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2026 JOINT PLANNING DESIRED FUTURE CONDITIONS EXPLANATORY REPORT

Prepared by: Groundwater Management Area 15
Joint Planning Committee

With Technical Assistance by:



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Acronyms and Abbreviations

ASCRD	Aquifer Storage & Recovery Conservation District
CGC GAM	Central Gulf Coast Aquifers Groundwater Availability Model
DFC	Desired Future Condition
GAM	groundwater availability model
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
HB	House Bill
INTERA	INTERA Incorporated
MAG	modeled available groundwater
RFP	request for proposal
TERS	total estimated recoverable storage
TWDB	Texas Water Development Board
UWCD	Underground Water Conservation District

1.0 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 Section 35.001). The responsibility for GMA delineation was delegated to the Texas Water Development Board (TWDB) per Texas Water Code Section 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.

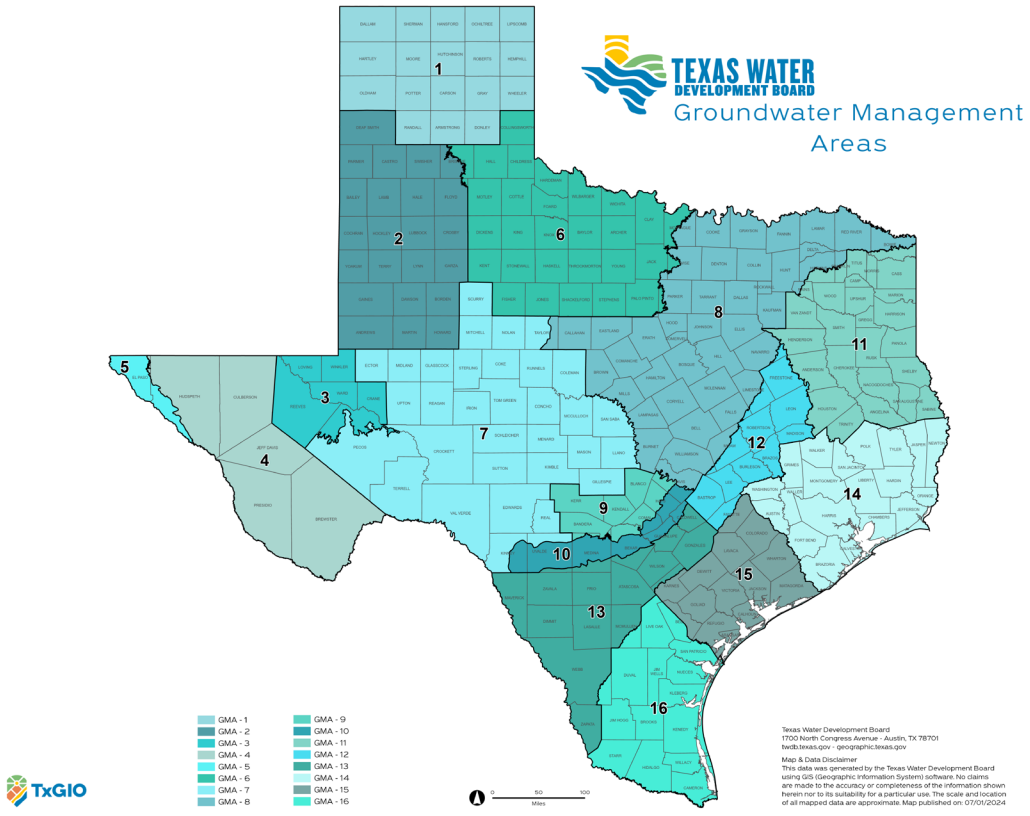


Figure 1. Delineation of 16 groundwater management areas in Texas.

1.1 Overview of GMA 15 and Aquifer System

GMA 15 covers all or parts of thirteen Groundwater Conservation Districts (GCDs) along the central Texas Gulf Coast. The 13 GCDs—shown in **Figure 2**—are 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 TWDB recognizes two major aquifers and three minor aquifers in GMA 15. **Figure 3** shows the footprints of the two major aquifers: 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, Fayette, Karnes, and Lavaca counties. **Figure 4** shows the footprints of the minor aquifers: the Yegua-Jackson, Sparta, and Queen City aquifers. The three aquifers occur as subcrop 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.

Table 1. Hydrogeologic Units in GMA 15 (modified from Keester and others, 2021).

Geologic Unit		Hydrogeologic Unit
Alluvium and Eolian Sand		Alluvium/Eolian Aquifer
Beaumont		Chicot Aquifer
Lissie		
Willis		
Goliad		Evangeline Aquifer
Upper Fleming		
Middle Fleming		Burkeville Confining Unit
Lower Fleming		Jasper Aquifer
Oakville		
Catahoula		
Jackson Group	Whitsett	Yegua-Jackson Aquifer
	Manning	
	Wellborn	
	Caddell	
Claiborne Group	Yegua	
	Cook Mountain	Aquitard
	Sparta	Sparta Aquifer
	Weches	Aquitard
	Queen City	Queen City Aquifer
	Reklaw	Aquitard
	Carrizo	Carrizo-Wilcox Aquifer
Wilcox Group	Upper	
	Middle	
	Lower	

There are fourteen counties that are either wholly or partially within GMA 15. **Table 2** lists the fourteen counties and their area and population projections for the entire county. In 2010, the fourteen counties had a population of 369,455 people, and the county with the largest population was Victoria County

with 86,793 people. The population of the fourteen counties is expected to decline to 367,362 people in 2080, with Victoria expanding to a population of 95,087 people. These population projections show a reversal in overall growth for GMA 15 compared with the 2021 joint planning cycle.

Table 2. Population projections from the 2027 State Water Plan by county.

County	Area (mi^2)[1]	2030	2040	2050	2060	2070	2080
Aransas	252	24,415	24,299	23,708	23,195	22,691	22,196
Bee**	880	31,363	31,563	31,337	31,030	30,725	30,422
Calhoun	507	19,449	18,619	17,599	16,571	15,483	14,332
Colorado	960	19,985	19,396	18,742	18,145	17,468	16,701
DeWitt	909	19,716	19,687	19,565	19,482	19,394	19,301
Fayette**	950	24,270	23,782	23,237	23,121	22,990	22,842
Goliad	852	6,803	6,648	6,559	6,454	6,334	6,197
Jackson	829	15,769	16,762	17,634	18,376	19,143	19,935
Karnes**	748	15,357	16,052	16,739	17,527	18,429	19,462
Lavaca	970	21,419	22,796	24,127	25,631	27,185	28,790
Matagorda	1,100	35,212	34,061	32,705	31,115	29,313	27,271
Refugio	770	6,489	6,243	5,992	5,799	5,595	5,379
Victoria	882	93,954	96,082	96,608	96,168	95,664	95,087
Wharton	1,086	41,709	41,752	41,314	40,765	40,146	39,447
GMA 15		375,910	377,742	375,866	373,379	370,560	367,362

**Values Represent the population projections for whole county and not just the portion within GMA 15

[1]Source of county areas is http://www.indexmundi.com/facts/united-states/quick-facts/texas/land-area#table

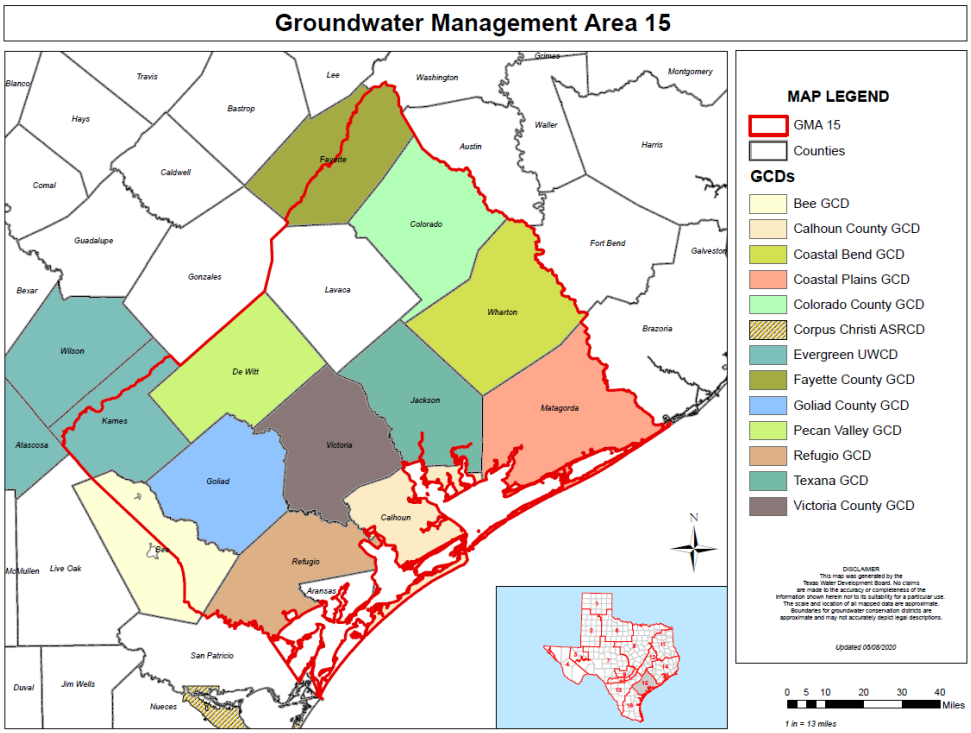


Figure 2. Delineation of GMA 15 showing locations of GCDs.

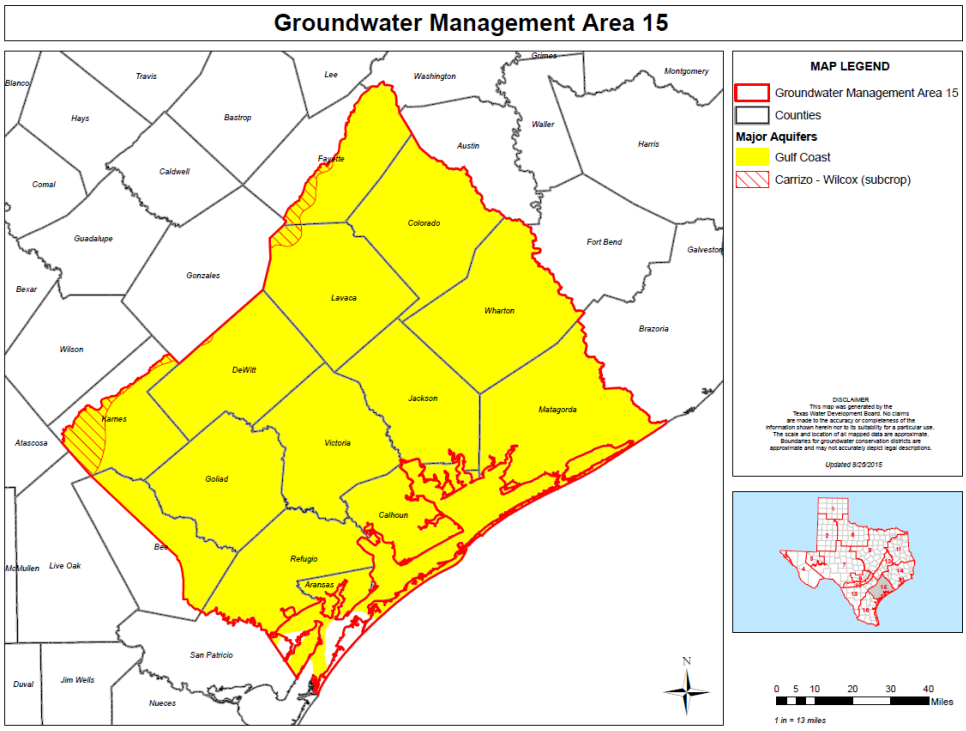


Figure 3. Map of GMA 15 major aquifer boundaries.

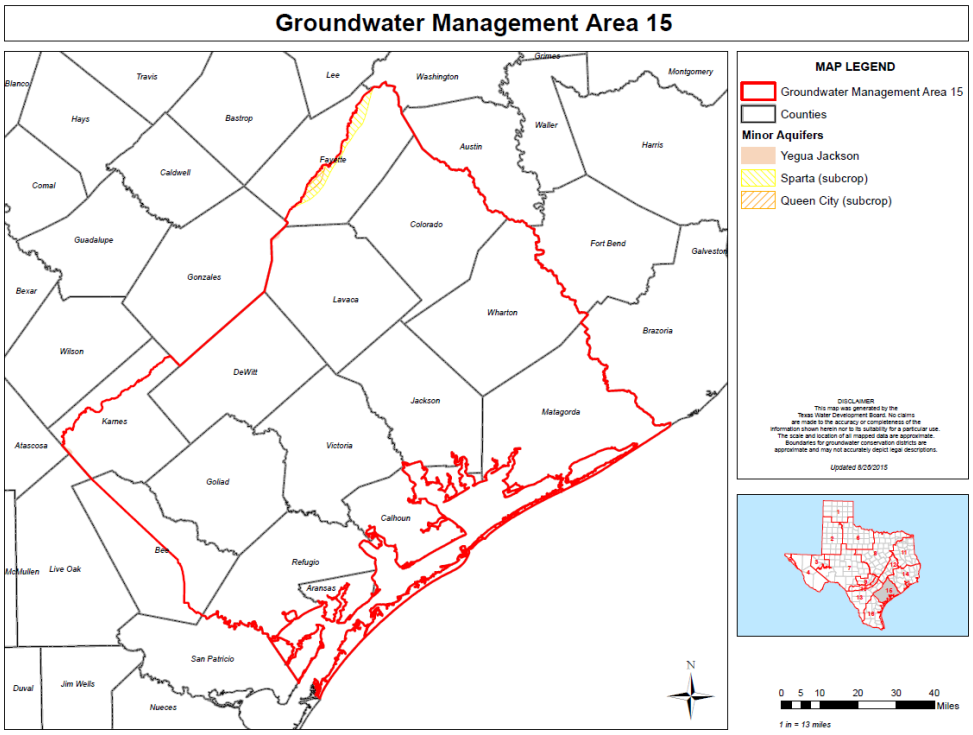


Figure 4. Map of GMA 15 minor aquifer boundaries.

1.2 Joint Planning Process

The joint-planning process was first adopted by the Texas Legislature with the passage of House Bill (HB) 1763 in 2005. HB 1763 required that, where two or more districts are located within the same boundaries of GMA, the districts shall establish Desired Future Conditions (DFCs) for all relevant aquifers in the GMA by no later than May 1, 2026 and every five years thereafter.

DFCs are defined in Title 31, Part 10, §356.10 (6) of the Texas Administrative Code as "the desired, quantified condition of groundwater resources (such as water levels, spring flows, or volumes) within a management area at one or more specified future times as defined by participating groundwater conservation districts within a groundwater management area as part of the joint planning process."

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 §16.053, Texas Water Code, 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 DFC joint-planning process to document that certain required factors for consideration have been addressed;

2. Performance of Groundwater Availability Model (GAM) runs or aquifer assessments to evaluate groundwater production scenarios and aquifer conditions;
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. GMA approval by resolution of the adoption of the final DFCs no later than January 5, 2027, pursuant to Texas Water Code Section 36.108(d-3. Following GMA adoption of the DFCs required information is to be submitted to the TWDB to determine administrative completeness of the DFC submission packet;
5. GCD adoption of DFCs as soon as possible after the TWDB determination of administrative completeness.
6. TWDB estimation of the amount of groundwater that can be pumped annually in order to achieve the DFC, based on GAM modeling; and
7. Provision of a Modeled Available Groundwater (MAG) report by TWDB to each GCD, which (along with other statutory factors) are considered by the GCD in developing a management plan, district rules, and in issuing permits. 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 Section 36.108(d)):
    a. Aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another;
    b. The water supply needs and water management strategies included in the state water plan;
    c. 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;
    d. Other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water;
    e. The impact on subsidence;
    f. Socioeconomic impacts reasonably expected to occur;
    g. The impact on the interests and rights in private property, including ownership and the rights of management area landowners and their lessees;
    h. The feasibility of achieving the DFC; and
    i. Any other information relevant to the specific DFCs

1.3 GMA 15 Joint Planning

The DFC joint-planning process (as outlined in Texas Water Code Section 36.108) is a public, transparent process, in which all planning decisions are made in open, publicly-noticed meetings in accordance with provisions contained in Texas Water Code Chapter 36. From 2021 to 2026, GMA 15 convened 17 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 Victoria

County GCD by mail at 1501 E. Mockingbird Lane, Suite 104, Victoria, Texas 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 2026 joint planning.

Table 3. List of GMA 15 meetings that were convened from 2021 through 2026.

Meeting Date	Quorum	Major Discussion Topic
October 14, 2021	Yes	Discussed Joint planning, management plans, and accomplishments of member districts of GMA 15
November 12, 2021	Yes	Discussed desired future conditions adopted on previous meeting, issues with DFCs, recorded aquifer conditions, and the Gulf Coast GAM
December 9, 2021	Yes	Discussed joint planning, review and approval of explanatory report and submittal of DFC packet to TWDB, and GMA 15 boundary
April 14, 2022	Yes	Discussed management plans and GCD accomplishments
July 14, 2022	Yes	Discussed proposed GAM
October 13, 2022	Yes	Discussed MAG report from TWDB, proposed GAM, and GMA 15 boundary
April 13, 2023	Yes	Discussed proposed GAM and GCD Achievements; VCGCD became the administrative hub for GMA 15
July 13, 2023	Yes	Discussed passing of HB 3278, soliciting proposals for technical services to GMA 15 to support DFC, and Explanatory report for 4th cycle
October 12, 2023	Yes	INTERA was approved for technical services for the 4th cycle
January 11, 2024	Yes	Discussed framework for funding technical services for 4th cycle and new GAM undergoing a sensitivity analysis at the TWDB
April 11, 2024	Yes	Discussed management plans; Requested TWDB authorize the use of the GAM for the Central GCDS to be used for the 4th round of joint planning
July 11, 2024	Yes	The use of the GAM for the Central GCAS was approved by TWDB
October 15, 2024	Yes	Minutes from previous meeting
January 9, 2025	Yes	INTERA presented slides and guided discussions regarding the development of 4th round of joint planning
April 10, 2025	Yes	Discussed the release of the draft recalibrated GAM; Dr. Young was authorized to Evaluate the Updated GAM; INTERA presented Subsidence, Hydrologic Conditions and Aquifer Uses and Conditions
July 10, 2025	Yes	Discussed evaluation of new GAM and characterization of brackish groundwater resources; INTERA presented Impacts on the Interests and Rights of Private Property, Water Needs and Strategies, Pumping Scenarios, and on the Review of new GAM
July 24, 2025	Yes	INTERA presented reports on the evaluation of new GAM

Meeting Date	Quorum	Major Discussion Topic
October 9, 2025	Yes	Discussed Goliad GCD using another GW model for establishing DFC; INTERA presented Socioeconomic Impacts and Environmental Impacts
January 8, 2026	Yes	INTERA presented DFC feasibility, other factors, and draft explanatory report

Appendix A contains the meeting notices and the minutes for the meetings. INTERA performed the groundwater availability model simulations for GMA 15, provided technical guidance, and supported the preparation of this explanatory report.

During the development of the proposed DFCs, a total of three GAM simulations were evaluated and considered. The simulations considered adjustments to historical pumping and changes in pumping for several GCDs. Results of these scenarios were presented at the July 10, 2025, GMA 15 meeting. The presentation of the modeling is included in **Appendix C**. After review and discussion, on October 9, 2025, GMA 15 adopted Scenario 1 as a reasonable scenario for evaluation of the factors relative to potential DFCs. **Table 4** summarizes the various pumping scenarios considered by GMA 15.

Table 4. GAM Simulations Used to Develop and Evaluate DFCs

Scenario	General Pumping Distribution Description
Baseline	3rd Round MAG areal distribution
	Adjustments to Pre-2022 Pumping
	Applied Historical TWDB Pumping
Scenario 1	Baseline
	Change in Texana GCD and Coastal Plains GCD pumping
Scenario 2 - Brackish	Baseline
	Scenario 1
	Brackish Water Pumping 40,000 acre-feet per year

During the GMA 15 meeting on “fill in date,” GMA 15 passed a resolution for Groundwater Management Area 15 Proposed Desired Future Conditions. 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 at least 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 5** lists the date that each district conducted a public hearing on the proposed DFCs.

Table 5. Dates of Public Hearings for Proposed DFCs (to be inserted).

2.0 GMA 15 Desired Future Conditions

Texas Water Code Section 36.001 defines a 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 Section 36.108.

2.1 Gulf Coast Aquifer System

The Gulf Coast Aquifer System includes, from youngest to oldest deposits, the Chicot Aquifer, Evangeline Aquifer, the Burkeville Confining Unit, and the Jasper Aquifer. The Burkeville Confining Unit separates the Evangeline and the Jasper aquifers (Table 1). GMA 15 uses the Central Gulf Coast GAM (CGC GAM) (Chowdhury and others, 2004) to help develop and evaluate the DFCs. GMA 15 used the zone delineations by Anaya and Hardwick (2023) to define areas representing each of the counties and aquifers.

On "INSERT NEW DATE HERE," GMA 15 representatives approved resolution # 2026 – 01, titled "Resolution to Adopt the Desired Future Conditions for Groundwater Management Area 15 Aquifers" (**Appendix B**). The adopted DFCs are expressed as average drawdown for each county and the entire GMA from January 1, 2000 through December 31, 2080. The DFC for GMA 15 shall not exceed an average drawdown of 13 feet for the Gulf Coast Aquifer System. DFCs for each county within the GMA shall not exceed the values specific in **Table 6**. Due to concerns regarding the possible inaccurate predictions of the CGC GAM within its borders, Goliad County GCD used a different groundwater model for developing its DFCs. **Appendix E** presents the information used by Goliad County GCD to developed their DFCs, summarized in Table 6.

Table 6. Desired Future Conditions for GMA 15 expressed as an Average Drawdown between January 2000 and December 2079.

County	Aquifer	DFC 2080
Aransas	Gulf Coast Aquifer System	0
Bee	Gulf Coast Aquifer System	7
Calhoun	Gulf Coast Aquifer System	5
Colorado	Chicot & Evangeline	17
	Jasper	25
DeWitt	Gulf Coast Aquifer System	17
Fayette	Gulf Coast Aquifer System	44
Goliad	Chicot	13
	Evangeline	34
	Burkeville	21
	Jasper	21
Jackson	Gulf Coast Aquifer System	10
Karnes	Gulf Coast Aquifer System	22
Lavaca	Gulf Coast Aquifer System	18
Matagorda	Chicot & Evangeline	15
Refugio	Gulf Coast Aquifer System	11

County	Aquifer	DFC 2080
Wharton	Chicot & Evangeline	15
Victoria	Gulf Coast Aquifer System	5

In addition to the adopted DFCs in Table 6, GMA 15 members also established DFC evaluation factors. For the Gulf Coast Aquifer System and each county, the evaluation factor is three feet above or below the adopted DFC (±3 feet the value shown in Table 6).

2.2 Carrizo-Wilcox Aquifer

The Carrizo-Wilcox Aquifer footprint extends into Bee, De Witt, Fayette, Karnes, and Lavaca counties within GMA 15. 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 previously shown in Table 1, 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 7** provides the TERS values for the aquifer within GMA 15 as calculated by Wade and Anaya (2014).

Table 7. Carrizo-Wilcox Aquifer total estimated recoverable storage within GMA 15.

County	Total Storage (acre-feet)
DeWitt	1,200,000
Fayette	16,000,000
Karnes	43,000,000
Lavaca	9,700,000
Total	69,900,000

The portion of the aquifer in Fayette and Karnes counties is managed by Fayette County GCD and Evergreen UWCD, respectively. Each of these districts participate in joint planning within other GMAs 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 Carrizo-Wilcox Aquifer as non-relevant for joint planning purposes.

2.3 Queen City Aquifer

GMA 15 classified the Queen City Aquifer as a non-relevant for joint planning purposes based on their discussion on January 14, 2021 (see Appendix F). The Queen City Aquifer footprint extends into Fayette County within GMA 15. 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 previously shown in Table 1, 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 8** provides the TERS values for the aquifer within GMA 15 as calculated by Wade and Anaya (2014).

Table 8. Queen City Aquifer total estimated recoverable storage within GMA 15.

County	Total Storage (acre-feet)
Fayette	640,000
Total	640,000

The portion of the aquifer in Fayette County is managed by Fayette County GCD. Fayette County GCD 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 Queen City Aquifer non-relevant for joint planning purposes.

2.4 Sparta Aquifer

GMA 15 considers the portion of the Sparta Aquifer within its boundary non-relevant for joint planning purposes based on their discussion on January 14, 2021 (see Appendix F). The Sparta Aquifer footprint extends into Fayette County within GMA 15. 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 in Table 1, 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 9** provides the TERS values for the Sparta Aquifer within GMA 15 as calculated by Wade and Anaya (2014).

Table 9. Sparta Aquifer total estimated recoverable storage within GMA 15

County	Total Storage (acre-feet)
Fayette	2,900,000
Total	2,900,000

The portion of the aquifer in Fayette County is managed by Fayette County GCD. Fayette County GCD 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 Sparta 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 based on their discussion on January 14, 2021 (see Appendix F). The Yegua-Jackson Aquifer footprint extends into Karnes and Lavaca counties within GMA 15. The portion of this aquifer within GMA 15 is relatively small. Figure 4 illustrates the location of the aquifer within GMA 15.

As shown in Table 1, 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 10** provides the TERS values for the aquifer within GMA 15 as calculated by Wade and Anaya (2014).

Table 10. Yegua-Jackson Aquifer total estimated recoverable storage within GMA 15.

County	Total Storage (acre-feet)
Lavaca	620,000
Karnes	190,000
Total	810,000

The portion of the aquifer in Karnes County is managed by Evergreen UWCD. Evergreen UWCD 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 Yegua-Jackson Aquifer as non-relevant for joint planning purposes within their boundary.

3.0 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 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 Section 36.108.

GMA 15 and each of its member GCDs evaluated DFCs with regard to the nine factors required by Texas Water Code Section 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, 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. An exception to this requirement was granted to Goliad County GCD based on evidence presented by the GCD that indicated that CGC GAM was an unreliable model for predicting the impacts of pumping on water level in Goliad County.

The allowance of different DFCs among the districts is justified for several reasons. One reason is that Texas Water Code Section 36.108(d-1) provides for the establishment of different DFCs, following consideration and documentation of factors in Texas Water Code Section 36.108(d), 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
2. Each geographic area overlying an aquifer in whole or in part or subdivision of an aquifer

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 covers only part of an 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

"INSERT DATE HERE" through "INSERT DATE HERE" (minimum 90 days) regarding the proposed DFCs. The summaries are provided in **Appendix D**. GMA 15 Representatives reviewed the summary submittals during a meeting held on "INSERT DATE HERE". 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.

4.0 Technical Justification

The DFCs adopted by GMA 15 were informed in part by evaluations conducted using the CGC GAM, originally developed by Waterstone Environmental Hydrology and Engineering, Inc. (Waterstone, 2003) and finalized by the Texas Water Development Board (Chowdhury and others, 2004). The CGC GAM represents the Gulf Coast Aquifer System using four numerical layers corresponding, from top to bottom, to the Chicot Aquifer, Evangeline Aquifer, Burkeville Confining Unit, and Jasper Aquifer. The model layers are shown in **Figure 5**. The regional extent of the model (**Figure 6**) encompasses the outcrop limits of the aquifer system to the west, the Gulf of Mexico to the east, and groundwater divides to the north and south (Young, 2016).

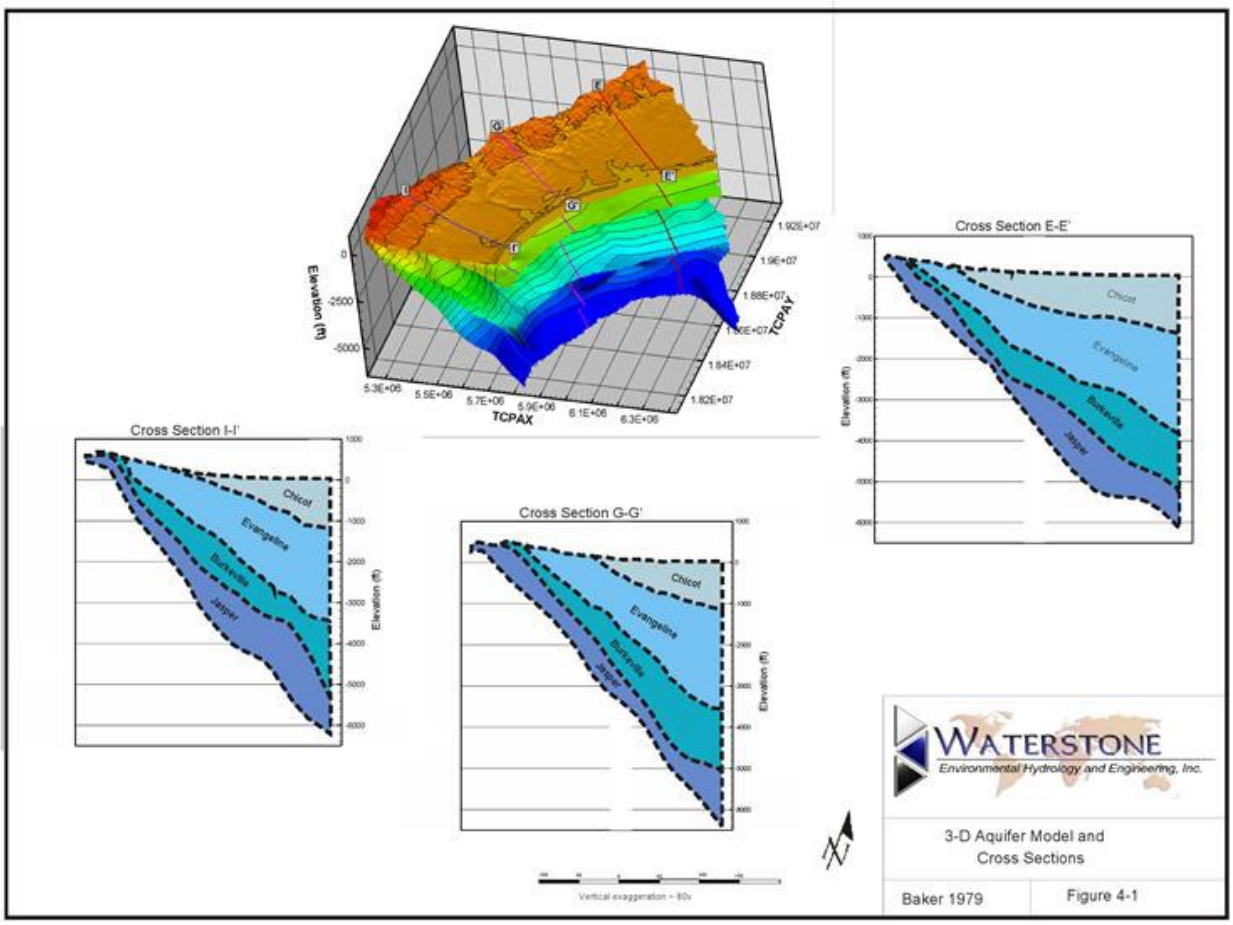


Figure 5. Three-dimensional surfaces and two-dimensional cross-sections showing the model layers for the Central Gulf Coast GMA (Waterstone, 2003)

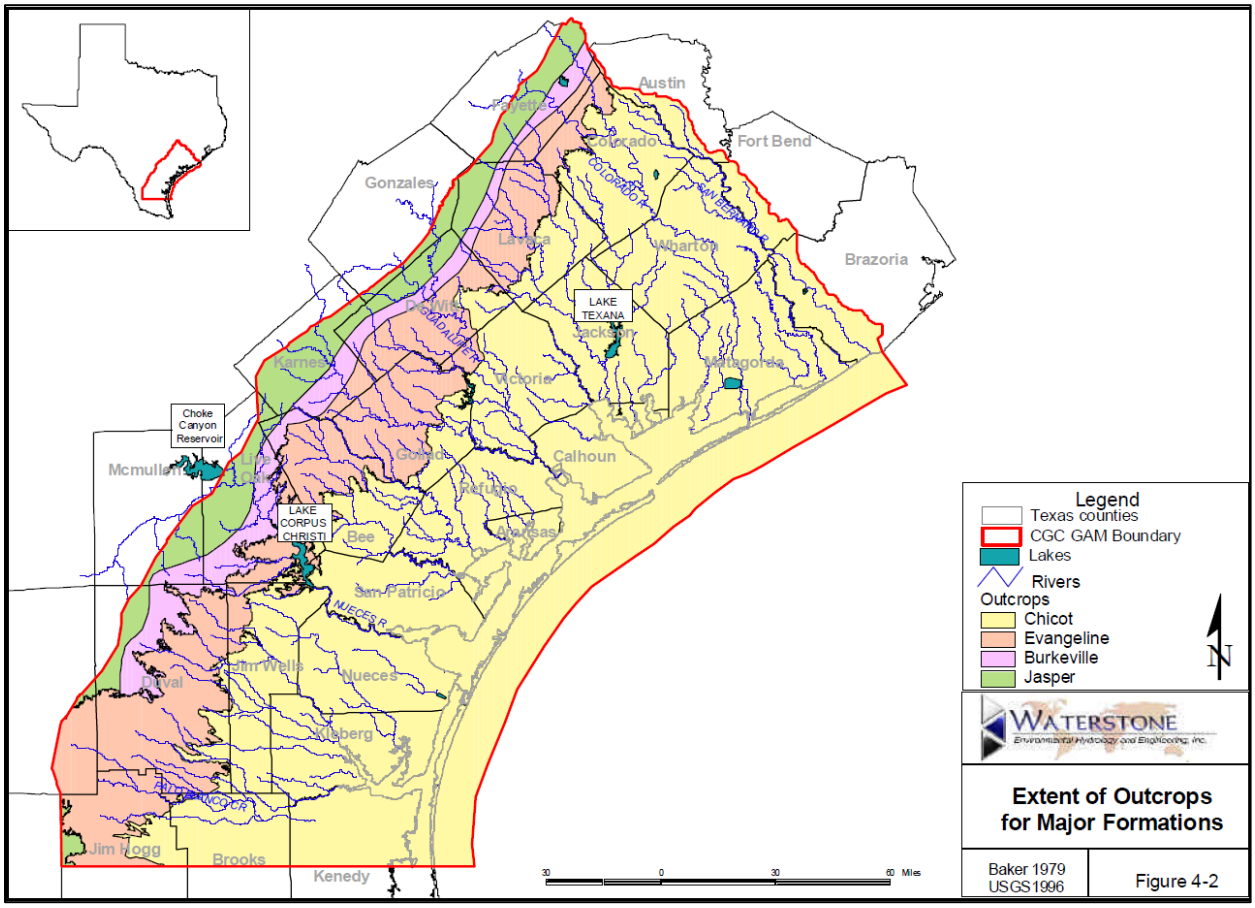


Figure 6. Model domain for the Central Gulf Coast GAM (Waterstone, 2003)

The CGC GAM was calibrated under steady-state conditions for the pre-development period and under transient conditions through the end of 1999 using available water-level observations and estimated historical pumping. Calibration of the CGC GAM focused primarily on matching measured water levels in the Chicot and Evangeline aquifers, with comparatively limited data available for the Burkeville Confining Unit and the Jasper Aquifer. While the model achieved reasonable agreement with observed regional water-level patterns, documentation of aquifer properties, recharge distributions, pumping allocation by layer, and boundary condition assumptions are limited. As a result, uncertainty exists in the model's ability to represent localized hydrogeologic conditions or predict site-specific groundwater responses accurately (Young, 2016).

During the 2016 joint planning process, GMA 15 updated pumping inputs for the years 2000–2016 better to reflect revised estimates of historical groundwater use (Young, 2016). Subsequent investigations conducted during and after the 2021 DFC joint planning cycle expanded the evaluation of model uncertainty, particularly within Goliad County. Local studies focused on improving estimates of recharge and re-evaluating the ability of the CGC GAM to reproduce observed water-level trends. These studies indicated that model recharge inputs may be higher than supported by field-based analyses and that simulated water levels in some areas remain stable or rise over time, while measured groundwater levels have declined at rates exceeding one foot per year over the past decade. A localized recalibration

of the CGC GAM further demonstrated the sensitivity of simulated results to parameter uncertainty and underscored the limitations of applying a regional-scale model to county-level assessments (Keester and others, 2021).

During the 3rd round of Joint Planning, GMA 15 explicitly considered predictive uncertainty in its evaluation of DFCs by examining multiple pumping and recharge scenarios and by reviewing the sensitivity of average drawdown results to baseline assumptions. After evaluating these scenarios, GMA 15 selected a baseline pumping configuration ("GMA15_2019_001_v1") to support the joint planning process. In addition, GMA 15 authorized the incorporation of Goliad County–specific technical justification addressing uncertainty and feasibility considerations into the DFC evaluation framework (Young, 2016; Keester and others, 2021).

Consistent with guidance from the TWDB, the CGC GAM is best viewed as a regional-scale planning tool that provides insight into broad groundwater system behavior rather than a definitive predictor of groundwater conditions at specific locations. While the CGC GAM represents the best available scientific tool for evaluating long-term regional impacts of pumping, the inherent assumptions, data limitations, and numerical resolution of the model necessitate careful interpretation of results and appropriate consideration of uncertainty when applying model outputs to DFC development and management decisions (Young, 2016; Keester and others, 2021).

During the current round of Joint Planning, GMA 15 developed three future pumping scenarios for the period from 2000 through 2080 to evaluate potential groundwater conditions under varying assumptions of water use. These scenarios, referred to as Baseline, Scenario 1, and Scenario 2, were designed to represent a range of plausible future pumping conditions across the GMA.

Under the Baseline scenario, groundwater pumping rates were adjusted for the period from 2015 through 2022 in several counties using updated estimates from the TWDB to reflect historical groundwater use and resulting flow conditions more accurately. In Matagorda and Wharton counties, pumping adjustments were applied over a longer period, from 2005 through 2024. In all cases, the spatial distribution of pumping was maintained, and only the relative proportions of total pumping were modified.

Scenarios 1 and 2 were developed to evaluate alternative future conditions, including anticipated increases in groundwater demand and the expanded use of brackish groundwater resources. Together, these scenarios provide a framework for assessing the sensitivity of projected groundwater conditions to changes in pumping magnitude and source, while maintaining consistency with the regional-scale structure of the GAM.

5.0 Consideration of Factors

Texas Water Code §36.108(d) requires GCDs within a GMA to consider a defined set of statutory factors prior to adopting DFCs. During the joint-planning process, GMA 15 considered each required factor through open meetings supported by presentations, and documented discussion. These considerations occurred over multiple planning meetings and reflect both regional-scale assessments and more recent, locally focused evaluations.

5.1 Aquifer Uses and Conditions

Aquifer uses and conditions within GMA 15 vary substantially by geography, aquifer depth, and dominant water-use sector. Groundwater production is greatest in the northeastern portion of the GMA, where irrigation dominates total use, while groundwater in the central and southwestern portions of the GMA supports a broader mix of municipal, industrial, domestic, livestock, and agricultural demands. Differences in aquifer productivity are also evident spatially, with increasing capacity to produce groundwater toward the northeast and downdip portions of the Gulf Coast Aquifer System.

Review of historical pumping data indicates that a majority of groundwater withdrawals occur in a limited number of counties, with irrigation accounting for the largest share of use.

5.2 Water Supply Needs and Water Management Strategies

GMA 15 spans portions of Regional Water Planning Areas K, L, N, and P. Accordingly, districts reviewed water-supply needs and water-management strategies included in the State Water Plan and regional plans applicable to those areas. Projected demands indicate that approximately half of future water needs within GMA 15 are expected to be met with groundwater from the Gulf Coast Aquifer System, with the largest projected needs concentrated in the northeastern counties—consistent with historical pumping patterns.

Based on these reviews, GMA 15 concluded that the adopted DFCs are unanticipated to constrain planned water-management strategies significantly during the planning horizon and are intended to balance groundwater availability with long-term resource protection.

5.3 Hydrological Conditions

Hydrological conditions considered during joint planning included TERS, recharge, inflows, outflows, and water-budget dynamics for the Gulf Coast Aquifer System. TERS estimates provided by the TWDB represent recoverable volumes based on porosity-adjusted storage assumptions but do not explicitly account for changes in water quality, subsidence, or surface-water interaction.

Water-budget analyses indicate that pumping is the dominant outflow from the aquifer system, with simulated inflows derived largely from captured streamflow and recharge. However, both planning cycles recognized that the Central Gulf Coast GAM is unsuitable for robust simulation of groundwater–surface water interaction. Consequently, GMA 15 relied on a combination of GAM results, recharge

studies, and independent hydrologic analyses when evaluating sustainability and long-term aquifer conditions.

5.4 Environmental Considerations

Environmental factors considered by GMA 15 focused primarily on potential impacts of groundwater pumping on spring flow and stream baseflow. Multiple studies indicate that groundwater generally discharges to streams in much of GMA 15, whereas the CGC GAM tends to simulate stream leakage into the aquifer under both pre-development and pumping conditions. This discrepancy has been attributed to model scale and grid resolution limitations.

While some reduction in groundwater contribution to surface water may occur as water levels decline, GMA 15 determined that the adopted DFCs are unlikely to result in measurable adverse environmental impacts during the planning horizon. This conclusion was reached by considering gain-loss studies, alternative modeling efforts, and regional hydrologic assessments in addition to GAM output.

5.5 Subsidence

Land subsidence associated with groundwater withdrawals has been documented historically within portions of GMA 15, particularly in areas with thick compressible clay sequences. Analyses of benchmark, topographic, and LiDAR data indicate that several counties have experienced multiple feet of subsidence since the mid-20th century (Young, 2016). More recent evaluations suggest that continued pumping may result in additional subsidence, although predicted future magnitudes under the adopted DFCs are generally less than one foot through the end of the planning horizon.

Given uncertainties in measurement and prediction, GMA 15 adopted no subsidence-specific DFCs during these planning cycles, but districts expressed interest in continued monitoring and refinement of subsidence assessment methods.

5.6 Socioeconomic Impacts

Socioeconomic impacts were evaluated primarily through analyses prepared by the TWDB in support of regional water planning. These analyses quantify potential economic and social impacts associated with unmet water demands but do not assess impacts attributable to DFC implementation at the GMA scale directly. Accordingly, GMA 15 supplemented these analyses with qualitative discussions among districts regarding potential local effects of water-level declines, pumping costs, and infrastructure needs.

Based on these considerations, GMA 15 concluded that the adopted DFCs are unexpected to result in adverse socioeconomic impacts during the planning horizon and are intended to support continued economic activity while protecting groundwater resources.

5.7 Private Property Rights

GMA 15 considered private property rights consistent with Texas Water Code §36.002, which recognizes groundwater ownership while allowing for reasonable regulation by GCDs. The districts concluded that the adopted DFCs, which are based on projected demands and regional-scale modeling, appear not to

unreasonably restrict a landowner's ability to access groundwater for beneficial use. Protection of property rights is expected to continue through district-specific management plans and rules tailored to local conditions.

5.8 Feasibility of DFCs

The feasibility of achieving the adopted DFCs was evaluated by examining whether the DFCs could be reasonably simulated using the TWDB-adopted CGC GAM, while acknowledging documented uncertainty in model structure, calibration, recharge, and pumping inputs. GMA 15 determined that feasibility should be assessed within defined tolerance limits rather than as an exact match between modeled and proposed DFCs (Young, 2016).

Based on this framework, GMA 15 adopted tolerance criteria under which DFCs are considered feasible if modeled average drawdowns differ from proposed values by no more than approximately 3.5 feet, with a larger tolerance applied in Goliad County due to locally documented discrepancies between simulated and observed water-level trends, recharge estimates, and groundwater–surface water interaction.

5.9 Other Considerations

Need to write about Brackish groundwater, limitations of current model and it ability to simulate brackish GW Modeling concerns with new model (define Brackish water and where it's at), (current legislation), (general high overview on brackish water).

6.0 References

Anaya, R. and Hardwick, D., 2020, Central Portion of the Gulf Coast Aquifer System Model Grid - As of 2023, 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.

Keester, M., Danielson, V., and Donnely, A, 2021, Desired Futrue Conditions Explanatory Report for Groundwater Management Area 15: Report prepared for Groundwater Management Area 15, 32 p.

Wade, S. and R. Anaya. 2014. Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 15, Texas Water Development Board Report, Prepared for GMA 15, January 15, 2014.

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.

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened at 118 S. Market Street Goliad, Texas 77963 at 9:30 AM on January 14, 2021.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Russell Labus
8	Fayette County Groundwater Conservation District	David Van Dresar
9	Goliad County Groundwater Conservation District	Art Dohmann
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offer to accept any public comments.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the draft minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Stewart moved to approve the meeting minutes as drafted. Mr. Van Dresar seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss explained that on January 12, 2021, the Treasurer's Report for the GMA 15 funds and LRE Water Invoice 390 submitted by Ms. Parma were forwarded to the GMA 15 Representatives and general managers of the Member District.

MOTION: Mr. Stewart moved to accept the Treasurer's Report for the GMA 15 funds and approve the payment of LRE Water Invoice 390 in the amount of $1,400.00. Mr. Labus seconded the motion. The motion passed.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

Mr. Andruss explained that on December 29, 2020, representatives of GMA 15 were sent a copy of the report prepared by LRE Water for Goliad County GCD regarding their project titled 'GAM Recalibration Focusing on Goliad County'.

No action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15 including GR16-025 MAG.

No Discussion.

No action was taken.

Agenda Item 7: Consideration of and possible action on matters related to joint planning including the review of management plans and accomplishments of Groundwater Management Area 15 member districts.

Topic 7.1 - Review of Management Plans and Accomplishments

Mr. Andruss explained that any annual reports for fiscal year 2020 forwarded to the GMA 15 Administrator at admin@vcgcd.org before March 26, 2021 will be reviewed and evaluated in a manner similar to reviews complete in previous years. The results of the review will be presented at the meeting of GMA 15 scheduled for April 2021.

No Action was taken.

Topic 7.2 - Consultants Work Schedule and Timeline for Adopting a DFC

Mr. Andruss explained that by May 1, 2021, GMAs "shall propose for adoption desired future conditions for the relevant aquifers within the management area."

Texas Water Code Sec 36.108(d) reads:
Not later than May 1, 2021, and every five years thereafter, the districts shall consider groundwater availability models and other data or information for the management area and shall propose for adoption desired future conditions for the relevant aquifers within the management area. Before voting on the proposed desired future conditions of the aquifers under Subsection (d-2), the districts shall consider:
(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 and assigns in groundwater as recognized under Section 36.002.
(8) the feasibility of achieving the desired future condition; and
(9) any other information relevant to the specific desired future conditions.

Texas Water Code Sec 36.108(d-3) established a deadline of January 5, 2022 for finally adopt the desired future conditions for the management area after consideration of the proposed desired future conditions at the district level.

No Action taken.

Topic 7.3 - Joint Planning and Related Work Products of the Technical Consultants

Mr. Andruss explained that on October 8, 2020, the representatives considered the socioeconomic impacts, the impacts on private property, and the feasibility of achieving desired future conditions within GMA 15.

On January 11, 2021, Mr. Keester submitted a revised, draft memorandum to the members of GMA 15 (redline version) regarding the feasibility of achieving desired future conditions within GMA 15.

The representatives discuss matters related to relevant aquifers for planning purposes in GMA 15, socio-economic impacts, property rights, and the feasibility of achieving desired future conditions within GMA 15.

MOTION: Mr. Labus moved to continue the designation of the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers as non-relevant for GMA 15 planning purposes. Mr. Van Dresar seconded the motion. The motion passed.

MOTION: Mr. Stewart moved to accept the memorandum from LRE Water regarding impacts on private property rights. Mr. Labus seconded the motion. The motion passed.

MOTION: Mr. Brasher moved to accept the memorandum from LRE Water regarding socio-economic impacts. Mr. Van Dresar seconded the motion. The motion passed.

MOTION: Mr. Van Dresar moved to accept the memorandum from LRE Water regarding the feasibility of achieving desired future conditions within GMA 15. Mr. Stewart seconded the motion. The motion passed.

Topic 7.4 - TWDB GAM Development for GMA 15

Mr. Andruss explained that on October 8, 2020, a subcommittee comprised of Mr. Andruss and Mr. Van Dresar was established to serve as a liaison to GMA 16 regarding the TWDB's conceptual GAM model for GMAs 15 and 16.

On December 3, 2020, a copy of a letter submitted to TWDB by Kenedy GCD and a presentation developed by Dr. Uddameri for VCGCD, CCGCD, RGCD and TGCD were forwarded to the general managers of the member districts of GMA 15 for review.

Given the similarity between the comments and concerns expressed by KGCD, VCGCD, CCGCD, RGCD and TGCD, a meeting of the subcommittee with representatives of GMA 16 was cancelled.

No action was taken.

Agenda Item 8: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

No Discussion.

No action was taken.

Agenda Item 9: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss the next meeting of the GMA 15 Committee is scheduled for April 8, 2021 location and time are to be determined.

No action was taken.

Agenda Item 10: Receive public comment.

No public comment provided.

Agenda Item 11: Adjournment

At approximately 10:30 AM, Mr. Van Dresar moved to adjourn the meeting. Mr. Brasher seconded the motion. The motion passed unanimously.

Groundwater Management Area 15
Meeting Minutes

The above and foregoing minutes were considered and approved on this the 8th day of April a.d. 2021

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

Groundwater Management Area 15

Sign-In Sheet

Date of Meeting: ___1-14-21_____

Name	Agenda Item Or Name
Tim Andruss	VCGCD
Kenneth Eller	
Art Donahoo	
Alex Kerstar	LRE Water
David A. Van Dresar	FCGCD
Cindy Parma	Pecan Valley
Lonnie Stewart	Bee GCD
[illegible]	CBGCD/CPGCD
Roy Rosier	Goliad P&Z
Amy Donnelly	DBS+A
Jim Bracher	CCGCD
Russell Lakes	Evergreen UWCD

Notice of Meeting

Groundwater Management Area 15

Corrected Notice

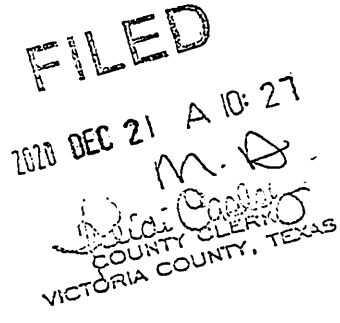
Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, January 14, 2021 at 118 S. Market Street Goliad, Texas 77963**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

7. Consideration of and possible action on matters related to joint planning including the review of consultant's work products to support joint planning and the development of Desired Future Conditions, management plans and accomplishments of Groundwater Management Area 15 member districts.
8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened in the Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas, at 9:30 AM on April 8, 2021.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Russell Labus
8	Fayette County Groundwater Conservation District	David Van Dresar
9	Goliad County Groundwater Conservation District	Heather Sumpter
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offer to accept any public comments.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Hudgins moved to approve the meeting minutes for January 14, 2021, as drafted. Mr. Van Dresar seconded the motion. The motion passed unanimously.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Ms. Parma provided details regarding the joint-planning funds and outstanding invoices.

MOTION: Mr. Van Dresar moved to accept the Treasurer's Report for the GMA 15 funds and approve the payment of LRE Water Invoice TX-411 in the amount of $8,580.00. Mr. Brasher seconded the motion. The motion passed unanimously.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

5.1 – Goliad County GCD Letter of Concern

Mr. Andruss explained that on March 15, 2021, Mr. Andruss, GMA 15 Chair and Administrator, received a letter from Goliad County GCD expressing concerns about the administration of GMA 15. On March 17, 2021, Mr. Andruss responded to the letter on behalf of GMA 15 and forwarded the response to the representatives of GMA 15 and others.

No action was taken.

5.2 - Goliad County GCD Acknowledgment of 2080 DFC Modeled Drawdown Results

Mr. Andruss explained that on March 24, 2021, Mr. Andruss, GMA 15 Chair and Administrator, received a letter from Goliad County GCD "acknowledge[ing] the 2080 DFC modeled drawdown results for each of the four individual components of the Gulf Coast Aquifer shown in Table 5 of the LRE Technical Memorandum dated March 3, 2021, titled "Summary of Modeling Results" as follows: ..." The letter was forwarded to the representatives of GMA 15 on March 24, 2021.

No Action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Andruss explained that on February 12, 2021, the GMA received notice from Texas Water Development Board that the updated groundwater availability model [GAM) for the central portion of the Sparta, Queen City, and Carrizo-Wilcox aquifers has been reviewed and accepted by the TWDB as the current GAM model.

No action was taken.

Agenda Item 7: Consideration of and possible action on matters related to joint planning including proposals for desired future conditions, the review of management plans and accomplishments of Groundwater Management Area 15 member districts.

Topic 7.1 - Timeline and Sequence for Adopting a DFC

Mr. Andruss explained that by May 1, 2021, GMAs "shall propose for adoption desired future conditions for the relevant aquifers within the management area."

Texas Water Code Sec 36.108(d) reads:
Not later than May 1, 2021, and every five years thereafter, the districts shall consider groundwater availability models and other data or information for the management area and shall propose for adoption desired future conditions for the relevant aquifers within the

management area. Before voting on the proposed desired future conditions of the aquifers under Subsection (d-2), the districts shall consider: (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 and assigns in groundwater as recognized under Section 36.002; (8) the feasibility of achieving the desired future condition; and (9) any other information relevant to the specific desired future conditions.

Texas Water Code Sec 36.108(d-2) reads:
The desired future conditions proposed under Subsection (d) must provide 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. This subsection does not prohibit the establishment of desired future conditions that provide for the reasonable long-term management of groundwater resources consistent with the management goals under Section 36.1071(a). The desired future conditions proposed under Subsection (d) must be approved by a two-thirds vote of all the district representatives for distribution to the districts in the management area. A period of not less than 90 days for public comments begins on the day the proposed desired future conditions are mailed to the districts. During the public comment period and after posting notice as required by Section 36.063, each district shall hold a public hearing on any proposed desired future conditions relevant to that district. During the public comment period, the district shall make available in its office a copy of the proposed desired future conditions and any supporting materials, such as the documentation of factors considered under Subsection (d) and groundwater availability model run results. After the close of the public comment period, the district shall compile for consideration at the next joint planning meeting a summary of relevant comments received, any suggested revisions to the proposed desired future conditions, and the basis for the revisions.

Texas Water Code Sec 36.108(d-3) establishes a deadline of January 5, 2022 (approximately 8 months from this meeting) for finally adopting the desired future conditions for the management area after consideration of the proposed desired future conditions at the district level.

No action was taken.

Topic 7.2 - Joint Planning and Related Work Products of the Technical Consultants

Mr. Andruss explained that on March 3, 2021, Mr. Keester submitted to the GMA 15 representatives the final revisions to the draft modeling summary and subsequently confirmed that no additional technical work was required before the representatives of GMA 15 propose desired future conditions for adoption.

MOTION: Mr. Van Dresar moved to accept and approve the technical memorandum from LRE Water regarding the Summary of Modeling Results dated March 3, 2021. Mr. Labus seconded the motion. The motion passed unanimously.

Topic 7.3 - Proposals of Desired Future Conditions for Relevant Aquifers of GMA 15 for Adoption

Mr. Andruss explained that the desired future conditions proposed under Texas Water Code Sec 36.108(d) must be approved by a two-thirds vote of all the district representatives for distribution to the districts in the management area. GMA 15 is comprised of 13 member districts. Therefore, approval of a proposal for desired future conditions for approval requires at least 9 affirmative votes.

The current desired future conditions were approved and adopted by resolution of all the representatives of GMA 15 present at the GMA 15 meeting held on April 29, 2016.

The current desired future condition of GMA 15 reads as follows:

Groundwater Management Area 15 adopts Desired Future Conditions (DFCs) as average drawdowns that occur between January 2000 and December 2069 for the following:
Gulf Coast Aquifer System - represents an average drawdown for the Chicot Aquifer, the Evangeline Aquifer, the Burkeville Confining Unit, and the Jasper Aquifer that is weighted by the area of each hydrogeological unit in the Central Gulf Coast Aquifer GAM (Chowdhury and others, 2004).

Chicot and Evangeline Aquifers - represents an average drawdown for the Chicot Aquifer and the Evangeline Aquifer that is weighted by the area of each hydrogeological unit in the Central Gulf Coast Aquifer GAM (Chowdhury and others, 2004).

Jasper Aquifer- represents an average drawdown for the area of the Jasper Aquifer in the Central Gulf Coast Aquifer GAM (Chowdhury and others, 2004).

Groundwater Management Area 15 adopts Desired Future Conditions for each county within the groundwater management area (county-specific DFCs) and adopts a Desired Future Condition for the counties in the groundwater management area (gma-specific DFC). The Desired Future Condition for the counties in the groundwater management area shall not exceed an average drawdown of 13 feet for the Gulf Coast Aquifer System at December 2069. Desired Future Conditions for each county within the groundwater management area (county-specific DFCs) shall not exceed the values specified in Table A-1 at December 2069

Table A-1. Desired Future Conditions for GMA 15 expressed as an Average Drawdown between January 2000 and December 2069.
Aransas County: 0 feet of drawdown of the Gulf Coast Aquifer System;
Bee County: 7 feet of drawdown of the Gulf Coast Aquifer System;
Calhoun County: 5 feet of drawdown of the Gulf Coast Aquifer System;
Colorado County: 17 feet of drawdown of the Chicot and Evangeline Aquifers and 23 feet of drawdown of the Jasper Aquifer;
Dewitt County: 17 feet of drawdown of the Gulf Coast Aquifer System;
Fayette County: 16 feet of drawdown of the Gulf Coast Aquifer System;

Goliad County: 10 feet of drawdown of the Gulf Coast Aquifer System;
Jackson County: 15 feet of drawdown of the Gulf Coast Aquifer System;
Karnes County: 22 feet of drawdown of the Gulf Coast Aquifer System;
Lavaca County: 18 feet of drawdown of the Gulf Coast Aquifer System;
Matagorda County: 11 feet of drawdown of the Chicot and Evangeline Aquifers;
Refugio County: 5 feet of drawdown of the Gulf Coast Aquifer System;
Victoria County: 5 feet of drawdown of the Gulf Coast Aquifer System;
Wharton County: 15 feet of drawdown of the Chicot and Evangeline Aquifers.

MOTION: Mr. Andruss moved to establish the following desired future conditions as the desired future conditions proposed for adoption for GMA 15:

1) The Desired Future Condition for the counties in the groundwater management area (gma-specific DFC) shall not exceed an average drawdown of 13 feet for the Gulf Coast Aquifer System at December 2080; and
2) The Desired Future Conditions for each county within the groundwater management area (county-specific DFCs) shall not exceed the values specified in Table A at December 2080:

Table A. Desired Future Conditions for Counties of GMA 15 expressed as an Average Drawdown between January 2000 and December 2080.

Aransas County	0 feet of drawdown of the Gulf Coast Aquifer System.
Bee County	7 feet of drawdown of the Gulf Coast Aquifer System.
Calhoun County	5 feet of drawdown of the Gulf Coast Aquifer System.
Colorado County	17 feet of drawdown of the Chicot and Evangeline Aquifers; and 25 feet of drawdown of the Jasper Aquifer.
DeWitt County	17 feet of drawdown of the Gulf Coast Aquifer System.
Fayette County	44 feet of drawdown of the Gulf Coast Aquifer System.
Goliad County	4 feet of recovery of the Chicot Aquifer; 2 feet of recovery of the Evangeline Aquifer; 7 feet of drawdown of the Burkeville Aquifer; and 14 feet of drawdown of the Jasper Aquifer.
Jackson County	15 feet of drawdown of the Gulf Coast Aquifer System.
Karnes County	22 feet of drawdown of the Gulf Coast Aquifer System.
Lavaca County	18 feet of drawdown of the Gulf Coast Aquifer System.
Matagorda County	11 feet of drawdown of the Chicot and Evangeline Aquifers.
Refugio County	5 feet of drawdown of the Gulf Coast Aquifer System.
Victoria County	5 feet of drawdown of the Gulf Coast Aquifer System.
Wharton County	15 feet of drawdown of the Chicot and Evangeline Aquifers.

Mr. Hudgins seconded the motion. The motion passed unanimously with the following record vote of representatives:

Bee Groundwater Conservation District	Lonnie Stewart
Calhoun County Groundwater Conservation District	Tim Andruss
Coastal Bend Groundwater Conservation District	Neil Hudgins
Coastal Plains Groundwater Conservation District	Neil Hudgins
Colorado County Groundwater Conservation District	Jim Brasher
Corpus Christi ASR Conservation District	
Evergreen Underground Water Conservation District	Russell Labus
Fayette County Groundwater Conservation District	David Van Dresar

Goliad County Groundwater Conservation District	Heather Sumpter
Pecan Valley Groundwater Conservation District	Cindy Parma
Refugio Groundwater Conservation District	Tim Andruss
Texana Groundwater Conservation District	Tim Andruss
Victoria County Groundwater Conservation District	Tim Andruss

Topic 7.4 - Review of Management Plans and Accomplishments

Mr. Andruss explained that based on the review of the annual reports of Calhoun County GCD, Pecan Valley GCD, Texana GCD, and Victoria County GCD for Fiscal Year 2020, the GMA has determined that the districts achieved the goals and objectives required per their respective management.

MOTION: Ms. Parma moved to acknowledge that those district that had developed an annual report for FY2020 stated the district had achieved the goals and objectives required per the respective management plans. Mr. Brasher seconded the motion. The motion passed unanimously.

Agenda Item 8: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

No action was taken.

Agenda Item 9: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained that the next meeting of GMA 15 is scheduled for July 8, 2021 with a meeting scheduled for October 14, 2021 as well.

No action was taken.

Agenda Item 10: Receive public comment.

No public comment provided.

Agenda Item 11: Adjournment

MOTION: At approximately 10:40 AM, Mr. Van Dresar moved to adjourn the meeting. Ms. Parma seconded the motion. The motion passed unanimously.

Groundwater Management Area 15
Meeting Minutes

The above and foregoing minutes were considered and approved on this the 14 day of October a.d. 2021.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

VCGCD - GRP - RP - GMA 15 - Meeting Sign-In Sheet

Meeting Date: 4/8/21

Printed Name	Organization and Contact Information
Cindy Parma	Pecan Valley GCD
DAVID VAN DRESSAR	FCGCD
[illegible]	GCGCD
[illegible]	LRE [illegible]
Heather Sumpter	[illegible]
Jim Brasher	CCGCD
Russell Labus	Evergreen UWCD
GRAYSON DONLEARN	TEXAS WATER DEVELOPMENT BOARD
[illegible]	CBGCD/CPGCD
Andy Donnelly	DBS+A
Ronnie Stewart	Bee GCD
Kenneth Files	VCGCD

Notice of Meeting

Groundwater Management Area 15

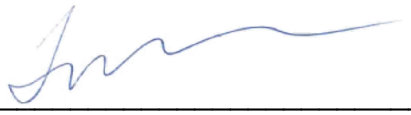
Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, April 8, 2021 at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including proposals for desired future conditions, the review of management plans and accomplishments of Groundwater Management Area 15 member districts.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened in the Auditorium at the Jackson County Services Building, 411 N. Wells St, Edna, Texas at 9:30 AM on October 14, 2021.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Russell Labus
8	Fayette County Groundwater Conservation District	
9	Goliad County Groundwater Conservation District	Heather Sumpter
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offer to accept any public comments. The representatives accepted public comment.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the draft minutes of the previous meeting were sent to the GMA 15 representatives prior to the meeting.

MOTION: Mr. Hudgins moved to approve the meeting minutes as drafted. Ms. Sumpter seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss explained that on October 4, 2021, the Treasurer's Report for the GMA 15 funds and LRE Water Invoice #487 were submitted by Ms. Parma to the GMA 15.

MOTION: Mr. Labus moved to accept the invoice and authorize the payment of the invoice in accordance with the GMA 15 cost-sharing agreement. Mr. Stewart seconded the motion. The motion passed.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

No action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Perez of the Texas Water Development Board provided an update on recent activities and developments at the Texas Water Development Board.

No action was taken.

Agenda Item 7: Consideration of and possible action on matters related to joint planning including: a. the review of management plans and accomplishments of member districts of Groundwater Management Area 15; b. the review of the summary reports of member districts of relevant comments received, any suggested revisions to the proposed desired future conditions, and GMA 15 the basis for the revisions related to the desired future condition proposed for adoption on April 8, 2021; c. any revisions to the desired future condition proposed for adoption on April 8, 2021 suggested by any member district; and d. the adoption of the desired future conditions for Groundwater Management Area 15.

Mr. Andruss explained that since the previous review of management plans of member districts was undertaken by representatives to GMA 15, the management plans of Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Corpus Christi ASR Conservation District, Evergreen Underground Water Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, and Texana Groundwater Conservation District have been revised. Based on a review of those revised management plans, it appears that: 1) the achievement of the goals established within each management plan will have a positive impact on planning,

2) the achievement of the performance measures within of each the management plans will have a positive effect on conserving and protecting groundwater and preventing waste, and 3) the implementation of each the management plans should achieve the desired future conditions established during the joint planning process to an adequate degree.

Mr. Andruss explained that as of October 7, 2021, summary reports had been submitted to GMA 15 for each member district except Corpus Christi ASR CD and Fayette County GCD. It appears the following member districts received relevant comments with suggested revisions to the proposed desired future conditions and the basis for the suggested revisions: Bee GCD, Evergreen UWCD, Goliad County GCD, Refugio GCD, and Texana GCD. The representatives of these member districts reviewed the summary reports of member districts of relevant comments received.

MOTION: Mr. Sumpter moved to revise the desired future condition proposed for adoption on April 8, 2021 by substituting "not to be exceeded between 2000 and 2080" for "expressed as an Average Drawdown between January 2000 and December 2080"; and substituting "Chicot Aquifer- 13 feet of drawdown, Evangeline Aquifer- 34 feet of drawdown, Burkeville Aquifer- 21 feet of drawdown, Jasper Aquifer- 21 feet of drawdown" for "4 feet of recovery of the Chicot Aquifer; 2 feet of recovery of the Evangeline Aquifer; 7 feet of drawdown of the Burkeville Aquifer; and 14 feet of drawdown of the Jasper Aquifer," in Table A. The motion failed for lack of a second.

