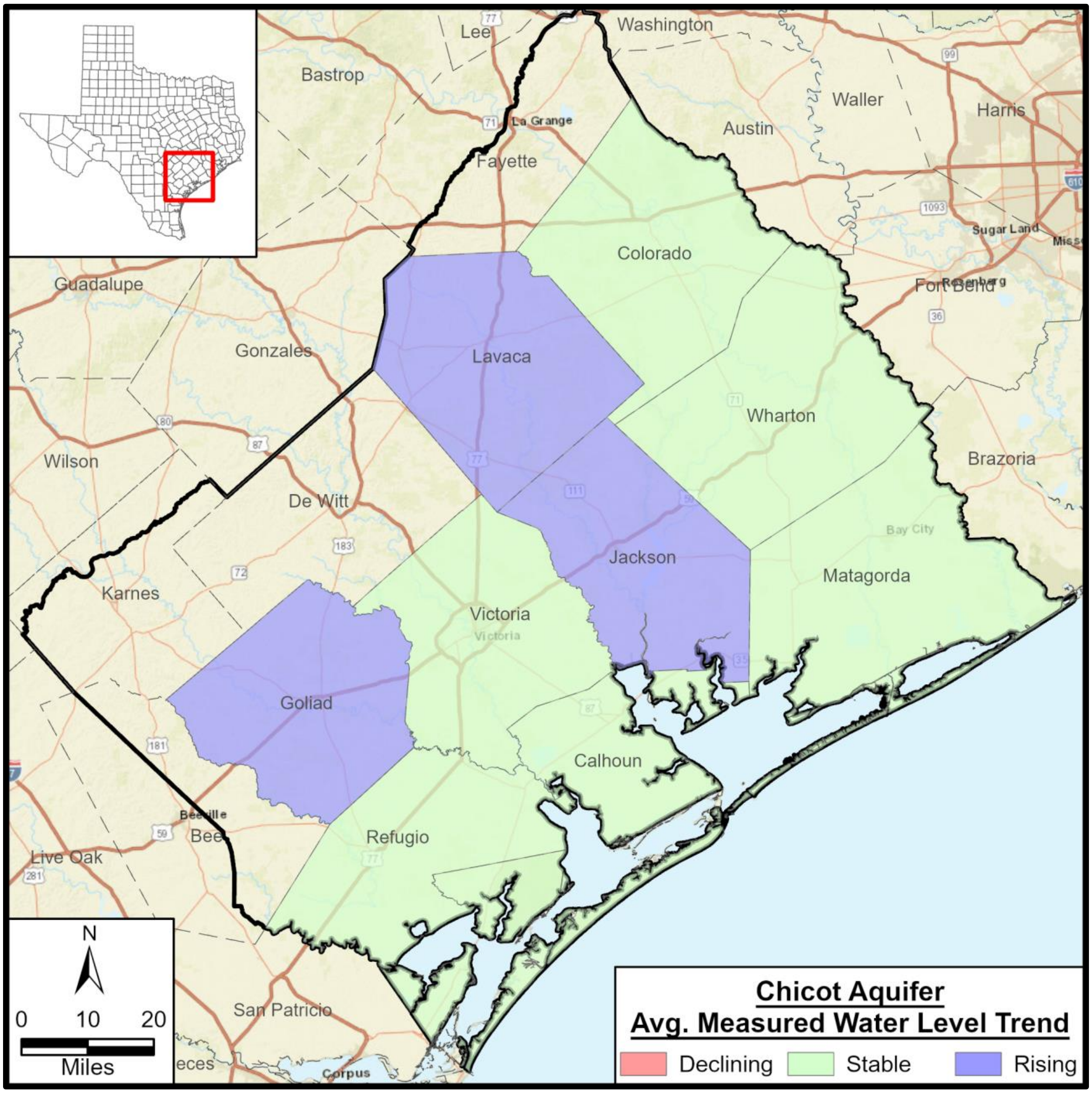


Figure 4. **Average measured water level trend for the Chicot Aquifer within GMA 15.**

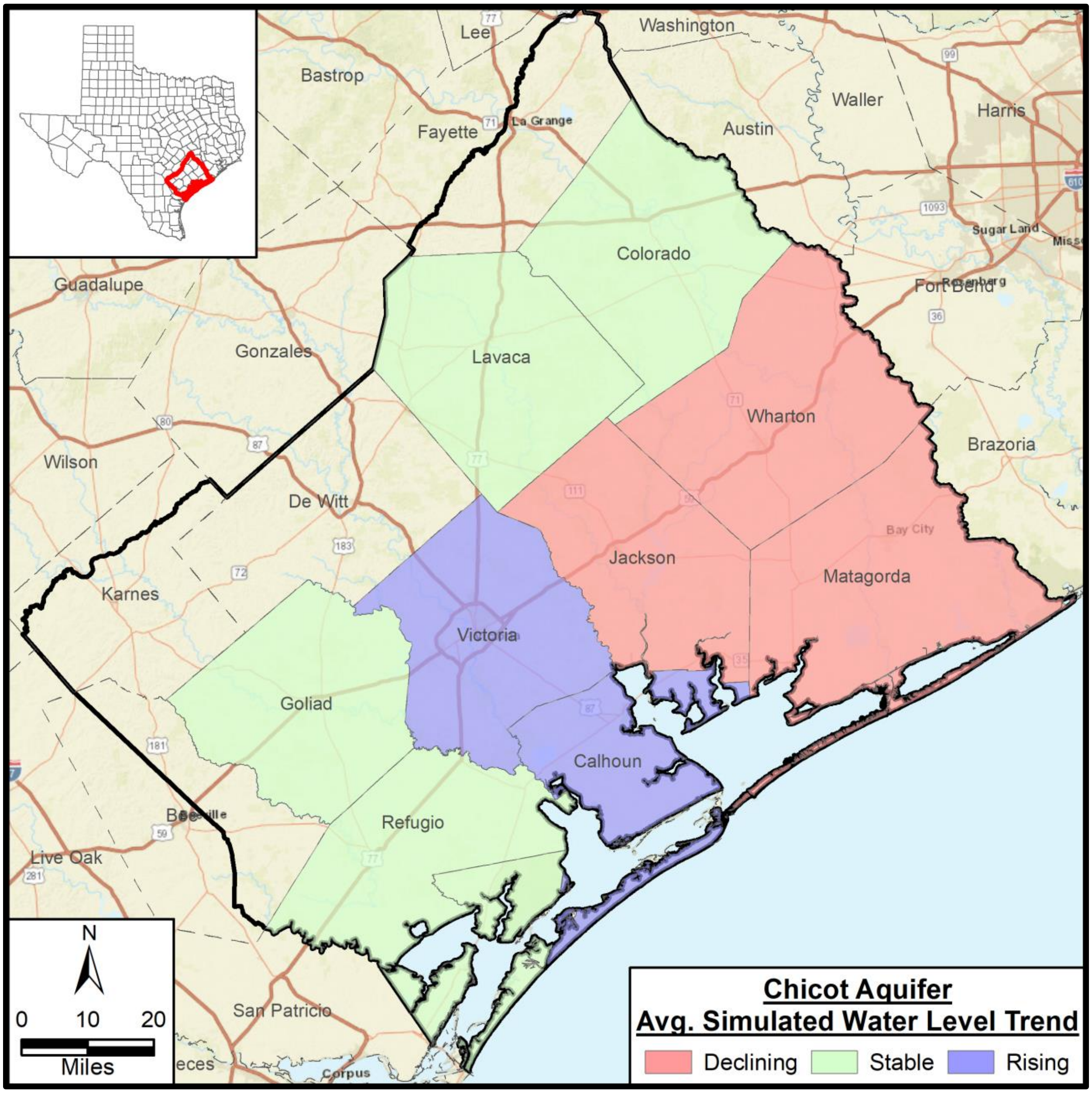


Figure 5. Average simulated water level trend for the Chicot Aquifer within GMA 15.

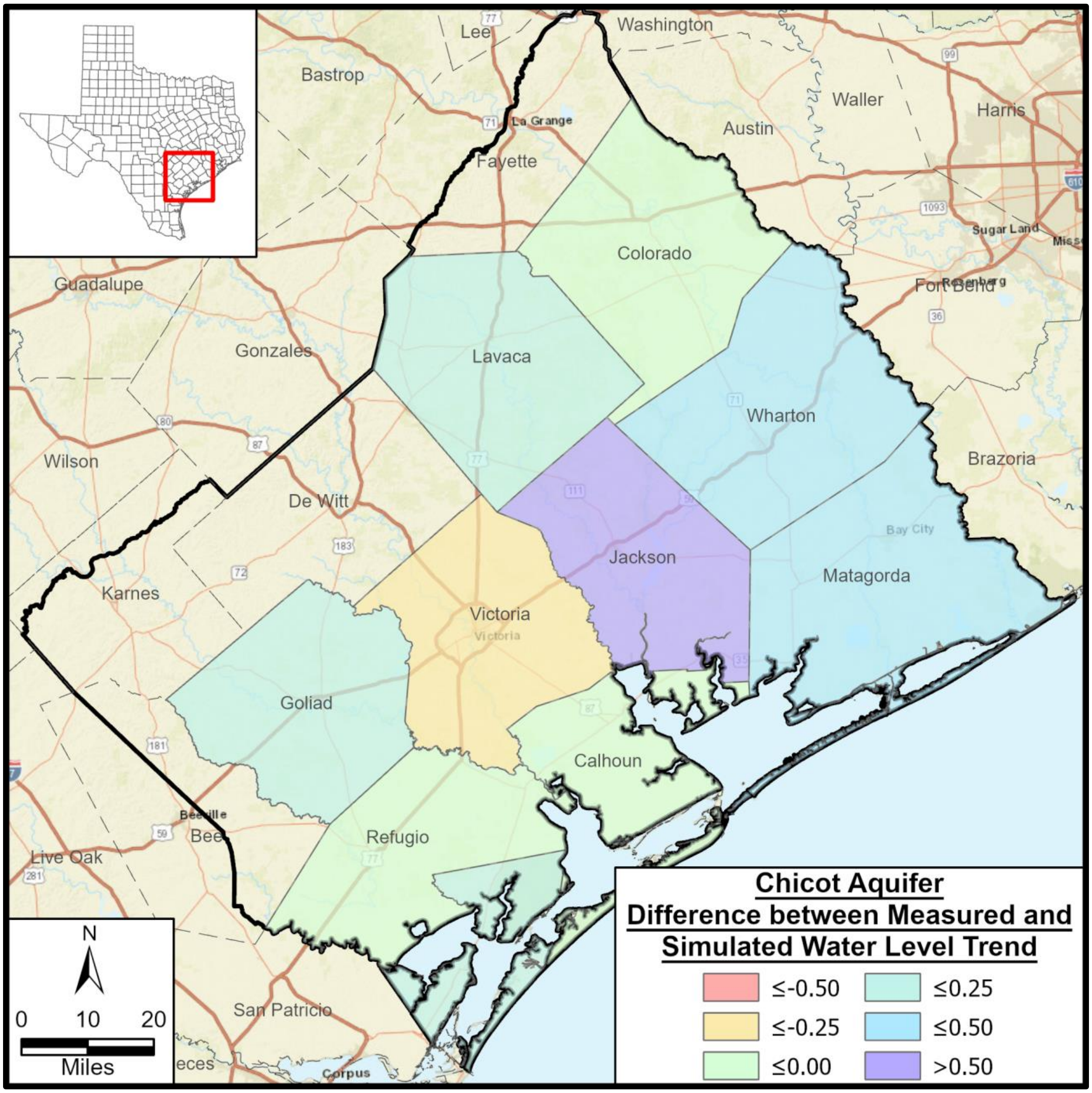


Figure 6. **Difference between the average measured and simulated water level trends (ft/yr) for the Chicot Aquifer within GMA 15.**

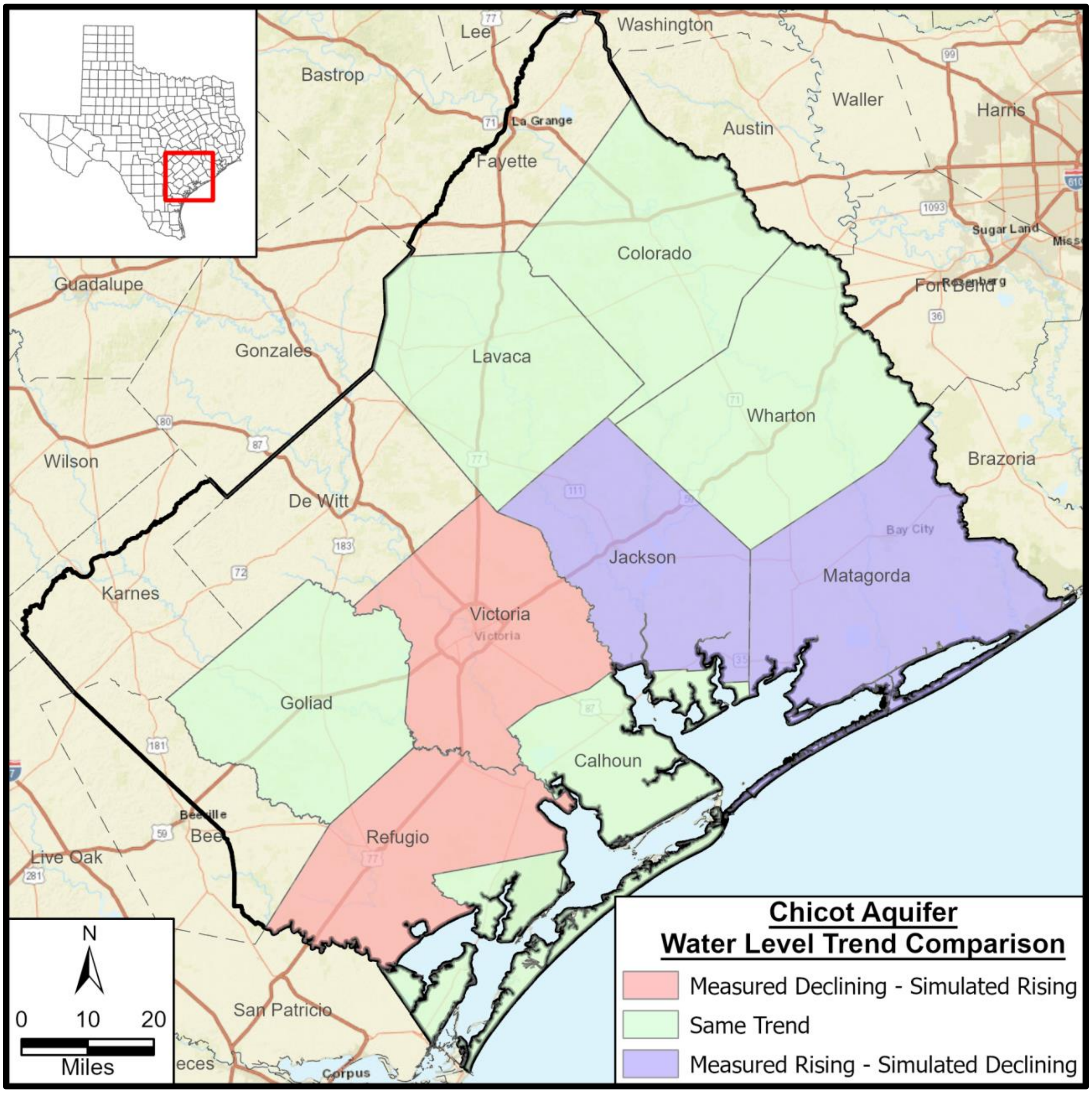


Figure 7. **Comparison of the average measured and simulated water level trends for the Chicot Aquifer within GMA 15.**

For the Evangeline Aquifer, the average measured trend for most counties is stable with one county having a rising trend and one county having a declining trend (Figure 8). The average simulated trend for all but one county is stable (Figure 9). There are two counties with large differences between the measured and simulated water level trends (less than -0.50 ft/yr or more than 0.50 ft/yr) with two other counties having a more moderate difference (-0.50 to -0.25 ft/yr or 0.25 to 0.50 ft/yr) between the trends (Figure 10). Six of the eight counties have the measured and simulated water level trends in the Evangeline Aquifer in opposite directions (Figure 11).

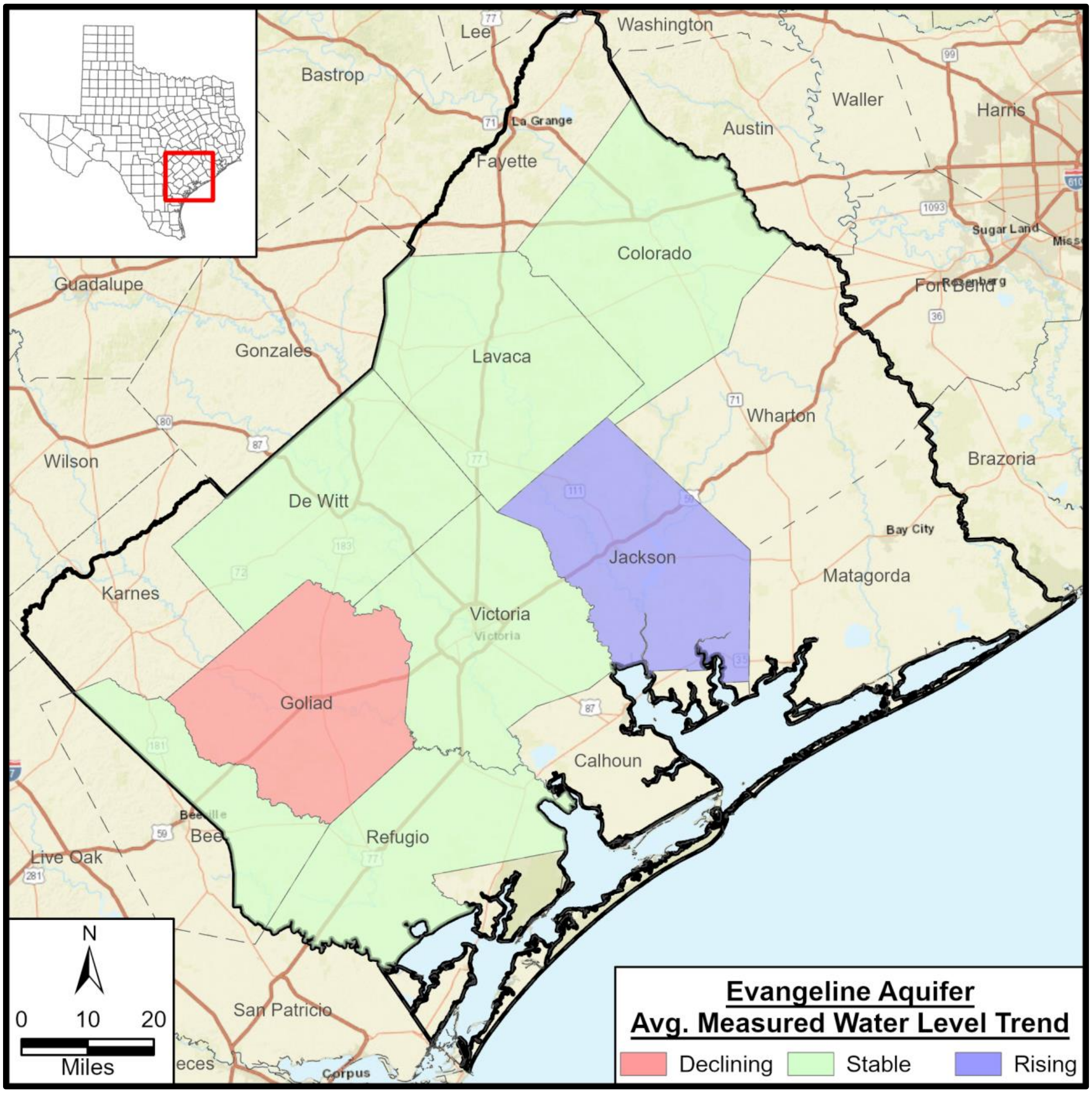


Figure 8. Average measured water level trend for the Evangeline Aquifer within GMA 15.

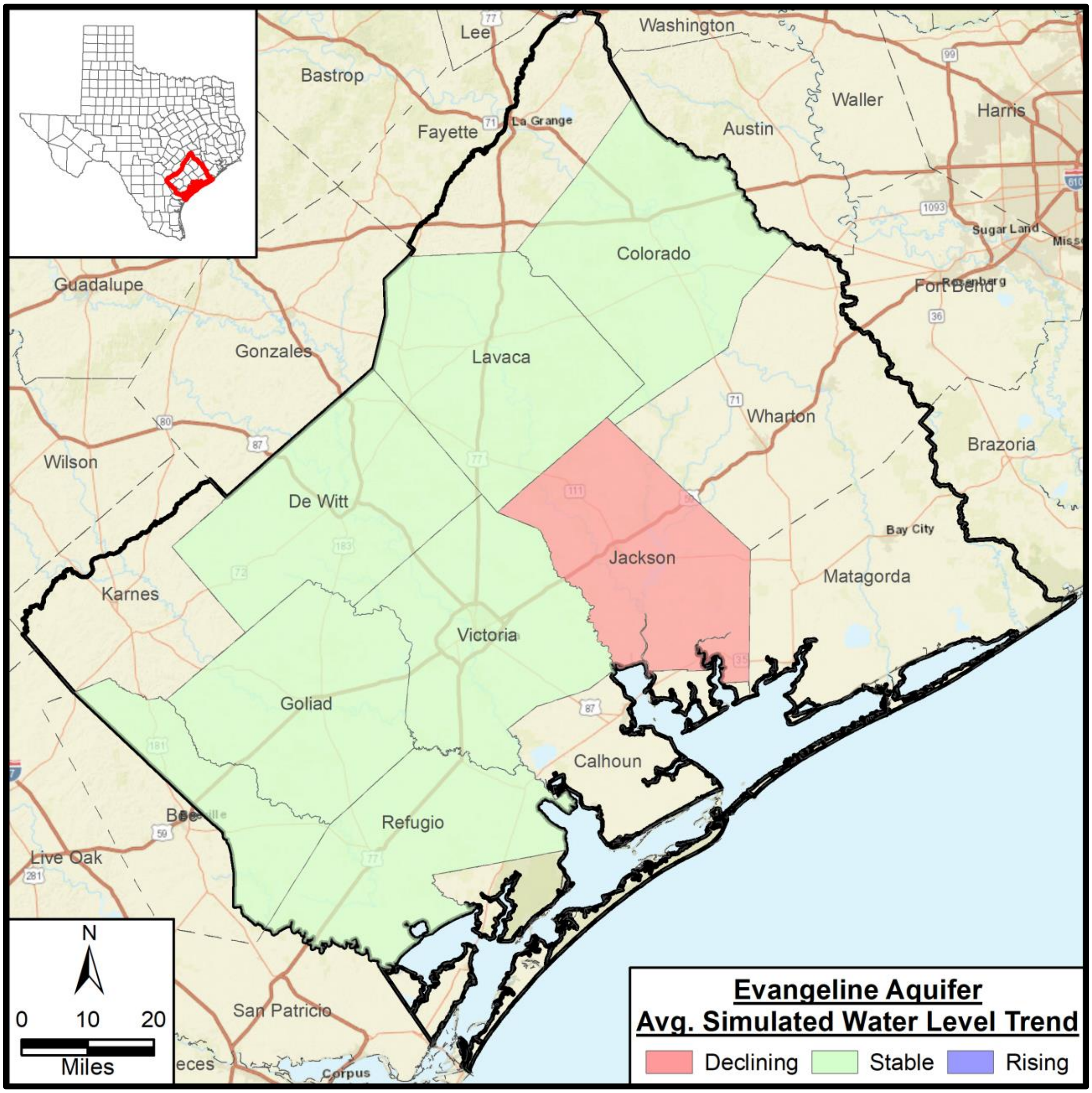


Figure 9. Average simulated water level trend for the Evangeline Aquifer within GMA 15.

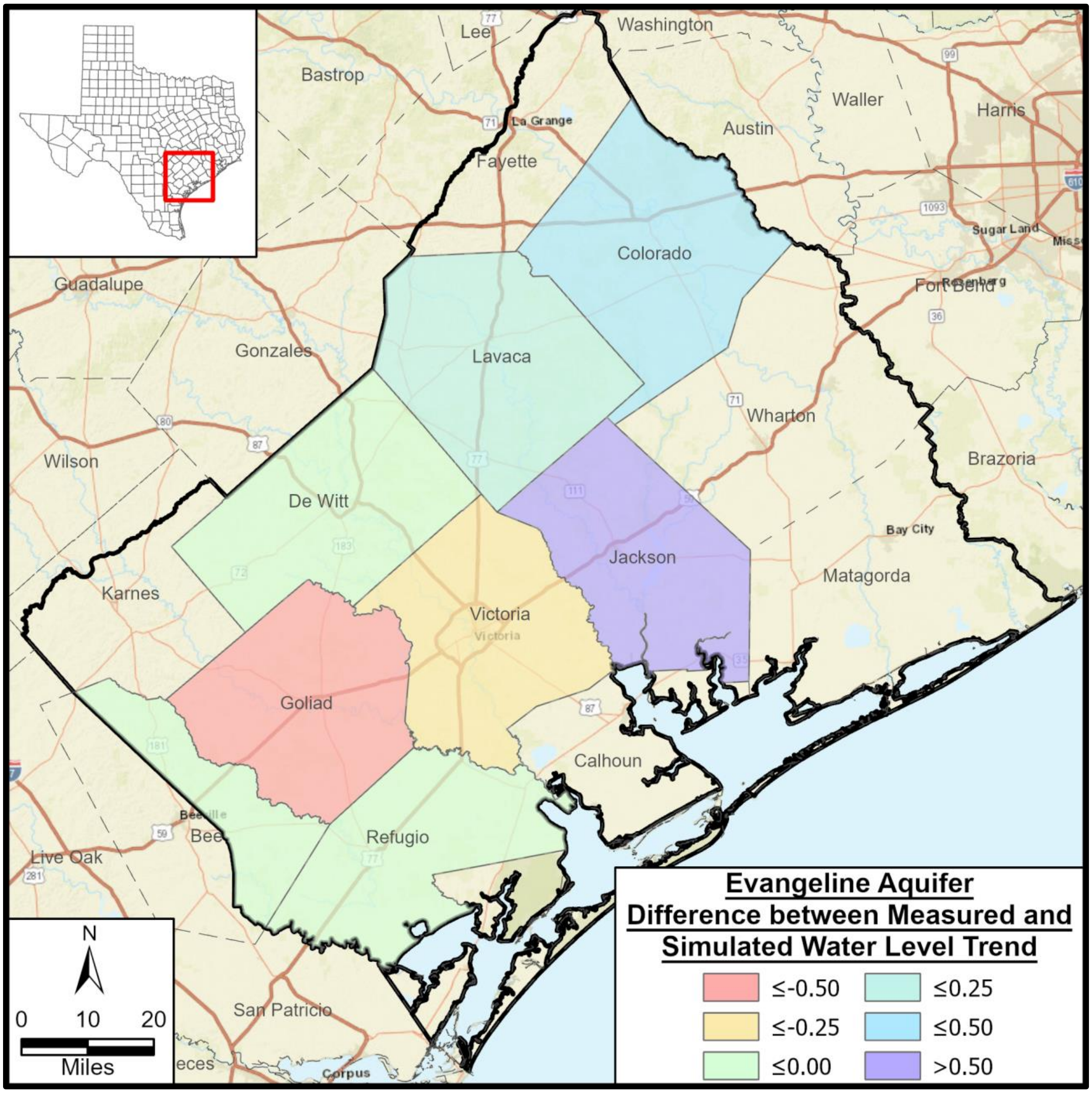


Figure 10. **Difference between the average measured and simulated water level trends (ft/yr) for the Evangeline Aquifer within GMA 15.**

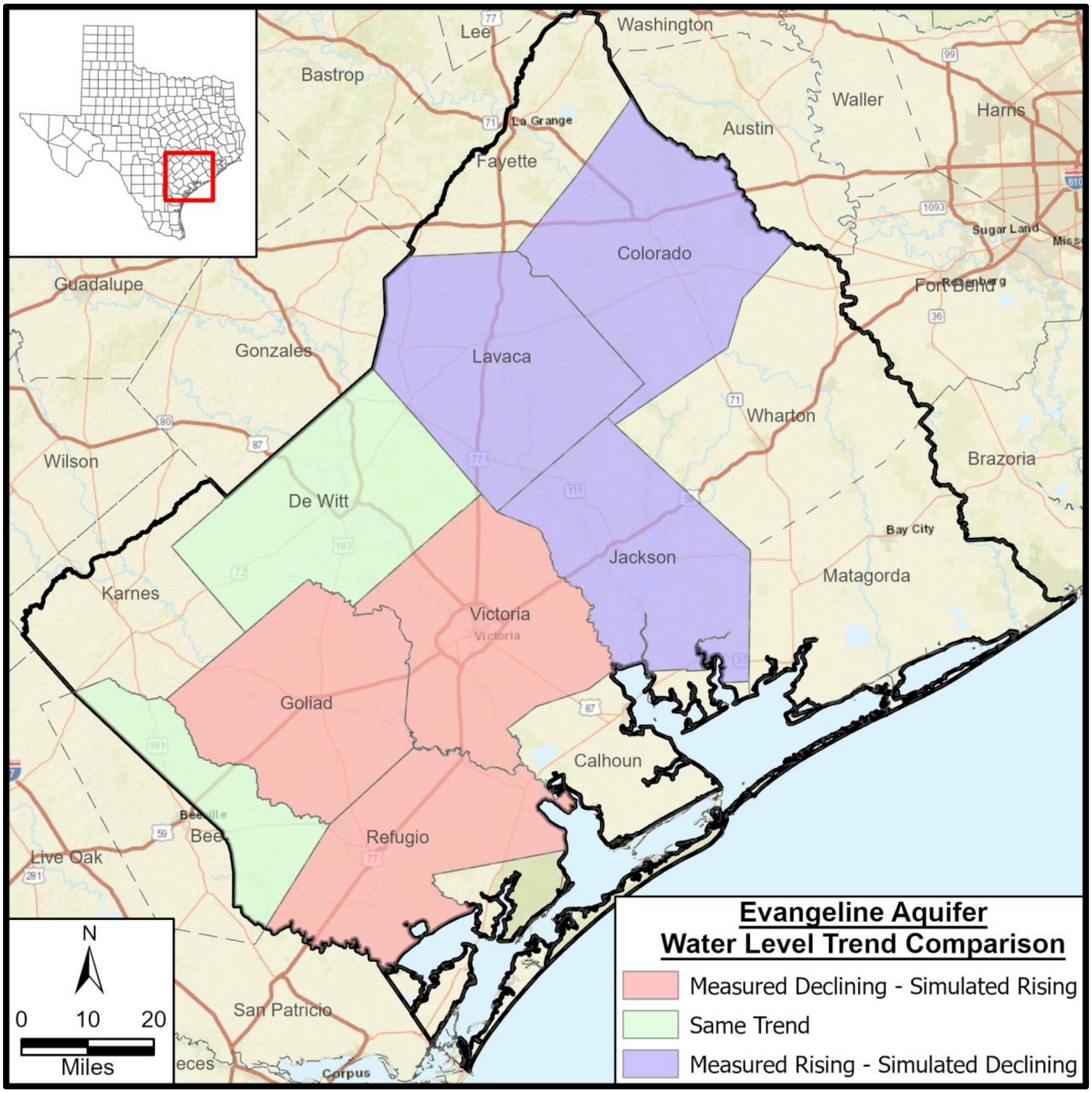


Figure 11. **Comparison of the average measured and simulated water level trends for the Evangeline Aquifer within GMA 15.**

For the Jasper Aquifer, the average measured trend for three counties is stable with two counties having a rising trend and two counties having a declining trend (Figure 12). The average simulated trend for all but two counties is declining (Figure 13). There are two counties with large differences between the measured and simulated water level trends (more than 0.50 ft/yr), one county having a moderate difference (-0.50 to -0.25 ft/yr) between the trends, and the remaining counties having little difference between the trends (Figure 14). Five of the seven counties have the measured and simulated water level trends in the Jasper Aquifer in the same direction with two counties having trends in opposite directions (Figure 15).

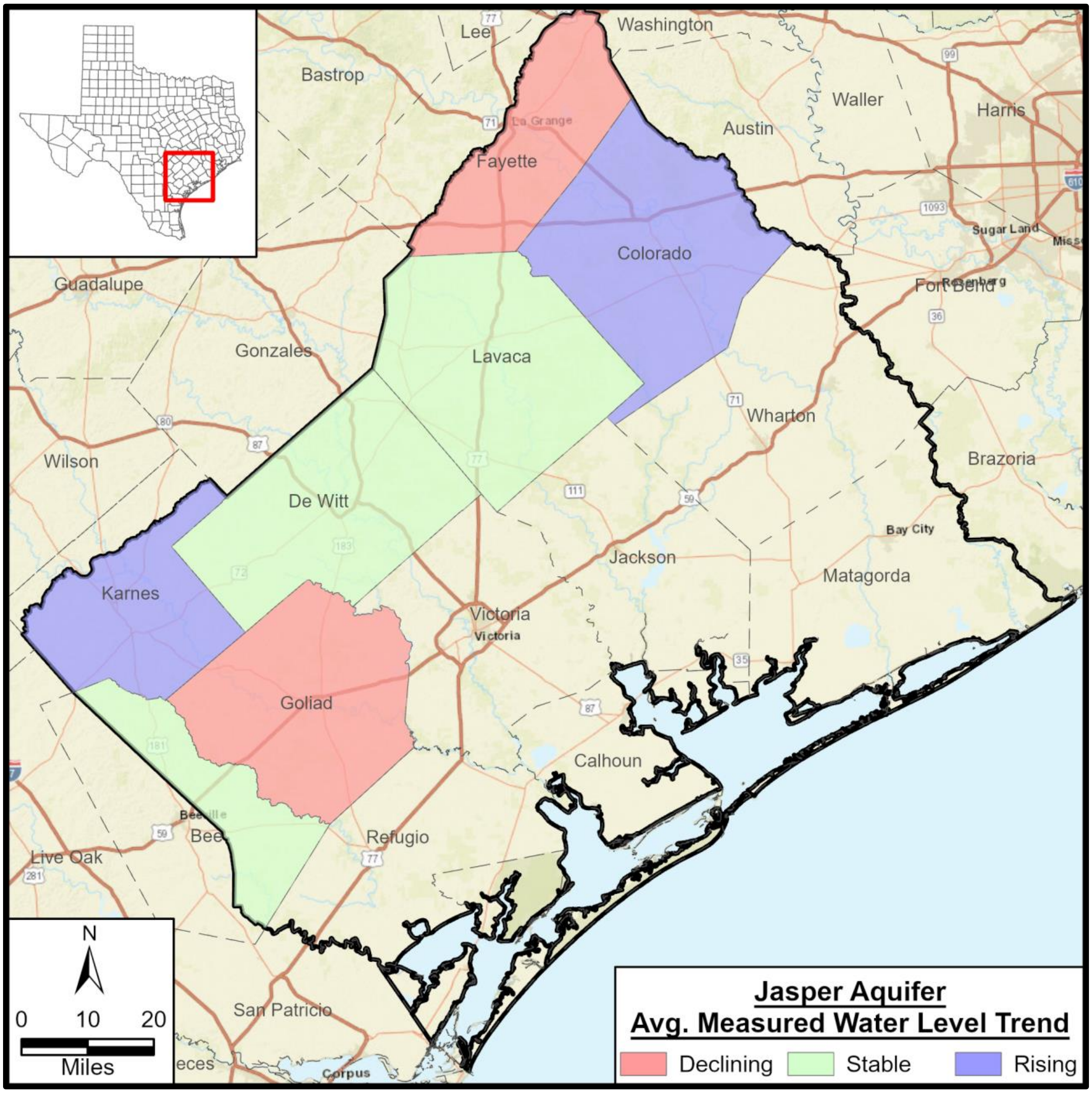


Figure 12. Average measured water level trend for the Jasper Aquifer within GMA 15.