↳ AS RECALIBRATED BY GCCD MODEL STAFF 7/14/2021.

Mr. Andruss explained that Texas Water Code Sec 36.108(d-3) establishes a deadline of January 5, 2022 for adopting the desired future conditions for the management area. A resolution, based on the resolution adopting the present desired future condition of GMA 15, has been drafted for consideration by the representatives.

Mr. Andruss explained that following the adoption of a desired future condition for Groundwater Management Area 15, the primary task to be completed by the GMA 15 representatives is the production of explanatory report for the adopted desired future condition, per 36.108(d-3). In order to 1) provide the technical consultants time to draft an explanatory report and 2) facilitate the timely completion of the DFC adoption process by the representatives, a special meeting of GMA 15 would be required before the regular meeting scheduled for January 13, 2021. December 9, 2021 is suggested as a potential date for the special GMA 15 meeting by Mr. Andruss.

Mr. Andruss explained that following the production of an explanatory report, the GMA 15 Administrator will send to TWDB and the member district the following, per 108(d-3) with a) proof that notice was posted for the joint planning meeting, b)

a copy of the resolution adopting the desired future condition, and c) a copy of the explanatory report.

Mr. Andruss read the draft resolution and recommended revisions to accurately record the vote on the adoption of the resolution.

MOTION: Mr. Brasher moved to adopt the desired future condition of GMA 15 as proposed on April 8, 2021 and Resolution #2021-01 with revisions to accurately record the vote on the adoption of the resolution. The motion was seconded by Mr. Stewart. The motion passed with 10 ayes and 1 nay with the following record vote:
Bee County Groundwater Conservation District: Aye
Calhoun County Groundwater Conservation District: Aye
Coastal Bend Groundwater Conservation District: Aye
Coastal Plains Groundwater Conservation District: Aye
Colorado County Groundwater Conservation District: Aye
Corpus Christi ASR Conservation District: Absent
Evergreen Underground Water Conservation District: Aye
Fayette County Groundwater Conservation District: Absent
Goliad County Groundwater Conservation District: Nay
Pecan Valley Groundwater Conservation District: Aye
Refugio Groundwater Conservation District: Aye
Texana Groundwater Conservation District: Aye
Victoria County Groundwater Conservation District: Aye

Agenda Item 8: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

No action was taken.

Agenda Item 9: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained that the next meeting of GMA 15 is scheduled for December 9, 2021 with the following items planned for consideration: the explanatory report, the boundary of GMA 15, and representatives of GMA 15 to regional water planning groups.

No action was taken.

Agenda Item 10: Receive public comment.

Mr. Andruss offer to accept any public comments. The representatives accepted and responded to public comment.

No action was taken.

Agenda Item 11: Adjournment

MOTION: At 11:16 AM, Mr. Stewart moved to adjourn the meeting. Mr. Brasher seconded the motion. The motion passed.

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the 12th day of NOVEMBER a.d. 2021.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

Tina Shearman –	NADA
Terrell Graham –	NADA
Carl Hummel	NADA
[illegible]	CBGCD/CPGCD
T. Andress	VCGCD
Carl Hummel	
Mike Keester	LRE Water
Russell Labus	Evergreen UWCD
Lonnie Stewart	Bee GCD
Cindy Parma	Pecan Valley GCD
Paul Kirk	DRSA
[illegible]	[illegible]
Jean Lorez	TWDB
Grayson Dowlearn	"

VCGCD - GRP - RP - GMA 15 - Public Comment Form

Date: October 14, 2021

Name: TINA SHEARMAN

Mailing Address: 9116 FM 743, Kenedy

Do you wish to comment on a specific agenda item? Yes | No

(Note: comments related to a specific agenda item may be held and accepted during the consideration of the agenda item.)

If yes, which agenda item: Public Comments

If you do not wish to provide oral comments, please submit written comments in the space below.

Please submit this form and any attachments to the GMA 15 Administrator before the meeting is convened.

FILED

2021 SEP 23 A 8:08

M.D.

COUNTY CLERK
VICTORIA COUNTY, TEXAS

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, October 14, 2021 in the Auditorium at the Jackson County Services Building, 411 N. Wells St. Edna, Texas**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including:
    a. the review of management plans and accomplishments of member districts of Groundwater Management Area 15;
    b. the review of the summary reports of member districts of relevant comments received, any suggested revisions to the proposed desired future conditions, and

the basis for the revisions related to the desired future condition proposed for adoption on April 8, 2021;

c. any revisions to the desired future condition proposed for adoption on April 8, 2021 suggested by any member district; and

d. the adoption of the desired future conditions for Groundwater Management Area 15.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.

Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened in the Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas, Classroom 108 at 9:30 AM on November 12, 2021.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Russell Labus
8	Fayette County Groundwater Conservation District	Wendy Pyle
9	Goliad County Groundwater Conservation District	Art Dohmann
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offer to accept any public comments.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

Mr. Dohmann requested a revision to the draft minutes for the meeting held on October 14, 2021, in the second full paragraph on page 3 to include the phrase "as requested by GCGCD memo dated 7/19/2021" in the motion recorded in the paragraph.

MOTION: Mr. Labus moved to approve the meeting minutes as revised. Mr. Stewart seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to joint planning including any revisions or amendments suggested by any member district to the desired future conditions adopted on October 14, 2021.

The representatives of GMA 15, representatives of TWDB, and members of the public discussed the desired future conditions adopted on October 14, 2021 and the issues identified by Goliad County GCD regarding the desired future conditions, recorded aquifer conditions within Goliad County, Gulf Coast Groundwater Availability Model, and the use of desired future conditions by Goliad County GCD.

MOTION: Mr. Andruss moved to:

1. affirm the desired future conditions adopted on October 14, 2021 for GMA 15;
2. incorporate the following request into the explanatory report for the desired future conditions adopted on October 14, 2021 for GMA 15:
    a. request that TWDB use the following evaluation factors and the model run submitted by GMA 15 in its explanatory report when evaluating the feasibility of the desired future conditions adopted on October 14, 2021 for GMA 15:
        i. Aransas County: +/-3 feet for the Gulf Coast Aquifer System.
        ii. Bee County: +/-3 feet for the Gulf Coast Aquifer System.
        iii. Calhoun County: +/-3 feet for the Gulf Coast Aquifer System.
        iv. Colorado County: +/-3 feet for the Chicot and Evangeline Aquifers; and +/-3 feet for drawdown of the Jasper Aquifer.
        v. DeWitt County: +/-3 feet for the Gulf Coast Aquifer System.
        vi. Fayette County: +/-3 feet for drawdown of the Gulf Coast Aquifer System.
        vii. Goliad County: +/-17 feet for the Chicot Aquifer; +/-36 feet for the Evangeline Aquifer; +/-14 feet for the Burkeville Aquifer; and +/-7 feet for the Jasper Aquifer, contingent upon Goliad County GCD submitting a memorandum justifying the increase beyond +/-5 feet for Gulf Coast Aquifer System.
        viii. Jackson County: +/-3 feet for the Gulf Coast Aquifer System.
        ix. Karnes County: +/-3 feet for the Gulf Coast Aquifer System.
        x. Lavaca County: +/-3 feet for the Gulf Coast Aquifer System.
        xi. Matagorda County: +/-3 feet for the Chicot and Evangeline Aquifers.
        xii. Refugio County: +/-3 feet for the Gulf Coast Aquifer System.
        xiii. Victoria County: +/-3 feet for the Gulf Coast Aquifer System.
        xiv. Wharton County: +/-3 feet for the Chicot and Evangeline Aquifers.

Mr. Dohnmann seconded the motion. The motion passed. Mr. Stewart was present but did not vote.

Agenda Item 5: Receive public comment.

No public comment provided.

Agenda Item 6: Adjournment

Groundwater Management Area 15
Meeting Minutes

MOTION: At approximately 10:49 AM, Mr. Stewart moved to adjourn the meeting. Mr. Hudgins seconded the motion. The motion passed.

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the 9th day of DECEMBER a.d. 2021.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

Notice of Meeting
Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Friday, November 12, 2021, at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to joint planning including any revisions or amendments suggested by any member district to the desired future conditions adopted on October 14, 2021.
5. Receive public comment.
6. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.

Tim Andruss, Administrator
Groundwater Management Area 15

FILED
2021 OCT 28 A 11:08
COUNTY CLERK
VICTORIA COUNTY, TEXAS

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened in the Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas, Classroom 108 at 9:30 AM on December 9, 2021.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Russell Labus
8	Fayette County Groundwater Conservation District	Wendy Pyle
9	Goliad County Groundwater Conservation District	Art Dohmann
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offer to accept any public comments.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Stewart moved to approve the meeting minutes as drafted. Mr. Hudgins seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss explained that an Ms. Parma of Pecan Valley GCD had submitted invoice for services provided to GMA 15 from LRE Water and a treasurer's report for November 30 2021.

MOTION: Mr. Stewart moved to accept and approve the GMA 15 treasurer's report the period ending November 30, 2021 and approve the payment of LRE Invoice TX-530 in the amount of $2,800.00. Mr. Labus seconded the motion. The motion passed.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

No action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Perez of the Texas Water Development Board provided an update on recent activities and developments at the Texas Water Development Board.

No action was taken.

Agenda Item 7: Consideration of and possible action on matters related to joint planning including the review of management plans and accomplishments of Groundwater Management Area 15 member districts; review and approval of explanatory report and submittal of DFC packet to TWDB.

Mr. Andruss explained that on November 12, 2021, the representatives passed a motion to incorporate within the explanatory report a request that TWDB use certain evaluation factors and the model run submitted by GMA 15 in its explanatory report when evaluating the feasibility of the desired future conditions adopted on October 14, 2021 for GMA 15. The representatives requested that GCGCD submit a memorandum documenting the justification for revised evaluation factors for Goliad County.

MOTION: Mr. Andruss moved to incorporate the memorandum related to evaluation factors from Goliad County GCD dated November 24, 2021 into the explanatory report for the desired future conditions adopted on October 14, 2021 for GMA 15 without expressing judgement regarding the validity or merit of the information provided by Goliad County GCD for such purpose. Mr. Stewart seconded the motion. The motion passed.

Mr. Andruss explained that on December 3, 2021, Mr. Keester notified the member districts by email that the draft explanatory report was available for review and comment. On December 12, 2021, Mr. Keester forwarded revisions suggested by GMA 15 representatives to the member districts. The representatives suggested revisions to the draft report.

MOTION: Mr. Andruss moved to 1) accept and approve the revisions to the draft explanatory report as proposed by member districts including the incorporation of the memorandum related to evaluation factors from Goliad County GCD dated November 24, 2021; and 2) authorize the GMA 15 administrator and GMA 15 technical consultant to complete all necessary administrative activities to submit the adopted DFCs for GMA 15, the related explanatory report, and any requested technical information to TWDB on or before January 5, 2022. Mr. Dohmann seconded the motion. The motion passed.

Agenda Item 8: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15 including review of the GMA 15 boundary and representatives to regional water planning groups.

Mr. Andruss explained that a map that was printed from the TWDB Groundwater Data Viewer application illustrates the apparent overlap of the boundaries of GMA 15 and the Corpus Christi ASR Conservation District. Furthermore, it appears that the inclusion of the Corpus Christi ASRCD in GMA 15 is based on what appears to be a minor and inconsequential overlap of the administrative boundary data used to represent Aransas County and the administrative boundary data used to represent the Corpus Christi ASR Conservation District. The inclusion of the Corpus Christi ASR Conservation District complicates the administration of GMA 15, increases the requirements of establishing a quorum, increases the requirement for passage of actions needing a 2/3 majority vote, and grants an interest in the joint planning activities of GMA 15 to a governmental entity apparently without an established responsibility regarding the management of the groundwater resources within the management area or constituency within the management area.

MOTION: Mr. Andruss moved to request that TWDB review the administrative boundaries of GMA 15 and the Corpus Christi ASR Conservation District and revise the membership of GMA 15 to exclude any member districts without any significant or consequential responsibility in the conservation, preservation, or protection of groundwater resources within the 14-county area of GMA 15 following the acceptance of the adopted DFCs of GMA 15. Mr. Hudgins seconded the motion. The motion passed.

Agenda Item 9: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained that the next regular meetings of GMA 15 is scheduled to occur on January 6, 2022 and April 7, 2022. Mr. Andruss informed the representatives that the GMA 15 committee would not meeting on January 6, 2022.

No action was taken.

Agenda Item 10: Receive public comment.

No public comment provided.

Agenda Item 11: Adjournment

MOTION: At approximately 10:02 AM, Mr. Stewart moved to adjourn the meeting. Mr. Labus seconded the motion. The motion passed.

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the 9th day of December, 2021

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

VCGCD - GRP - RP - GMA 15 - Meeting Sign-In Sheet

Meeting Date: December 9, 2021

Printed Name	Organization and Contact Information
ART DOHMANN	GCGCD
Heather Sumpter	LCCCD
Cindy Parma	Pecan Valley GCD
Mike Keester	LRE Water
Carl Hummel	
Jim Brasher	CCGCD
Lonnie Stevens	BGCD
	CBGCD/CPGCD
Russell Labus	Evergreen UWCD
Paul Cosby	DBSA
Jean Perez	TWDB

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, December 9, 2021, at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including the review of management plans and accomplishments of Groundwater

Management Area 15 member districts; review and approval of explanatory report and submittal of DFC packet to TWDB.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15 including review of the GMA 15 boundary and representatives to regional water planning groups.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened in the Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas, Classroom 108 at approximately 10:20 AM on December 9, 2021.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Russell Labus
8	Fayette County Groundwater Conservation District	Wendy Pyle
9	Goliad County Groundwater Conservation District	Art Dohmann
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at approximately 10:20 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offer to accept any public comments.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting, convened on December 9, 2021 at 9:30 AM, were presented to the GMA 15 representatives during this meeting.

MOTION: Mr. Brasher moved to approve the meeting minutes December 9, 2021, as drafted. Mr. Stewart seconded the motion. The motion passed.

Agenda Item 4: Receive public comment.

Mr. Graham provided public comment on behalf of Neighbors Against Damaging Aquifers (NADA).

No action was taken.

Agenda Item 5: Adjournment

MOTION: At approximately 10:25 AM, Mr. Stewart moved to adjourn the meeting. Ms. Pyle seconded the motion. The motion passed.

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the 14 day of APRIL, 2022.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **immediately following the adjournment of the meeting scheduled to convene at 9:30 AM on Thursday, December 9, 2021, at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Receive public comment.
5. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened in the County Services Building, 411 N. Wells, Edna Texas, at 9:30 AM on April 14, 2022.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Russell Labus
8	Fayette County Groundwater Conservation District	Wendy Pyle
9	Goliad County Groundwater Conservation District	Heather Sumpter
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offer to accept any public comments.

Jordan Furnans with LRE Water addressed the representatives.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the draft minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Hudgins moved to approve the meeting minutes as drafted. Mr. Labus seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Ms. Parma presented a Treasurer's report for period ending March 31, 2022.

MOTION: Mr. Hudgins moved to 1) accept and approve the GMA 15 treasurer's report for the period ending March 31, 2022, 2) authorize payment of invoice LRE TX-547 in the amount of $20,238.00, and 3) authorize PVGCD to refund any remaining balance to the contributing districts on a pro-rata basis if TWDB designates the DFC submittal as administratively complete without requesting additional information requiring additional consultation from GMA 15 technical consultants. Ms. Sumpter seconded the motion. The motion passed.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

No action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15 including a report regarding the status of the project to update the Gulf Coast Aquifer GAM.

Mr. Perez of the Texas Water Development Board provided an update on recent activities and developments at the Texas Water Development Board.

No action was taken.

Agenda Item 7: Consideration of and possible action on matters related to joint planning including the review of management plans and accomplishments of Groundwater Management Area 15 member districts.

Topic 7.1 – Review of the management plans of the member districts of Groundwater Management Area 15

Mr. Andruss explained on March 25, 2022, the Calhoun County Groundwater Conservation District submitted a draft management plan (i.e., CCGCD - Management Plan - CY2022 - Draft) to TWDB for review. The plan was revised to incorporate the recently-adopted DFC without updated MAG values as well as revised performance standards for each management plan objective. Based on a

review of the draft Management Plan of Calhoun County Groundwater Conservation District, the GMA has determined that the plan 1) would likely have a positive impact on planning, 2) would likely have a positive impact on conserving and protecting groundwater and preventing waste of groundwater, and 3) would likely achieve the Desired Future Conditions to an adequate degree.

No action was taken.

Topic 7.2 - Review of the accomplishments of the member districts of Groundwater Management Area 15

- Calhoun County Groundwater Conservation District:
  Based on the review of the annual report of Calhoun County Groundwater Conservation District for Fiscal Year 2021, the GMA has determined that the District achieved the goals and objectives required per the Management Plan of the District.

- Pecan Valley Groundwater Conservation District:
  Based on the review of the annual report of Pecan Valley Groundwater Conservation District for Fiscal Year 2021, the GMA has determined that the District achieved the goals and objectives required per the Management Plan of the District.

- Refugio Groundwater Conservation District:
  Based on the review of the annual report of Refugio Groundwater Conservation District for Fiscal Year 2021, the GMA has determined that the District achieved the goals and objectives required per the Management Plan of the District.

- Texana Groundwater Conservation District:
  Based on the review of the annual report of Texana Groundwater Conservation District for Fiscal Year 2021, the GMA has determined that the District achieved the goals and objectives required per the Management Plan of the District.

- Victoria County Groundwater Conservation District:
  Based on the review of the annual report of Victoria County Groundwater Conservation District for Fiscal Year 2021, the GMA has determined that the District achieved the goals and objectives required per the Management Plan of the District.

No action was taken.

Agenda Item 8: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

No action was taken.

Agenda Item 9: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained that the next meeting of GMA 15 is scheduled for July 14, 2022.

No action was taken.

Agenda Item 10: Receive public comment.

No public comment provided.

Agenda Item 11: Adjournment

MOTION: At approximately 10:24 AM, Mr. Andruss moved to adjourn the meeting. Ms. Parma seconded the motion. The motion passed.

Groundwater Management Area 15
Meeting Minutes

The above and foregoing minutes were considered and approved on this the 14 day of July a.d. 2022.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, April 14, 2022, at the County Services Building, 411 N. Wells St. Edna, Texas**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15 including a report regarding the status of the project to update the Gulf Coast Aquifer GAM.

7. Consideration of and possible action on matters related to joint planning including the review of management plans and accomplishments of Groundwater Management Area 15 member districts.
8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.

Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened in the Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas, Classroom 108 at 9:30 AM on July 14, 2022.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	
4	Coastal Plains Groundwater Conservation District	
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Landon Yosko
8	Fayette County Groundwater Conservation District	
9	Goliad County Groundwater Conservation District	Terrell Graham
10	Pecan Valley Groundwater Conservation District	
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offer to accept any public comments.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Stewart moved to approve the meeting minutes as drafted. Mr. Brasher seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Ms. Parma provided a financial report on July 1 related to bank accounts used to hold the funds contributed by member districts of GMA 15.

No Action was taken.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

MOTION: Mr. Graham moved to have GMA15 request that TWDB afford the representatives and member district more time, at least until October 30, 2022, to provide comments regarding the proposed GAM. Mr. Yosko seconded the motion. The motion passed.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

No action was taken.

Agenda Item 7: Consideration of and possible action on matters related to joint planning including the review of management plans and accomplishments of Groundwater Management Area 15 member districts including methods employed by member districts to assess achievement of desired future conditions.

No action was taken.

Agenda Item 8: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

MOTION: Ms. Parma moved to select and appoint Mr. Terrell Graham as the GMA15 representative to Region L RPWG. Mr. Brasher seconded the motion. The motion passed.

Agenda Item 9: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained that the next meeting of GMA 15 is scheduled for October 13, 2022.

No action was taken.

Agenda Item 10: Receive public comment.

No public comment provided.

Agenda Item 11: Adjournment

MOTION: Mr. Brasher moved to adjourn the meeting. Mr. Yosko seconded the motion. The motion passed.

Groundwater Management Area 15
Meeting Minutes

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the 13 day of October, a.d. 2022.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

VCGCD - GRP - RP - GMA 15 - Meeting Sign-In Sheet

Meeting Date: July 14, 2022

Printed Name	Organization and Contact Information
ART DOHMANN	GCGCD
Cindy Parma	PVGCD
Heather Sumpter	GCAGCD
Lonnie Sloan	BGCD
Jean Perez	TWDB
Paul Kirby	DBSA

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, July 14, 2022 at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901**. The meeting will be open to the public.

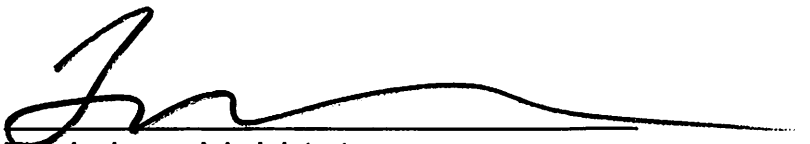
Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including the review of management plans and accomplishments of Groundwater

Management Area 15 member districts including methods employed by member districts to assess achievement of desired future conditions.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15 including the election of officers and administrator.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened in the Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas, Classroom 108 at 9:30 AM on October 13, 2022.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	J. Brewer
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Russell Labus
8	Fayette County Groundwater Conservation District	David Van Dresar
9	Goliad County Groundwater Conservation District	Terrel Graham
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offered to accept public comment.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Stewart moved to approve the meeting minutes as drafted. Mr. Hudgins seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

No action was taken.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

No action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Perez of the Texas Water Development Board provided an update on recent activities and developments at the Texas Water Development Board.

No action was taken.

Agenda Item 7: Consideration of and possible action on matters related to joint planning including the Groundwater Availability Model (GAM) and the Central and Southern Portions of the Gulf Coast Aquifer System in Texas.

Topic 1: Modeled available groundwater report prepared by the TWDB using the desired future conditions adopted by district representatives in Groundwater Management Area 15.

Mr. Andruss explained that on September 20, 2022, the representatives of GMA 15 received the report titled GAM RUN 21-020 MAG: MODELED AVAILABLE GROUNDWATER FORTHE GULF COAST AQUIFER SYSTEM INGROUNDWATER MANAGEMENT AREA 15 from Mr. Jean Perez by email on behalf of the TWDB Executive Administrator.

No action was taken.

Topic 2: Proposed Groundwater Availability Model (GAM) for the Central and Southern Portions of Gulf Coast Aquifer System in Texas.

Mr. Andruss explained that on August 23, 2022, Mr. Graham of Goliad County GCD provided a copy of comments being submitted to TWDB regarding the proposed GAM; on August 31, 2022, Mr. Andruss submitted comments developed by Dr. Uddameri on behalf of CCGCD, RGCD, TGCD,

and VCGCD to TWDB regarding the proposed GAM; on August 31, 2022, Mr. Andruss on behalf of GMA 15 requested TWDB postpone the adoption of the new GAM to afford the member district the opportunity to 1) consider feedback from their technical consultants, and 2) compare the DFC modeling results from the CGC-GAM and new GAM. An invitation to attend the GMA 15 meeting scheduled for October 13, 2022, was extended to Mr. Hardwick and his team to participate in the discussion regarding the proposed model. Copies of the comments submitted were provided to the members prior to the meeting.

The members of GMA 15 and representatives of TWDB discussed at length the new groundwater availability model for central and southern portions of the Gulf Coast Aquifer and its impact on the joint planning of the groundwater management area.

MOTION: Mr. Andruss moved to request that TWDB complete the work to develop the predictive component of the new GAM. Mr. Hudgins seconded the motion. The motion passed.

Topic 3: Administrative adjustment of the boundaries of GMA 15.

Mr. Andruss explained that on July 12, 2022, Mr. Perez of TWDB informed the management area that a new request to amend the boundaries of 15 would need to be submitted that contained "(1) a resolution supporting the change signed by each of the district representatives in each affected groundwater management area; (2) a demonstration that the geographic and hydrogeologic conditions require the proposed boundary change or an explanation that the change involves only an administrative correction; and (3) a copy of the notice and minutes of the public meeting held by the districts in each affected groundwater management area at which the districts approved the resolution in paragraph (1) of this subsection.

Mr. Andruss requested that Mr. Van Dresar to attempt to coordinate with representatives of Corpus Christi Aquifer Storage and Recovery Conservation District for the purposes of encouraging participation in the joint planning efforts of Groundwater Management Area 15.

No action was taken.

Agenda Item 8: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

No action was taken.

Groundwater Management Area 15
Meeting Minutes

Agenda Item 9: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained that the next regular meeting of GMA 15 is scheduled to occur on January 12, 2023.

No action was taken.

Agenda Item 10: Receive public comment.

No public comment provided.

Agenda Item 11: Adjournment

MOTION: At approximately 10:30 AM, Mr. Van Dresar moved to adjourn the meeting. Mr. Stewart seconded the motion. The motion passed.

The above and foregoing minutes were considered and approved on this the 13th day of APRIL a.d. 2023.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

VCGCD - GRP - RP - GMA 15 - Meeting Sign-In Sheet

Meeting Date: 10/13/22

Printed Name	Organization and Contact Information
Cindy Ruma	Pecan Valley GCD
Leslie Castleberry	Arnesas County
Neal Hudgins	CBGCD / CPGCD
David VanDresar	Fayette County GCD
Annalysa Camacho	Guliad County GCD
Daryn Hardwick	TWDB
Russell Labus	Evergreen UWCD
Landon Yoska	Evergreen UWCD
Jesse Perez	TWDB
Paul Kirby	JBSA
James Dodson	FCF
Lonnie Stewart	BCE
Mark Sugarek	Bec
TERRELL GRAHAM	GOIAD
Venki Uddameri	LAMAR UNIVERSITY.
Jim Brashear	CCGCD

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, October 13, 2022 at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including the Groundwater Availability Model (GAM) for the Central and Southern Portions of Gulf Coast Aquifer System in Texas.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



_____

Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened in the Jackson County Services Building, 411 N. Wells, Edna, Texas 77957.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	Esteban Ramos
7	Evergreen Underground Water Conservation District	Landon Yosko
8	Fayette County Groundwater Conservation District	David Van Dresar
9	Goliad County Groundwater Conservation District	Terrel Graham
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offered to accept public comment.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Van Dresar moved to approve the meeting minutes as drafted. Mr. Hudgins seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

No action was taken.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

No action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Perez of the Texas Water Development Board provided an update on recent activities and developments at the Texas Water Development Board.

No action was taken.

Agenda Item 7: Consideration of and possible action on matters related to joint planning including the Groundwater Availability Model (GAM) and the Central and Southern Portions of the Gulf Coast Aquifer System in Texas.

Topic 1: New Model for Gulf Coast Aquifer

Mr. Andruss explained that on March 30, 2023, Natalie Ballew, TWDB Groundwater Directors, provided an update to GMA 15 and GMA 16 regarding the adoption timeline for the new model for the Gulf Coast Aquifer, which covers GMA 15. By the end of April 2023, the final numerical report is anticipated to be released. By the end of November 2023, the report comparing the MAG pumping scenario modeled using the to-be-developed predictive model to the MAG run using the current model is expected to be complete.

On April 5, 2023, Mr. Graham of Goliad County GCD began submitting messages to TWDB and GMA 15 regarding potential issues regarding the water balance of the new model.

No action was taken.

Topic 2: Management Plans

Mr. Andruss explained that Chapter 36 of the Texas Water Code identifies reasons an interested party may file a petition for an inquiring regarding district duties including " (5) a district fails to update its management plan before the second anniversary of the adoption of desired future conditions by the management area;". The desired future conditions for GMA 15 were adopted in December 2021. Representatives of GMA 15 are encouraged to coordinate with Stephen Allen of TWDB regarding management plan amendments and adoptions.

No action was taken.

Topic 3: GCD Achievements

Mr. Andruss explained that the representatives of GMA 15 last considered the achievements of member districts on April 14, 2022. As of April 11, 2023, annual reports for fiscal year 2022 from Victoria County GCD, Goliad County GCD, and Pecan Valley GCD had been received by GMA 15 and reviewed. Based on the review of each plan, it appears that each district has achieved the goals and objectives established by their respective management plans.

Mr. Van Dresar moved to accept and approve the review of the GCD achievements as presented. Mr. Ramos seconded the motion. The motion passed unanimously.

Agenda Item 8: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

Mr. Andruss explained the following bills of the 88th regular session of the Texas Legislature address desired future conditions. Based on a review of the proposed legislation, it does not appear that the DFC adoption process is likely to be substantially revised.

- HB 3278 (LINK) - 04/11/2023 H Committee report distributed: Apr 11 2023 8:03AM (public access to DFC materials)
- HB 4532 (LINK) - 04/04/2023 H Reported favorably w/o amendment(s) (defines modeled sustained groundwater pumping)
- HB 4623 (LINK) - 03/22/2023 H Referred to Natural Resources: Mar 22 2023 11:54AM
- HB 4891 (LINK) - 03/28/2023 H Left pending in committee
- SB 156 (LINK) - 04/10/2023 H Referred to Natural Resources: Apr 10 2023 3:28PM (inclusion of DFC and MAG in MPs)
- SB 2397 (LINK) - 03/23/2023 S Referred to Water, Agriculture, & Rural Affairs
- SB 2540 (LINK) - 03/23/2023 S Referred to Water, Agriculture, & Rural Affairs

Presently, the districts of GMA 15 are required to propose for adoption desired future conditions for the relevant aquifers within the management area by May 1, 2026 (TWC 36.108(d)). The district are required "finally adopt" subsequent desired future conditions and associated explanatory report before January 5, 2027 (TWC 36.108(d-3)). Given TWDB's anticipated completion of the new GAM for GMA 15 by December 2023, it appears the districts will have 36 months to complete the DFC adoption process.

To facilitate the timely completion of the DFC adoption process, draft revisions to the bylaws and cost sharing agreement adopted for the 3rd Joint Planning Cycle have been prepared for consideration by the representatives.

Mr. Hudgins moved to:

1) re-adopt the GMA 15 - Administrative Procedures - Rev 20180109;
2) approve the distribution of the By-Laws of the GMA-15 Committee - Rev 20230413, GMA15 - Interlocal Agreement for Cost-Sharing - Rev 20230413a, as drafted, for consideration and adoption by the member districts by October 12, 2023; and
3) request that the Victoria County GCD serve as the GMA 15 Administrator for the purposes of:
    a) holding the GMA 15 Joint Planning Funds,
    b) soliciting proposals from qualified entities to provide technical services to GMA 15 to support the development and adoption of desired future conditions and associated explanatory report for the 4th Joint Planning Cycle, and
    c) negotiating terms of an agreement for consulting services from the preferred respondent(s) identified by the GMA-15 Committee Members.

Ms. Parma seconded the motion. The motion passed unanimously.

Agenda Item 9: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained that the next regular meeting of GMA 15 is scheduled to occur on July 13, 2023.

No action was taken.

Agenda Item 10: Receive public comment.

No public comment provided.

Agenda Item 11: Adjournment

MOTION: At approximately 10:43 AM, Mr. Van Dresar moved to adjourn the meeting. Ms. Parma seconded the motion. The motion passed unanimously.

The above and foregoing minutes were considered and approved on this the 13th day of July a.d. 2023.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

FILED
2023 MAR 22 P 1:31
M. D.
COUNTY CLERK
VICTORIA COUNTY, TEXAS

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, April 13, 2023, at the Jackson County Services Building, 411 N. Wells, Edna, Texas 77957.** The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including the review of management plans and accomplishments of Groundwater Management Area 15 member districts.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.

Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting was convened on July 13, 2023, at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	
4	Coastal Plains Groundwater Conservation District	
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	Esteban Ramos
7	Evergreen Underground Water Conservation District	Russel Labus
8	Fayette County Groundwater Conservation District	David Van Dresar
9	Goliad County Groundwater Conservation District	Terrel Graham
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

Attached to these minutes is a copy of the meeting sign-in sheet.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offered to accept public comment.

No action was taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Van Dresar moved to approve the meeting minutes as drafted. Ms. Parma seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

No action was taken.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

Topic 1 - 88th Regular Legislative Session of Texas

Mr. Andruss explained House Bill 3278 was passed during the legislative session and was not vetoed, becoming law. The bill significantly revises 36.108 of Chapter 36 of the Texas Water Code. The revisions impact the process through which proposed DFCs are considered by member districts of a GMA and the representatives of the member districts at the GMA.

Topic 2 - GMA 15 Webpage hosted by VCGCD

Mr. Andruss explained the VCGCD recently migrated its website to the webhosting service provided by Streamline. The VCGCD migrated the content hosted on its website related to GMA 15 to the new service.

With the new website, members of the public can manage their subscription to email lists maintained by the District by clicking on the "Join our mailing list" tab located at the bottom right corner of each page of our website. The email lists for GMA 15 that were manually maintained by the District have been imported into this new system. Subscribers can manage the lists to which they are subscribed or unsubscribe from a list from the link provided in the email messages delivered from this system. The VCGCD will develop and use the following internal email lists during the 4th cycle of joint planning for GMA 15:

- List 1: representatives of member districts of GMA 15 (e.g., email address for the presiding officer of a member district)
- List 2: administrative contacts of member districts of GMA 15 (e.g., the email address of the general manager of a member district or administrative staff member of a member district)

Topic 3 - TAGD Roundtable of GMA Chairs

Mr. Andruss explained on June 20, 2023, Tim Andruss participated in one of two roundtable discussion of GMA coordinators. The meeting was hosted by TAGD with participants from several GMAs and TWDB staff. The discussions focused

on the DFC adoption process and outcomes associated with the 3rd joint planning cycle. The intention of this effort is to gather feedback from GMAs regarding improving the DFC development process. TWDB expressed frustration with a lack of notification of and the limited ability to track the adoption of DFCs by member districts as required under 36.108(d-4). Additional roundtable discussions regarding joint planning and DFC adoption are anticipated.

No Action Taken

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Perez of the Texas Water Development Board provided an update on recent activities and developments at the Texas Water Development Board.

No action was taken.

Agenda Item 7: Consideration of and possible action on representatives of Groundwater Management Area 15 to the Regional Water Planning Groups.

Mr. Andruss explained the representatives last considered region water planning group representatives on July 14, 2022, and appointed Mr. Graham as the representative to the South Central Regional Water Planning Group (Region L).

The TWDB website identifies the following individuals as the Regional Water Planning Group Representatives from GMA 15: Region K: Jim Brasher; Region L: Art Dohmann; Region P: Neil Hudgins; and Region N: Mark Sugarek.

On June 29, 2023, TWDB was notified of the discrepancy associated with the the GMA's representative to Region L.

No Action Taken

Agenda Item 8: Consideration of and possible action on matters related to joint planning including the draft request for proposals for technical services for Groundwater Management, Area 15, the review of management plans, and accomplishments of Groundwater Management Area 15 member districts.

Mr. Andruss explained on April 21, 2023, the Board of Directors of the Victoria County Groundwater Conservation District (VCGCD) agreed to serve as the GMA 15 Administrator for the purposes of a) holding the GMA 15 Joint Planning Funds, b) soliciting proposals from qualified entities to provide technical services to GMA 15 to support the development and adoption of desired future conditions and associated explanatory report for the 4th Joint Planning Cycle, and c) negotiating terms of an agreement for consulting services from the preferred

respondent(s) identified by the members of the GMA-15 Committee.
A draft RFP for the purposes of soliciting qualifications and proposals to soliciting proposals from qualified entities to provide technical services to GMA 15 to support the development and adoption of desired future conditions and associated explanatory report for the 4th Joint Planning Cycle has been developed. The draft RFP was submitted to the member districts of GMA 15 prior to this meeting for review. The draft RFP is based on RFPs used in the past to obtain proposals during previous joint planning cycles. The RFP specifies the District will be soliciting proposals for (and potentially entering into agreements for) those member districts of GMA 15 that contribute funding to the joint planning effort through the cost sharing agreement developed and accepted by the representatives of GMA 15.

The final version of the RFP will be published by VCGCD after considering feedback from the representatives of GMA 15 at this meeting, if any, and the legal counsel of the Victoria County Groundwater Conservation District.

No Action Taken

Agenda Item 9: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15 including administrative procedures of the GMA-15 Joint Planning Committee, By-Laws of GMA 15 Committee, Interlocal Agreement for Cost-Sharing By Member District of the GMA 15 Committee.

Mr. Andruss explained the representatives of GMA 15 approved the distribution of the By-Laws of the GMA-15 Committee - Rev 20230413, GMA15 - Interlocal Agreement for Cost-Sharing - Rev 20230413a, as drafted, for consideration and adoption by the member districts by October 12, 2023.

The adopted version of the by-laws and interlocal agreement for cost-sharing were forwarded to the member districts of GMA 15 prior to the meeting.

No Action Taken

Agenda Item 10: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained the next meeting of GMA 15 is scheduled for October 12, 2023, at 9:30 AM. The location of the meeting was to be determined at a future date.

Agenda Item 11: Receive public comment.

No Public Comment.

Groundwater Management Area 15
Meeting Minutes

Agenda Item 12: Adjournment

MOTION: At approximately 10:16 AM, Mr. Graham moved to adjourn the meeting. Mr. Van Dresar seconded the motion. The motion passed unanimously.

The above and foregoing minutes were considered and approved on this the 12th day of October a.d. 2023.

Groundwater Management Area 15 Representative

ATTEST:

James E Brashear

Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, July 13, 2023, at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on representatives of Groundwater Management Area 15 to the Regional Water Planning Groups.

8. Consideration of and possible action on matters related to joint planning including the draft request for proposals for technical services for Groundwater Management Area 15, the review of management plans, and accomplishments of Groundwater Management Area 15 member districts.
9. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15 including administrative procedures of the GMA-15 Joint Planning Committee, By-Laws of GMA 15 Committee, Interlocal Agreement for Cost-Sharing By Member District of the GMA 15 Committee.
10. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
11. Receive public comment.
12. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened on October 12, 2023 at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Aarin Teague
8	Fayette County Groundwater Conservation District	David Van Dresar
9	Goliad County Groundwater Conservation District	
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offered to accept public comment.

No action taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Stewart moved to approve the meeting minutes as drafted. Mr. Hudgins seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss explained the Victoria County GCD will open an account with Prosperity Bank in October 2023 for the purpose of depositing the joint planning funds of the GMA 15 Committee.

No Action was taken.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

Mr. Andruss explained the Victoria County GCD received a copy of the resolution regarding the adoption of the 2021 GMA 15 DFC from Pecan Valley GCD on July 13, 2023.

No Action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Andruss explained the following:

On July 14, 2023, Mr. Perez with TWDB responded to the inquiries of the members regarding the new Gulf Coast GAM. The message was forwarded to the general managers of the member districts.

On July 24, 2023, a message received from Mr. Dohmann of Goliad County GCD was forwarded to Mr. Perez of TWDB requesting additional information associated with the new GAM.

Mr. Perez provided comments regarding current activities underway at the Texas Water Development Board regarding groundwater resources and explained that the GAM comparison report was expected to be completed by the end of calendar year 2023.

No action taken.

Agenda Item 7: Consideration of and possible action on representatives of Groundwater Management Area 15 to the Regional Water Planning Groups.

No Action Taken

Agenda Item 8: Consideration of and possible action on matters related to joint planning including the draft request for proposals for technical services for Groundwater Management, Area 15, the review of management plans, and accomplishments of Groundwater Management Area 15 member districts.

Groundwater Management Area 15
Meeting Minutes

Topic 1 - Proposals for Technical Services

Mr. Andruss explained the following:

> On August 1, 2023, the Victoria County GCD posted on its website the RFQ/RFP for Technical Services for GMA 15 soliciting detailed proposals from qualified parties (respondents) regarding their recommended approach to and qualifications for supporting the GMA-15 Committee (Committee) in its efforts to conduct all necessary and appropriate activities to develop and adopt desired future conditions (DFCs) for the relevant aquifers within Groundwater Management Area 15 (GMA 15) during the 4th Joint Planning Cycle.
>
> On September 14, 2023, the District received the following submittal to the RFP/RFQ for Technical Services for GMA 15 from Intera, Inc.
>
> The deadline for submitting a response to the solicitation was September 15, 2023, at 3:00 PM.
>
> The submittal from Intera, Inc. is considered responsive and was the only submittal received by the district.

Mr. Young gave a presentation regarding the proposal and responded to comments and questions from the representatives.

Motion: Mr. Hudgins moved to identify Intera, Inc as the preferred respondent of the GMA 15 Committee for the RFQ/RFP for Technical Services for GMA 15. Mr. Brasher seconded the motion. The motion passed unanimously.

Topic 2 – Management Plans of the Member Districts

Mr. Andruss explained the following:

> On July 14, 2023, the Texas Water Development Board designated the management plan adopted by Victoria County GCD on April 21, 2023, as administratively complete.
>
> On July 17, 2023, the Texas Water Development Board designated the management plan adopted by Calhoun County GCD on April 24, 2023, as administratively complete.
>
> On July 17, 2023, the Texas Water Development Board designated the management plan adopted by Refugio GCD on April 17, 2023, as administratively complete.

On July 17, 2023, the Texas Water Development Board designated the management plan adopted by Texana GCD on April 20, 2023, as administratively complete.

On August 28, 2023, Goliad County GCD notified GMA 15 of its management plan adopted on August 7, 2023.

Based on a review of the management plans of the Calhoun County GCD, the Goliad County GCD, the Refugio GCD, the Texana GCD, and the Victoria County GCD, the GMA Administrator has determined that the plans 1) would likely have a positive impact on planning, 2) would likely have a positive impact on conserving and protecting groundwater and preventing waste of groundwater, and 3) would likely achieve the Desired Future Conditions to an adequate degree.

Motion: Mr. Van Dresar moved to ratify the determination of GMA 15 Administrator that the management plans of the Calhoun County GCD, the Goliad County GCD, the Refugio GCD, the Texana GCD, and the Victoria County GCD 1) would likely have a positive impact on planning, 2) would likely have a positive impact on conserving and protecting groundwater and preventing waste of groundwater, and 3) would likely achieve the Desired Future Conditions to an adequate degree. Mr. Stewart seconded the motion. The motion passed unanimously.

Agenda Item 9: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15 including administrative procedures of the GMA-15 Joint Planning Committee, By-Laws of GMA 15 Committee, Interlocal Agreement for Cost-Sharing By Member District of the GMA 15 Committee.

Mr. Andruss explained the following:

The representatives of GMA 15 approved the distribution of the By-Laws of the GMA-15 Committee - Rev 20230413, GMA15 - Interlocal Agreement for Cost-Sharing - Rev 20230413a, as drafted, for consideration and adoption by the member districts by October 12, 2023.

The adopted version of the by-laws and interlocal agreement for cost-sharing were forwarded to the member districts of GMA 15 prior to the meeting.

As of September 18, 2023, Victoria County GCD had received executed copies of the resolutions for the GMA 15 By-Laws and GMA 15 Cost Sharing Agreement for the 4th Planning Cycle from the following member

districts:
1. Calhoun County Groundwater Conservation District (Submitted: July 24, 2023)
2. Coastal Bend Groundwater Conservation District (Submitted: September 18, 2023)
3. Refugio Groundwater Conservation District (Submitted: July 17, 2023)
4. Texana Groundwater Conservation District (Submitted: July 20, 2023)
5. Victoria County Groundwater Conservation District (Submitted: July 21, 2023)

No Action Taken

Agenda Item 10: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained the next meeting of GMA 15 is scheduled for January 11, 2024, at 9:30 AM at the Dr. Pattie Dodson Health Center in Victoria, Texas.

No action taken.

Agenda Item 11: Receive public comment.

No Public Comment.

Agenda Item 12: Adjournment

MOTION: At approximately 10:21 AM, Mr. Van Dresar moved to adjourn the meeting. Ms. Parma seconded the motion. The motion passed unanimously.

The above and foregoing minutes were considered and approved on this the 11 day of January a.d. 2024

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, October 12, 2023, at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
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7. Consideration of and possible action on representatives of Groundwater Management Area 15 to the Regional Water Planning Groups.

8. Consideration of and possible action on matters related to joint planning including the proposals for technical services for Groundwater Management Area 15, the review of management plans, and accomplishments of Groundwater Management Area 15 member districts.
9. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15 including administrative procedures of the GMA-15 Joint Planning Committee, By-Laws of GMA 15 Committee, Interlocal Agreement for Cost-Sharing By Member District of the GMA 15 Committee.
10. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
11. Receive public comment.
12. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened on January 11, 2024 at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Mark Sugarek
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Aarin Teague
8	Fayette County Groundwater Conservation District	David Van Dresar
9	Goliad County Groundwater Conservation District	Terrell Graham
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offered to accept public comment.

No action taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Van Dresar moved to approve the meeting minutes as drafted. Mr. Hudgins seconded the motion. The motion passed.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss explained on April 13, 2023, the representatives of GMA 15 established a framework for funding a project to obtain technical services for adopting a DFC during the 4th Cycle of Joint Planning with the adoption of the bylaws and a cost sharing agreement for the management area. The cost sharing agreement established the schedule of funding commitments for any member district that adopted the cost sharing agreement with a total of $82,500.00 if all member districts of GMA 15 adopted the cost sharing agreement.

On July 17, 2023, the Board of Directors of the Refugio Groundwater Conservation District approved and adopted the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

On July 20, 2023, the Board of Directors of the Texana Groundwater Conservation District approved and adopted the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

On July 21, 2023, the Board of Directors of the Victoria County Groundwater Conservation District approved and adopted the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

On July 24, 2023, the Board of Directors of the Calhoun County Groundwater Conservation District approved and adopted the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

On August 13, 2023, Mr. Hudgins of CPGCD provided a copy of the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

On October 17, 2023, Ms. Parma of PVGCD provided a copy of the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

On October 20, 2023, Mr. Brasher of CCGCD provided a copy of the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

On October 27, 2023, Ms. Gonzales of EUWCD provided a copy of the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

On November 6, 2023, Mr. Van Dresar of FCGCD provided a copy of the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

On November 14, 2023, Mr. Stewart of BGCD provided a copy of the resolutions authorizing the interlocal agreement for cost sharing by member districts of the GMA-15 Committee and approving the by-laws of the GMA-15 Committee.

The approved cost sharing agreement amounts were provided.

As of December 22, 2023, the Victoria County Groundwater Conservation District had processed the following financial transactions related to the joint planning efforts of the GMA 15 Committee:

1. Credit: $7,500.00 - Deposit of VCGCD joint planning contribution
2. Credit: $7,500.00 - Deposit of CBGCD joint planning contribution
3. Credit: $7,500.00 - Deposit of CPGCD joint planning contribution

Members of the GMA-15 Committee (those districts that have adopted the by-laws and cost sharing agreement) should submit their joint planning fund contributions to VCGCD as soon as possible. Please ensure checks are made payable to Victoria County Groundwater Conservation District.

No Action was taken.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

Mr. Andruss explained the on December 19, 2023, Ms. Parma notified the GMA that the Pecan Valley GCD had adopted a revised management plan on December 14, 2023.

Mr. Van Dresar informed the committee that Fayette County GCD had adopted a revised management plan on January 8, 2024.

Mr. Graham informed the committee that Goliad County GCD had contested a uranium mining application in Goliad County.

Ms. Teague informed the committee that the Evergreen UWCD adopted an updated management plan in December 2023.

No Action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Andruss explained on December 9, 2023, GMA 15 learned, through correspondence between Mr. Stewart of Bee GCD and Mr. Perez of TWDB, that 1) TWDB's predictive model runs using the 2021 round of joint planning files and the new GAM for the central and southern Gulf Coast Aquifer did not produce similar predictive drawdowns produced using the Central Gulf Coast GAM, and 2) TWDB is currently performing a sensitivity analysis to determine if the new GAM should be altered. Previously, TWDB had committed to providing the comparison report by the end of December 2023.

Mr. Bradley presented updates to the committee regarding the operations of the Texas Water Development Board.

No action taken.

Agenda Item 7: Consideration of and possible action on representatives of Groundwater Management Area 15 to the Regional Water Planning Groups.

Mr. Andruss provided an update to the committee regarding Region L.
Mr. Van Dresar provided an update to the committee regarding Region K
Mr. Sugarek provided an update to the committee regarding Region N.

No action taken.

Agenda Item 8: Consideration of and possible action on matters related to joint planning including the draft request for proposals for technical services for Groundwater Management, Area 15, the review of management plans, and accomplishments of Groundwater Management Area 15 member districts.

Topic 1 – Technical Services

Mr. Andruss explained the VCGCD has delayed its efforts to negotiate terms of an agreement with Intera for providing the proposed technical services to the GMA-15 Committee because 1) one or more of the member districts of GMA 15 have not adopted the by-laws and cost-sharing agreement, 2) one or more of the member district the GMA-15 Committee have not submitted their contributions to the fund for the the technical services for the 4th cycle of joint planning, and 3) TWDB has not provided the comparison report on the predictive runs of the previous and current GAM for GMA 15.

No action taken.

Topic 2 – Management Plans of the Member Districts

Mr. Andruss explained based on a review of the management plans of the Pecan Valley GCD, the GMA 15 Administrator has determined that the plans 1) would likely have a positive impact on planning, 2) would likely have a positive impact on conserving and protecting groundwater and preventing waste of groundwater, and 3) would likely achieve the Desired Future Conditions to an adequate degree.

Motion: Mr. Van Dresar moved to ratify the determination of the GMA 15 Administrator that the management plan of the Pecan Valley GCD 1) would likely have a positive impact on planning, 2) would likely have a positive impact on conserving and protecting groundwater and preventing waste of groundwater, and 3) would likely achieve the Desired Future Conditions to an adequate degree. Mr. Graham seconded the motion. The motion passed unanimously.

Topic 3 – Accomplishments of the Member Districts.

None.

No Action Taken.

Agenda Item 9: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15 including administrative procedures of the GMA-15 Joint Planning Committee, By-Laws of GMA 15 Committee, Interlocal Agreement for Cost-Sharing By Member District of the GMA 15 Committee.

None.

No Action Taken

Agenda Item 10: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained the next meeting of GMA 15 is scheduled for April 11, 2024 at 9:30 AM at a location other than the typical meeting location of the Dr. Pattie Dodson Health Center in Victoria, Texas, as the meeting room is unavailable.

The meeting will be held at the Goliad office.

No action taken.

Agenda Item 11: Receive public comment.

No Public Comment.

Groundwater Management Area 15
Meeting Minutes

Agenda Item 12: Adjournment

MOTION: At approximately 10:45 AM, Mr. Van Dresar moved to adjourn the meeting. Mr. Sugarek seconded the motion. The motion passed unanimously.

The above and foregoing minutes were considered and approved on this the 11th day of April a.d. 2024.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, January 11, 2024, at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St., Victoria, Texas 77901**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on representatives of Groundwater Management Area 15 to the Regional Water Planning Groups.

8. Consideration of and possible action on matters related to joint planning including the technical services for Groundwater Management Area 15, the review of management plans, and accomplishments of Groundwater Management Area 15 member districts.
9. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15 including administrative procedures of the GMA-15 Joint Planning Committee, By-Laws of GMA 15 Committee, Interlocal Agreement for Cost-Sharing By Member District of the GMA 15 Committee.
10. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
11. Receive public comment.
12. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened on April 11, 2024 at the Goliad County GCD Office Building, 118 S. Market Street, Goliad, Texas.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	
7	Evergreen Underground Water Conservation District	Aarin Teague
8	Fayette County Groundwater Conservation District	Wendi Labus
9	Goliad County Groundwater Conservation District	Terrell Graham
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

No action was taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offered to accept public comment.

Public comments were received by the representatives.

No action taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Mr. Hudgins moved to approve the meeting minutes as drafted. Ms. Parma seconded the motion. The motion passed unanimously.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss explained on April 13, 2023, the representatives of GMA 15 established a framework for funding a project to obtain technical services for adopting a DFC during the 4th Cycle of Joint Planning with the adoption of the bylaws and a cost sharing agreement for the management area. The cost sharing agreement established the schedule of funding commitments for any member district that adopted the cost sharing agreement with a total of $82,500.00 if all member districts of GMA 15 adopted the cost sharing agreement.

No Action was taken.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

Mr. Andruss explained on January 11, 2024, Ms. Teague of Evergreen UWCD notified GMA 15 of the approval of the management plan for Evergreen Underground Water Conservation District.

On January 24, 2024, members of GMA 15 were notified of an opportunity for feedback regarding the proposed RWPG-estimates for counties that reside within GMA 15.

On January 25, 2024, Mr. Stewart of Bee GCD notified GMA 15 of the approval of the management plan for Bee Groundwater Conservation District.

On February 21, 2024, Ms. Parma of Pecan Valley GCD notified GMA 15 of the approval of the annual report of Pecan Valley Groundwater Conservation District.

On February 26, 2024, Ms. Parma of Pecan Valley GCD notified GMA 15 of the approval of the management plan of Pecan Valley Groundwater Conservation District by the Texas Water Development Board.

No Action was taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

TWDB representatives were present and provided an update regarding developments at the agency.

No action taken.

Agenda Item 7: Consideration of and possible action on representatives of Groundwater Management Area 15 to the Regional Water Planning Groups.

Topic 1 – Technical Services

Mr. Andruss explained the VCGCD has suspended its efforts to negotiate terms of an agreement with Intera for providing the proposed technical services to the GMA-15 Committee because 1) one or more of the member districts of GMA 15 have not adopted the by-laws and cost-sharing agreement, 2) one or more of the member district the GMA-15 Committee have not submitted their contributions to the fund for the technical services for the 4th cycle of joint planning, and 3) TWDB has not provided the comparison report on the predictive runs of the previous and current GAM for GMA 15.

No action taken.

Topic 2 – Management Plans of the Member District

Mr. Andruss explained based on a review of the management plans of the Evergreen UWCD and Bee GCD, the GMA 15 Administrator has determined that the plans 1) would likely have a positive impact on planning, 2) would likely have a positive impact on conserving and protecting groundwater and preventing waste of groundwater, and 3) would likely achieve the Desired Future Conditions to an adequate degree.

Motion: Ms. Teague moved to ratify the determination of the GMA 15 Administrator that the management plans of the Evergreen UWCD and Bee GCD 1) would likely have a positive impact on planning, 2) would likely have a positive impact on conserving and protecting groundwater and preventing waste of groundwater, and 3) would likely achieve the Desired Future Conditions to an adequate degree. Mr. Graham seconded the motion. The motion passed unanimously.

Topic 3 – Accomplishments of the Member Districts

No discussion.

No Action Taken.

Topic 4 – Identification of the best available science to be used in the proposal and adoption of the desired future conditions for GMA 15

Mr. Andruss explained that on March 22, 2024, Mr. Andruss, on behalf of representatives of GMA 15, requested an update from Mr. Hardwick of TWDB regarding his work to conduct a sensitivity analysis and development of a plan to

alter the new GAM the covers GMA 15. Mr. Hardwick indicated that an explanation letter regarding the subject was being prepared by TWDB.

Mr. Hardwick provided a summary of the work efforts undertaken by the TWDB to review the new groundwater availability model for the central and southern portions of the Gulf Coast Aquifer and the TWDB's plan for making revisions and corrections to the model.

The representatives of the management area discussed the use of the new model at length with Mr. Hardwick.

Motion: Mr. Andruss moved to request that TWDB authorize the use of the Groundwater Availability Model of the Central Gulf Coast Aquifer System, as used during the 3rd Joint Planning Cycle, for development of proposed and adopted desired future conditions for the relevant aquifers within GMA 15 during the 4th Joint Planning Cycle. Mr. Hudgins seconded the motion. The motion passed.

Agenda Item 8: Consideration of and possible action on matters related to joint planning including the draft request for proposals for technical services for Groundwater Management, Area 15, the review of management plans, and accomplishments of Groundwater Management Area 15 member districts.

None.

No Action Taken.

Agenda Item 9: Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained the next meeting of GMA 15 is scheduled for July 11, 2024, at 9:30 AM at a location other than the typical meeting location of the Dr. Pattie Dodson Health Center in Victoria, Texas, as the meeting room is unavailable.

The representatives decided to meet at the office of the Fayette County Groundwater Conservation District on July 11, 2024.

No action taken.

Agenda Item 10: Receive public comment.

No Public Comment.

Agenda Item 11: Adjournment

Groundwater Management Area 15
Meeting Minutes

MOTION: At approximately 11:14 AM, Ms. Parma moved to adjourn the meeting. Mr. Hudgins seconded the motion. The motion passed unanimously.

The above and foregoing minutes were considered and approved on this the 11th day of July a.d. 2024.

Groundwater Management Area 15 Representative

ATTEST:

James E Brashier

Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, April 11, 2024 at the Goliad County GCD Office Building, 118 S. Market Street, Goliad, Texas**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of Groundwater Management Area 15 member districts, and the

identification of the best available science to be used in the proposal and adoption of desired future conditions for GMA 15.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.

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Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened on July 11, 2024, at the VFW Hall, 500 Veterans Memorial Drive, La Grange, Texas.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	
4	Coastal Plains Groundwater Conservation District	
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	Daisy Fuentes
7	Evergreen Underground Water Conservation District	Aarin Teague
8	Fayette County Groundwater Conservation District	Wendi Labus
9	Goliad County Groundwater Conservation District	Art Dohmann
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Tim Andruss
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Kenneth Eller

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM. A quorum was present.

No action taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offered to accept public comment.

Public comments were received by the representatives.

No action taken.

Agenda Item 3: Consideration of and possible action on minutes of the previous meeting.

Mr. Andruss explained that the minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

MOTION: Ms. Labus moved to approve the meeting minutes as drafted. Ms. Parma seconded the motion. The motion passed unanimously.

Agenda Item 4: Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss explained on April 13, 2023, the representatives of GMA 15 established a framework for funding a project to obtain technical services for adopting a DFC during the 4th Cycle of Joint Planning with the adoption of the bylaws and a cost sharing agreement for the management area. The cost sharing agreement established the schedule of funding commitments for any member district that adopted the cost sharing agreement with a total of $82,500.00 if all member districts of GMA 15 adopted the cost sharing agreement.

Mr. Andruss also gave an update on the payments received from each member district.

The approved cost sharing agreement included the following cost sharing schedule:

Member Districts of GMA 15	Minimum Contribution	Approved GMA 15 Cost Sharing Agreement (as of July 3, 2024)	Contributions Remitted to GMA 15 Administrator (as of July 3, 2024)
Bee GCD	$3,750.00	Yes	Yes
Calhoun County GCD	$7,500.00	Yes	Yes
Coastal Bend GCD	$7,500.00	Yes	Yes
Coastal Plains GCD	$7,500.00	Yes	Yes
Colorado County GCD	$7,500.00	Yes	Yes
Corpus Christi ASRCD	$3,750.00		
Evergreen UWCD	$3,750.00	Yes	Yes
Fayette County GCD	$3,750.00	Yes	Yes
Goliad County GCD	$7,500.00		
Pecan Valley GCD	$7,500.00	Yes	Yes

Refugio GCD	$7,500.00	Yes	Yes
Texana GCD	$7,500.00	Yes	Yes
Victoria County GCD	$7,500.00	Yes	Yes
Total	**$82,500.00**		

VCGCD - Bank Statement - Act# 3881 - March 2024

Reporting Period Start: 3/1/24
Reporting Period Stop: 3/31/24
Beginning Balance: $48,313.16
(1) Credit: $6.14
(0) Debits: $0.00
Ending Balance: $48,319.30

VCGCD - Bank Statement - Act# 3881 - April 2024

Reporting Period Start: 4/1/24
Reporting Period Stop: 4/30/24
Beginning Balance: $48,319.30
(3) Credit: $5.94
(0) Debits: $0.00
Ending Balance: $48,325.24

VCGCD - Bank Statement - Act# 3881 - May 2024

Reporting Period Start: 5/1/24
Reporting Period Stop: 5/31/24
Beginning Balance: $48,325.24
(4) Credit: $22,506.97
(0) Debits: $0.00
Ending Balance: $70,832.21

No action taken.

Agenda Item 5: Consideration of and possible action on reports and communication from GMA 15 member districts and GMA 15 representatives to Regional Water Planning Groups.

Mr. Andruss explained on May 30, 2024, a letter was sent to Dr. Hardwick of TWDB on behalf of the members of GMA 15 as requested at the April 11, 2024 meeting

requesting authorization of "the use of the Groundwater Availability Model of the Central Gulf Coast Aquifer System, as used during the 3rd Joint Planning Cycle, for development of proposed and adopted desired future conditions for the relevant aquifers within GMA 15 during the 4th Joint Planning Cycle."

On May 30, 2024, Dr. Hardwick responded by stating that TWDB is "willing to allow for use of the previous model if absolutely necessary" while requesting that the representatives provide "additional time to allow us to complete this work before the GMA 15 member districts definitively decide to use the previous model."

Mr. Andruss provided an update on the activities of the South Central Texas Regional Planning Group (Region L).

Mr. Dohmann provided an update regarding the contested case involving GCGCD related to uranium mining in Goliad County.

No action taken.

Agenda Item 6: Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Ms. Ballew, Groundwater Director for TWDB, provided an update regarding the technical work underway by the modeling section to review and adjust the new groundwater availability model for GMA 15 and GMA 16.

No action taken.

Agenda Item 7: Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of Groundwater Management Area 15 member districts, and the identification of the best available science to be used in the proposal and adoption of desired future conditions for GMA 15.

Topic 1 – Technical Services

Mr. Andruss explained the VCGCD has resumed its efforts to negotiate terms of an agreement with Intera for providing the proposed technical services to the GMA-15 Committee because 1) the majority of the member districts of GMA 15 have adopted the by-laws and cost-sharing agreement, 2) the majority of the member district the GMA-15 Committee have submitted their contributions to the fund for the technical services for the 4th cycle of joint planning, and 3) the TWDB agreed to allow the use of the "GAM for the central portion of the Gulf Coast Aquifer System" by GMA 15.

Due to the funding gap between GCD contributions and Intera's proposed cost, VCGCD and Intera are examining ways to alter the scope of the project to address the funding short fall. VCGCD gave suggested revisions for consideration by Intera.

After discussing options regarding funding of the technical work to be completed for the adoption of a new desired future condition for GMA 15, the member districts that previously contributed to the GMA 15 planning fund agreed to seek authorization to contribute additional money to fully the technical services proposed by Intera.

No action taken.

Topic 2 – Management Plans of the Member District

No discussion.

No action taken.

Topic 3 – Accomplishments of the Member Districts

No discussion.

No action taken.

Topic 4 – Identification of the best available science to be used in the proposal and adoption of the desired future conditions for GMA 15

No discussion.

No action taken.

Agenda Item 8: Consideration of and possible action on matters related to development of groundwater availability model for GMA 15.

Mr. Andruss explained on June 11, 2024, Mr. Dohmann requested the placement of this agenda item on the meeting notice for July 11, 2024, during a meeting regarding aquifer monitoring approaches.

No action taken.

Agenda Item 9: Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

No discussion.

No action taken.

Agenda Item 10: Consideration of and Possible action on identification and scheduling of future agenda items and meetings.

The next meeting of GMA 15 is scheduled for October 10, 2024, at 10:00 AM at EUWCD.

Agenda Item 11: Receive Public Comment.

No discussion.

No action taken.

Agenda Item 12: Adjournment.

No Discussion.

Ms. Labus moved to adjourn the meeting at 11:27 AM. Ms. Parma seconded the motion. The motion passed unanimously.

The above and foregoing minutes were considered and approved on this the 9th day of January a.d. 2025.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **10:00 AM on Thursday, July 11, 2024 at the VFW Hall, 500 Veterans Memorial Drive, La Grange, Texas**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of Groundwater Management Area 15 member districts, and the

identification of the best available science to be used in the proposal and adoption of desired future conditions for GMA 15.

8. Consideration of and possible action on matters related to the development of a groundwater availability model for GMA 15.
9. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
10. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
11. Receive public comment.
12. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



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Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes

The Groundwater Management Area 15 meeting convened on October 15, 2024, at the Nueces River Authority Office, 500 IH 69, Suite 805, Robstown, Texas 78380.

Members GCD Representatives Present:

1	Bee Groundwater Conservation District	Lonnie Stewart
2	Calhoun County Groundwater Conservation District	Tim Andruss
3	Coastal Bend Groundwater Conservation District	Neil Hudgins
4	Coastal Plains Groundwater Conservation District	Neil Hudgins
5	Colorado County Groundwater Conservation District	Jim Brasher
6	Corpus Christi ASR Conservation District	Maria Corona
7	Evergreen Underground Water Conservation District	Darrell Brownlow
8	Fayette County Groundwater Conservation District	Wendi Labus
9	Goliad County Groundwater Conservation District	Terrell Graham
10	Pecan Valley Groundwater Conservation District	Cindy Parma
11	Refugio Groundwater Conservation District	Carroll Borden
12	Texana Groundwater Conservation District	Tim Andruss
13	Victoria County Groundwater Conservation District	Tim Andruss

Agenda Item 1: Call to order and welcome guests.

Mr. Andruss called the meeting to order at 2:52 PM. A quorum was present.

No action taken.

Agenda Item 2: Receive public comment.

Mr. Andruss offered to accept public comment.

Public comments were received by the representatives.

No action taken.

Agenda Item 3: Consideration of and possible action on matters related to groundwater availability models for the Gulf Coast Aquifer System.

No discussion.

No action taken.

Agenda Item 4: Consideration of and possible action on matters related to joint planning and administration of Groundwater Management Area 15.

4.1 – Technical Services

No discussion.

No action taken.

4.2 – Minutes of the Previous Meeting

No discussion.

No action taken.

4.3 – Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15

No discussion.

No action taken.

Agenda Item 5: Receive Public Comment

Mr. Andruss offered to accept public comment.

No public comment was given.

No action taken.

Agenda Item 12: Adjournment.

No Discussion.

Mr. Brownlow moved to adjourn the meeting after concluding all business of the groundwater management area at approximately 2:55 PM. Ms. Parma seconded the motion. The motion passed unanimously.

Groundwater Management Area 15
Meeting Minutes

The above and foregoing minutes were considered and approved on this the 9th day of January a.d. 2025.