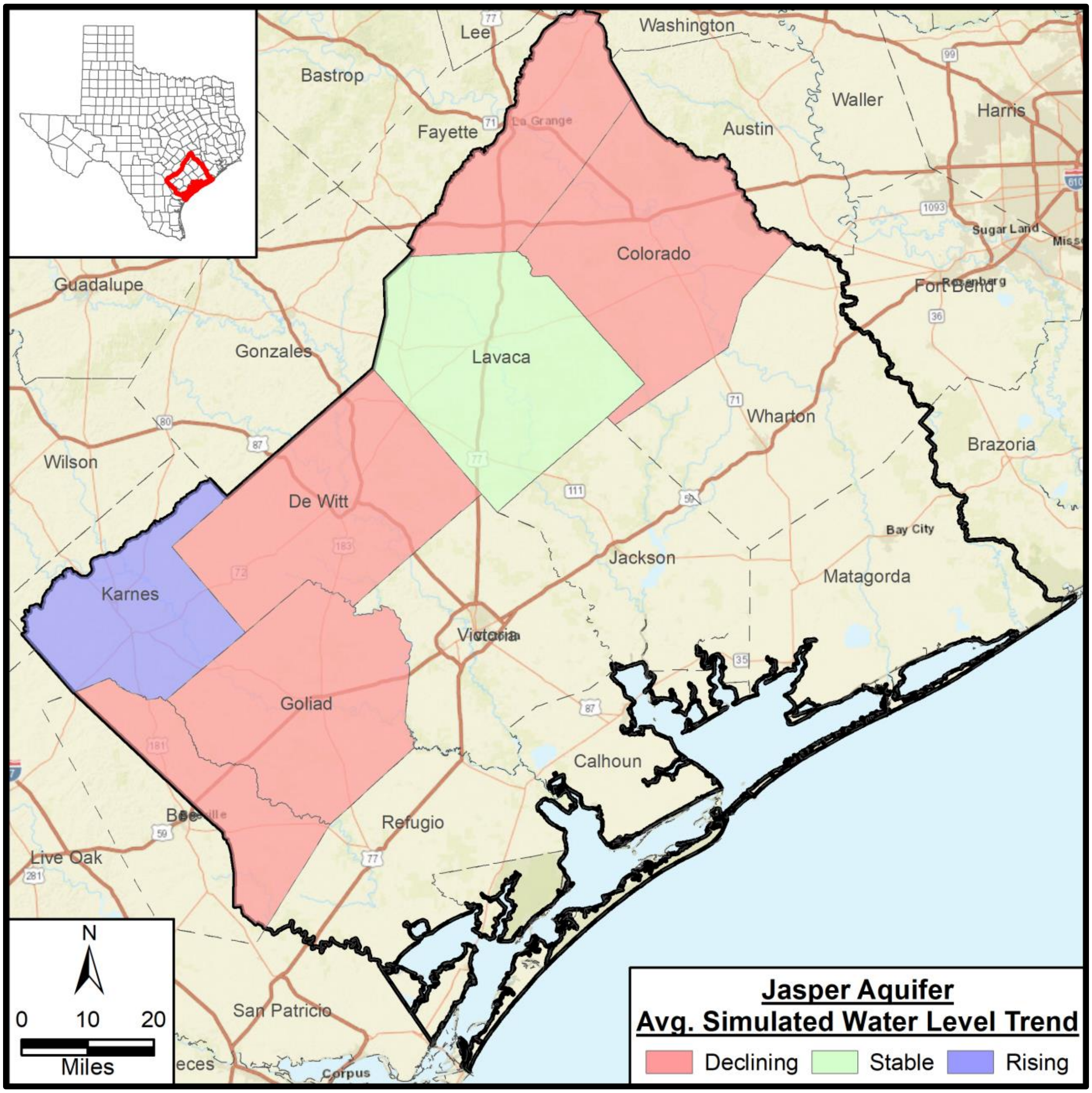


Figure 13. **Average simulated water level trend for the Jasper Aquifer within GMA 15.**

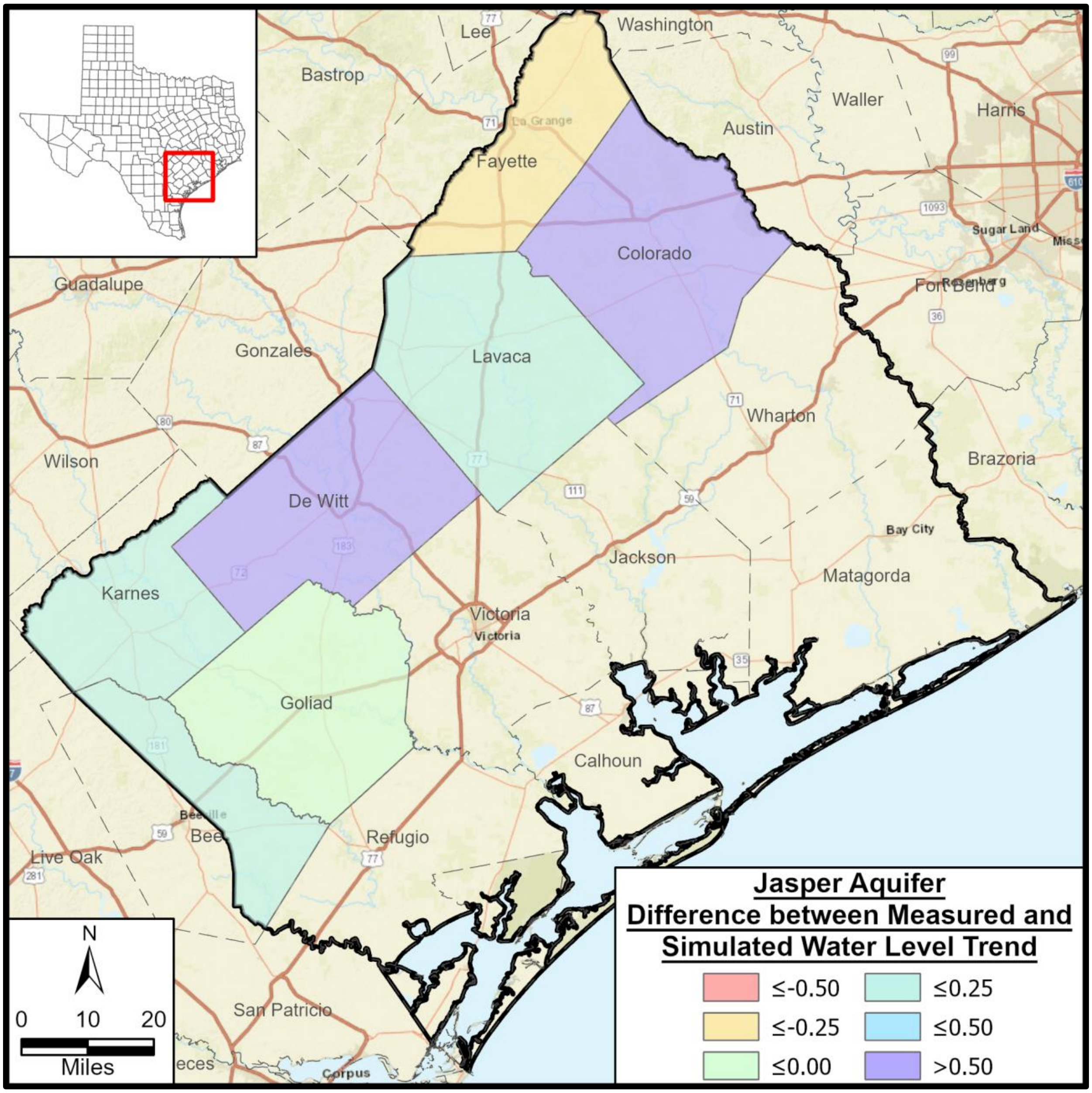


Figure 14. **Difference between the average measured and simulated water level trends (ft/yr) for the Jasper Aquifer within GMA 15.**

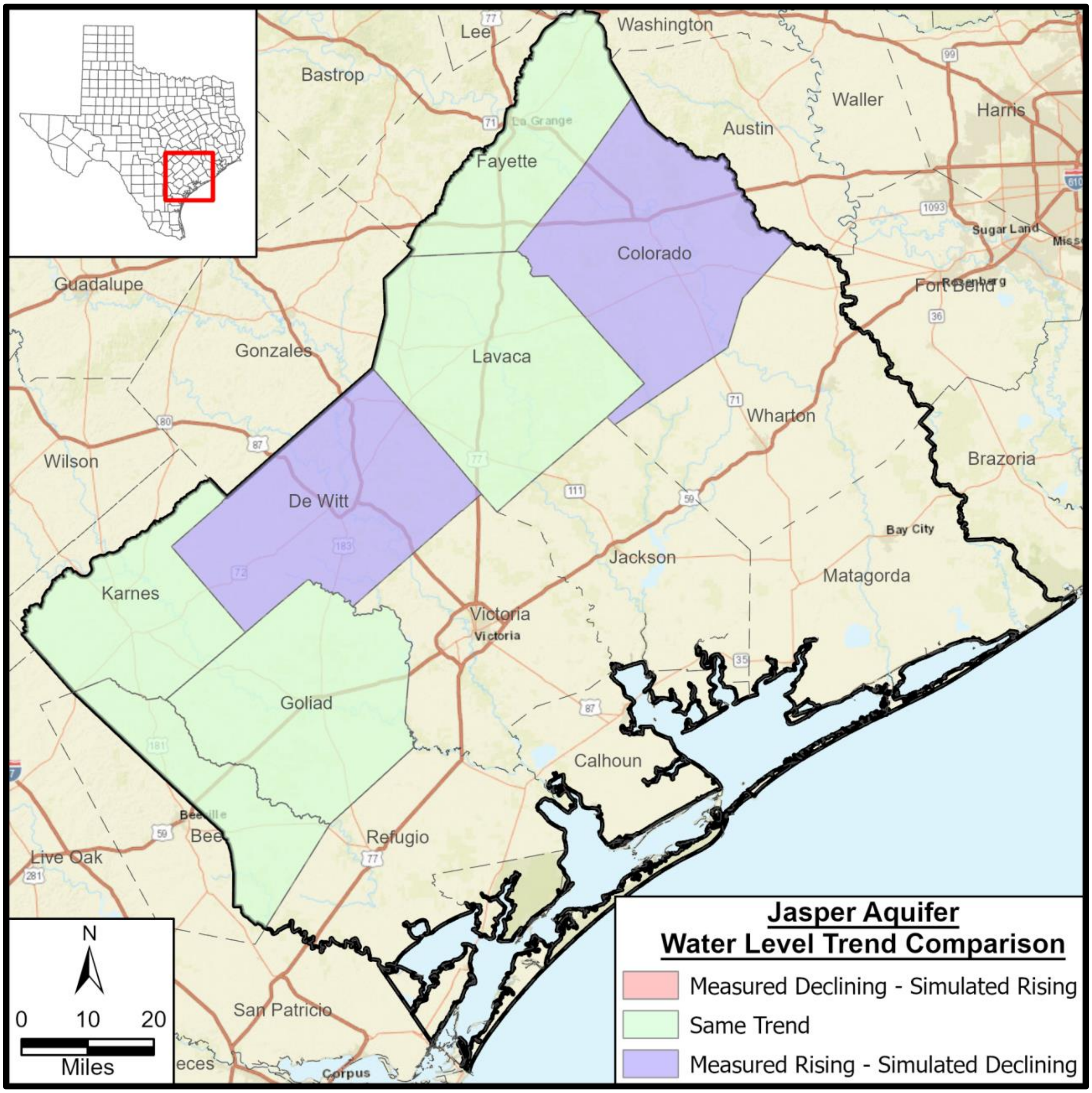


Figure 15. **Comparison of the average measured and simulated water level trends for the Jasper Aquifer within GMA 15.**

For the Gulf Coast Aquifer System as a whole, the average measured trend is stable in most of GMA 15 with two counties having a rising trend and two counties having a declining trend (Figure 16). However, the average simulated trend for five counties in GMA 15 is declining (Figure 17). There two counties with large differences between the measured and simulated water level trends (less than -0.50 ft/yr or more than 0.50 ft/yr), six counties having a moderate difference (-0.50 to -0.25 ft/yr or 0.25 to 0.50 ft/yr) between the trends, and six counties having little difference between the trends (Figure 18). Six counties have the measured and simulated water level trends in opposite directions (Figure 19).

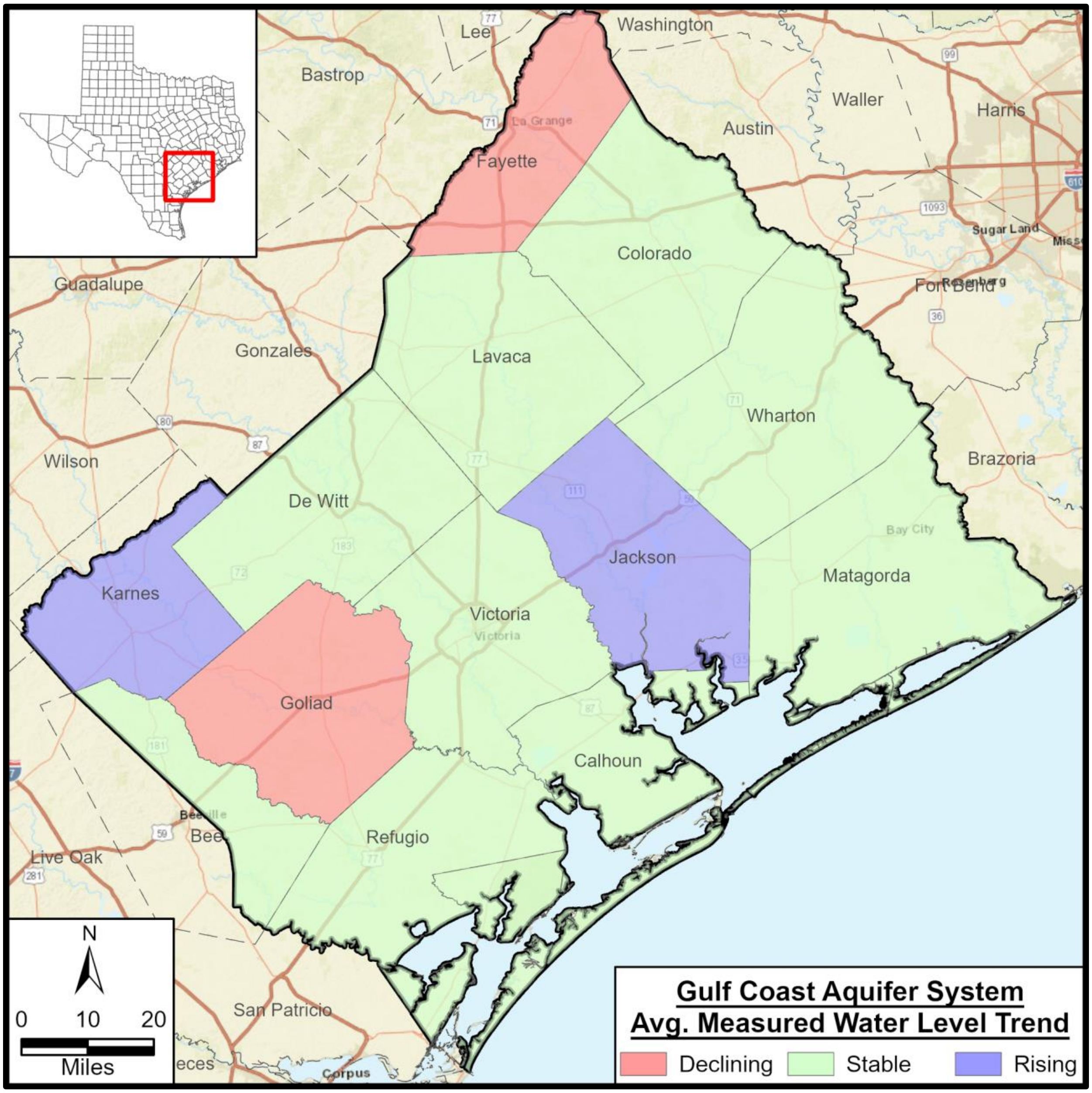


Figure 16. **Average measured water level trend for the Gulf Coast Aquifer System within GMA 15.**

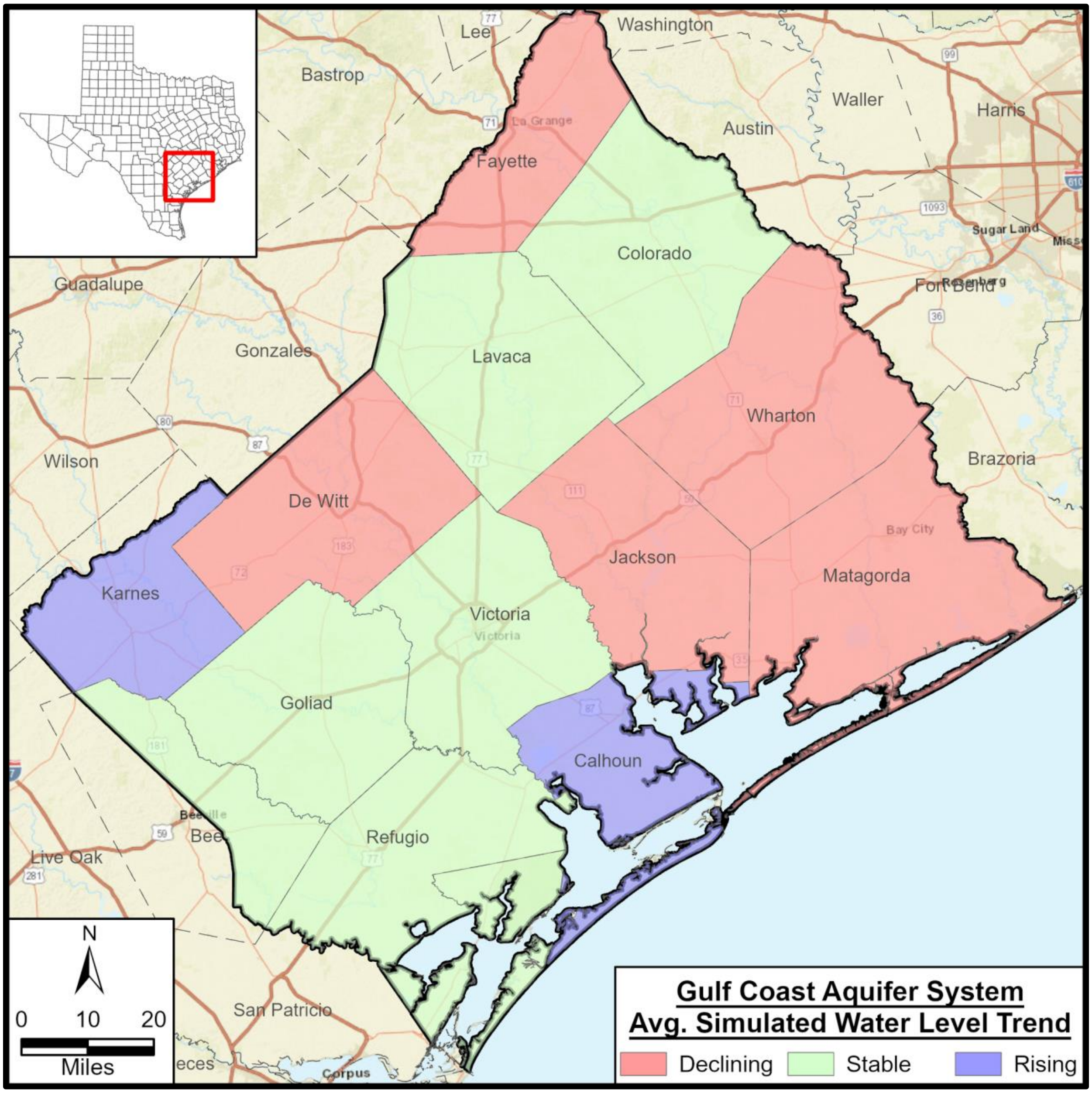


Figure 17. **Average simulated water level trend for the Gulf Coast Aquifer System within GMA 15.**

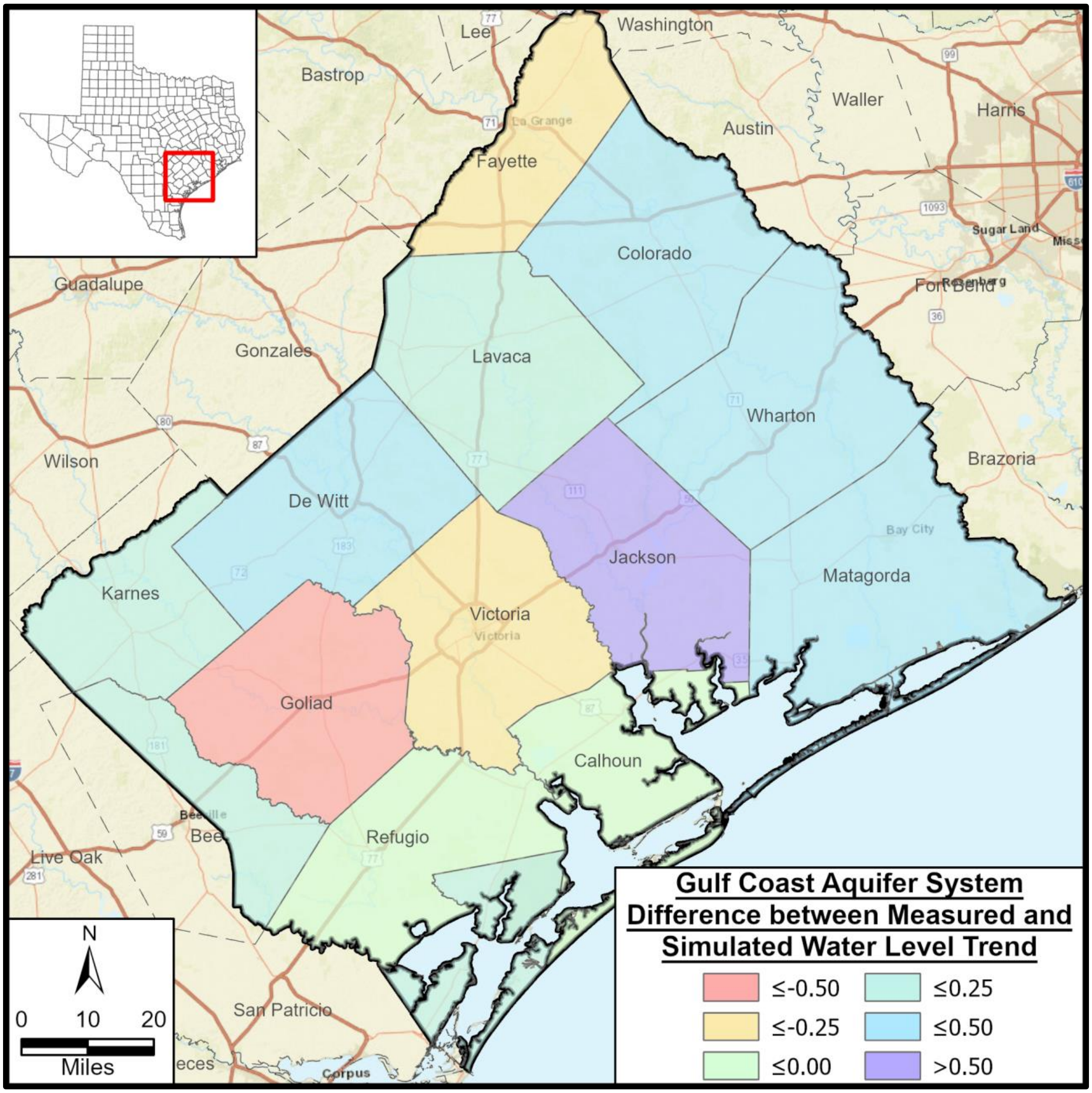


Figure 18. **Difference between the average measured and simulated water level trends (ft/yr) for the Gulf Coast Aquifer System within GMA 15.**

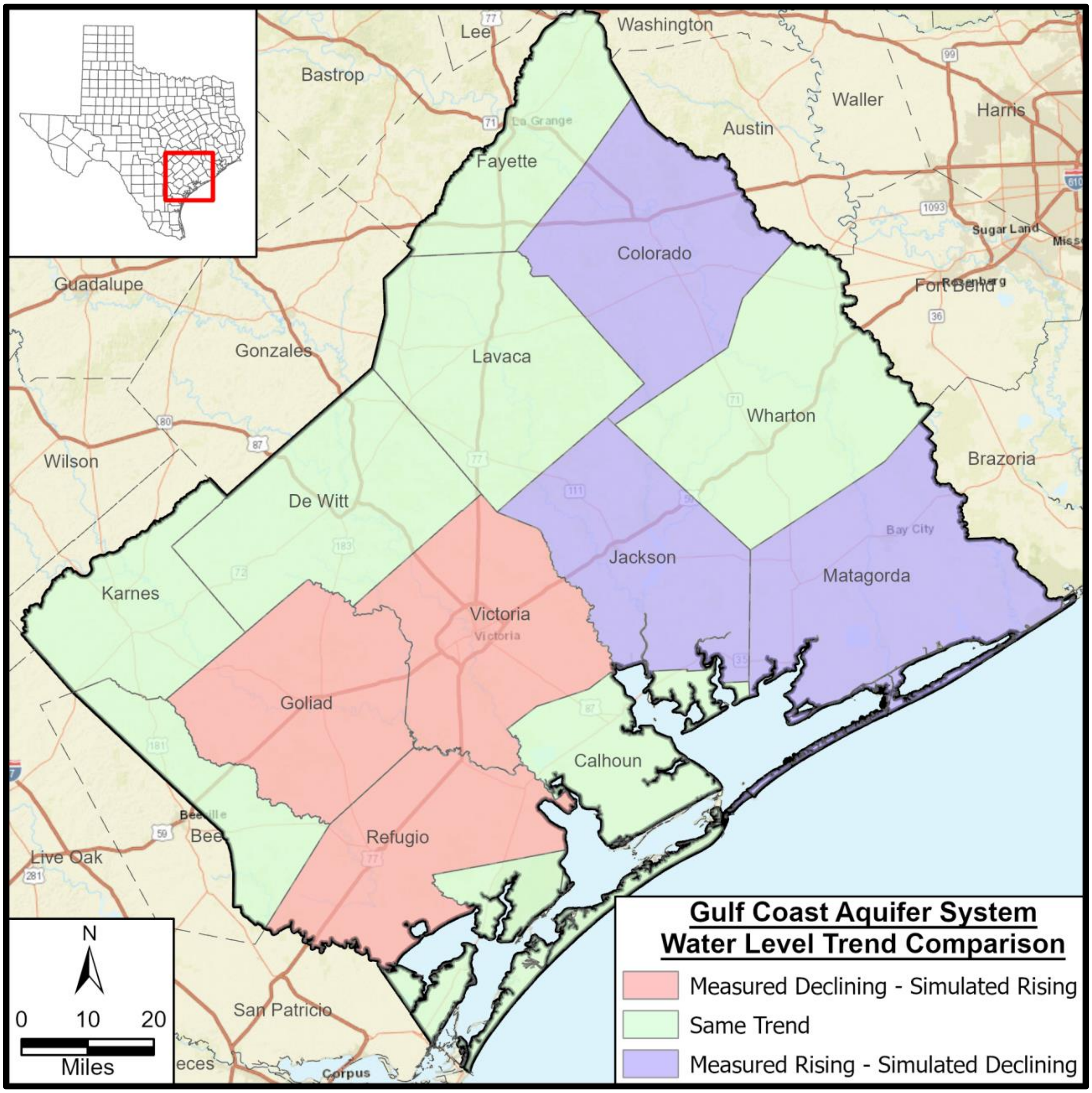
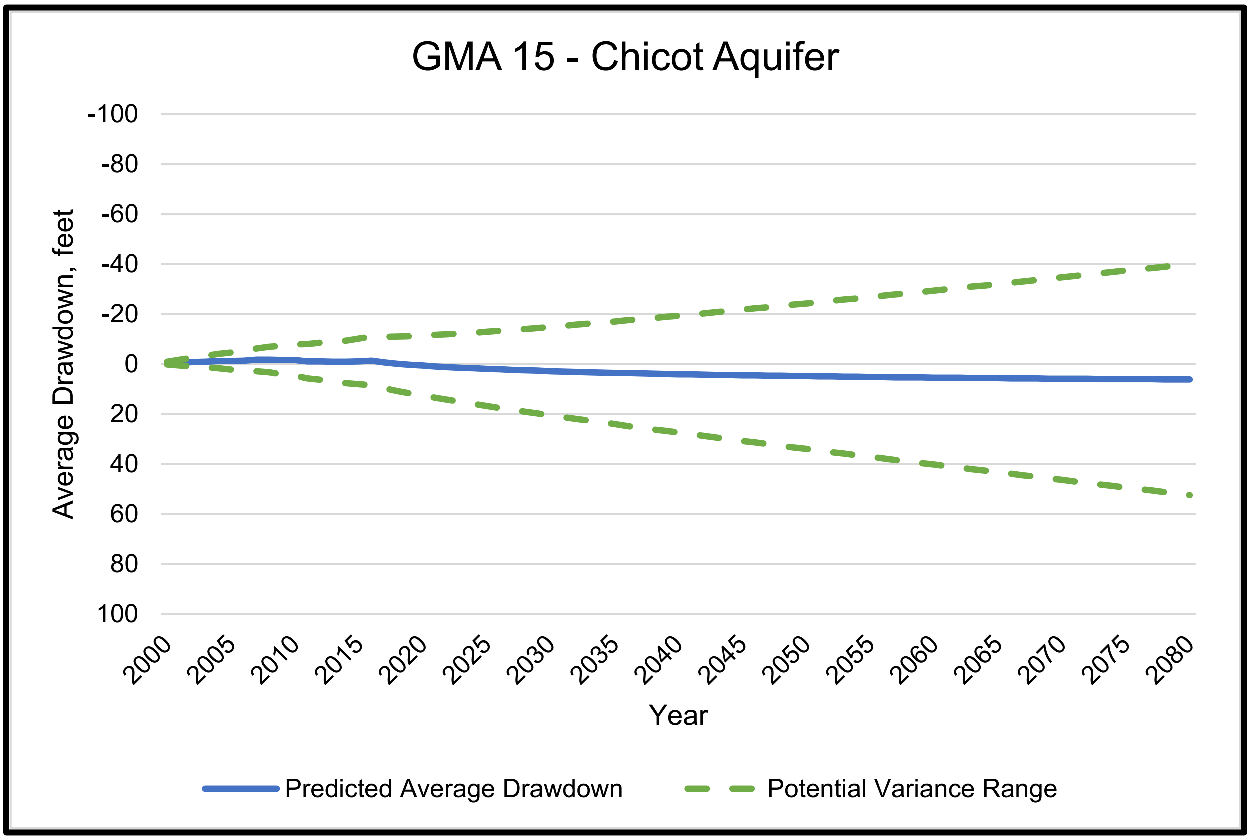
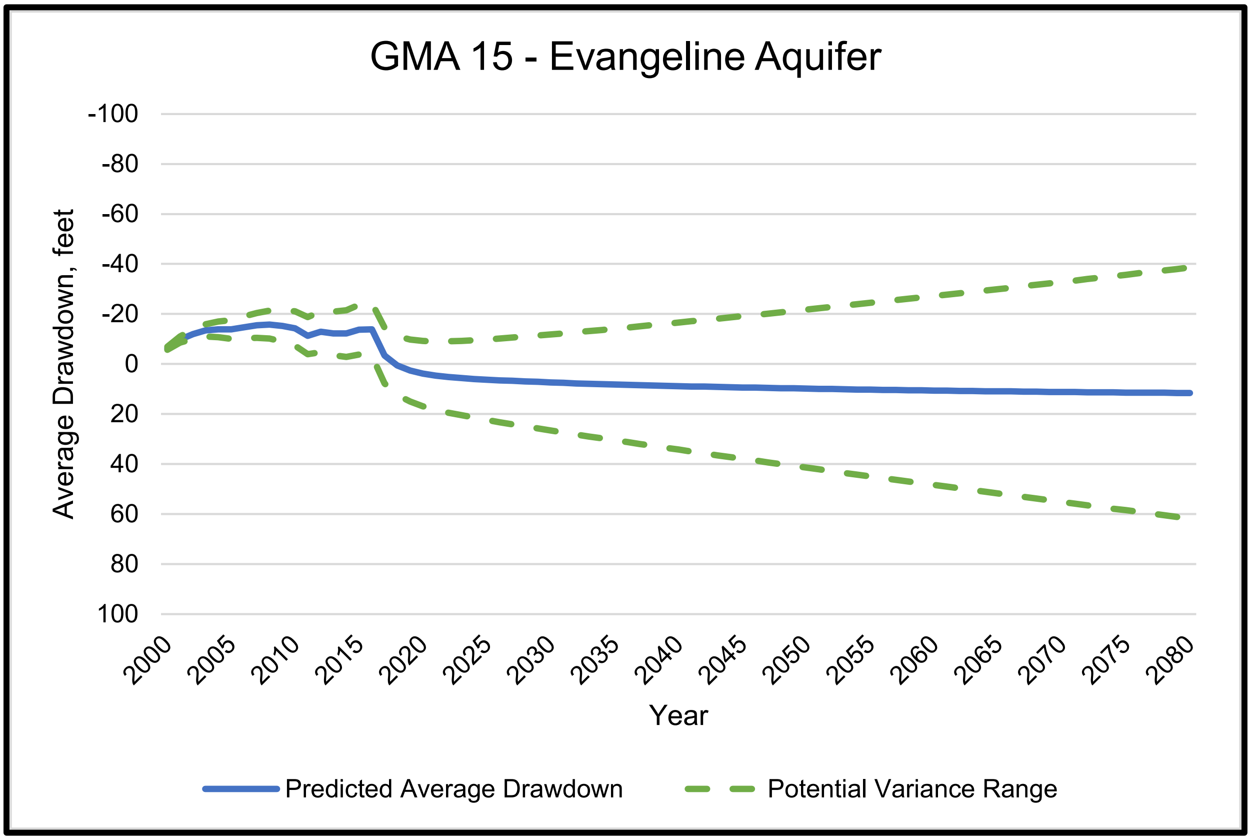
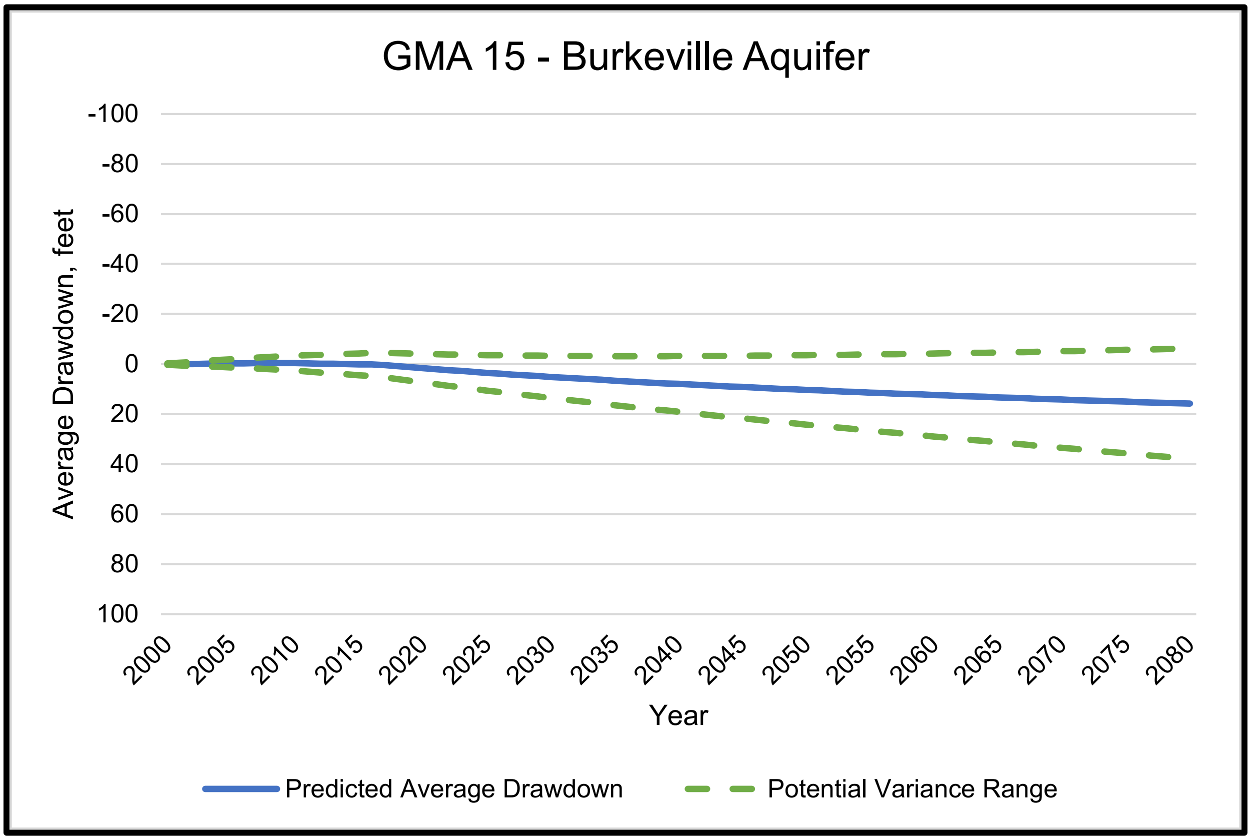


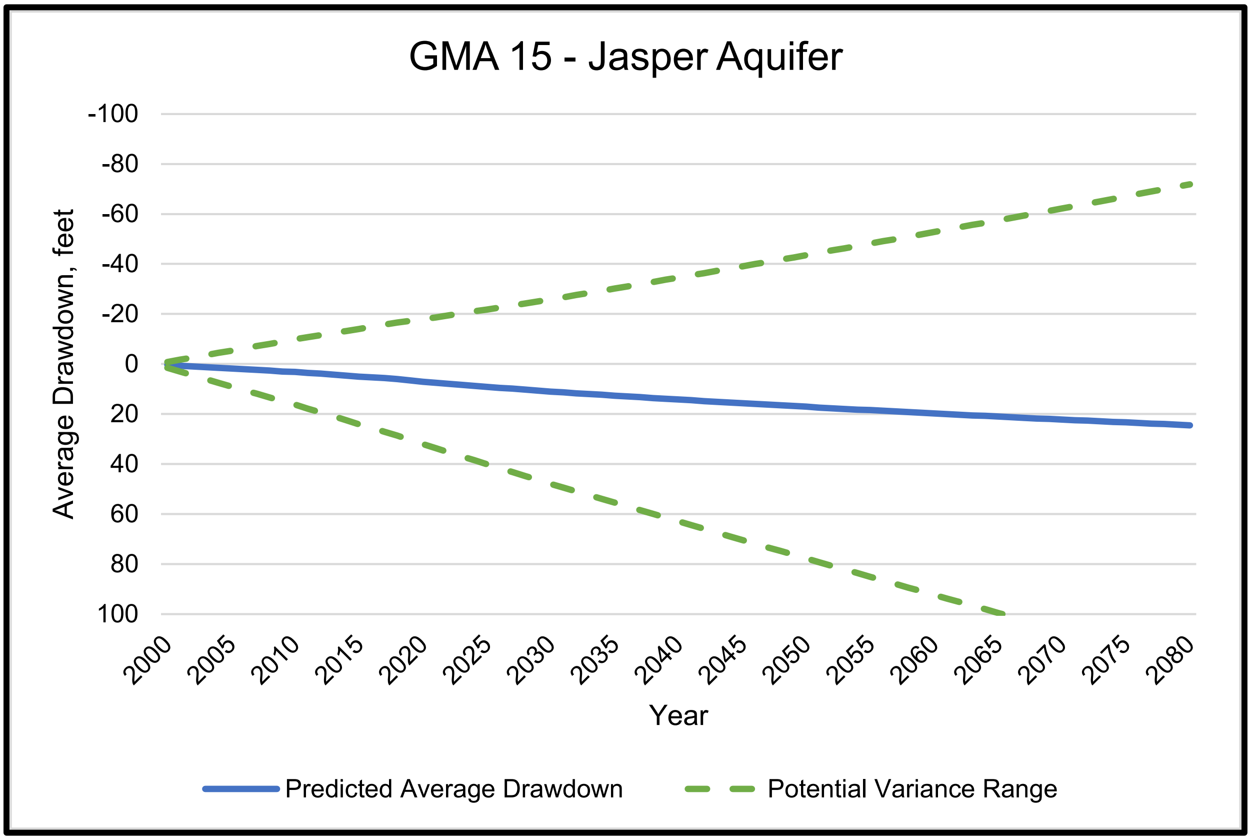
Figure 19. **Comparison of the average measured and simulated water level trends for the Gulf Coast Aquifer System within GMA 15.**

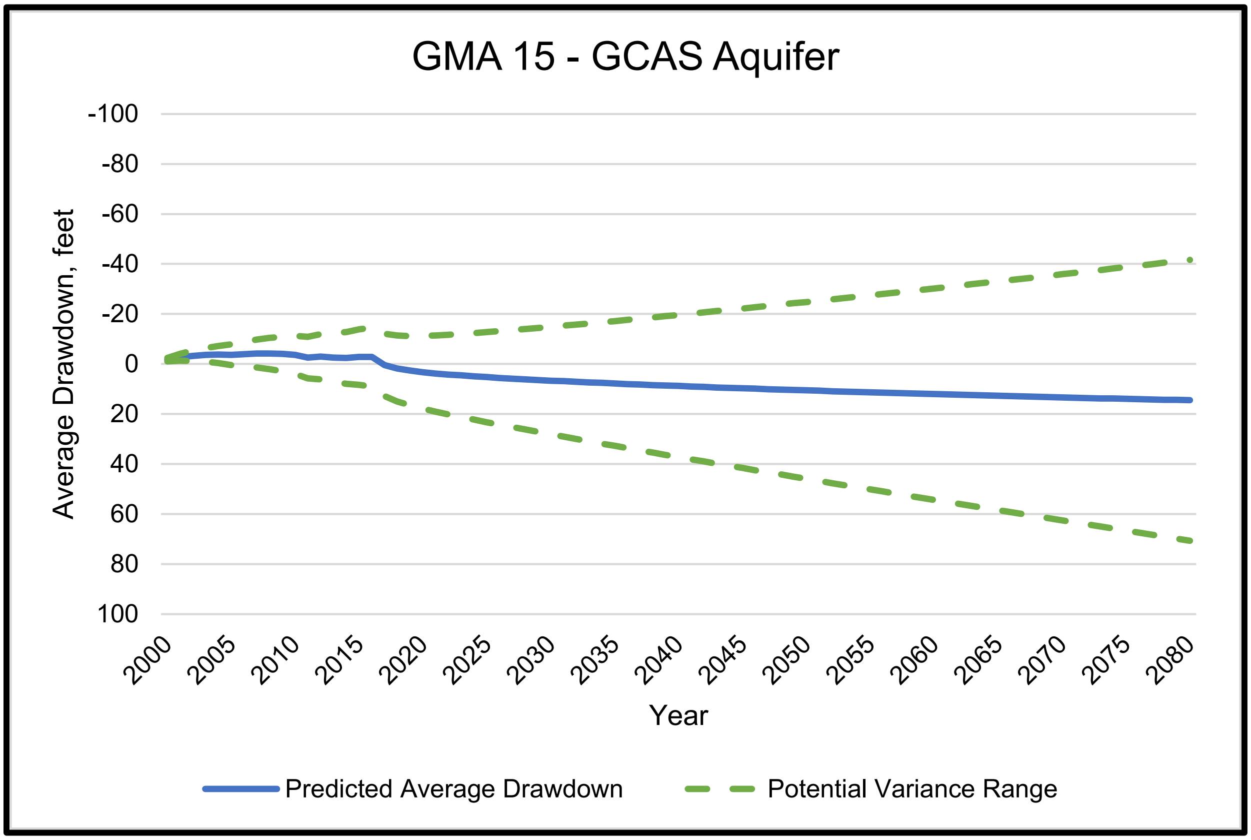
Appendix C –
Fan Plots Illustrating the Variance in Average Drawdown Over Time