Groundwater Management Area 15 Representative

ATTEST:

Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting, in conjunction with representatives from Groundwater Management Area 16, at **1:30 PM and upon conclusion of the Stakeholder Advisory Presentation by Texas Water Development Board staff regarding updates to the groundwater availability model for the central and southern portions of the Gulf Coast Aquifer System, on Tuesday, October 15, 2024, at the Nueces River Authority Office, 500 IH 69, Suite 805, Robstown, TX 78380**. The meeting will be open to the public.

Agenda:

1. Call to order and roll call of representatives of GMA 15.
2. Receive public comment.
3. Consideration of and possible action on matters related to groundwater availability models for the Gulf Coast Aquifer System.
4. Consideration of and possible action on matters related to joint planning and administration of Groundwater Management Area 15.
5. Receive public comment.
6. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



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Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes for January 9 , 2025

The Groundwater Management Area 15 meeting convened at the office of the Evergreen Underground Water Conservation District, 110 Wyoming Boulevard, Pleasanton, Texas on January 9, 2025, at 9:30 AM.

Agenda Item 1 - Call to order and welcome guests.

Mr. Andruss called the meeting to order at 9:30 AM and determined a quorum of representatives of the member districts of Groundwater Management Area 15 were present.

Representatives present:

- Bee Groundwater Conservation District - Lonnie Stewart
- Calhoun County Groundwater Conservation District - Tim Andruss
- Coastal Bend Groundwater Conservation District - Neil Hudgins
- Coastal Plains Groundwater Conservation District - Neil Hudgins
- Colorado County Groundwater Conservation District - Jim Brasher
- Corpus Christi ASR Conservation District -
- Evergreen Underground Water Conservation District - Aarin Teague
- Fayette County Groundwater Conservation District - Wendi Labus
- Goliad County Groundwater Conservation District - Terrell Graham
- Pecan Valley Groundwater Conservation District - Cindy Parma
- Refugio Groundwater Conservation District - Tim Andruss
- Texana Groundwater Conservation District - Tim Andruss
- Victoria County Groundwater Conservation District - Tim Andruss

Agenda Item 2 - Receive public comment.

Mr. Andruss offered to accept public comment. No public comment was provided to the representatives.

Agenda Item 3 - Consideration of and possible action on matters related to the minutes of the previous meeting.

Mr. Andruss reported the draft minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

Action: Mr. Stewart moved to accept and approve the meeting minutes for July 11, 2024, and October 15, 2024 as drafted. Mr. Brasher seconded the motion. The motion passed unanimously.

Agenda Item 4 - Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss provided a summary of contributions to the GMA 15 Joint Planning Fund:

Bee GCD $4,750.00
Calhoun County GCD $9,500.00
Coastal Bend GCD $9,500.00
Coastal Plains GCD $9,500.00
Colorado County GCD $9,500.00
Corpus Christi ASRCD $0.00
Evergreen UWCD $4,750.00
Fayette County GCD $4,750.00
Goliad County GCD $0.00
Pecan Valley GCD $9,500.00
Refugio GCD $9,500.00
Texana GCD $9,500.00
Victoria County GCD $9,500.00
Total $90,250.00

Mr. Andruss provided the following information regarding the GMA 15 Joint Planning Fund Bank Account:

VCGCD - Bank Statement - Act# 3881 - September 2024
Reporting Period Start: 9/1/24
Reporting Period Stop: 9/30/24
Beginning Balance: $79,859.16
(6) Credit: $10,010.43
(0) Debits: $0.00
Ending Balance: $89,869.59

VCGCD - Bank Statement - Act# 3881 - October 2024
Reporting Period Start: 10/1/24
Reporting Period Stop: 10/31/24
Beginning Balance: $89,869.59
(1) Credit: $11.42
(0) Debits: $0.00
Ending Balance: $89,881.01

VCGCD - Bank Statement - Act# 3881 - November 2024
Reporting Period Start: 11/1/24
Reporting Period Stop: 11/30/24
Beginning Balance: $89,881.01
(1) Credit: $11.05

(0) Debits: $0.00

Ending Balance: $89,892.06

Agenda Item 5 - Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.

Mr. Andruss reported that on December 11, 2024, Michelle Shelton of Goliad County GCD forwarded a copy of a resolution adopted by the Board of Directors of the Goliad County GCD on November 18, 2024 regarding the District's position on Groundwater Availability Modeling to each member district of GMA 15.

Agenda Item 6 - Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Andruss reported that on December 17, 2024, Katie Dahlberg of TWDB notified GMA 15 of its intended approach for developing he draft water demand projections for the next planning cycle (2031 RWPs) which is affected by the development of DFCs and the calculation of MAGs. Specifically, Ms. Dahlberg explained about the approach:

- "Acknowledging the mismatch in the DFC/RWP timelines, if DFC/MAGs are not coordinated with our draft projections development timeline, TWDB will use a rate of change approach based on the current irrigation demand projections (link below) in order to release draft projections to the Regional Water Planning Groups (RWPGs) by March 2027.
- RWPGs can request revisions to the draft projections, including the use of updated MAGs. However, to incorporate the updated MAGs into the final projections for the 2031 RWPs, MAGs would need to be available by August 2027. As you know, MAG development is dependent upon administratively complete explanatory reports and then subsequent capacity of TWDB groundwater staff."

Mr. Andruss reported additional information regarding current irrigation water demand projections for the 2026 RWPs and high-level regional water planning and groundwater planning timelines. See:
https://www.twdb.texas.gov/waterplanning/data/projections/2027/projections.asp.

Agenda Item 7 - Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of Groundwater Management Area 15 member districts, and the development of desired future conditions.

Topic 3 - Development of Desired Future Conditions.

Dr. Young of Intera presented slides and guided discussions regarding the development of the 3rd cycle of joint planning and the process for developing desired future conditions during the current planning cycle.

The representatives of GMA 15:

a. discussed the method and outcomes of developing the DFCs for GMA 15 during the 3rd planning cycle including corrections needed to certain slides regarding the current DFC and related MAG values;
b. requested that Dr. Young begin work on the consideration of the aquifer uses and condition factor, the water needs (and water management strategies) factor, the hydrologic condition factor, and the environmental conditions factor for the current joint planning cycle in a similar fashion as considered during previous joint planning efforts;
c. requested that Dr. Young begin work on the consideration of the socioeconomic factor by:
    i. assigning aquifer designations, where possible, to the registry of wells consisting of a GIS dataset of well locations and well depths provided by the funding members of GMA 15; and
    ii. assigning water level and drawdown estimates, where possible, to the registry of wells provided by the funding members of GMA 15;
d. requested that Dr. Young begin work on the consideration of the subsidence factor by:
    i. reviewing previous work related to subsidence developed by or for funding members of GMA 15;
    ii. identifying areas with significant subsidence, if any, based on the model runs selected by the GMA 15 representatives to demonstrate the proposed DFC is feasible;
e. requested the Dr. Young provide each member district of GMA 15 with the TWDB estimates of historical groundwater pumping for their jurisdiction by aquifer from year 2016 through year 2022; and
f. agreed to review and provide any necessary corrections to Dr. Young identified for the historical groundwater pumping estimates from year 2016 through year 2022.

Action: Mr. Andruss moved to instruct the technical consultant to use TWDB's 2004 groundwater availability model for the Central Gulf Coast for performing predictive model runs for the 4th Joint Planning Cycle for GMA 15. Ms. Labus seconded the motion. The motion passed with opposition by Mr. Graham.

Agenda Item 8 - Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

The representatives did not discuss or take action regarding this item.

Agenda Item 9 - Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss reported the next meeting of GMA 15 is scheduled for April 10, 2025, at 9:30 AM at the UHV Northwest Campus, Room 129, 1604 E. Airline Rd., Victoria, Texas 77901.

VCGCD has secured meeting space at the UHV Northwest Campus in Victoria for the GMA 15 meetings scheduled on July 10, 2025 and October, 9, 2025.
Mr. Brasher requested that an appropriate agenda items for considering and designating GMA 15 delegates to regional water planning groups be placed on the agenda for the next meeting.

Agenda Item 10 - Receive public comment.

Mr. Andruss offered to accept public comment. No public comment was provided to the representatives.

Agenda Item 11 - Adjournment.

Action: Mr. Hudgins moved to adjourn the meeting at 12:45 PM. Ms. Labus seconded the motion. The motion passed unanimously.

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the 10th day of APRIL a.d. 2025.

_____ Groundwater Management Area 15 Representative

ATTEST:

_____ Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

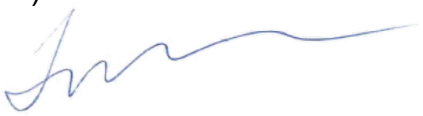
Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, January 9, 2025 at the Office of Evergreen Underground Water Conservation District, 110 Wyoming Boulevard, Pleasanton, TX 78064**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of member districts of Groundwater Management Area 15, and the development of desired future conditions.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



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Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes for April 10, 2025

The Groundwater Management Area 15 meeting convened at the Texas AgriLife Extension Service Building, Wharton County, 315 E. Milam St., Wharton, Texas 77488 on April 10, 2025, at 9:30 AM.

Agenda Item 1 - Call to order and welcome guests.

Mr. Andruss called the roll of the representatives of member districts of Groundwater Management Area 15:

- Bee Groundwater Conservation District - Lonnie Stewart
- Calhoun County Groundwater Conservation District - Tim Andruss
- Coastal Bend Groundwater Conservation District - Neil Hudgins
- Coastal Plains Groundwater Conservation District - Neil Hudgins
- Colorado County Groundwater Conservation District - Aaron Weishuhn
- Corpus Christi ASR Conservation District - No Representative
- Evergreen Underground Water Conservation District - Darrell Brownlow
- Fayette County Groundwater Conservation District - Wendi Labus
- Goliad County Groundwater Conservation District - Terrell Graham
- Pecan Valley Groundwater Conservation District - Cindy Parma
- Refugio Groundwater Conservation District - Tim Andruss
- Texana Groundwater Conservation District - Tim Andruss
- Victoria County Groundwater Conservation District - Tim Andruss

Agenda Item 2 - Receive public comment.

Mr. Andruss offered to accept public comment. No public comment was provided to the representatives.

Agenda Item 3 - Consideration of and possible action on matters related to the minutes of the previous meeting.

Mr. Andruss reported the draft minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

Action: Mr. Brownlow moved to accept and approve the meeting minutes for January 9, 2025, as drafted. Ms. Labus seconded the motion. The motion passed unanimously.

Agenda Item 4 - Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss provided a summary of contributions to the GMA 15 Joint Planning Fund:

Member Districts of GMA 15	Contribution
Bee GCD	$4,750.00
Calhoun County GCD	$9,500.00

Coastal Bend GCD	$9,500.00
Coastal Plains GCD	$9,500.00
Colorado County GCD	$9,500.00
Corpus Christi ASRCD	$0.00
Evergreen UWCD	$4,750.00
Fayette County GCD	$4,750.00
Goliad County GCD	$0.00
Pecan Valley GCD	$9,500.00
Refugio GCD	$9,500.00
Texana GCD	$9,500.00
Victoria County GCD	$9,500.00
Total	**$90,250.00**

Mr. Andruss provided the following information regarding the GMA 15 Joint Planning Fund Bank Account:

VCGCD - Bank Statement - Act# 3881 - January 2025

Reporting Period Start: 1/1/25
Reporting Period Stop: 1/31/25
Beginning Balance: $89,903.48
(1) Credit: $11.45
(0) Debits: $0.00
Ending Balance: $89,914.93

VCGCD - Bank Statement - Act# 3881 - February 2025

Reporting Period Start: 2/1/25
Reporting Period Stop: 2/28/25
Beginning Balance: $89,914.93
(1) Credit: $10.35
(0) Debits: $0.00
Ending Balance: $89,925.28

VCGCD - Bank Statement - Act# 3881 - March 2025

Reporting Period Start: 3/1/25
Reporting Period Stop: 3/31/25
Beginning Balance: $89,925.20
(1) Credit: $11.46
(0) Debits: $0.00
Ending Balance: $89,936.74

Action: Mr. Brownlow moved to accept the reported financial information for January, February and March 2025, as presented. Mr. Hudgins seconded the motion. The motion passed unanimously.

Agenda Item 5 - Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.

Topic 1 - Release of draft recalibration GAM for the central and southern portions of the Gulf Coast

Mr. Andruss explained on February 5, 2025, the GMA 15 Administrator received notice from Dr. Hardwick of TWDB of the release of the recalibration report related to the new GAM for the central and southern portions of the Gulf Coast and the deadline to provide comments on the report by April 5, 2025. In response, the GMA 15 Administrator contacted TWDB regarding the deadline for comments. Dr. Hardwick extended the deadline for comments on the report until July 31, 2025. Mr. Bradley of Texas Water Development Board notified the membership of TWDB's intent use the new GAM for the central and southern portions of the Gulf Coast.

Action: Mr. Andruss moved to authorize Dr. Young of Intera to complete the task described as "Evaluate Updated GAM and TWDB Benchmark Run with Current MAGs", by July 3, 2025, at a cost not to exceed $7,500, to evaluate the utility of the recalibrated model for the joint planning processes and evaluating impacts of pumping scenarios in the jurisdictions of the member districts that have contributed funds to the joint planning fund of GMA 15. Mr. Stewart seconded the motion. The motion passed unanimously.

Topic 2 - GCGCD Report

Mr. Andruss explained on April 1, 2025, Mr. Graham of GCGCD forwarded a report to the GMA 15 Administrator for distribution to the representatives of GMA 15.

Agenda Item 6 - Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Bradley of Texas Water Development Board notified the members of recent activities of TWDB.

Agenda Item 7 - Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of Groundwater Management Area 15 member districts, and the development of desired future conditions.

Topic 1 - Management Plans of the Member Districts.

Dr. Young gave a presentation on and facilitated the discussion regarding subsidence within GMA 15.

Action: Mr. Andruss moved to accept the report and presentation given by Intera regarding Subsidence Impacts. Ms. Parma seconded the motion. The motion passed unanimously.

Dr. Young gave a presentation on and facilitated the discussion regarding hydrologic conditions within GMA 15.

Action: Mr. Andruss moved to accept the report and presentation given by Inter regarding Hydrologic Conditions. Mr. Hudgins seconded the motion. The motion passed unanimously.

Dr. Young gave a presentation on and facilitated the discussion regarding aquifer use and conditions in GMA 15.

The representatives agreed to submit the following information to Mr. Andruss within 60 days:

1. preliminary DFC statements,
2. pumping distributions to support the evaluation of the preliminary DFC statements,

Action: Mr. Andruss moved to proceed with Task 4 and Task 9 to be presented at the July 2025 meeting. Mr. Brownlow seconded the motion. The motion passed unanimously.

Action: Mr. Brownlow moved to request that TWDB 1) develop estimates of MAG values in GMA 15 based on the current desired future condition of GMA 15 using the new GAM for the central and southern portions of the Gulf Coast and 2) submit a report to GMA 15 documenting the comparison of those values to the existing MAG values for GMA 15. Mr. Stewart seconded the motion. The motion passed unanimously.

Agenda Item 8 - Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

Topic 1 - GMA 15 Delegates to Regional Water Planning Groups

Mr. Andruss explained on January 9, 2025, Mr. Brasher requested that an appropriate agenda items for considering and designating GMA 15 delegates to regional water planning groups be placed on the agenda for the next meeting.

Action: Mr. Weishuhn moved to nominate himself for Region K. Ms. Labus seconded the motion. The motion passed unanimously.

Topic 2 - Email Distribution Lists for GMA 15

Mr. Andruss explained that he would maintain an email distribution list for the district representative and the administrative contact for each district within GMA 15. The current lists are provided below. Any changes to the list should be sent to tim.andruss@vcgcd.org by the presiding officer of the district or their designated representative to GMA 15.

District Representatives of GMA 15 Member Districts

Bee GCD: <trynefarm@aol.com>;
Calhoun County GCD: <dmay@tisd.net>;
Coastal Bend GCD: <ronald59@gmail.com>;
Coastal Plains GCD: <aquainfo@sbcglobal.net>;
Colorado County GCD: <tlw9@sbcglobal.net>;
Corpus Christi ASRCD: <gustavog@cctexas.com>;
Evergreen UWCD: <darrell@carrizoconsulting.com>;
Fayette County GCD: <info@fayettecountygroundwater.com>;
Goliad County GCD: <tgraham192@gmail.com>;
Pecan Valley GCD: <knips@swbell.net>;
Refugio GCD: <bordence@gmail.com.;
Texana GCD: <altsan@sbcglobal.net>;
Victoria County GCD: <dmarkmeek@yahoo.com>

Administrative Email Addresses of GMA 15 Member Districts

Bee GCD Administrative Email: <beegcd@yahoo.com>;
Calhoun County GCD Administrative Email: <admin@calhouncountygcd.org>;
Coastal Bend GCD Administrative Email: <thedistrict@cbgcd.com>;
Coastal Plains GCD Administrative Email: <shorris@co.matagorda.tx.us>;
Evergreen UWCD Administrative Email: <info@evergreenuwcd.org>;
Fayette County GCD Administrative Email: <info@fayettecountygroundwater.com>;
Goliad County GCD Administrative Email: <tgraham192@gmail.com>;
Pecan Valley GCD Administrative Email: <secretary@pvgcd.org>;

Refugio GCD Administrative Email: <admin@rgcd.org>;
Texana GCD Administrative Email: <admin@texanagcd.org>;
Victoria County GCD Administrative Email: <admin@vcgcd.org>

Agenda Item 9 - Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained the next meeting of GMA 15 is scheduled for July 10, 2025, at 9:30 AM at the Dr. Pattie Dodson Health Center, 2805 N. Navarro St, Room 108, Victoria, Texas 77901. VCGCD has secured meeting space at the Dr. Pattie Dodson Health Center for the GMA 15 meetings scheduled on October 9, 2025.

Agenda Item 10 - Receive public comment.

Mr. Andruss offered to accept public comment. No public comment was provided to the representatives.

Agenda Item 11 - Adjournment.

Action: Mr. Brownlow moved to adjourn the meeting after concluding all business of the groundwater management area at approximately 1:23 PM. Ms. Parma seconded the motion. The motion passed unanimously.

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the 10th day of July a.d. 2025.

_____ Groundwater Management Area 15 Representative

ATTEST:

Cindy Parma _____ Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, April 10, 2025 at the Texas AgriLife Extension Service Building, Wharton County, 315 E. Milam St., Wharton, Texas 77488**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of member districts of Groundwater Management Area 15, and the development of desired future conditions.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at 2805 N. Navarro St., Suite 210, Victoria, Texas 77901, by email at admin@vcgcd.org, or by phone at (361) 579-6863.

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Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes for July 10, 2025

The Groundwater Management Area 15 meeting convened at the Victoria County Groundwater Conservation District Office, 1501 E. Mockingbird Lane, Suite 104, Victoria, Texas, on July 10, 2025 at 9:30 AM.

Agenda Item 1 - Call to order and welcome guests.

Mr. Andruss called the roll of the representatives of member districts of Groundwater Management Area 15:

- Bee Groundwater Conservation District - Lonnie Stewart
- Calhoun County Groundwater Conservation District - Tim Andruss
- Coastal Bend Groundwater Conservation District - Neil Hudgins
- Coastal Plains Groundwater Conservation District - Neil Hudgins
- Colorado County Groundwater Conservation District - Aaron Weishuhn
- Corpus Christi ASR Conservation District - No Representative
- Evergreen Underground Water Conservation District - Ed Griffin
- Fayette County Groundwater Conservation District - David Van Dresar
- Goliad County Groundwater Conservation District - Terrell Graham
- Pecan Valley Groundwater Conservation District - Cindy Parma
- Refugio Groundwater Conservation District - Tim Andruss
- Texana Groundwater Conservation District - Tim Andruss
- Victoria County Groundwater Conservation District - Tim Andruss

Agenda Item 2 - Receive public comment.

Mr. Andruss offered to accept public comment. No public comment was provided to the representatives.

Agenda Item 3 - Consideration of and possible action on matters related to the minutes of the previous meeting.

Mr. Andruss reported the draft minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

Action: Mr. Stewart moved to accept and approve the meeting minutes for April 10, 2025. Mr. Van Dresar seconded the motion. The motion passed unanimously.

Agenda Item 4 - Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss provided a summary of contributions to the GMA 15 Joint Planning Fund:

Member Districts of GMA 15	Contribution
Bee GCD	$4,750.00
Calhoun County GCD	$9,500.00
Coastal Bend GCD	

	$9,500.00
Coastal Plains GCD	$9,500.00
Colorado County GCD	$9,500.00
Corpus Christi ASRCD	$0.00
Evergreen UWCD	$4,750.00
Fayette County GCD	$4,750.00
Goliad County GCD[1]	$2,500.00
Pecan Valley GCD	$9,500.00
Refugio GCD	$9,500.00
Texana GCD	$9,500.00
Victoria County GCD	$9,500.00
Total	**$90,250.00**

Note 1: GCGCD contribution is not to be used for technical work utilizing the groundwater availability model.

Reporting Period Ending Balance: $69.971.21

Agenda Item 5 - Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.

Topic 1 - Evaluation of the Groundwater Availability Model for the Central and Southern Portions of Gulf Coast Aquifer System (CSGC-GAM) for District Uses

Mr. Andruss explained in an effort to complement the work to be completed by Intera to evaluate the utility of the new groundwater availability model (GAM) developed by the Texas Water Development Board for use by GMA 15, Victoria County, Calhoun County, Refugio, and Texana GCDs have sponsored a project to be completed by Intera to evaluate the utility of the GAM for district uses. In particular, the GCDs are interested in assessing the utility of the draft CSGC-GAM for GCD purposes such as developing district-level DFCs, evaluating aquifer impacts associated with production permit requests, assessing and predicting subsidence, assessing and predicting saltwater intrusion, or assessing and predicting the consequences of incentivizing deep saline groundwater production. Each district is contributing $12,500 to fund the project.e the new GAM for the central and southern portions of the Gulf Coast.

Topic 2 - Characterization of Brackish Groundwater Resources in Calhoun, Refugio, and Jackson Counties.

Mr. Andruss explained in an effort to prepare for significant, new development of groundwater resource in Calhoun, Refugio, and Jackson Counties, Calhoun County GCD, Refugio GCD, and Texana GCD have sponsored a project to be completed by Intera to characterize the brackish groundwater resources within their respective jurisdictions. The completion of the project will support their efforts

to consider and possibly adopt rules intended to incentivize brackish groundwater development in lieu of fresh groundwater development. Each district is contributing $20,000 to fund the project.

Agenda Item 6 - Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Perez of Texas Water Development Board notified the members of recent activities of TWDB.

Action: Mr. Stewart moved to authorize Mr. Andruss submit a letter on behalf of GMA 15 expressing GMA 15's opposition of the use the Groundwater Availability Model for the Central and Southern Portions of the Gulf Coast Aquifer System (CSGCA-GAM) for water planning purposes as public comment to the draft update to the groundwater availability model (GAM) for the central and southern portions of the Gulf Coast Aquifer System. Mr. Graham seconded the motion. The motion passed unanimously.

Agenda Item 7 - Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of Groundwater Management Area 15 member districts, and the development of desired future conditions.

Topic 1 - House Bill 2078, 89th Regular Session of the Texas Legislature

Mr. Andruss explained House Bill 2078 relating to the joint planning of desired future conditions in groundwater management areas is effective September 1, 2025. The bill creates significant changes to Sections 36.1071 and Section 36.108 of Chapter 36 of the Texas Water Code. Section 108 relates to the joint planning in groundwater management areas. The revisions to 36.108 alter 1) the requirements of GMAs related to what and how the representatives review member district's accomplishments and achievement of DFCs and 2) process for adopting DFCs and development of the explanatory report.

Topic 2 - Annual Review of Accomplishments of the Member Districts.

The representatives neither discussed nor took action regarding this topic.

Topic 3 - Review of Management Plans during Current Joint Planning Cycle

The representatives neither discussed nor took action regarding this topic.

Topic 4 - Development of Desired Future Conditions.

Dr. Young and Mr. Lamkey of Intera presented Intera's findings regarding the 1) Impacts on the Interests and Rights in Private Property, 2) Pumping Scenarios, 3) Review of the GMA 15 and GMA 16 GAM, and 4) Consideration of Water Supply Needs and Management Strategies.

Action: Mr. Graham moved to accept the presentation titled *Impacts on the Interests and Rights in Private Property* provided by Intera. Mr. Brownlow seconded the motion. The motion passed unanimously.

The representatives identified several errors and omissions within the presentation and discussed GCGCD's concerns with the model runs. Mr. Graham agreed to provide GCGCD's explanation and justification for its request for special consideration in the use of the predictive GAM runs in support of the joint planning process.

Action: Mr. Steward moved to authorized Mr. Andruss to submit a letter on the behalf of GMA 15 expressing opposition to the intention of TWDB to utilize the draft GAM for joint planning or regional water planning purposes. Mr. Graham seconded the motion. The motion passed unanimously.

Action: Mr. Dresar moved to accept the presentation titled *Consideration of Water Supply Needs and Management Strategies* provided by Intera with correction of identified errors. Mr. Hudgins seconded the motion. The motion passed unanimously.

Agenda Item 8 - Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

The representatives neither discussed nor took action regarding this item.

Agenda Item 9 - Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained the next meeting of GMA 15 is scheduled for October 9, 2025, at 9:30 AM at 1501 E. Mockingbird Lane, Suite 104, Victoria, Texas. A special meeting may be held on July 24, 2025.

Agenda Item 10 - Receive public comment.

Mr. Andruss offered to accept public comment. No public comment was provided to the representatives.

Agenda Item 11 - Adjournment.

Action: Mr. Van Dresar moved to adjourn the meeting after concluding all business of the groundwater management area at approximately 11:54 AM. Ms. Parma seconded the motion. The motion passed unanimously.

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the 9th day of October a.d. 2025.

_____ Groundwater Management Area 15 Representative

ATTEST:

_____ Groundwater Management Area 15 Representative

Notice of Meeting

Groundwater Management Area 15

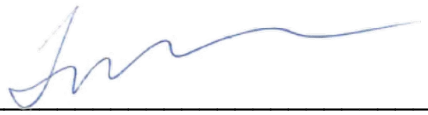
Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, July 10, 2025 at the Victoria County Groundwater Conservation District Office, 1501 E. Mockingbird Lane, Suite 104, Victoria, Texas**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of member districts of Groundwater Management Area 15, and the development of desired future conditions.

8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at P.O. Box 69, Victoria, Texas 77902, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes for July 24, 2025

The Groundwater Management Area 15 meeting convened at the Victoria County Groundwater Conservation District Office, 1501 E. Mockingbird Lane, Suite 104, Victoria, Texas, on July 24, 2025 at 9:30 AM.

Agenda Item 1 - Call to order and welcome guests.

Mr. Andruss called the roll of the representatives of member districts of Groundwater Management Area 15:

- Bee Groundwater Conservation District - No Representative
- Calhoun County Groundwater Conservation District - Tim Andruss
- Coastal Bend Groundwater Conservation District - Neil Hudgins
- Coastal Plains Groundwater Conservation District - Neil Hudgins
- Colorado County Groundwater Conservation District - No Representative
- Corpus Christi ASR Conservation District - No Representative
- Evergreen Underground Water Conservation District - Ed Griffin
- Fayette County Groundwater Conservation District - Wendi Labus
- Goliad County Groundwater Conservation District - Terrell Graham
- Pecan Valley Groundwater Conservation District - Cindy Parma
- Refugio Groundwater Conservation District - Tim Andruss
- Texana Groundwater Conservation District - Tim Andruss
- Victoria County Groundwater Conservation District - Tim Andruss

Agenda Item 2 - Receive public comment.

Mr. Andruss offered to accept public comment. No public comment was provided to the representatives.

Agenda Item 3 - Receive a presentation from the Technical Consultant for GMA 15 regarding the review and assessment of the Groundwater Availability Model for the Central and Southern Portions of the Gulf Coast Aquifer for use in the Joint Planning Process.

Mr. Young and Mr. Lamkey presented reports on their evaluation of the recalibrated CSGCA-GAM.

Agenda Item 4 - Consideration of and possible action on the report from the technical consultant and the use of the Groundwater Availability Model for the Central and Southern Portions of the Gulf Coast Aquifer for use in the Joint Planning Process.5.

Mr. Andruss requested a summary report from Intera regarding it's review and evaluation of the CSGCA-GAM.

Agenda Item 5 - Receive public comment.

Mr. Graham updated the representatives on Goliad County GCD's disagreement with using the received DFC's and increase the evaluation factor for Goliad County.

Agenda Item 6 - Adjournment.

Action: Ms. Labus moved to adjourn the meeting after concluding all business of the groundwater management area at approximately 11:06 AM. Ms. Parma seconded the motion. The motion passed unanimously.

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the 9th day of October a.d. 2025.

Groundwater Management Area 15 Representative

ATTEST:

Edward A. Griffin Groundwater Management Area 15 Representative

Notice of Meeting
Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, July 24, 2025 at the Victoria County Groundwater Conservation District Offices, 1501 E. Mockingbird Lane, Suite 104, Victoria, Texas**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Receive a presentation from the Technical Consultant for GMA 15 regarding the review and assessment of the Groundwater Availability Model for the Central and Southern Portions of the Gulf Coast Aquifer for use in the Joint Planning Process.
4. Consideration of and possible action on the report from the technical consultant and the use of the Groundwater Availability Model for the Central and Southern Portions of the Gulf Coast Aquifer for use in the Joint Planning Process.
5. Receive public comment.
6. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at P.O. Box 69, Victoria, Texas 77902, by email at admin@vcgcd.org, or by phone at (361) 579-6863.



_____

Tim Andruss, Administrator
Groundwater Management Area 15

Groundwater Management Area 15
Meeting Minutes for October 9, 2025

The Groundwater Management Area 15 meeting convened at the Victoria County Groundwater Conservation District Office, 1501 E. Mockingbird Lane, Suite 104, Victoria, Texas, on October 9, 2025 at 9:30 AM.

Agenda Item 1 - Call to order and welcome guests.

Mr. Andruss called the roll of the representatives of member districts of Groundwater Management Area 15:

- Bee Groundwater Conservation District - Lonnie Stewart
- Calhoun County Groundwater Conservation District - Tim Andruss
- Coastal Bend Groundwater Conservation District - No Representative
- Coastal Plains Groundwater Conservation District - No Representative
- Colorado County Groundwater Conservation District - Aaron Weishuhn
- Corpus Christi ASR Conservation District - No Representative
- Evergreen Underground Water Conservation District - Ed Griffin
- Fayette County Groundwater Conservation District - Wendi Labus
- Goliad County Groundwater Conservation District - Terrell Graham
- Pecan Valley Groundwater Conservation District - Cindy Parma
- Refugio Groundwater Conservation District - Tim Andruss
- Texana Groundwater Conservation District - Tim Andruss
- Victoria County Groundwater Conservation District - Tim Andruss

Agenda Item 2 - Receive public comment.

Mr. Andruss offered to accept public comment. No public comment was provided to the representatives.

Agenda Item 3 - Consideration of and possible action on matters related to the minutes of the previous meeting.

Mr. Andruss reported the draft minutes of the previous meeting were sent to the GMA 15 representatives prior to this meeting.

Action: Mr. Stewart moved to accept and approve the meeting minutes for July 10 and July 24, 2025. Mr. Griffin seconded the motion. The motion passed unanimously.

Agenda Item 4 - Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.

Mr. Andruss provided a summary of contributions to the GMA 15 Joint Planning Fund:

Member Districts of GMA 15	Contribution
Bee GCD	$4,750.00
Calhoun County GCD	$9,500.00
Coastal Bend GCD	$9,500.00
Coastal Plains GCD	$9,500.00
Colorado County GCD	$9,500.00
Corpus Christi ASRCD	$0.00
Evergreen UWCD	$4,750.00
Fayette County GCD	$4,750.00
Goliad County GCD[1]	$2,500.00
Pecan Valley GCD	$9,500.00
Refugio GCD	$9,500.00
Texana GCD	$9,500.00
Victoria County GCD	$9,500.00
Total	**$90,250.00**

Note 1: GCGCD contribution is not to be used for technical work utilizing the groundwater availability model.

Reporting Period Ending Balance: $61,987.00

Agenda Item 5 - Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.

The representatives neither discussed nor took action regarding this item.

Agenda Item 6 - Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.

Mr. Andruss explained on September 29, 2025, Mr. Perez of TWDB, provided a copy of a presentation he intends to deliver during the meeting.

Mr. Perez was present and gave his report.

Agenda Item 7 - Consideration of and possible action on matters related to joint planning including technical services for GMA 15, the review of management plans and accomplishments of Groundwater Management Area 15 member districts, and the development of desired future conditions.

Topic 1 - Evaluation of the Groundwater Availability Model for the Central and Southern Portions of Gulf Coast Aquifer System (CSGC-GAM)

Mr. Andruss explained on July 31, 2025, Mr. Andruss submitted comments to TWDB regarding Groundwater Availability Model for the Central and Southern Portions of Gulf Coast Aquifer System (CSGC-GAM) on behalf of member districts of GMA 15.
On July 31, 2025, Mr. Andruss submitted comments to TWDB regarding Groundwater Availability Model for the Central and Southern Portions of Gulf Coast Aquifer System (CSGC-GAM) on behalf of Victoria County GCD, Calhoun County GCD, Refugio GCD, and Texana GCD.

Topic 2 - Annual Review of Accomplishments of the Management Area.

Mr. Andruss explained Section 36.108, Water Code has been revised.
Item C of Section 36.108 requires "district representatives shall meet at least annually to conduct joint planning with the other districts in the management area. The representatives shall review: (1) the accomplishments of the **management area**;" (emphasis added)

Topic 3 - Review of Management Plans during Current Joint Planning Cycle

Mr. Andruss explained Section 36.108, Water Code has been revised.
Item c of Section 36.108 requires "district representatives shall meet at least annually to conduct joint planning with the other districts in the management area. The representatives shall review: ... (3) not less than once during each five-year period described by Subsection (d), the management plans of each district in the management area."
Item c-1 of Section 36.108 requires member districts of GMAs to "consider: (1) the goals of each management plan and its impact on planning throughout the management area; (2) the effectiveness of the measures established by each district's management plan for conserving and protecting groundwater and preventing waste, and the effectiveness of these measures in the management area generally; (3) any other matters that the boards consider relevant to the protection and conservation of groundwater and the prevention of waste in the management area; and (4) the **degree to which <u>each district</u> is achieving the desired future conditions** established during the joint planning process **through the implementation of the district's management plan and rules**." (emphasis added)
The representatives agreed to submit a report of their district's accomplishments by December 19, 2025, to facilitate the review of accomplishments at the GMA 15

meeting scheduled for January 8, 2026.

Topic 4 - Development of Desired Future Conditions.

Mr. Andruss explained Section 36.108, Water Code has been revised.

Item d-1a of Section 36.108 requires district representatives to "(1) adopt desired future conditions under this section for each approximately 50-year planning period identified by the executive administrator for the preparation of state and regional water plans; and (2) **identify interim values for the desired future conditions adopted under Subdivision (1) for time periods not to exceed 10 years solely to assist the districts in monitoring interim progress in achieving the desired future conditions adopted for the approximately 50-year planning period."**

Item d-3 of Section 36.108 has been expanded to include the following "(6) include an **explanation in plain language of why a desired future condition adopted for an aquifer was changed** if the desired future condition is different from the desired future condition adopted for the aquifer over the preceding five-year joint planning period; and (7) include **a summary of how each district is performing in achieving the desired future conditions**."

Mr. Lamkey of Intera gave presentations on environmental impacts and socioeconomic impacts.

Action: Mr. Griffin moved to accept the presentation on environmental impacts by Intera. Mr. Weishuhn seconded the motion. The motion passed unanimously.

Action: Mr. Stewart moved to accept the presentation on socioeconomic impacts by Intera. Ms. Parma seconded the motion. The motion passed unanimously.

Action: Mr. Graham moved to use the "LRE Report" to justify the DFC and the DFC Evaluation Factor within the explanatory reports. Ms. Parma seconded the motion. The motion passed unanimously.

Agenda Item 8 - Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.

The representatives neither discussed nor took action regarding this item.

Agenda Item 9 - Consideration of and possible action on identification and scheduling of future agenda items and meetings.

Mr. Andruss explained the next meeting of GMA 15 is scheduled for January 8, 2026, at 9:30 AM at 1501 E. Mockingbird Lane, Suite 104, Victoria, Texas. Victoria County GCD has reserved the meeting room for potential meetings of GMA 15 on the following dates: February 12, 2026, March 12, 2026, and April 9, 2026.

Agenda Item 10 - Receive public comment.

Mr. Andruss offered to accept public comment. Comment regarding concerns with proposed groundwater development in Nueces County were provided by a member of the public.

Agenda Item 11 - Adjournment.

Action: Ms. Parma moved to adjourn the meeting after concluding all business of the groundwater management area at approximately 11:55 AM. Mr. Griffin seconded the motion. The motion passed unanimously.

Prepared by: Tim Andruss

The above and foregoing minutes were considered and approved on this the _____ day of _____ a.d. _____.

_____ Groundwater Management Area 15 Representative

ATTEST:

_____ Groundwater Management Area 15 Representative

Notice of Meeting
Groundwater Management Area 15

Notice is hereby given in accordance with Chapter 36 of the Texas Water Code that the groundwater conservation districts located wholly or partially with Groundwater Management Area 15 consisting of Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District will hold a joint planning meeting at **9:30 AM on Thursday, January 8, 2026 at the Victoria County Groundwater Conservation District Offices, 1501 E. Mockingbird Lane, Suite 104, Victoria, Texas**. The meeting will be open to the public.

Agenda:

1. Call to order and welcome guests.
2. Receive public comment.
3. Consideration of and possible action on matters related to the minutes of the previous meeting.
4. Consideration of and possible action on matters related to budget and financial reports of Groundwater Management Area 15.
5. Consideration of and possible action on reports and communication from Groundwater Management Area 15 member districts and Groundwater Management Area 15 representatives to Regional Water Planning Groups.
6. Consideration of and possible action on reports from Texas Water Development Board representatives to Groundwater Management Area 15.
7. Consideration of and possible action on matters related to joint planning:
    a. Review of accomplishments of Groundwater Management Area 15.
    b. Review of management plans of districts in Groundwater Management Area 15.
    c. Review of methods of evaluating achievement of desired future conditions of Groundwater Management Area 15.
    d. Review of proposals to adopt new or amend existing desired future conditions for Groundwater Management Area 15.
8. Consideration of and possible action on administrative and organizational matters of Groundwater Management Area 15.
9. Consideration of and possible action on identification and scheduling of future agenda items and meetings.
10. Receive public comment.
11. Adjournment.

Please submit comments, questions, and requests for additional information to Tim Andruss of the Victoria County Groundwater Conservation District by mail at P.O. Box 69, Victoria, Texas 77902 by email at admin@vcgcd.org, or by phone at (361) 579-6863.

12/19/2025

Tim Andruss, Administrator
Groundwater Management Area 15

GMA 15
Pumping Scenarios

Groundwater Management Area 15

July 10, 2025



Presented by:
Steven Young Ph.D, PE, PG
Nick Lamkey PG

Agenda

- Summary of DFCs and MAGS from Third Round of Joint Planning
- INTERA Data Request for Revised Pumping
- Pumping 2015 to 2022
- Scenario 1 Simulations
- Scenario 2 Simulations

INTERA

Third Round of Joint Planning: DFCs

- The evaluation factor is three feet above or below the adopted DFC except in Goliad

- Goliad County Evaluation Factors
  - Chicot: ±17 feet
  - Evangeline: ±36 feet
  - Burkeville: ±14 feet
  - Jasper: ±7 feet

January 1, 2000 to December 31, 2080

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

INTERA

Third Round of Joint Planning: MAGS

GAM RUN 21-020 MAG:
MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15

Grayson Dowlearn, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Section
512-475-1552
August 16, 2022

AFY

County	Aquifer	MAG (afy)			
		2020	2050	2070	2080
Aransas	na	na	na	na	na
Bee	CH, EV, BK, JS	8,017	8,000	8,003	7,989
Calhoun	CH, EV, BK, JS	7,611	7,611	7,611	7,611
Colorado	CH & EV	71,665	71,665	71,665	71,665
	JS	918	918	918	918
DeWitt	CH, EV, BK, JS	17,993	17,827	17,784	17,772
Fayette	CH, EV, BK, JS	7,168	8,011	8,660	8,590
Goliad	CH	418	430	436	436
	EV	4,983	5,165	5,287	5,287
	BK	425	505	559	559
	JS	250	515	690	690
Jackson		90,571	90,571	90,571	90,571
Karnes	CH, EV, BK, JS	10,694	3,399	2,952	2,949
Matagorda	CH & EV	38,892	38,892	38,892	38,892
Refugio	CH, EV, BK, JS	5,858	5,858	5,858	5,858
Wharton	CH & EV	181,446	181,446	181,446	181,446
Victoria	CH, EV, BK, JS	59,948	59,948	59,948	59,948

INTERA

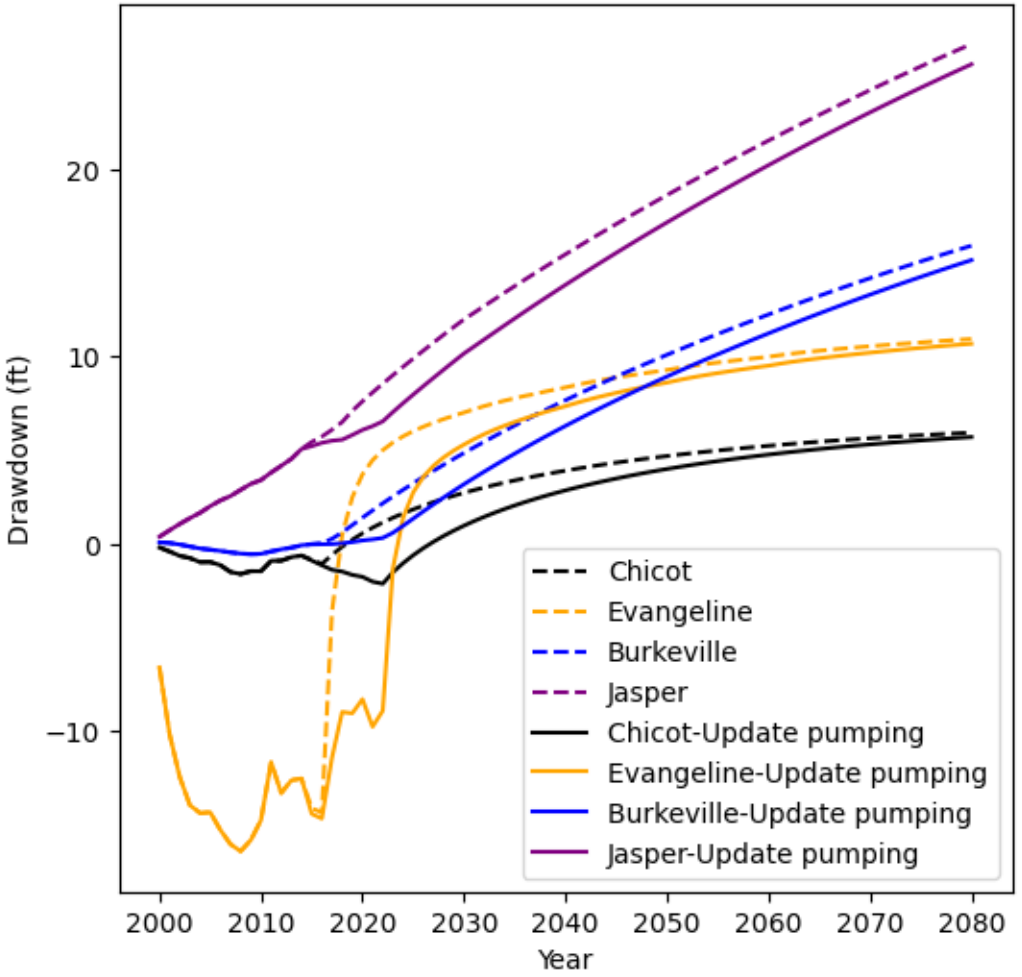
GMA 15 Pumping Adjustments: 2015 – 2022*

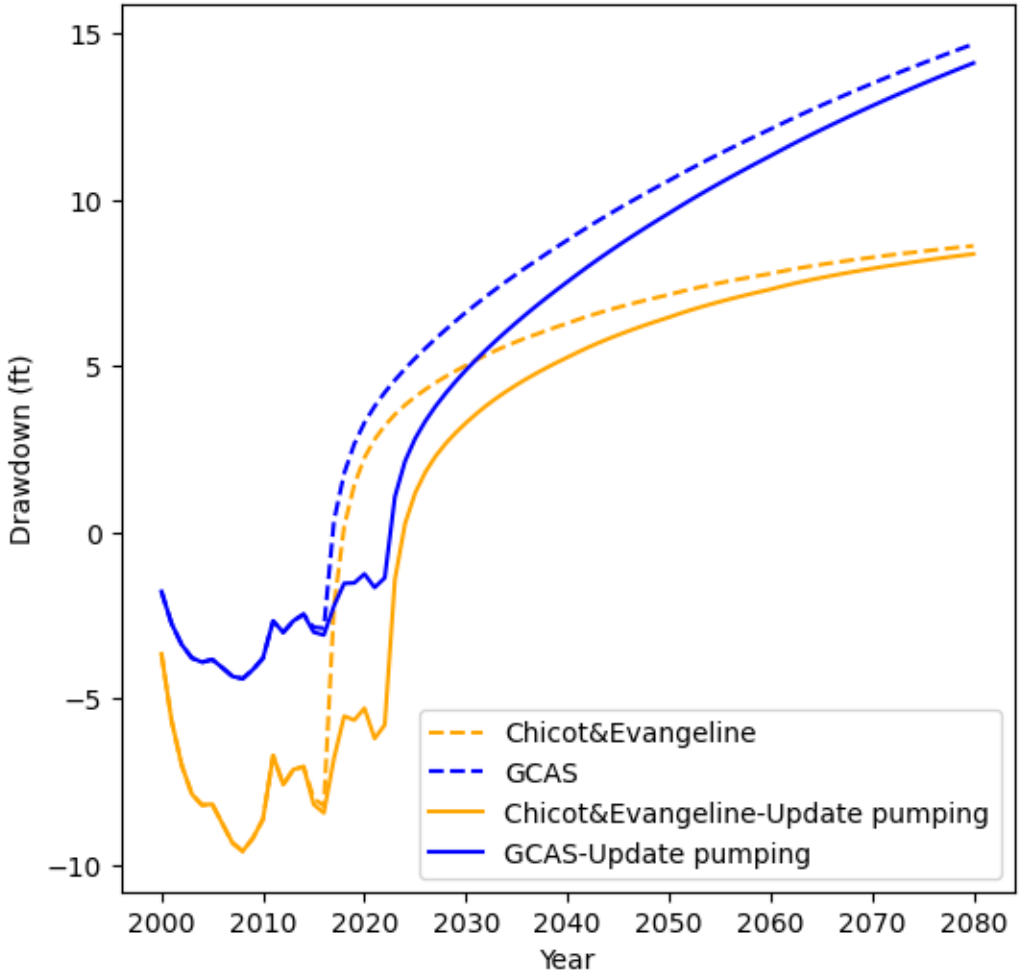
County	Year							
	2015	2016	2017	2018	2019	2020	2021	2022
Aransas	0.46	0.46	0.27	0.21	0.20	0.40	0.40	0.41
Bee	0.79	0.81	0.19	0.19	0.17	0.18	0.19	0.24
Calhoun	0.77	0.72	0.12	0.14	0.14	0.14	0.15	0.15
Colorado	0.96	0.96	0.35	0.46	0.35	0.35	0.35	0.60
De witt	0.41	0.55	0.68	0.23	0.23	0.37	0.30	0.38
Goliad	0.76		0.82	0.79	0.83	0.83	0.77	0.91
Jackson	0.99	0.99	0.60	0.67	0.68	0.64	0.61	0.70
Karnes	0.65	0.56	0.24	0.23	0.25	0.82	0.90	1.07
Lavaca	0.86	0.86	0.48	0.55	0.59	0.62	0.54	0.61
Matagorda	1.12	0.91	0.92	0.96	0.84	0.85	0.83	0.78
Refugio	0.87	0.89	0.36	0.31	0.33	0.37	0.34	0.35
Victoria	0.89	0.89	0.20	0.22	0.25	0.26	0.23	0.32
Wharton	0.94	0.95	0.64	0.71	0.59	0.68	0.44	0.47

INTERA

* Presented April 10, 2025

Drawdown Predicted by Current GAM and GAM with Pumping Updated Using TWDB Pumping through 2022





Average drawdown relative to Jan. 2000 in GMA15 Predicted by the GAM.

Requested Adjustments to Pre 2022 Pumping

- General Manager Neil Hudgins (July 2025)
- Pumping Adjustments
  - No location change
  - All pumping adjusted by the same ratios

Year	Coastal Plains GCD	Coastal Bend GCD
2005	19,981	-
2006	20,092	134,682
2007	18,369	86,777
2008	24,151	138,928
2009	39,079	177,272
2010	26,898	131,091
2011	58,652	190,759
2012	39,189	153,313
2013	43,205	163,614
2014	45,212	156,806
2015	35,341	121,100
2016	29,206	111,143
2017	28,418	111,819
2018	30,803	138,047
2019	27,214	111,820
2020	27,851	117,757
2021	27,049	83,745
2022	36,739	167,886
2023	44,826	145,887
2024	41,252	-

County	Year																			
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Matagorda	0.51	0.85	0.89	0.90	0.92	0.88	0.94	0.92	0.93	0.99	0.91	0.89	0.69	0.75	0.67	0.68	0.66	0.90	1.10	1.01
Wharton		0.98	1.07	1.01	1.01	1.01	1.01	1.01	0.98	1.00	1.00	1.00	0.62	0.76	0.62	0.65	0.46	0.93	0.80	

Data Request – Annual Pumping Data*

* Presented at GMA 15 meeting on April 10, 2025 and in INTERA letter dated April 10, 2025

Appendix A.
Format for Submission of Annual Pumping Data

For each GCD, INTERA will provide the total annual pumping from 2015 to 2022 for the Chicot Aquifer, Evangeline Aquifer , Burkeville Confining Layer, the Jasper Aquifer, and the total for four geologic units. A GCD will have the option to adjust any of the pumping amounts using one or both of following options. The GCDs may mix and match the options if it wishes to do so.

Option 1 – Annual Pumping Amount by Model Layer

To change the annual pumping amount for a model layer for a specific year, a GCD will need to submit an excel file. The excel sheet should be email to Steve Young at syoung@intera.com and to Tim Andruss at Tim.Andruss@vcgcd.org. The excel will list one change per row. Each row needs to include the following :the county, the model layer, the year, and annual pumping amount in acre-feet/year day. An example of formatted data is:

County	Model Layer	Year	amount (afy)
Victoria	Chicot	2017	20,000
Victoria	Jasper	2017	500
Victoria	Evangeline	2019	7,000

Option 2 – Annual Pumping Amount by Well

To change the annual pumping amount for a specific well for a specific year, a GCD will need to submit an excel file. The excel sheet should be email to Steve Young at syoung@intera.com and to Tim Andruss at Tim.Andruss@vcgcd.org. The excel will list one pumping amount change per row. Each row needs to include the following: county, well ID, well latitude, well longitude, model layer, and annual pumping amount in acre-feet/year day. An example of formatted data is:

County	Well ID	Latitude	Longitude	Model Layer	Year	Amount(afy)
Victoria	VC-25c	28.3247	-97.1345	Chicot	2017	470
Victoria	VC-386	29.3247	-97.7428	Chicot	2017	970
Victoria	VC-001	28.8888	-96.9879	Evangeline	2017	1,550
Victoria	VC-84	28.1275	-97.5578	Chicot	2017	260
Victoria	VC-19s	29.0002	-98.8804	Jasper	2017	120

Data Request – Well Data*

Appendix B.
Format for Submission of Well Data

For each GAM simulation, INTERA will tabulate simulated drawdown at 10-year intervals starting at the year 2000 and ending in the year 2080 for every well submitted by a GCD. In addition, INERA will generate a hydrograph of the simulated water level for up to 200 wells submitted by a GCD. The list of wells needs to be listed in a excel file. The excel file should be email to Steve Young at syoung@intera.com and to Tim Andruss at Tim.Andruss@vcgcd.org. The excel file will list one well per row. . Each row needs to include the following: county, well ID, well latitude, well longitude, and model layer. An example of formatted data is:

County	Well ID	Latitude	Longitude	Model Layer
Victoria	VC-123	28.3247	-97.1345	Chicot
Victoria	VC-009	28.6734	-98.2222	Jasper
Victoria	VC-184	27.9075	-97.1987	Evangeline
Victoria	VC-349	28.3337	-97.7865	Evangeline
Victoria	VC-054	28.3247	-97.4456	Chicot

INTERA

* Presented at GMA 15 meeting on April 10, 2025 and in INTERA letter dated April 10, 2025

Response to INTERA Data Request

- No Change to Pumping and DFC
  - Live Oak GCD, Bee County GCD, Goliad County GCD, CBGCD,
  - Victoria County GCD (Scenario 1)

    a·condition·to·not·exceed·an·average·drawdown·of·5·feet·in·the·Gulf·Coast·Aquifer,·+/-3·feet,·at·the·end·of·year·2080·evaluated·using·the·previous·pumping·distribution·used·to·develop·the·DFC··¶
  - Calhoun County GCD (Scenario 1)

    a condition to not exceed an average drawdown of 5 feet in the Gulf Coast Aquifer, +/-3 feet, at the end of year 2080 evaluated using the previous pumping distribution used to develop the DFC for Calhoun County unchanged.
  - Refugio County GCD (Scenario 1)

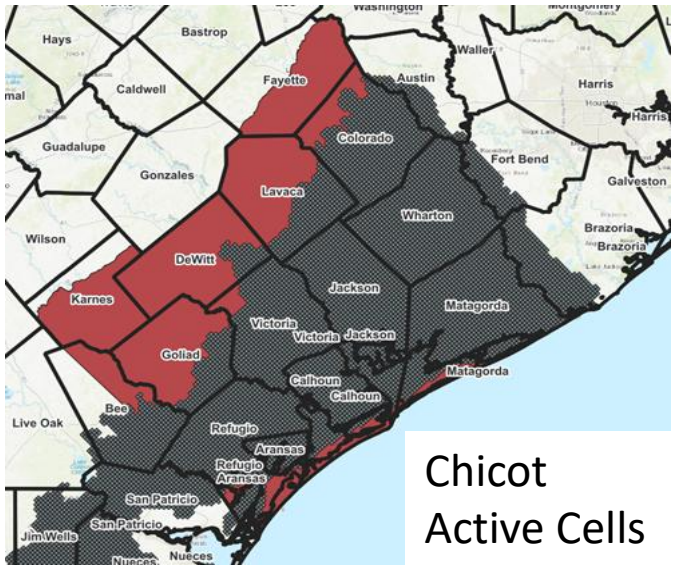
    a·condition·to·not·exceed·an·average·drawdown·of·5·feet·in·the·Gulf·Coast·Aquifer,·+/-3·feet,·at·the·end·of·year·2080·evaluated·using·the·previous·pumping·distribution·¶
- Change Pumping and DFC
  - Texana GCD (Scenario 1)

    ·a·condition·to·not·exceed·an·average·drawdown·of·**10·feet**·in·the·Gulf·Coast·Aquifer·at·the·end·of·year·2080·with·the·previous·pumping·distribution·used·to·develop·the·DFC·reduced·by·33%.¶
  - Coastal Plains GCD

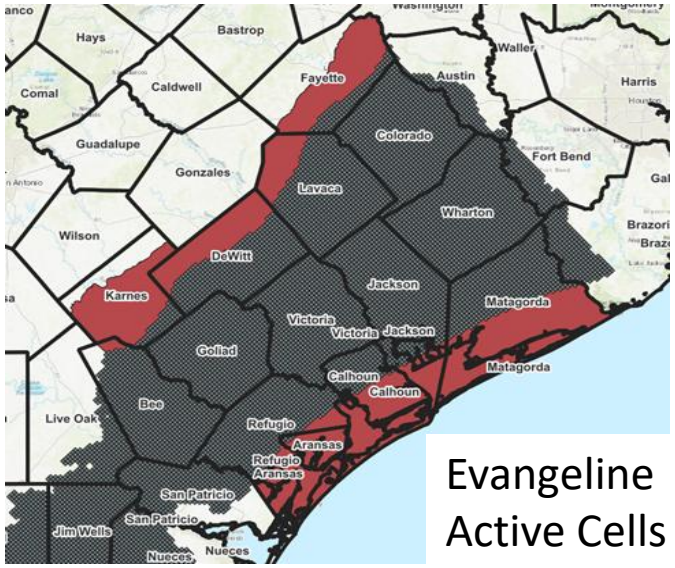
    The Coastal Plains GCD DFC is currently at 11 ….would like to see this increased to 15 ft.

Limitation of GAM Regard Developing DFCs

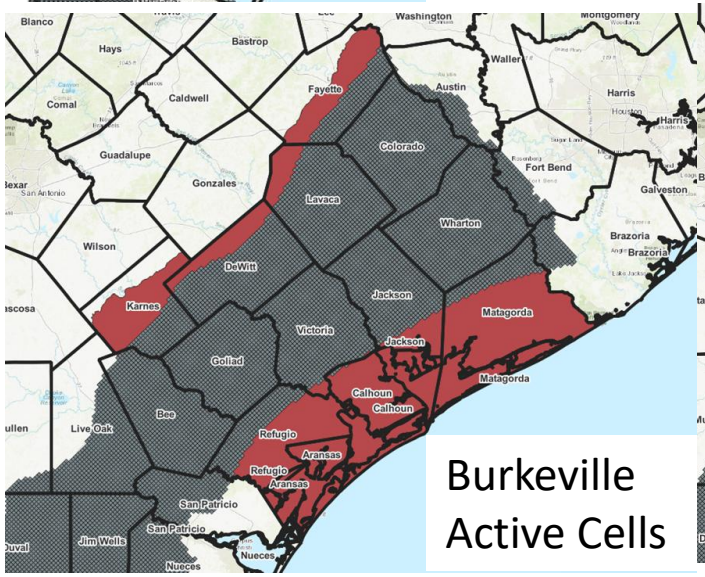
- Jasper is totally absent in four counties
- Jasper partly absent in five counties
- Pumping Effects from GMA 14 are essentially ignored
- GMA 13 GAM coverage should include 1 to 2 counties into GMA 14
- Recently updated GMA 14 GULF 2023 extend two counties into GMA 15 to Victoria County



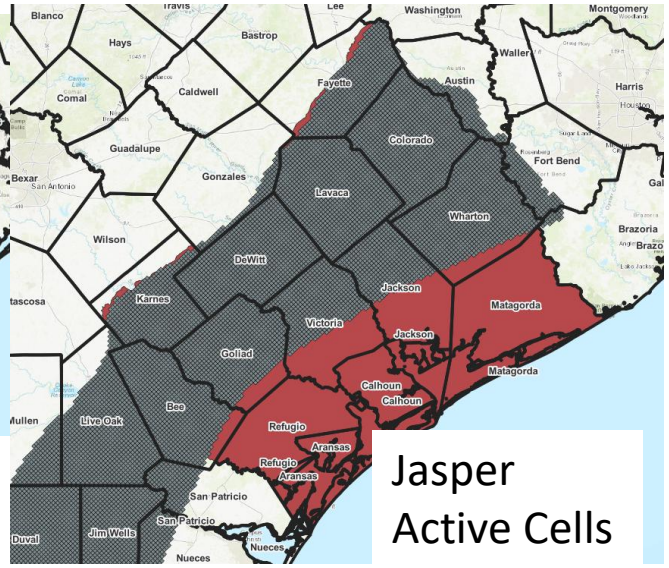
Chicot
Active Cells



Evangeline
Active Cells



Burkeville
Active Cells



Jasper
Active Cells

Challenges with Achieving DFCs in Matagorda County & Jackson County

- Matagorda County Desires Increase DFCs
  - GMA 15 GAM does not account for the contribution from GMA 14 production on drawdown in Matagorda County
  - Matagorda County DFC is insensitive to increasing Brazoria County pumping by 50%
  - Matagorda County DFC is sensitive to decreasing Jackson County pumping by 33%
- INTERA investigated numerous combination with GAM 15 pumping with no success
- Options for achieving Coastal Plains GCD DFC
  - Significantly increase pumping in Brazoria County
  - Increase evaluation factors above 3 ft

Response to INTERA Data Request

Change in Pumping within GMA 15

County	Aquifer	Pumping	
		MAG	Revised
Jackson	Chicot	66,168	66,168
Jackson	Evangeline	24,553	16,450
Matagorda	Chicot	33,790	33,790
Matagorda	Evangeline	7,121	13,103

Change in Pumping within GMA 15

Pumping in Chicot and Evangeline aquifers in Brazoria County significantly increased

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

Predicted DFC (Jan 2000 – Dec 2080)

County	Aquifer	DFC 2080
Aransas	Gulf Coast Aquifer System	0
Bee	Gulf Coast Aquifer System	7
Calhoun	Gulf Coast Aquifer System	5
Colorado	Chicot & Evangeline	17
	Jasper	25
DeWitt	Gulf Coast Aquifer System	17
Fayette	Gulf Coast Aquifer System	44
Goliad	Chicot	-4
	Evangeline	-2
	Burkeville	7
	Jasper	14
Jackson	Gulf Coast Aquifer System	**10**
Karnes	Gulf Coast Aquifer System	22
Lavaca	Gulf Coast Aquifer System	18
Matagorda	Chicot & Evangeline	**15**
Refugio	Gulf Coast Aquifer System	11
Wharton	Chicot & Evangeline	15
Victoria	Gulf Coast Aquifer System	5

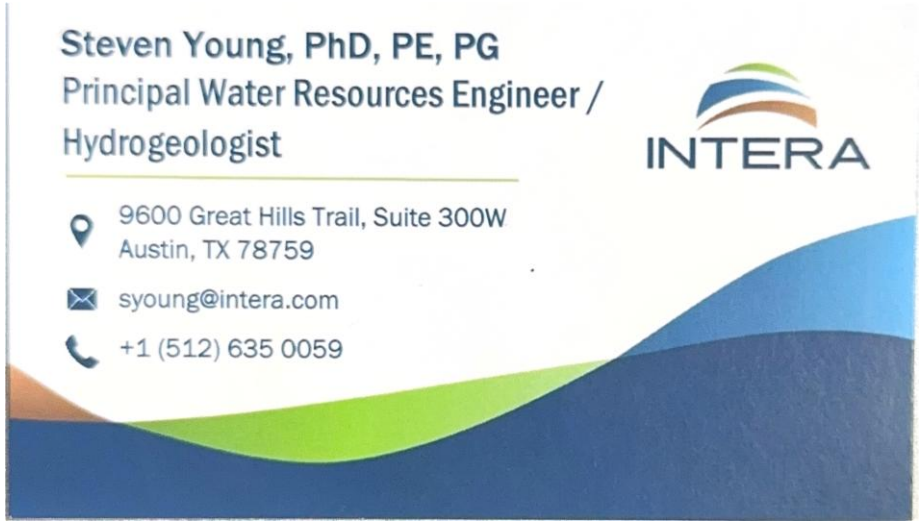
***Same Evaluation Factors as Those Used in Last Planning Period with Rounding to Nearest Integer**

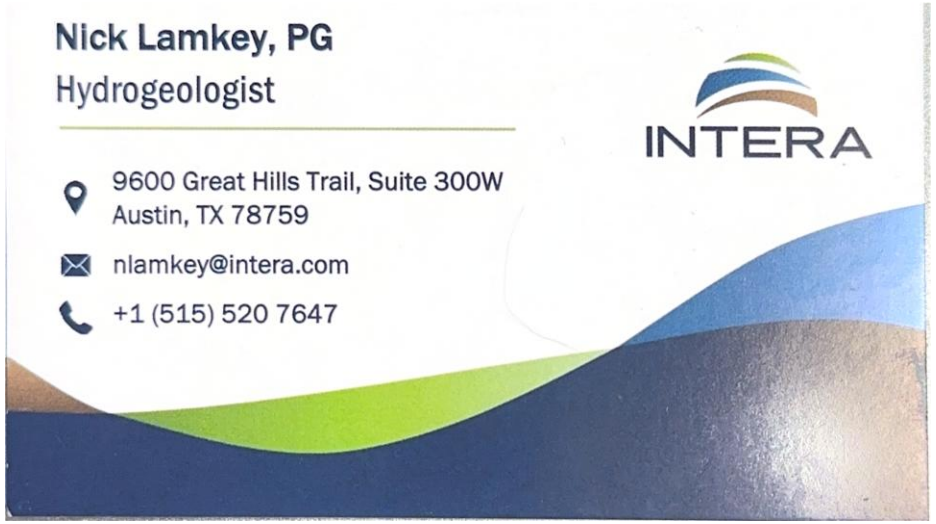
Response to INTERA Data Request (Scenario 2)

- INTERA Investigations did not Find a Path for Success any GCD Request

- Scenario 2 Adds Brackish Water Pumping to Scenario 1
  - Calhoun County GCD (Scenario 2)
    - a condition to not exceed an average drawdown of 20 feet in the Burkeville and Jasper Aquifers, combined,+/- 3 feet, at the end of year 2080 evaluated using:
    - an additional 40,000 acre-feet per year in the Burkeville and Jasper Aquifers in Calhoun County.
  - Refugio County GCD (Scenario 2)
    - a condition to not exceed an average drawdown of 20 feet in the Burkeville and Jasper Aquifers, combined,+/- 3 feet, at the end of year 2080 evaluated using:
    - an additional 40,000 acre-feet per year in the Burkeville and Jasper Aquifers in Refugio County.
  - Victoria County GCD (Scenario 2)
    - a condition to not exceed an average drawdown of 20 feet in the Burkeville and Jasper Aquifers, combined,+/- 3 feet, at the end of year 2080 evaluated using:
    - an additional 40,000 acre-feet per year in the Burkeville and Jasper Aquifers in Victoria County.
  - Texana GCD(Scenario 2)
    - a condition to not exceed an average drawdown of 20 feet in the Burkeville and Jasper Aquifers, combined,+/- 3 feet, at the end of year 2080 evaluated using:
    - an additional 40,000 acre-feet per year in the Burkeville and Jasper Aquifers in Jackson County.

Questions?