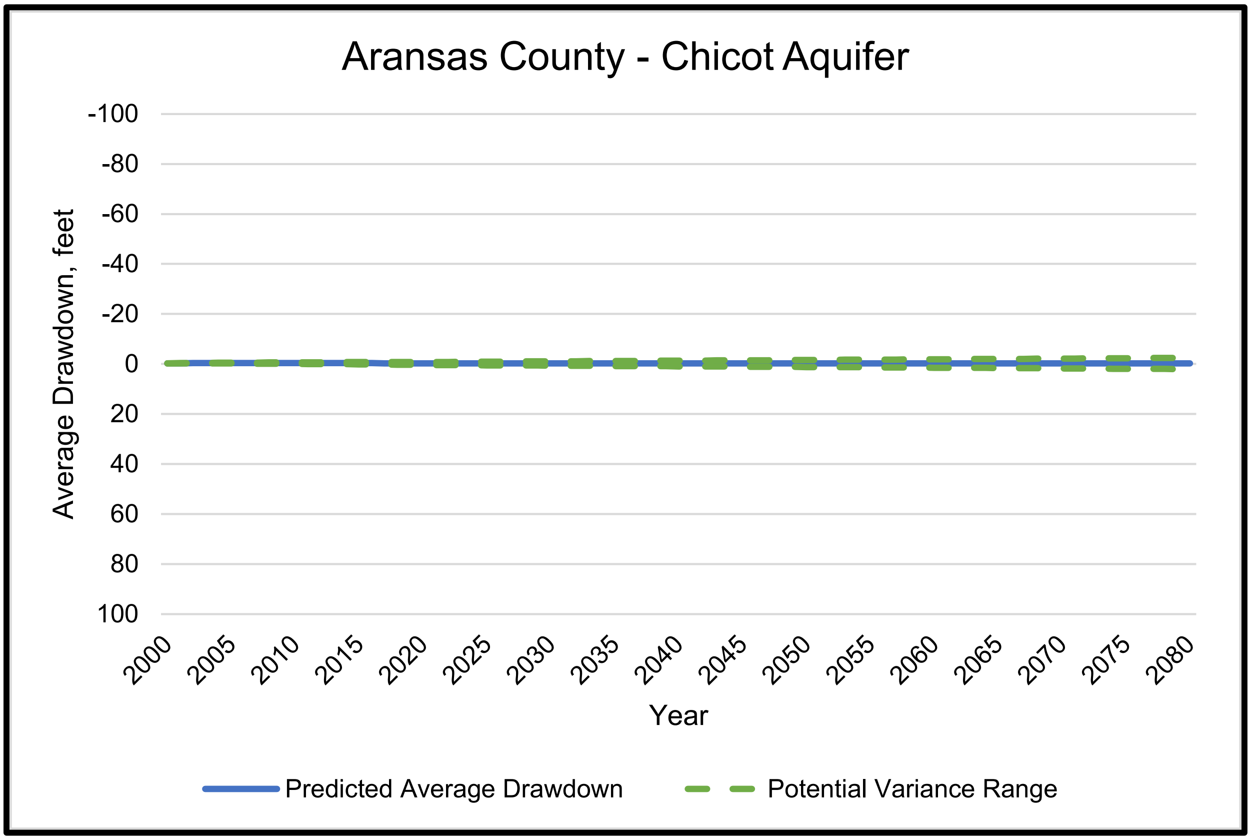

GMA 15 - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

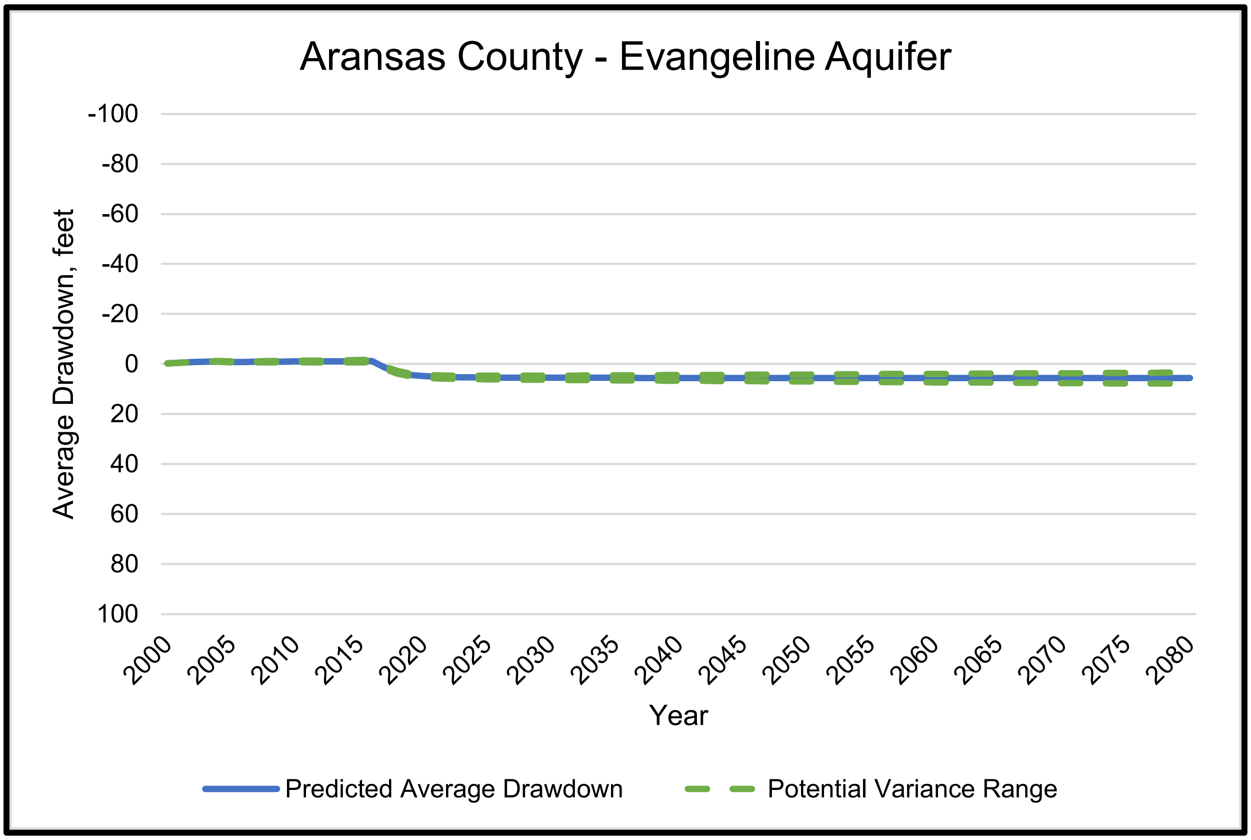

GMA 15 - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

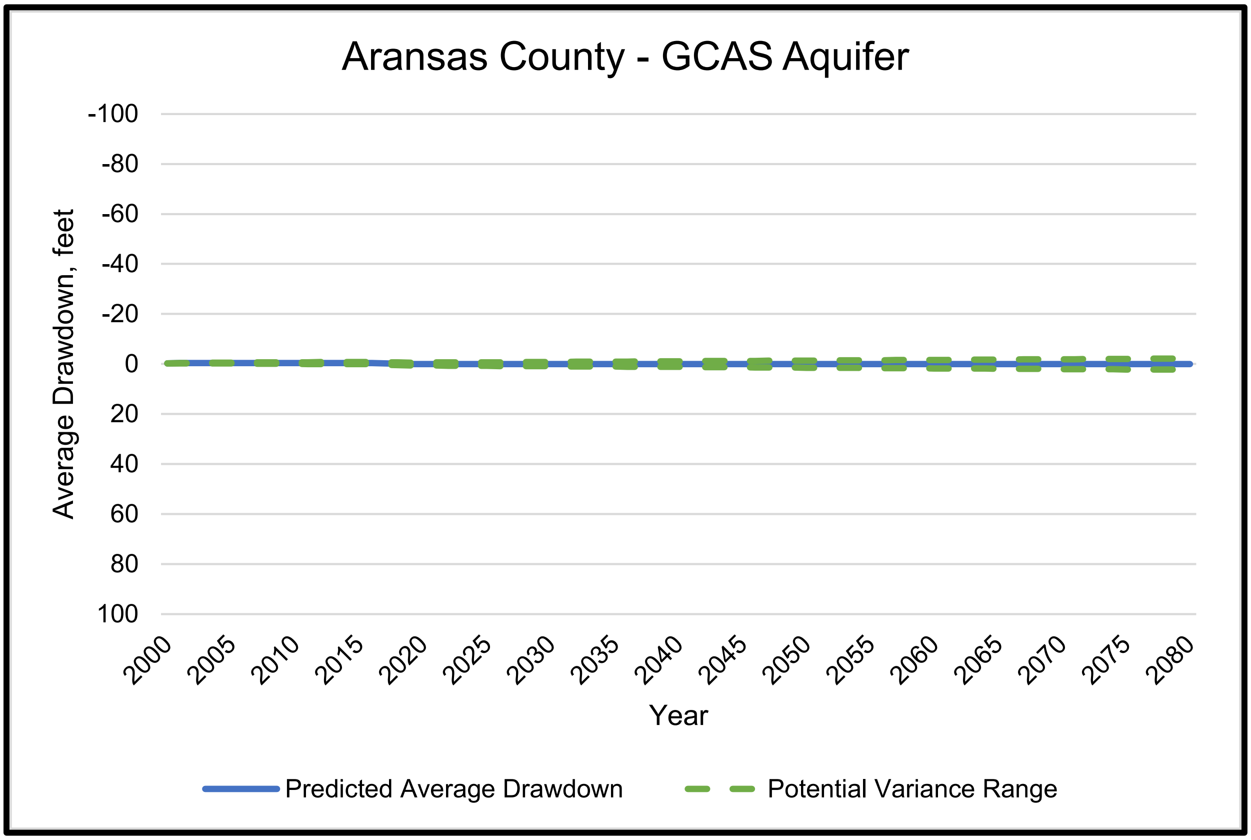

GMA 15 - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

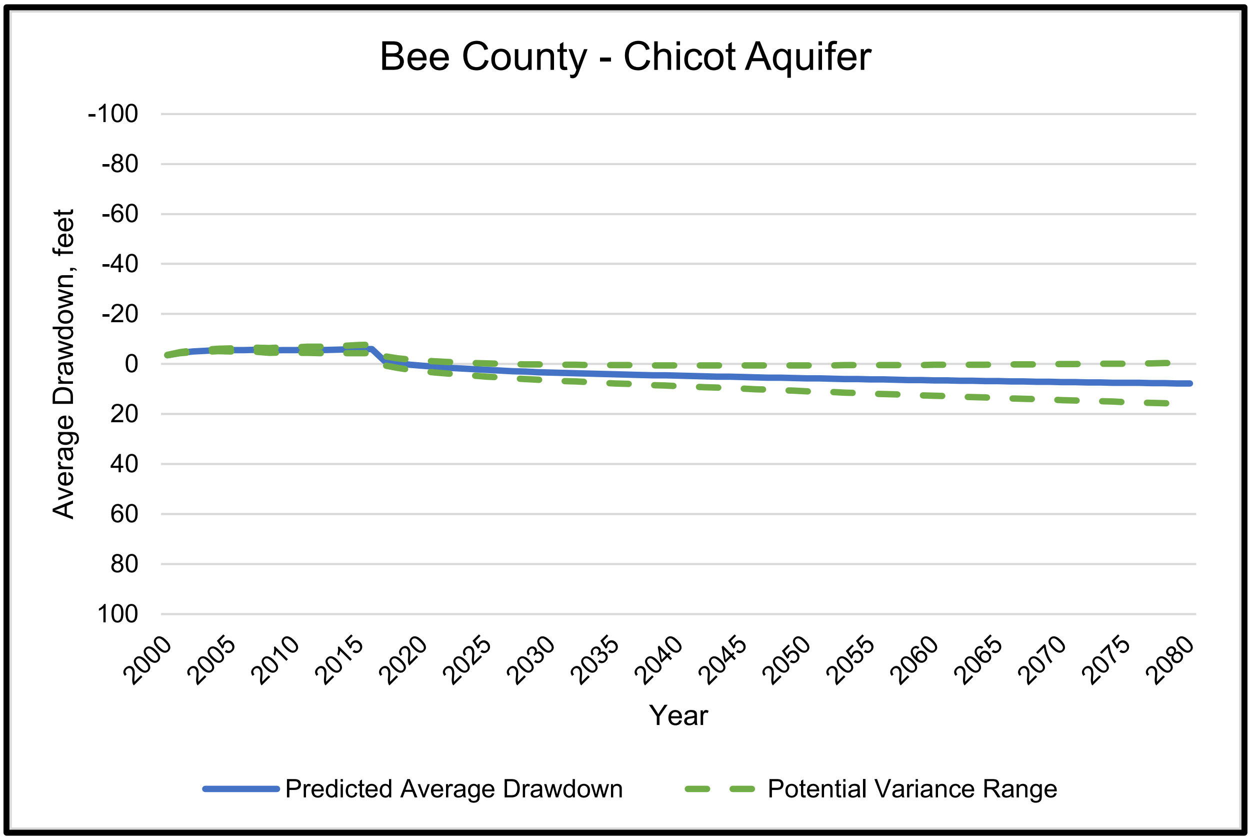

GMA 15 - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

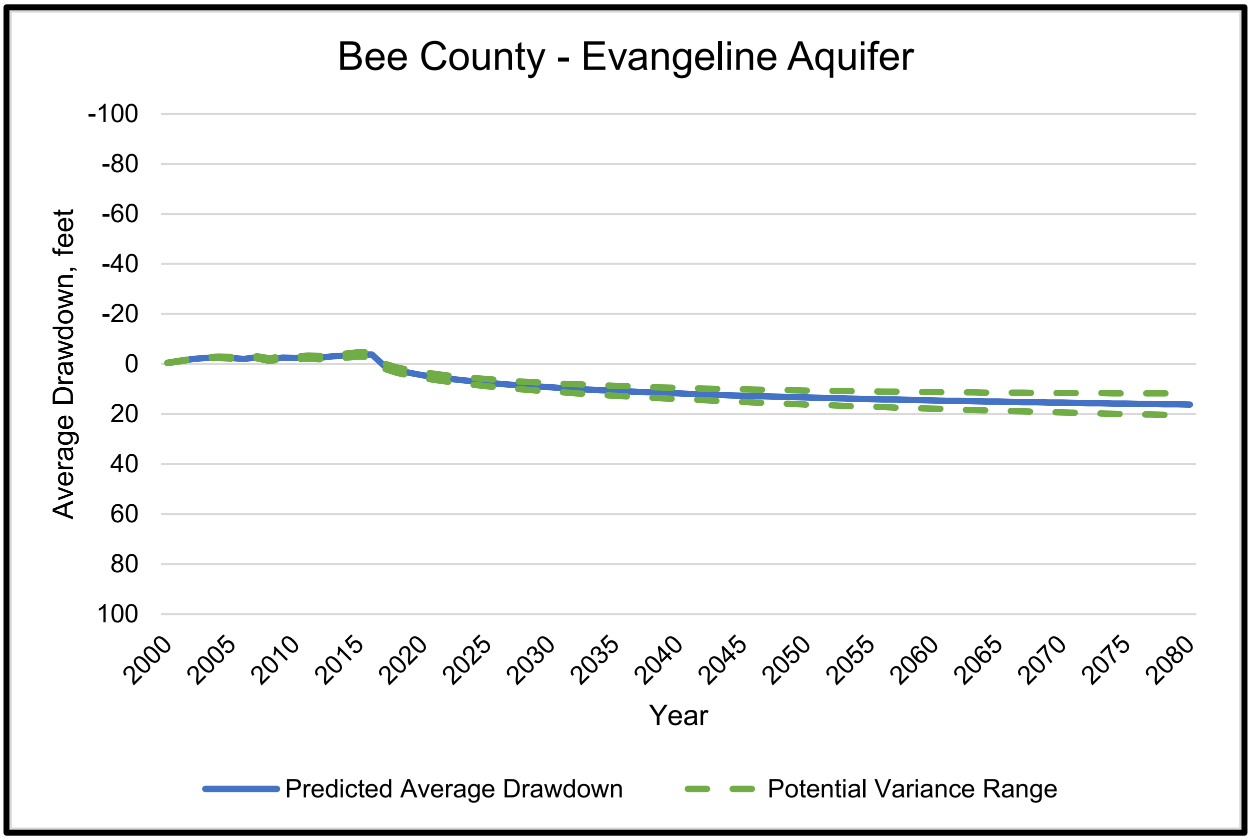

GMA 15 - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

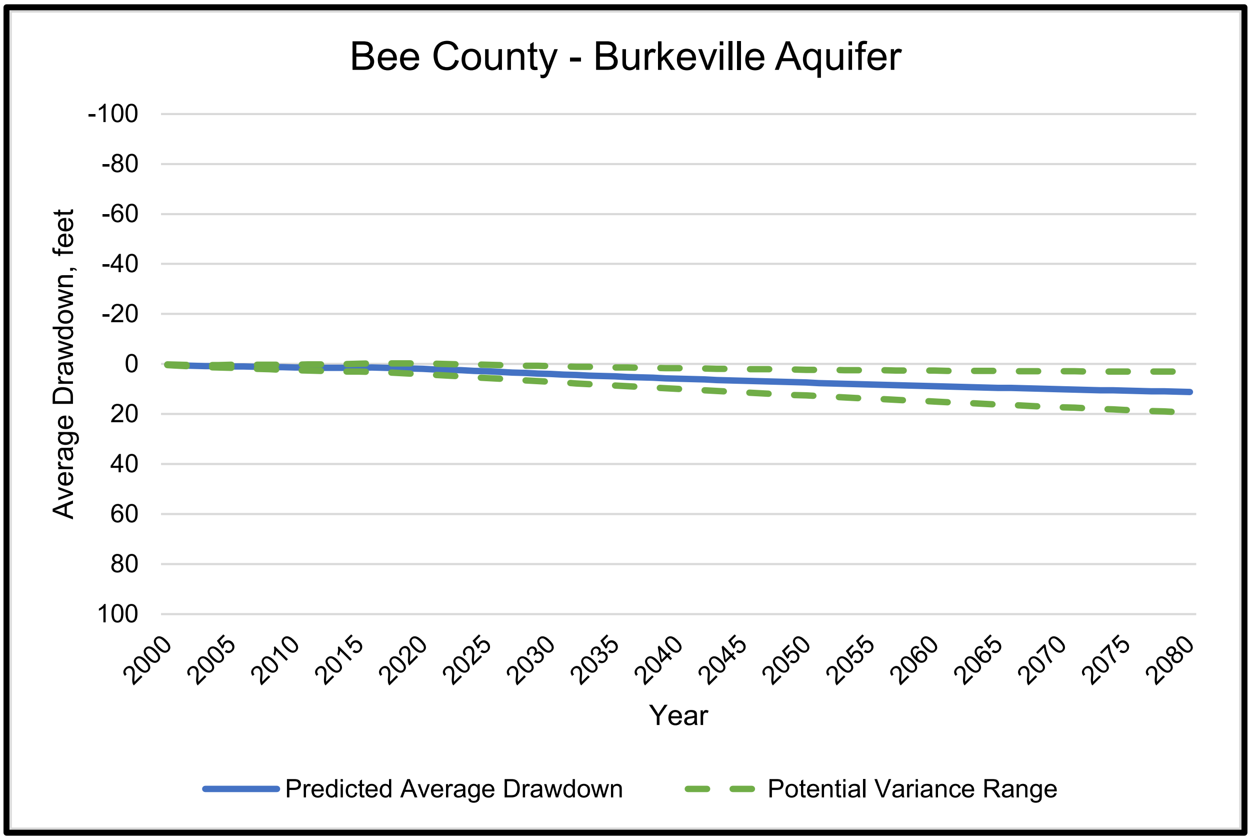

Aransas County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

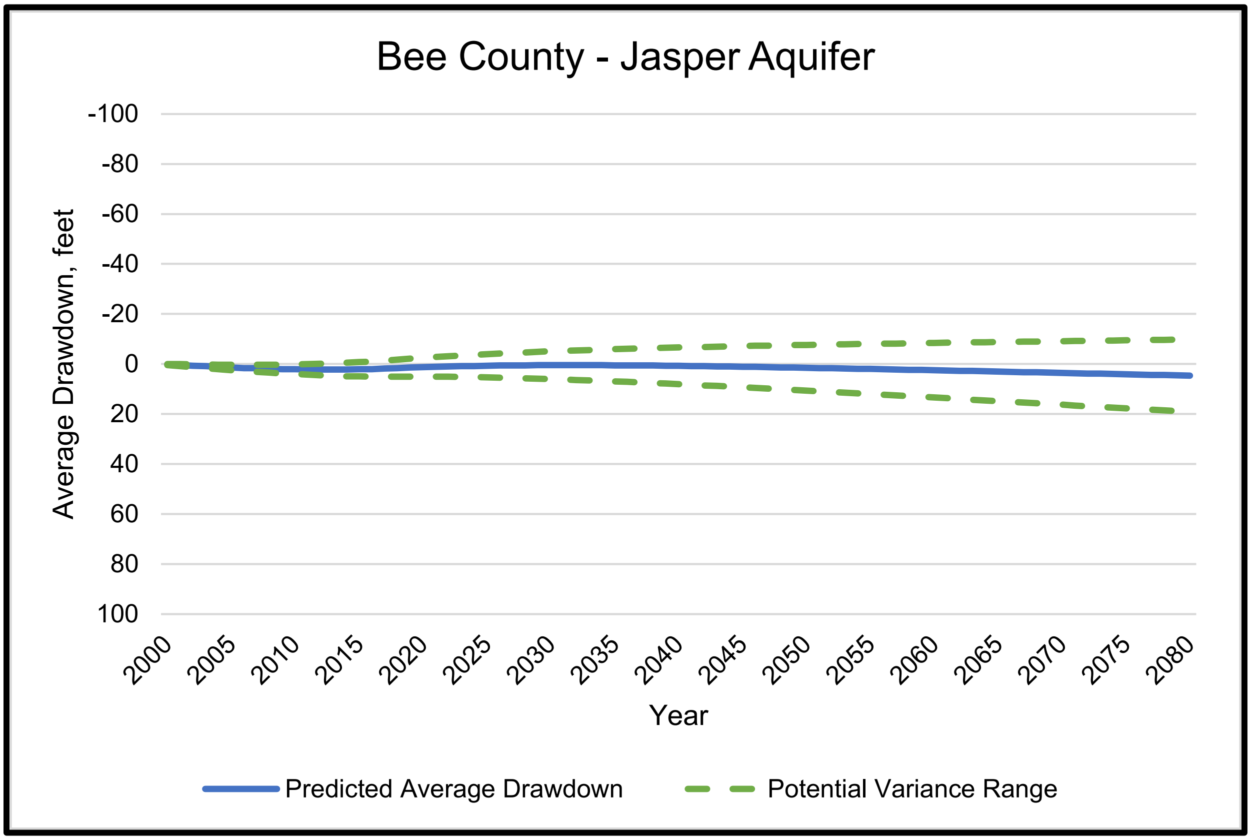

Aranmas County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

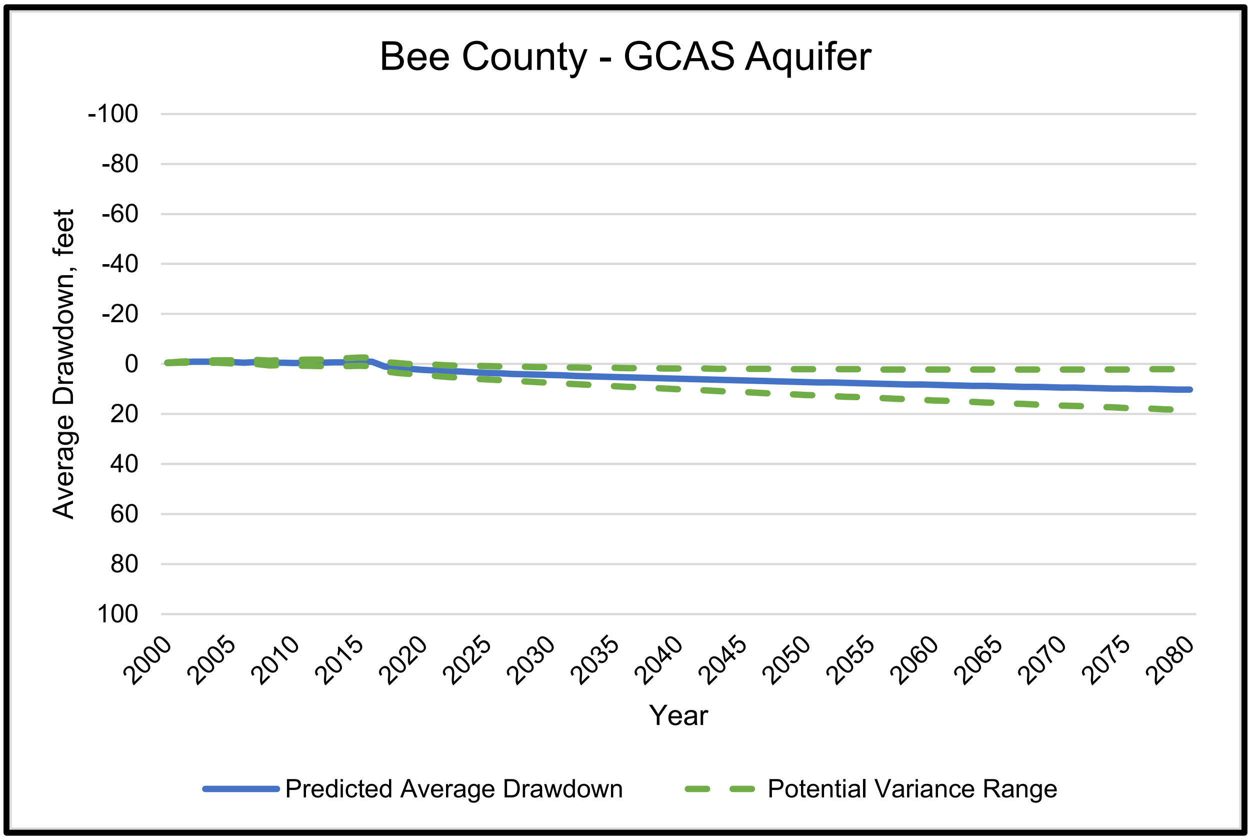

Aransas County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

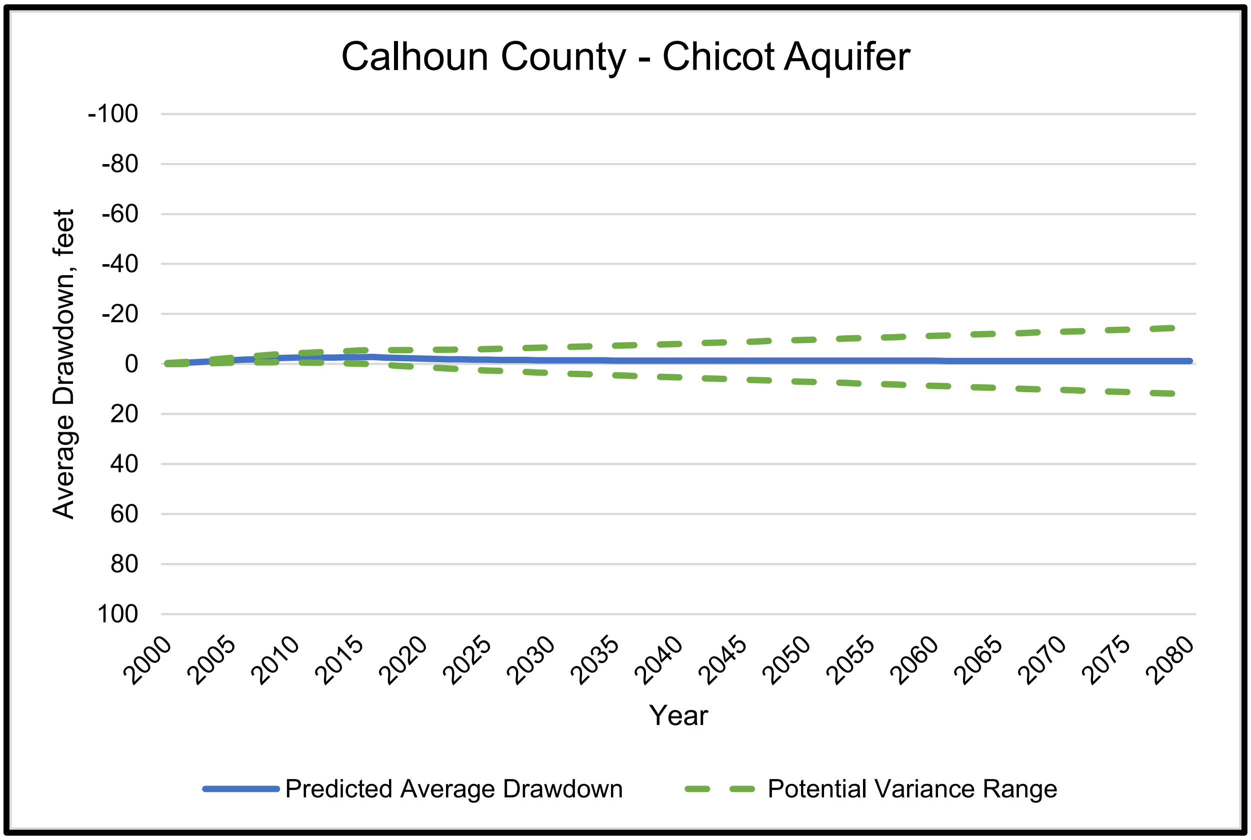

Bee County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

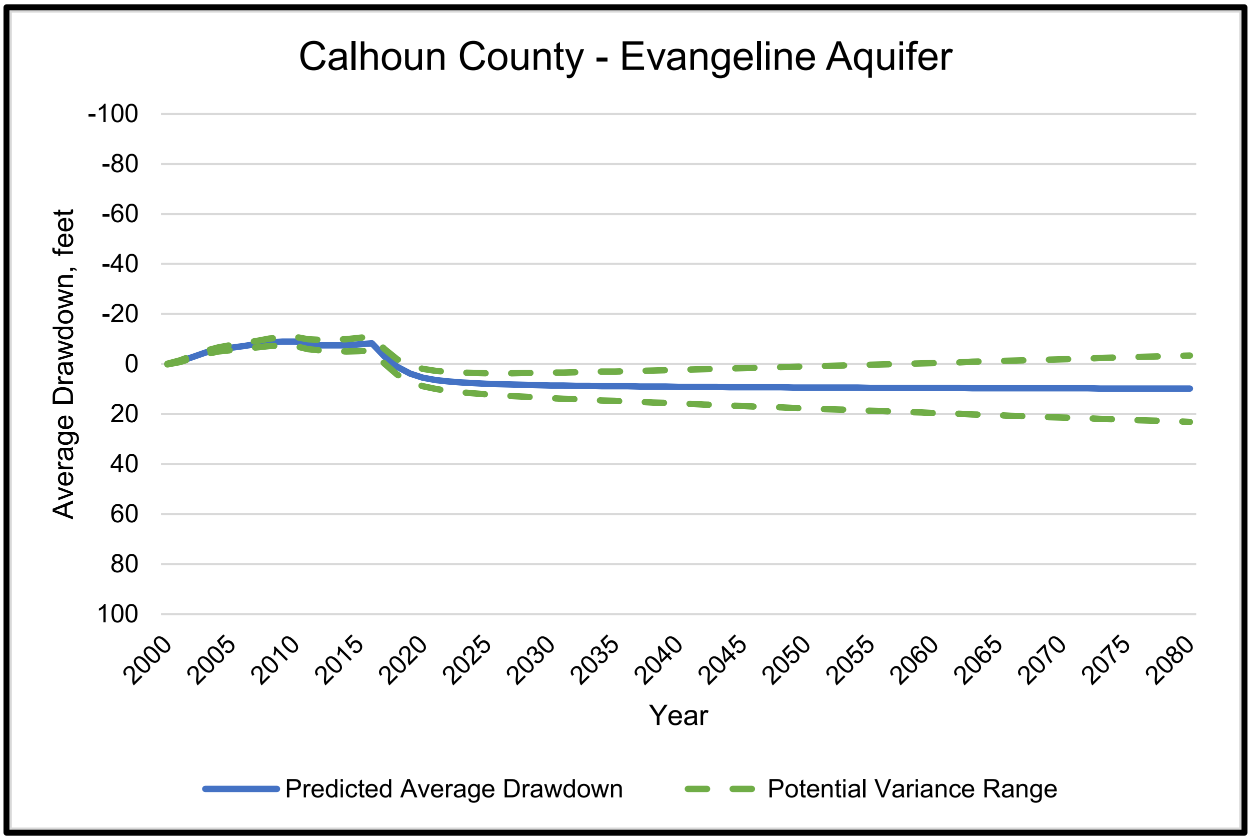

Bee County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

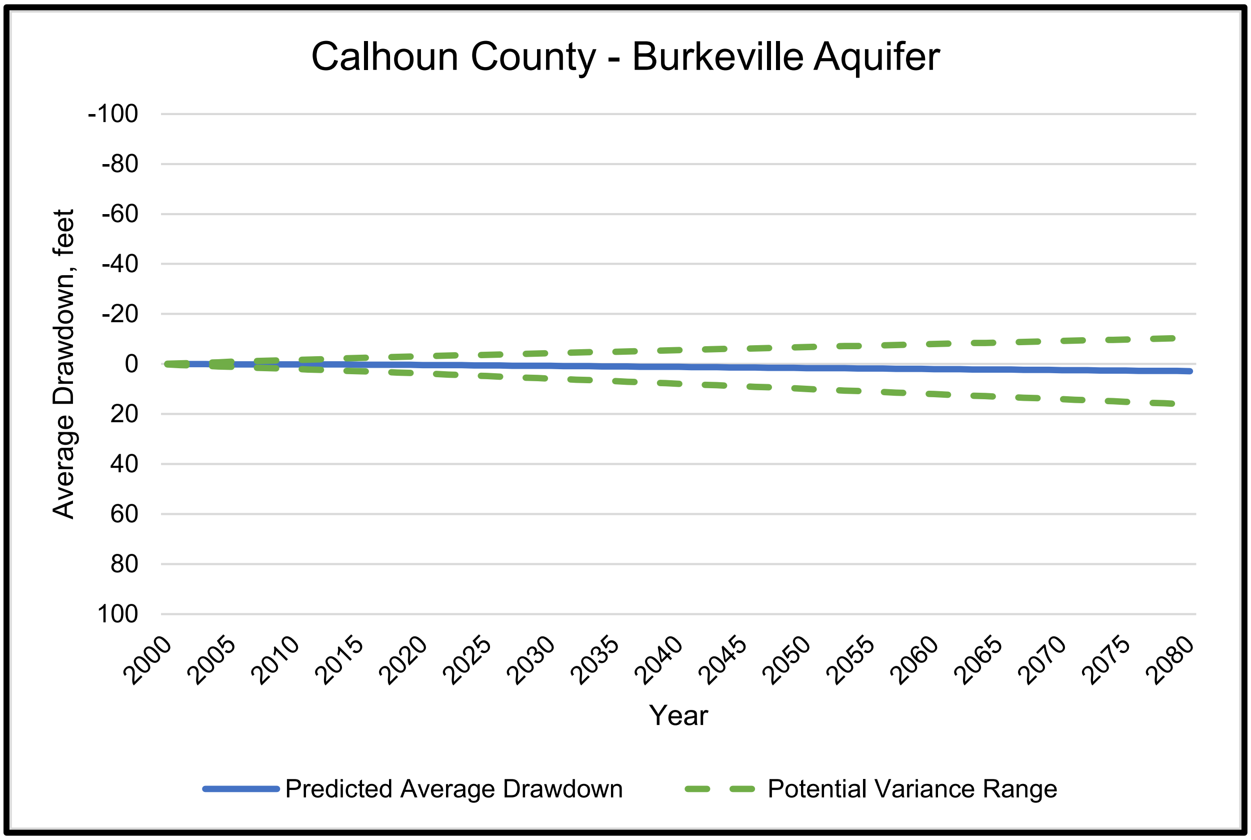

Bee County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

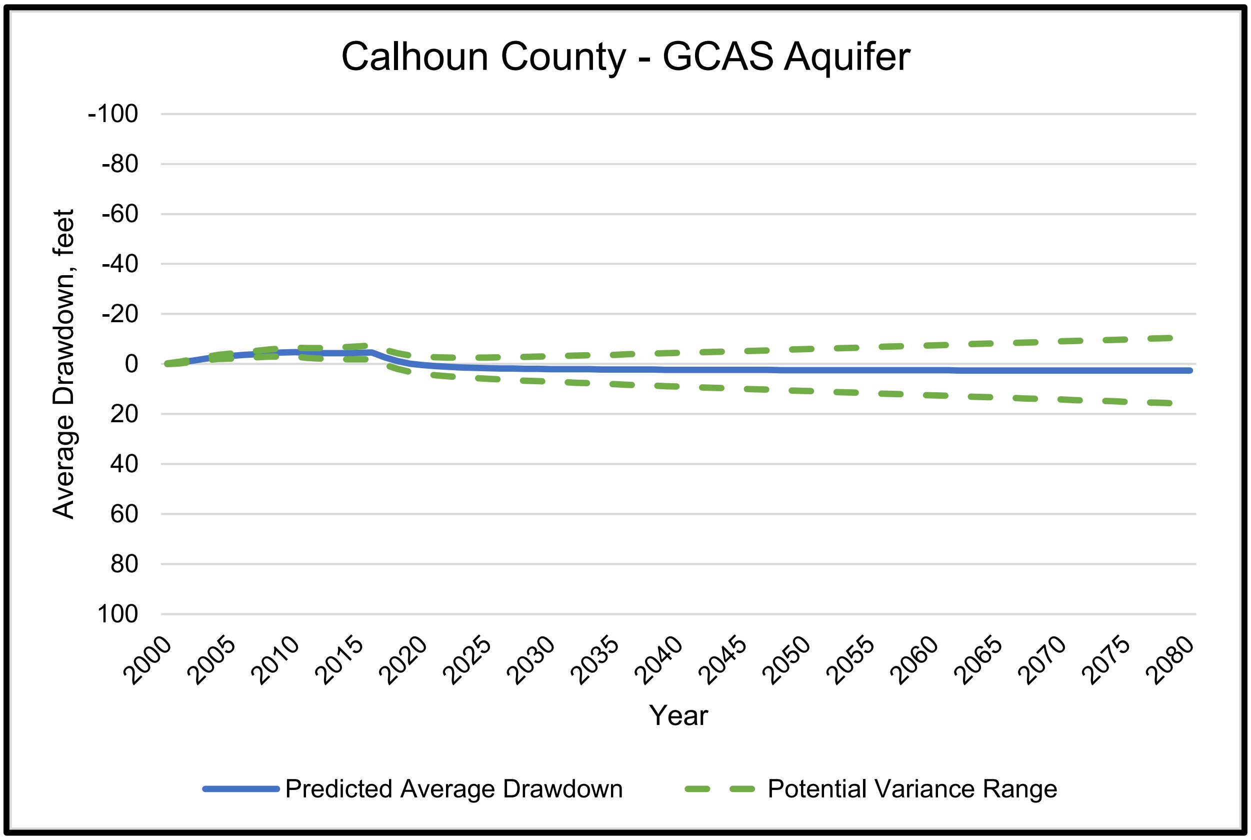

Bee County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

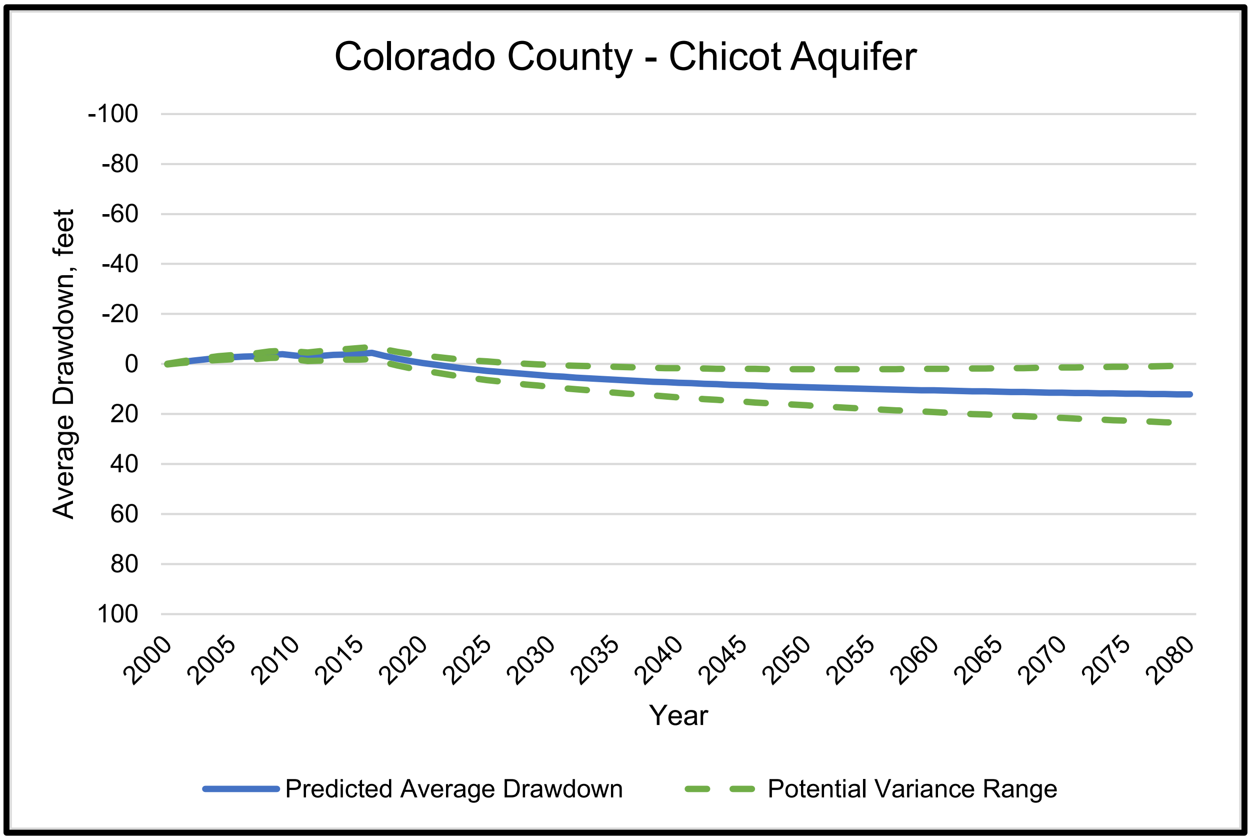

Bee County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

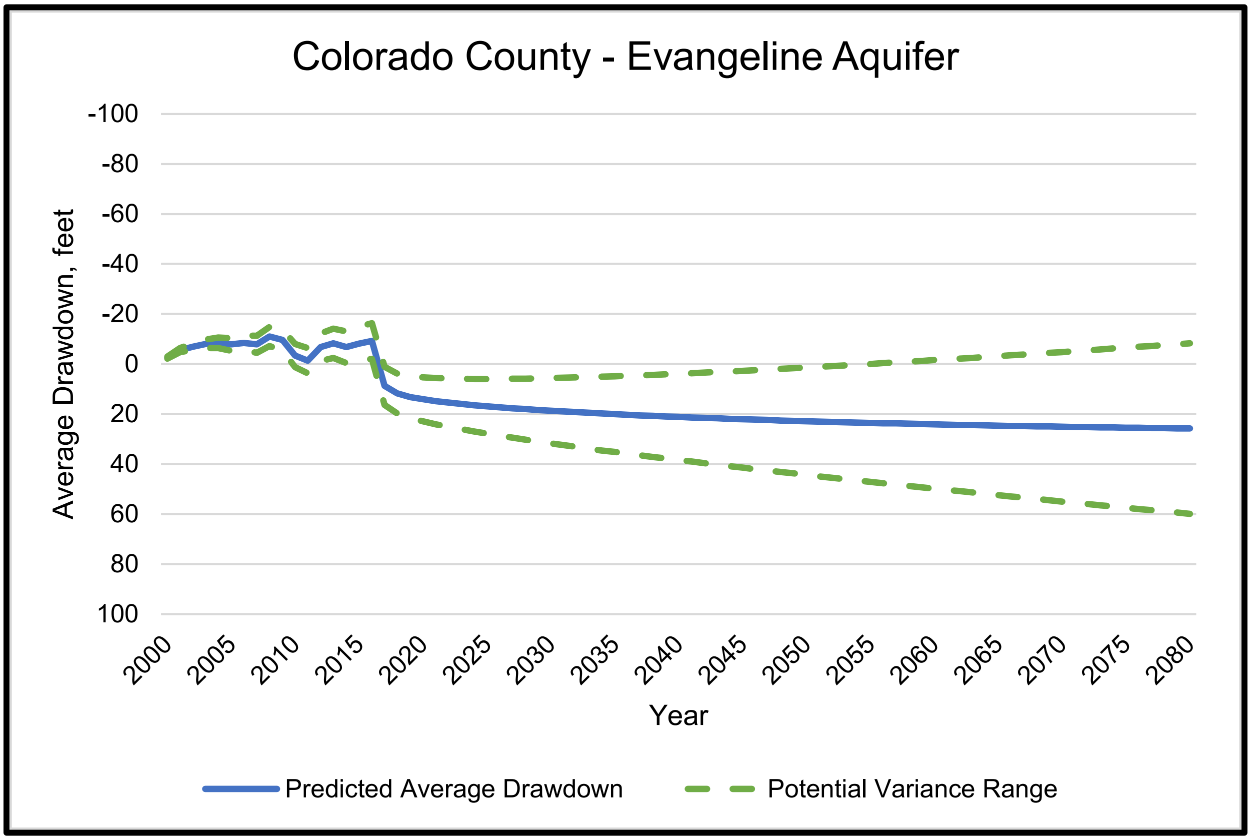

Calhoun County - Chicot Aquifer
-100
-80
-60
-40
-20
0
20
40
60
80
100
Average Drawdown, feet
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

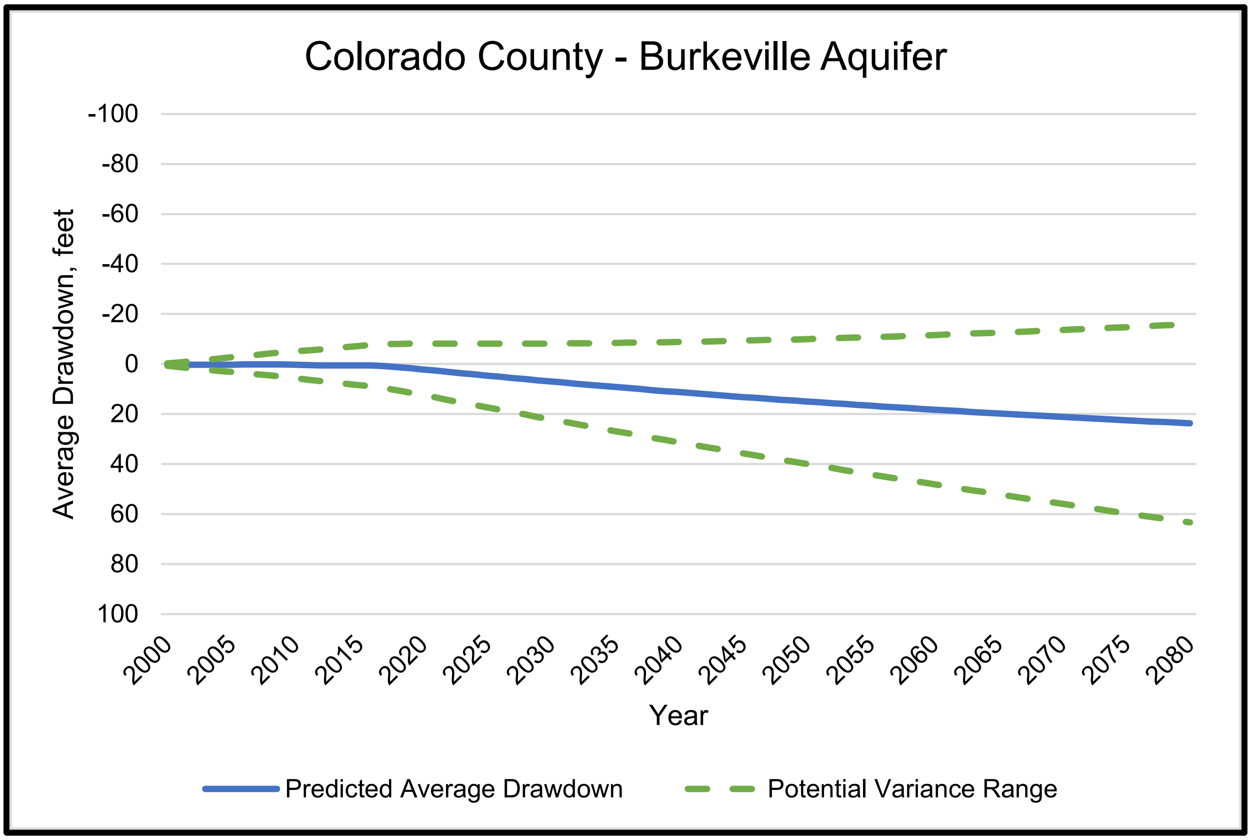

Calhoun County - Evangeline Aquifer
-100
-80
-60
-40
-20
0
20
40
60
80
100
Average Drawdown, feet
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

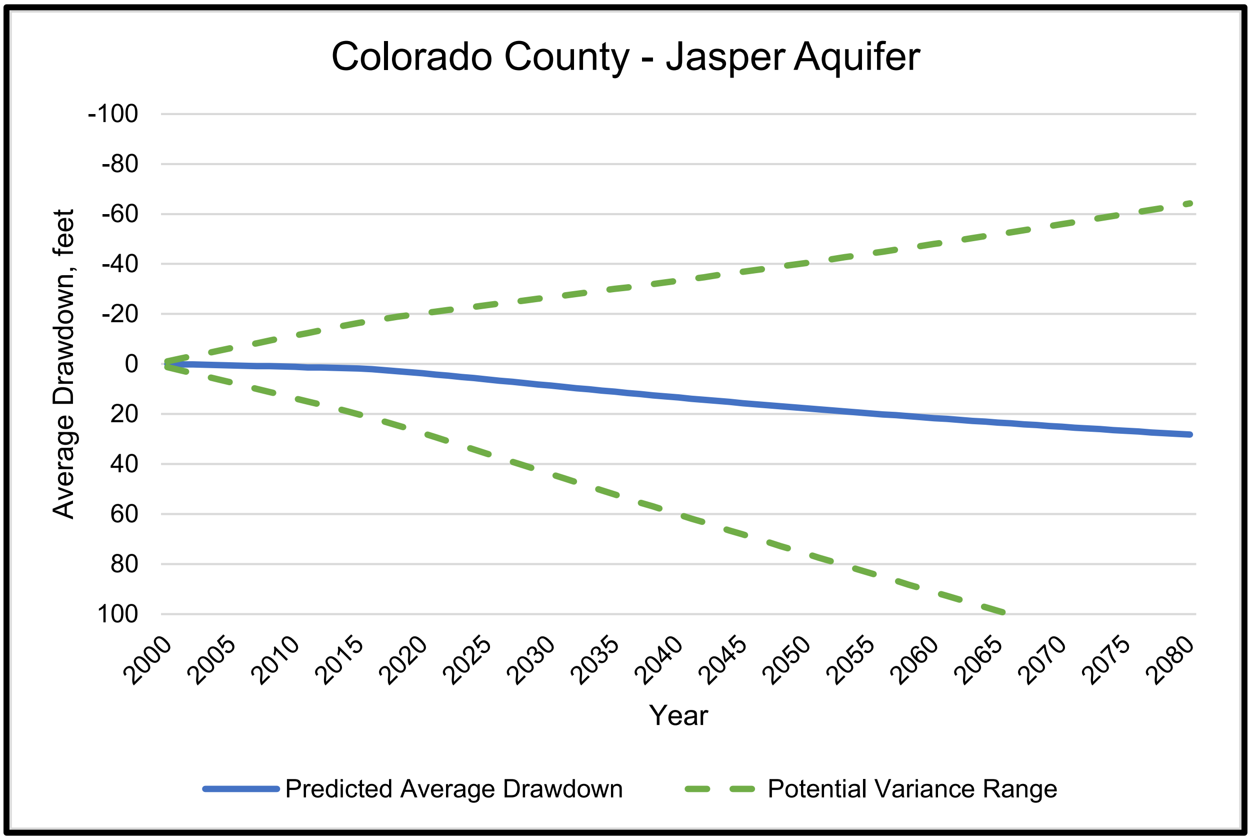

Calhoun County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

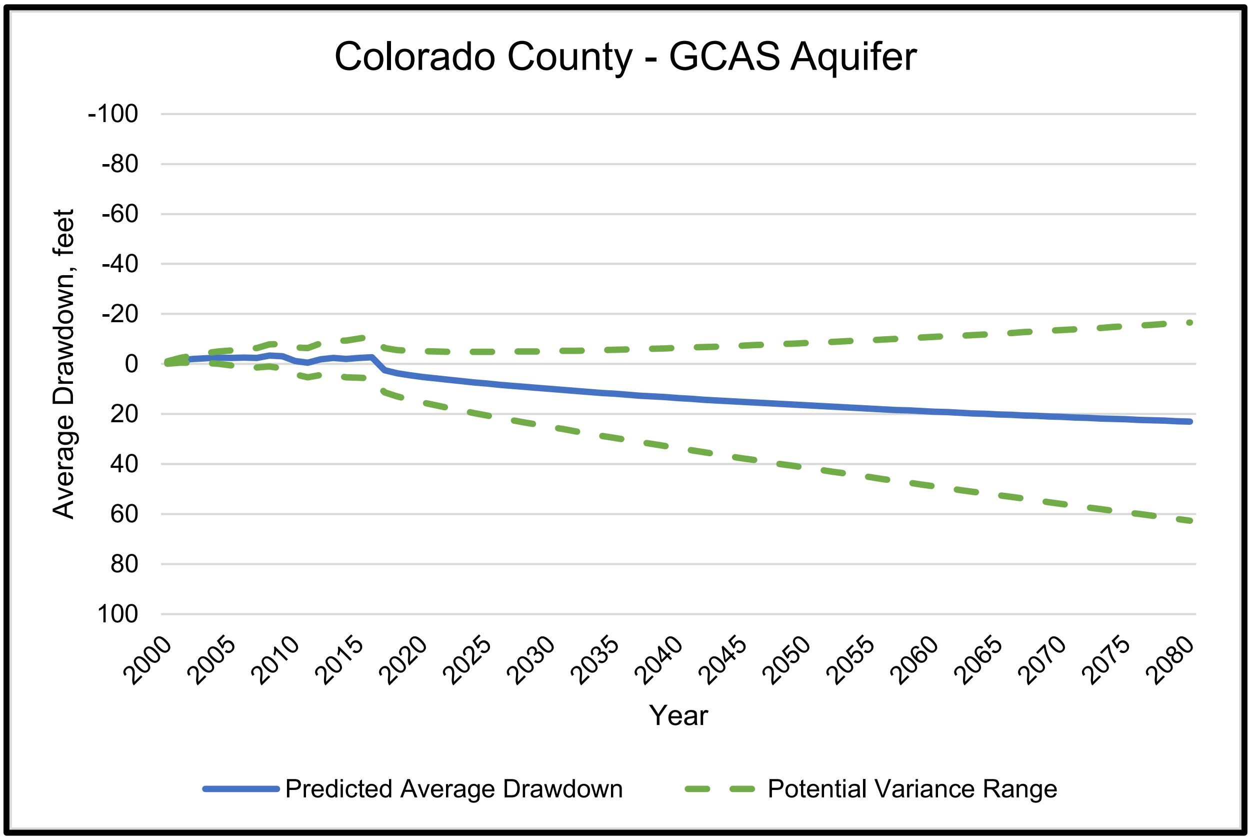

Calhoun County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

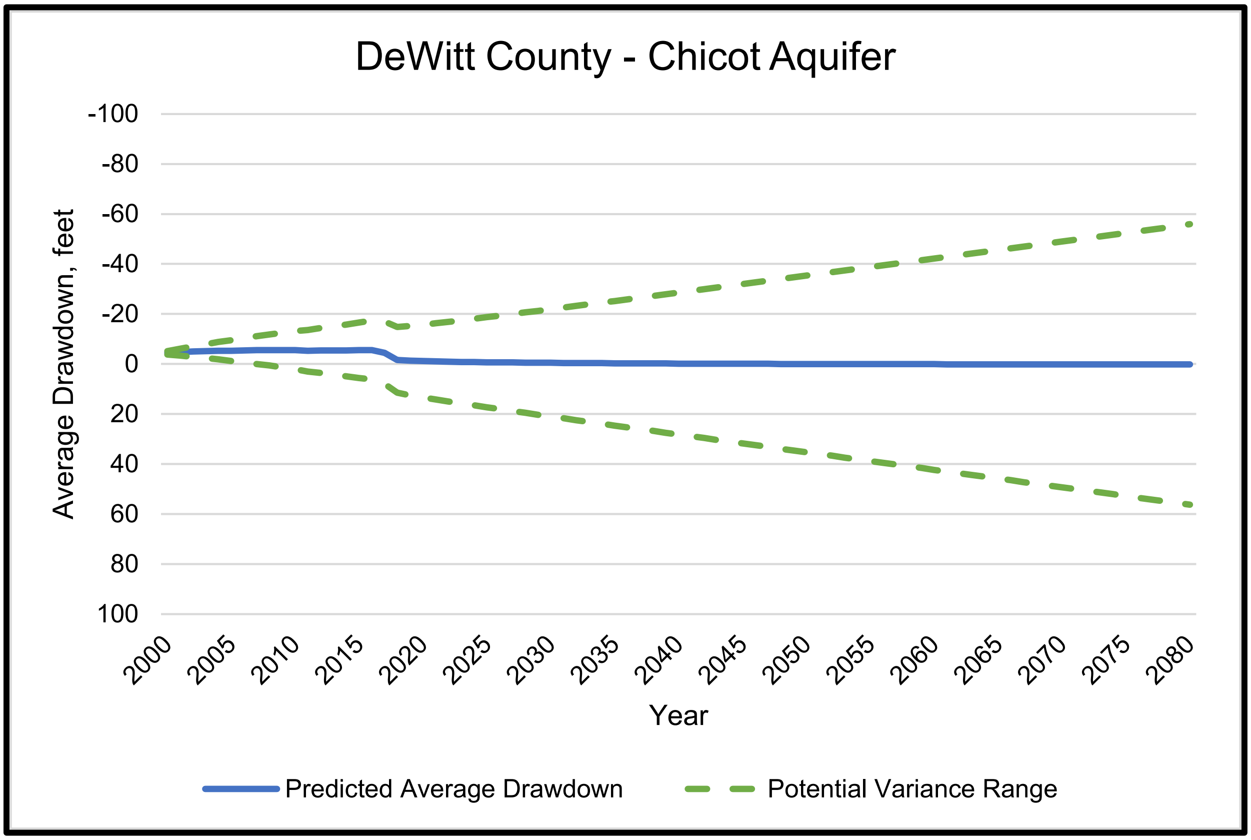

Colorado County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

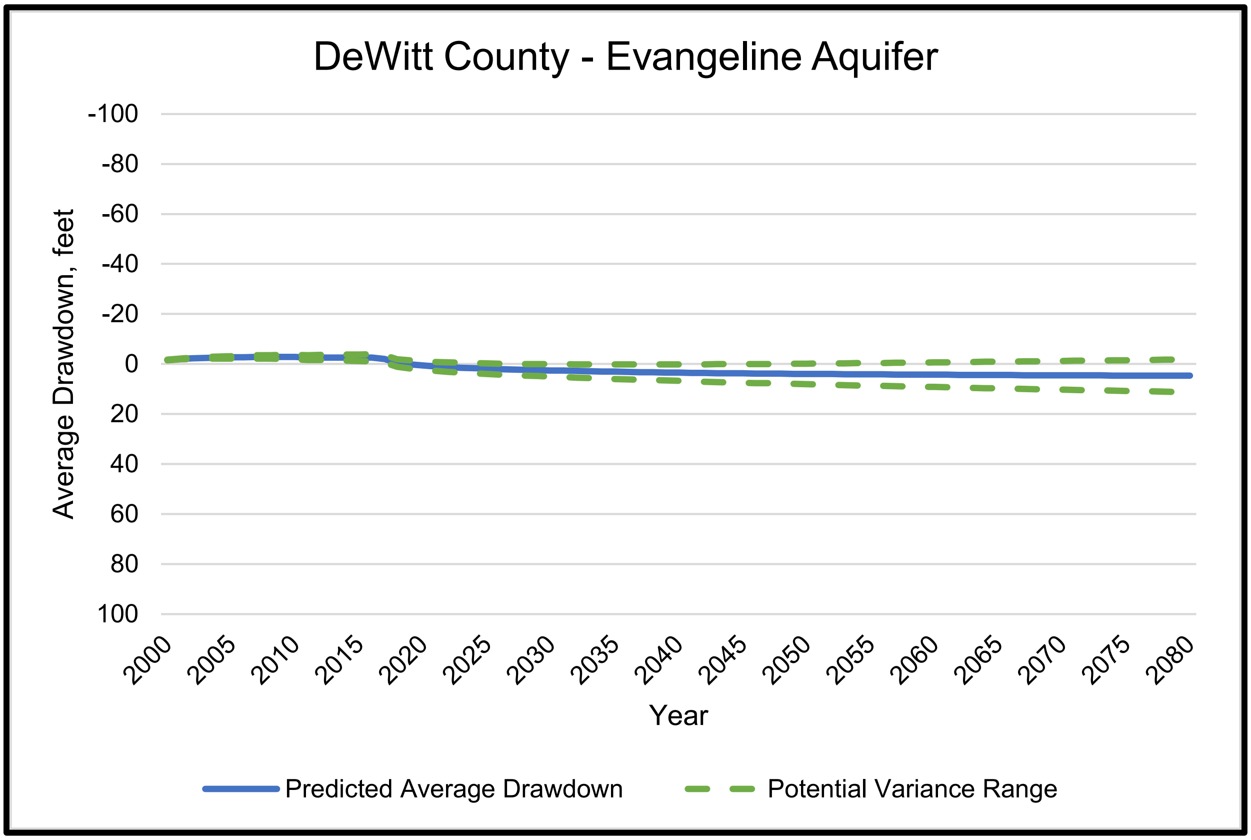

Colorado County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

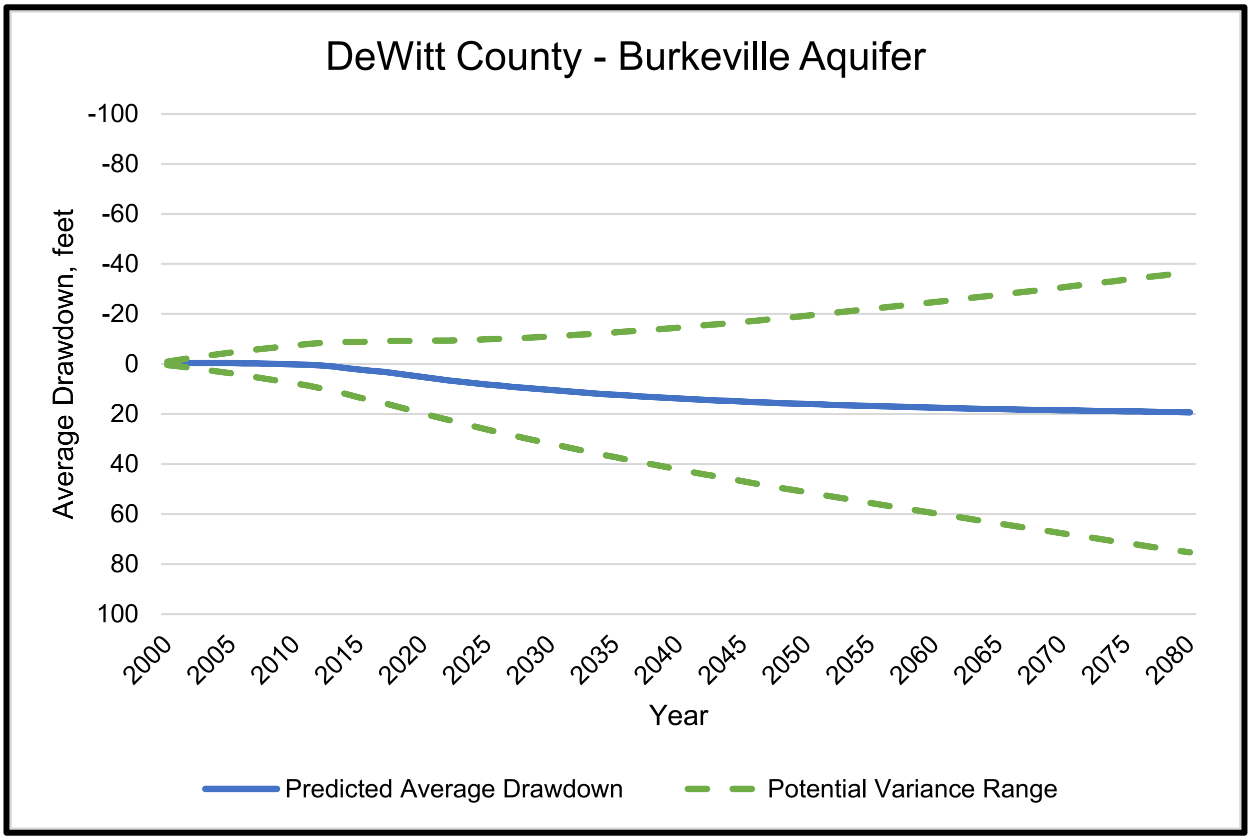

Colorado County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

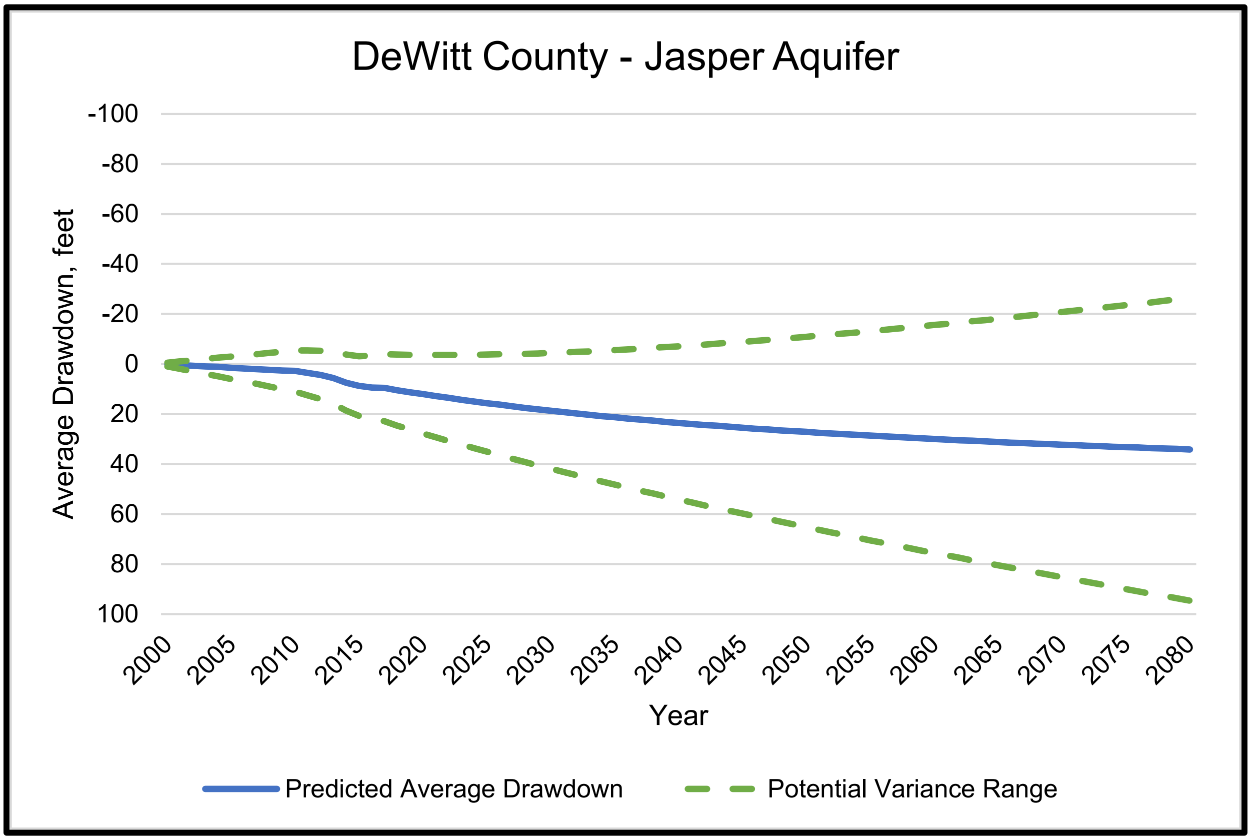

Colorado County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

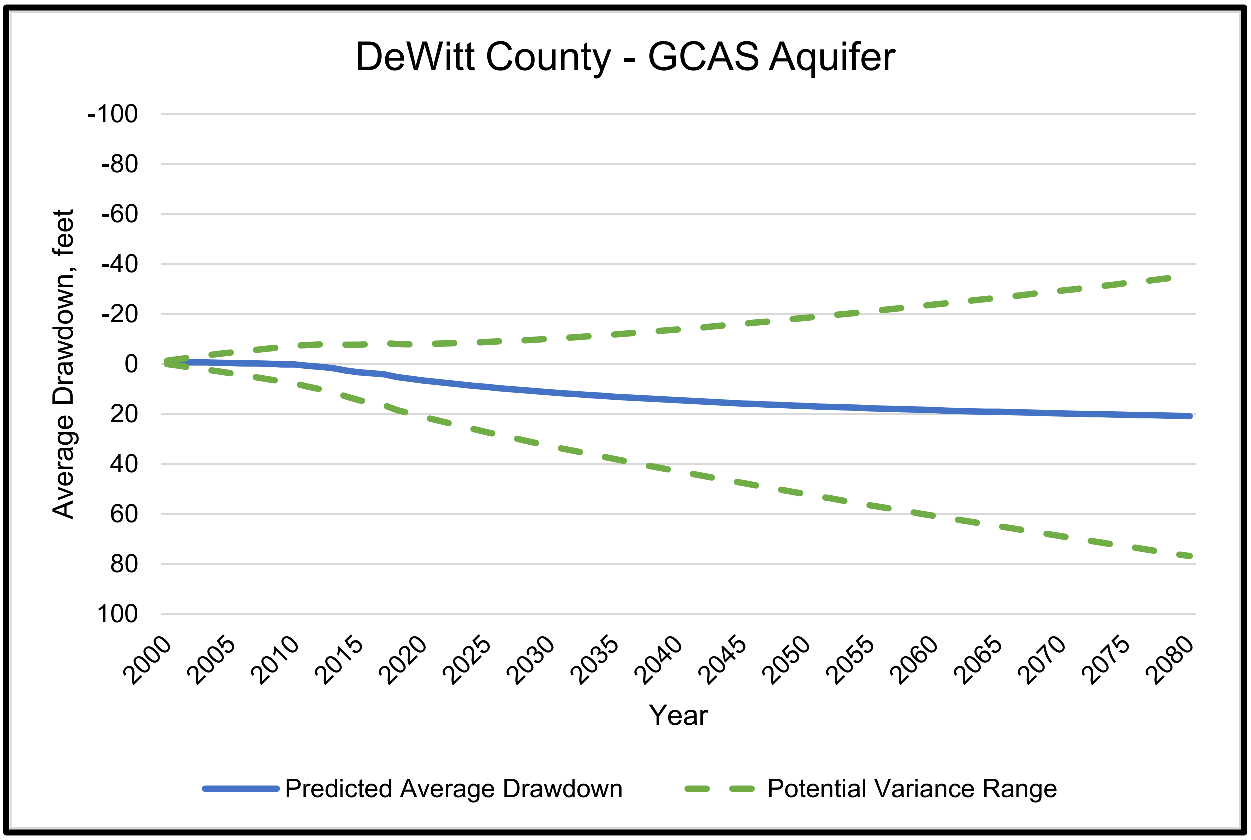

Colorado County - GCAS Aquifer
-100
-80
-60
-40
-20
0
20
40
60
80
100
Average Drawdown, feet
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