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Appendix E

Additional Information Provided by Goliad County Groundwater Conservation District

Outlook

FW: Preliminary DFCs and Pumping

From tgraham192@gmail.com <tgraham192@gmail.com>
Date Tue 1/6/2026 3:25 PM
To Steve Young <syoung@intera.com>
Cc Nicholas Lamkey <nlamkey@intera.com>

Caution! This message was sent from outside of INTERA, INC. Block sender | Report

Steve:

Apparently I did not copy you on the email. Sorry about that.

Terrell

From: tgraham192@gmail.com <tgraham192@gmail.com>
Sent: Wednesday, May 28, 2025 1:30 PM
To: 'Tim Andruss' <tim.andruss@vcgcd.org>
Cc: 'Michelle Shelton' <mshelton@goliadcogcd.org>
Subject: Preliminary DFCs and Pumping

Tim:

As we discussed a couple of weeks ago. We are concerned about the DFCs being calculated with one model and the MAGs being calculated with another model. It is hoped that the TWDB runs preliminary MAGs as we requested. With all of this is mind, we provide the following preliminary DFCs. Our preliminary pumping is the same as the last go round. We reserve the right to change these values. We expect our MAG to be near what it was last go round.

Chicot Aquifer: 13 feet of drawdown.
Evangeline Aquifer: 34 feet of drawdown.
Burkeville Aquifer: 21 feet of drawdown.
Jasper Aquifer: 21 feet of drawdown.

Thank you,
Terrell

LRE WATER
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

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Michael R. Keester, P.G. 10/20/2020
Senior Project Manager | Hydrogeologist

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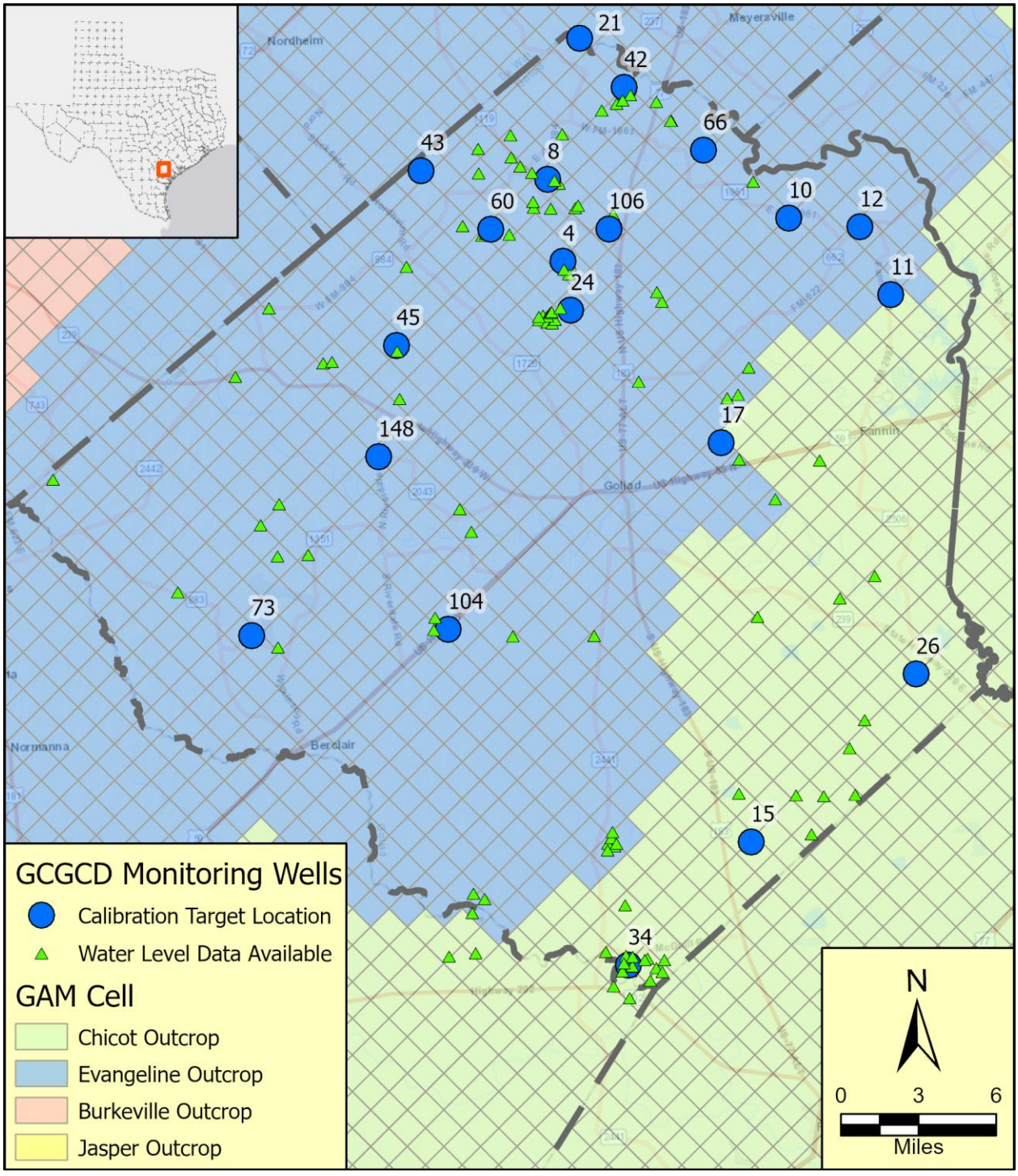


Figure 1. GCGCD monitoring well locations.

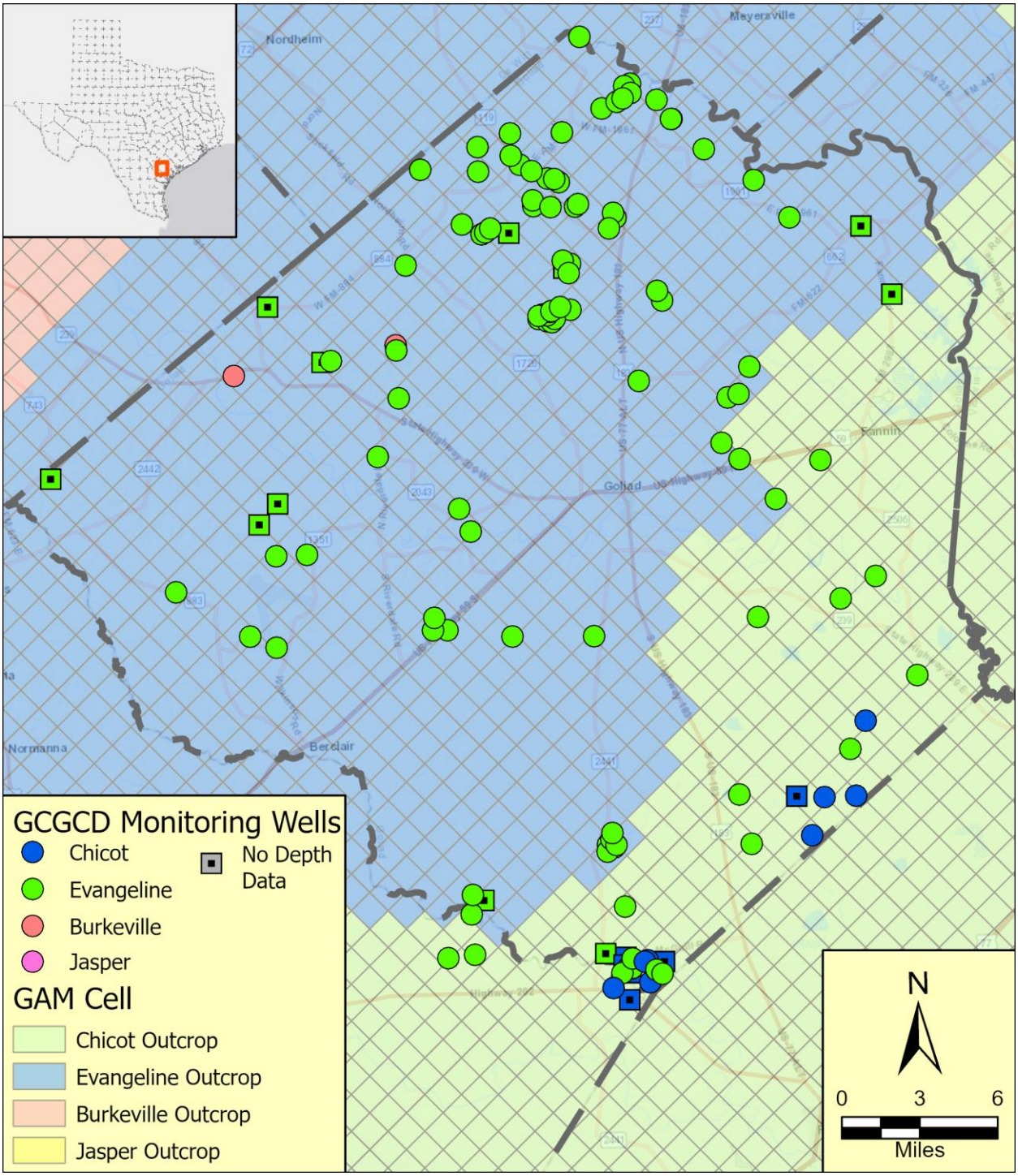


Figure 2. GCGCD monitoring wells by aquifer.

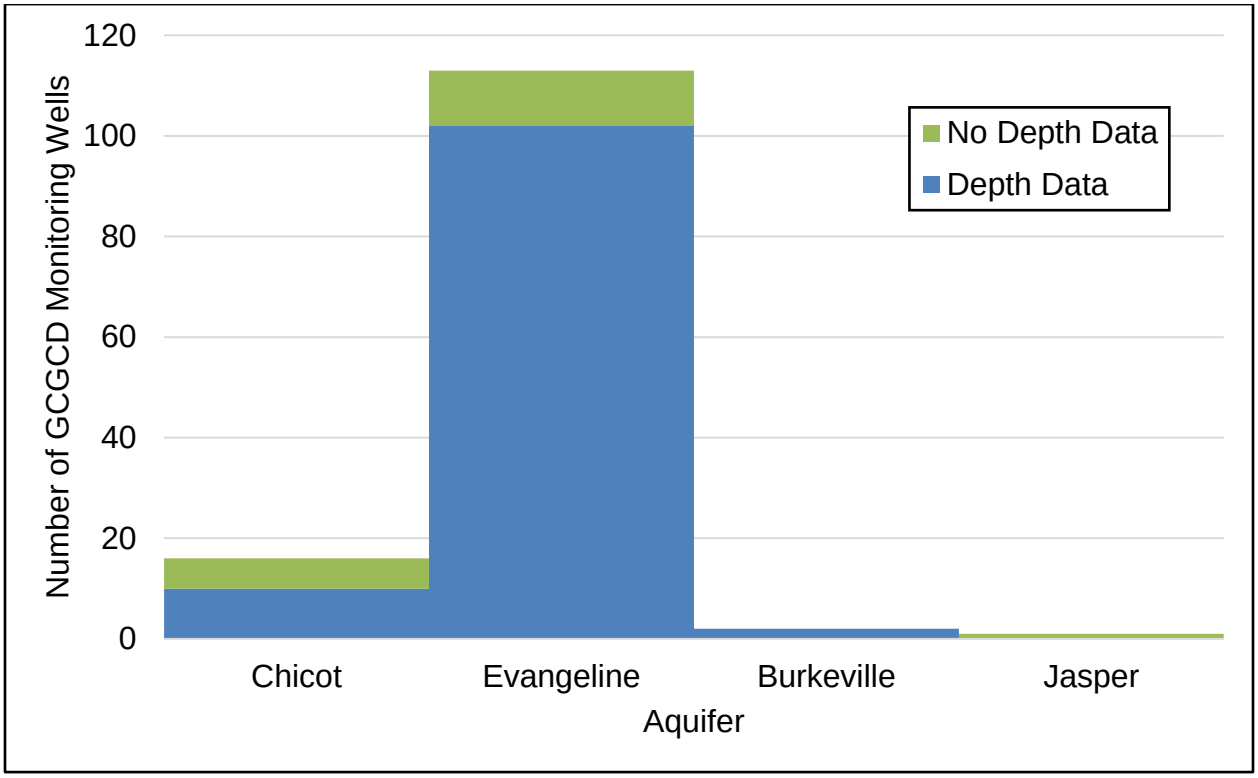


Figure 3. Number GCGCD monitoring wells by aquifer.

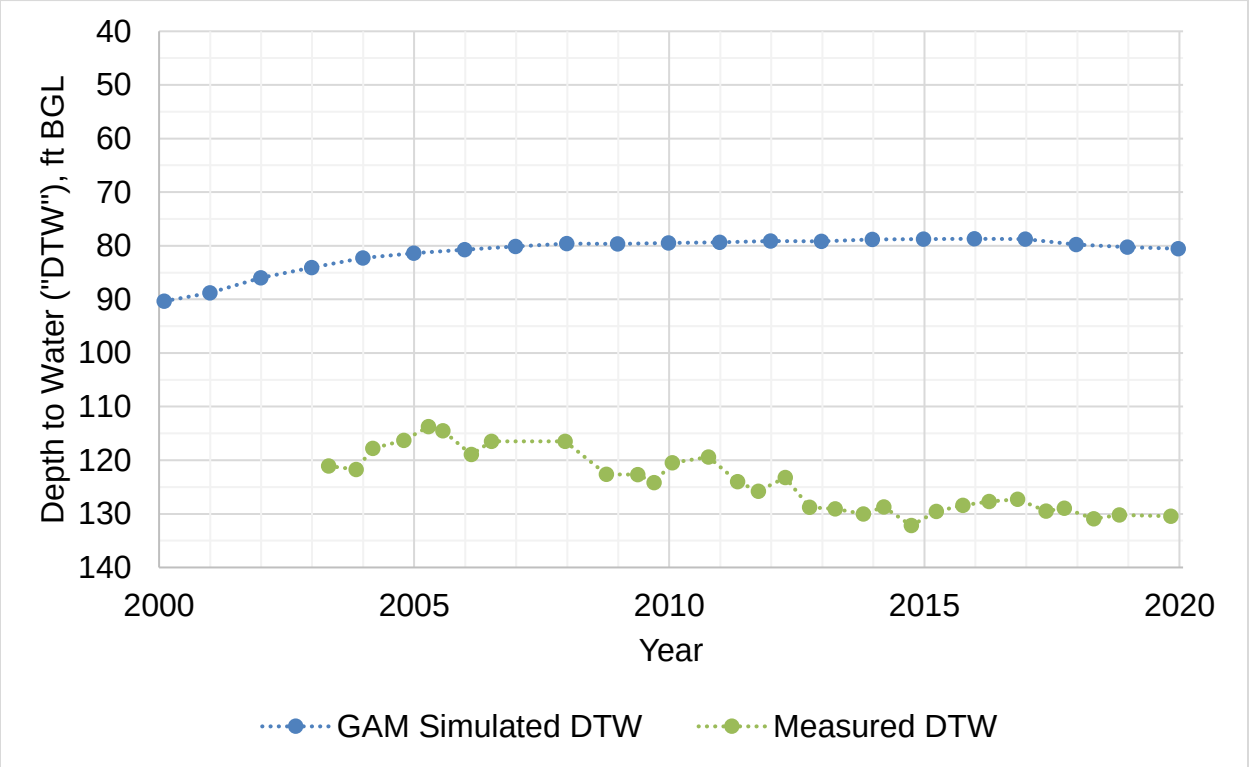


Figure 4. GCGCD monitoring well #4 simulated and measured depth to water. Simulated depth to water calculated as the difference between the land surface elevation and the simulated water level.

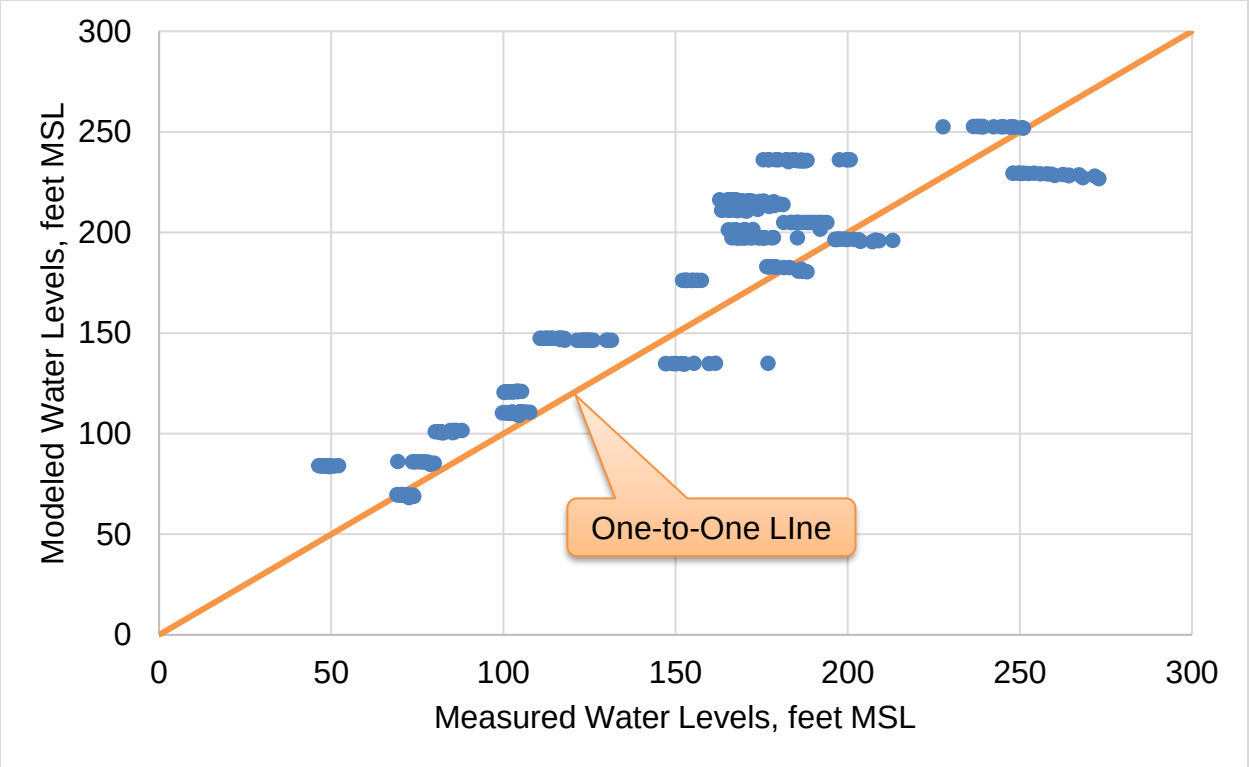


Figure 5. GAM simulated water levels versus measured water levels at the target monitoring wells. Points above the "One-to-One Line" indicate the simulated water level is higher than the corresponding measured water level.

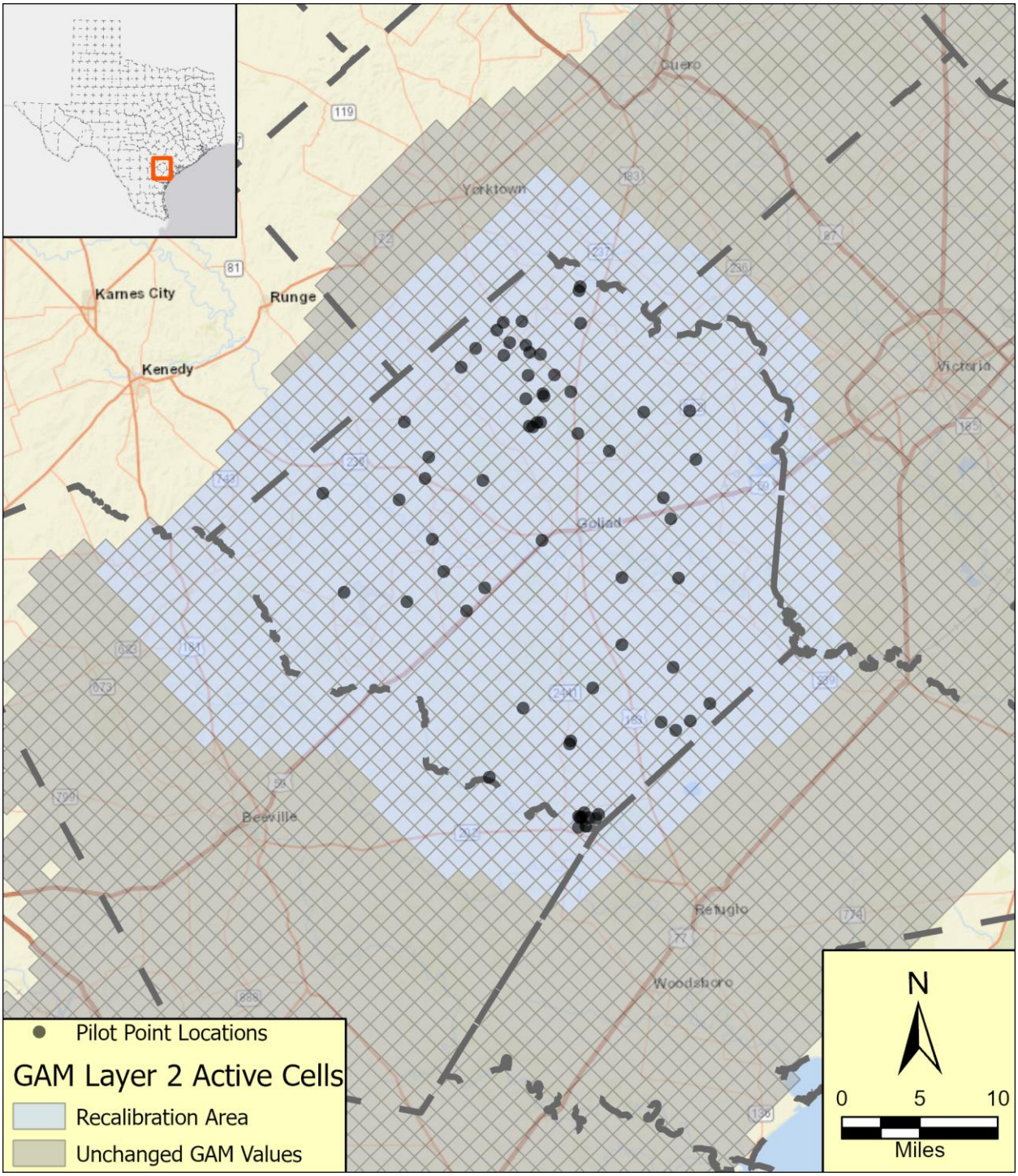


Figure 6. GAM layer 2 recalibration error and pilot point locations.

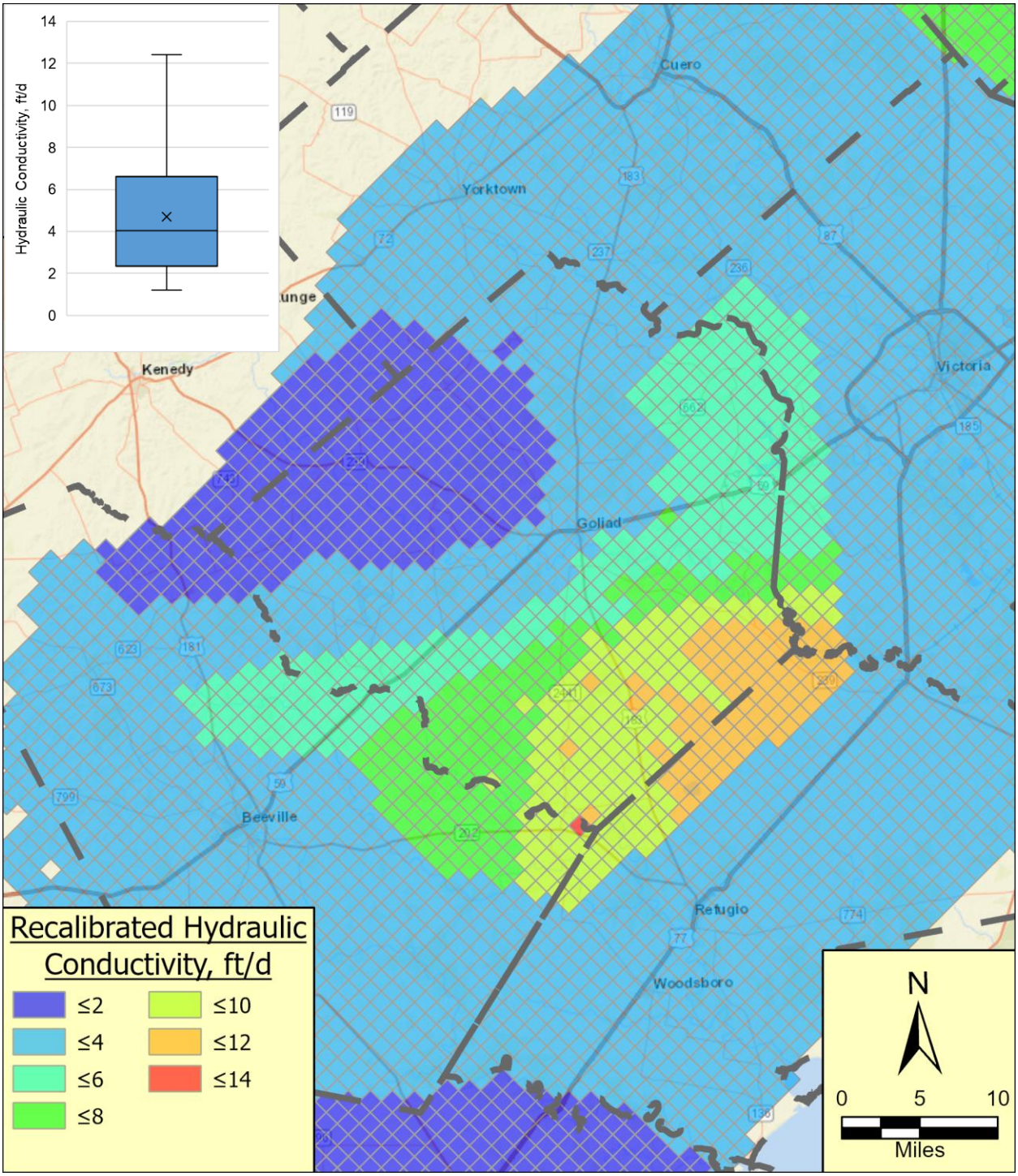


Figure 7. GAM layer 2 recalibration hydraulic conductivity distribution.

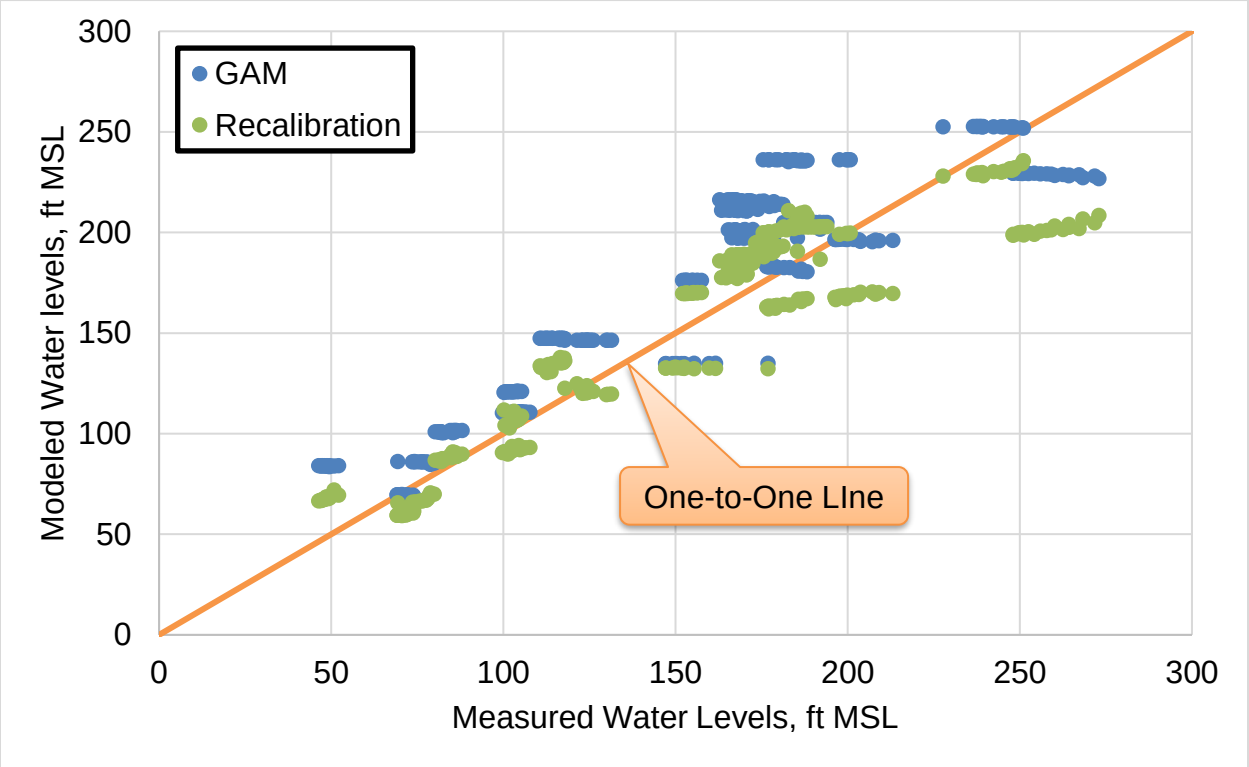


Figure 8. GAM and recalibration simulated water levels versus measured water levels at the target monitoring wells. Points above the "One-to-One Line" indicate the simulated water level is higher than the corresponding measured water level.

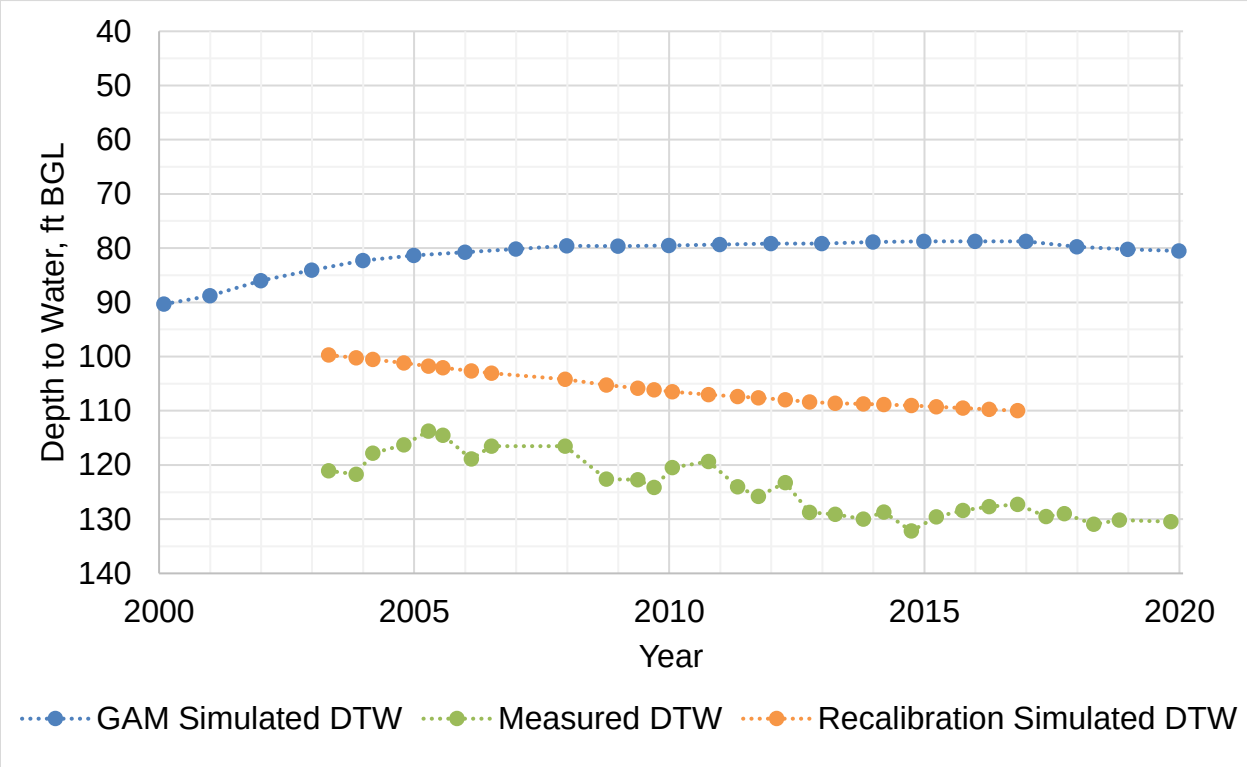


Figure 9. **GCGCD monitoring well #4 GAM and recalibration simulated and measured depth to water. Simulated depth to water calculated as the difference between the land surface elevation and the simulated water level.**

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

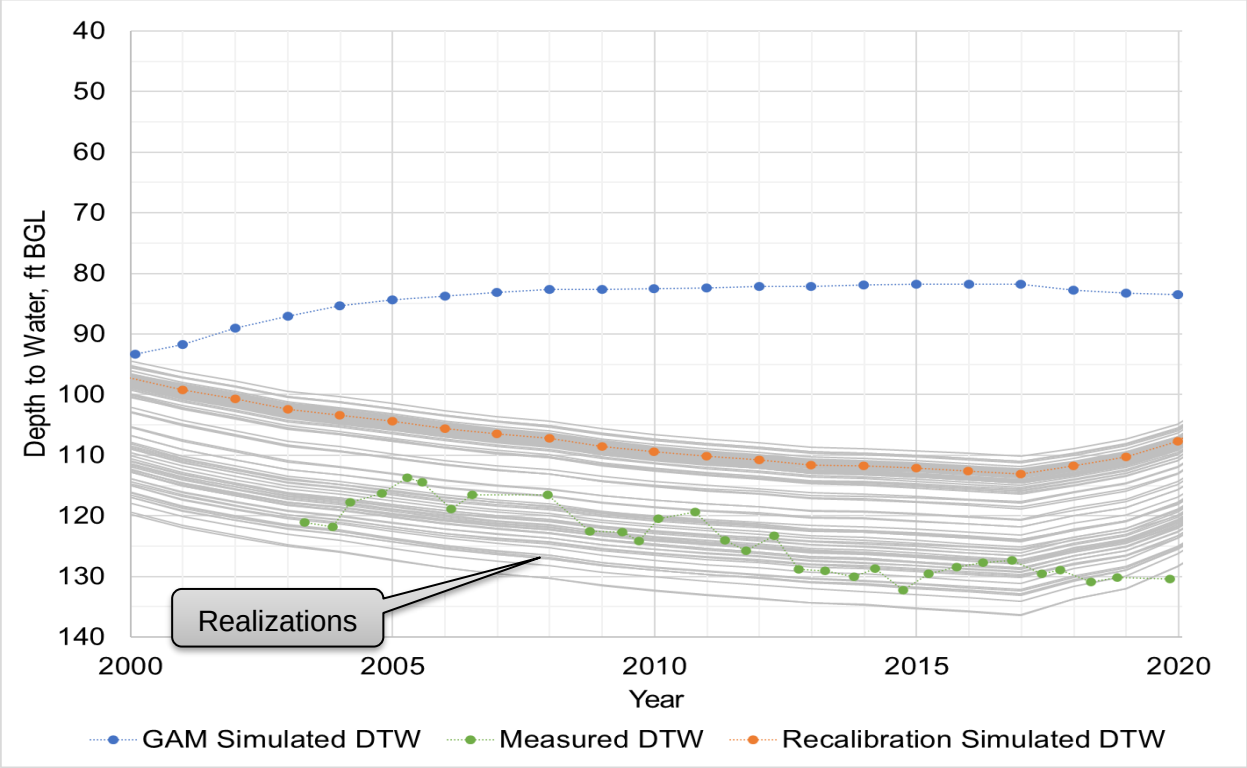


Figure 10. GCGCD monitoring well #4 measured depth to water with simulated depth to water from the GAM, recalibration, and 100 recalibration realizations (gray lines). Simulated depth to water calculated as the difference between the land surface elevation and the simulated water level.

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

Year	Chicot		Evangeline		Burkeville		Jasper		GCAS	
	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

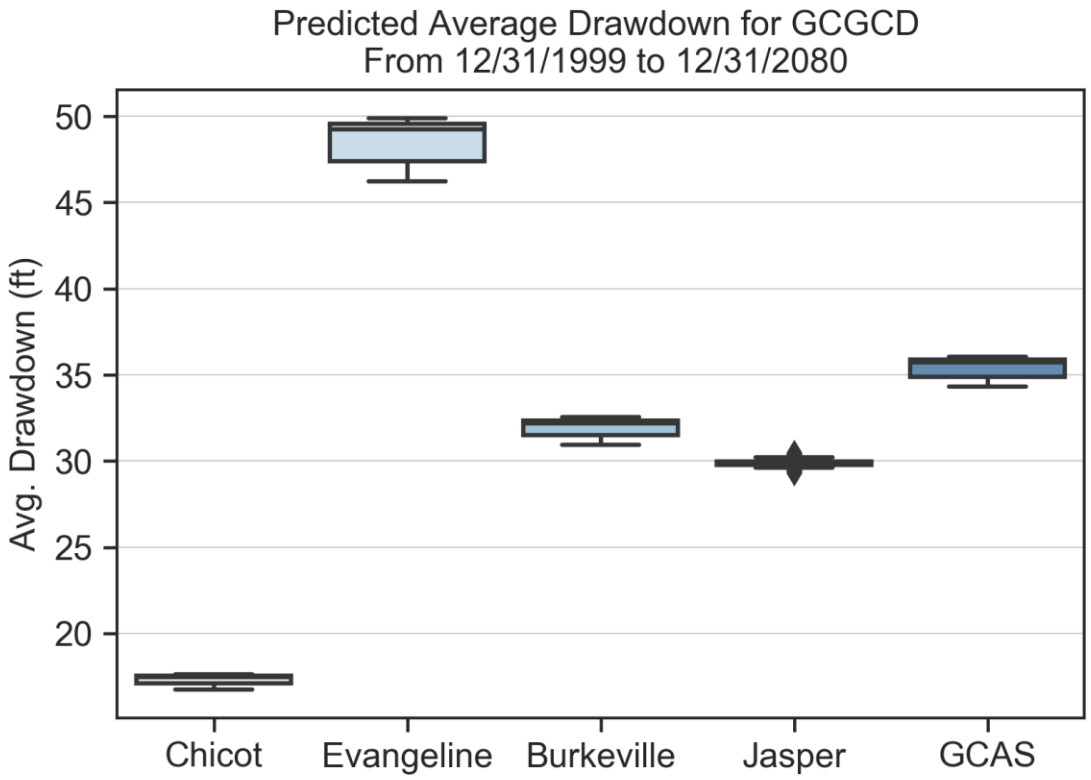


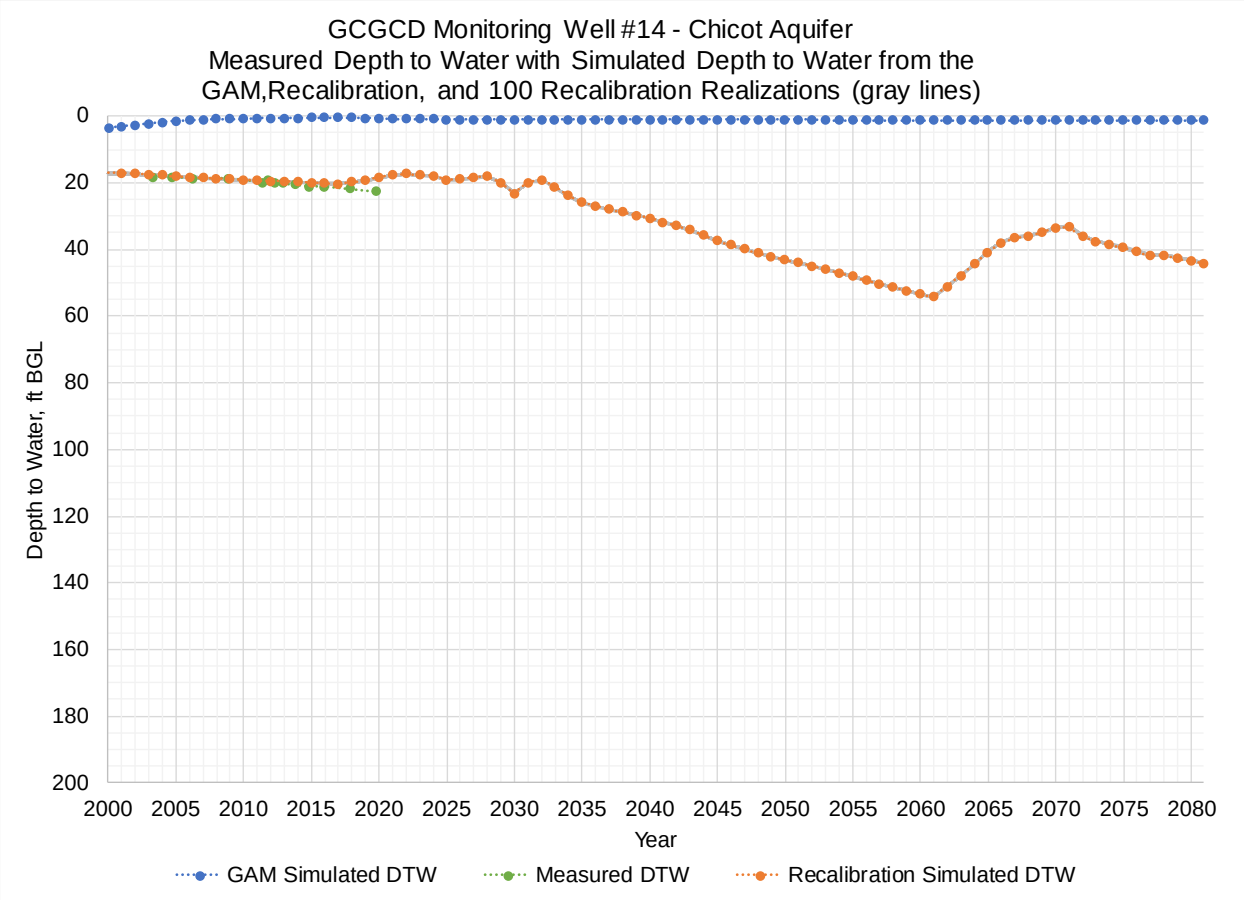
Figure 11. Box plot of the predicted average drawdown in GCGCD from predictions using the GMA 15 adopted pumping file in the model with the recalibration and realization hydraulic conductivity values.

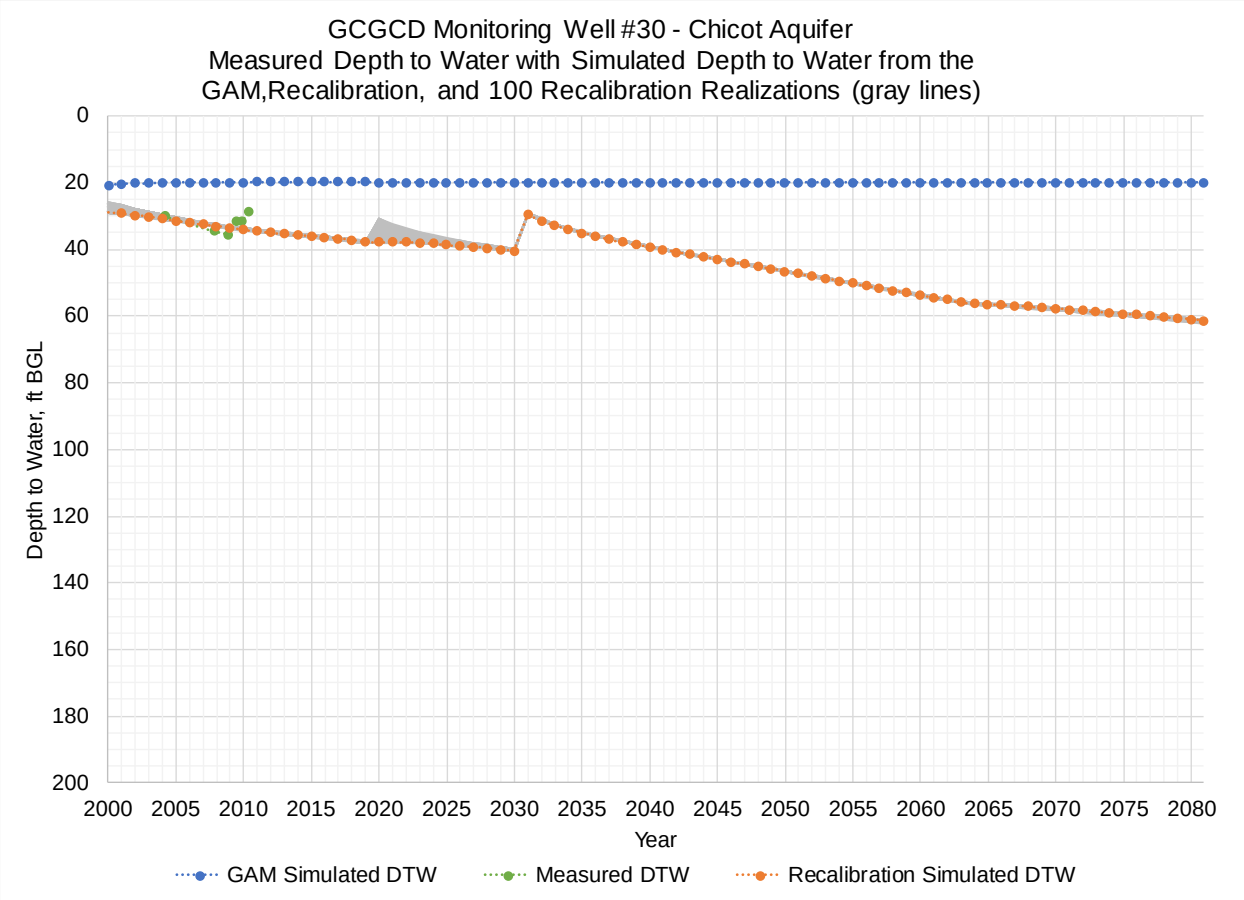
Table 5. Predicted drawdown between 12/31/1999 and 12/31/2080 at select GCGCD monitoring wells.

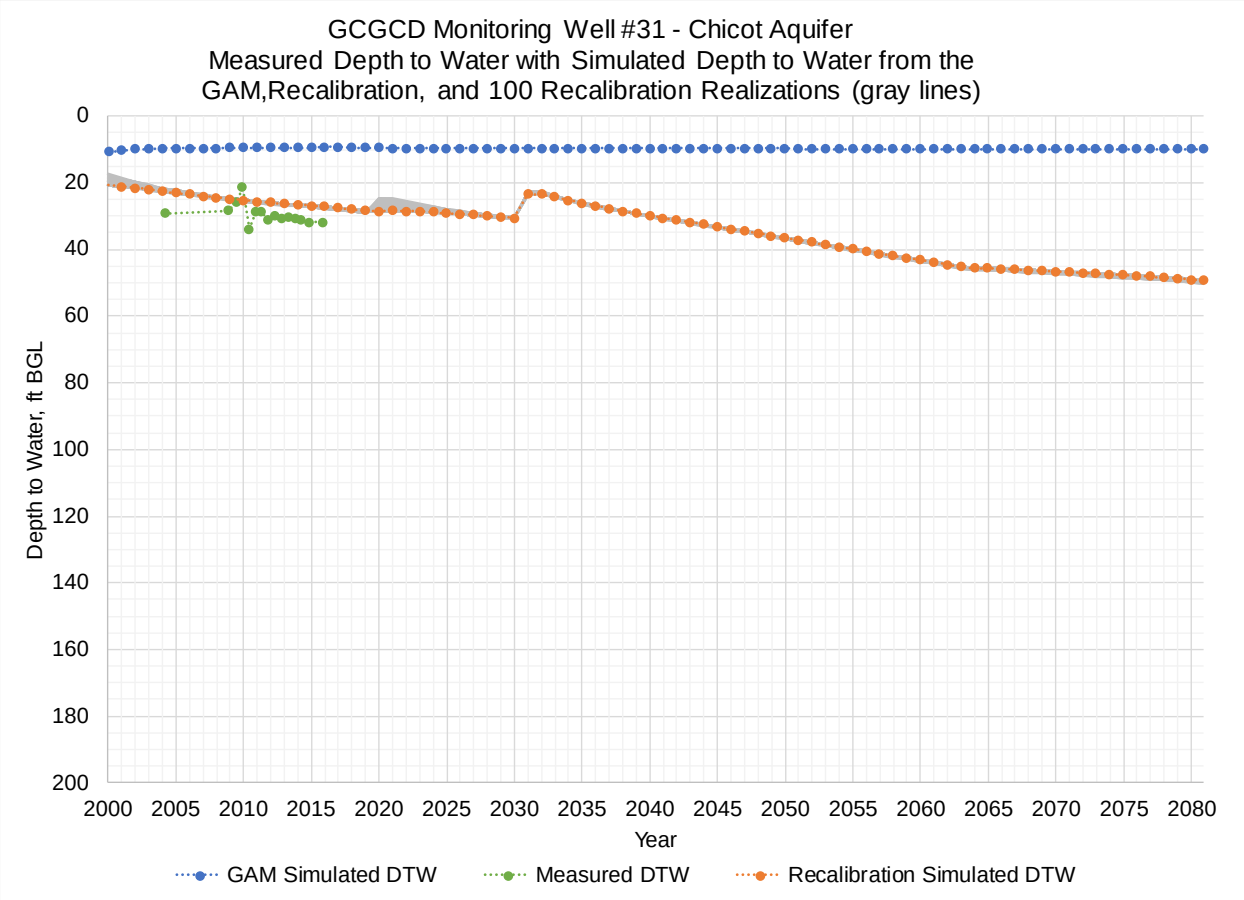
Aquifer (GAM Layer)	Monitoring Well	Predicted Drawdown	Realizations Minimum	Realizations Maximum
Chicot (1)	14	27	26	27
	34	33	32	36
	96	20	19	20
Evangeline (2)	4	81	70	81
	11	48	46	49
	15	33	28	32
	17	32	27	31
	37	41	37	41
	42	79	76	89
	43	83	75	83
	45	40	36	39
	73	94	81	95
Burkeville / Jasper (3 /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

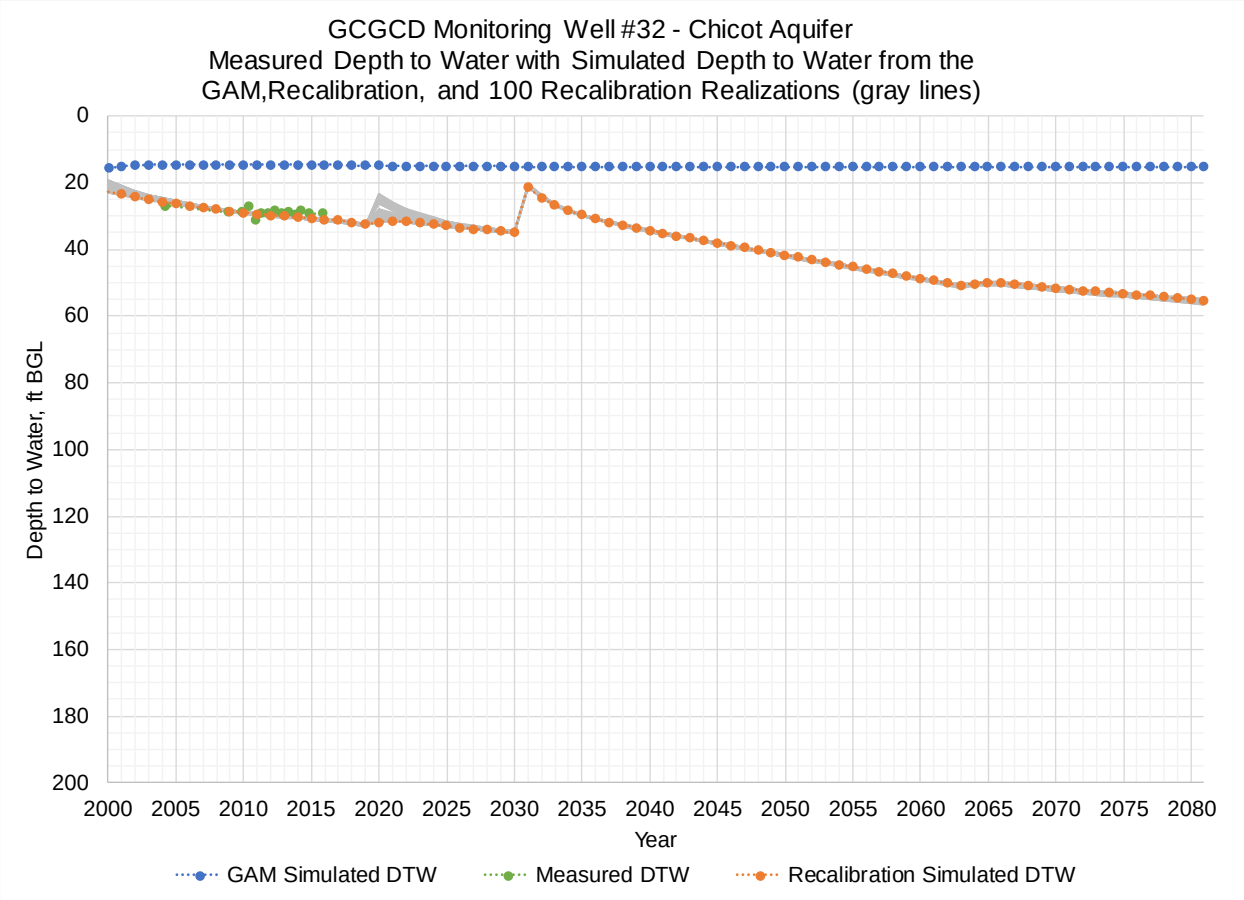
Attachment —
Measured depth to water with simulated depth to water from the GAM, recalibration, and 100 recalibration realizations (gray lines) at GCGCD monitoring well locations. Simulated depth to water represents the difference between the land surface elevation and the simulated water level.

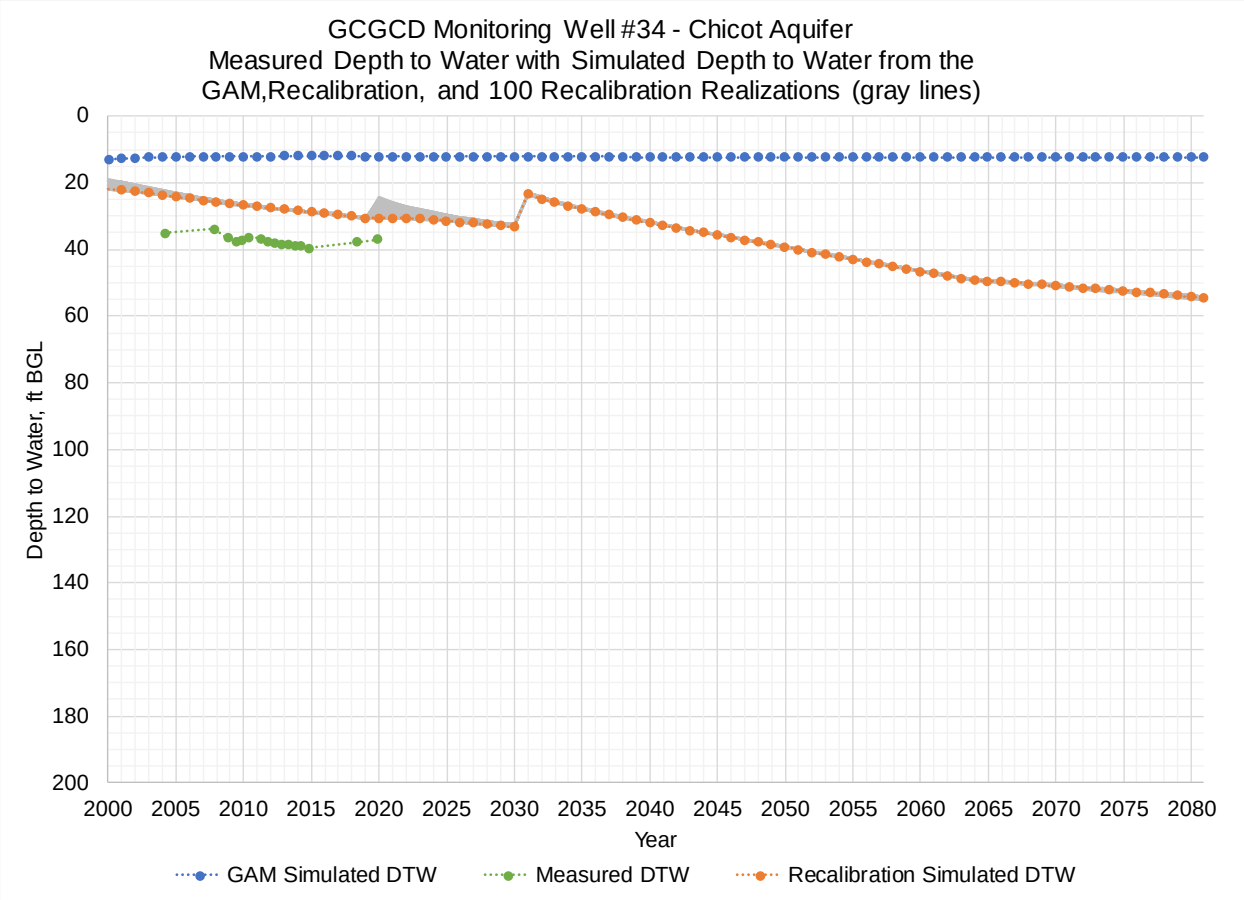
Chicot Aquifer Monitoring Wells

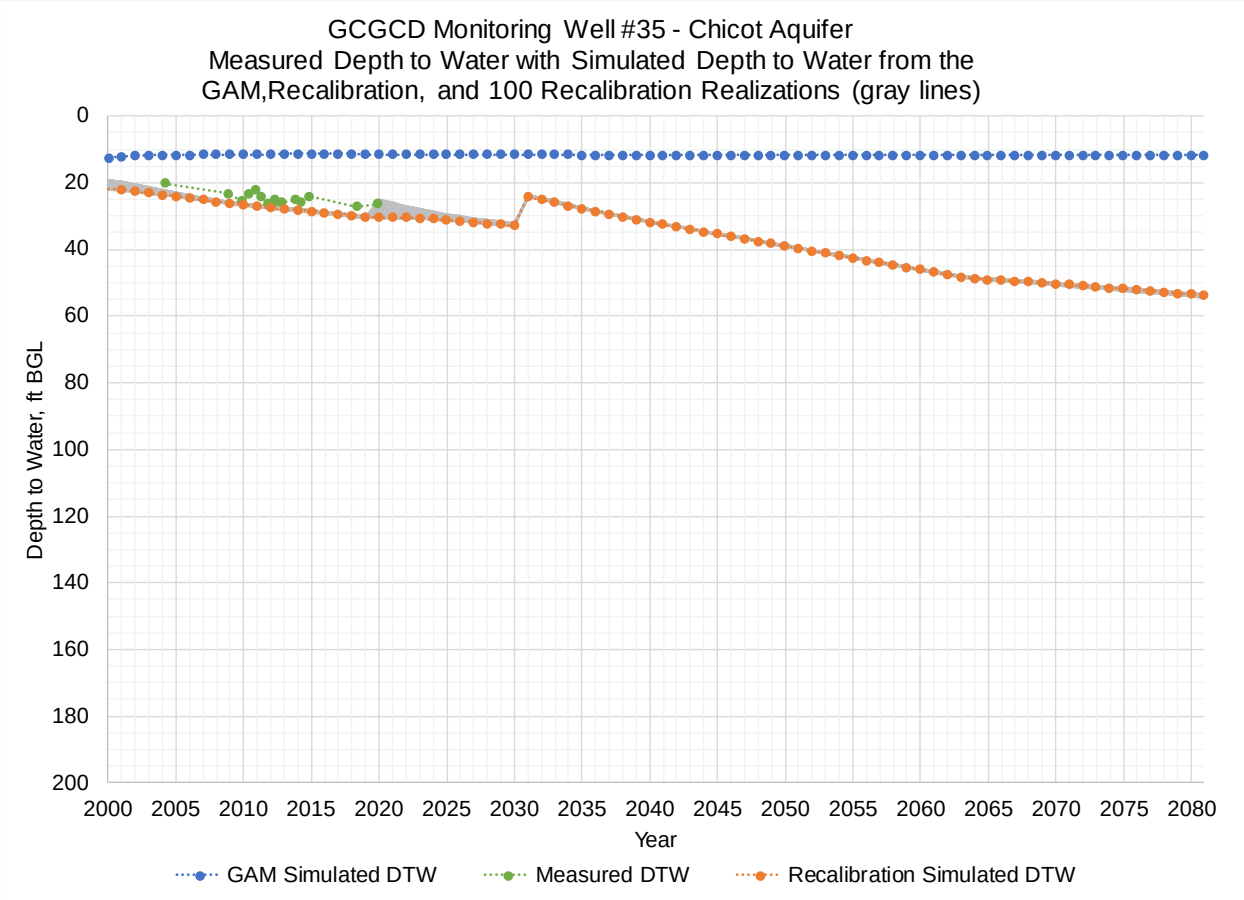

GCGCD Monitoring Well #14 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
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2080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

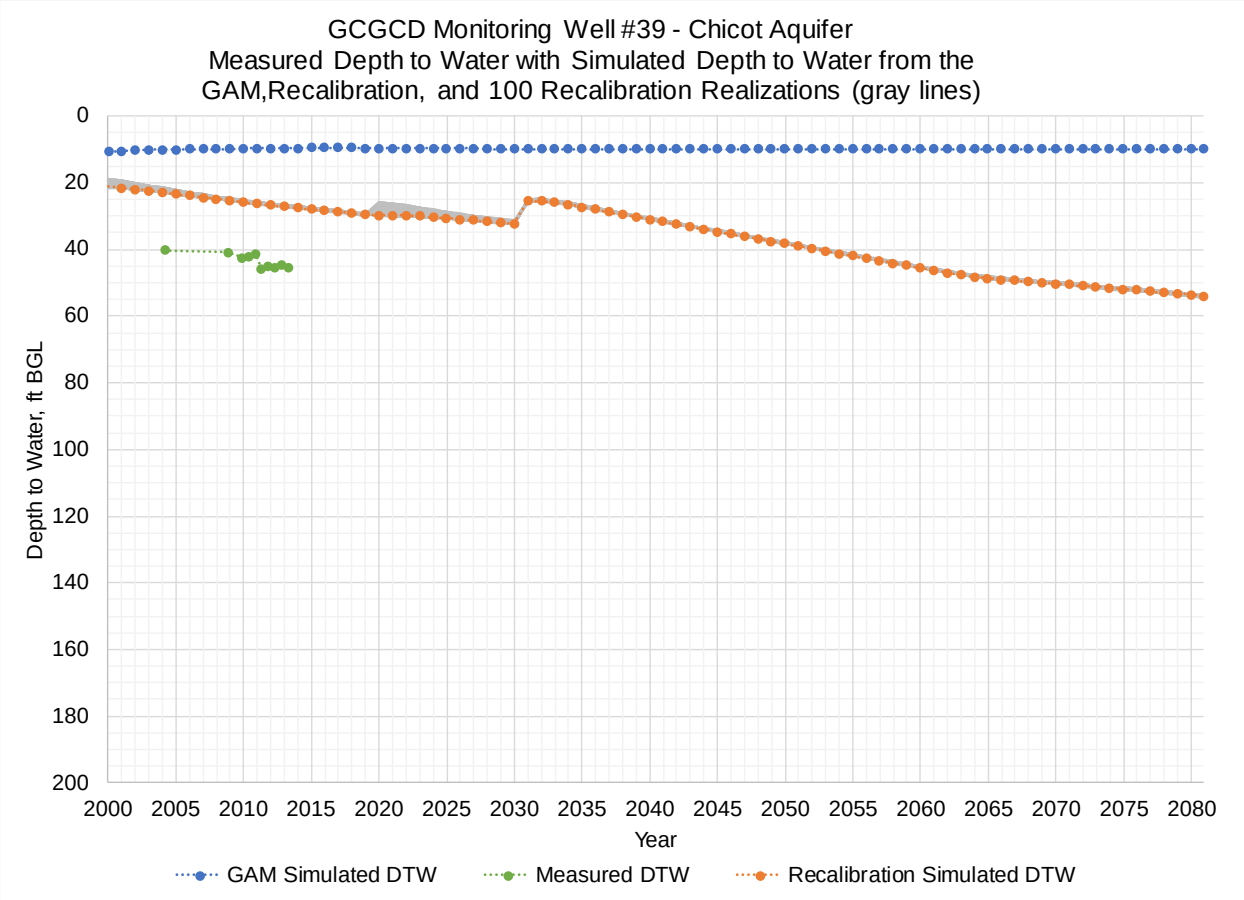

GCGCD Monitoring Well #30 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
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200
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2005
2010
2015
2020
2025
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

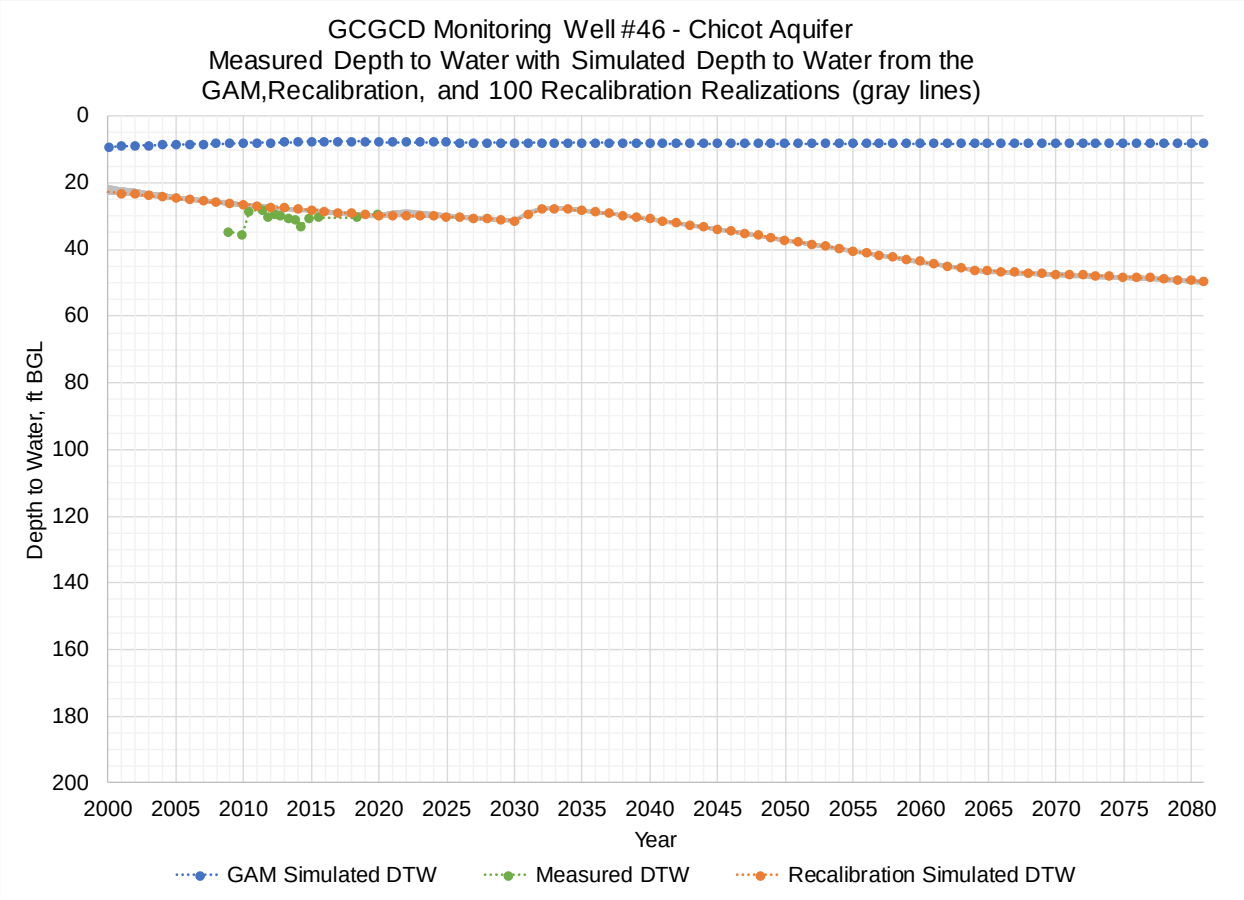

GCGCD Monitoring Well #31 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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100
120
140
160
180
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2010
2015
2020
2025
2030
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

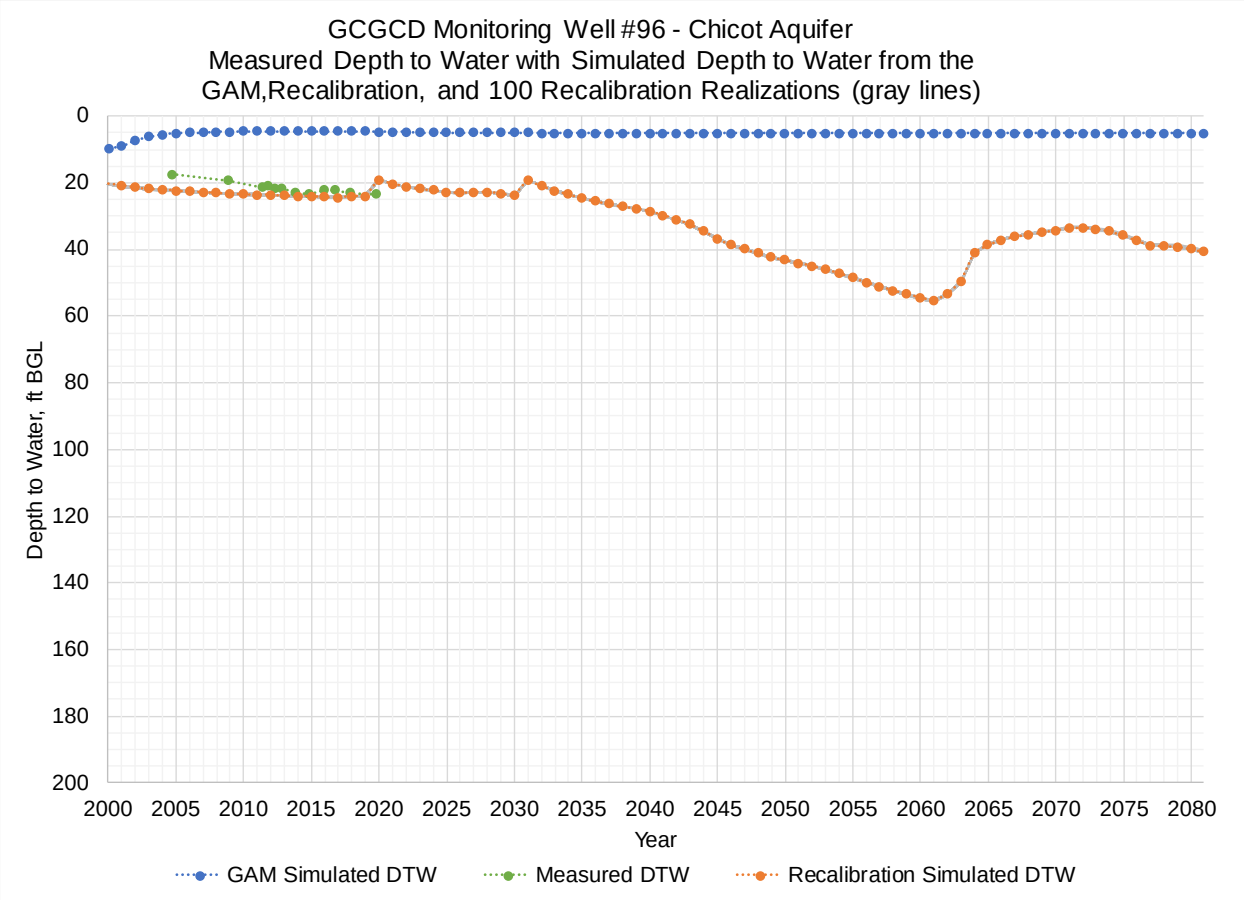

GCGCD Monitoring Well #32 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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100
120
140
160
180
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2010
2015
2020
2025
2030
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

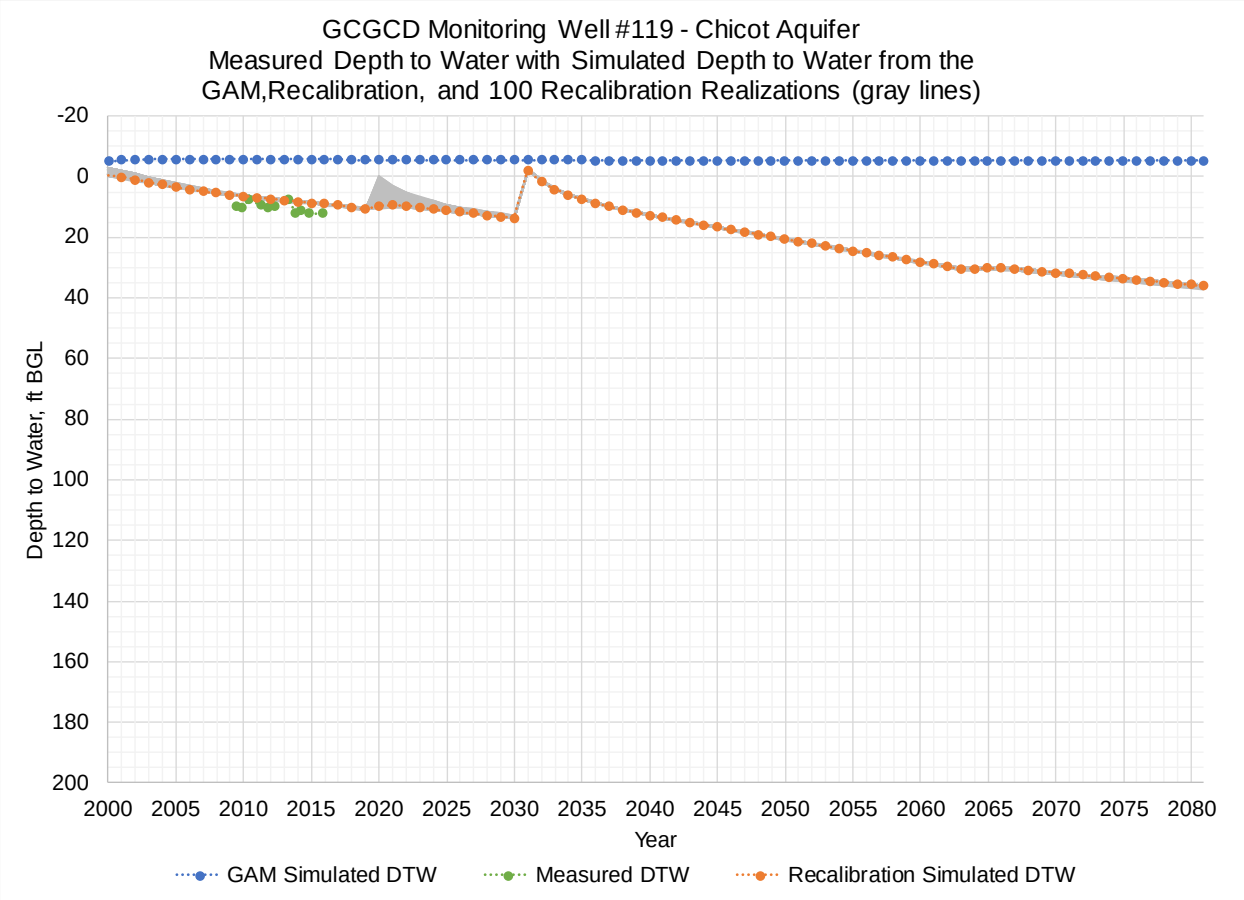

GCGCD Monitoring Well #34 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
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80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

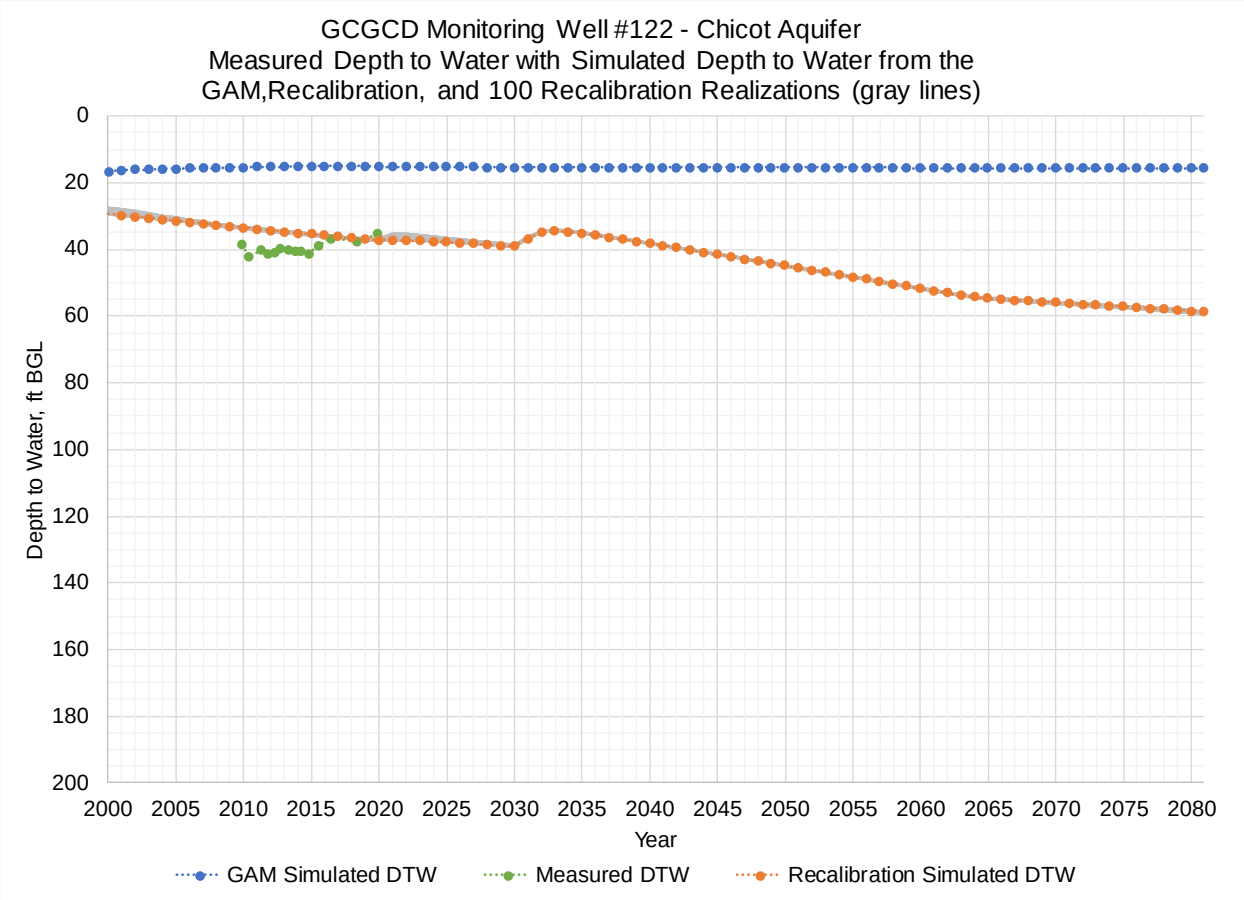

GCGCD Monitoring Well #35 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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100
120
140
160
180
200
2000
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2015
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

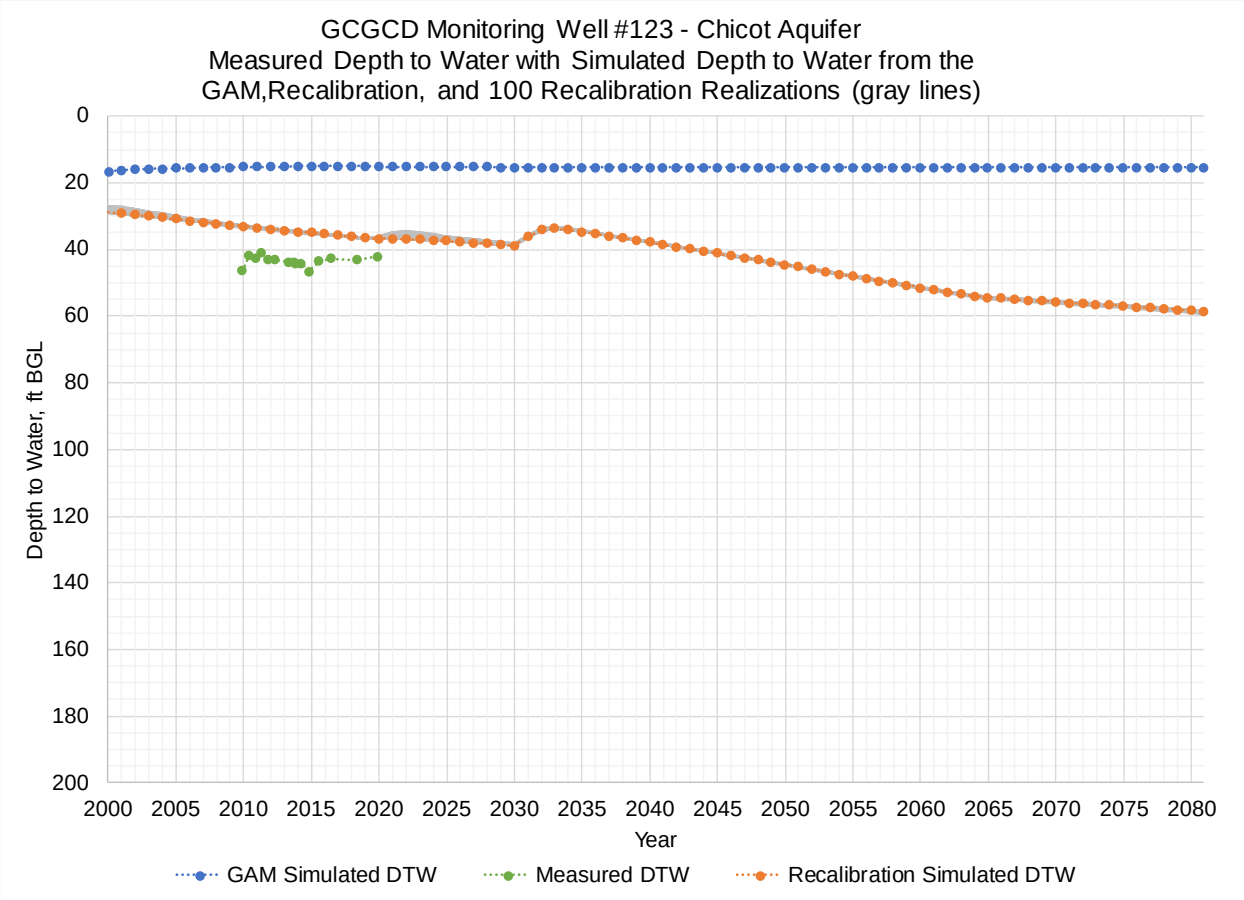

GCGCD Monitoring Well #39 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
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2080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

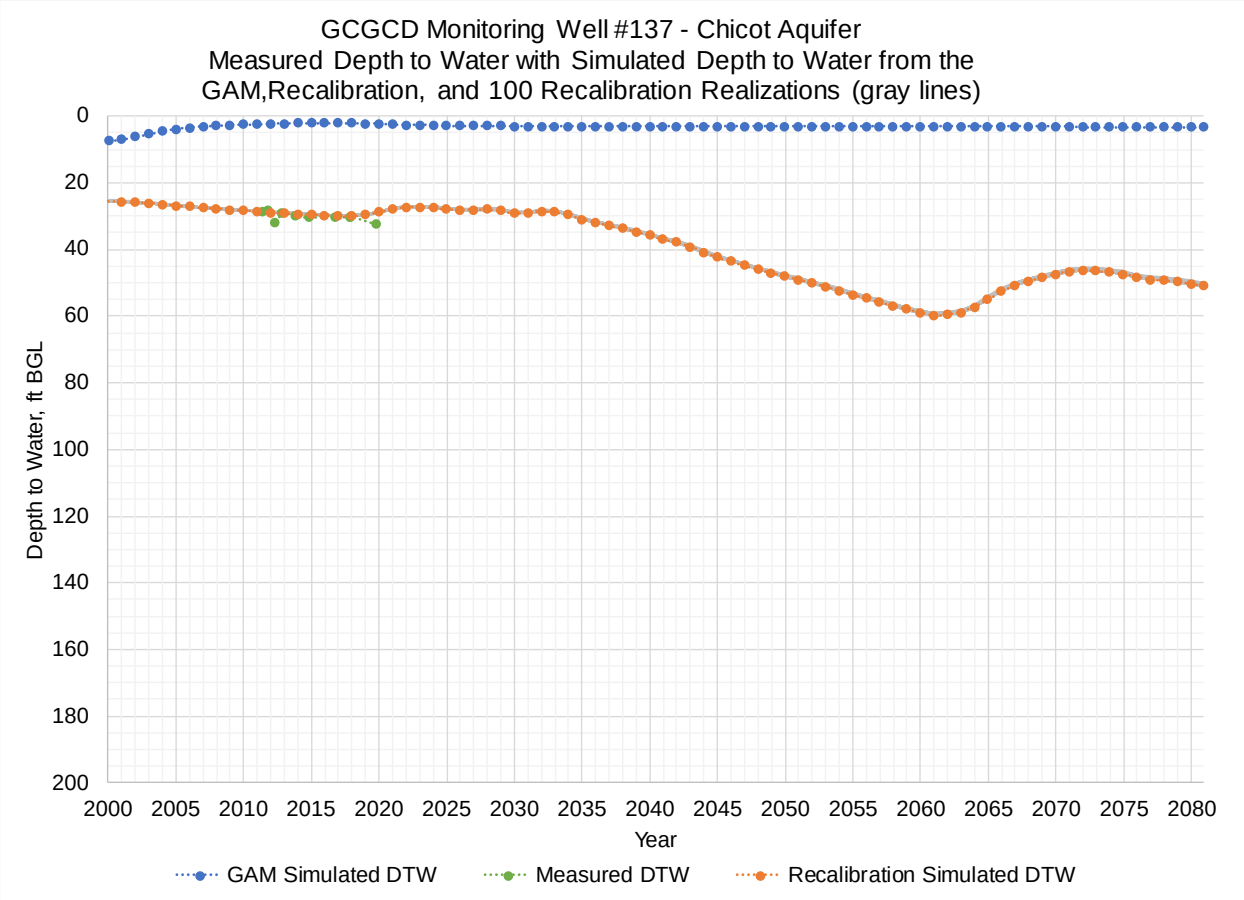

GCGCD Monitoring Well #46 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
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2075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

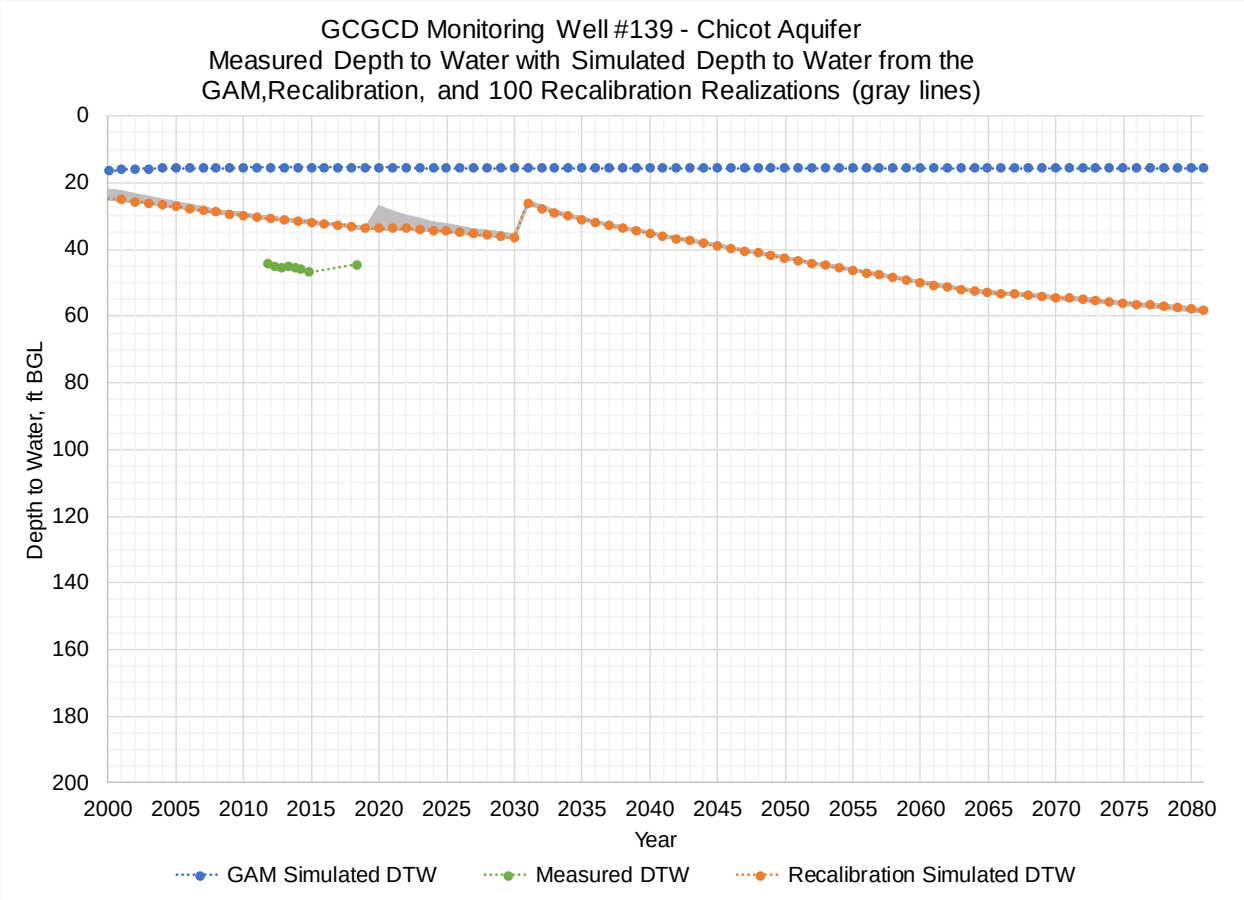

GCGCD Monitoring Well #96 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
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2000
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

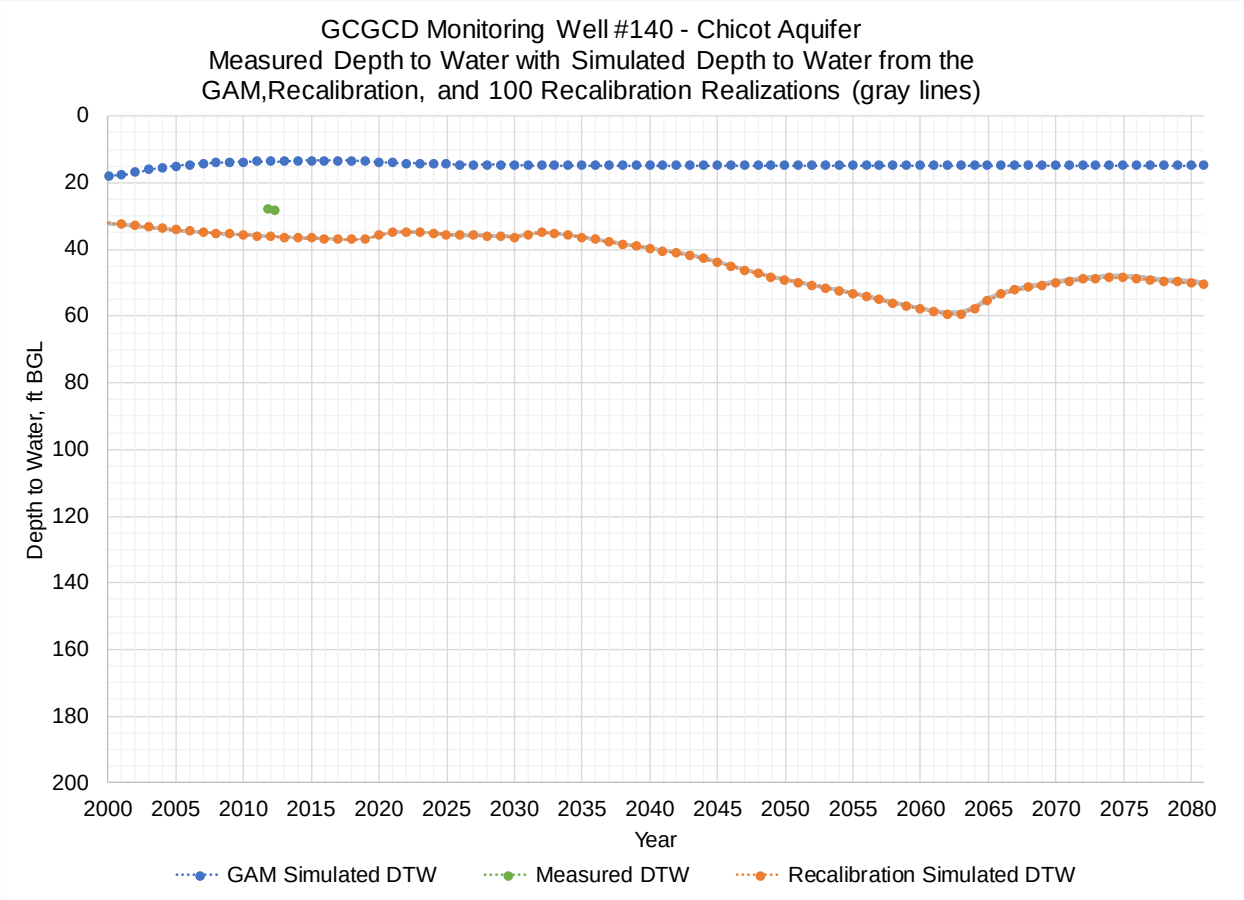

GCGCD Monitoring Well #119 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
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60
80
100
120
140
160
180
200
2000
2005
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

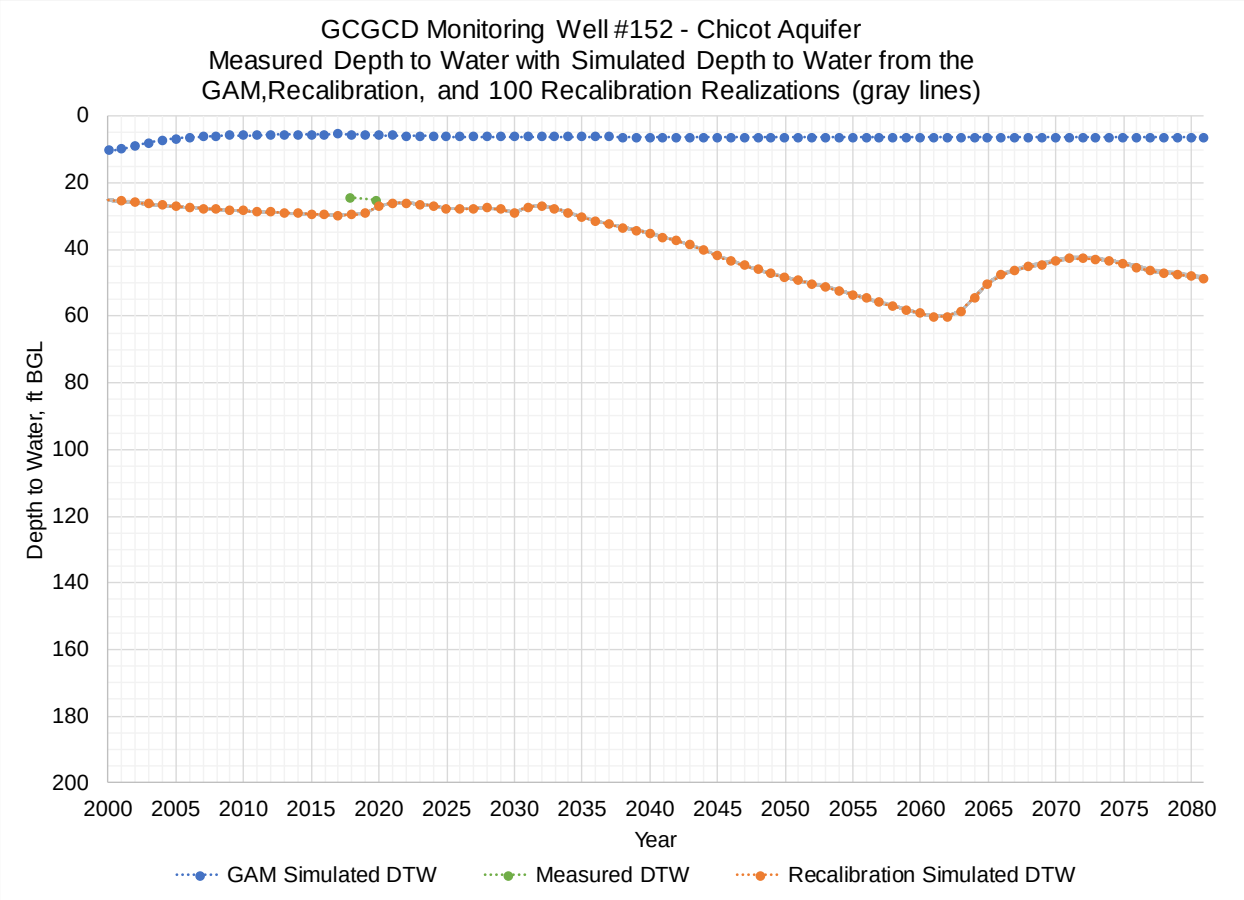

GCGCD Monitoring Well #122 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
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100
120
140
160
180
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2025
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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
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

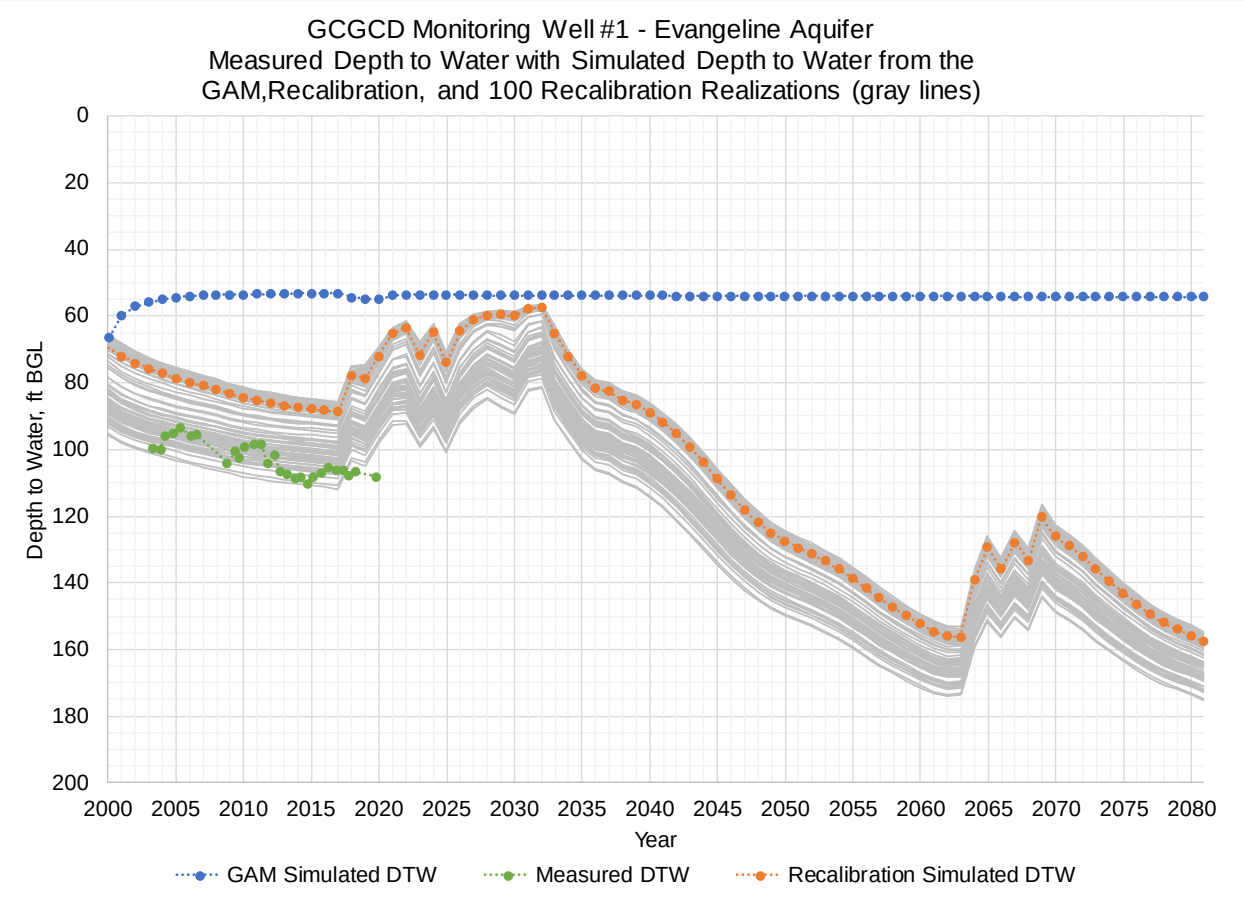

GCGCD Monitoring Well #137 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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100
120
140
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2000
2005
2010
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2025
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

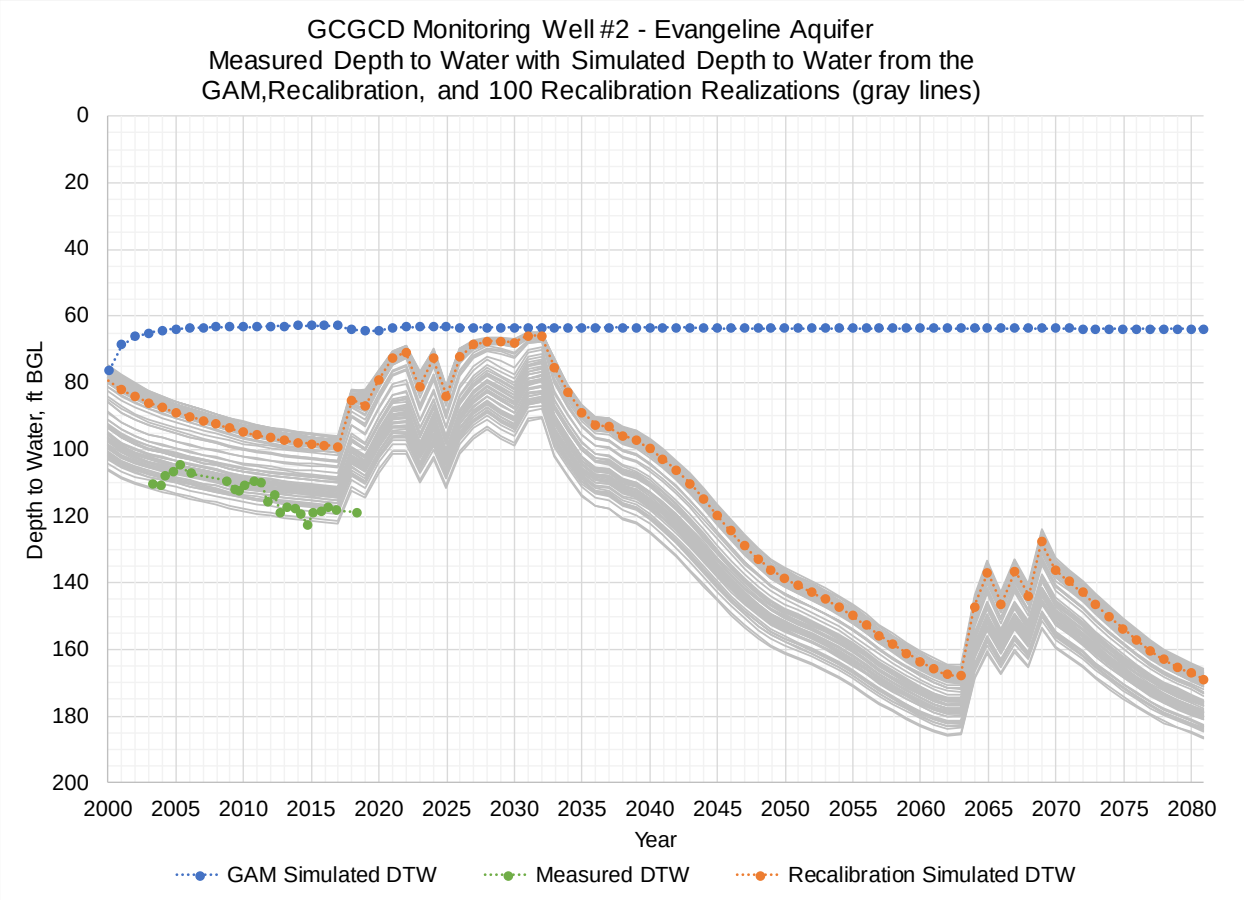

GCGCD Monitoring Well #139 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

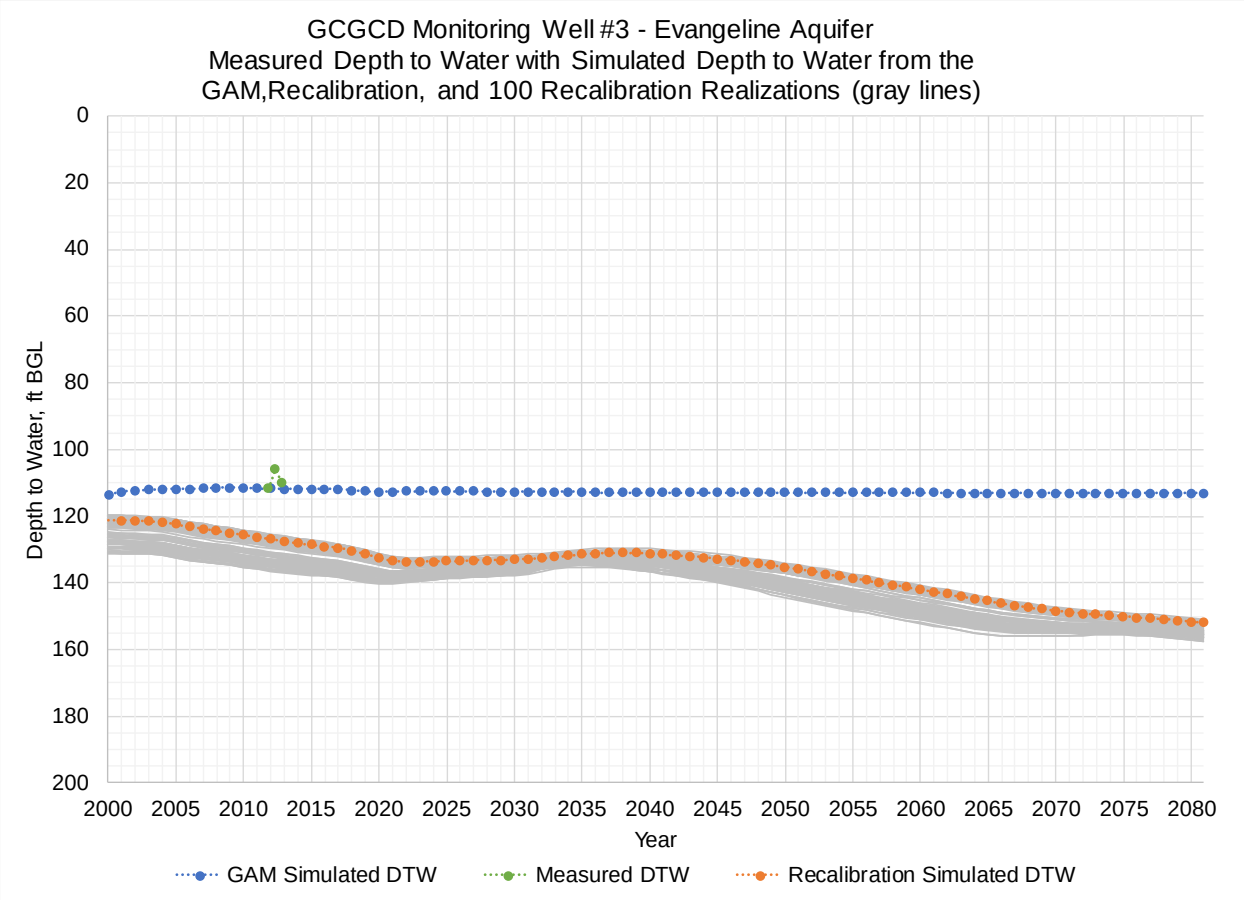

GCGCD Monitoring Well #140 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

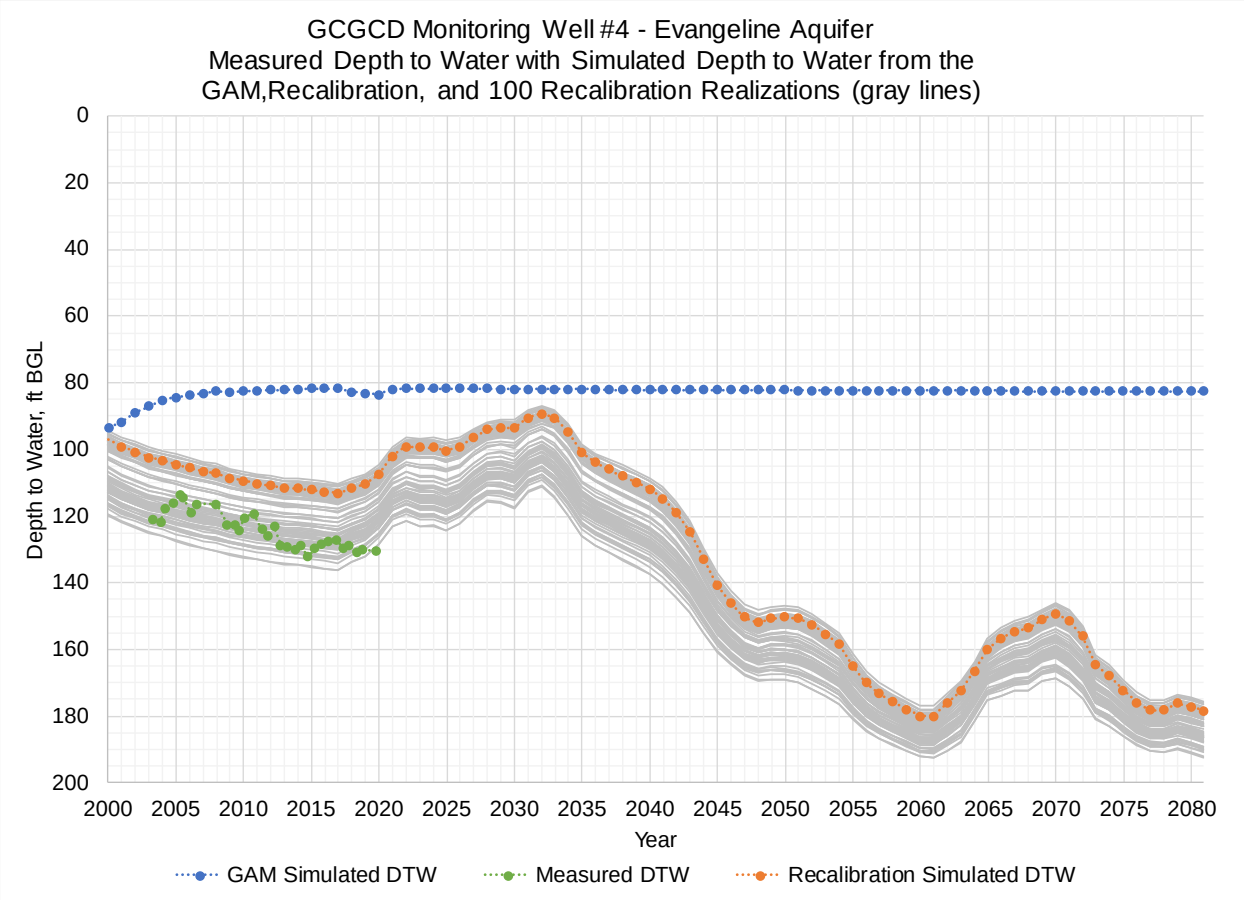

GCGCD Monitoring Well #152 - Chicot Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