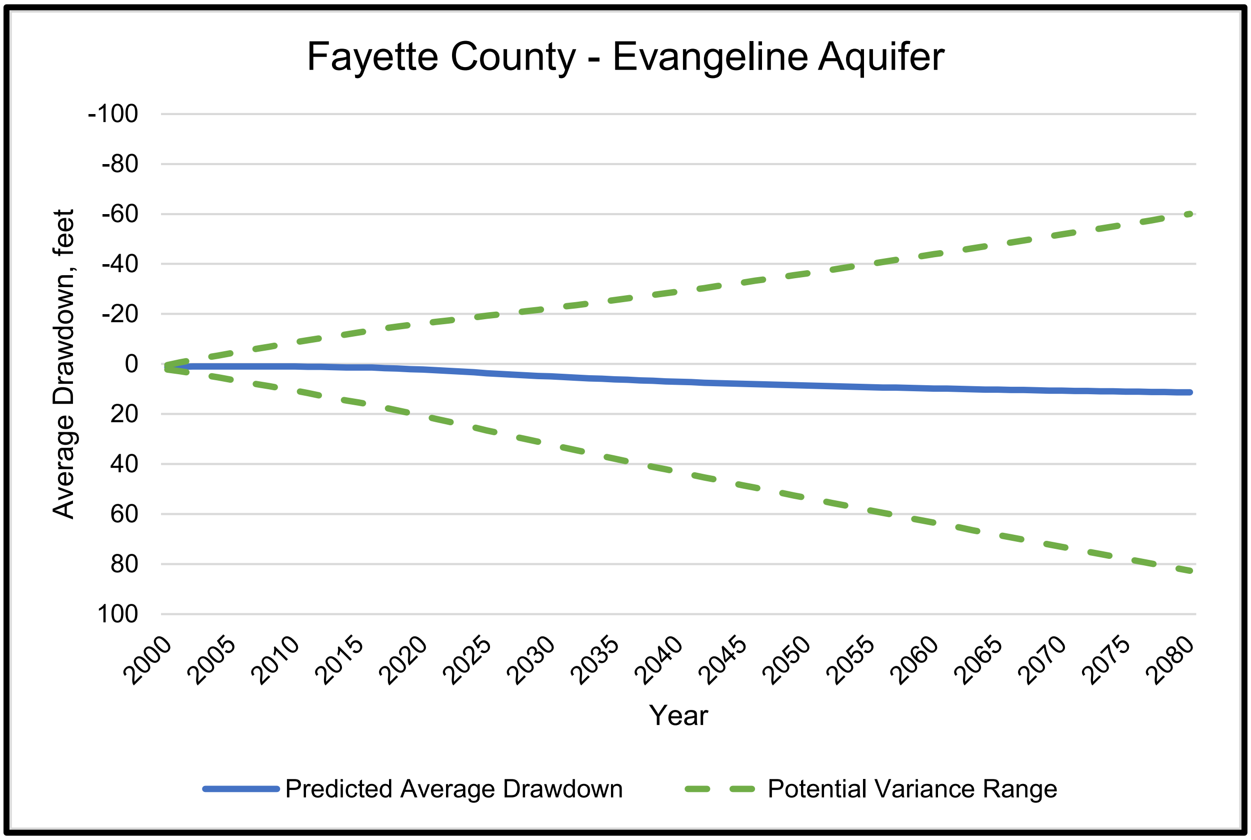

DeWitt County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

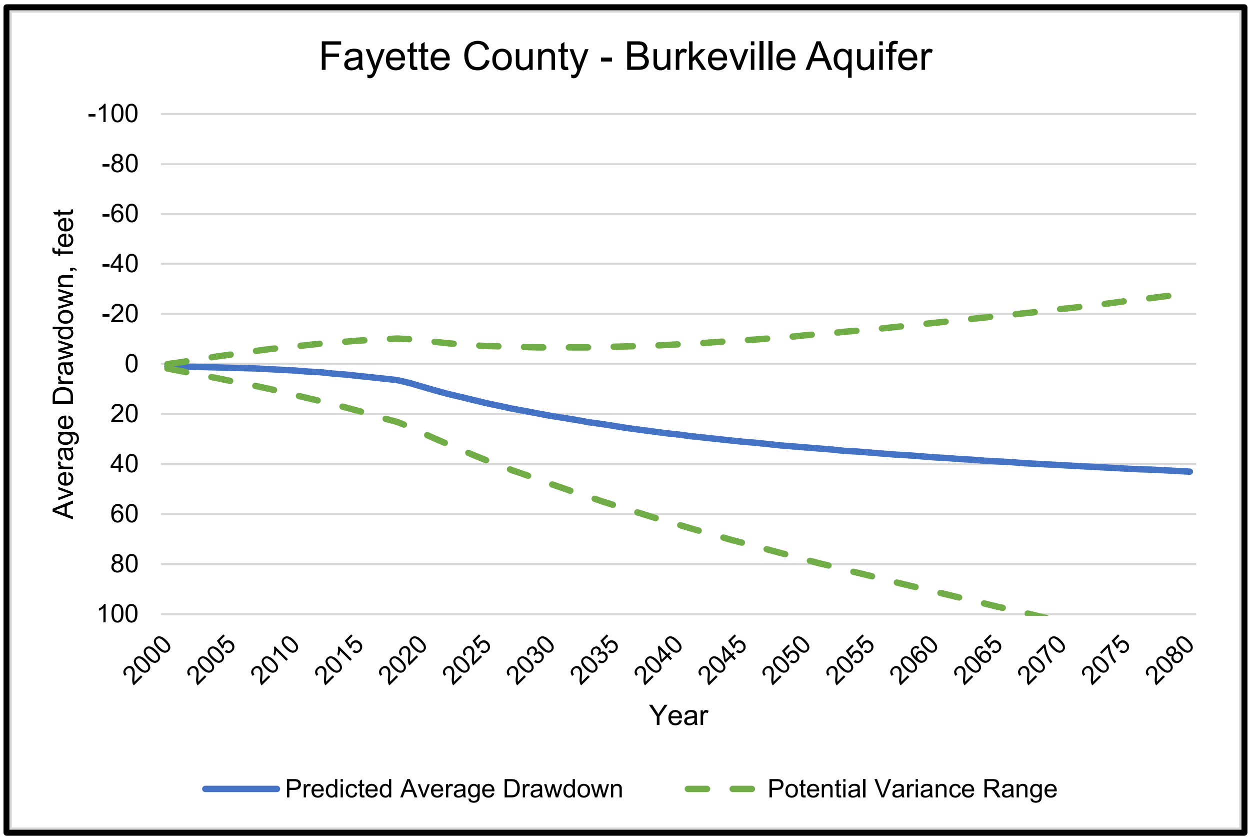

DeWitt County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

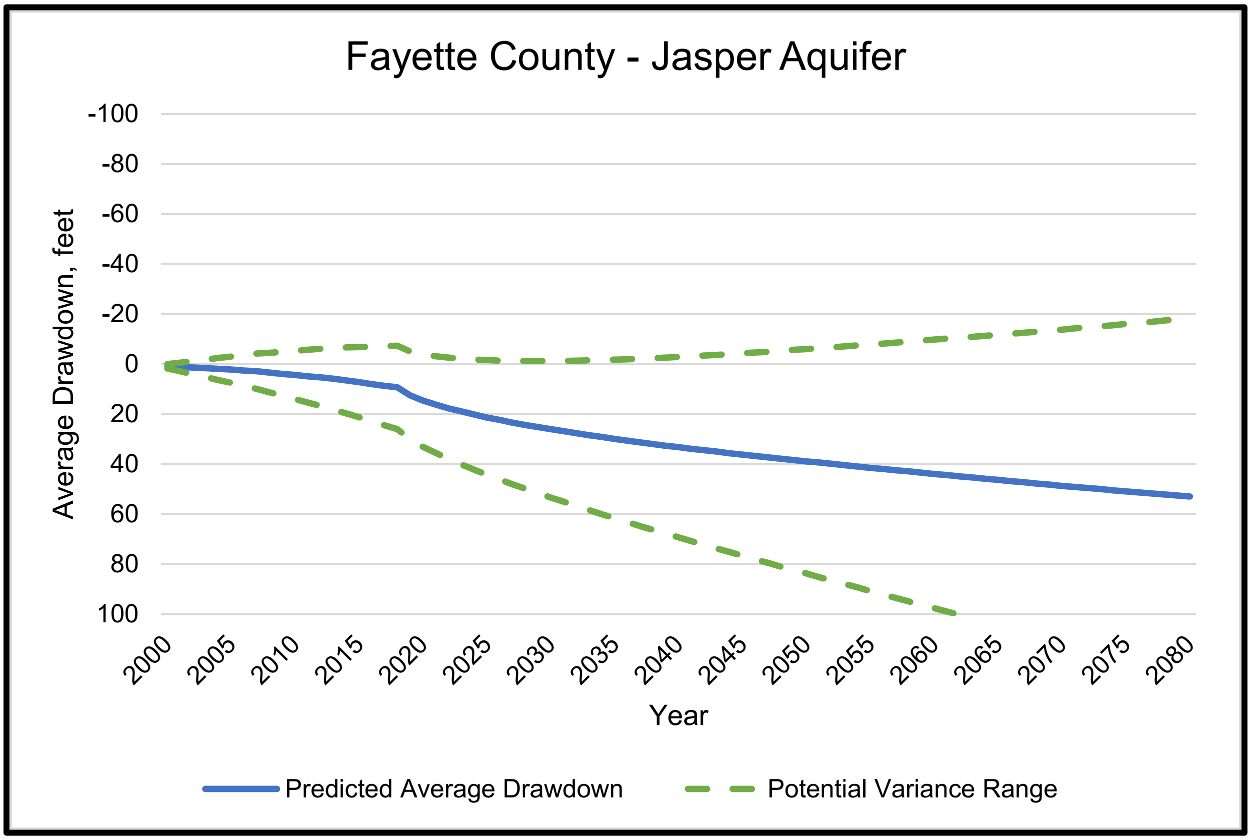

DeWitt County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

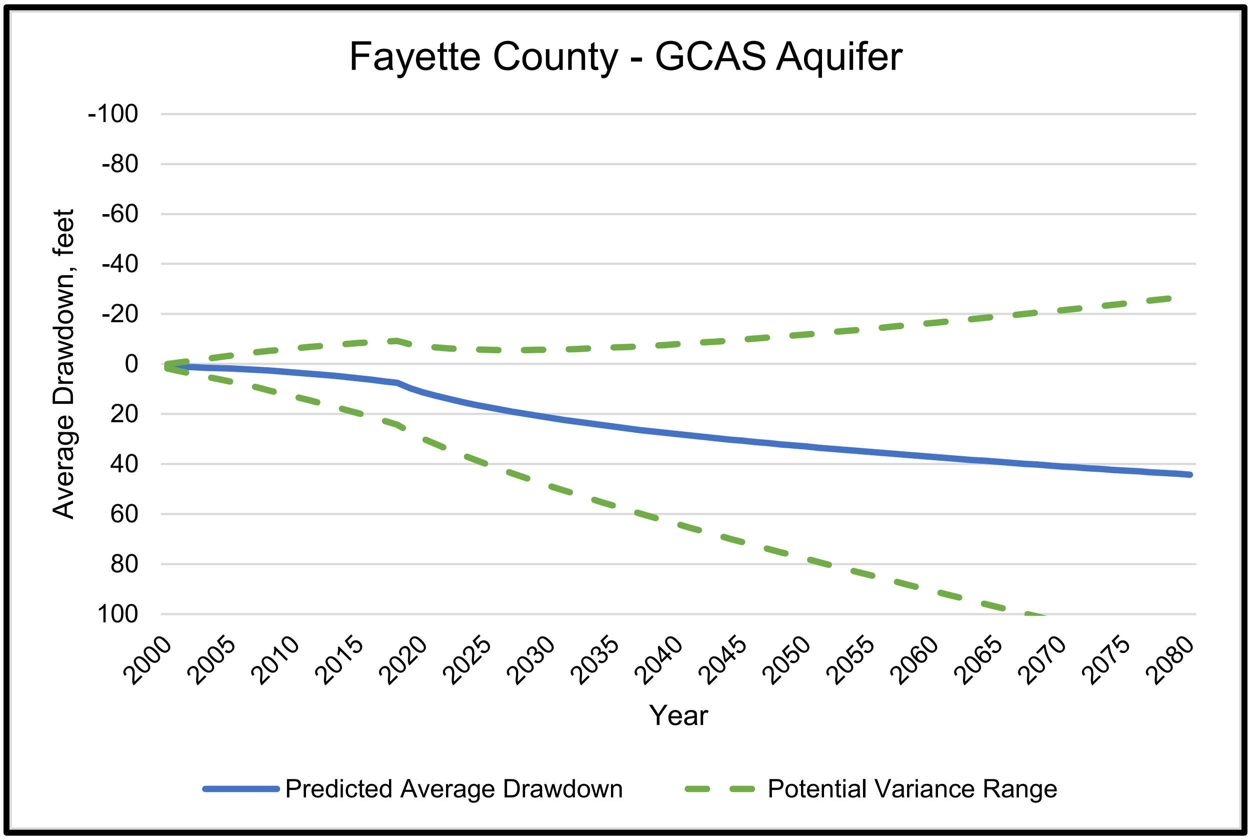

DeWitt County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

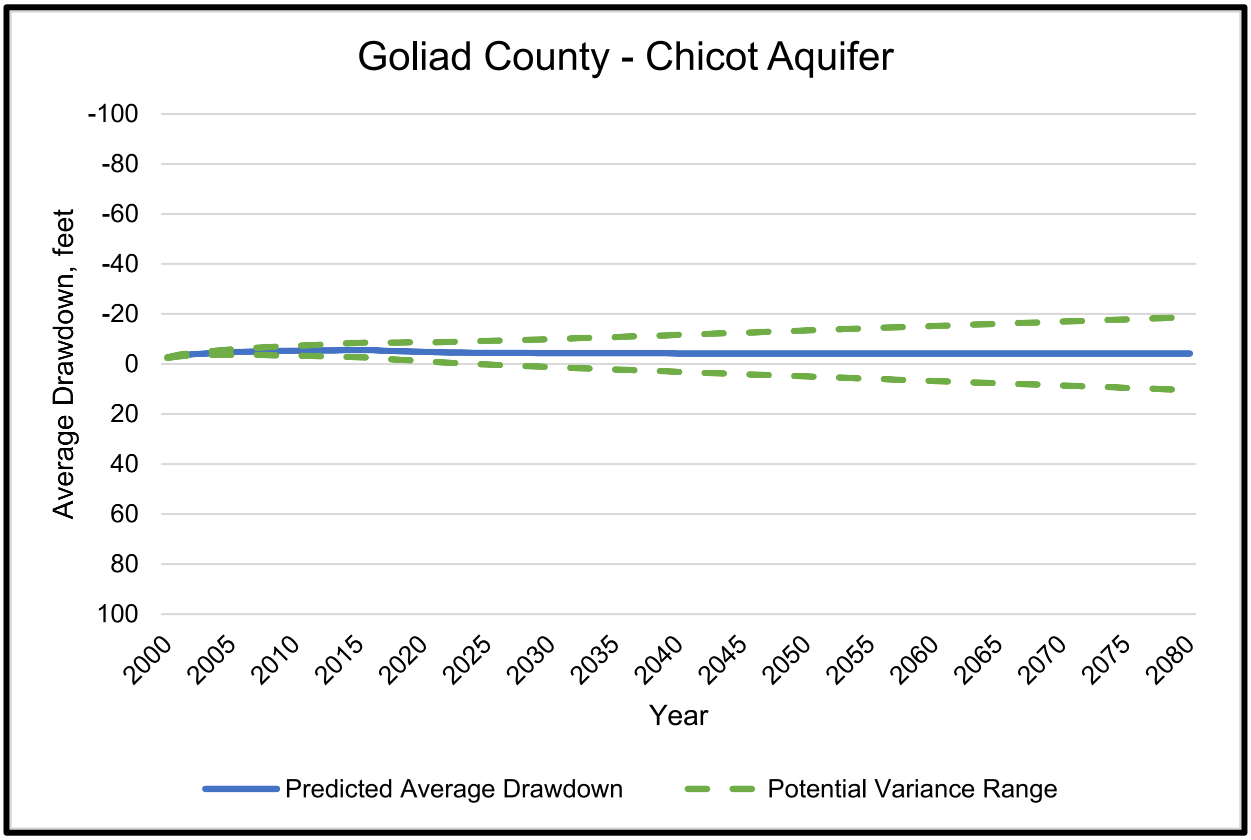

DeWitt County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

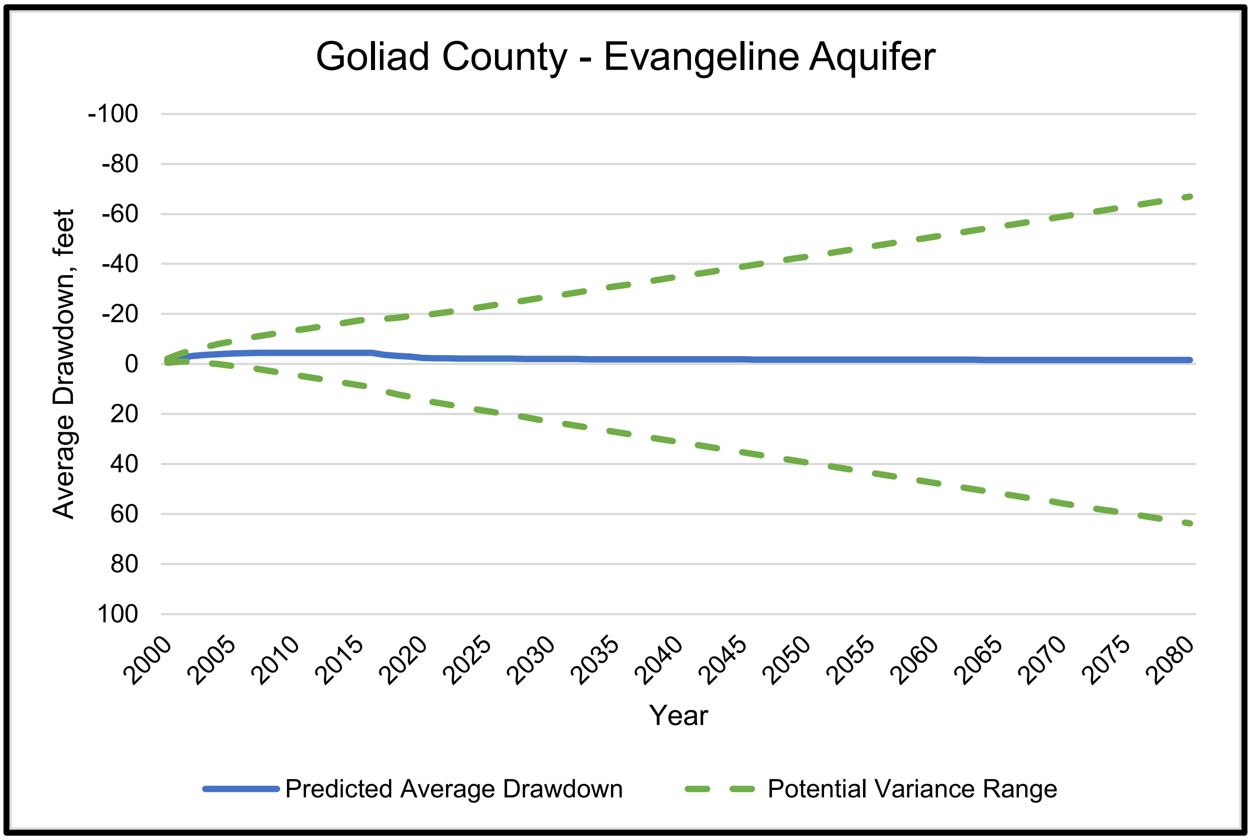

Fayette County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

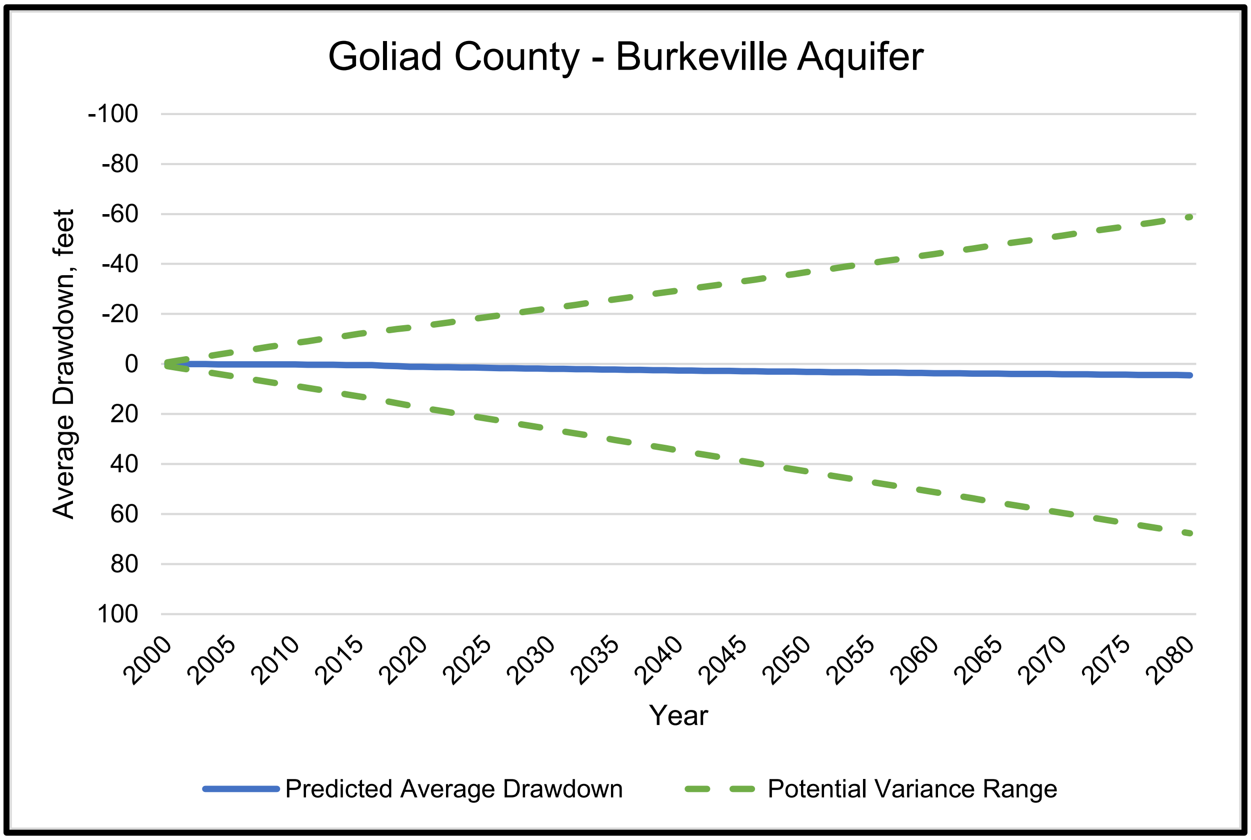

Fayette County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

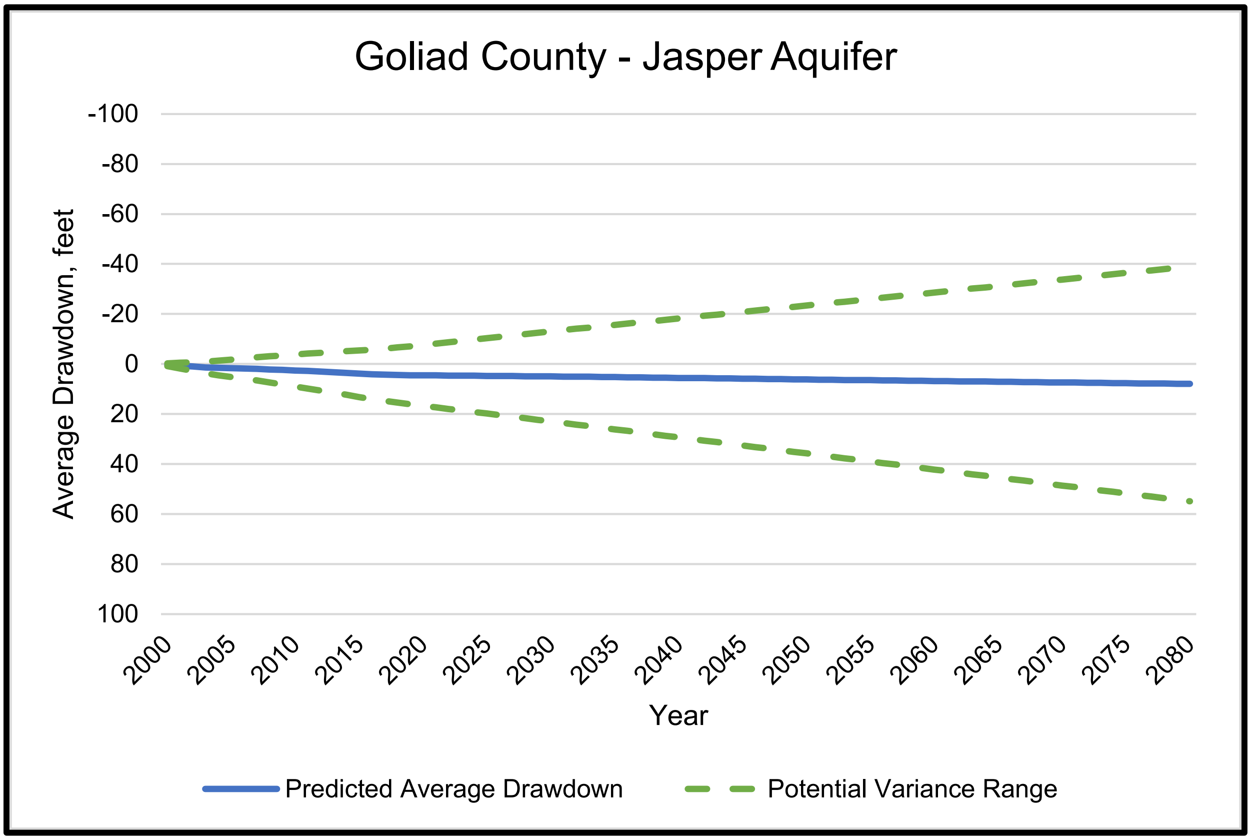

Fayette County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

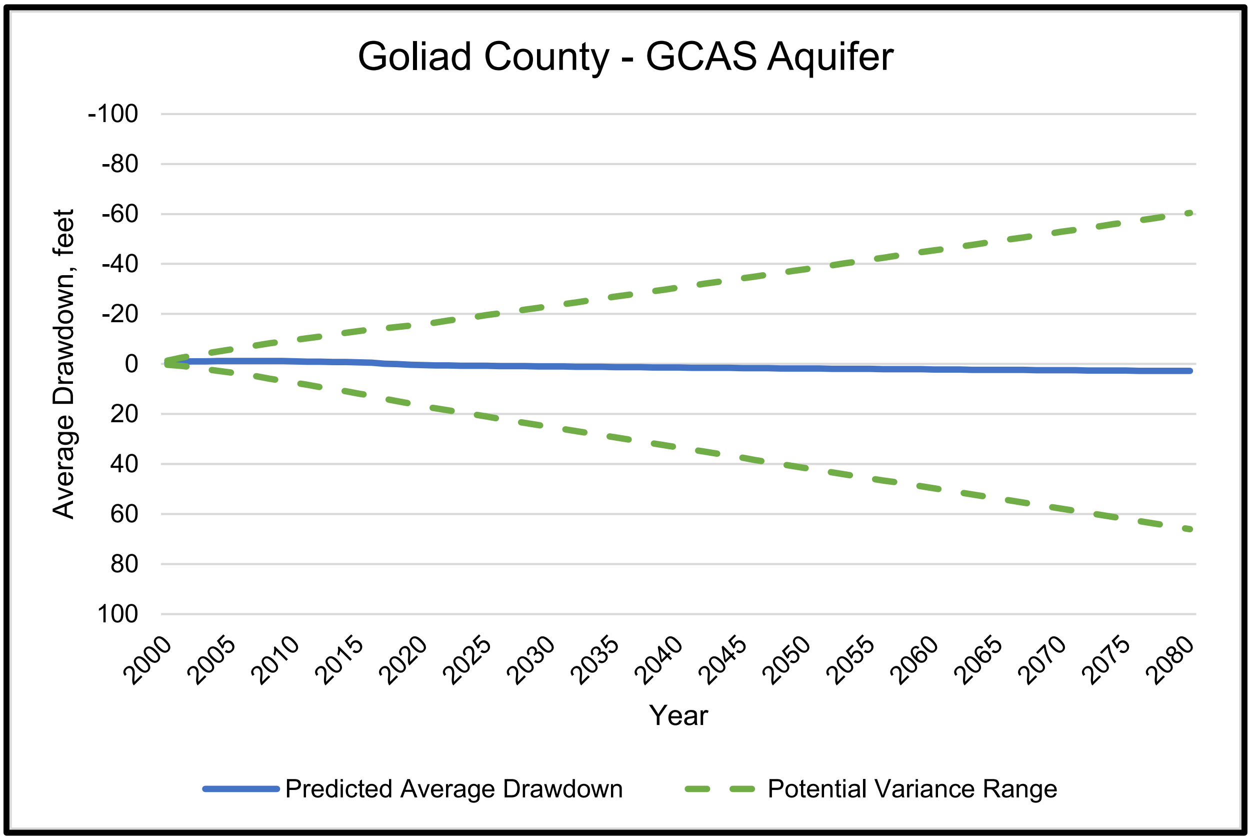

Fayette County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

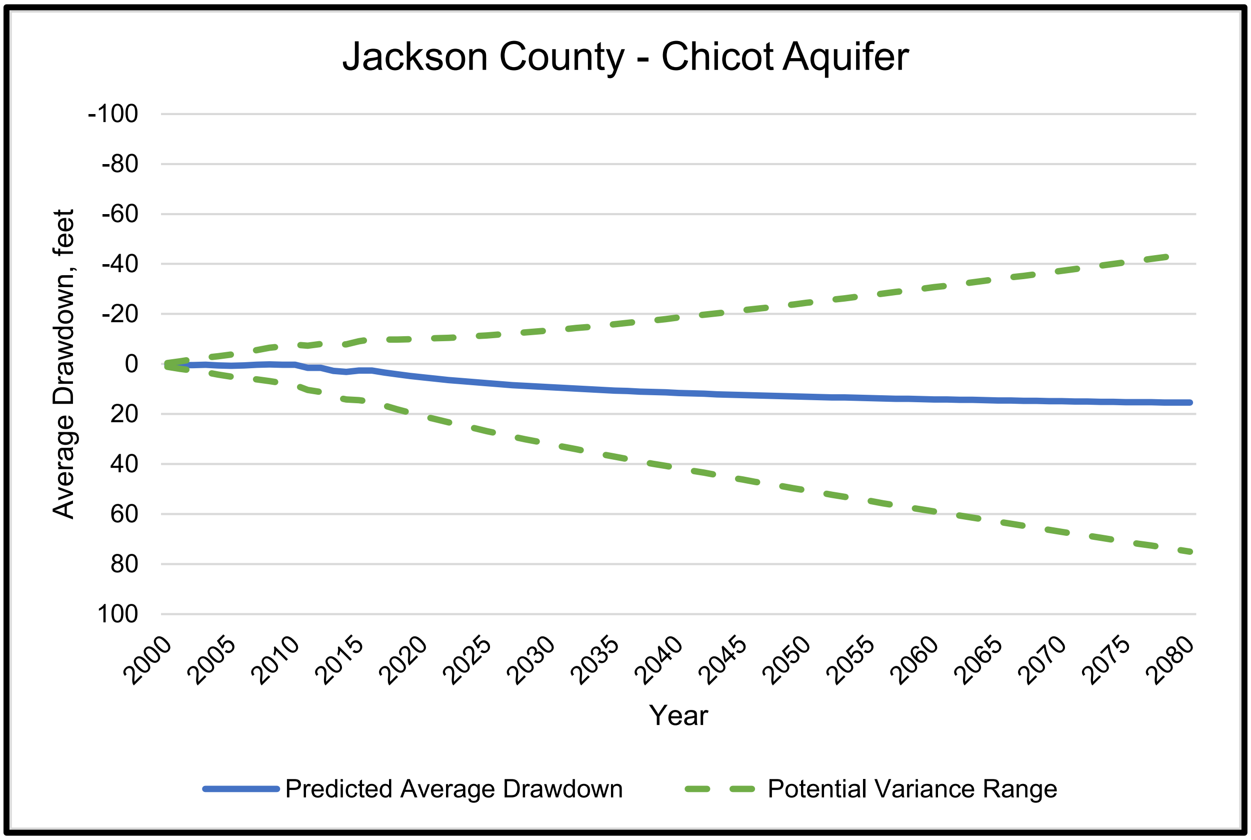

Goliad County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

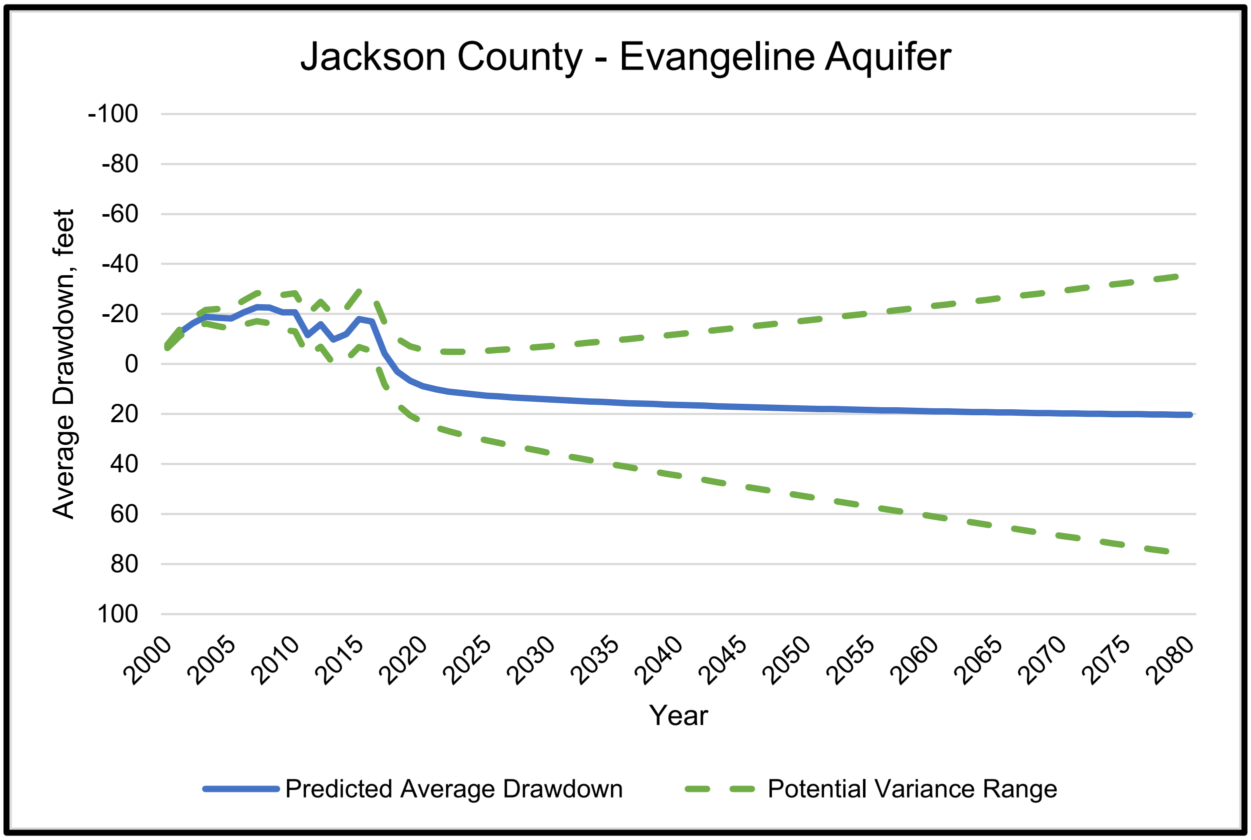

Goliad County - Evangeline Aquifer
-100
-80
-60
-40
-20
0
20
40
60
80
100
Average Drawdown, feet
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

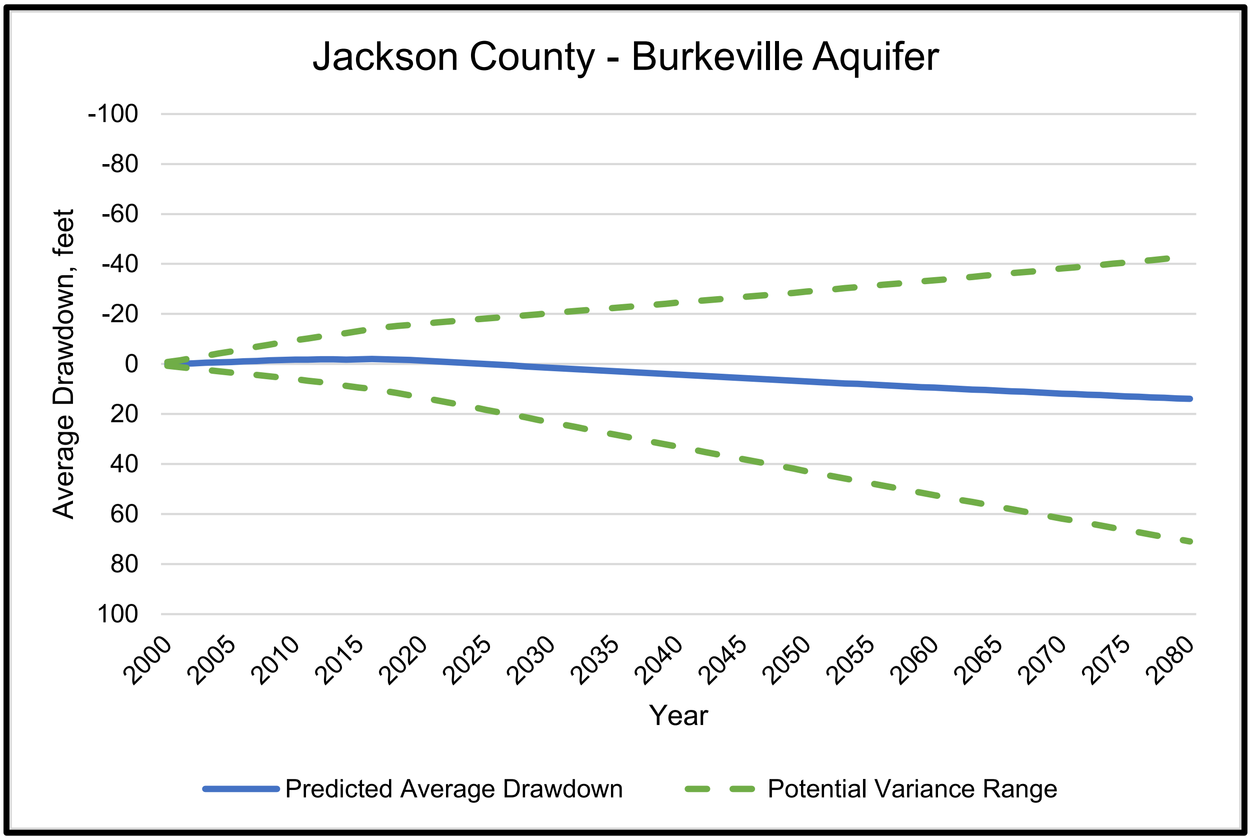

Goliad County - Burkeville Aquifer
-100
-80
-60
-40
-20
0
20
40
60
80
100
Average Drawdown, feet
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

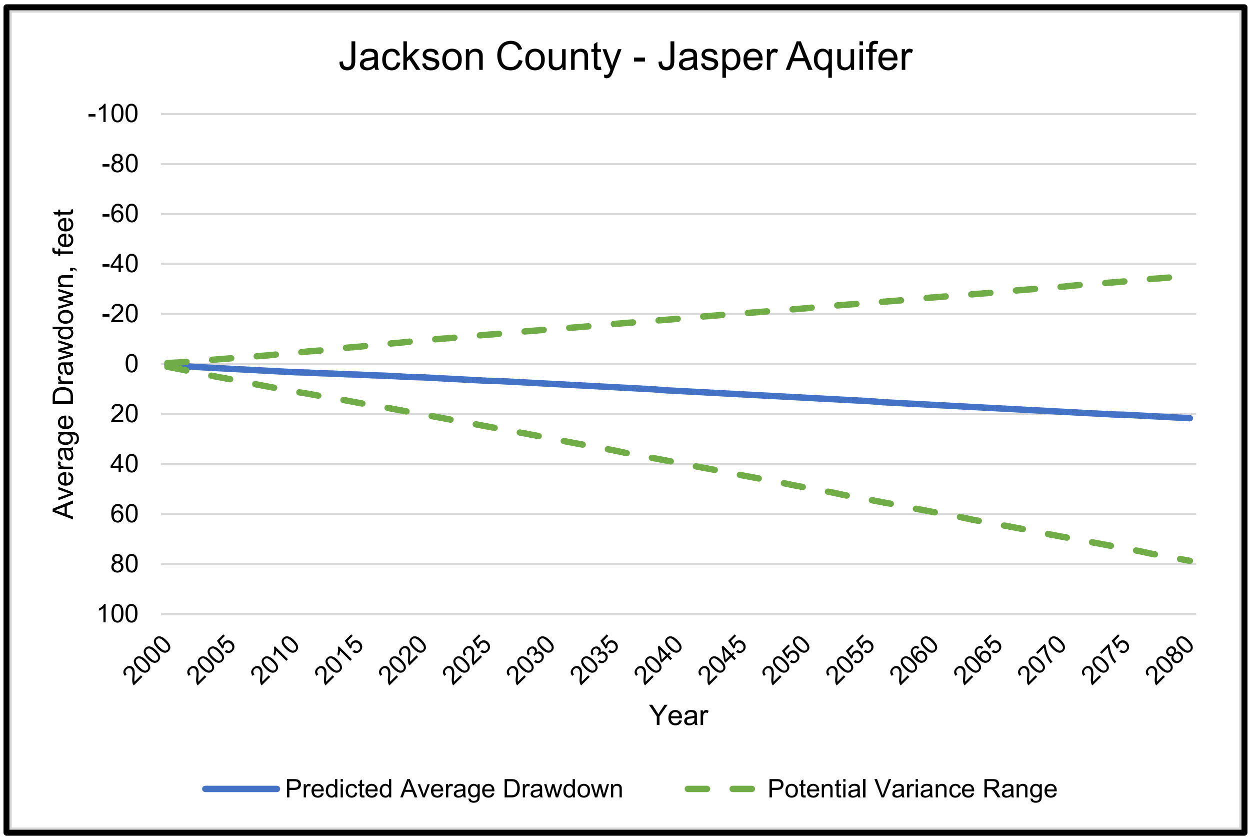

Goliad County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

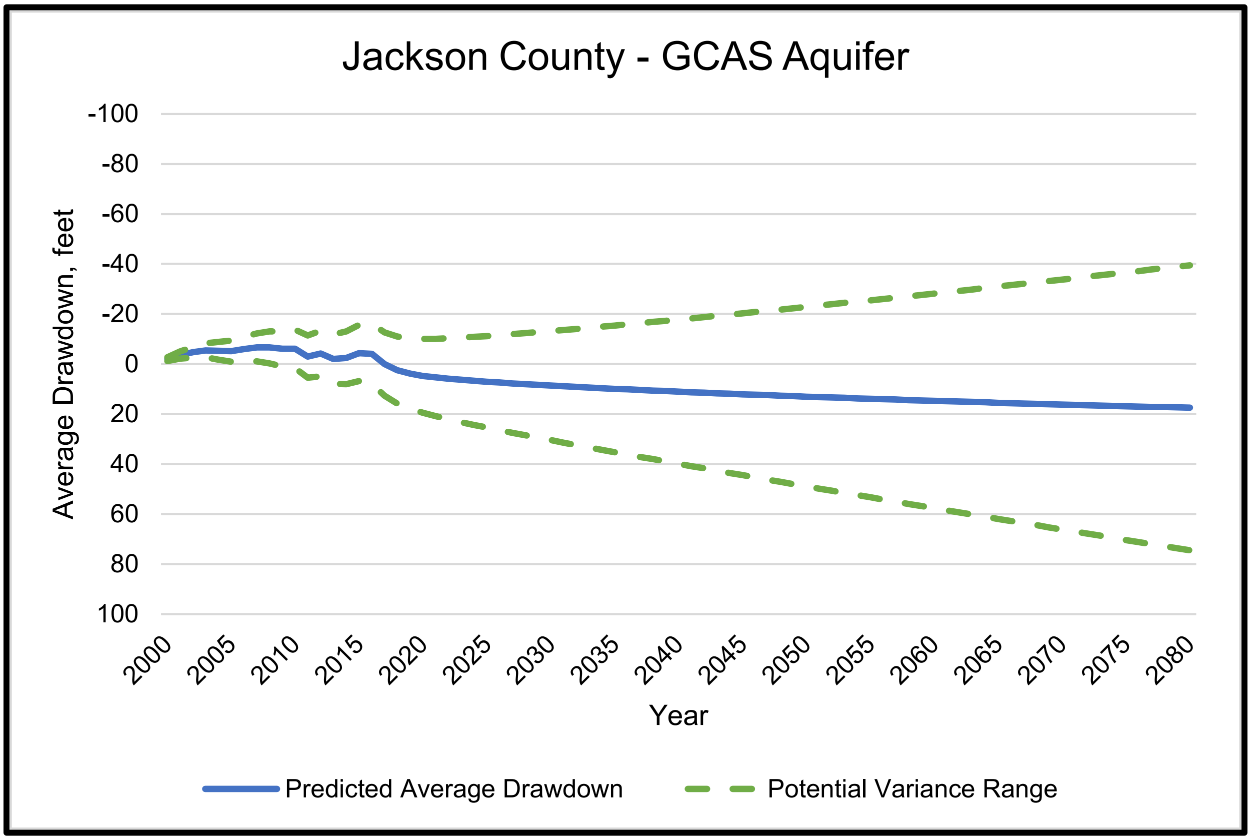

Goliad County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

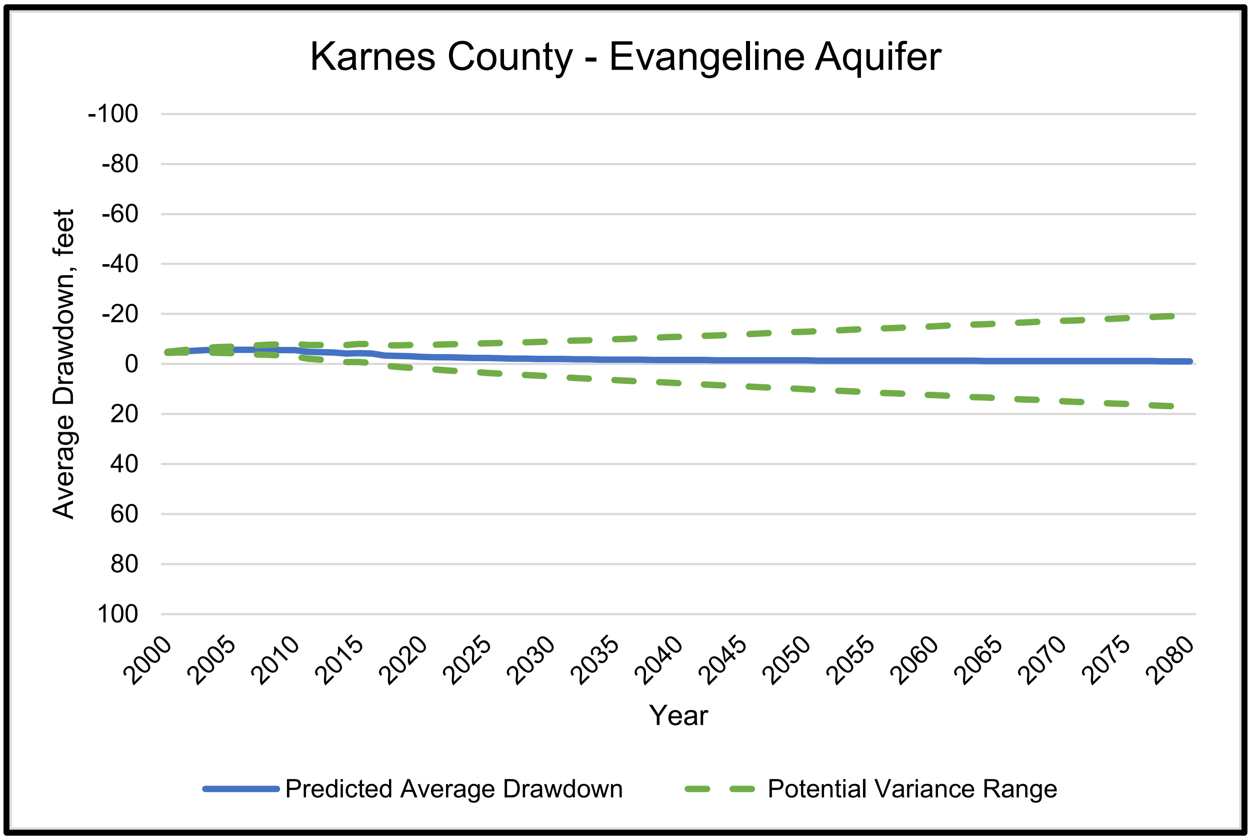

Jackson County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

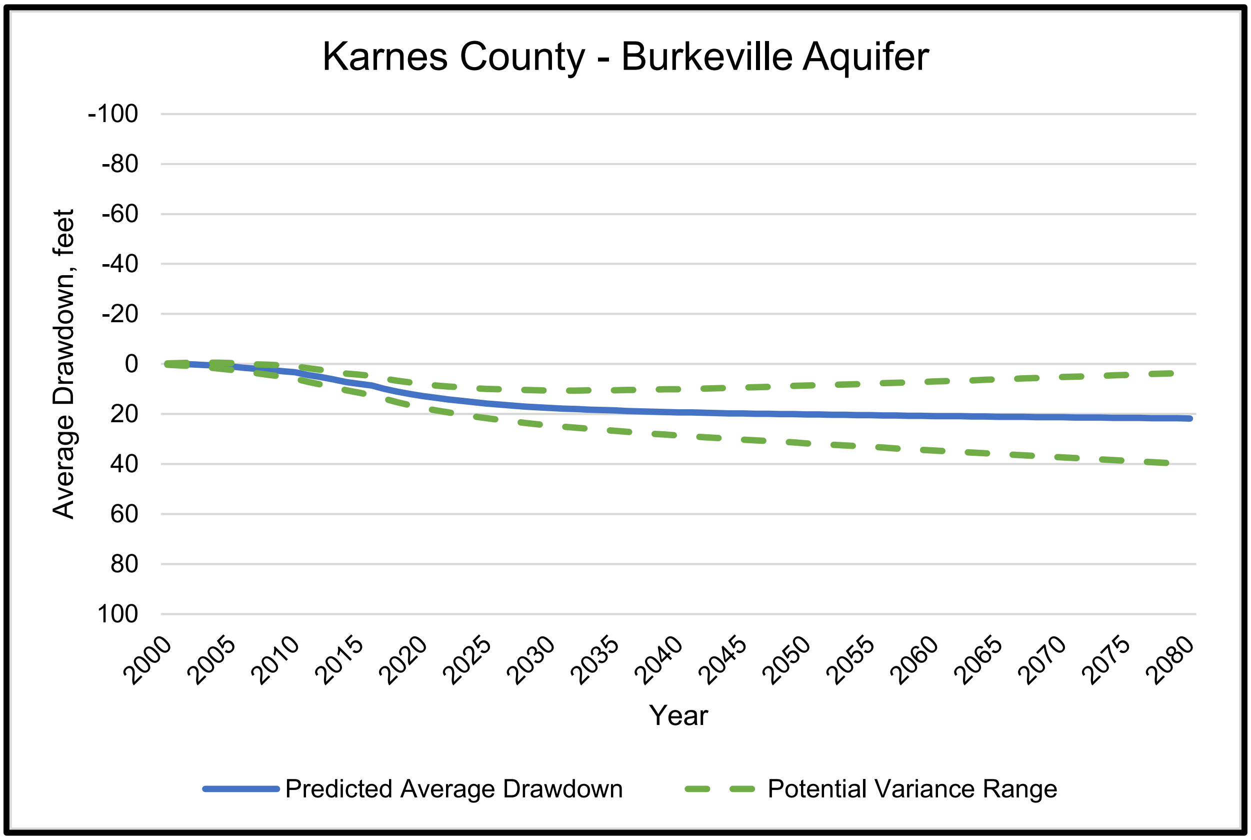

Jackson County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

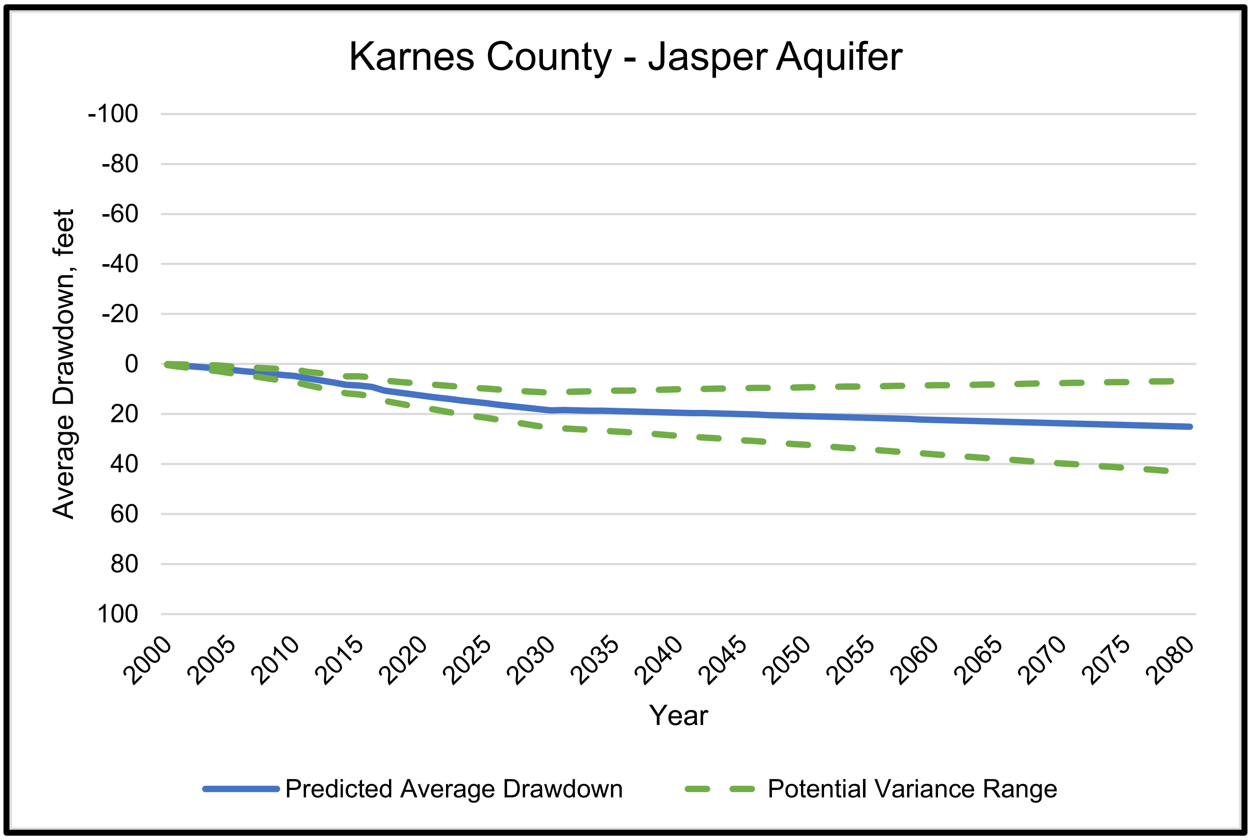

Jackson County - Burkeville Aquifer
-100
-80
-60
-40
-20
0
20
40
60
80
100
Average Drawdown, feet
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