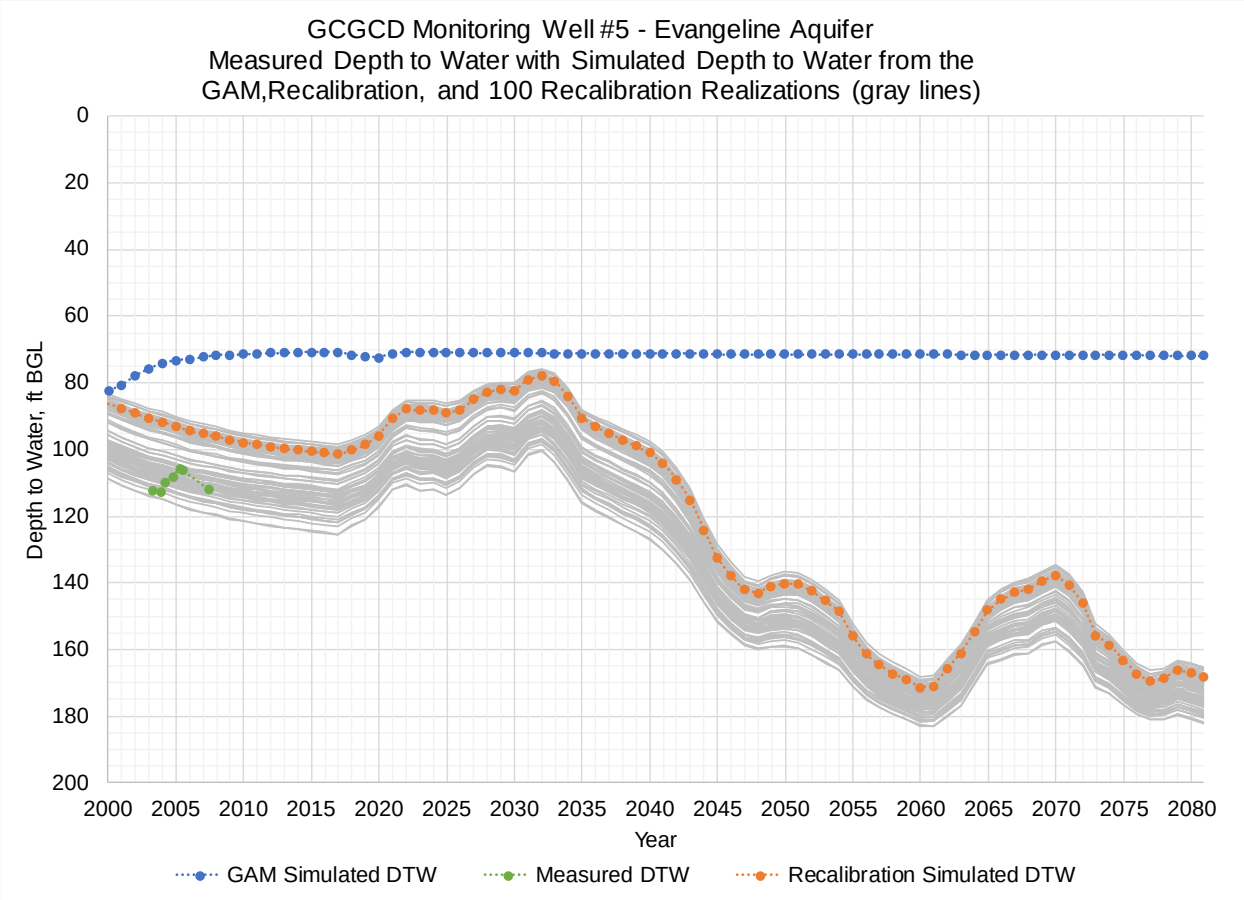
Evangeline Aquifer Monitoring Wells

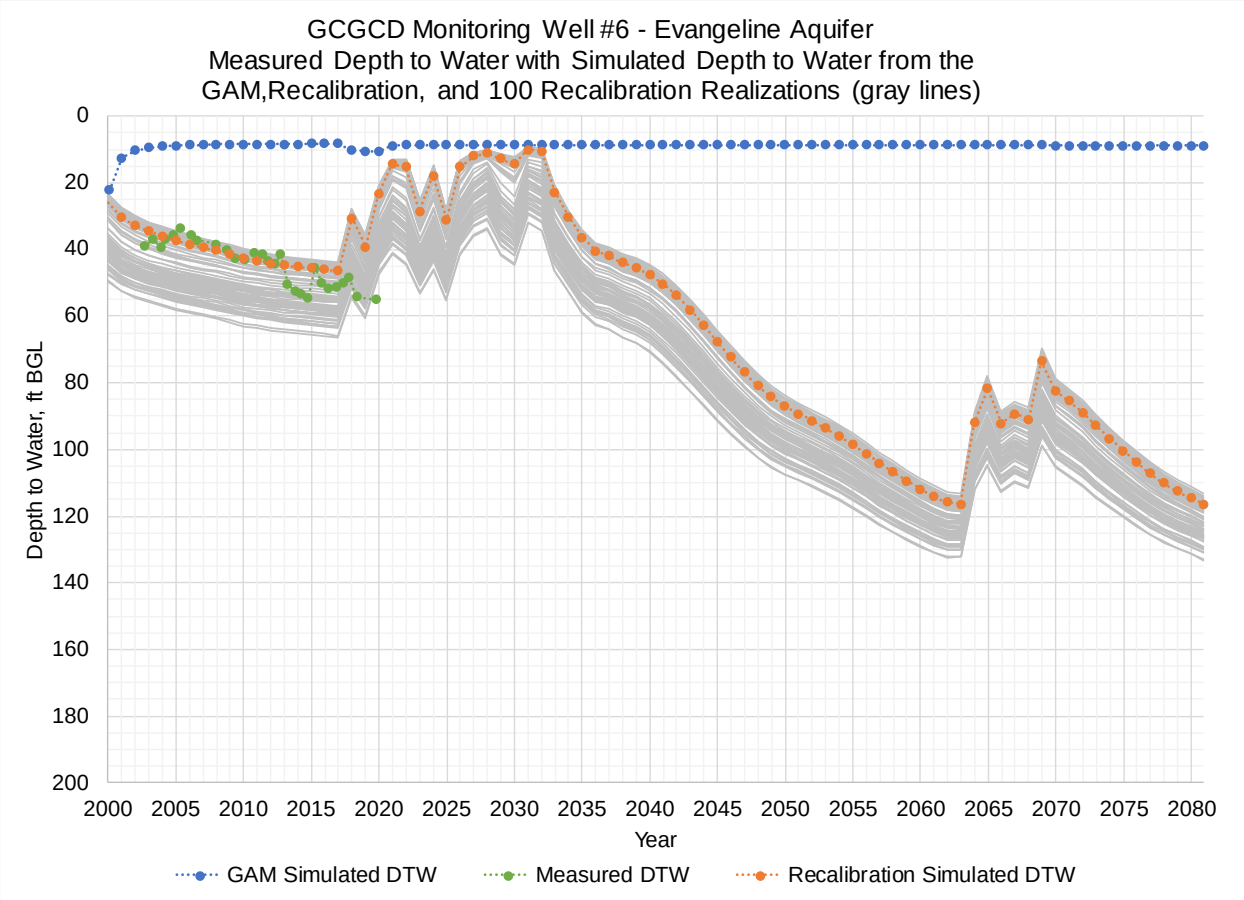

GCGCD Monitoring Well #1 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

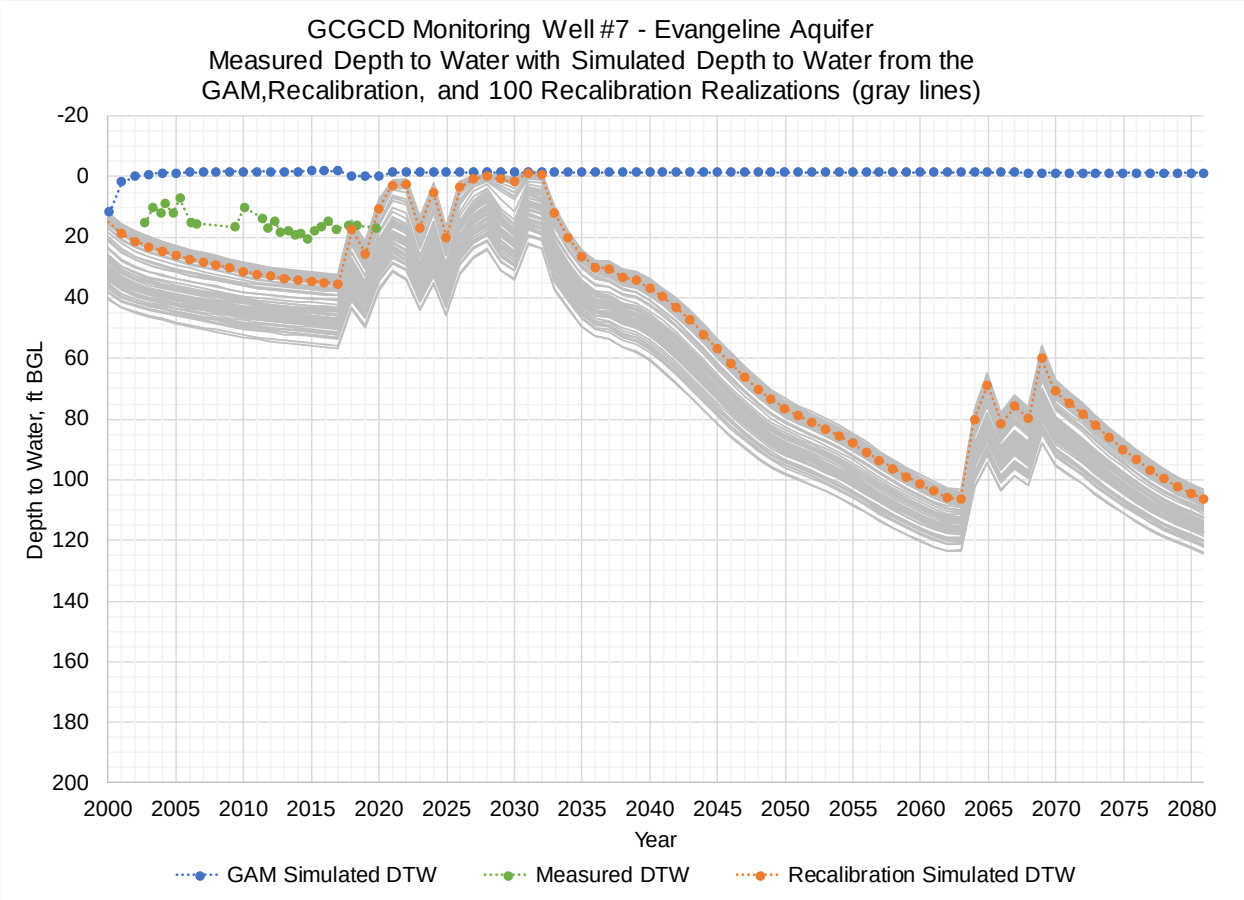

GCGCD Monitoring Well #2 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

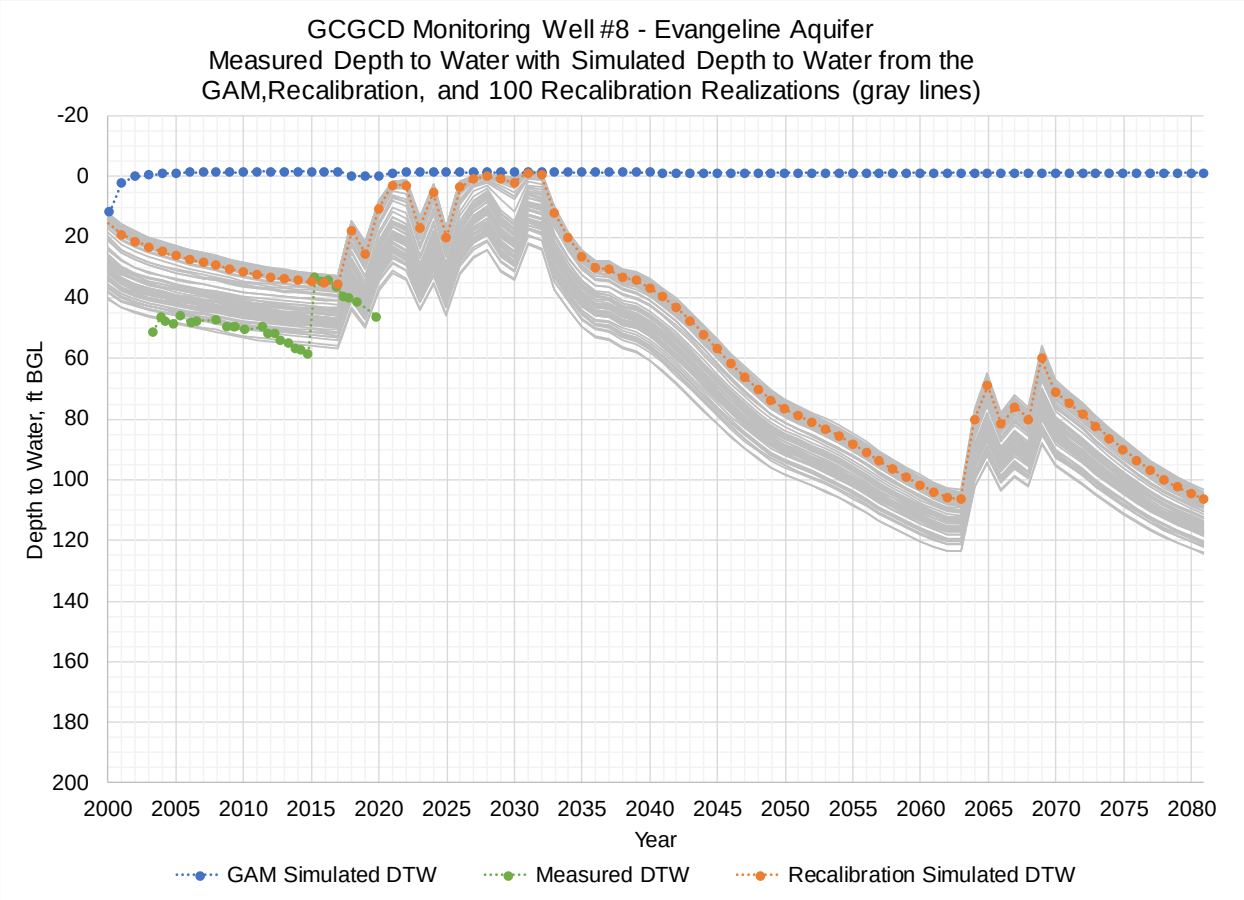

GCGCD Monitoring Well #3 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

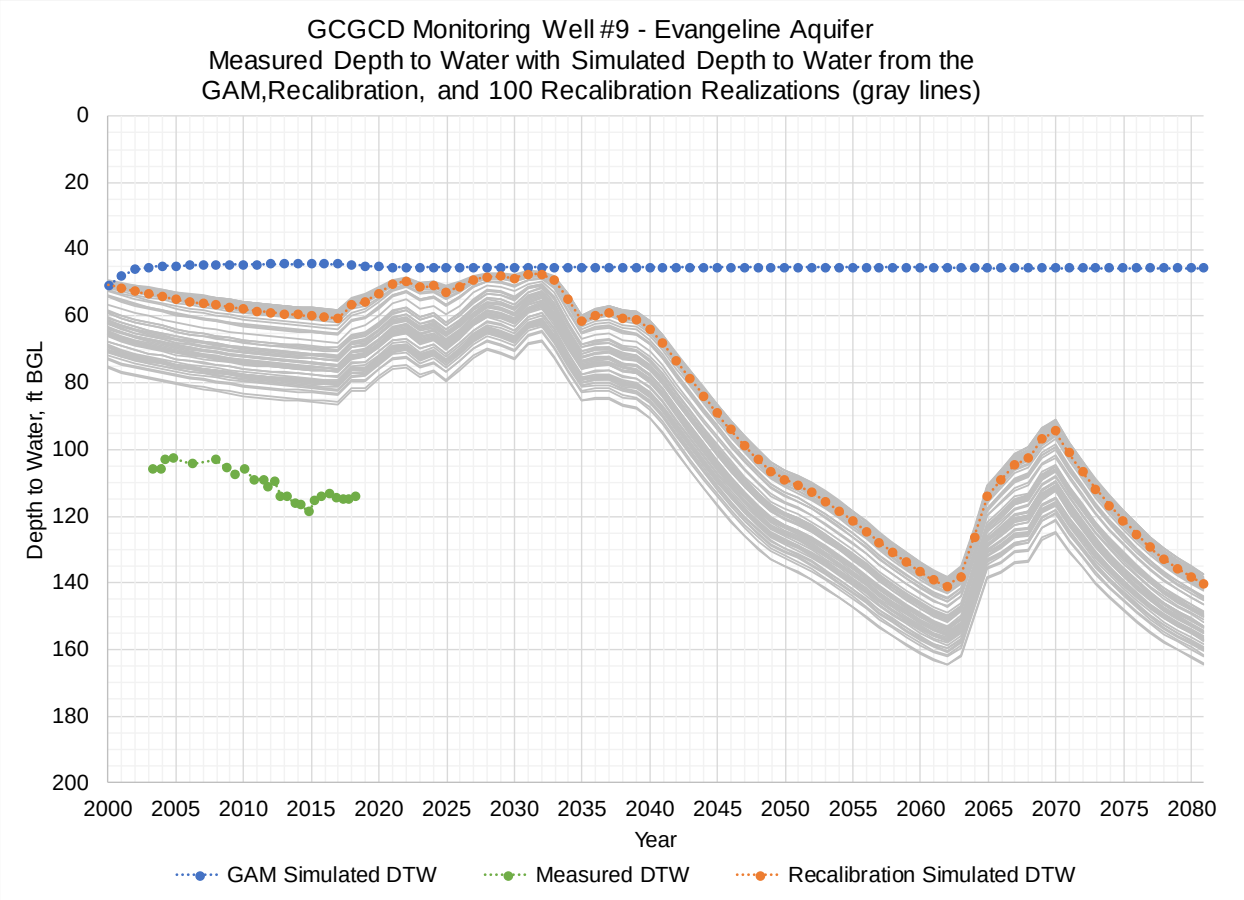

GCGCD Monitoring Well #4 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

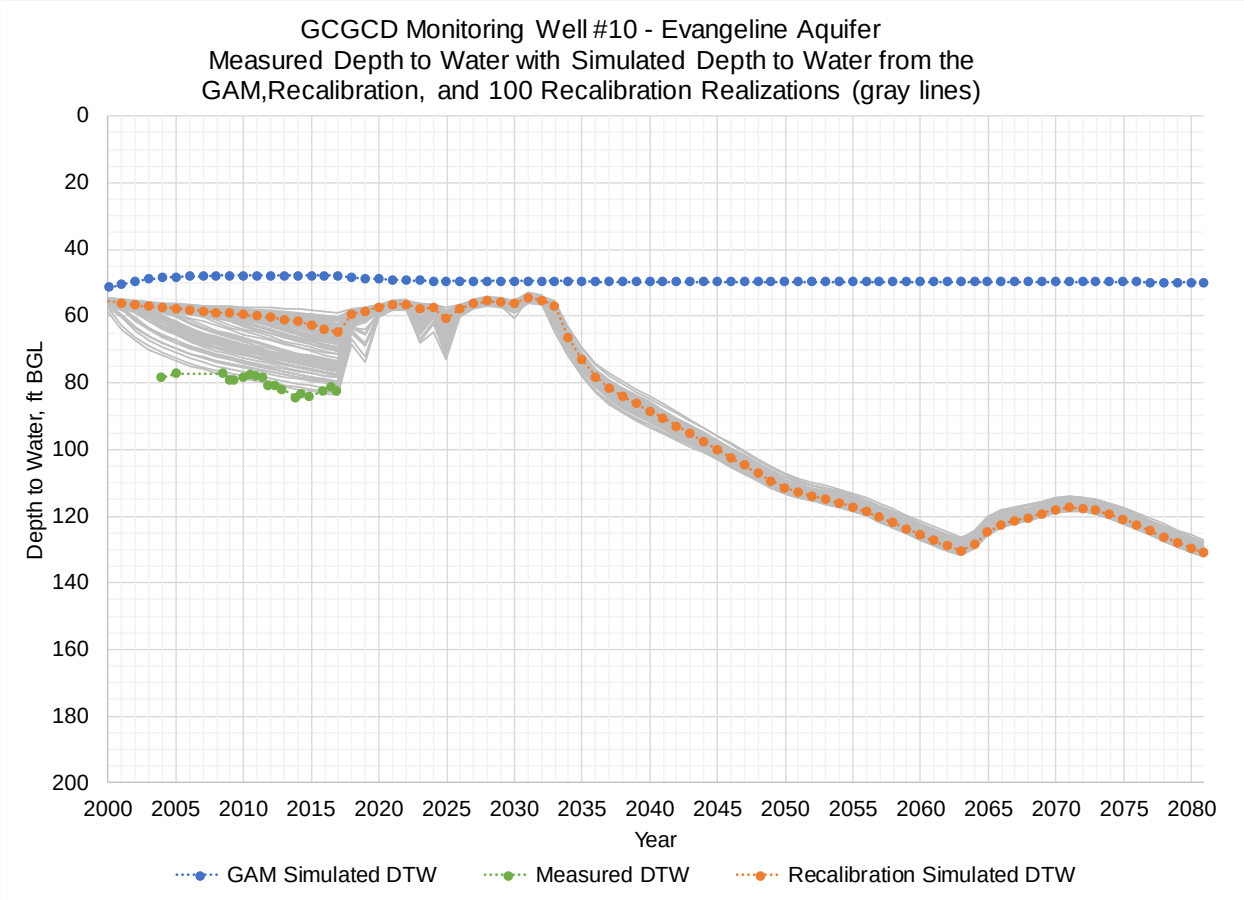

GCGCD Monitoring Well #5 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

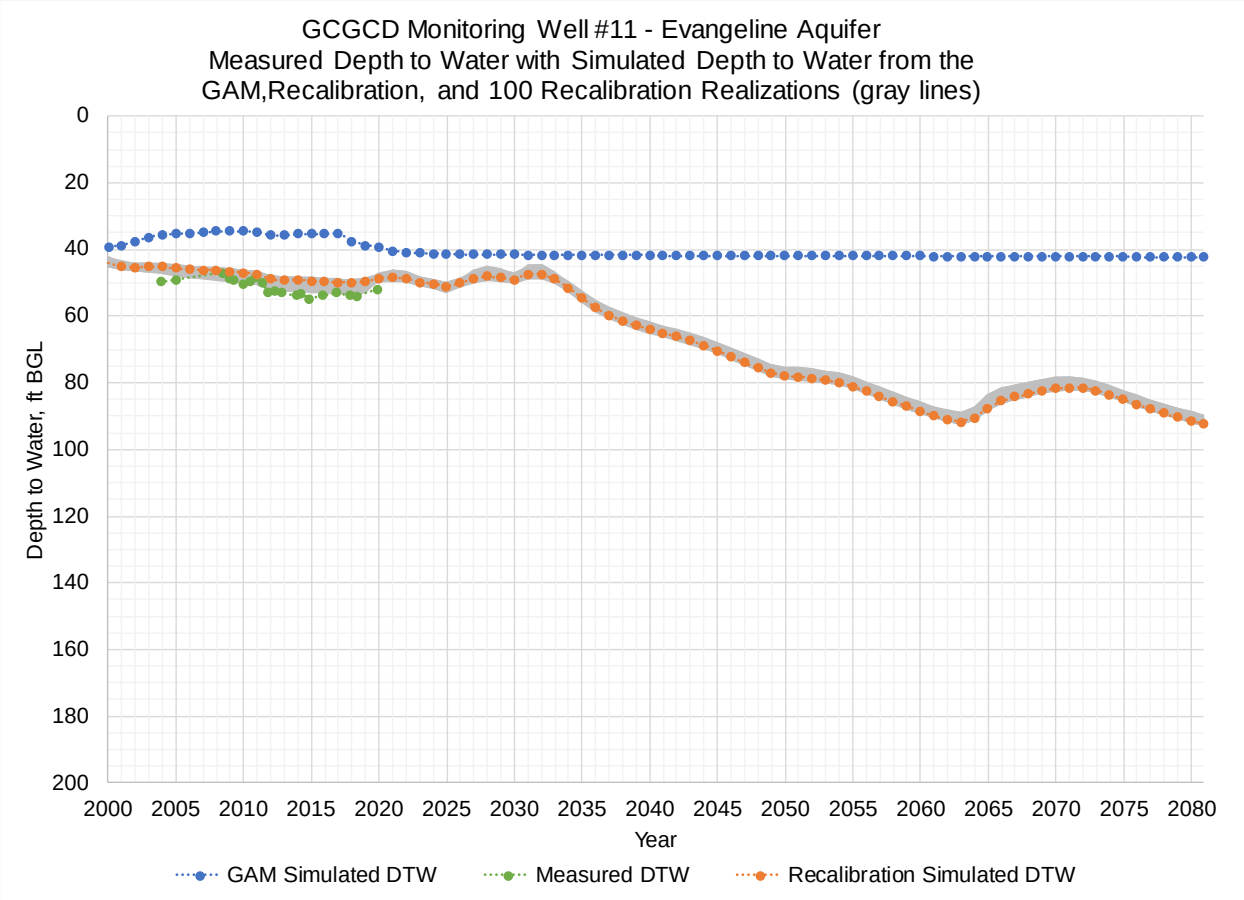

GCGCD Monitoring Well #6 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

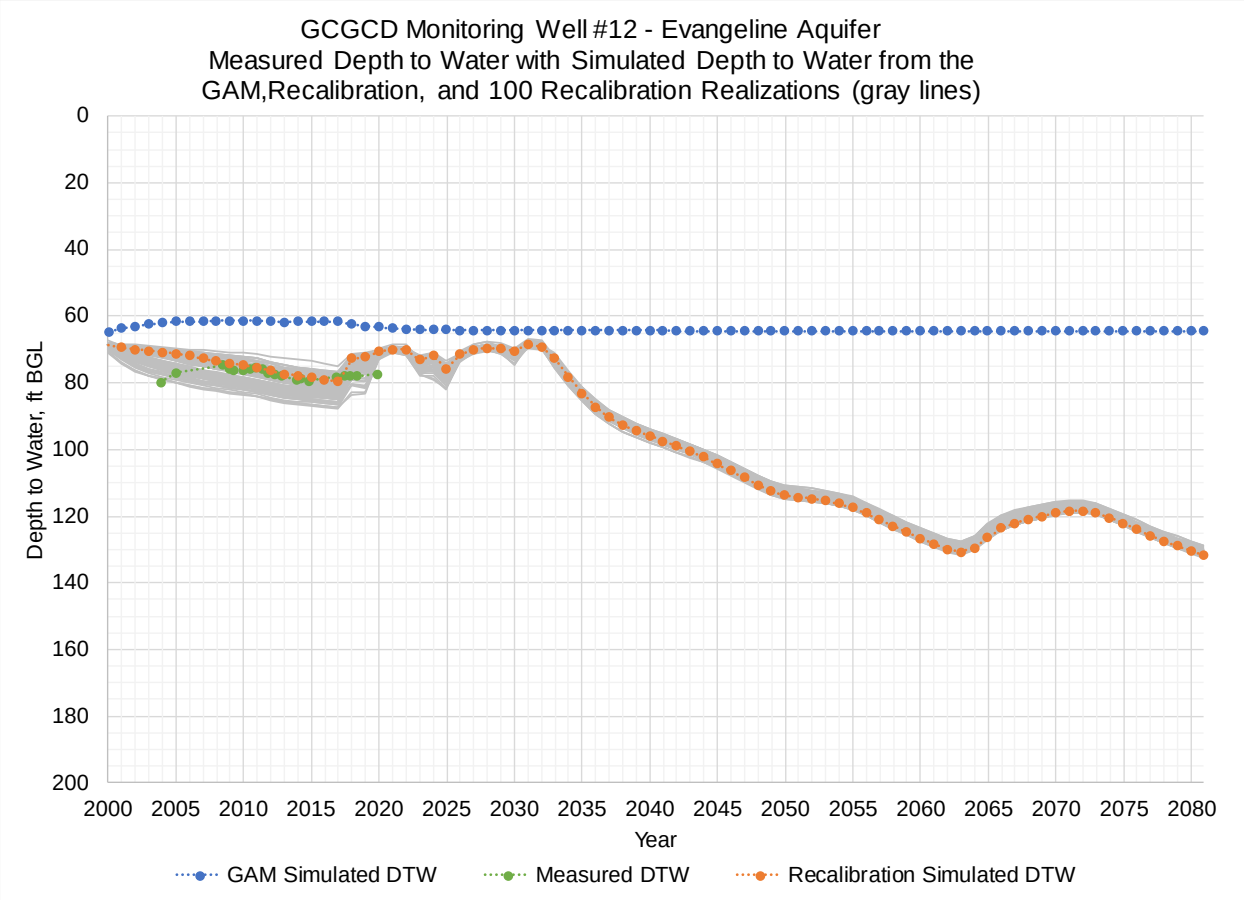

GCGCD Monitoring Well #7 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

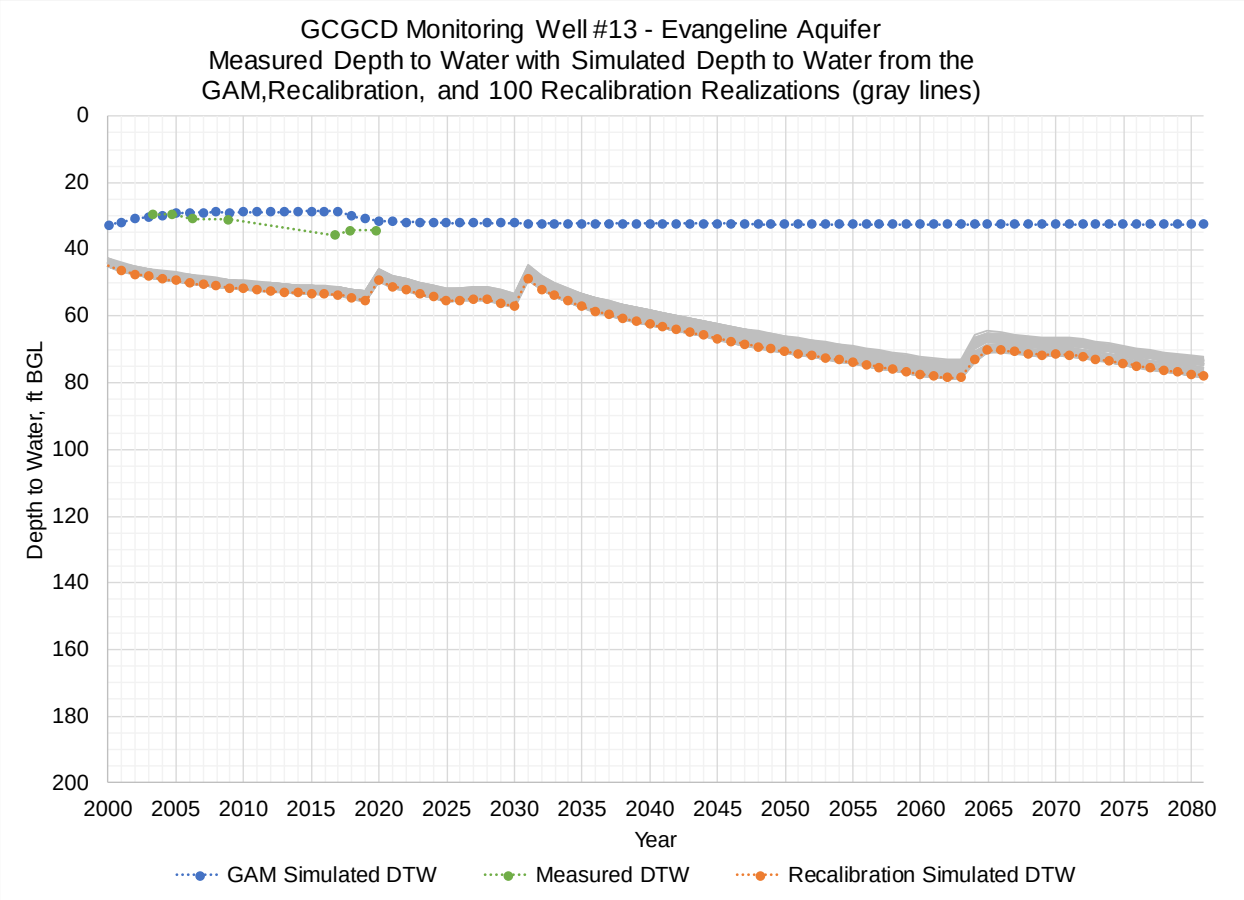

GCGCD Monitoring Well #8 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

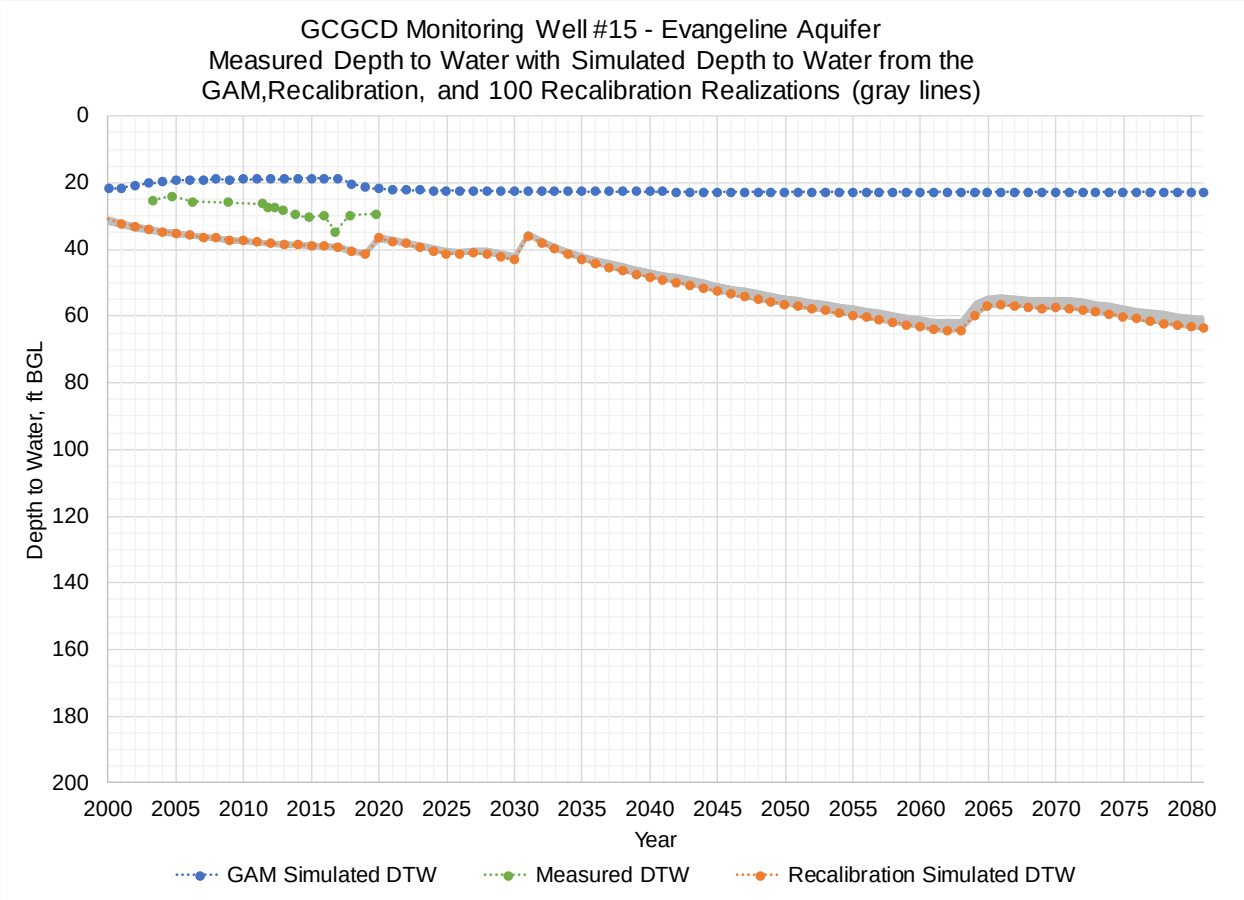

GCGCD Monitoring Well #9 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

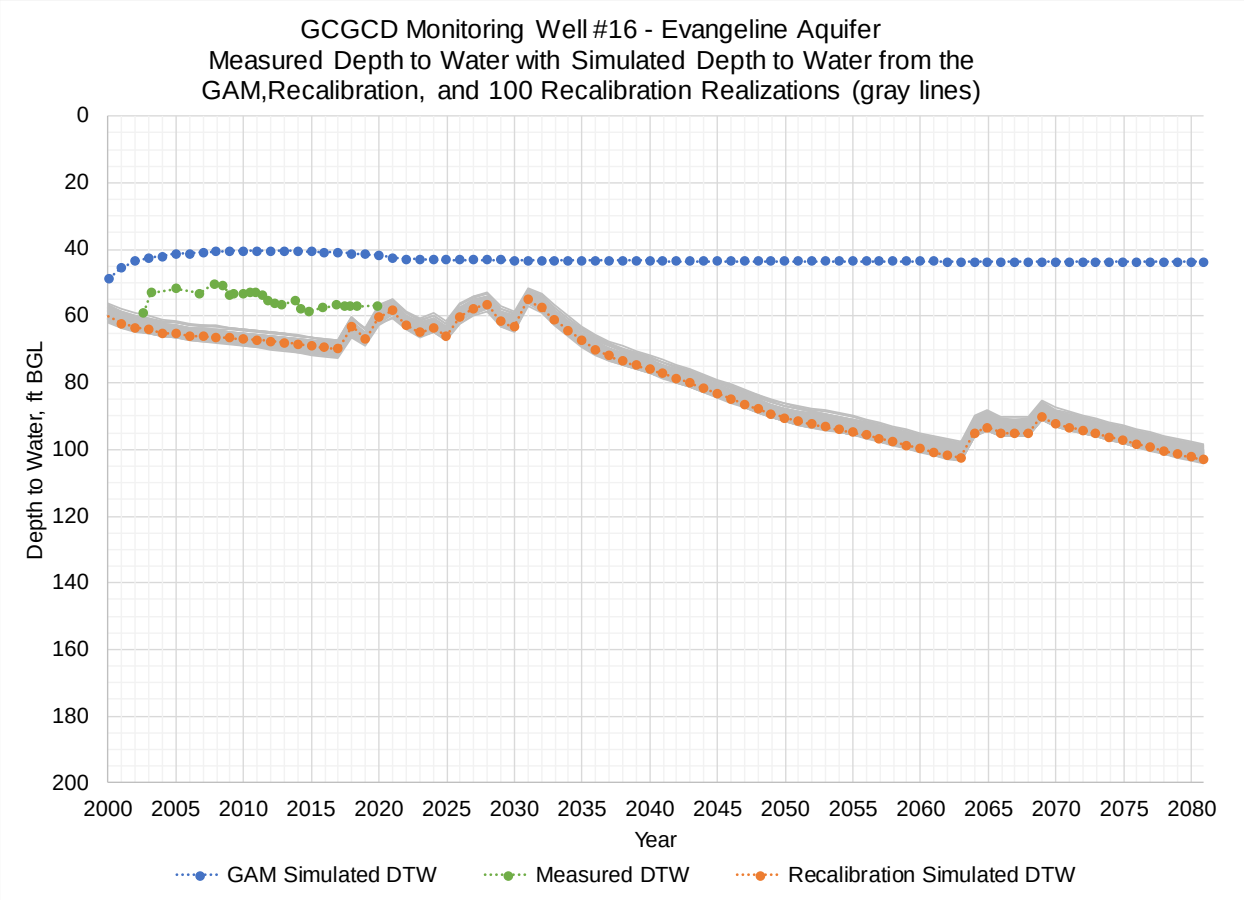

GCGCD Monitoring Well #10 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

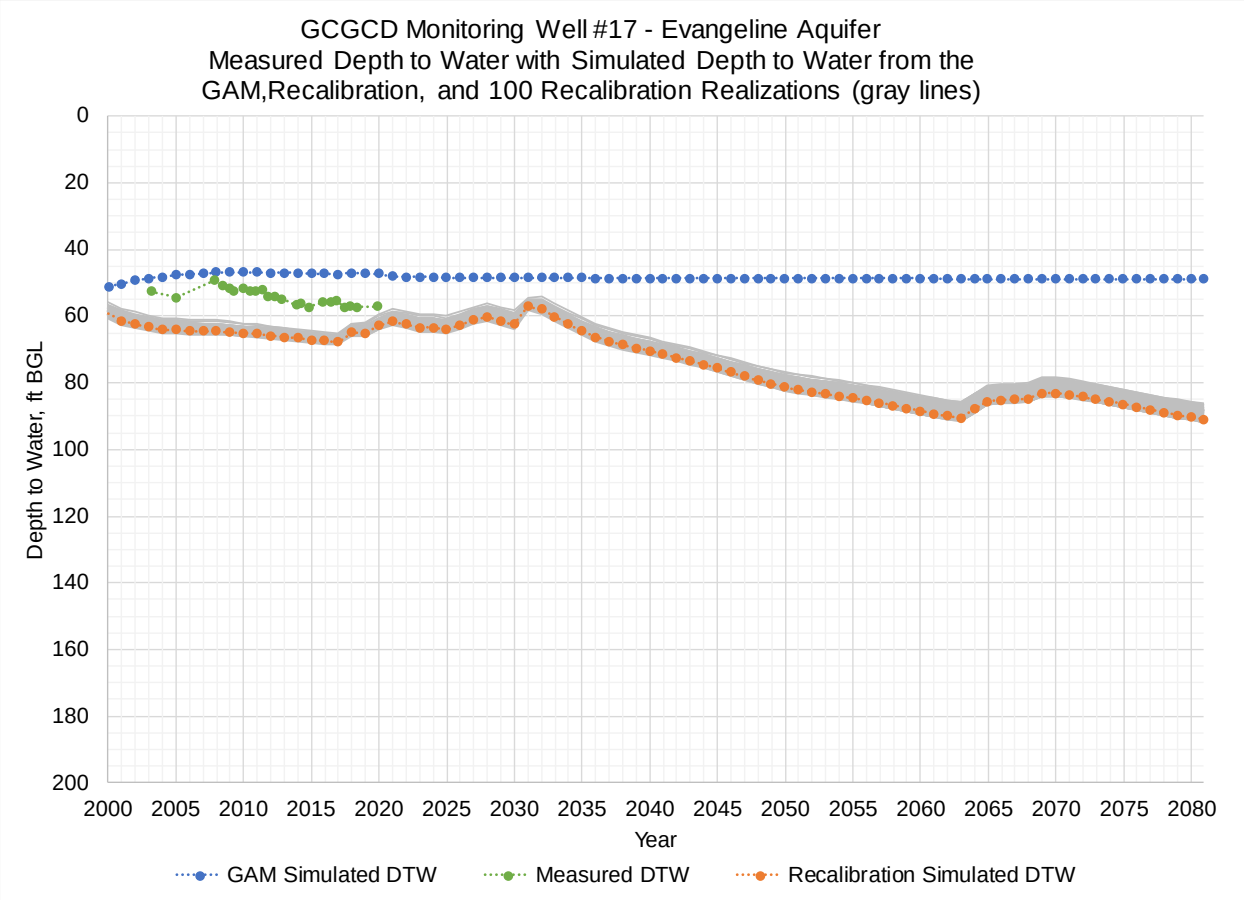

GCGCD Monitoring Well #11 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

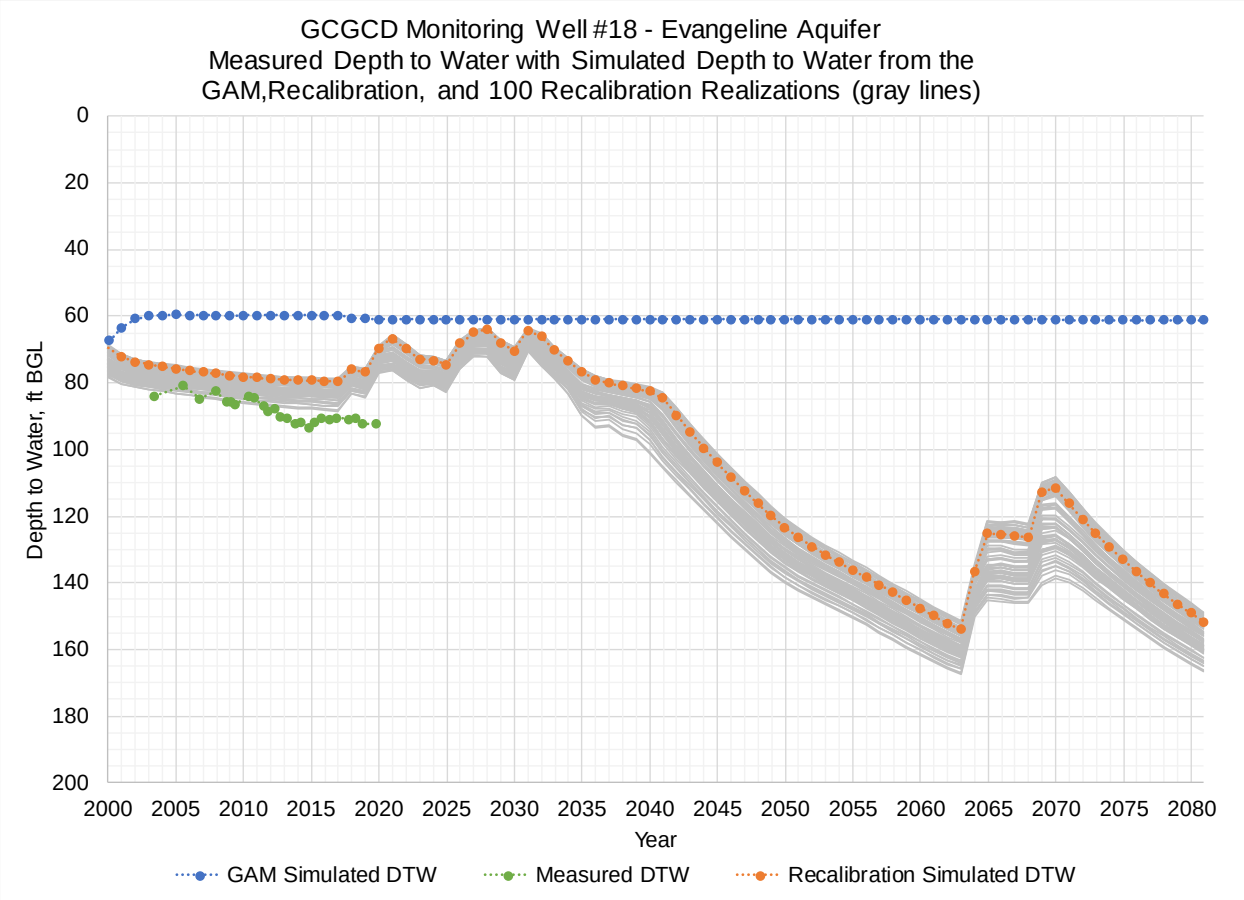

GCGCD Monitoring Well #12 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

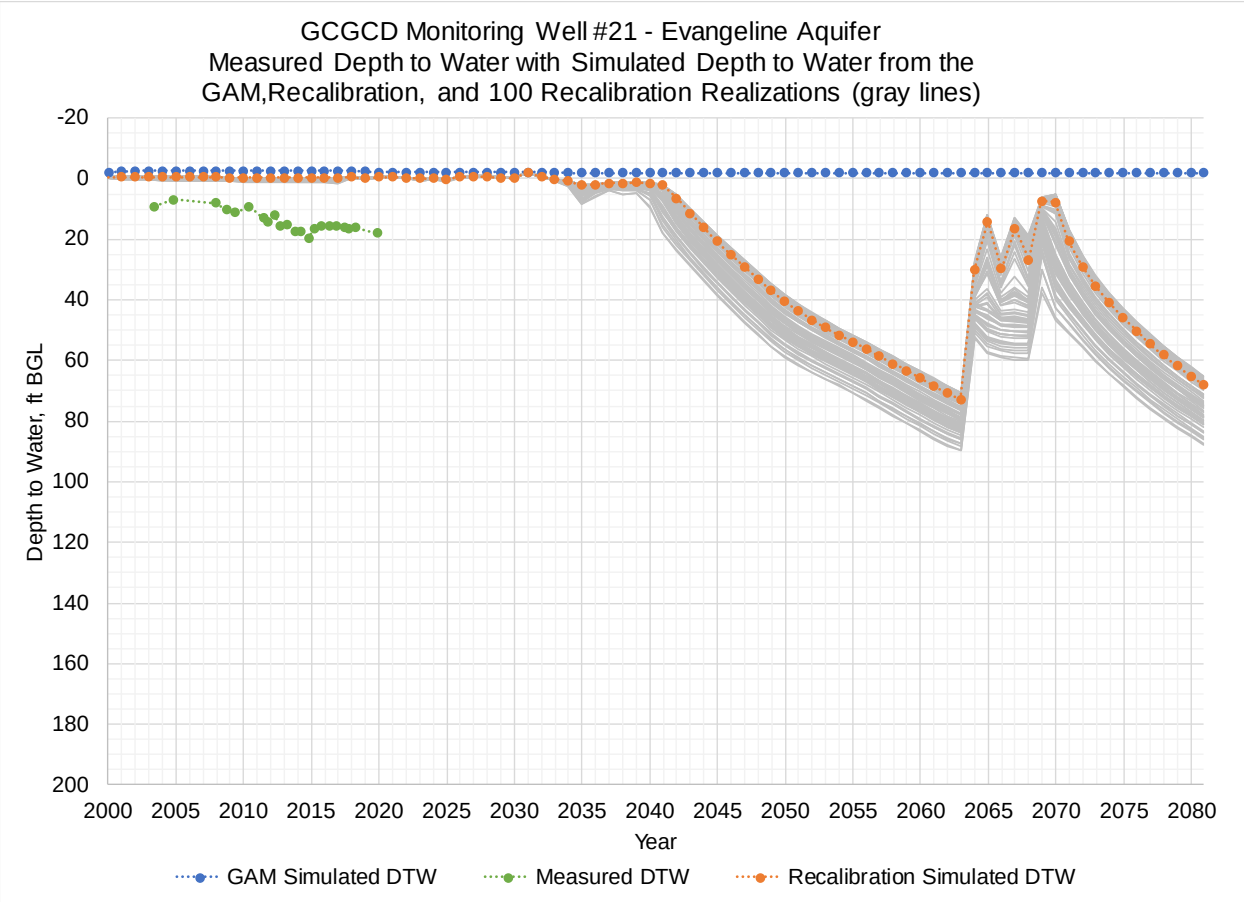

GCGCD Monitoring Well #13 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

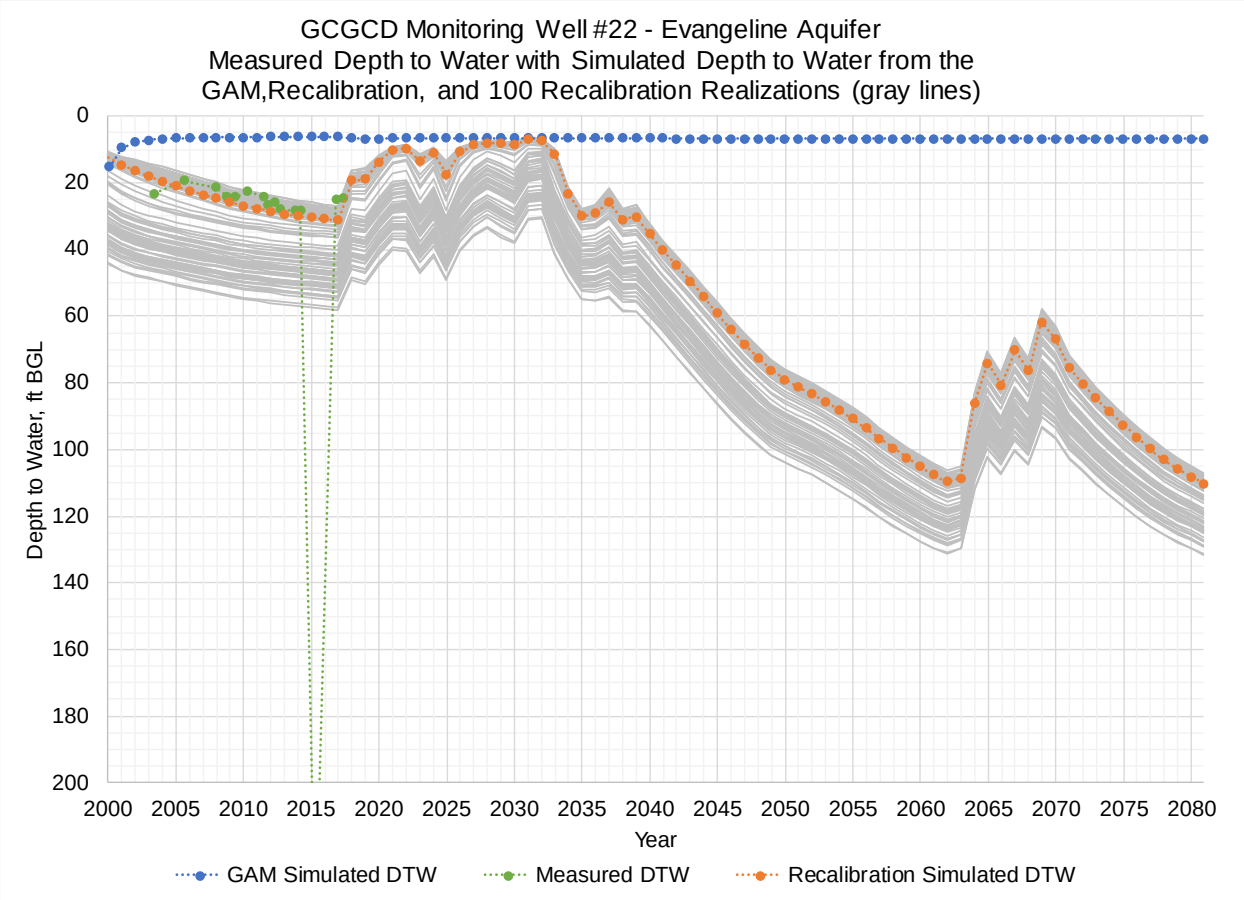

GCGCD Monitoring Well #15 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

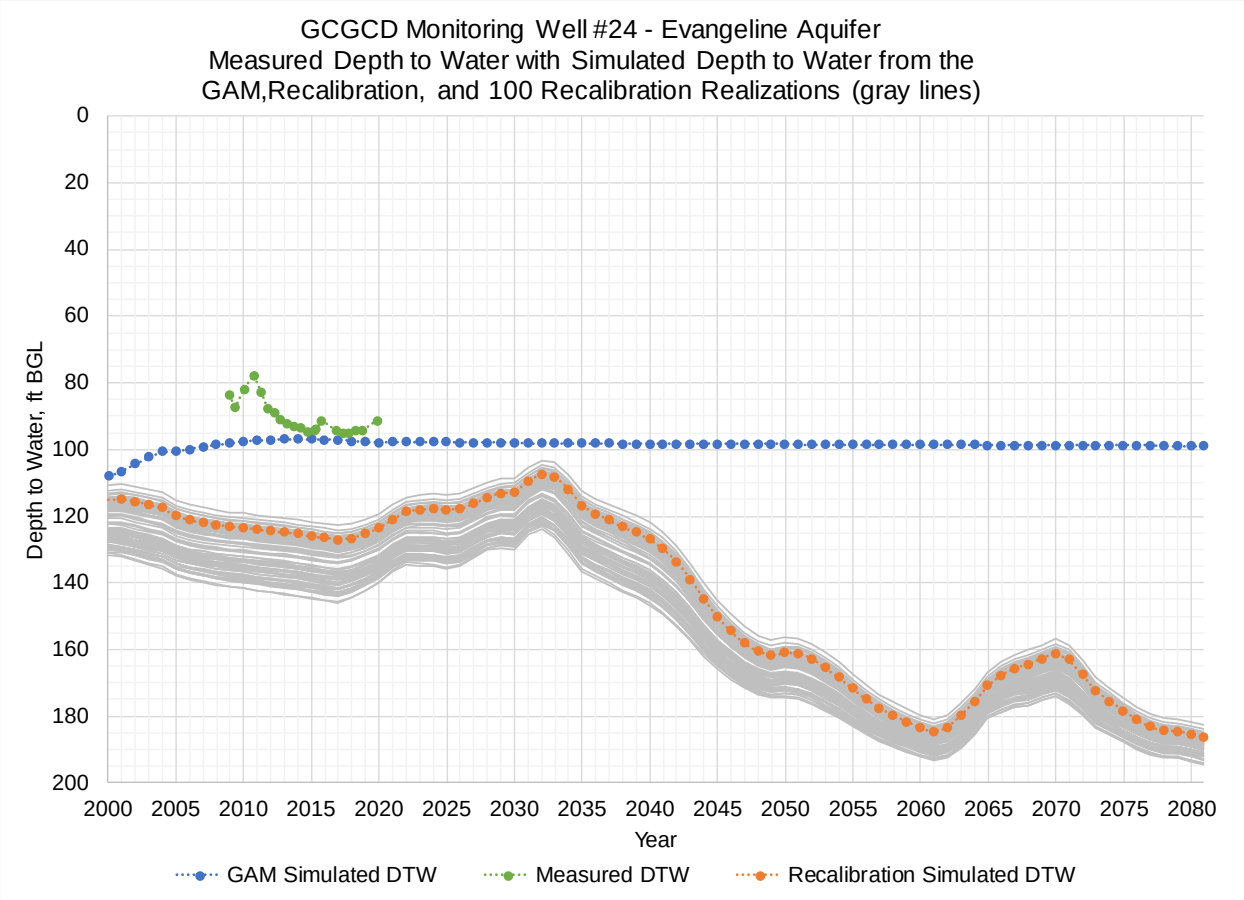

GCGCD Monitoring Well #16 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

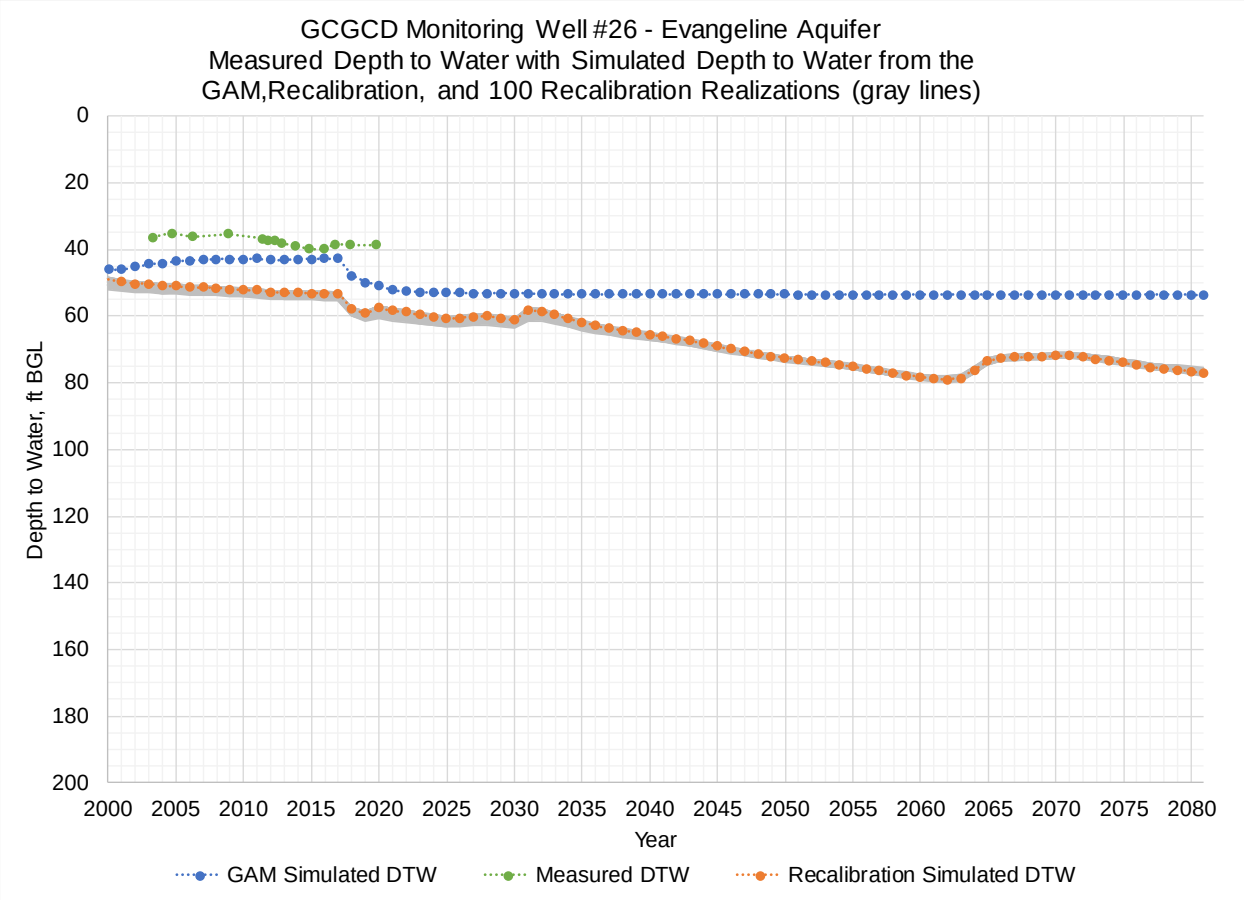

GCGCD Monitoring Well #17 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

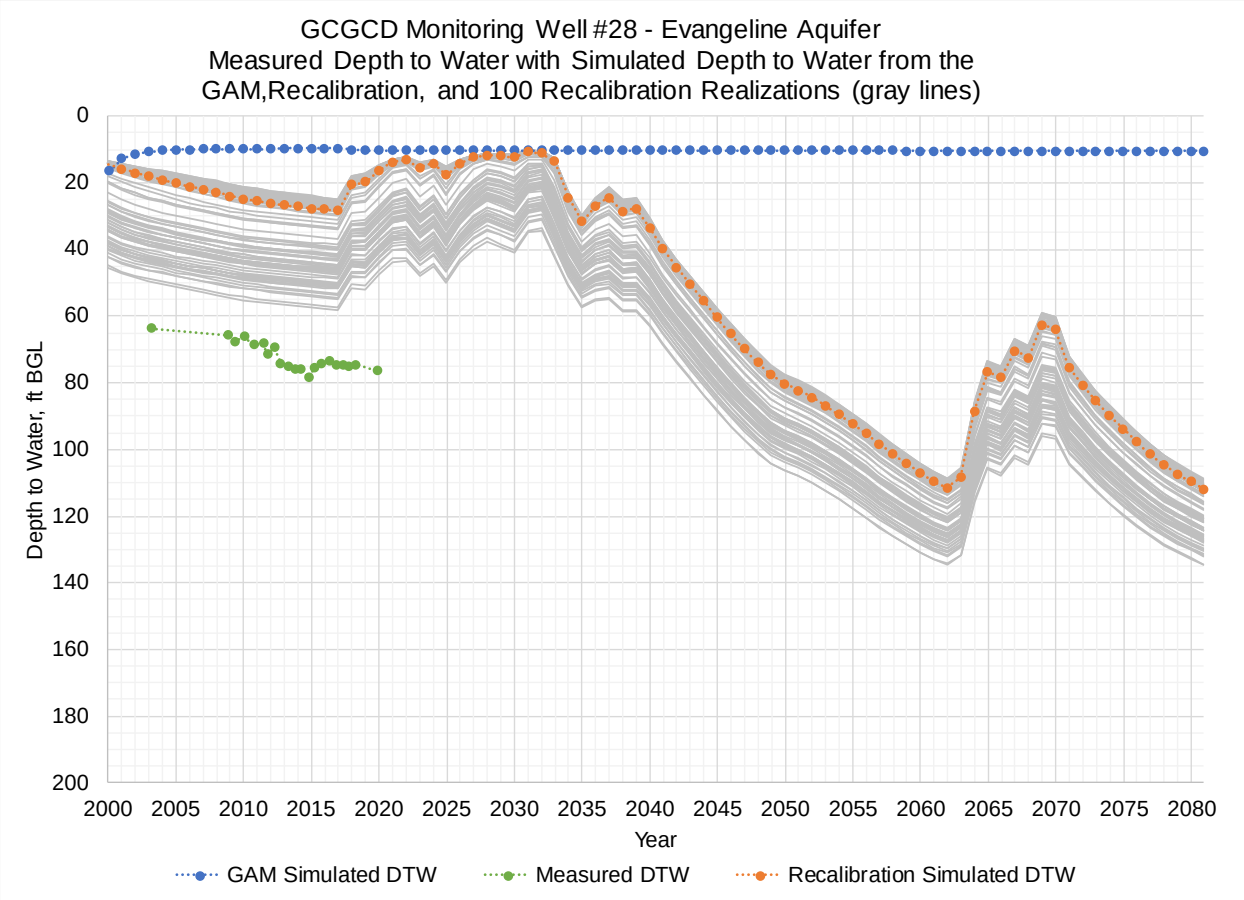

GCGCD Monitoring Well #18 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

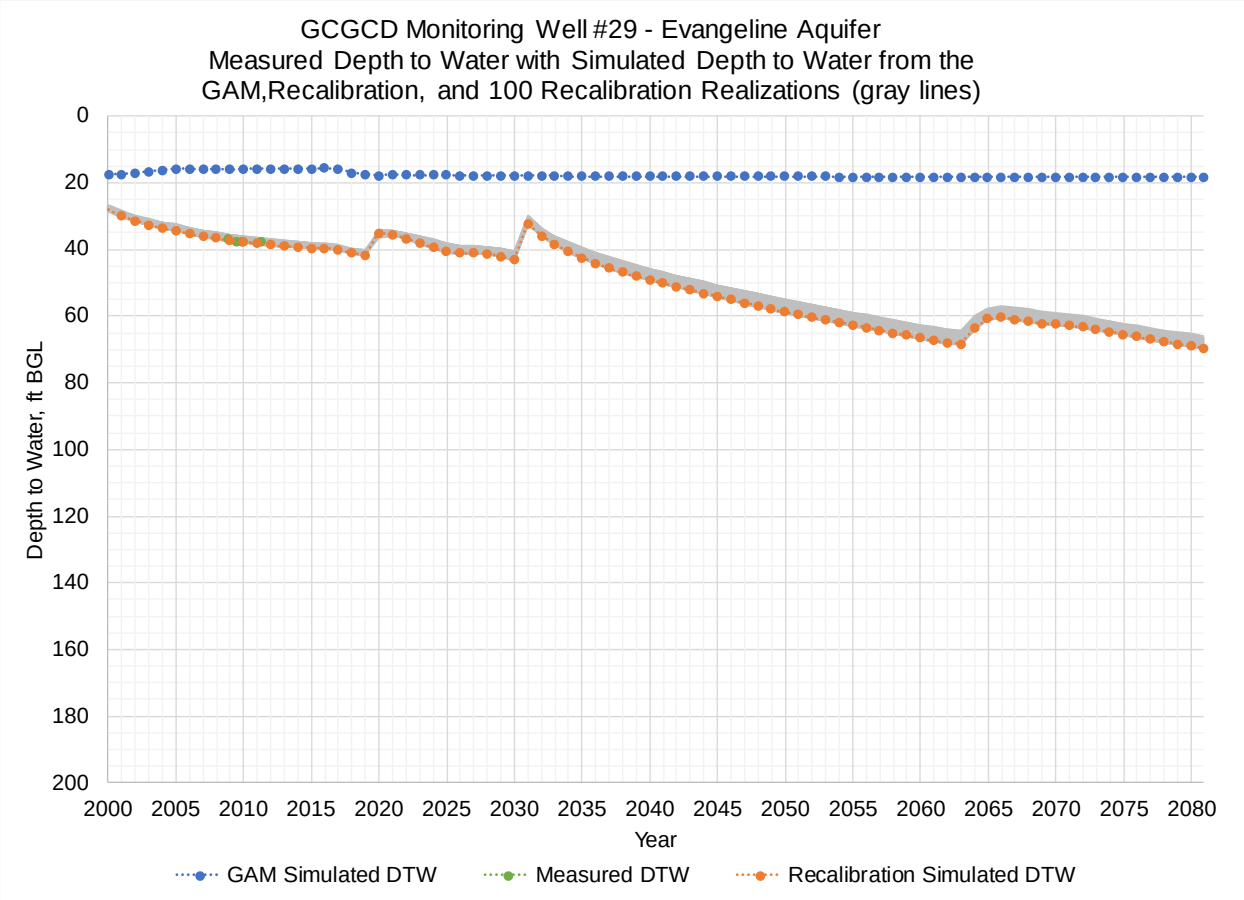

GCGCD Monitoring Well #21 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

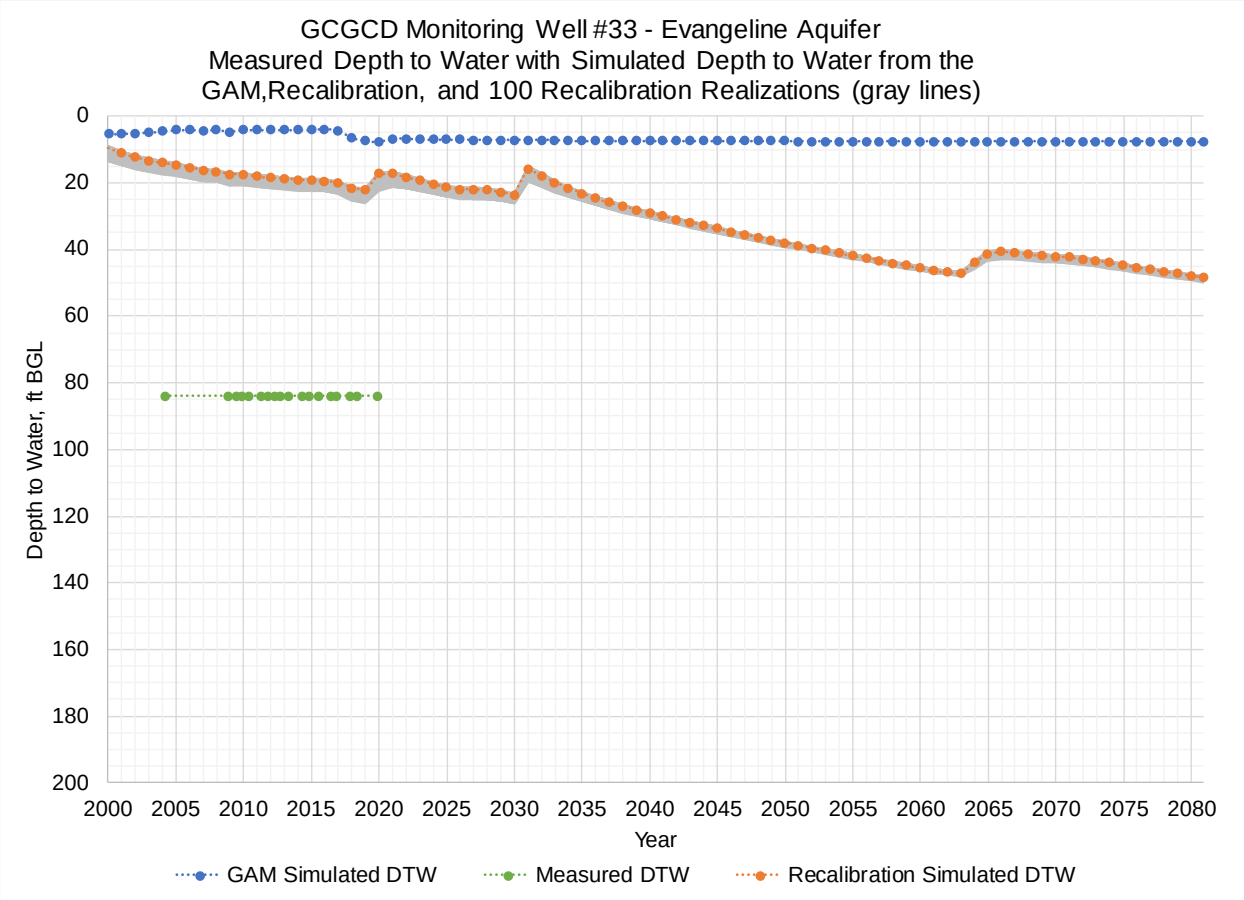

GCGCD Monitoring Well #22 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
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2000
2005
2010
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2025
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

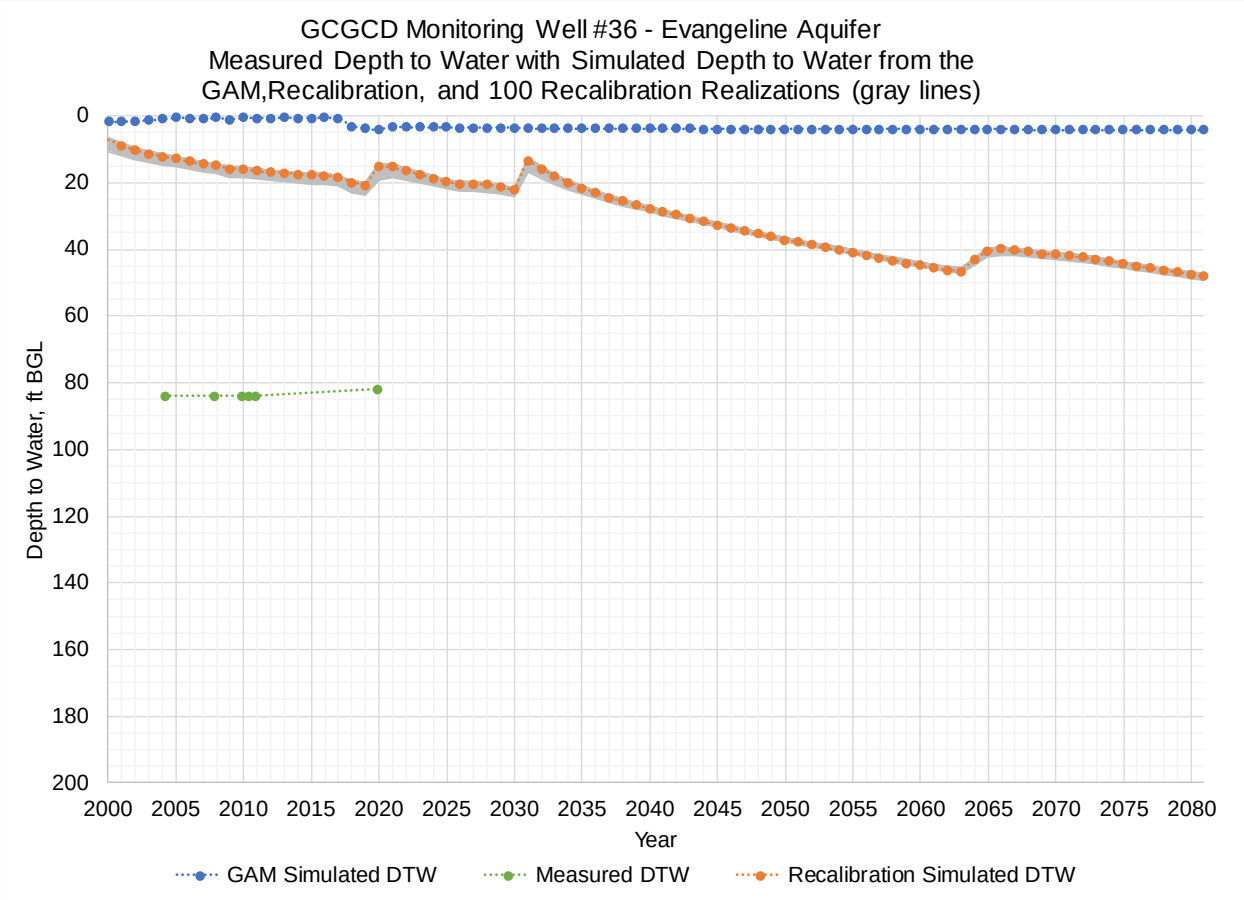

GCGCD Monitoring Well #24 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

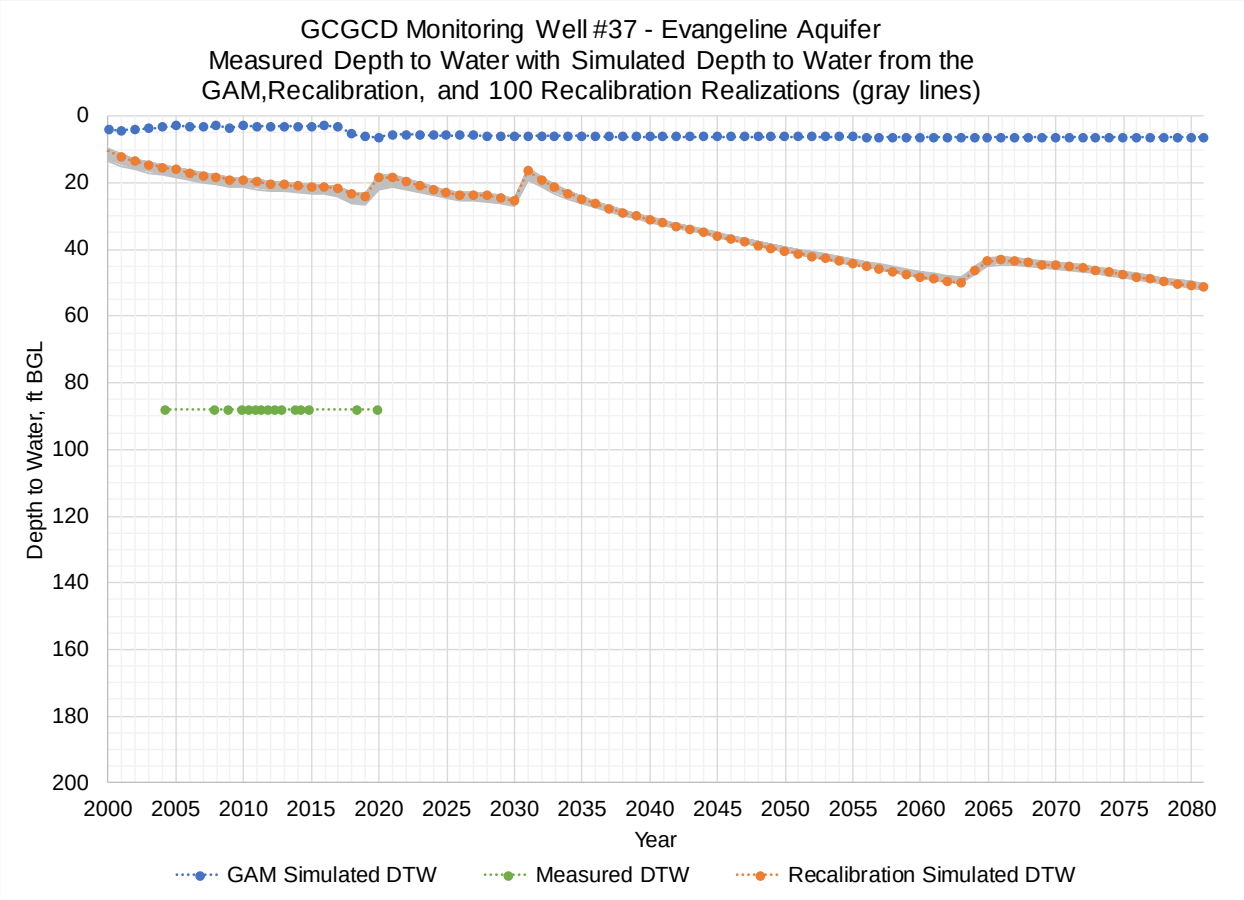

GCGCD Monitoring Well #26 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2005
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

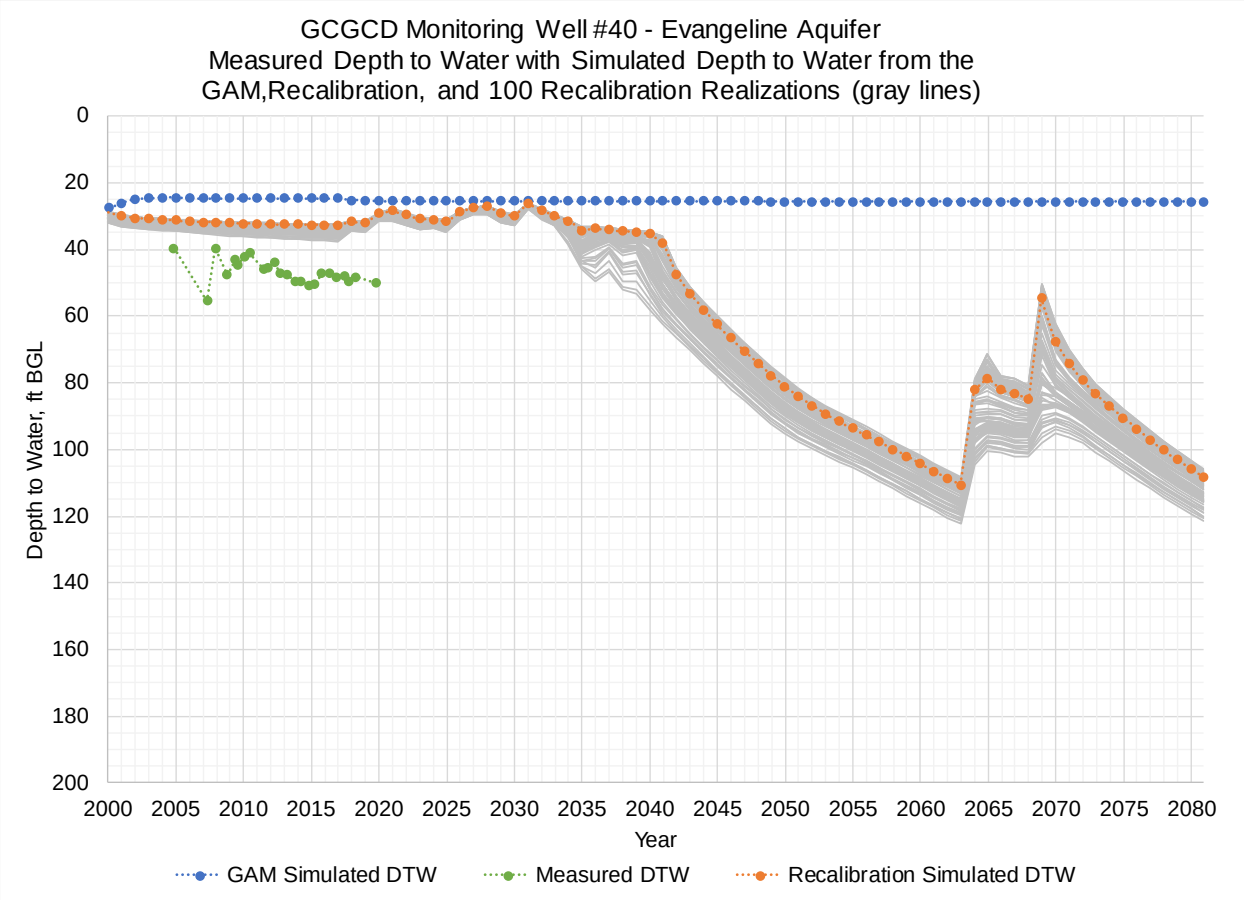

GCGCD Monitoring Well #28 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2005
2010
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

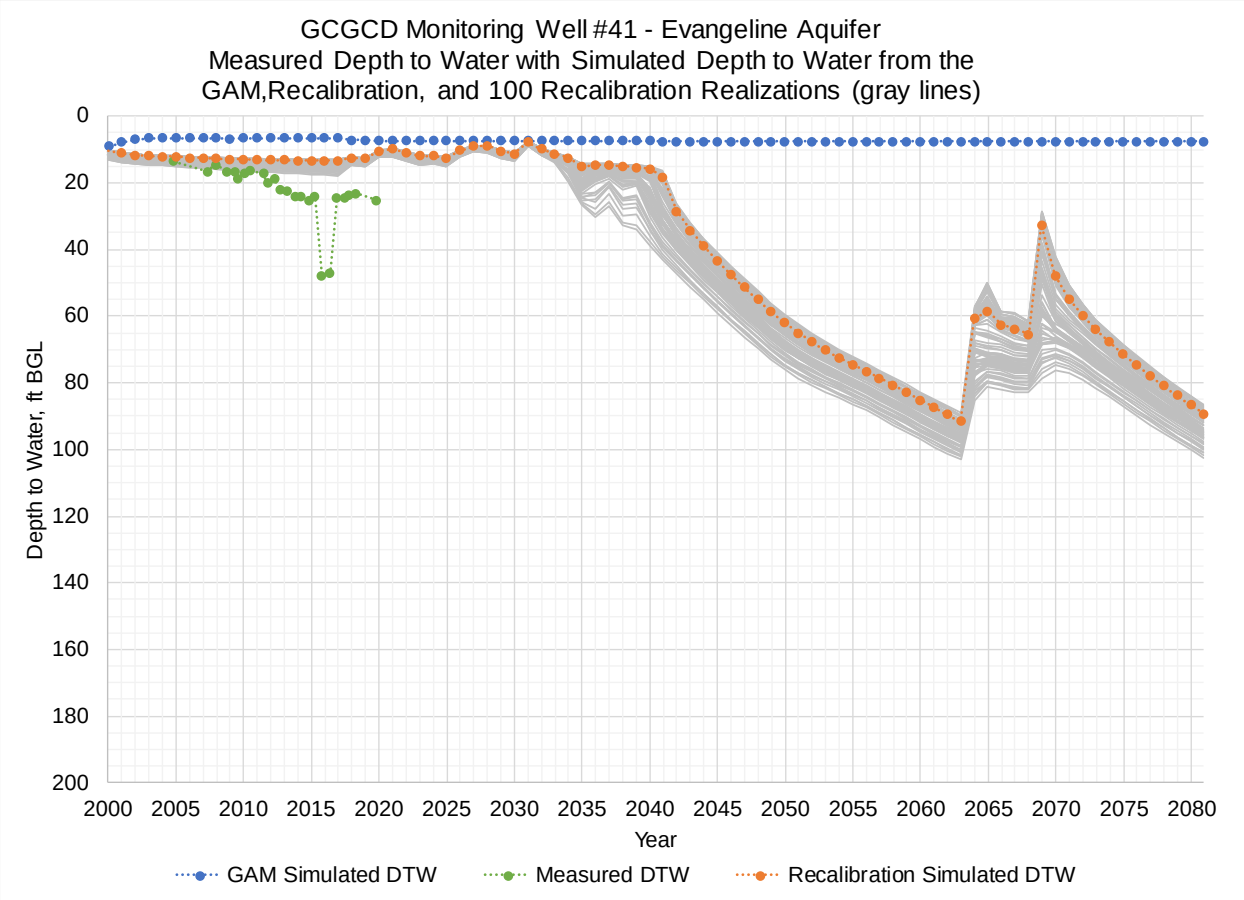

GCGCD Monitoring Well #29 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

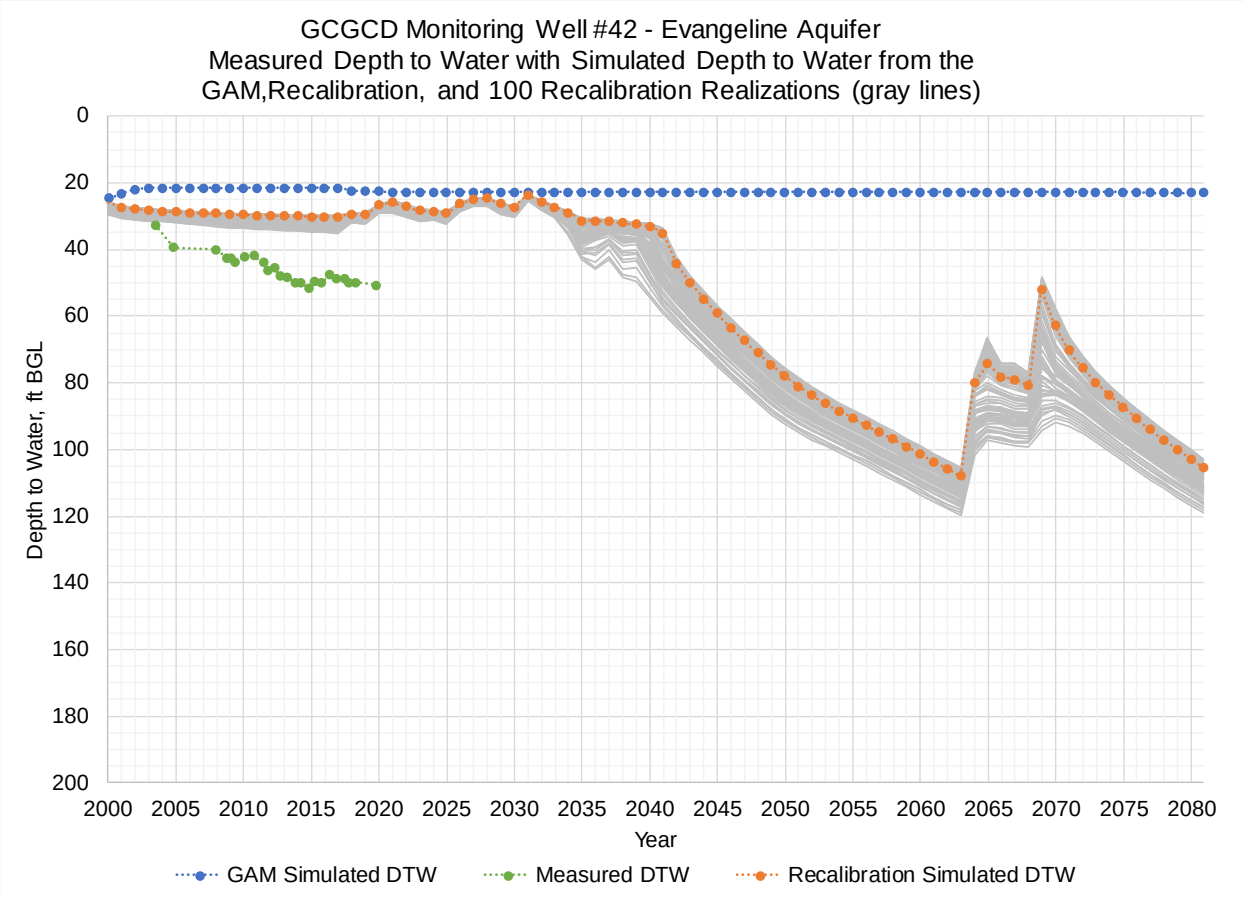

GCGCD Monitoring Well #33 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

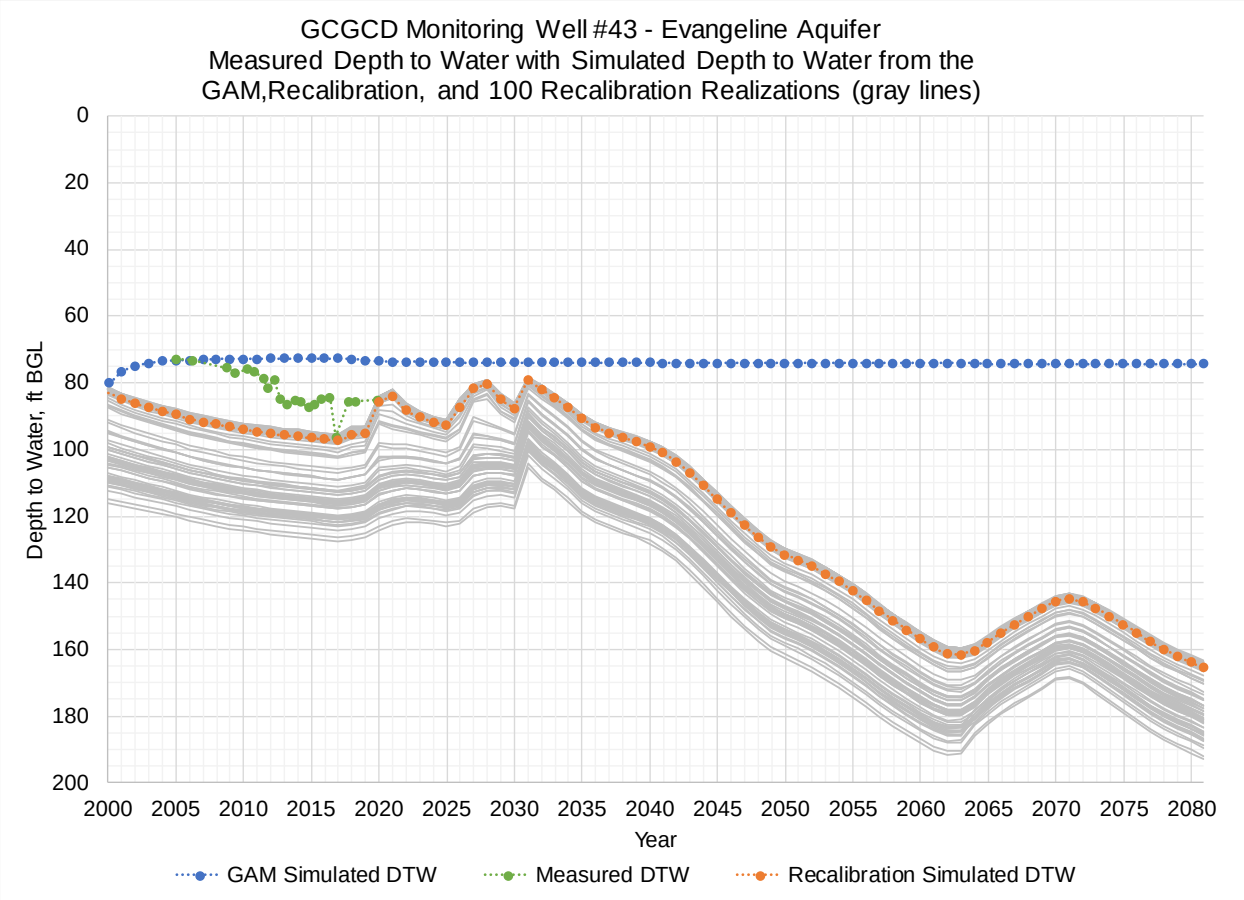

GCGCD Monitoring Well #36 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

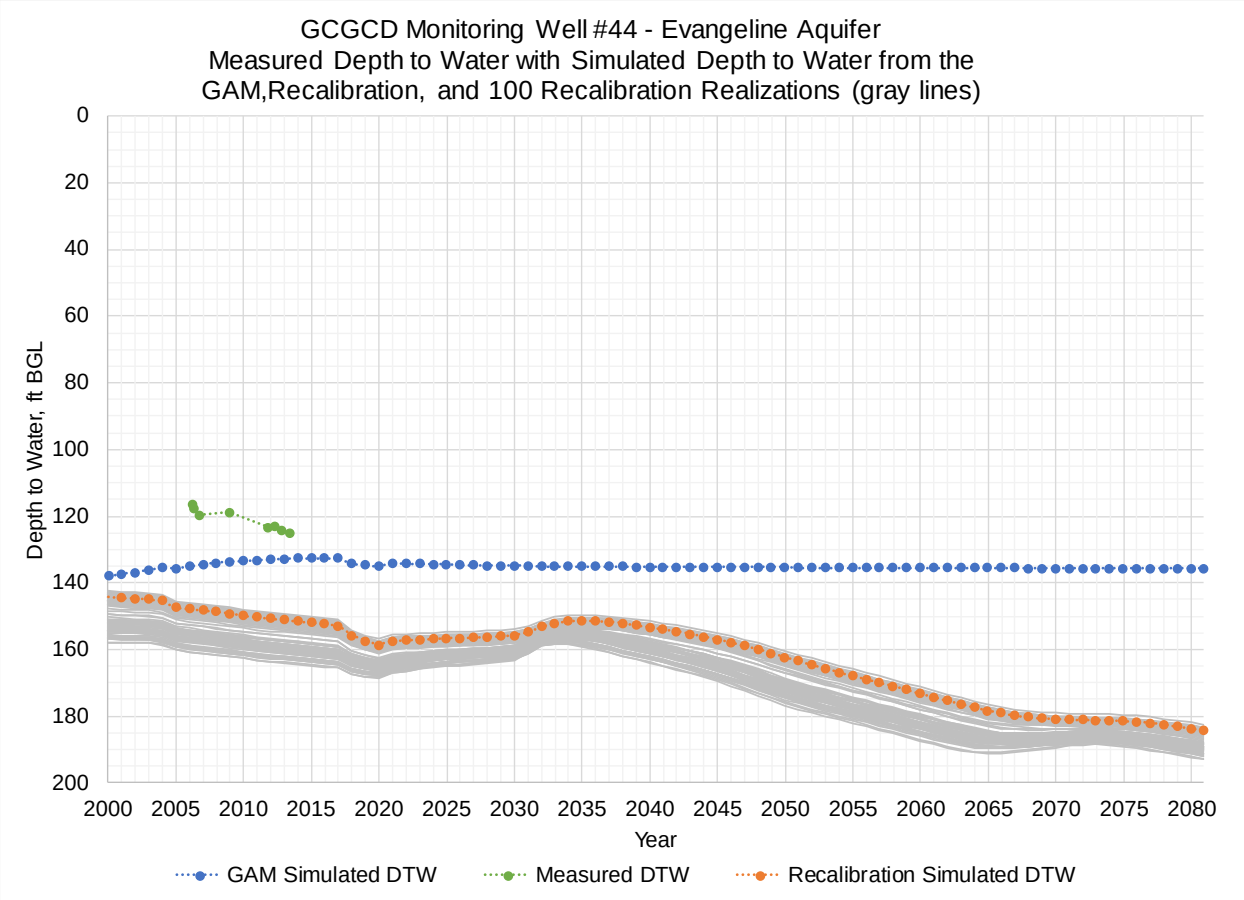

GCGCD Monitoring Well #37 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

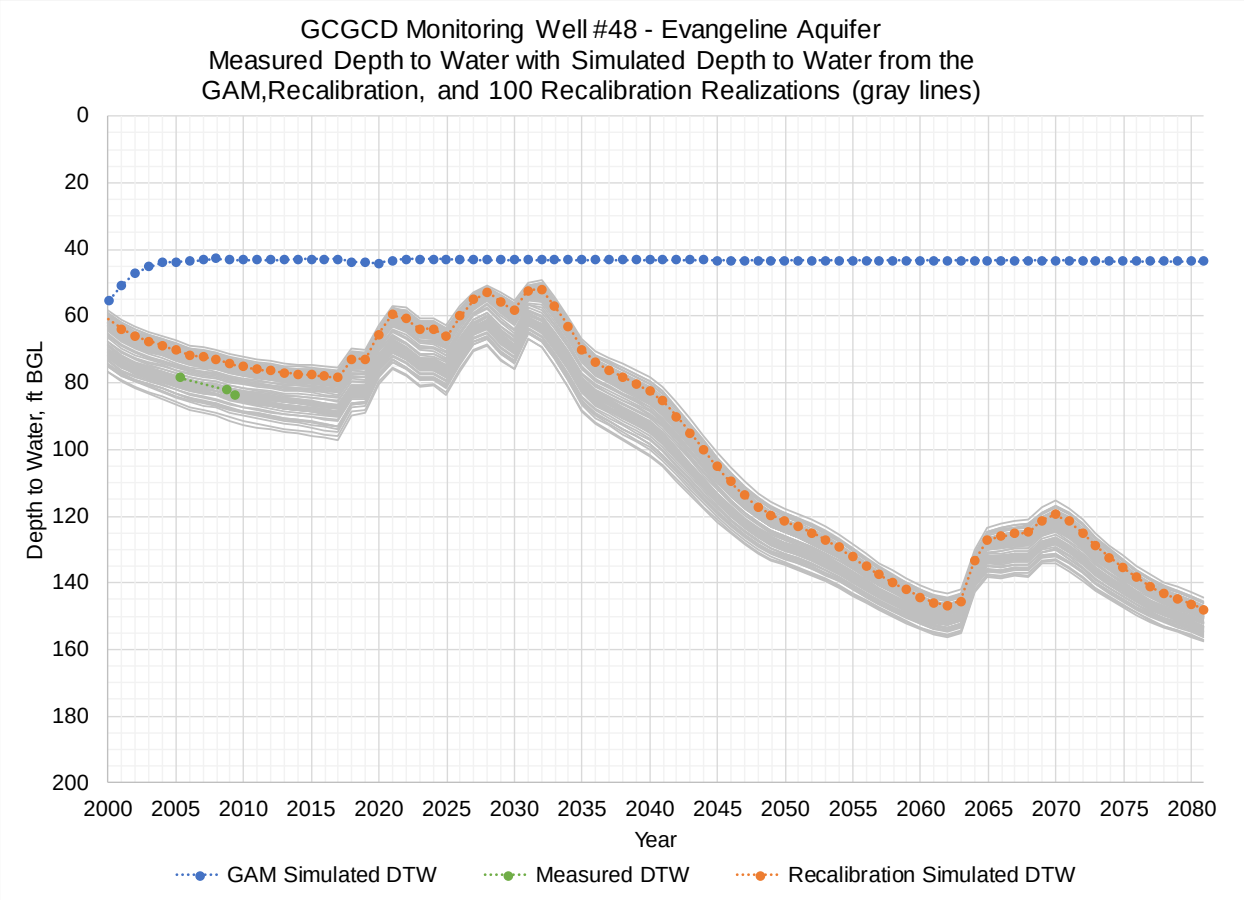

GCGCD Monitoring Well #40 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

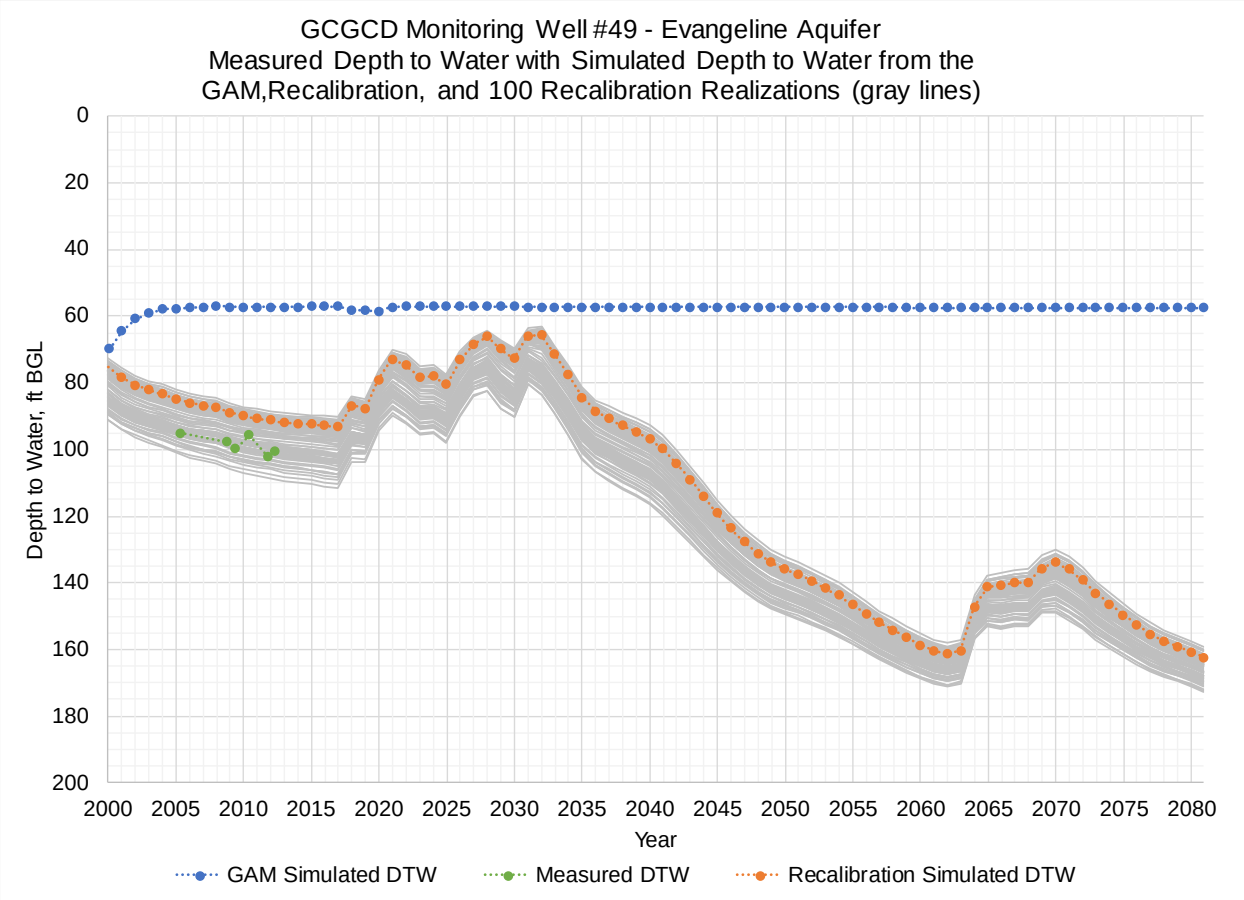

GCGCD Monitoring Well #41 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

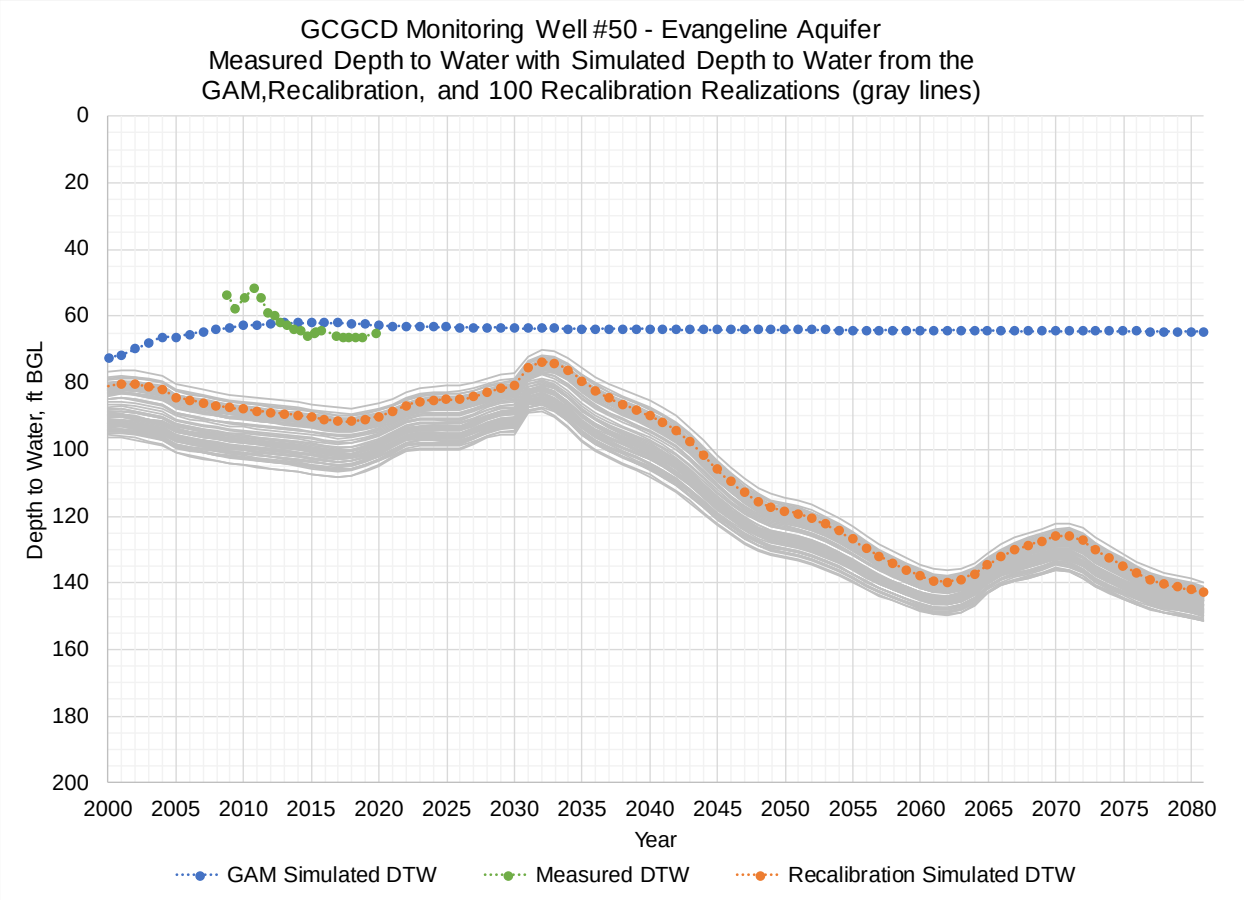

GCGCD Monitoring Well #42 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

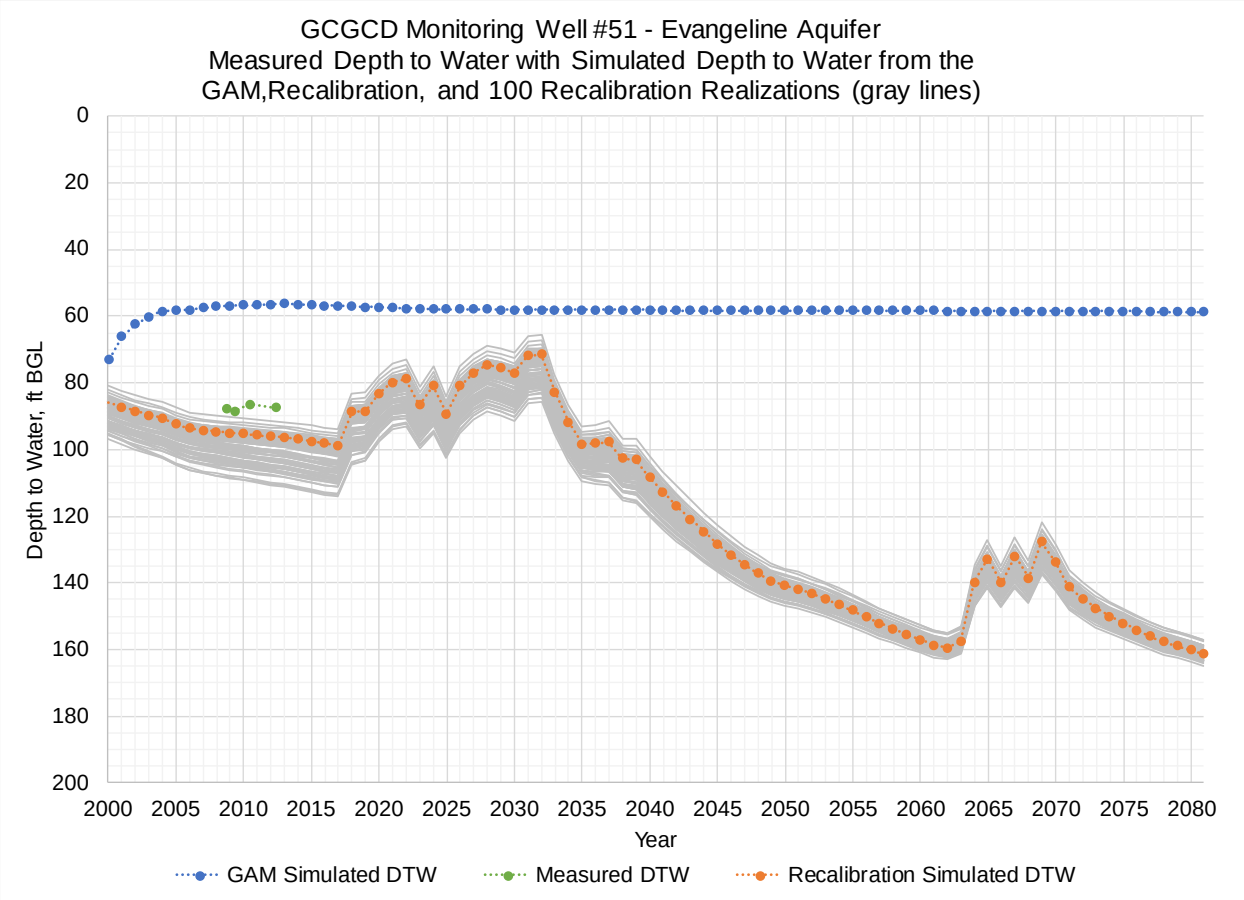

GCGCD Monitoring Well #43 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

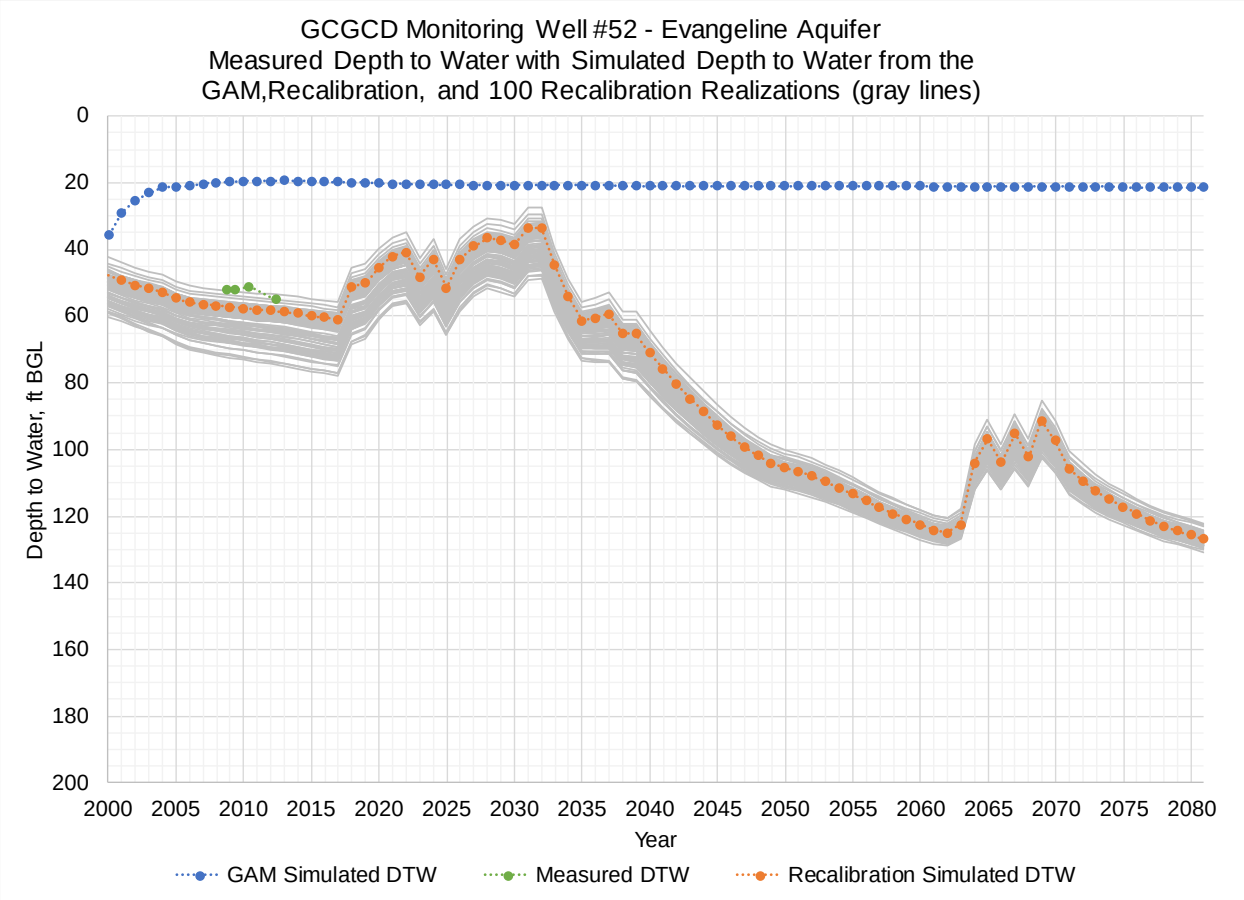

GCGCD Monitoring Well #44 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

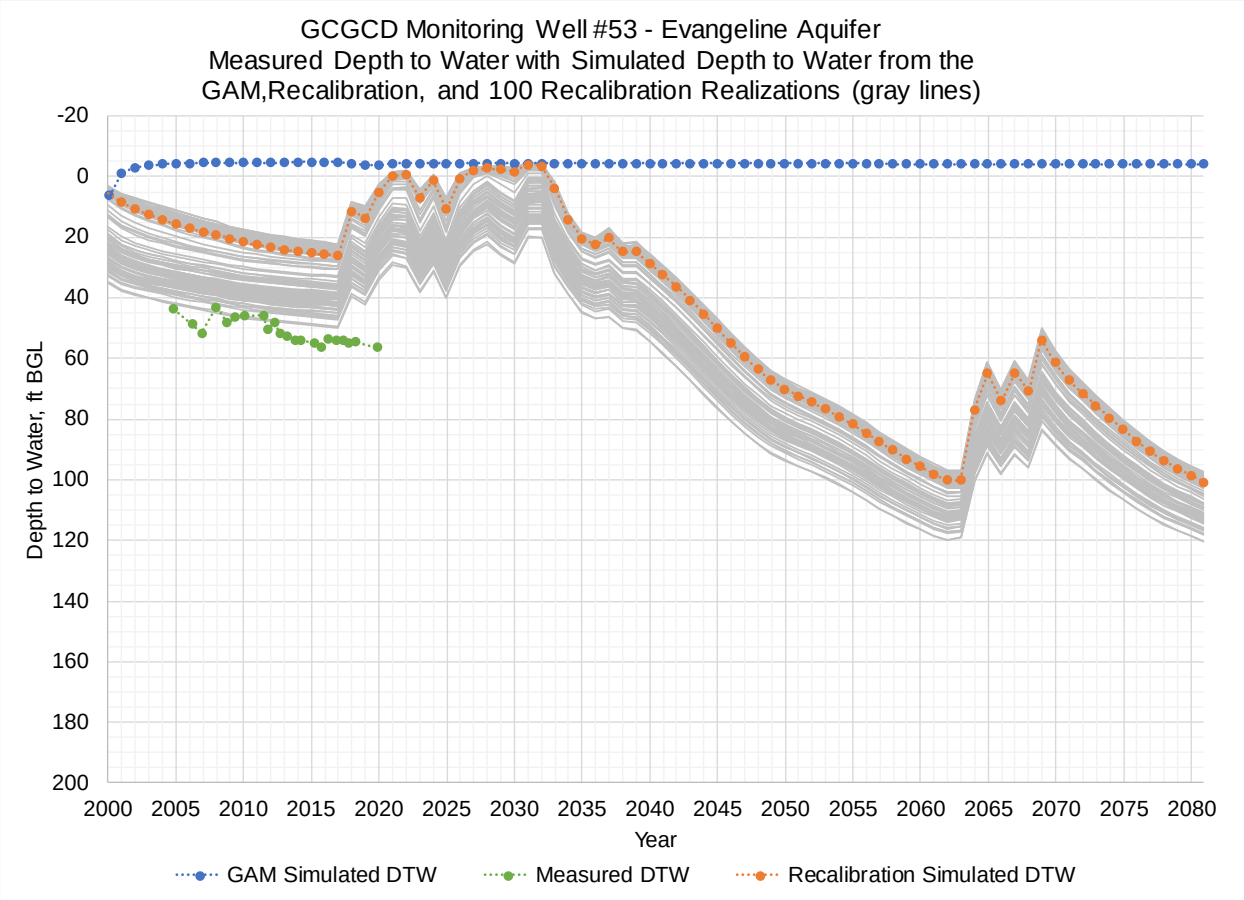

GCGCD Monitoring Well #48 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

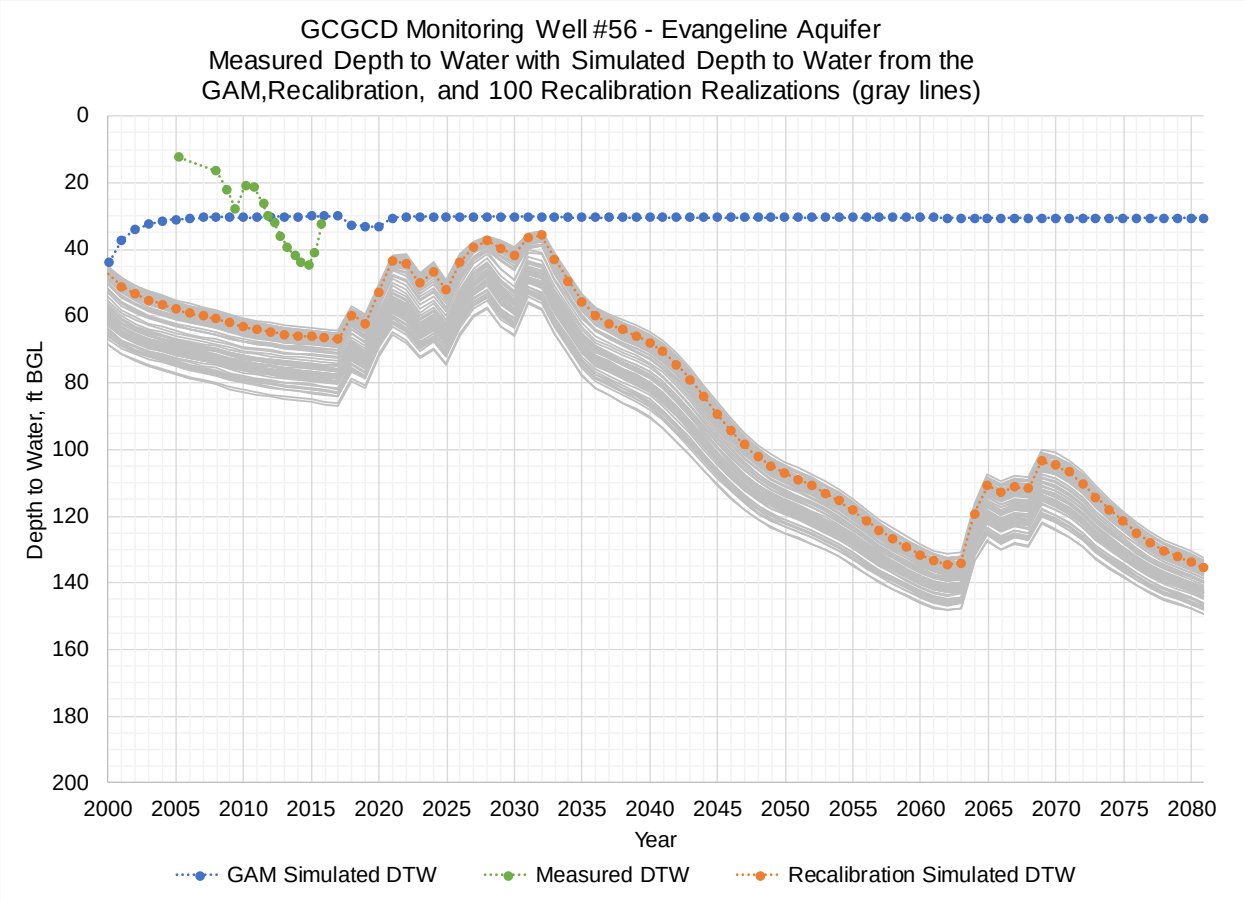

GCGCD Monitoring Well #49 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
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100
120
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

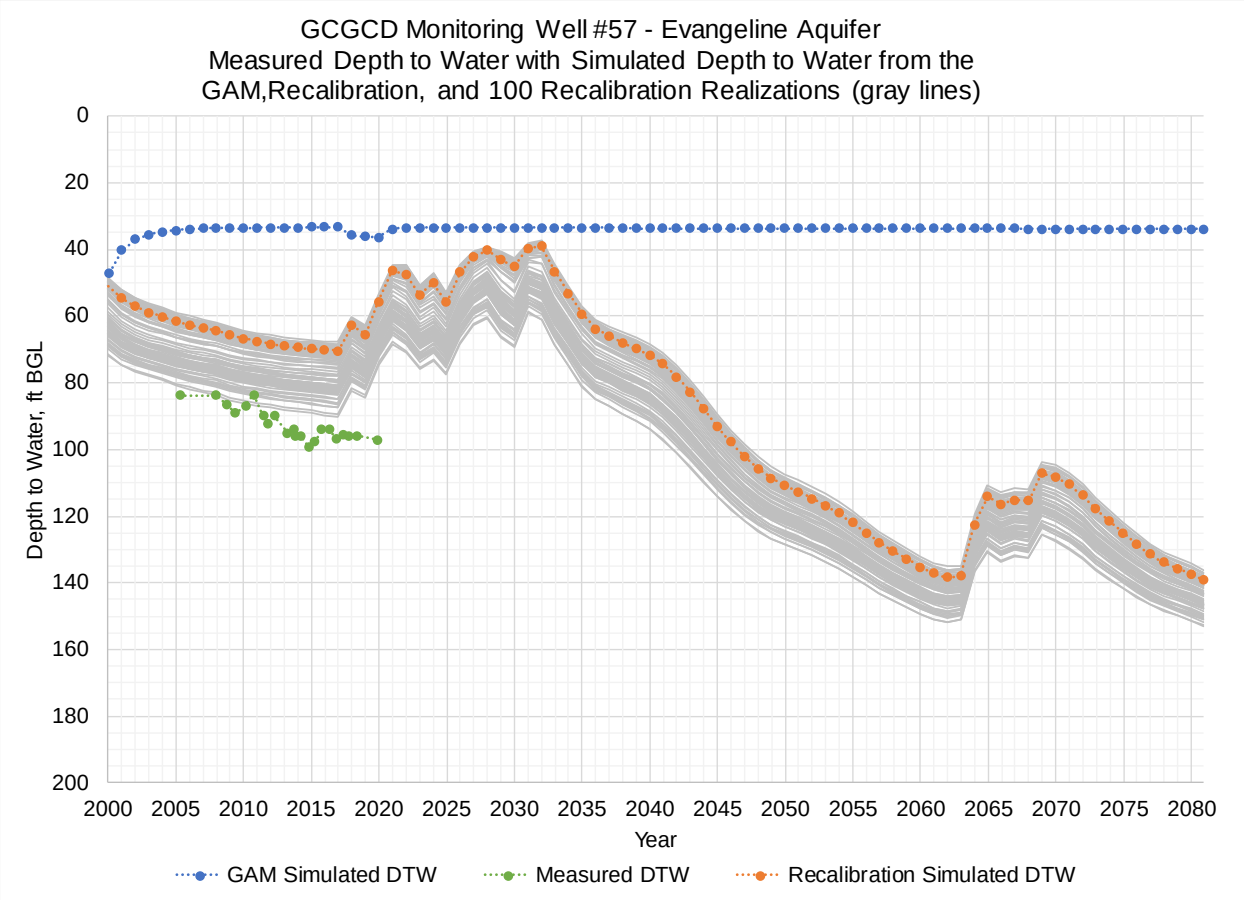

GCGCD Monitoring Well #50 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
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2025
2030
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

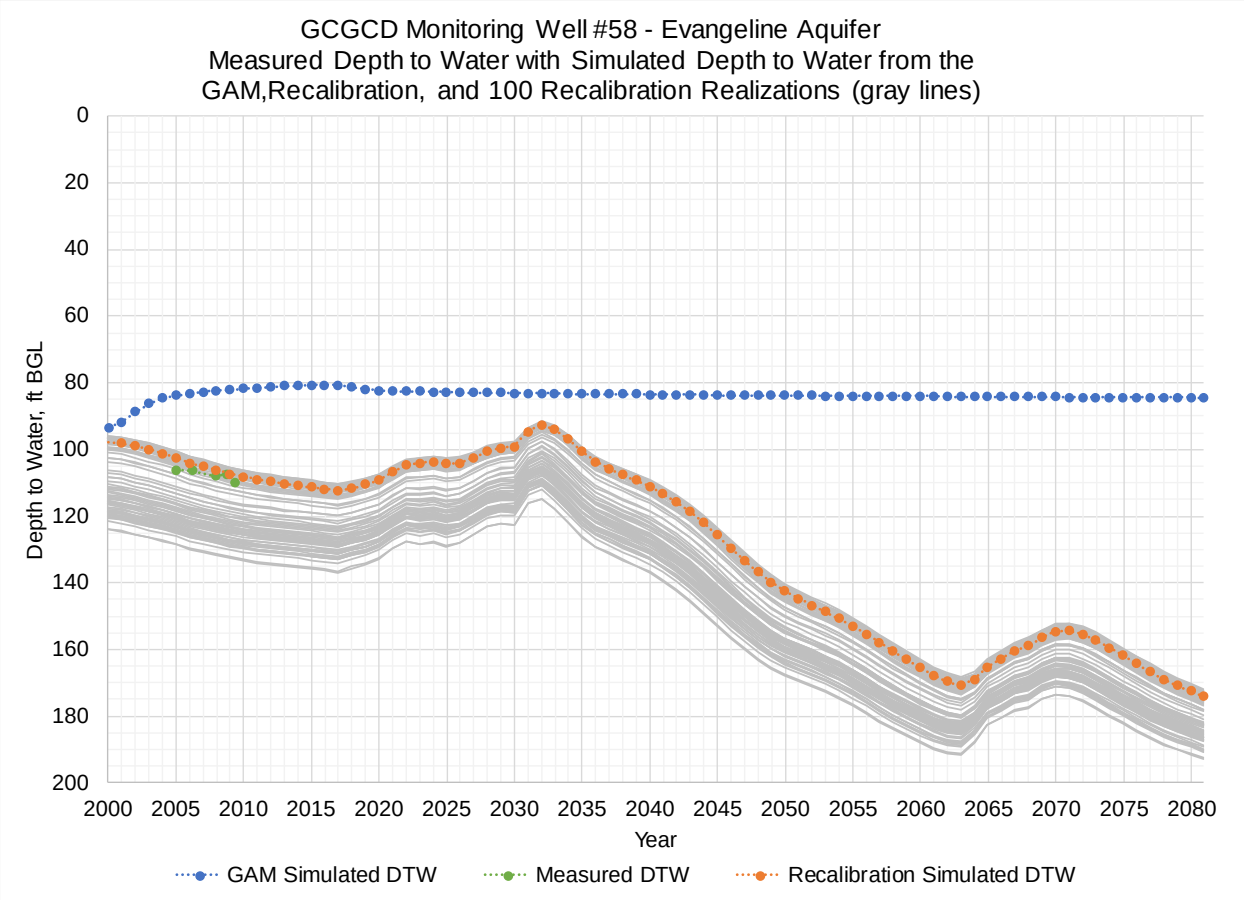

GCGCD Monitoring Well #51 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
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180
200
2000
2005
2010
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2025
2030
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

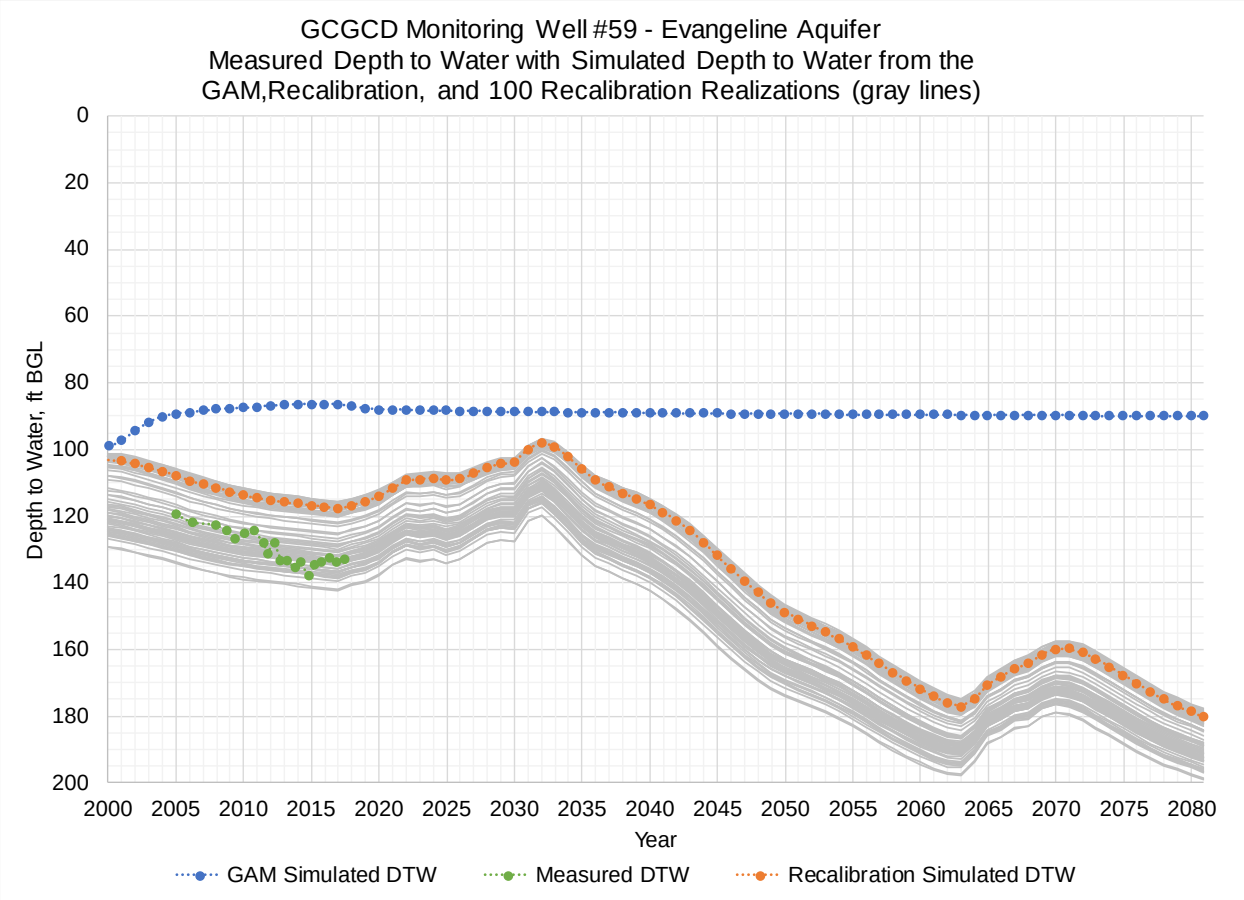

GCGCD Monitoring Well #52 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
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160
180
200
2000
2005
2010
2015
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2025
2030
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

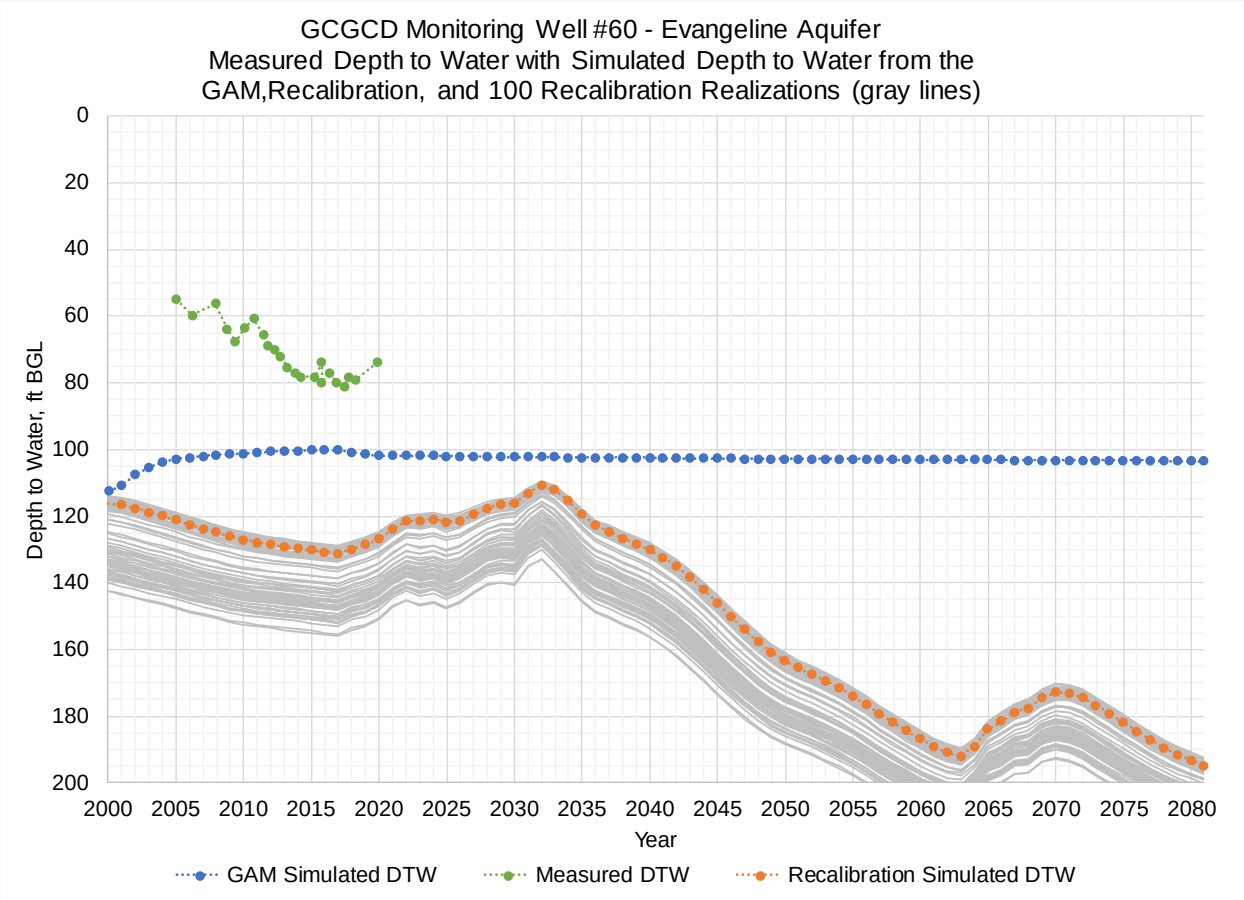

GCGCD Monitoring Well #53 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
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2025
2030
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

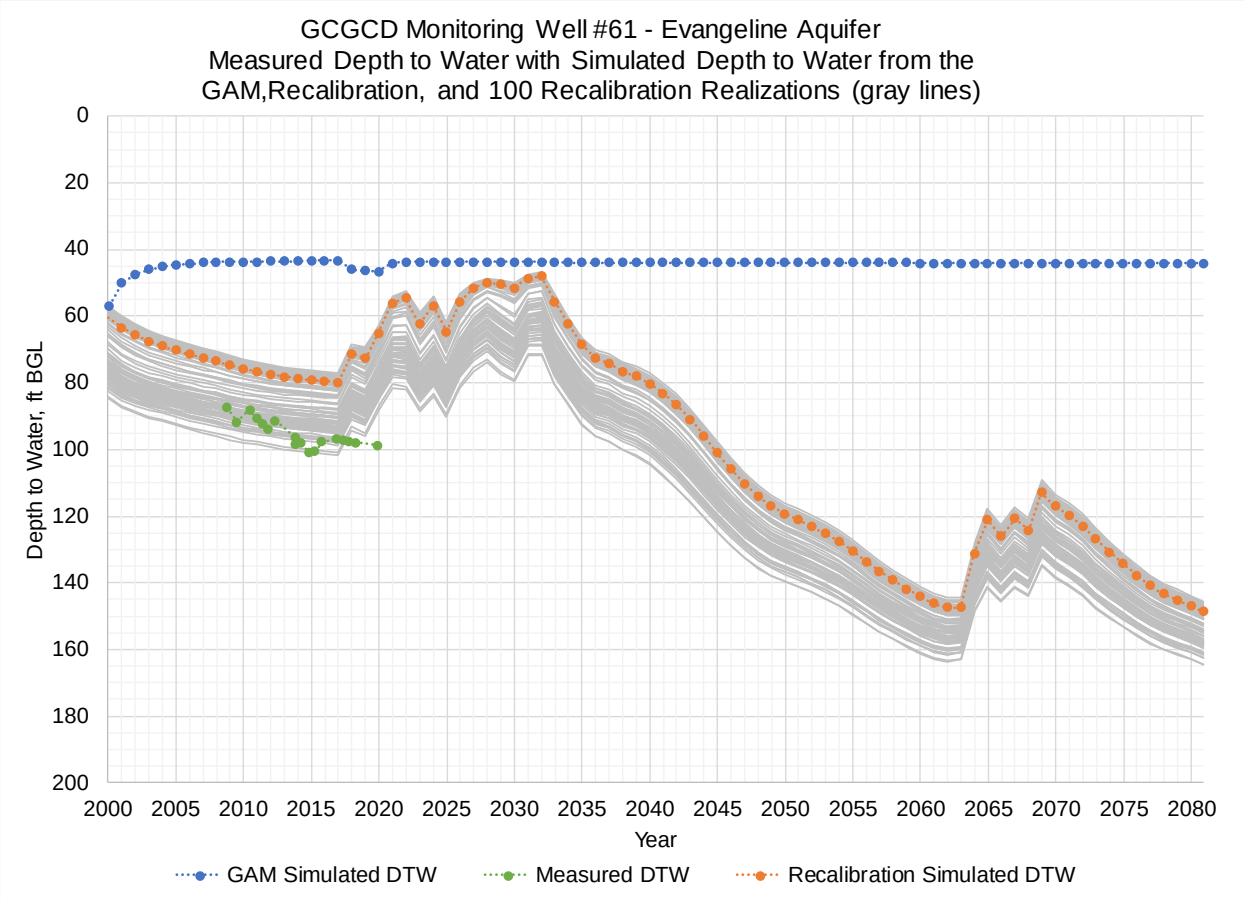

GCGCD Monitoring Well #56 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2025
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

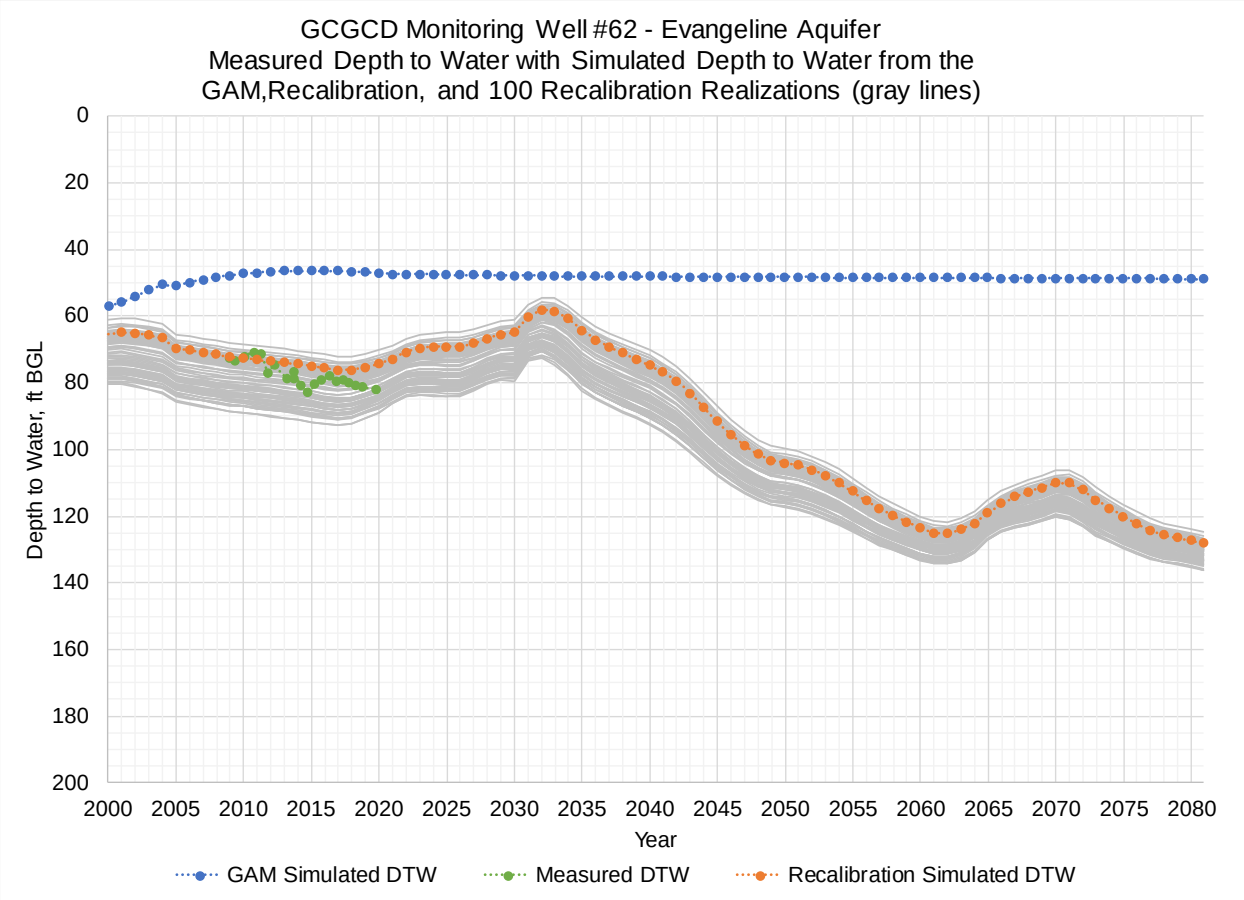

GCGCD Monitoring Well #57 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2000
2005
2010
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2025
2030
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2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

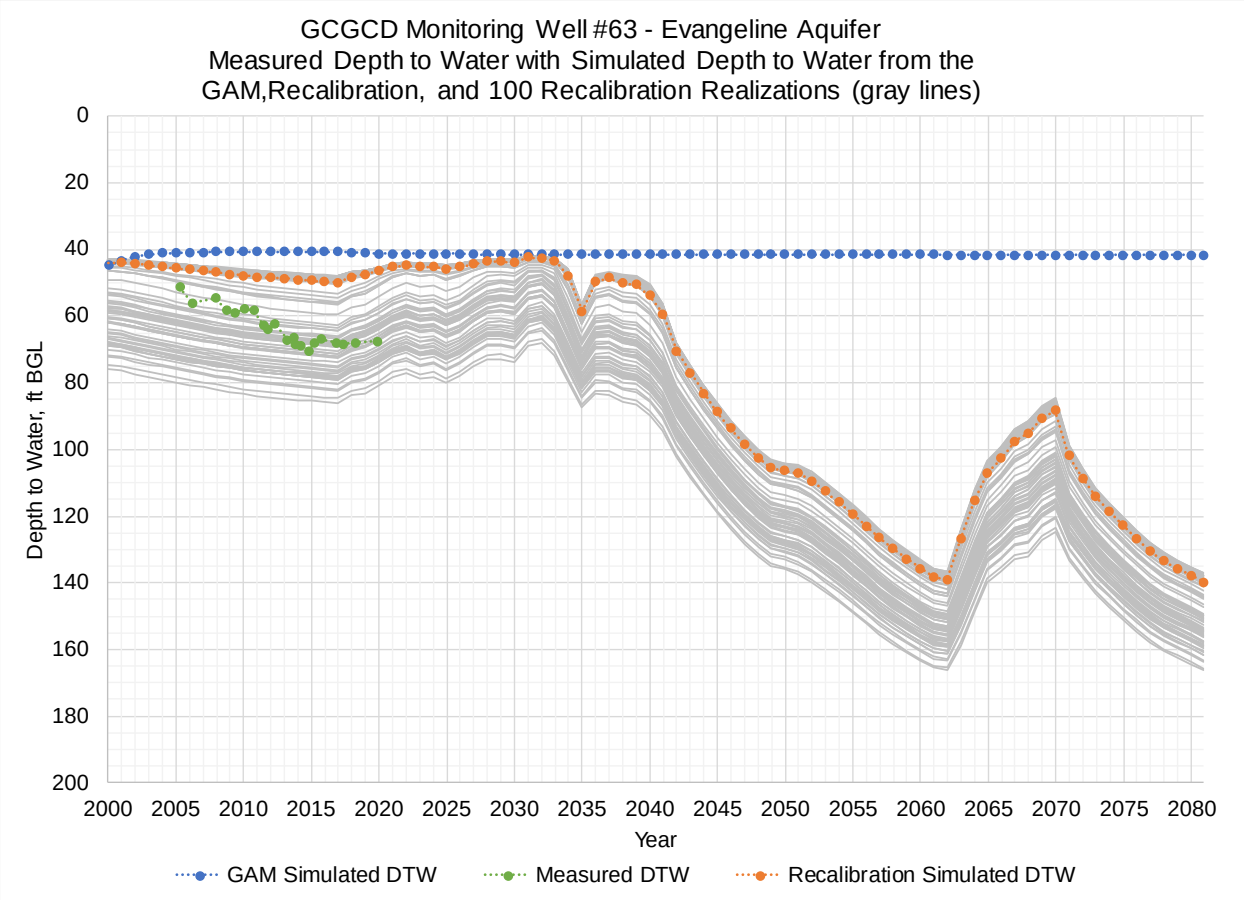

GCGCD Monitoring Well #58 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
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2025
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