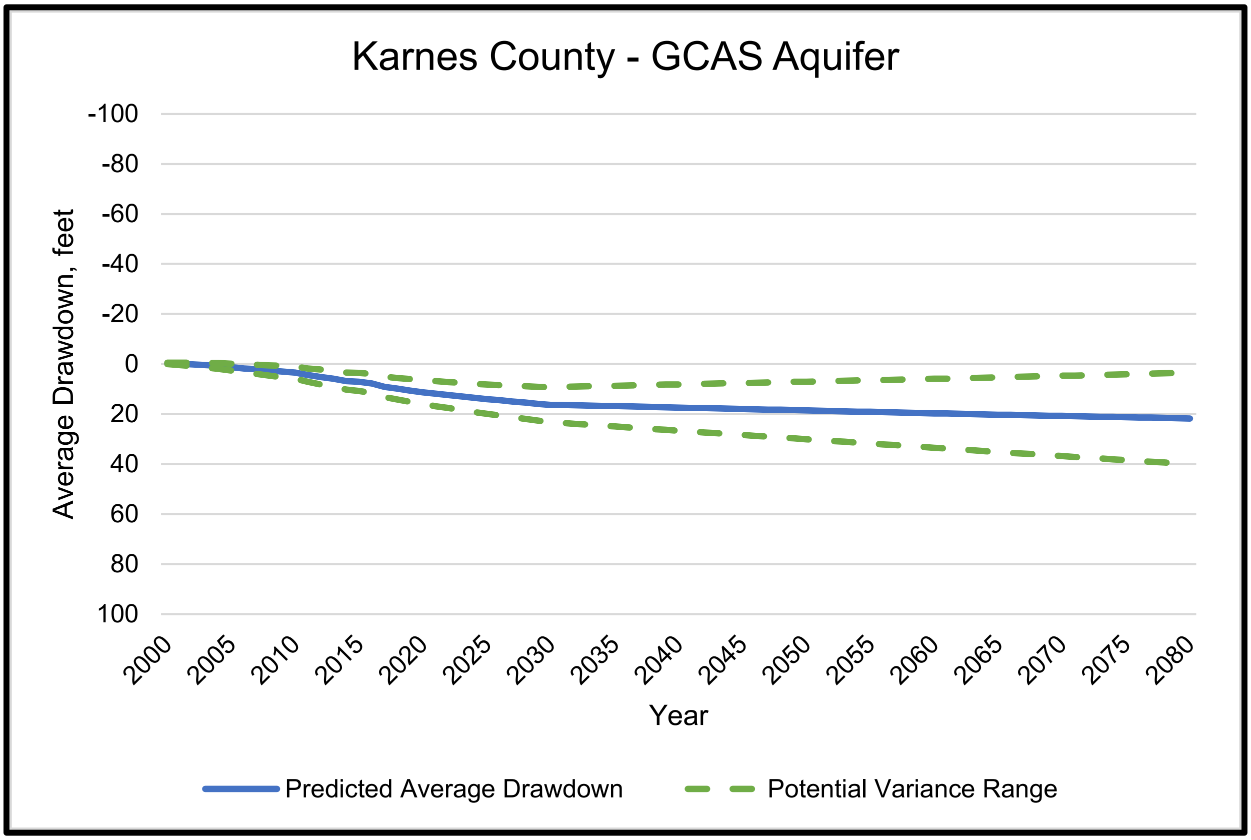

Jackson County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

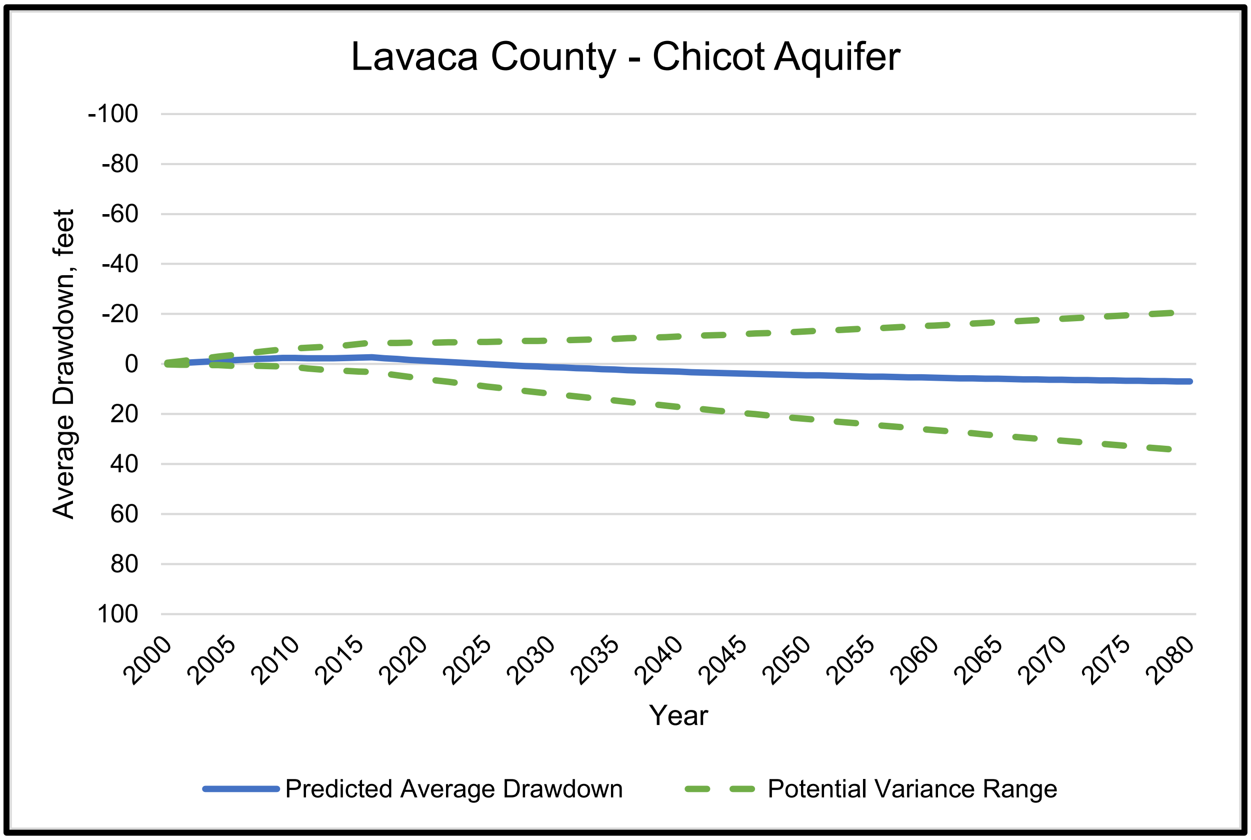

Jackson County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

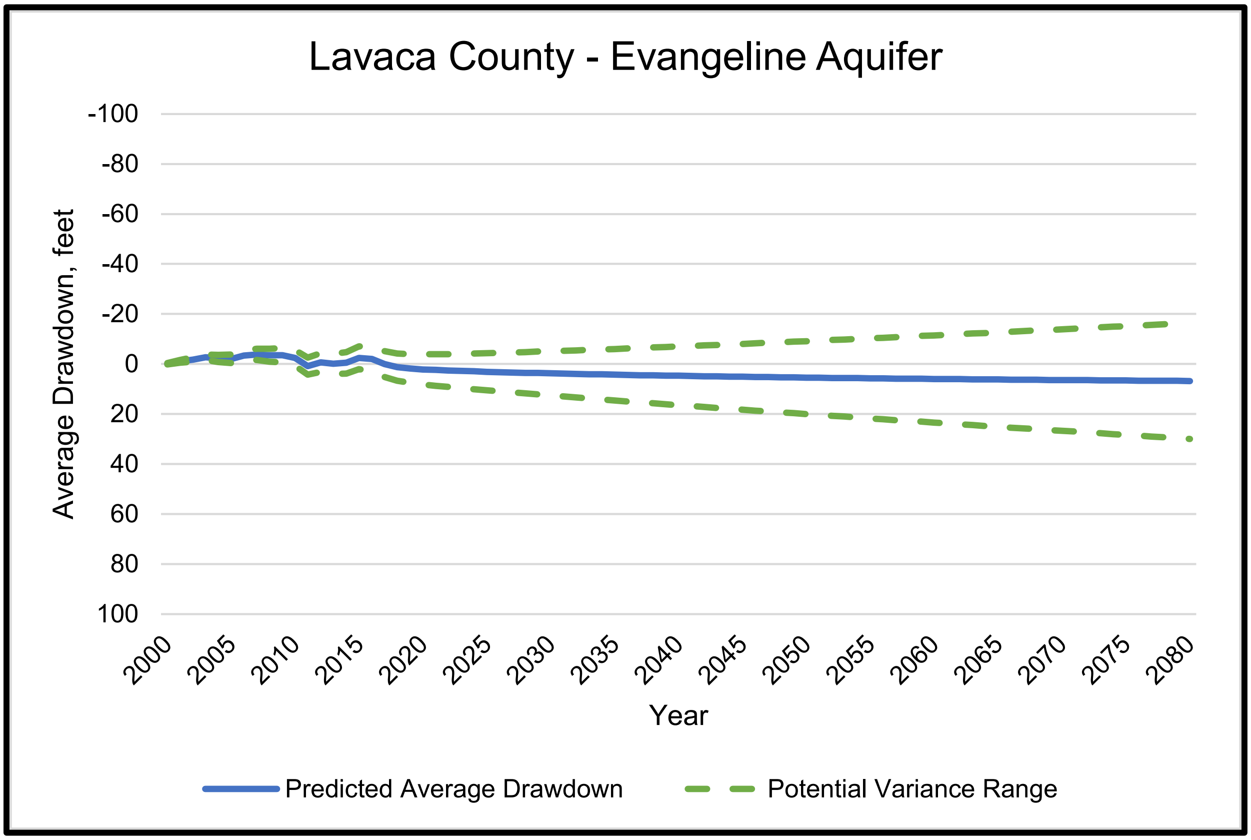

Karnes County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

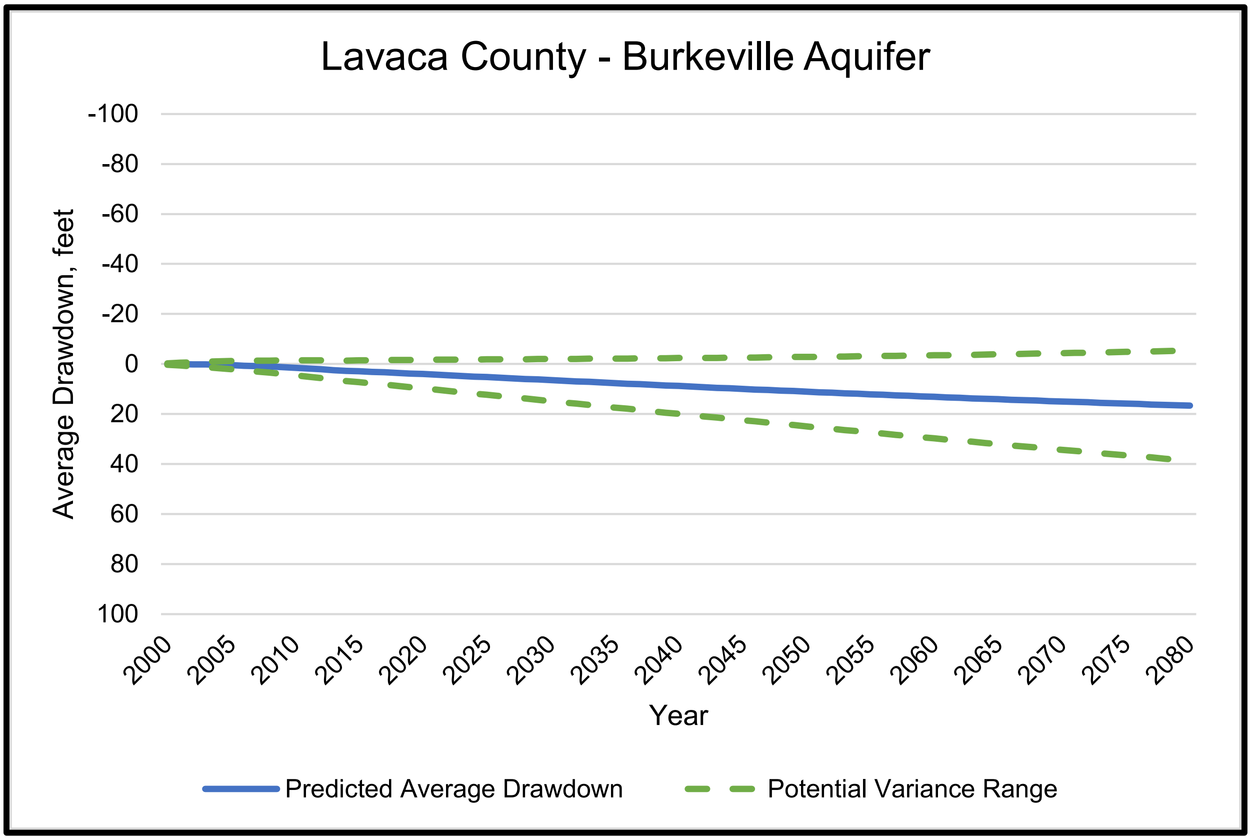

Karnes County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

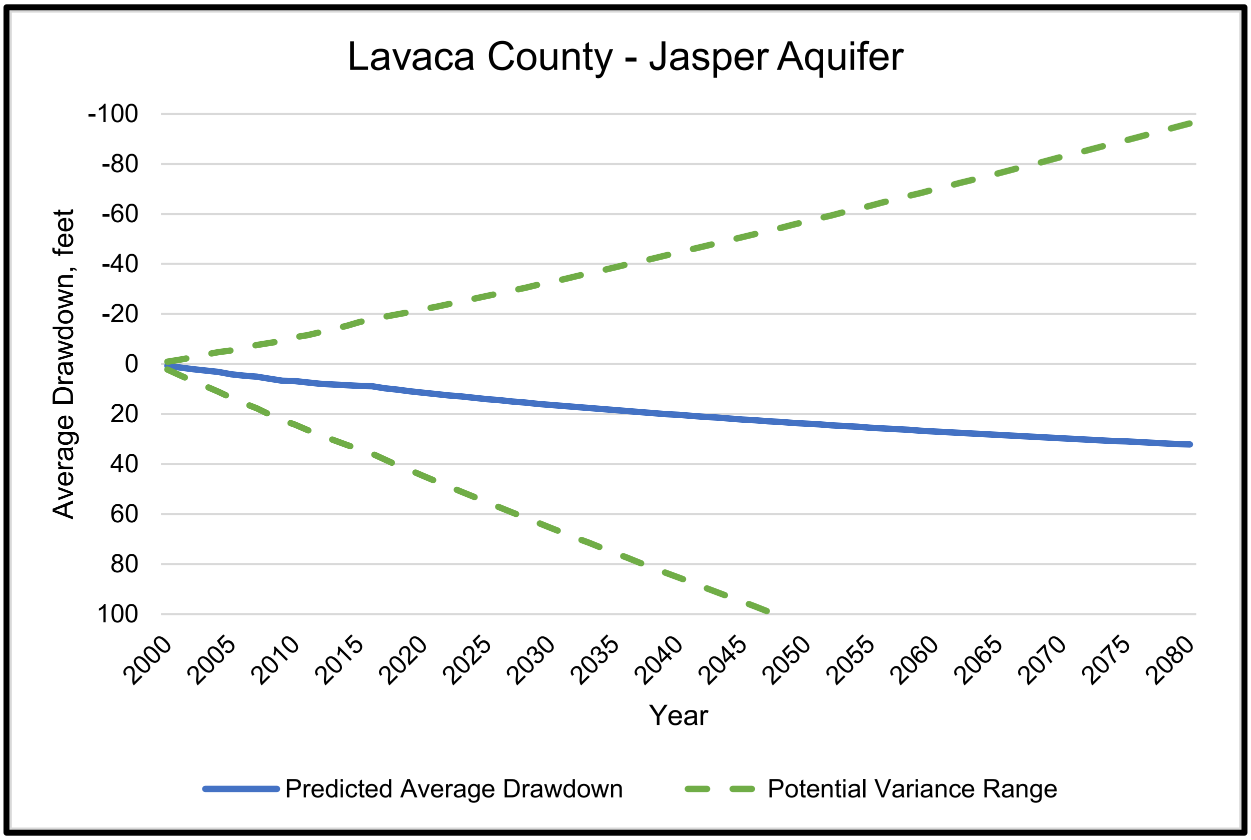

Karnes County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

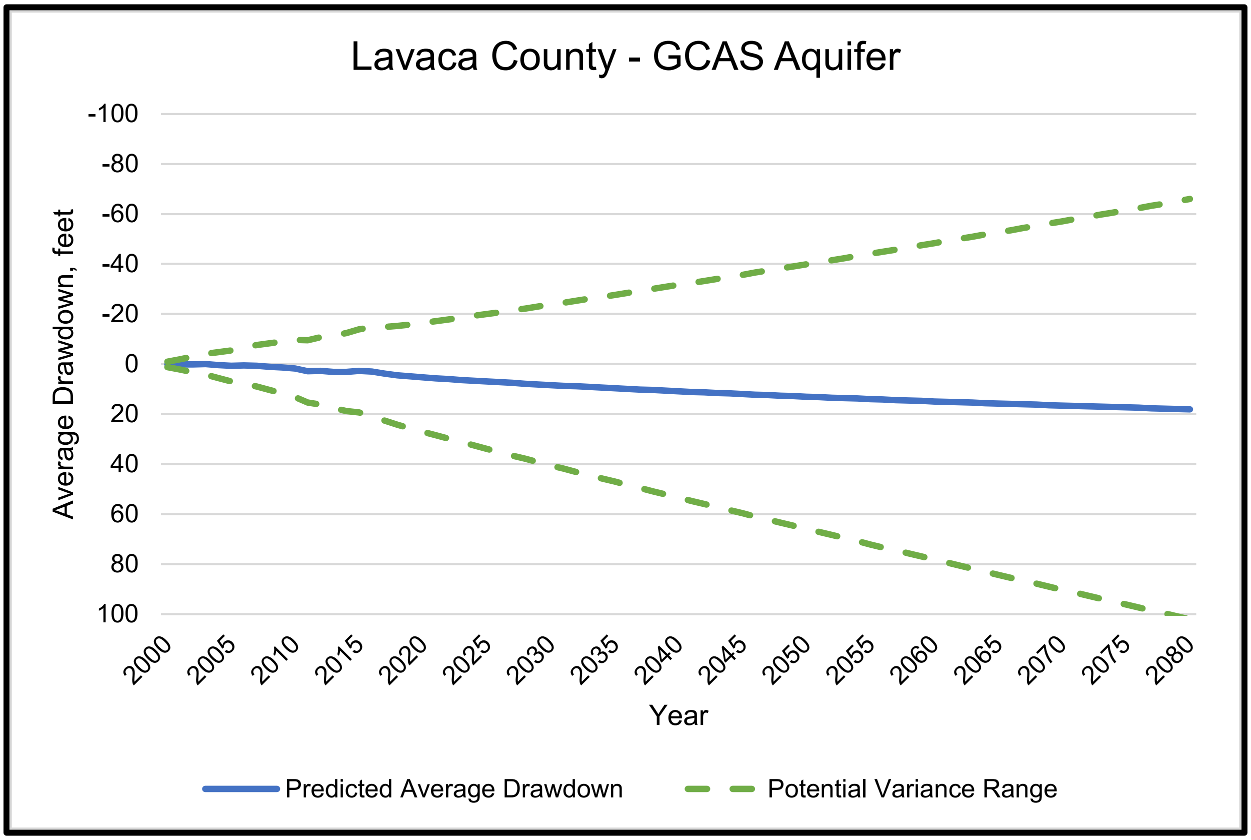

Karnes County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

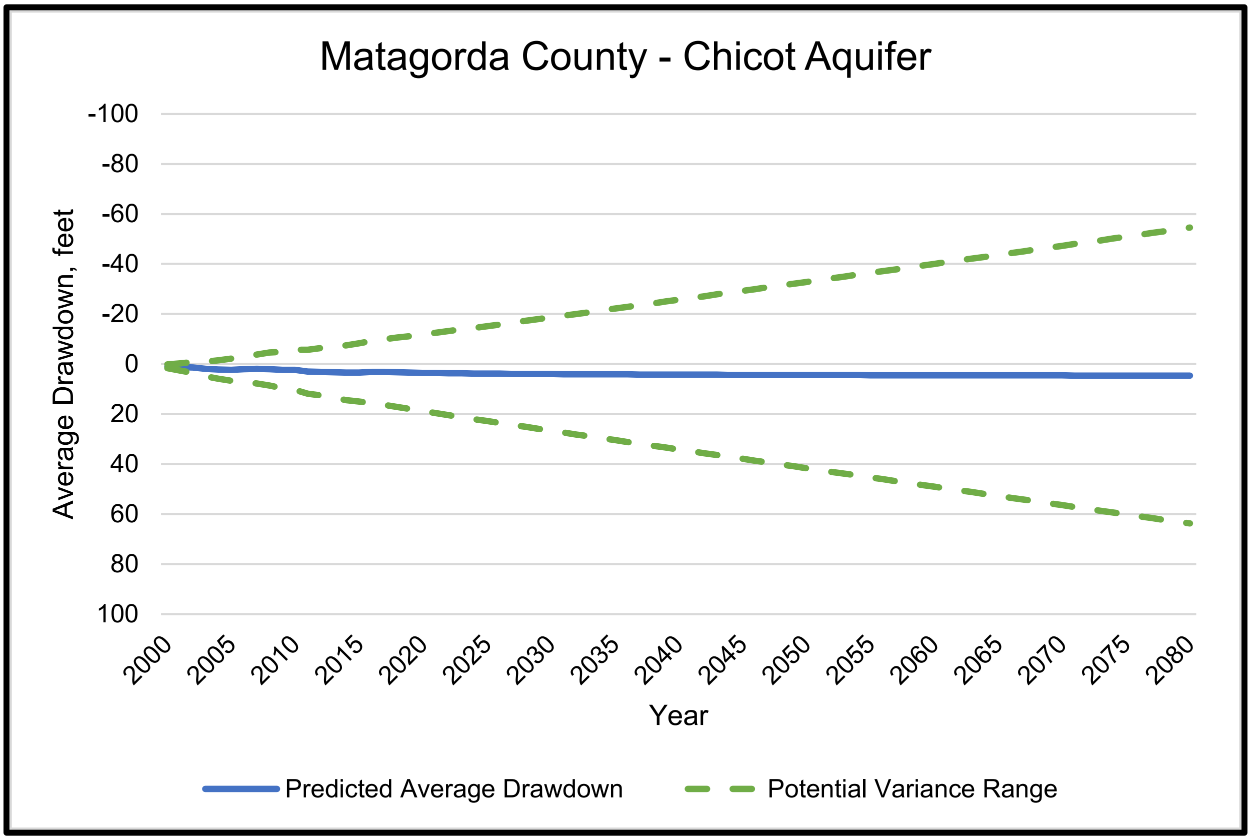

Lavaca County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

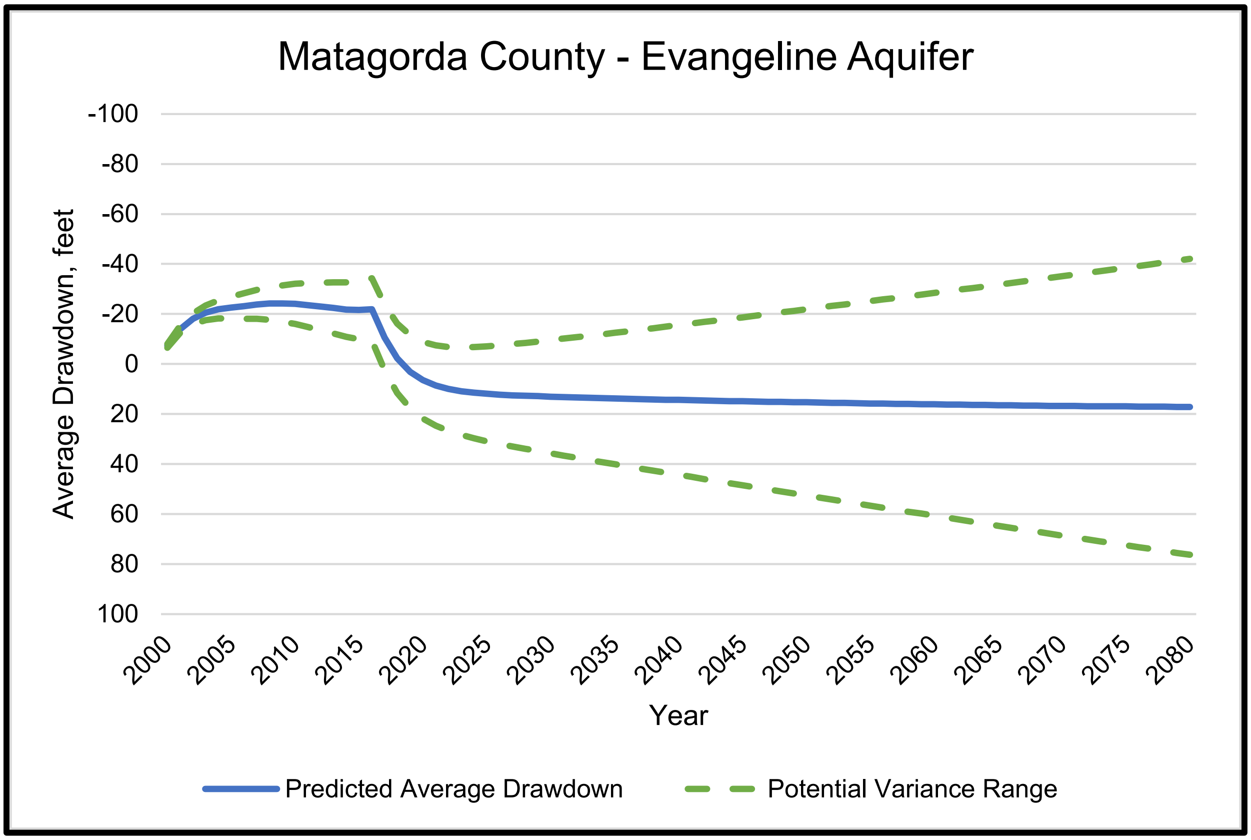

Lavaca County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

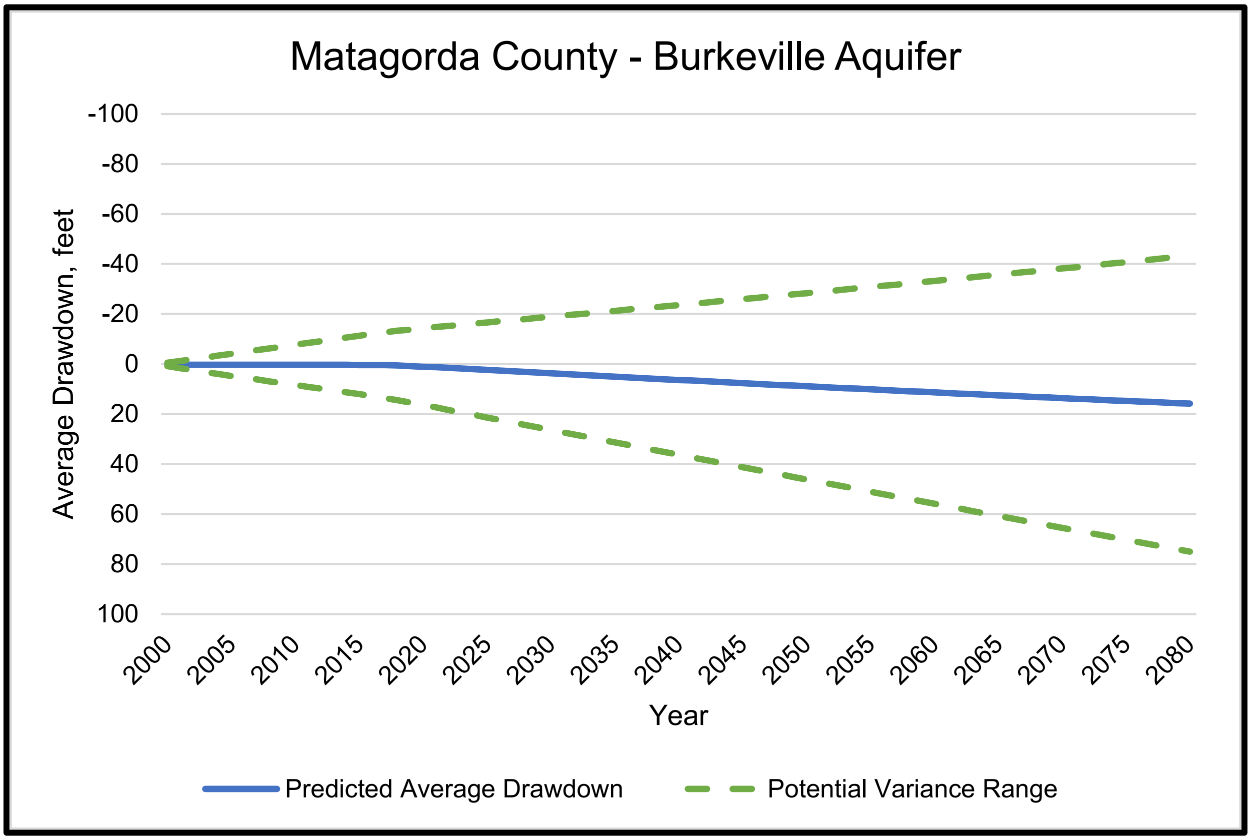

Lavaca County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

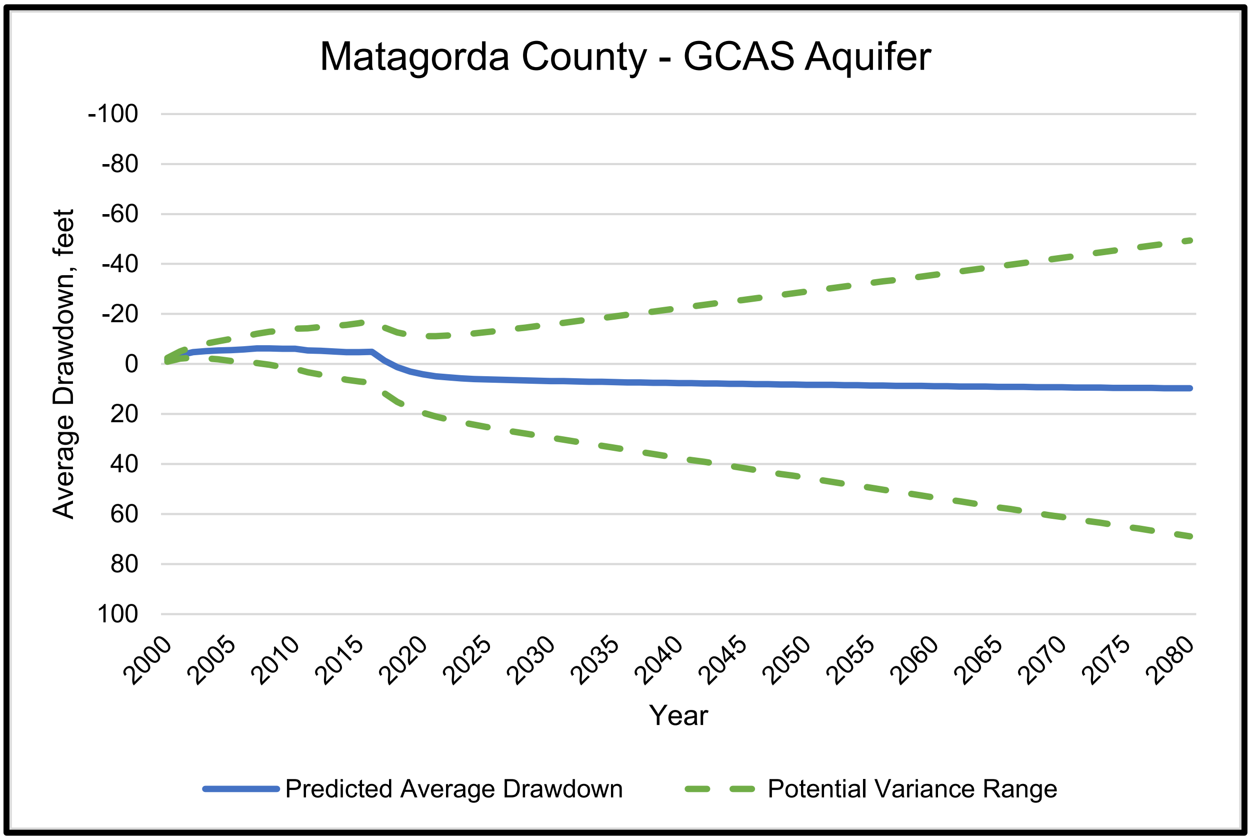

Lavaca County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

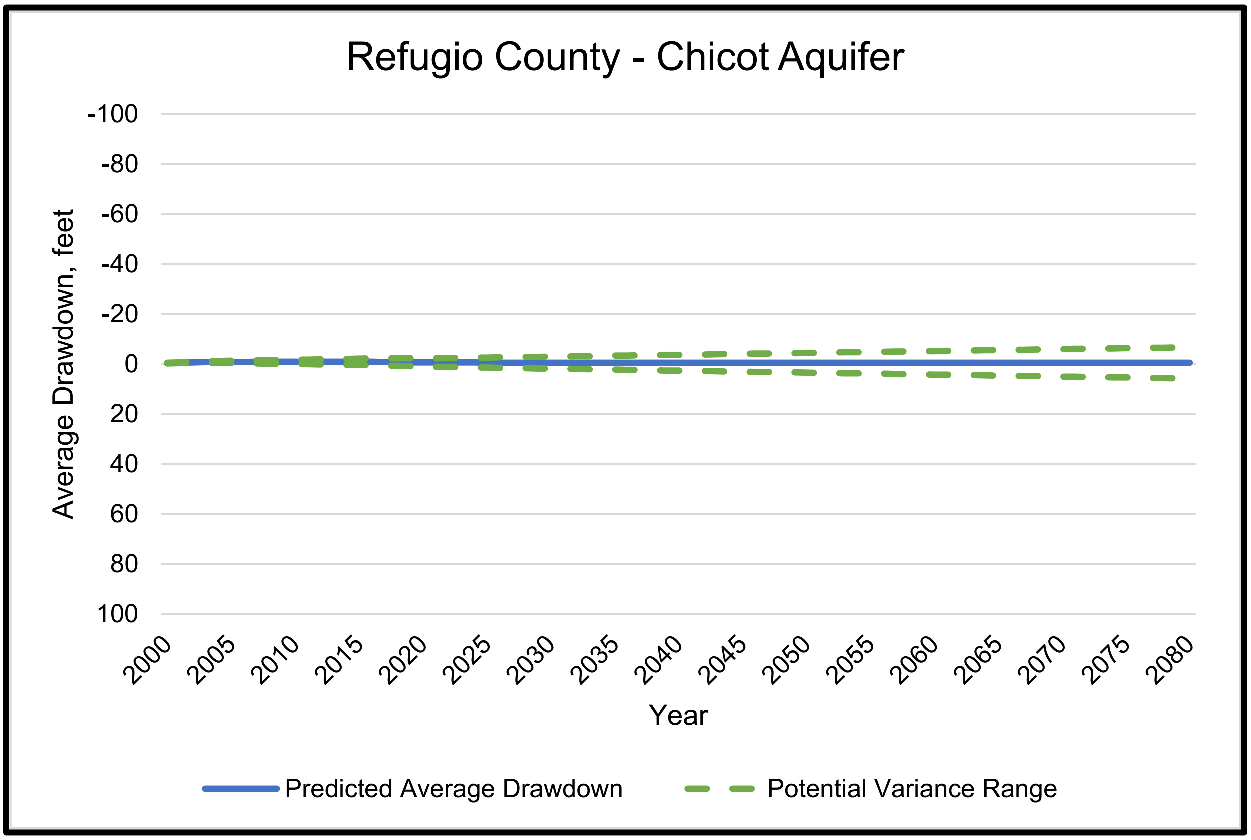

Lavaca County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

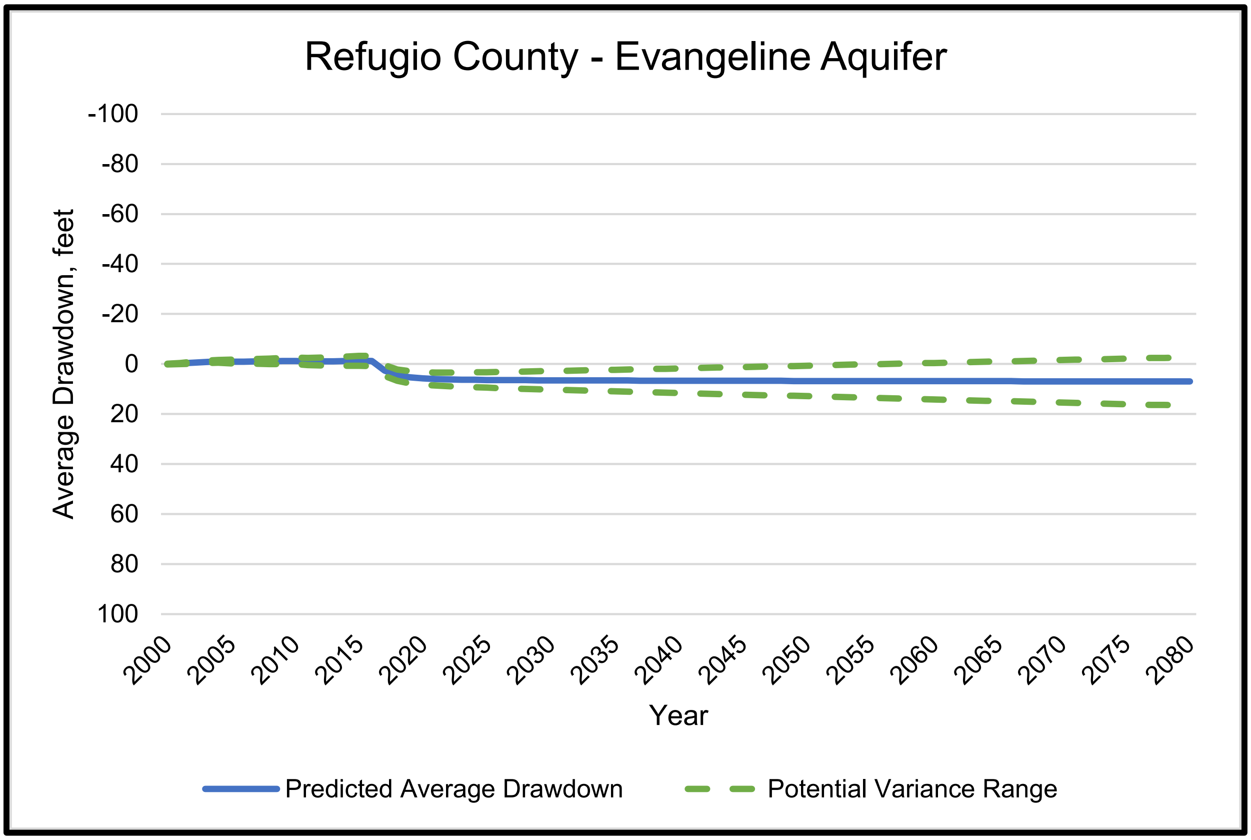

Matagorda County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

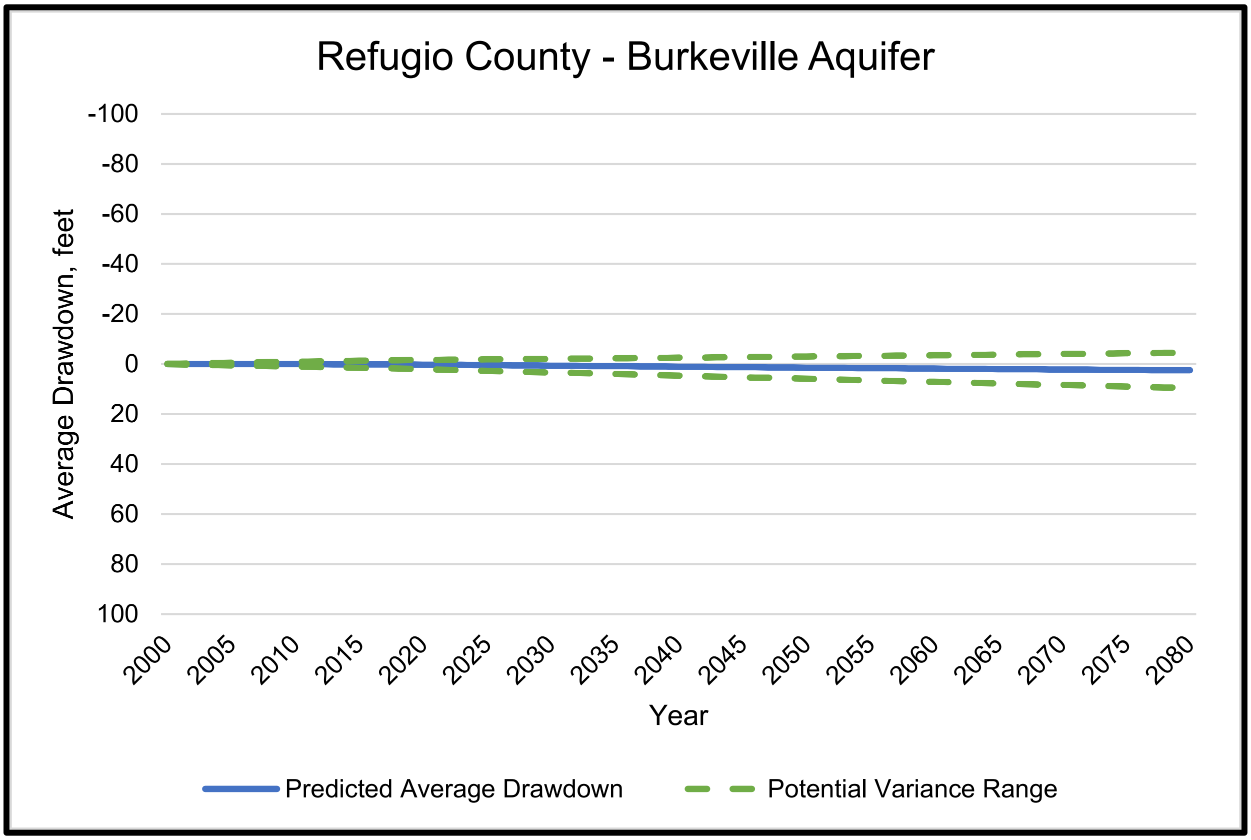

Matagorda County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

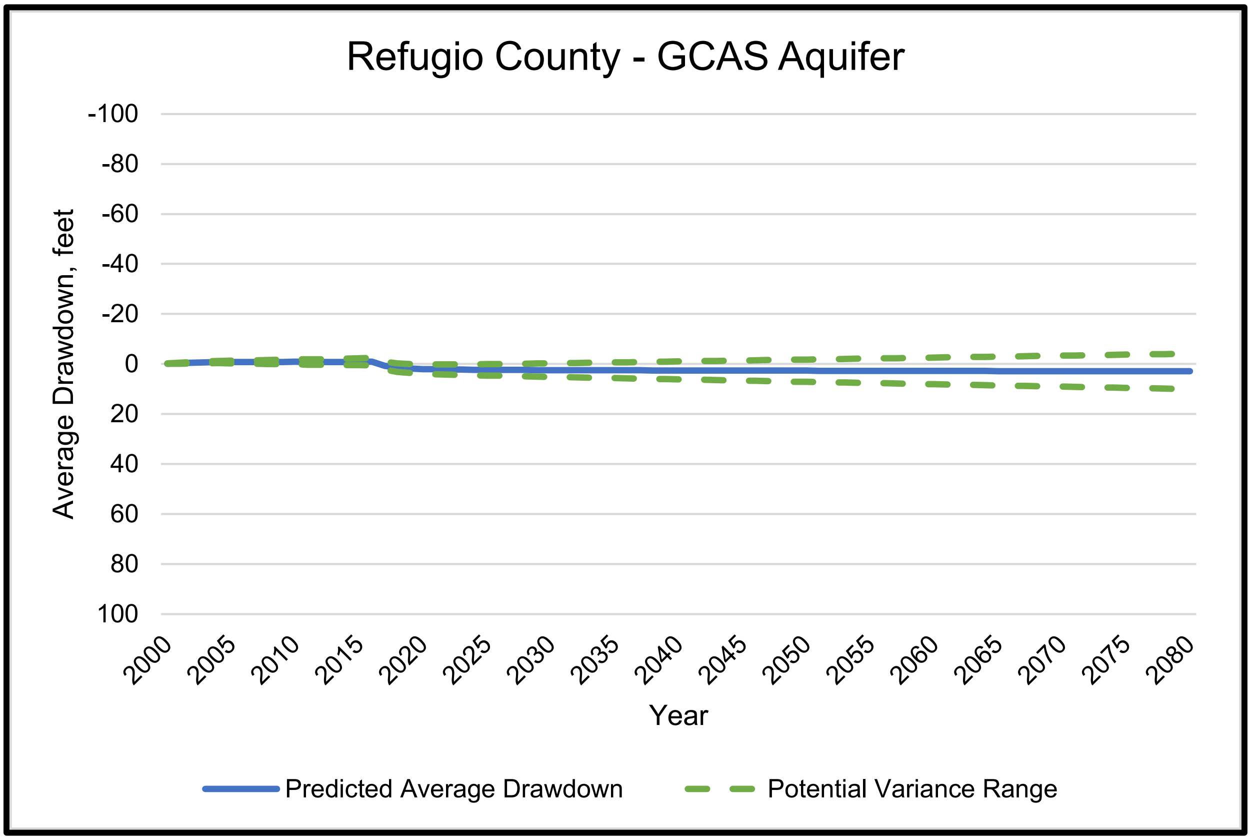

Matagorda County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

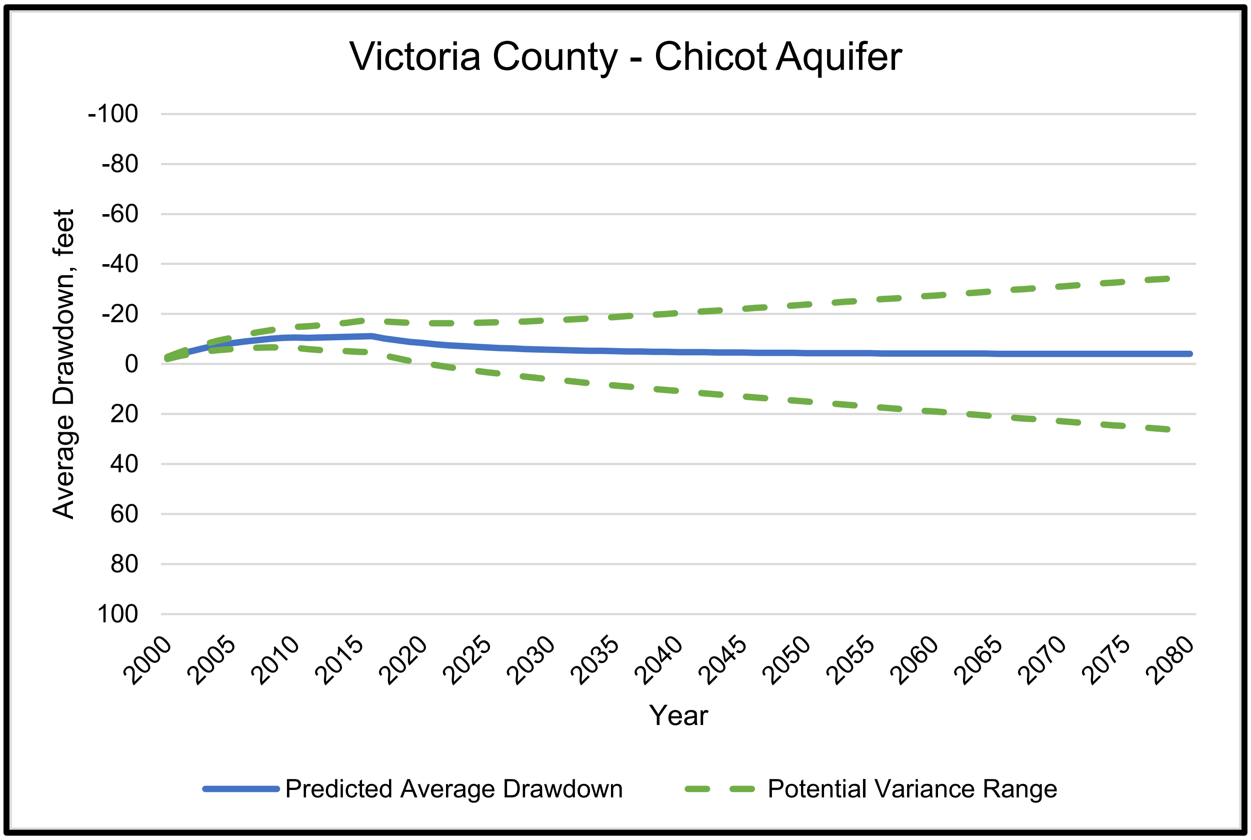

Matagorda County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

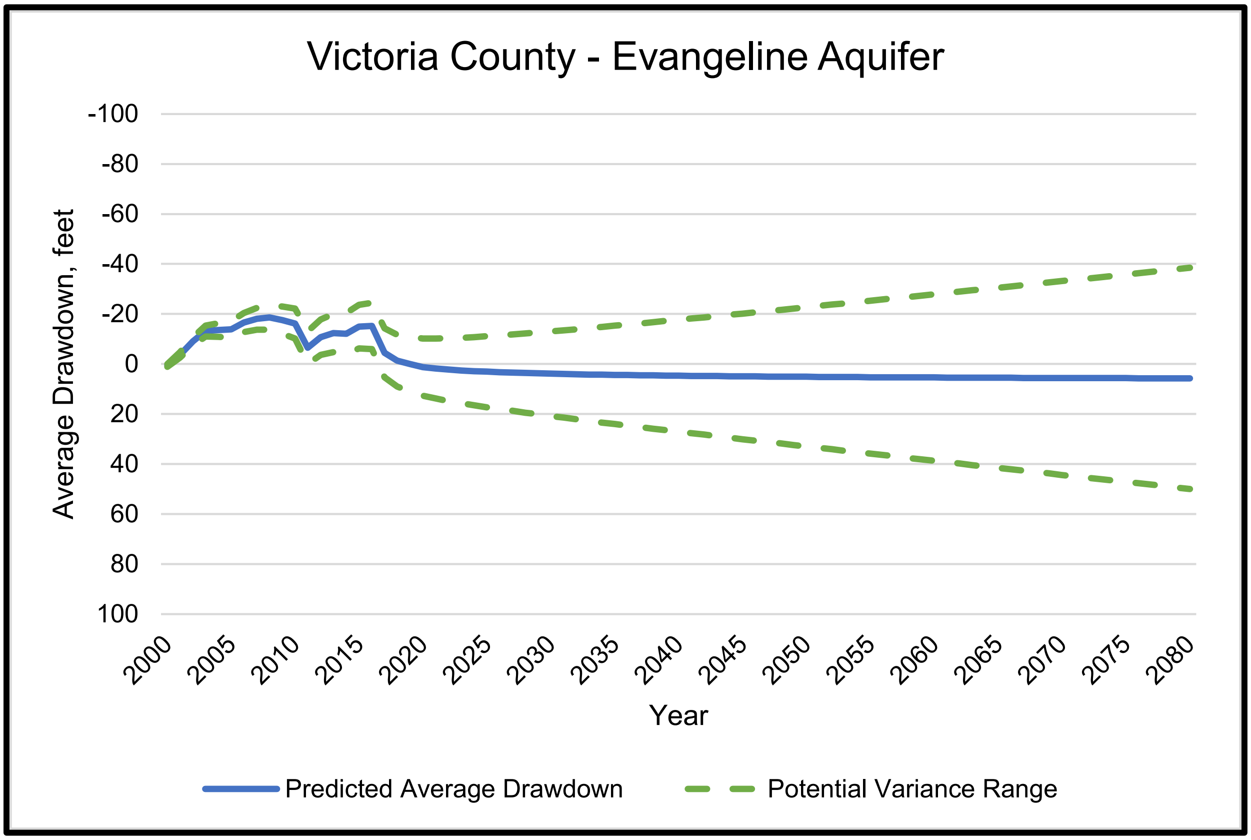

Refugio County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

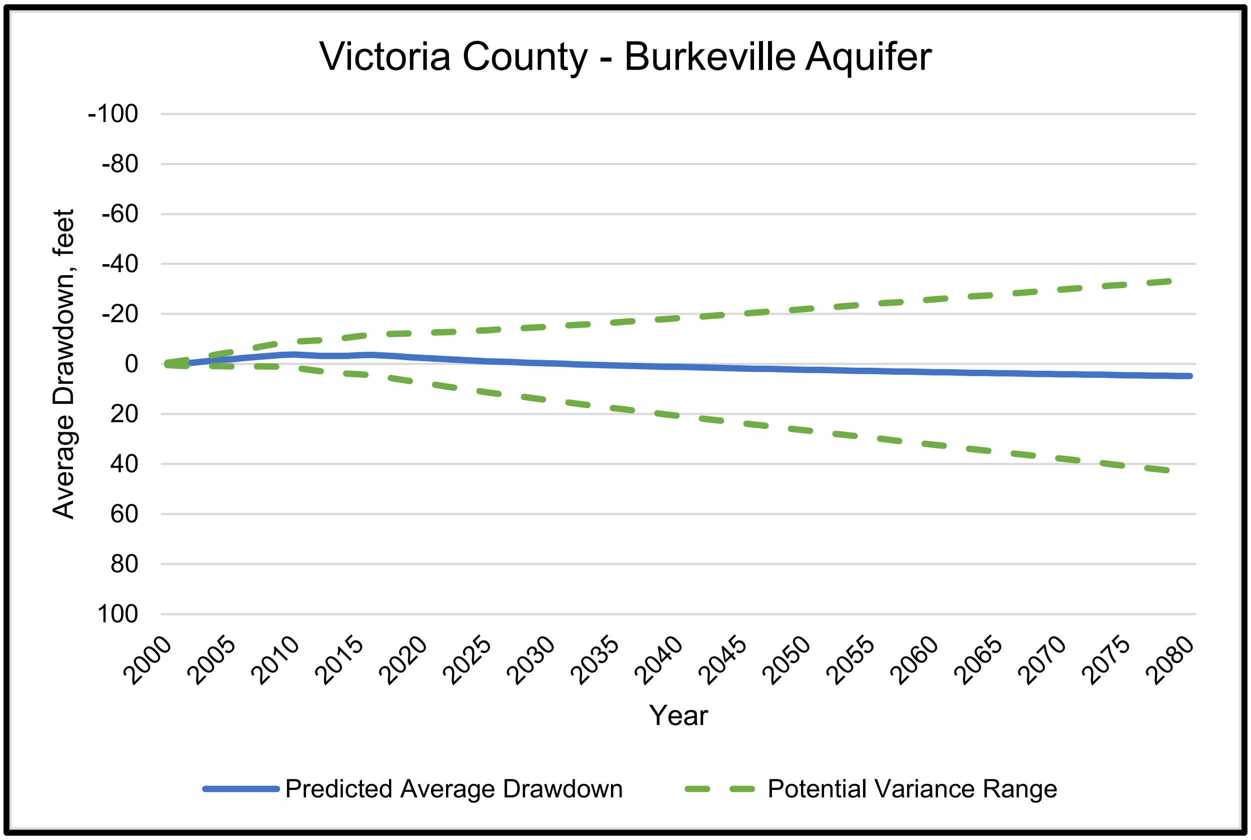

Refugio County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

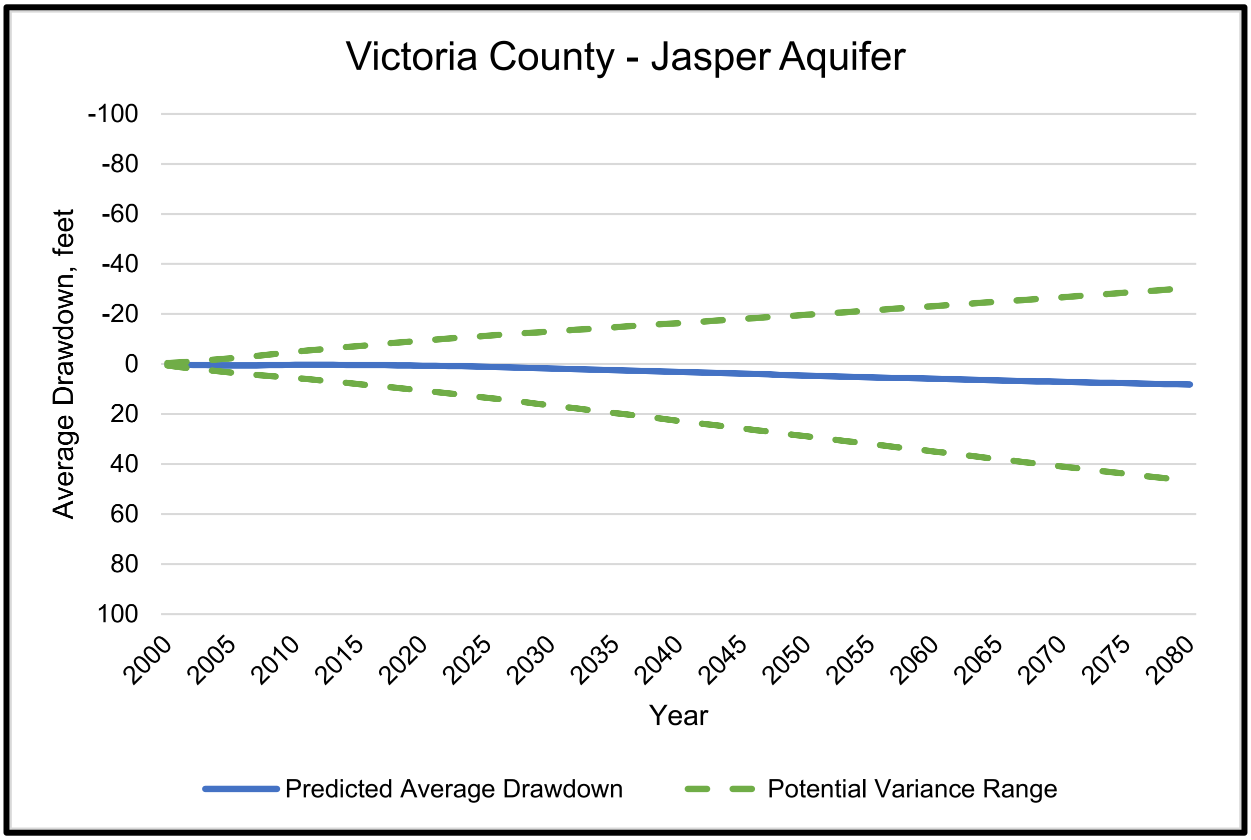

Refugio County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

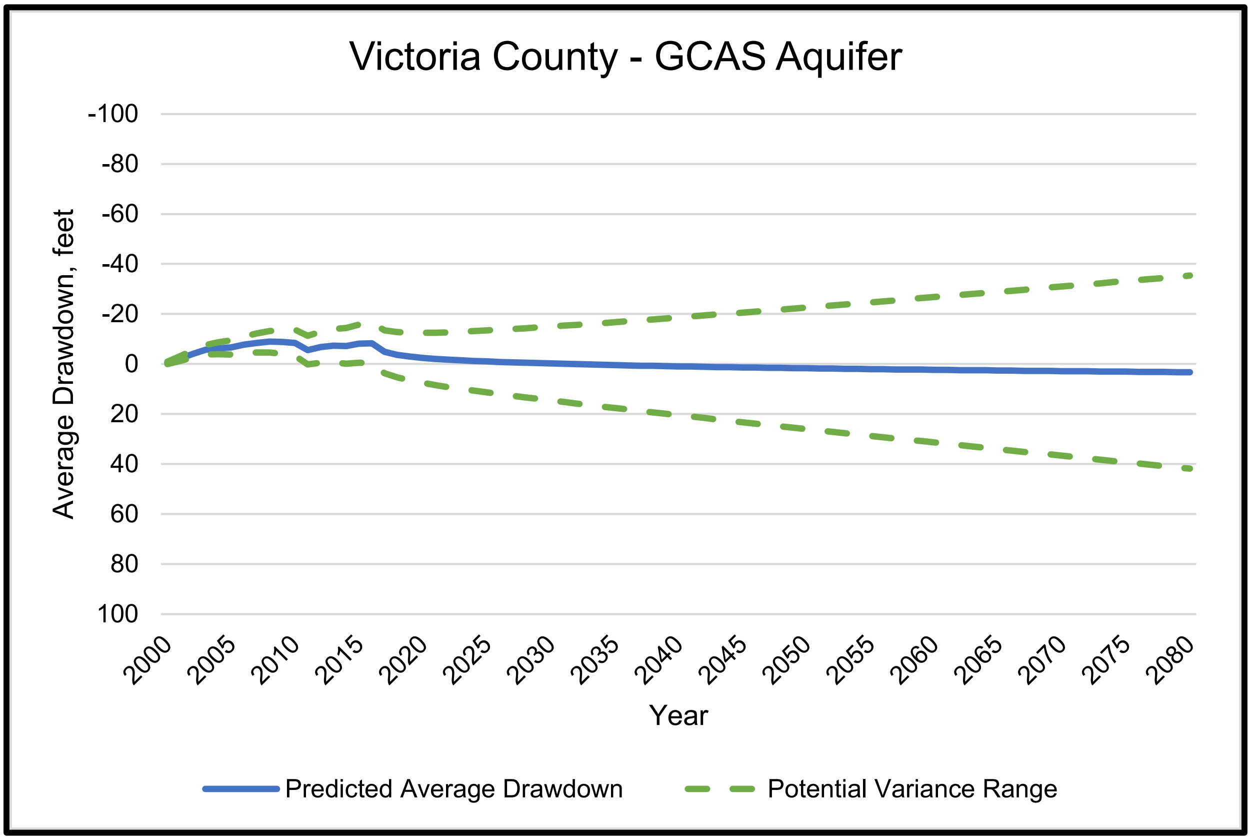

Refugio County - GCAS Aquifer
-100
-80
-60
-40
-20
0
20
40
60
80
100
Average Drawdown, feet
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

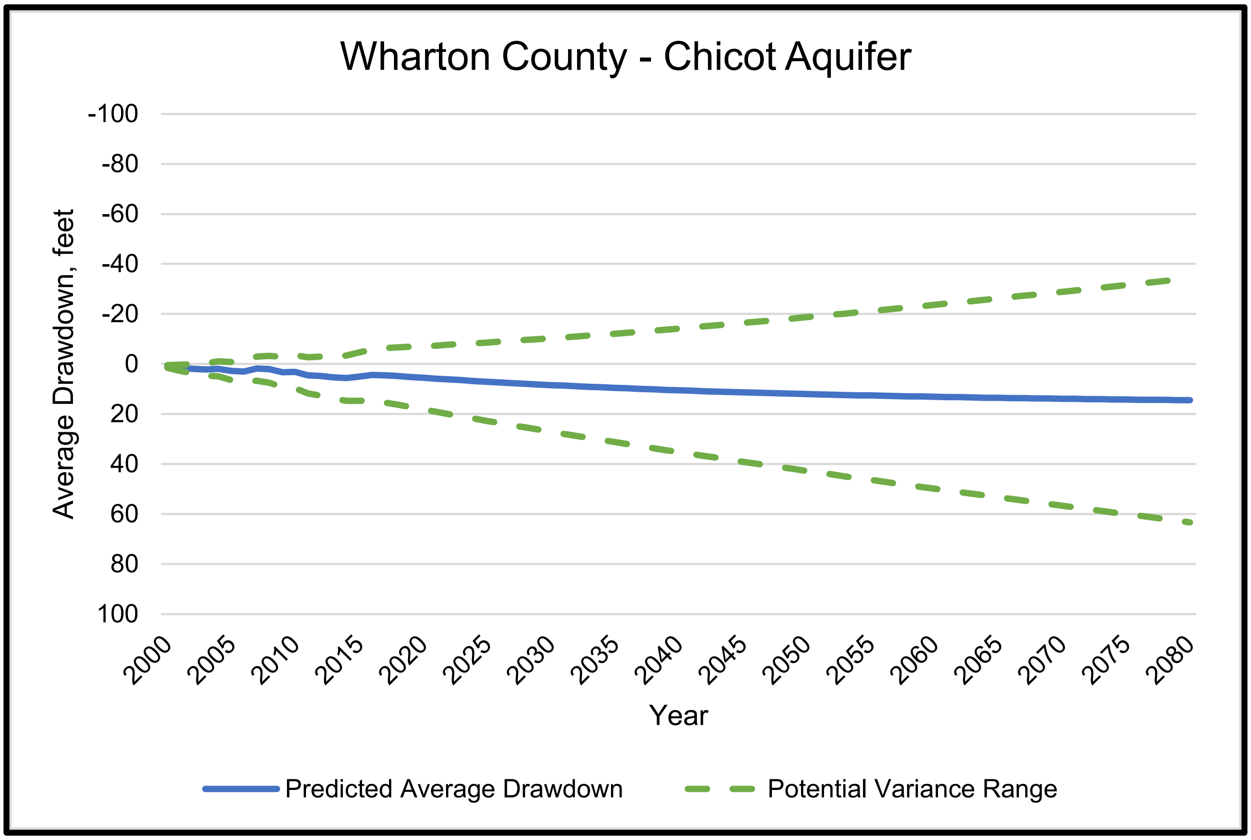

Victoria County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

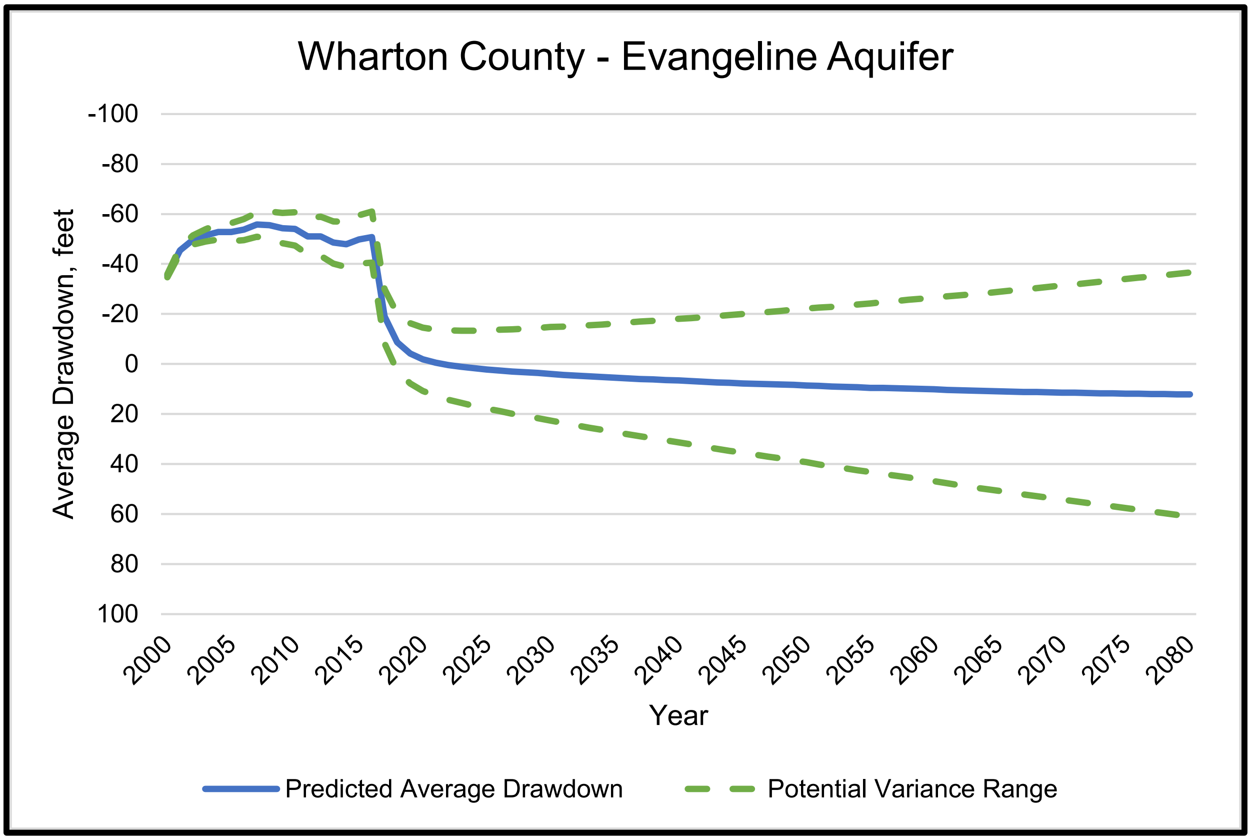

Victoria County - Evangeline Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

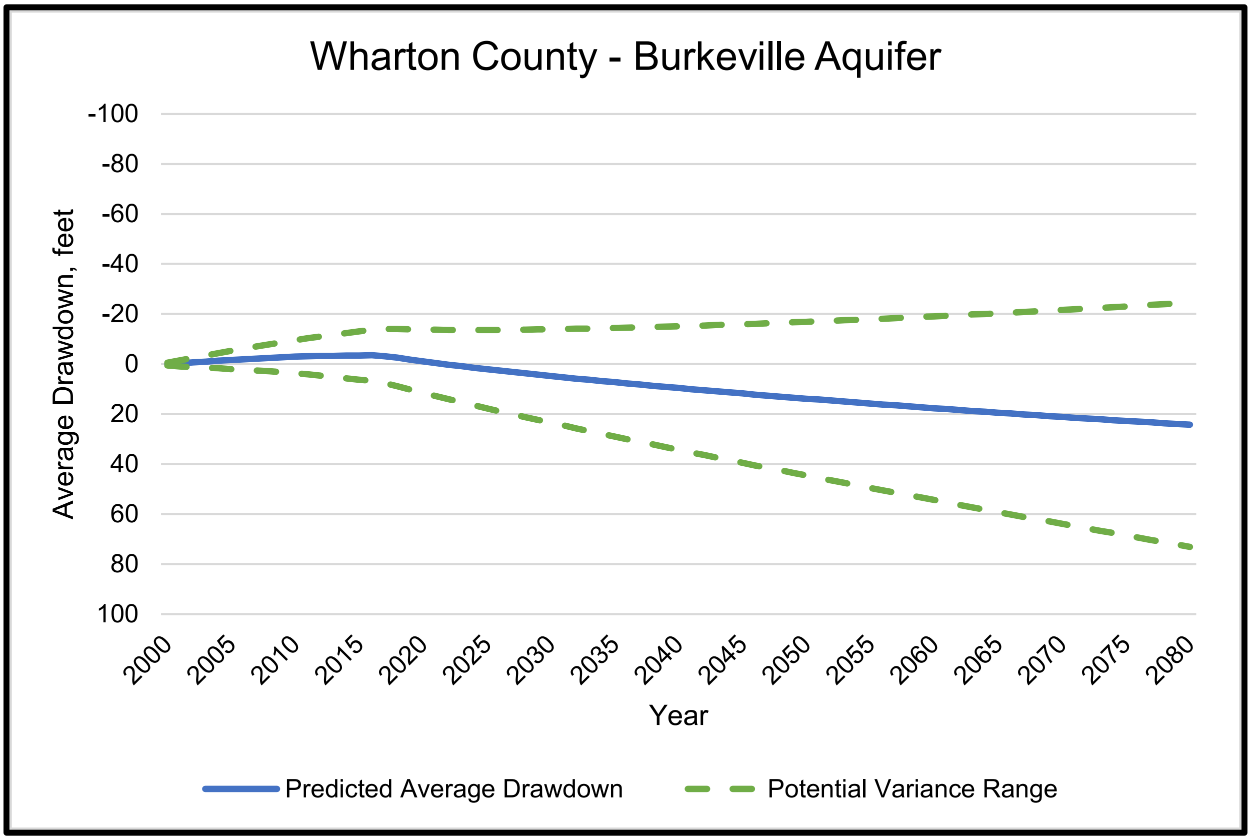

Victoria County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

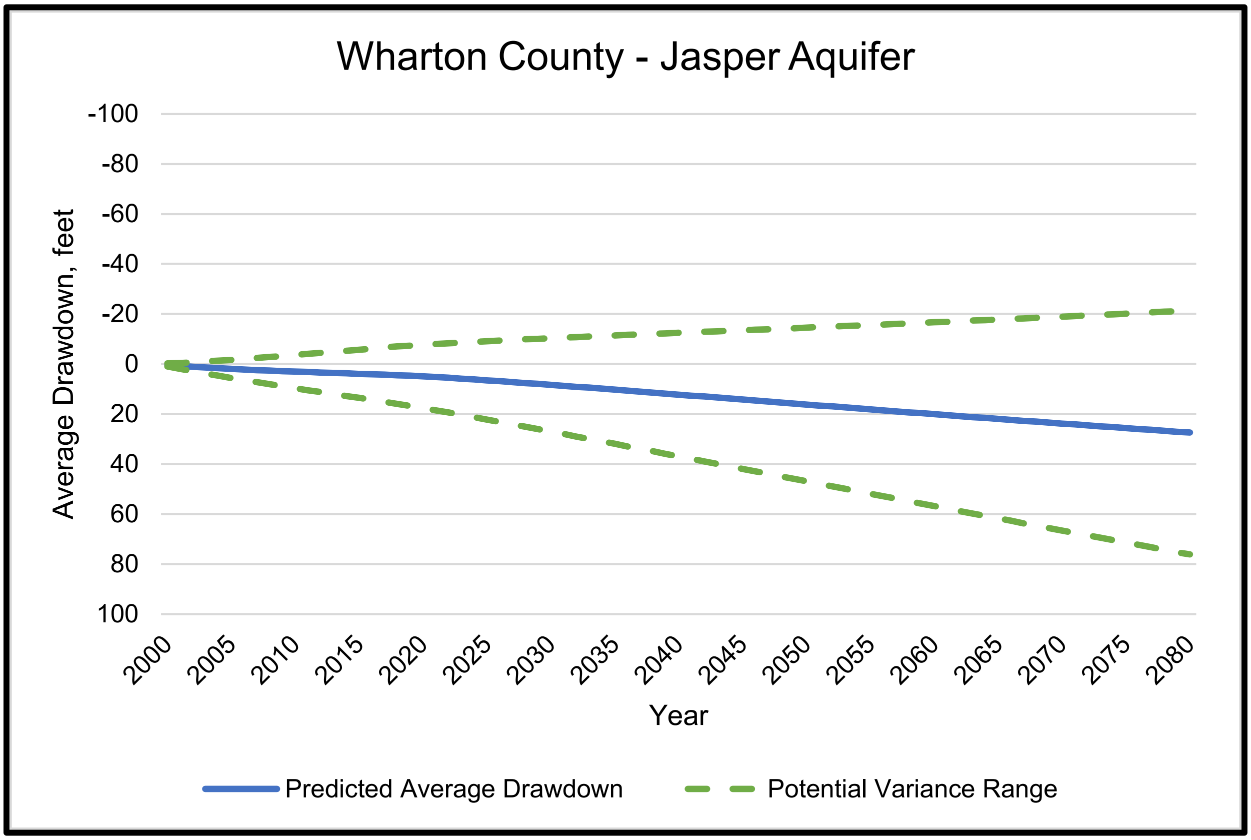

Victoria County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

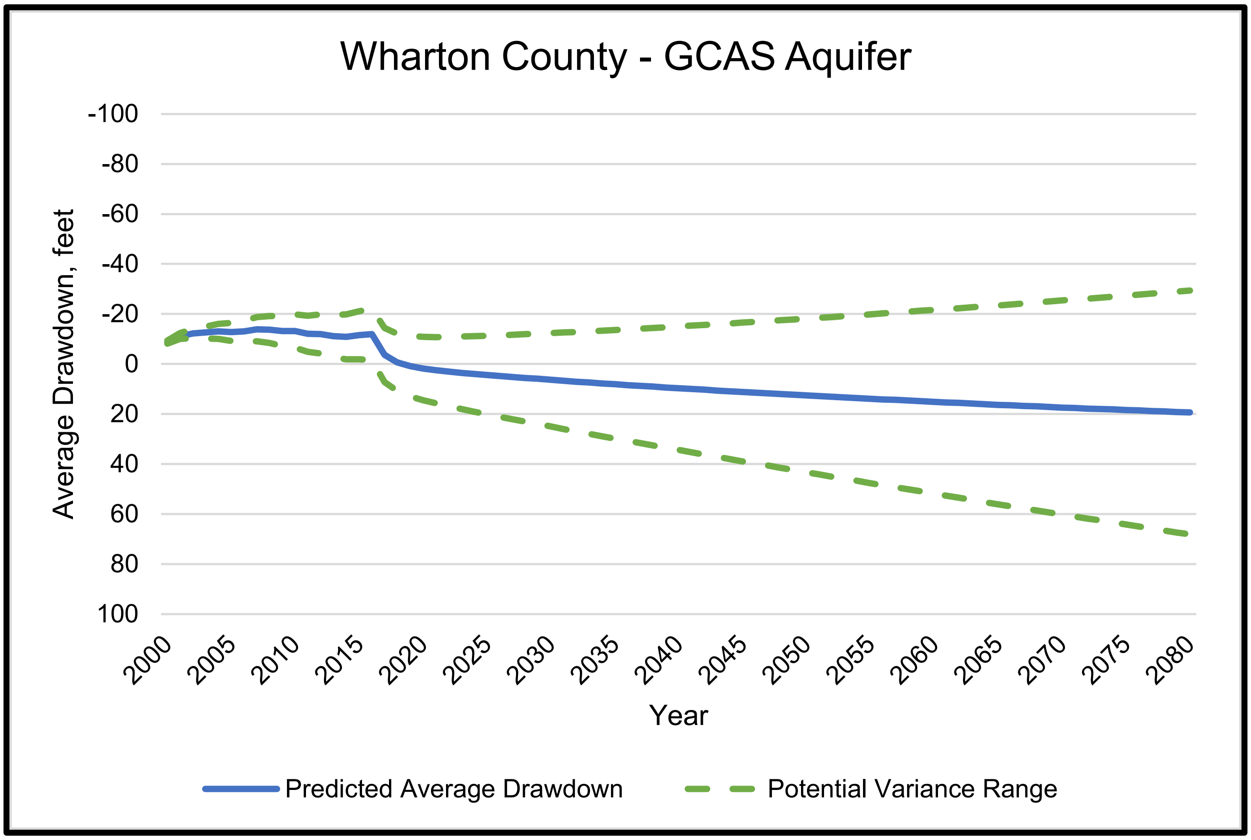

Victoria County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range


Wharton County - Chicot Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range


Wharton County - Evangeline Aquifer
-100
-80
-60
-40
-20
0
20
40
60
80
100
Average Drawdown, feet
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range


Wharton County - Burkeville Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range


Wharton County - Jasper Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range


Wharton County - GCAS Aquifer
Average Drawdown, feet
-100
-80
-60
-40
-20
0
20
40
60
80
100
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
Year
Predicted Average Drawdown
Potential Variance Range

Appendix 5.16 — Presentation Regarding Feasibility of Achieving the DFCs

DISCUSSION OF DFC FEASIBILITY

October 8, 2020

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?

LRE WATER

2016 CONSIDERATIONS SUMMARY

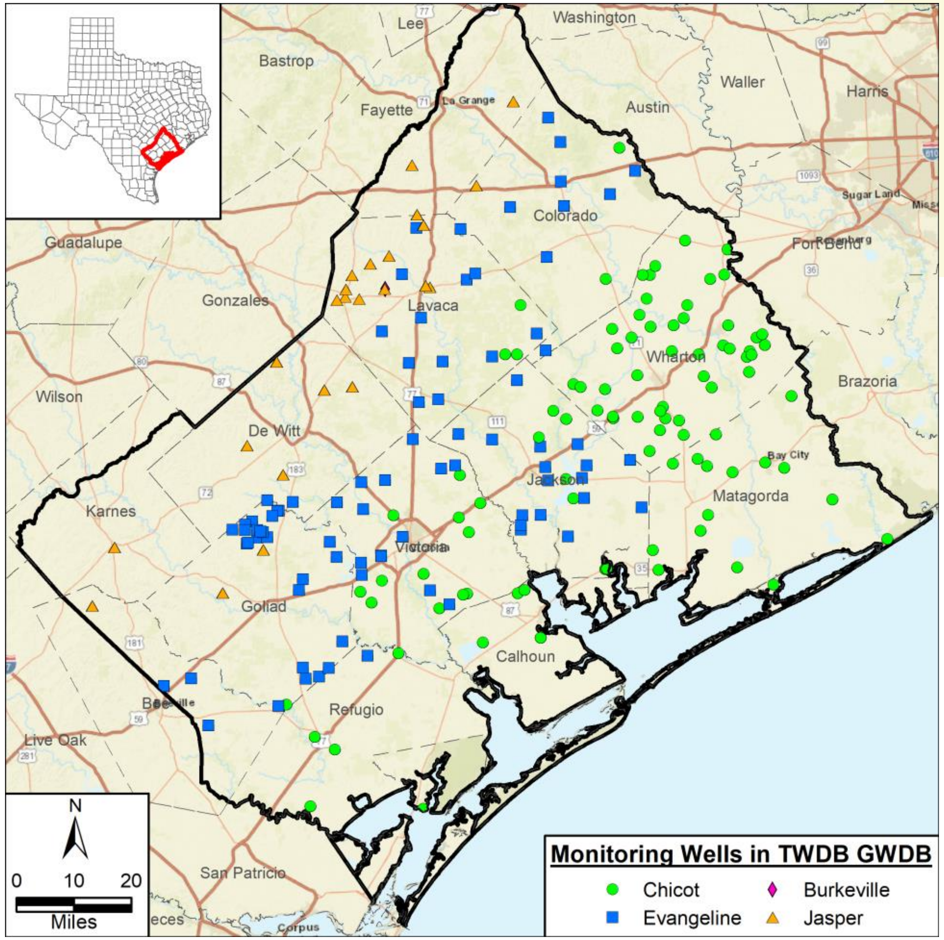
- Feasible if consistent with GAM results
- Possibly use water level measurements to assess compliance
- Incorporate variance relative to GAM results

2016 DFC VARIANCE

- Inherit uncertainty in the GAM results
  - ➢ Error documented in GAM report
  - ➢ More recent observations of potential predictive error
- Ongoing studies to support GAM development
- 3.5-foot variance deemed reasonable (5.0 feet for Goliad)

QUANTITATIVE CONSIDERATIONS

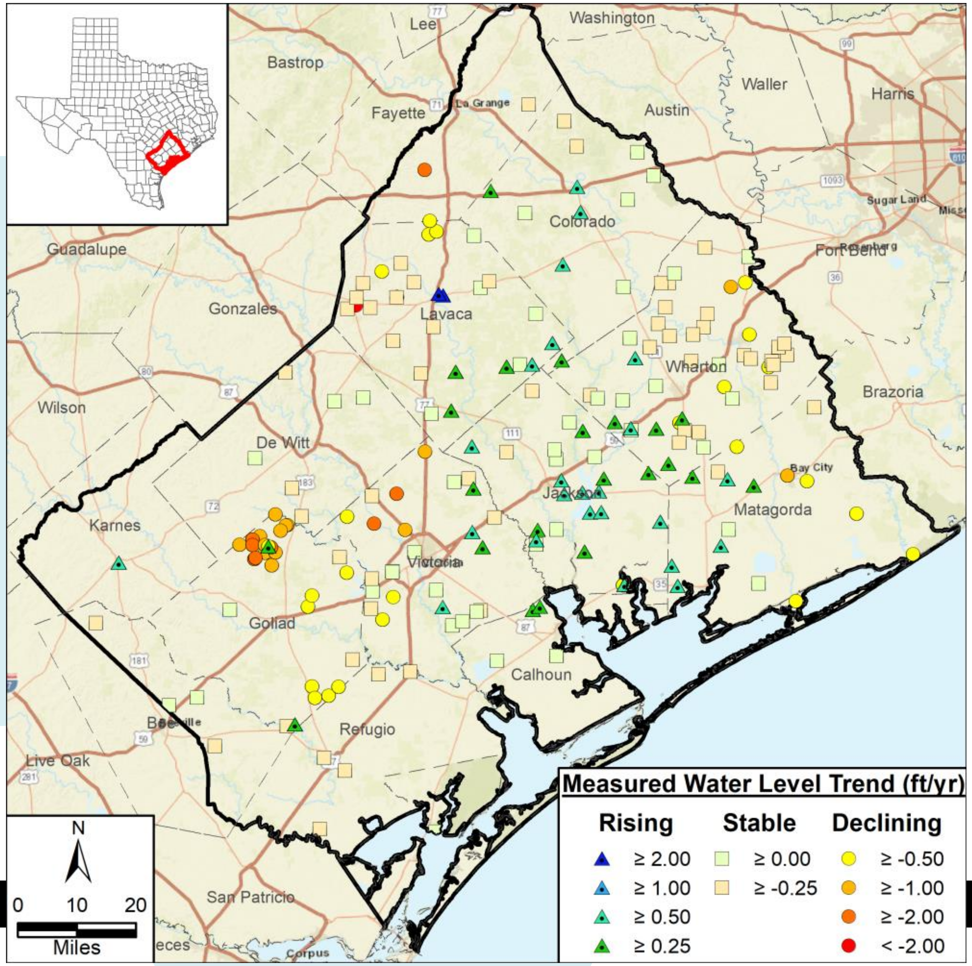
- Pumping updated from 2000 through 2016
- 206 observation or recorder wells from TWDB database
- Evaluate trend of simulated versus measured water levels
    - ➢ Reflects recent change in water levels
    - ➢ Reflects ability of model to simulate observed changes
- Are trends consistent (going in the same direction)?
- What is the error between the trends?



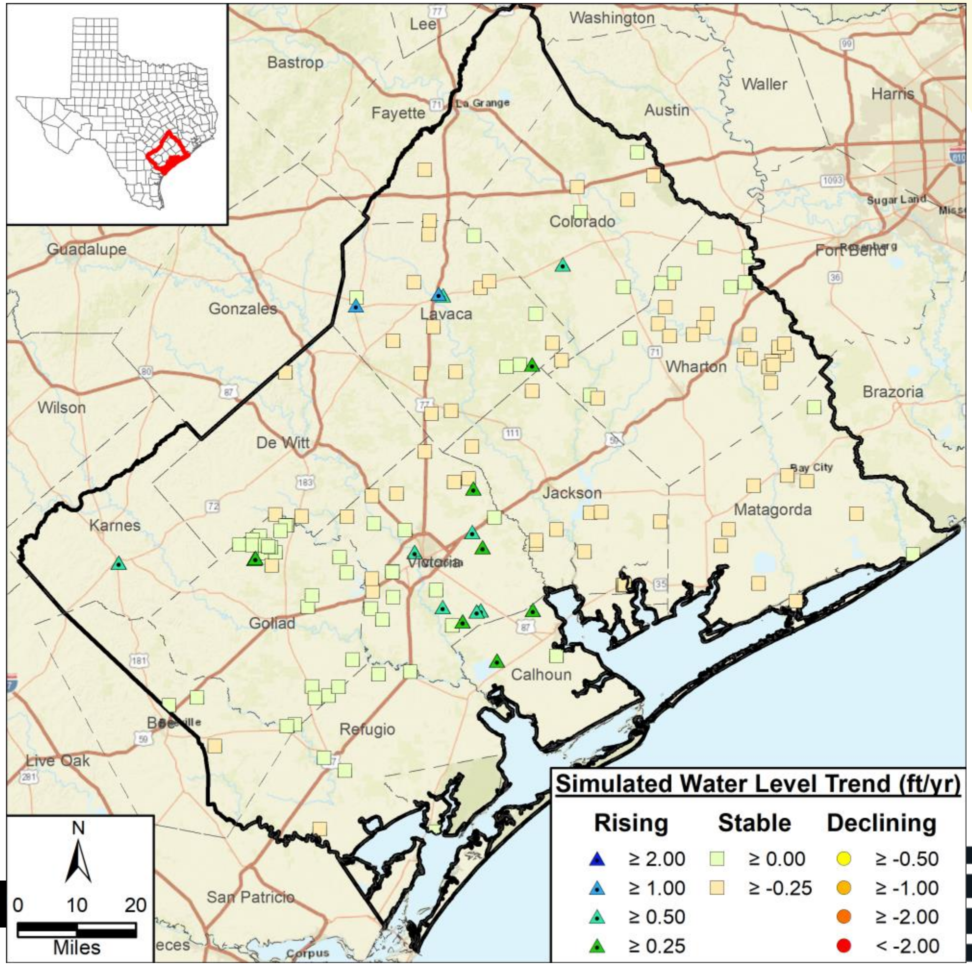
LRE WATER

GCAS WATER LEVEL TRENDS (2000-2020)

Measured

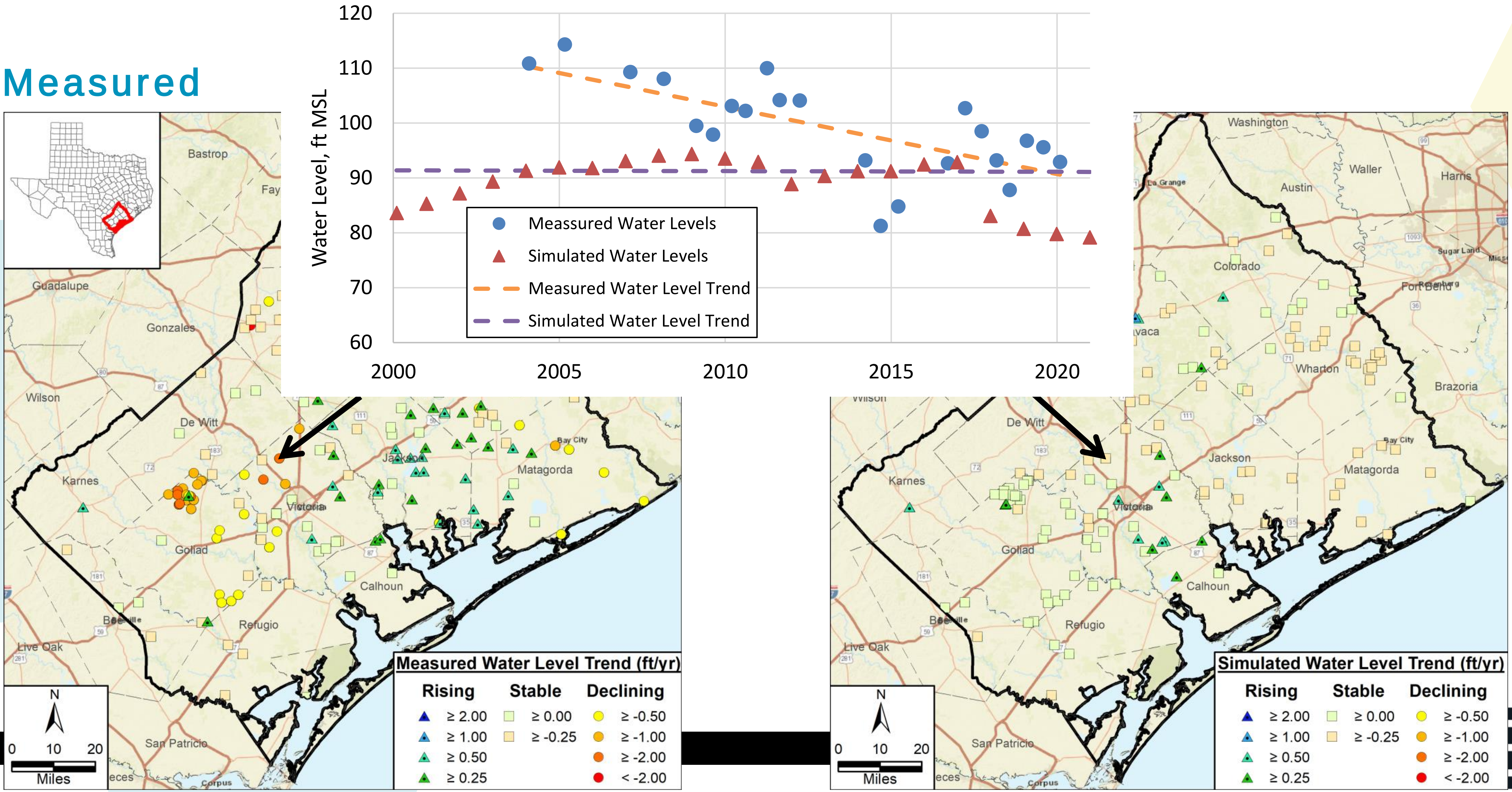


Simulated



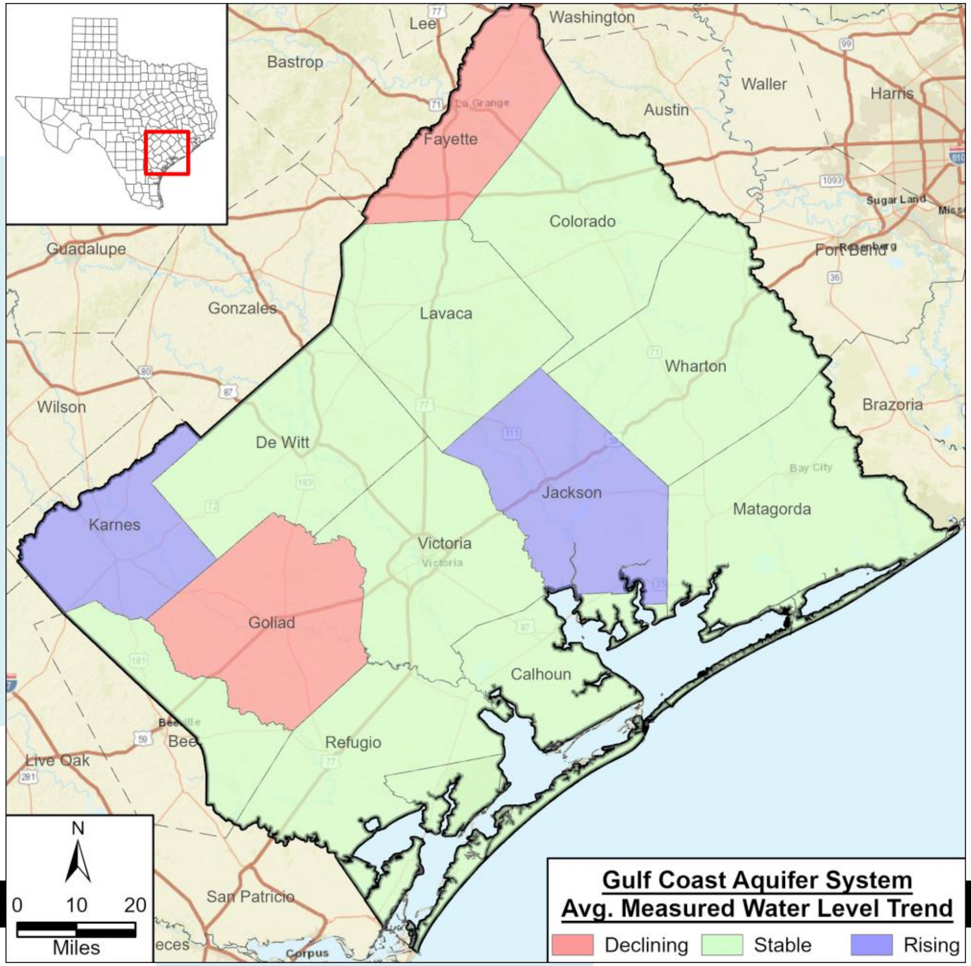
GCAS WATER LEVEL TRENDS (2000-2020)

Measured

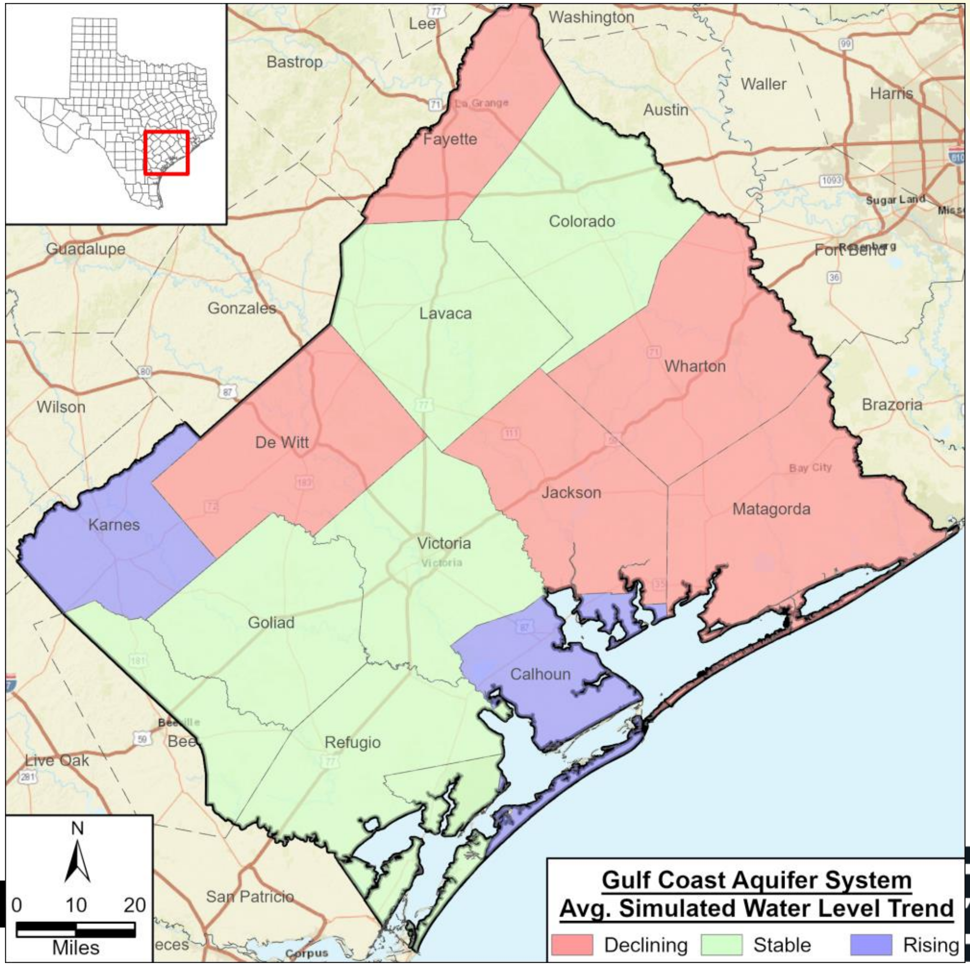


COUNTY AVERAGE GCAS WATER LEVEL TRENDS (2000-2020)

Average Measured Trend



Average Simulated Trend



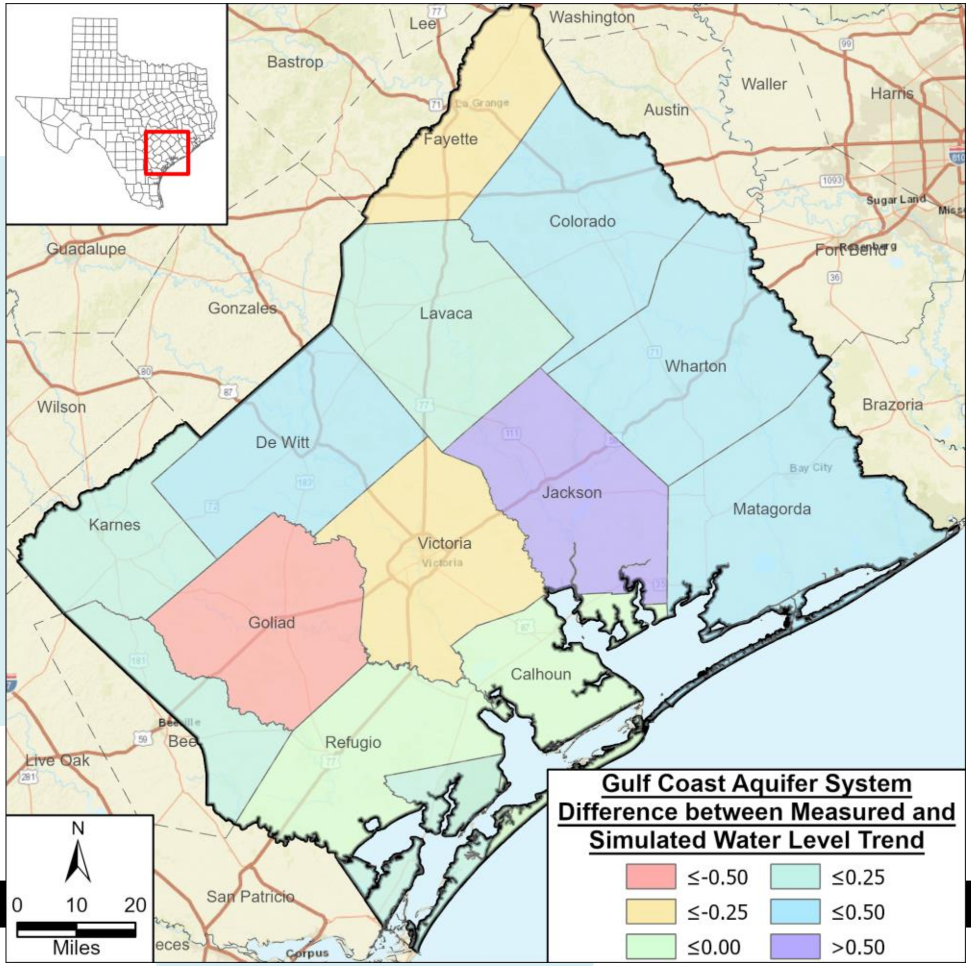
WATER

GCAS OBSERVATIONS

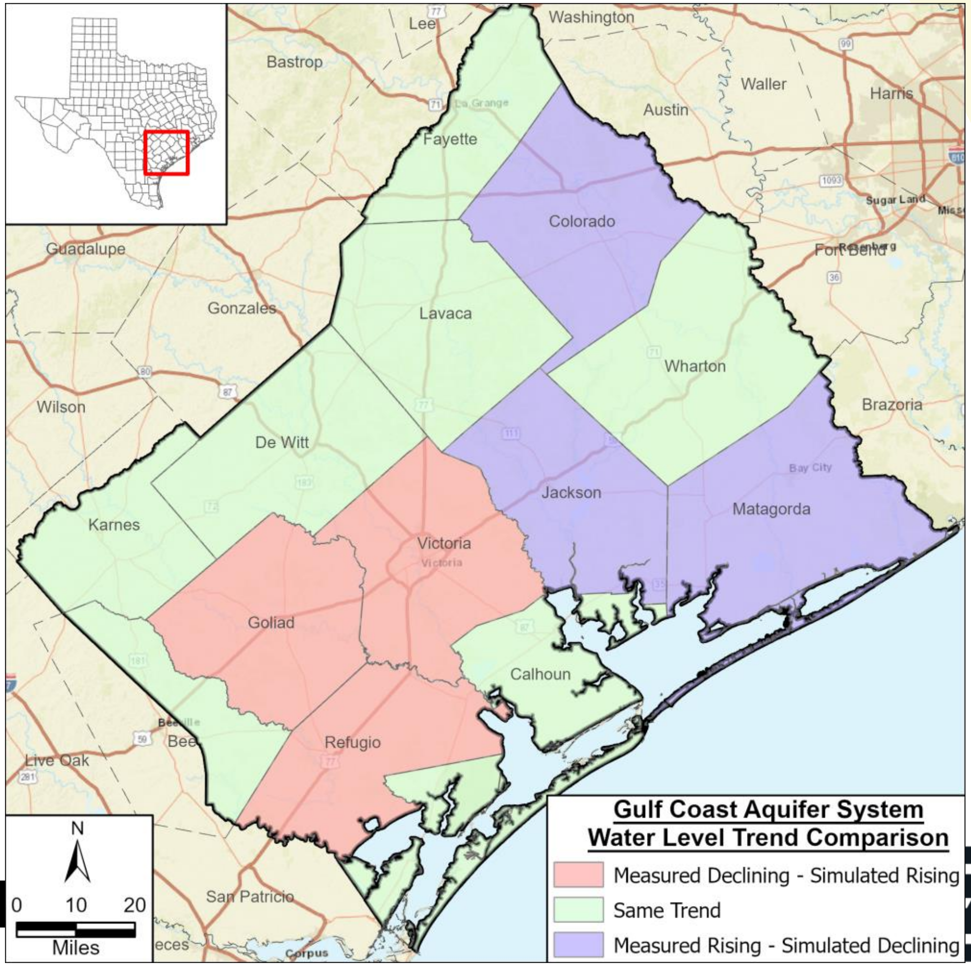
- For the GMA
  - Average measured trend = -0.03 ft/yr
  - Average simulated trend = -0.11 ft/yr
- 3 counties have measured decline and simulated rise
- 3 counties have measured rise and simulated decline

COUNTY AVERAGE GCAS WATER LEVEL TRENDS (2000-2020)

Difference in Trends



Comparison of Trend Direction



WATER

GAM UNCERTAINTY

- For counties with opposite trends, GAM may not be reasonably predicting future drawdown
  - Measured rise with simulated decline, DFCs easily achievable
  - Measured decline with simulated rise, DFC achievement challenging
- For model-based DFCs, a variance to the DFC is recommended
- Used root mean square error (RMSE) to quantify potential DFC variances
  - 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	Chicot	Evangeline	Burkeville	Jasper	GCAS
Aransas	0.03	—	—	—	0.03
Bee	—	0.05	—	0.18	0.10
Calhoun	0.16	—	—	—	0.16
Colorado	0.14	0.42	—	1.14	0.49
De Witt	—	0.08	—	0.75	0.69
Fayette	—	—	—	0.88	0.88
Goliad	0.18	0.81	—	0.58	0.78
Jackson	0.74	0.69	—	—	0.70
Karnes	—	—	—	0.23	0.23
Lavaca	0.34	0.29	0.27	1.59	1.04
Matagorda	0.73	—	—	—	0.73
Refugio	0.08	0.12	—	—	0.09
Victoria	0.38	0.55	—	—	0.48
Wharton	0.60	—	—	—	0.60
GMA 15	**0.57**	**0.62**	**0.27**	**1.19**	**0.69**

LRE WATER

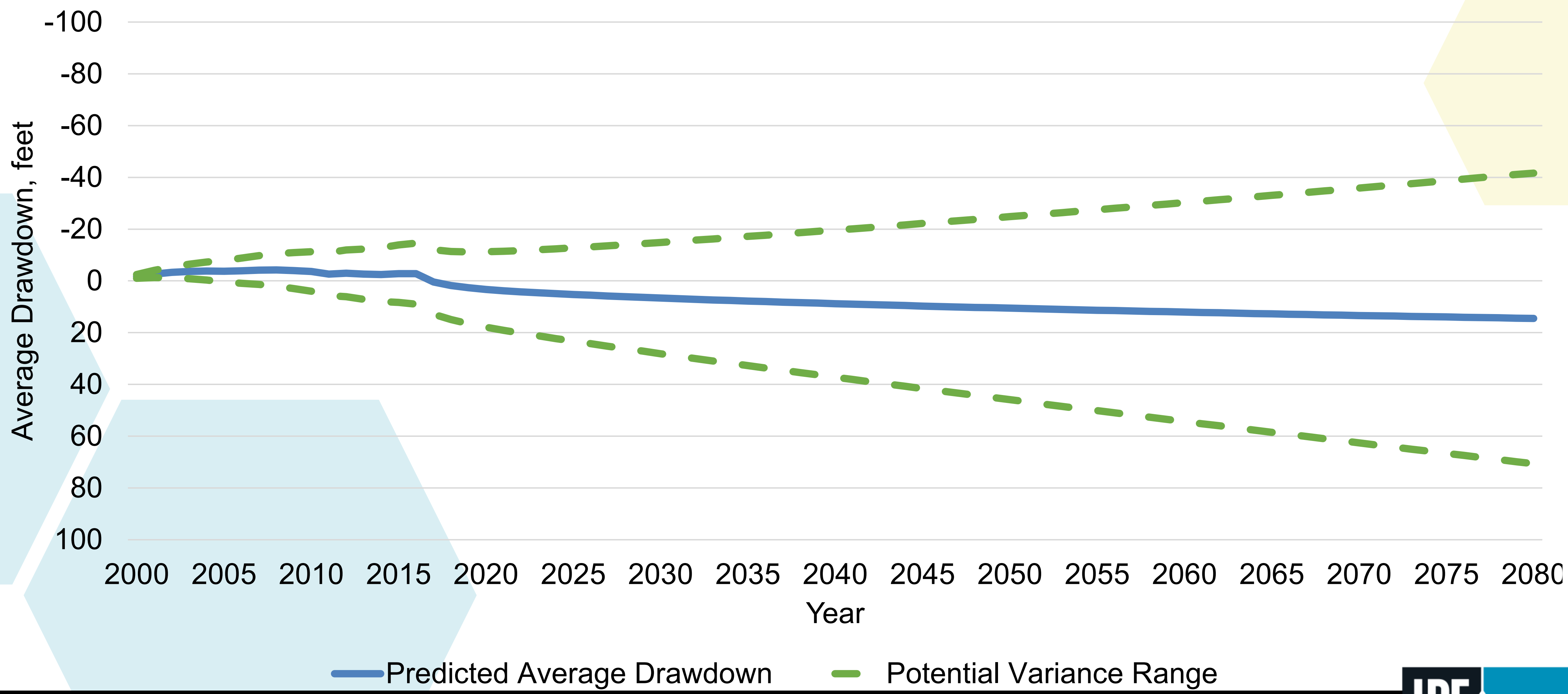
RANGE OF AVERAGE DRAWDOWN

County	Chicot	Evangeline	Burkeville	Jasper	GCAS
Aransas	0 (-2 to 2)	6 (3 to 8)	—	—	0 (-2 to 2)
Bee*	8 (0 to 16)	16 (12 to 21)	11 (3 to 19)	5 (-10 to 19)	10 (2 to 18)
Calhoun	-1 (-15 to 12)	10 (-3 to 23)	3 (-10 to 16)	—	3 (-11 to 16)
Colorado	12 (1 to 24)	26 (-8 to 60)	24 (-16 to 63)	28 (-64 to 121)	23 (-17 to 63)
De Witt	0 (-56 to 56)	5 (-2 to 11)	19 (-37 to 75)	34 (-26 to 95)	21 (-35 to 77)
Fayette	—	11 (-60 to 83)	43 (-28 to 114)	53 (-18 to 124)	44 (-27 to 116)
Goliad	-4 (-19 to 10)	-2 (-67 to 64)	4 (-59 to 68)	8 (-39 to 55)	3 (-60 to 66)
Jackson	15 (-44 to 75)	20 (-36 to 76)	14 (-43 to 71)	22 (-35 to 79)	18 (-40 to 75)
Karnes	—	-1 (-19 to 17)	22 (3 to 40)	25 (7 to 43)	22 (3 to 40)
Lavaca	7 (-21 to 35)	7 (-16 to 30)	17 (-5 to 39)	32 (-96 to 161)	18 (-66 to 102)
Matagorda	5 (-55 to 64)	17 (-42 to 76)	16 (-43 to 75)	—	10 (-49 to 69)
Refugio	0 (-7 to 6)	7 (-3 to 17)	3 (-5 to 10)	—	3 (-4 to 10)
Victoria	-4 (-35 to 27)	6 (-38 to 50)	5 (-34 to 43)	8 (-30 to 47)	3 (-35 to 42)
Wharton	15 (-34 to 63)	12 (-37 to 61)	24 (-25 to 73)	27 (-21 to 76)	19 (-29 to 68)
GMA 15	**6 (-40 to 52)**	**12 (-39 to 62)**	**16 (-6 to 38)**	**24 (-72 to 121)**	**14 (-42 to 71)**

*Average drawdown is for all of Bee County, not just the portion in GMA 15

TER

GMA 15 GCAS AVERAGE DRAWDOWN



DISCUSSION

- 3.5-foot DFC variance may need to be reconsidered in some areas
- Comparison of trends indicates significant model uncertainty in some areas
- Using the RMSE of the trends is one way to assess potential error and quantify DFC variance

LRE WATER

QUESTIONS/COMMENTS

Discussion of DFC Feasibility

October 8, 2020

LRE WATER

Appendix 5.17 —
Presentation Regarding Potentially Non-Relevant Aquifers for GMA 15 Joint Planning

DISCUSSION OF POTENTIALLY NON-RELEVANT AQUIFERS FOR GMA 15 JOINT PLANNING

GMA 15 Agenda Item 7

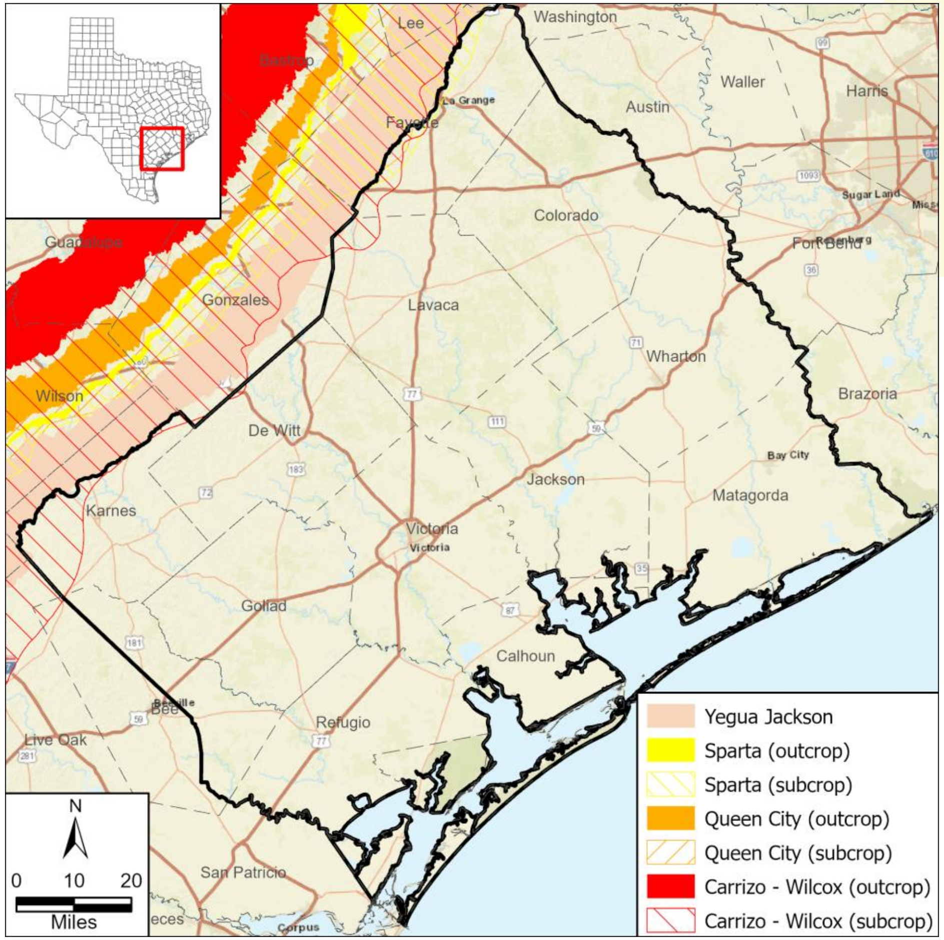
January 14, 2021

LRE WATER

CARRIZO-WILCOX AQUIFER IN GMA 15

- Counties: Bee, De Witt, Fayette (GMA 12), Karnes (GMA 13), Lavaca
- Characteristics – Deep, brackish to saline
- Use & demands – none to negligible
- TERS (GAM Task 13-038)

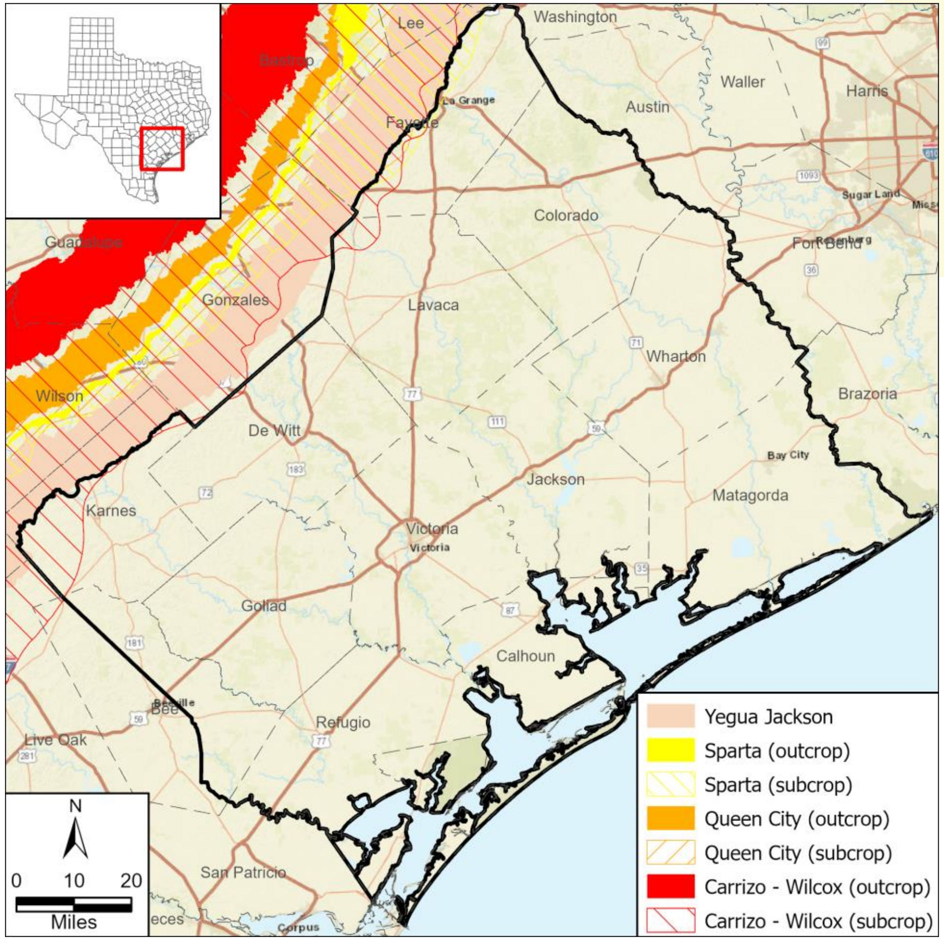
County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
De Witt	1,200,000	300,000	900,000
Fayette	16,000,000	4,000,000	12,000,000
Karnes	43,000,000	10,750,000	32,250,000
Lavaca	9,700,000	2,425,000	7,275,000
Total	69,900,000	17,475,000	52,425,000



QUEEN CITY AQUIFER IN GMA 15

- Fayette County (GMA 12)
- Characteristics – Deep, brackish to saline
- Use & demands – none to negligible
- TERS (GAM Task 13-038)

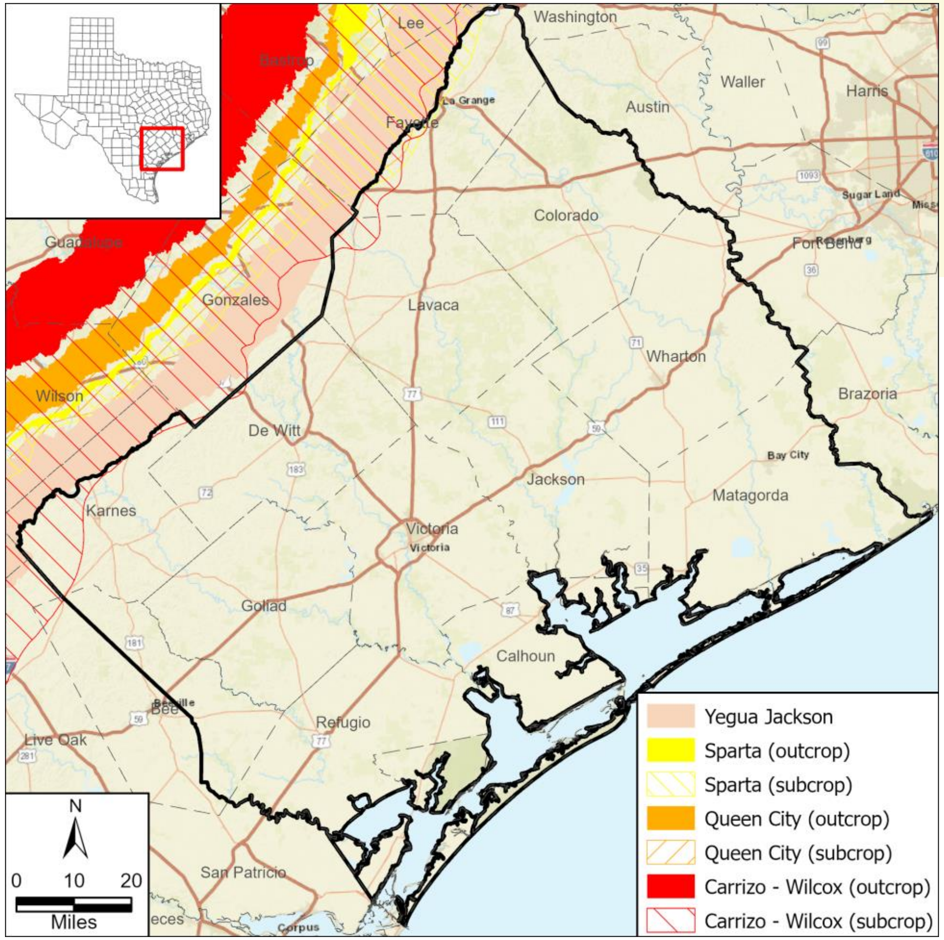
County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Fayette	640,000	160,000	480,000
Total	640,000	160,000	480,000



SPARTA AQUIFER IN GMA 15

- Fayette County (GMA 12)
- Characteristics – Deep, brackish to saline
- Use & demands – none to negligible
- TERS (GAM Task 13-038)

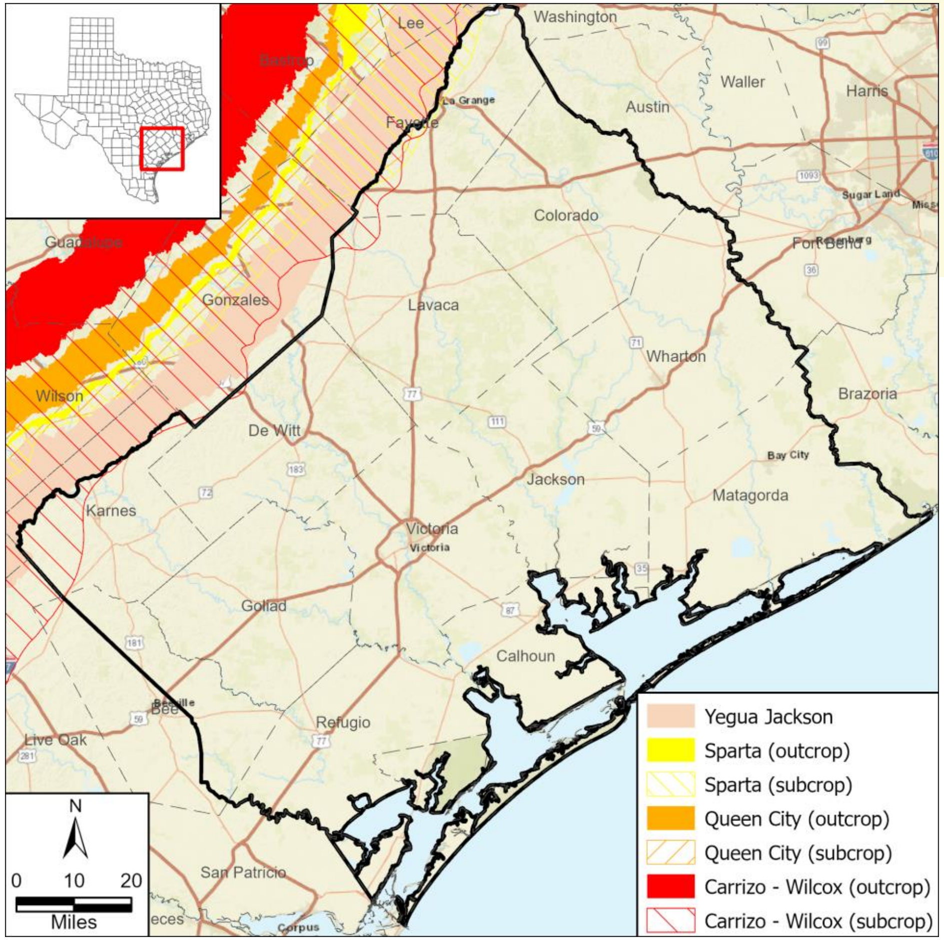
County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Fayette	2,900,000	725,000	2,175,000
Total	2,900,000	725,000	2,175,000



YEGUA-JACKSON AQUIFER IN GMA 15

- Counties: Karnes (GMA 13), Lavaca
- Characteristics – outcrop, small extent
- Use & demands – none to negligible
- TERS (GAM Task 13-038)

County	Total Storage (acre-feet)	25 percent of Total Storage (acre-feet)	75 percent of Total Storage (acre-feet)
Lavaca	620,000	155,000	465,000
Karnes	190,000	47,500	142,500
Total	810,000	202,500	607,500



LRE WATER

SUMMARY

- Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers each have a small footprint in GMA 15
- Aquifers managed as part of other GMAs
- Recommend continuing to declare these aquifers non-relevant for GMA 15 joint planning purposes