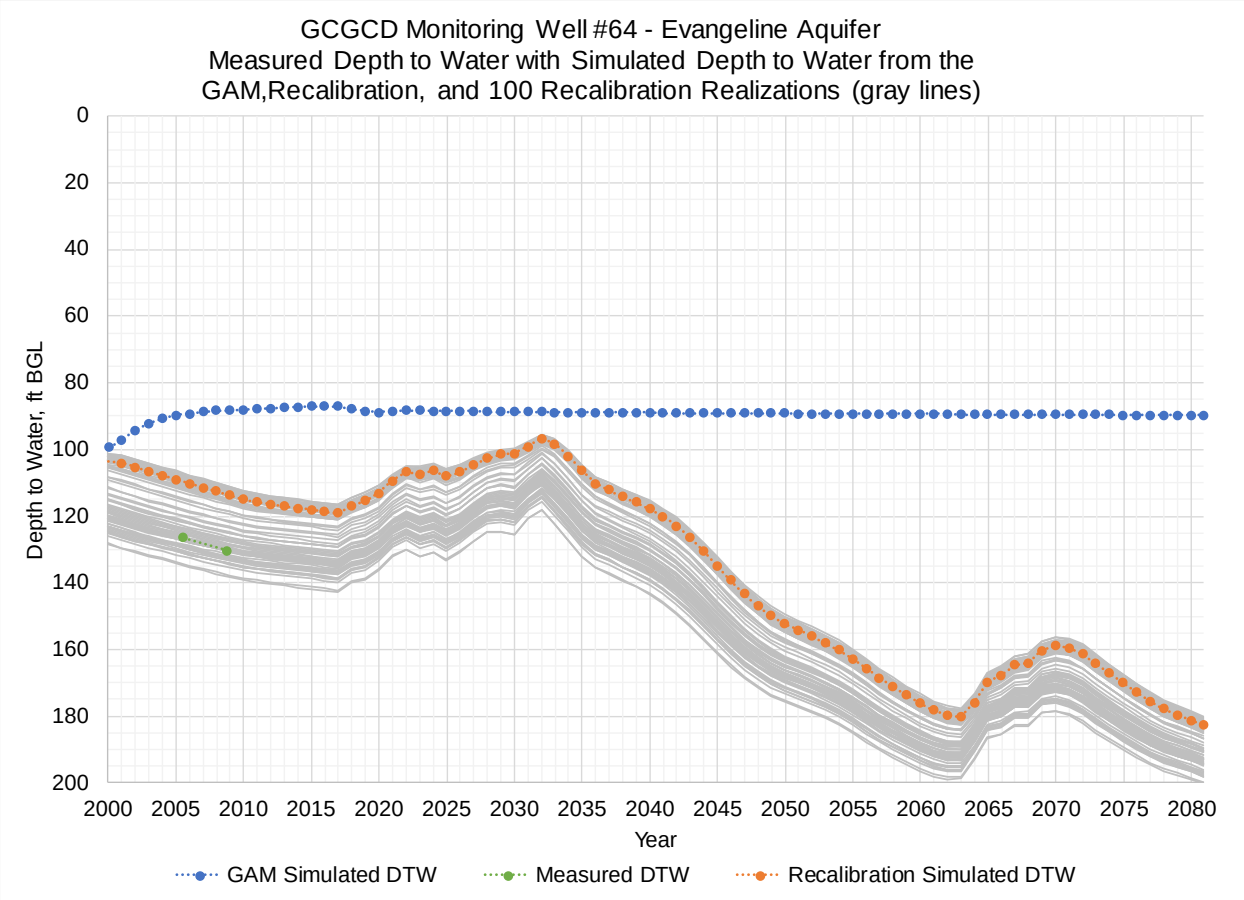

GCGCD Monitoring Well #59 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

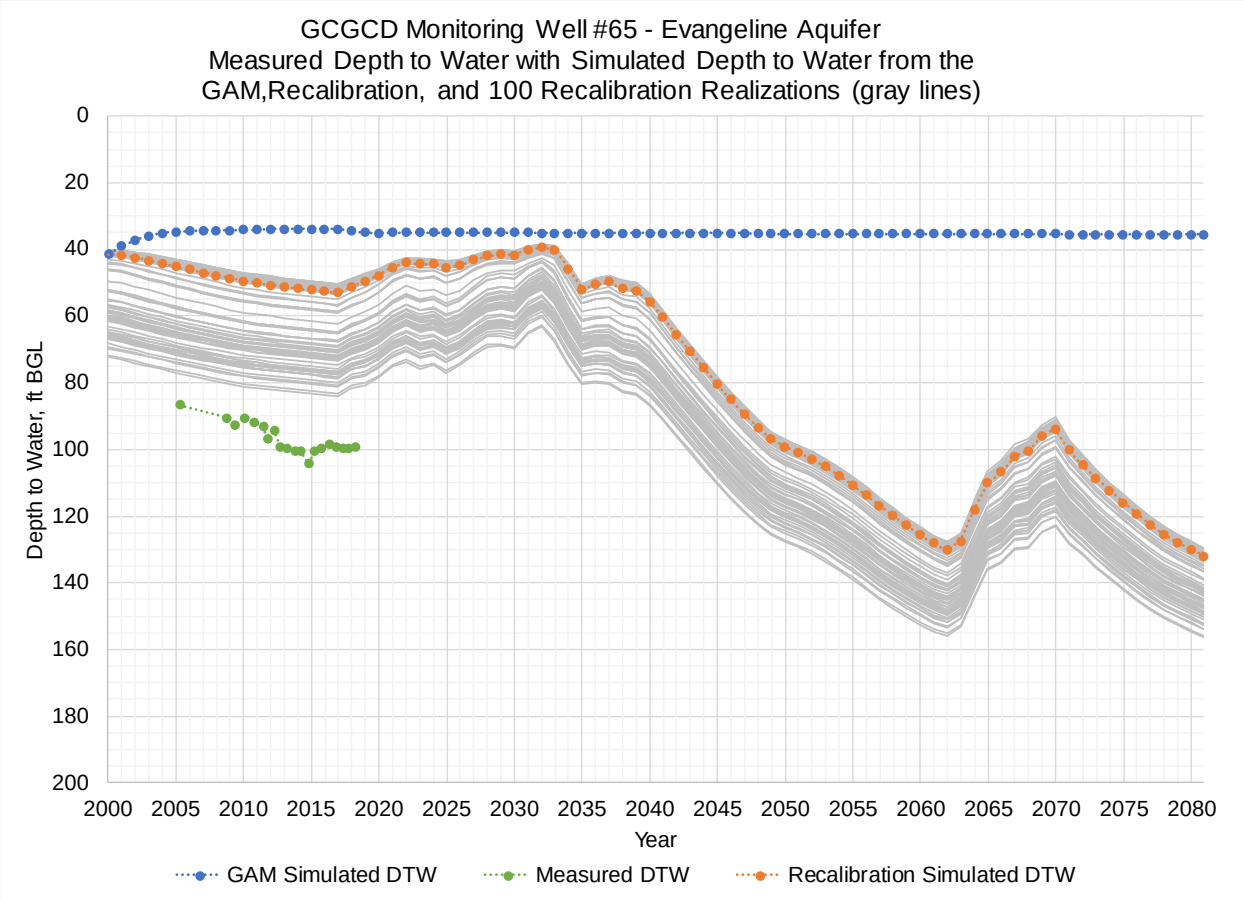

GCGCD Monitoring Well #60 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
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200
2000
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2010
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2025
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

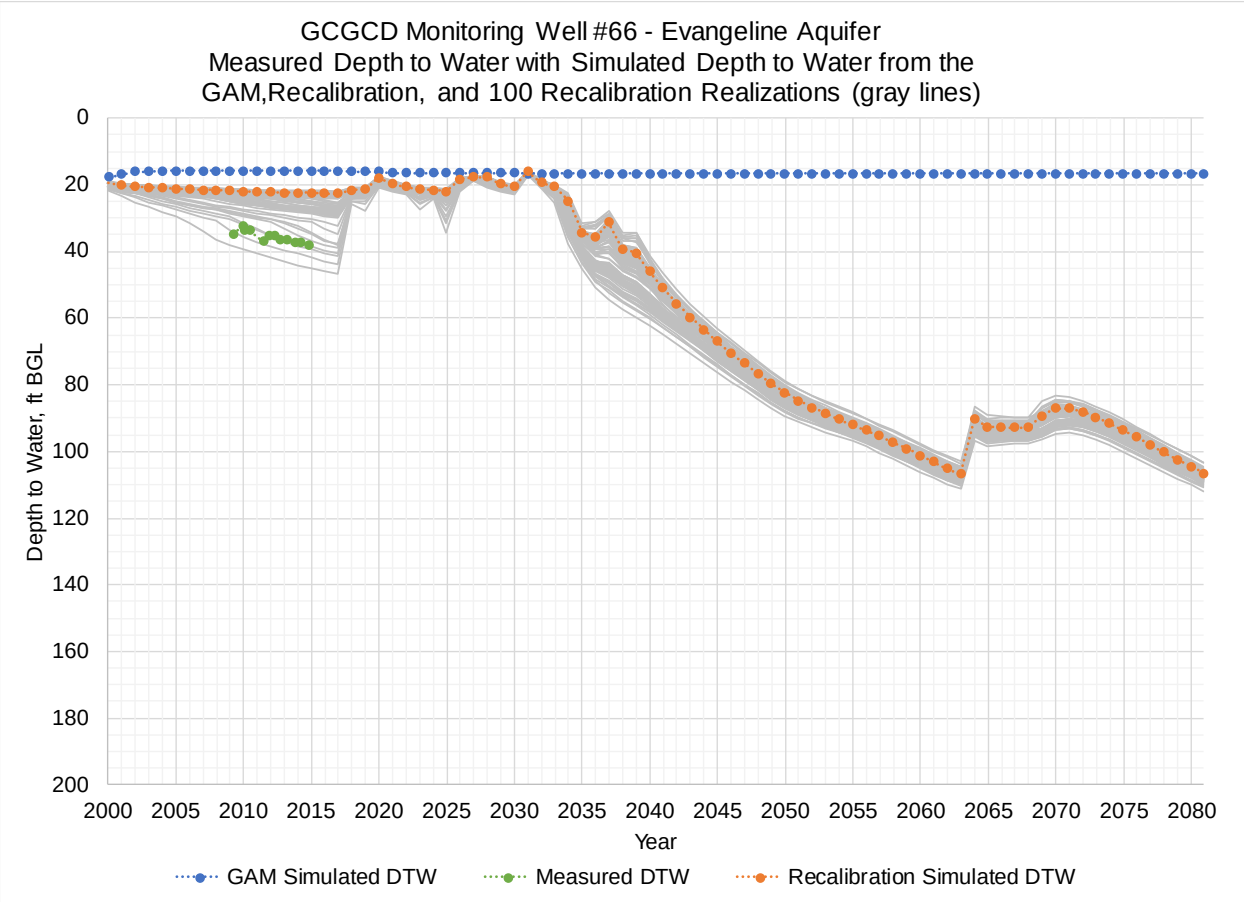

GCGCD Monitoring Well #61 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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100
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2025
2030
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

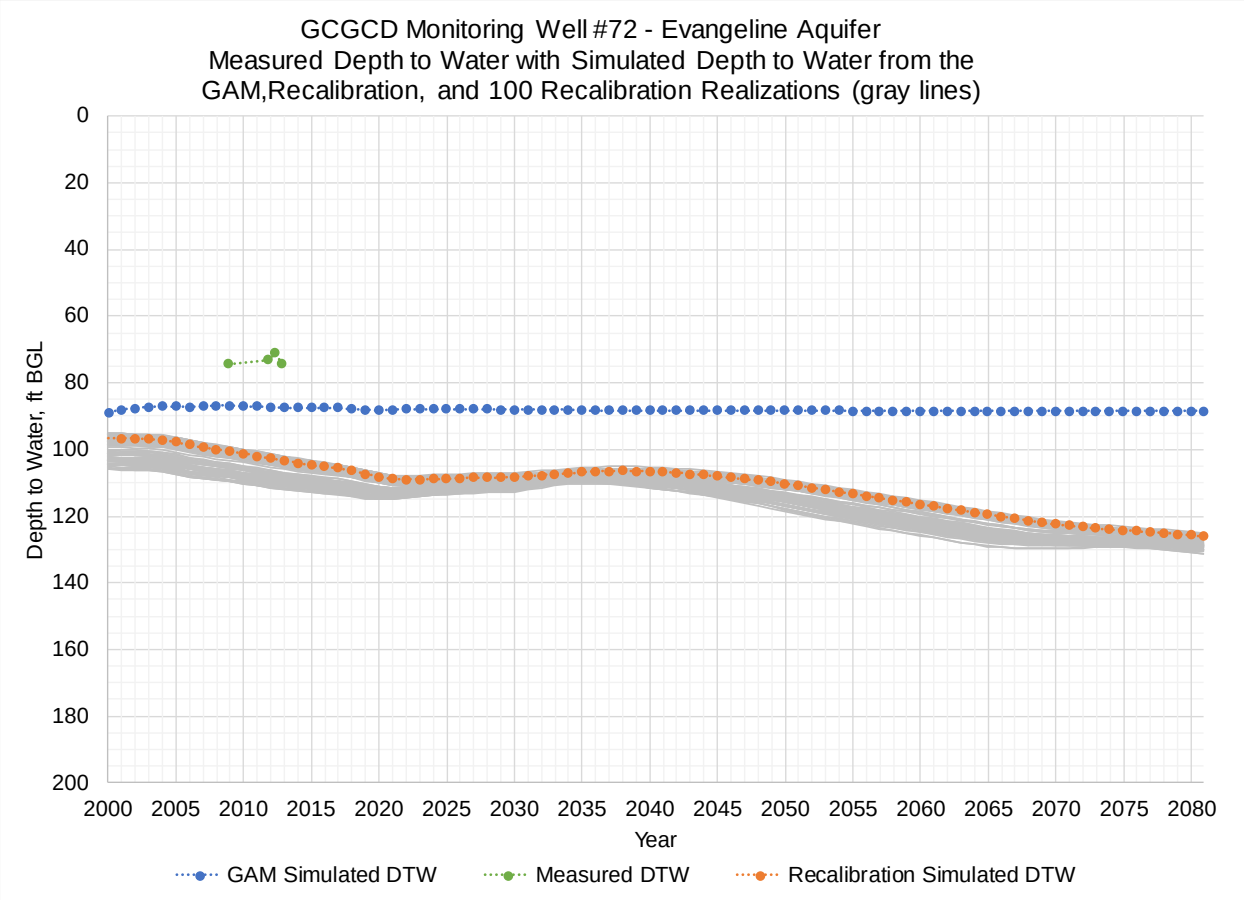

GCGCD Monitoring Well #62 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
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100
120
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2000
2005
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

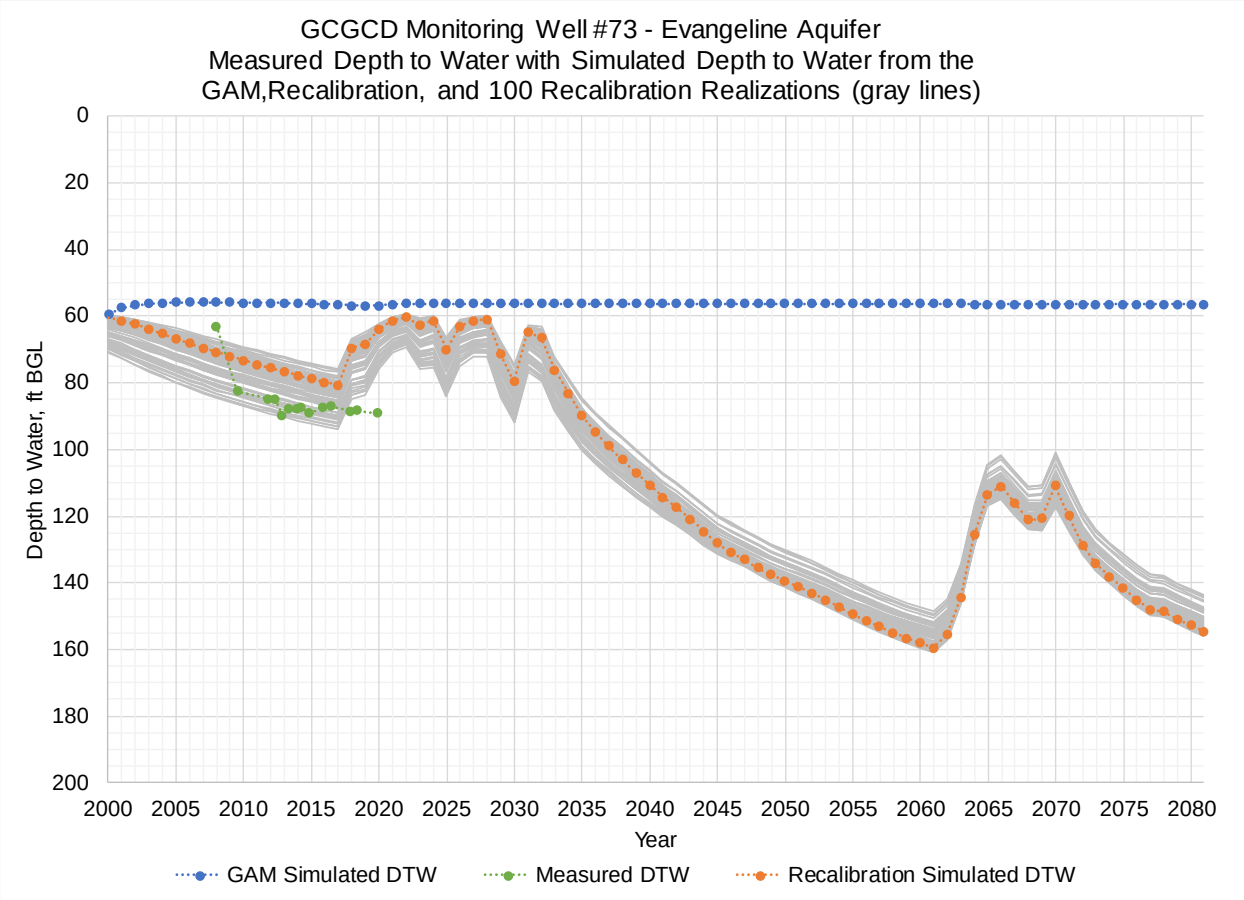

GCGCD Monitoring Well #63 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

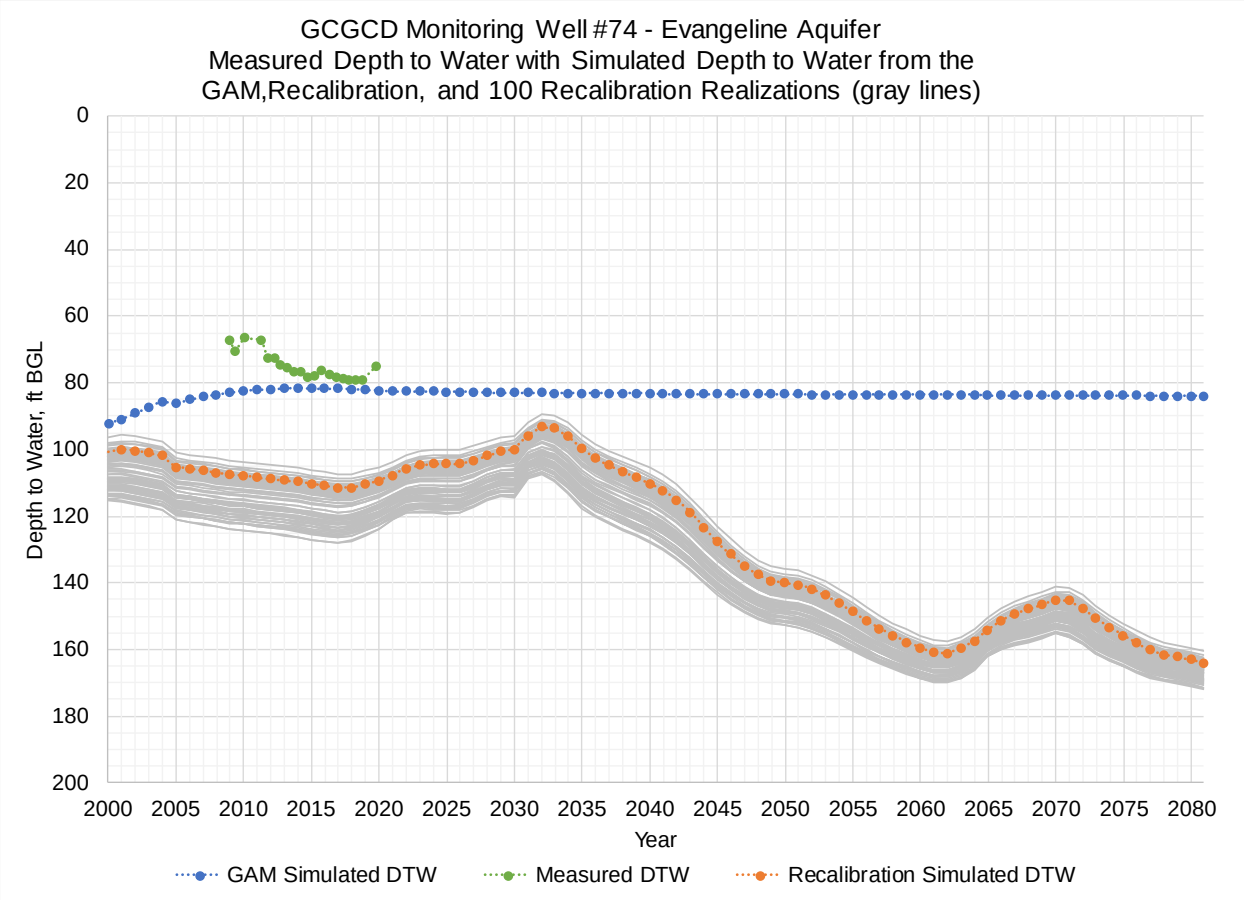

GCGCD Monitoring Well #64 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

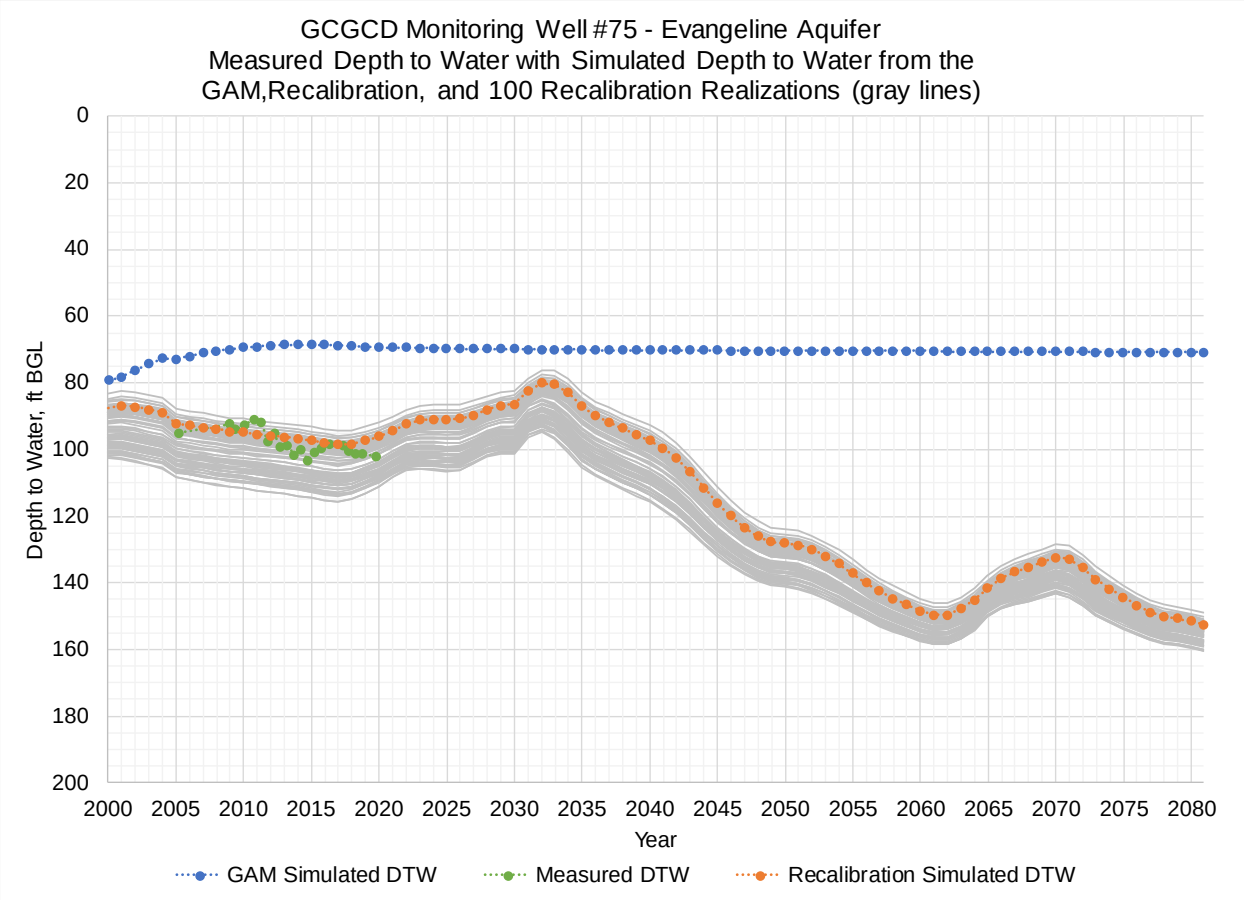

GCGCD Monitoring Well #65 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

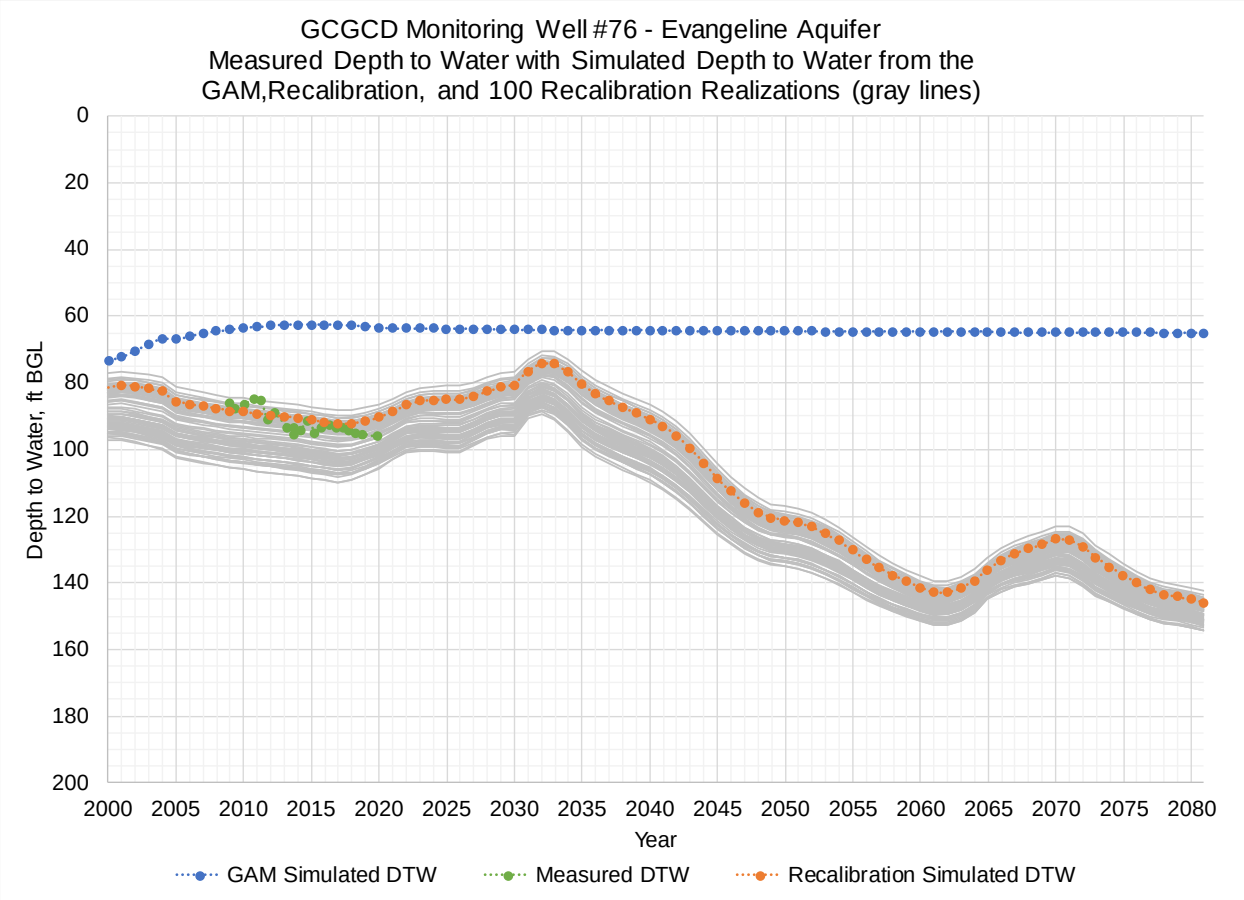

GCGCD Monitoring Well #66 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

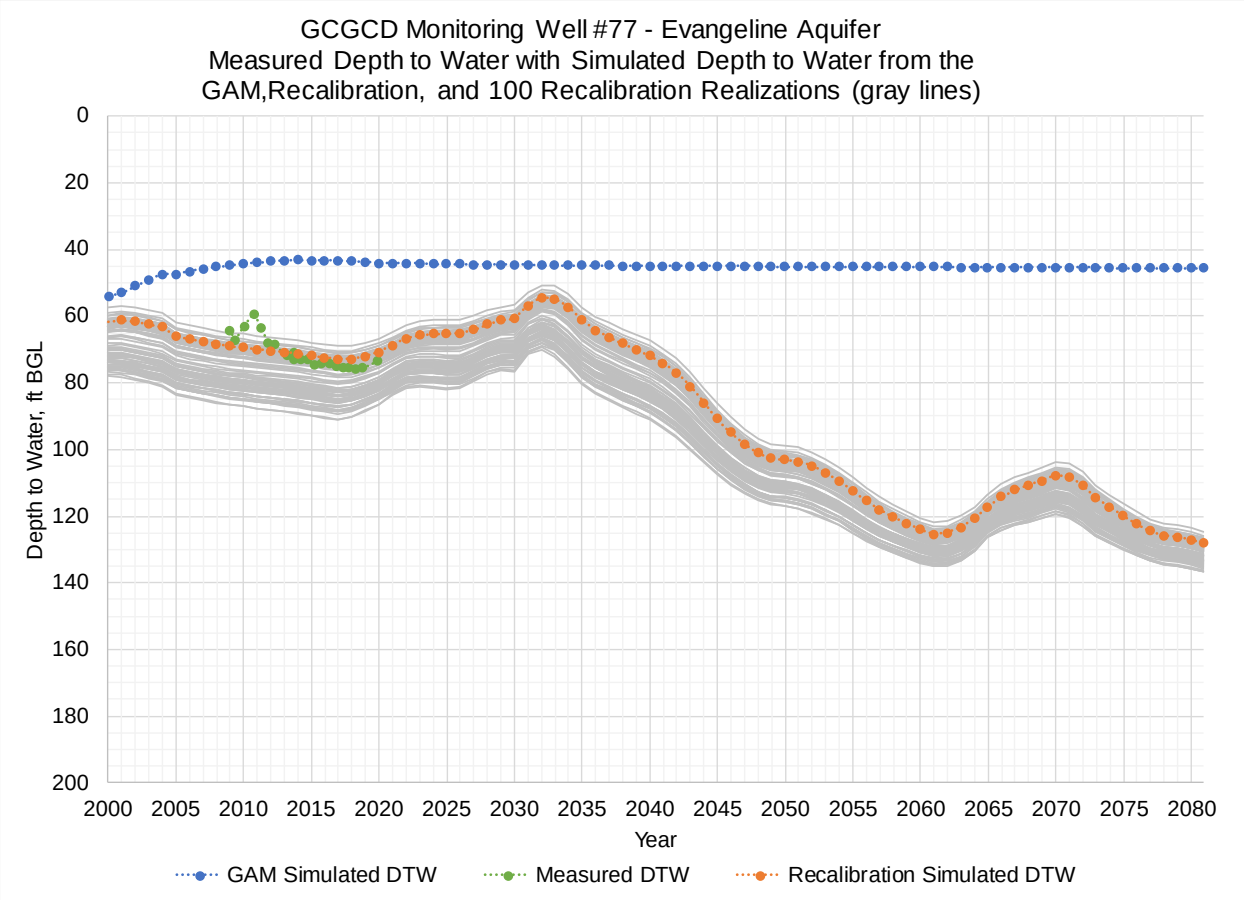

GCGCD Monitoring Well #72 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

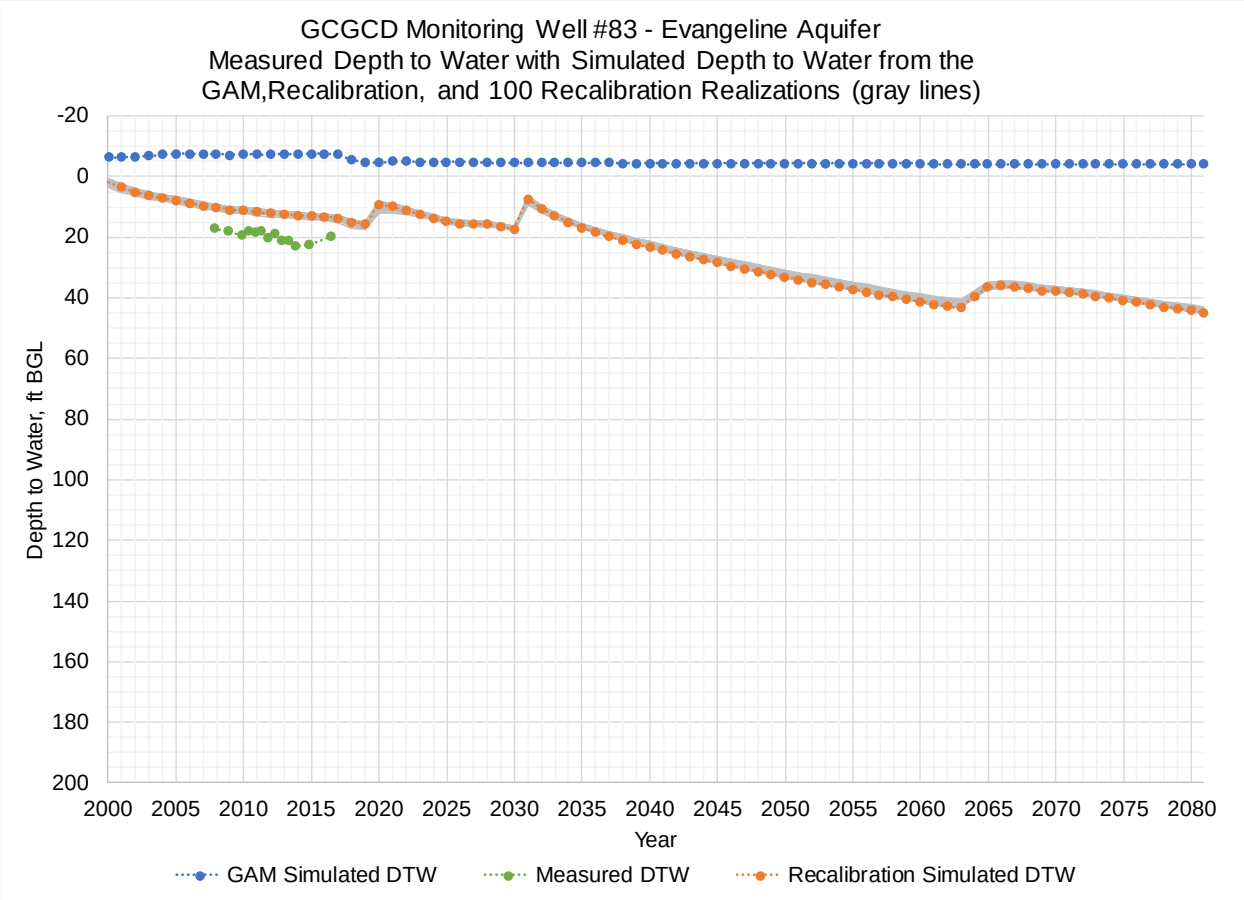

GCGCD Monitoring Well #73 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

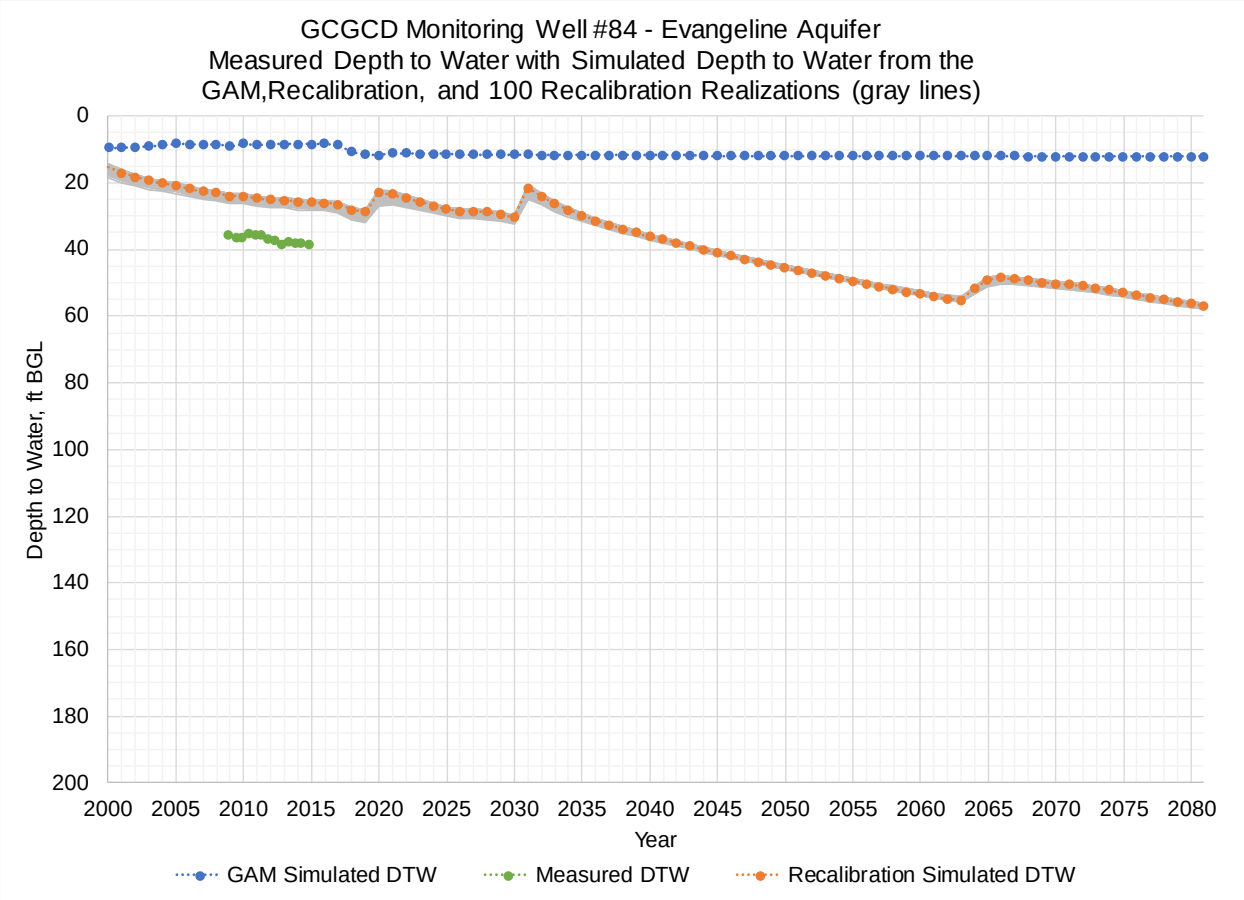

GCGCD Monitoring Well #74 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

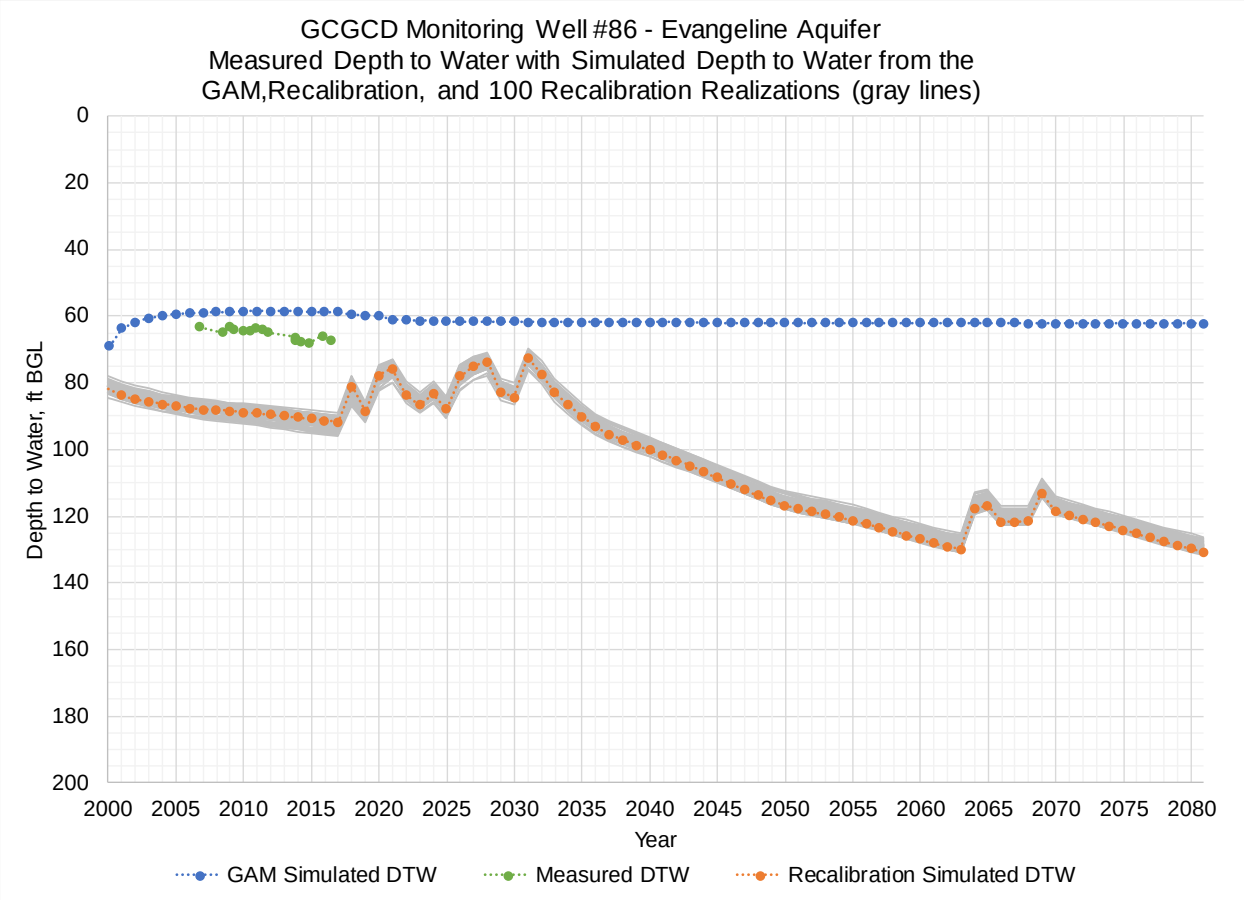

GCGCD Monitoring Well #75 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

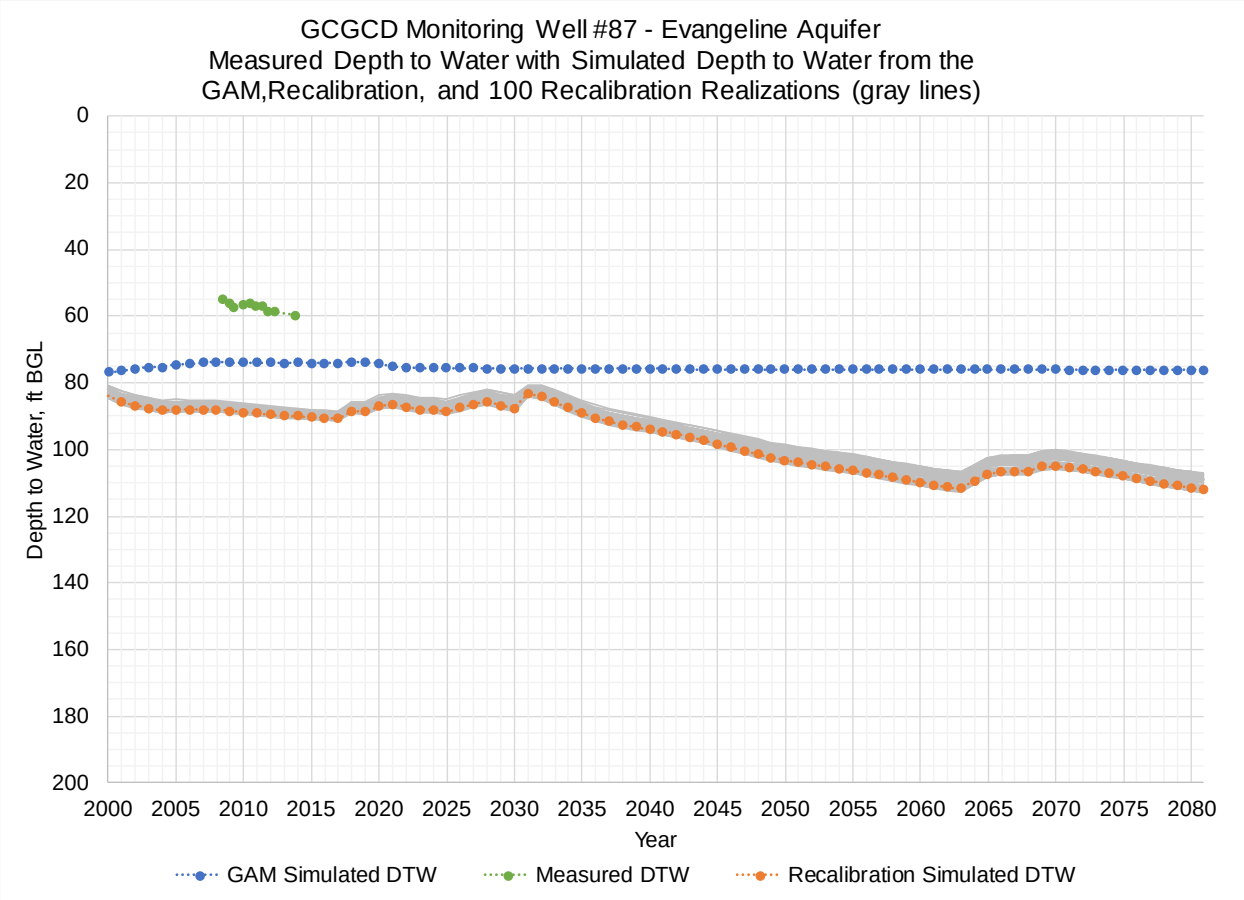

GCGCD Monitoring Well #76 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

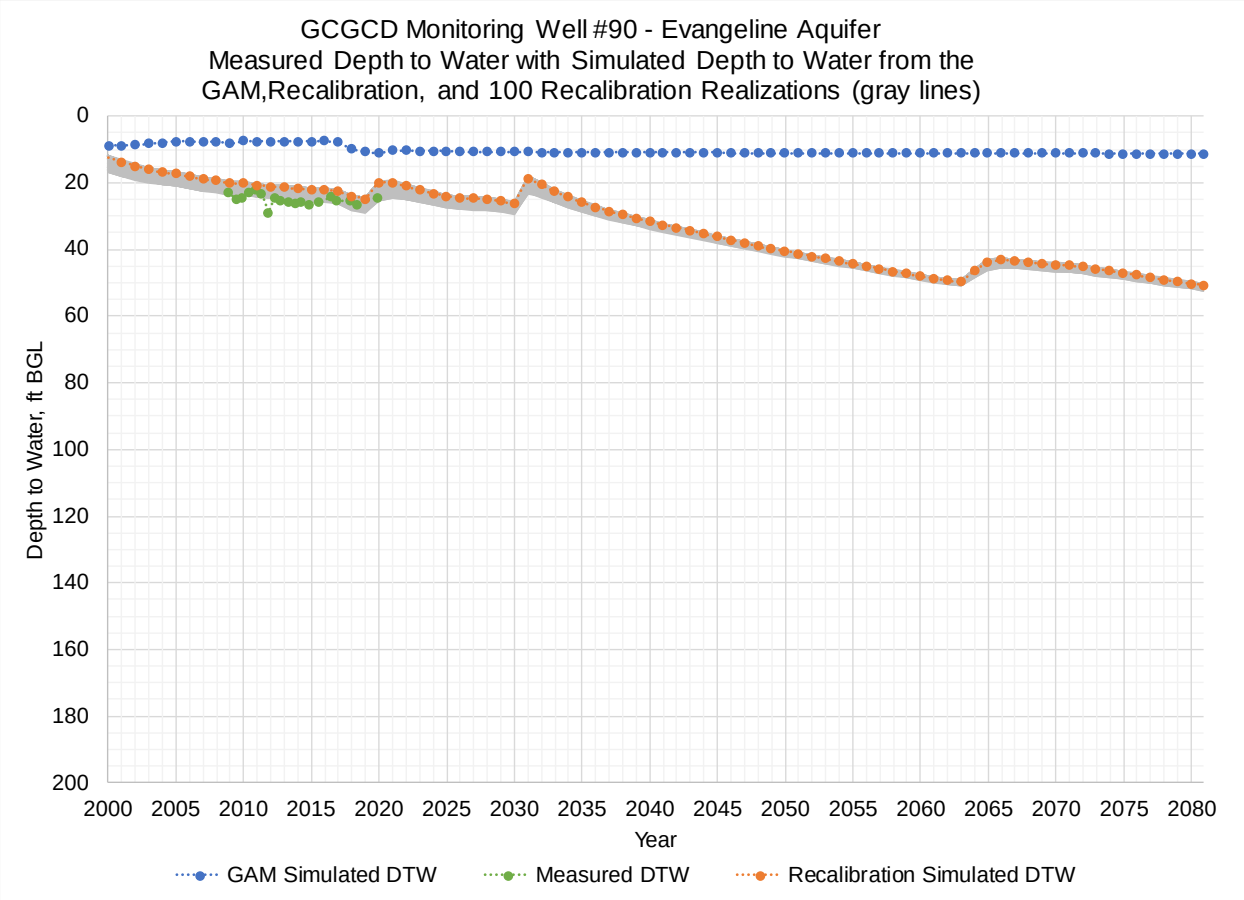

GCGCD Monitoring Well #77 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

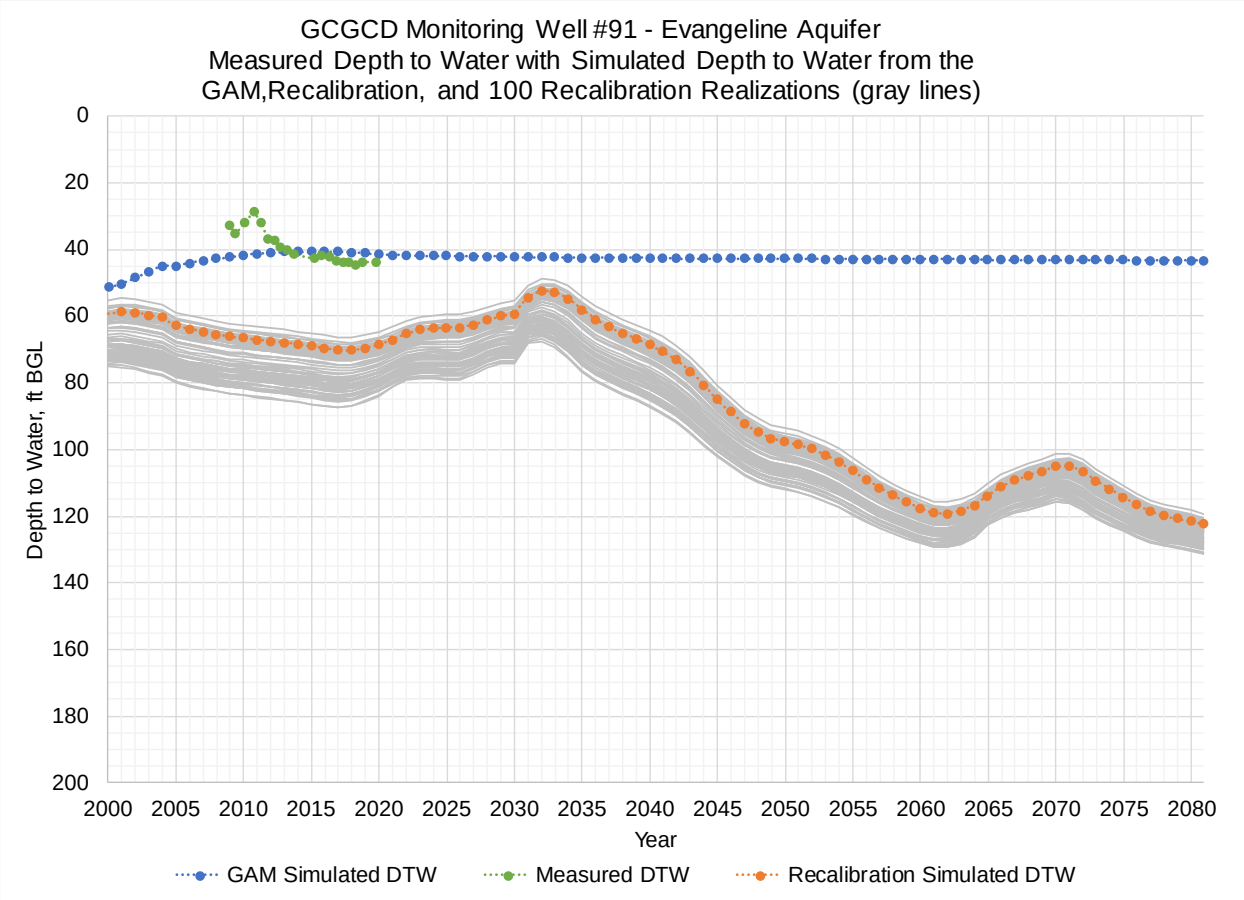

GCGCD Monitoring Well #83 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

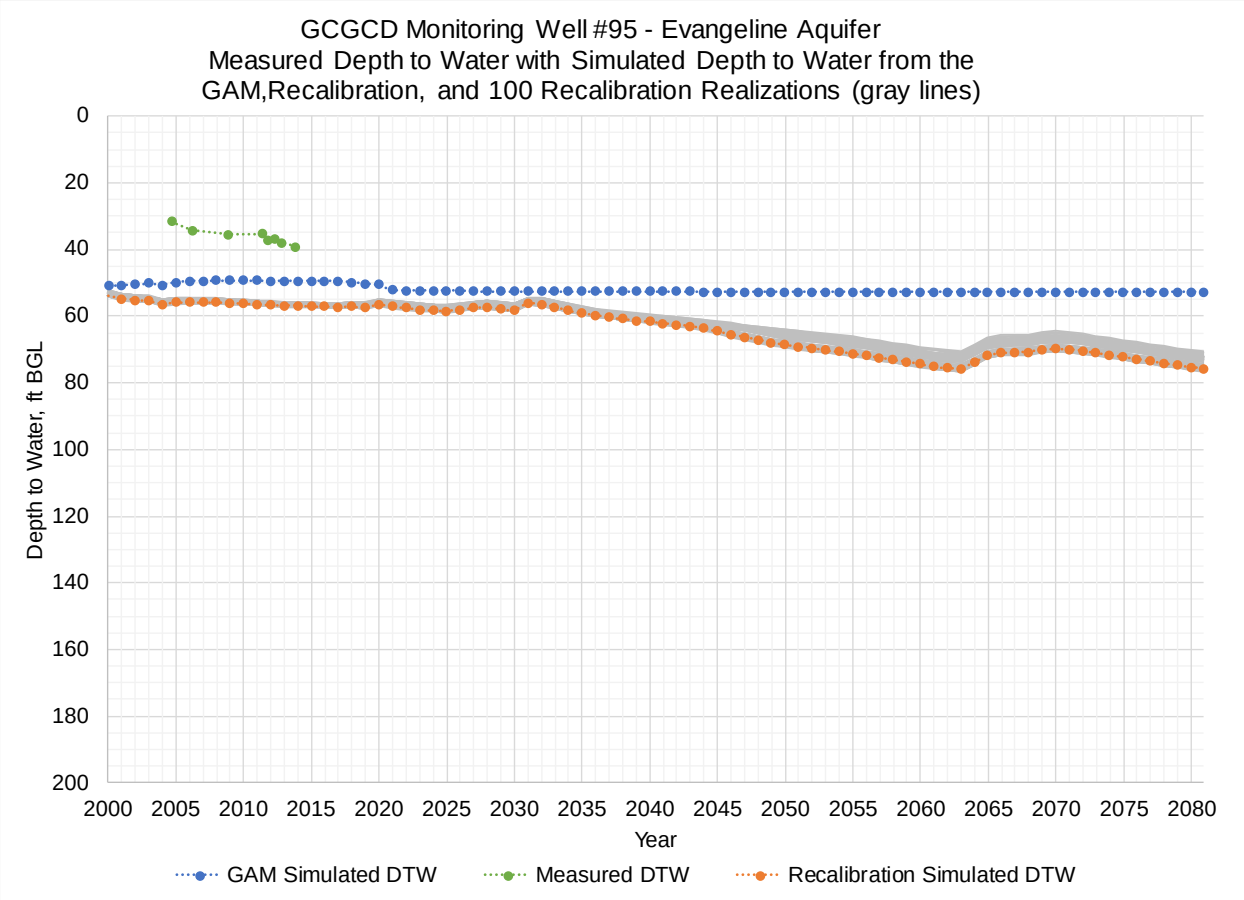

GCGCD Monitoring Well #84 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

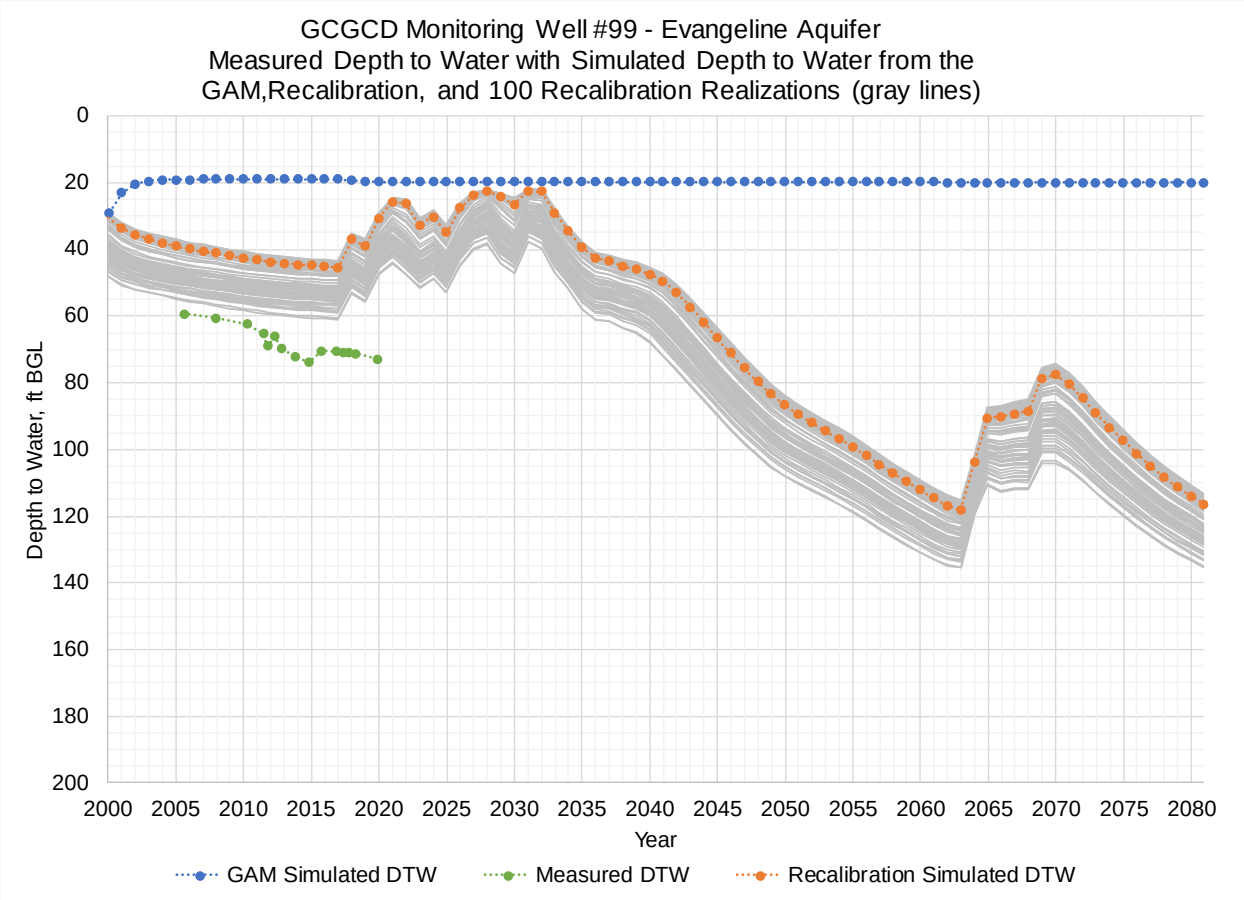

GCGCD Monitoring Well #86 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

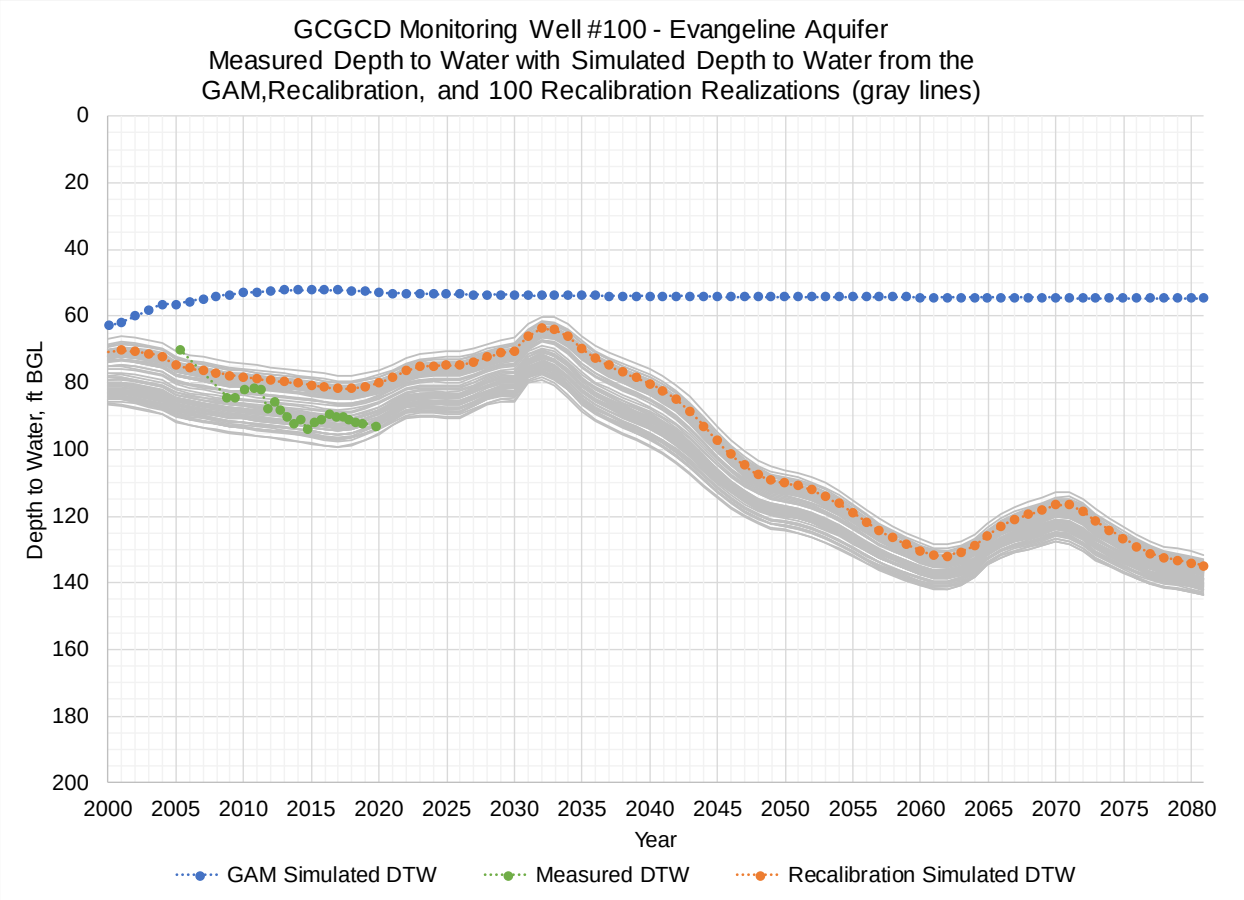

GCGCD Monitoring Well #87 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

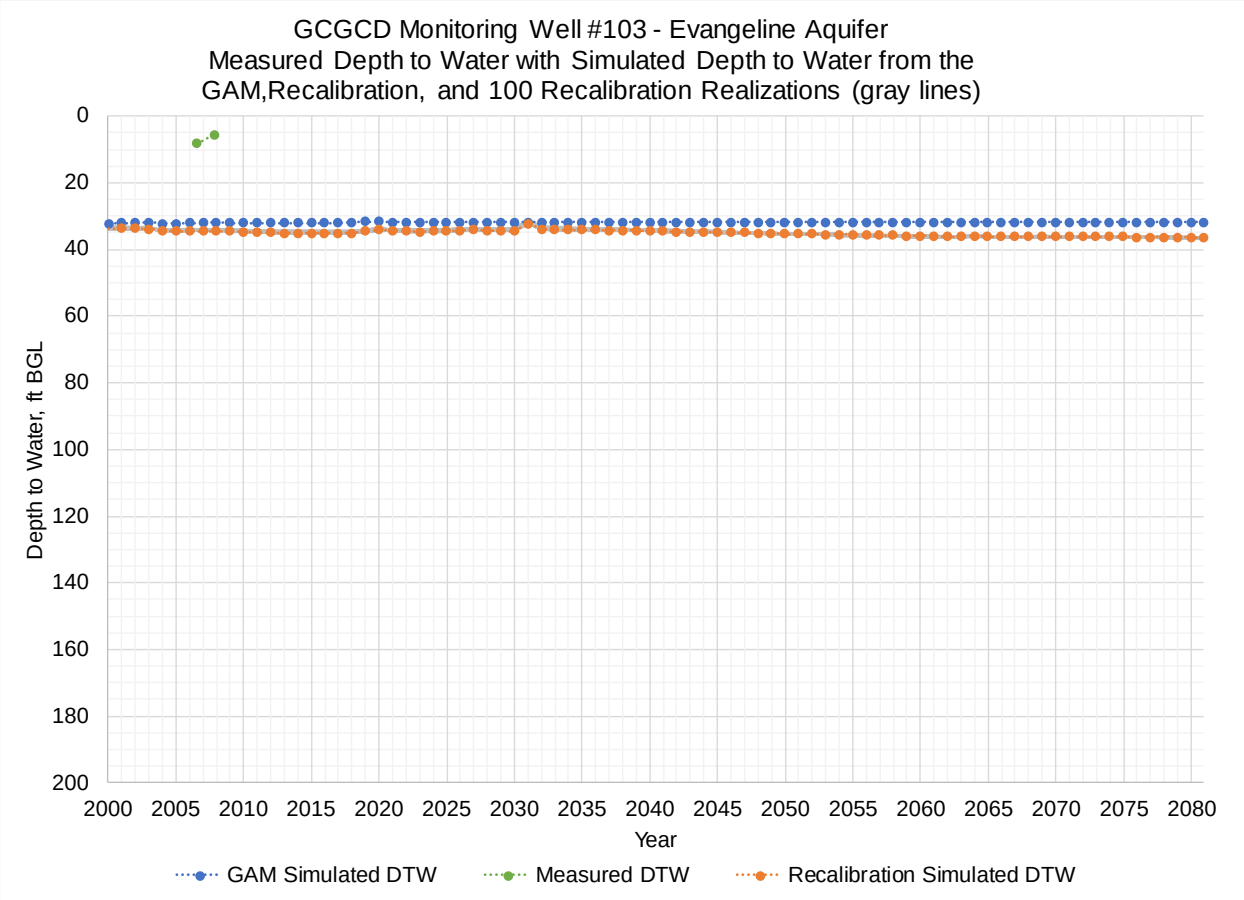

GCGCD Monitoring Well #90 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

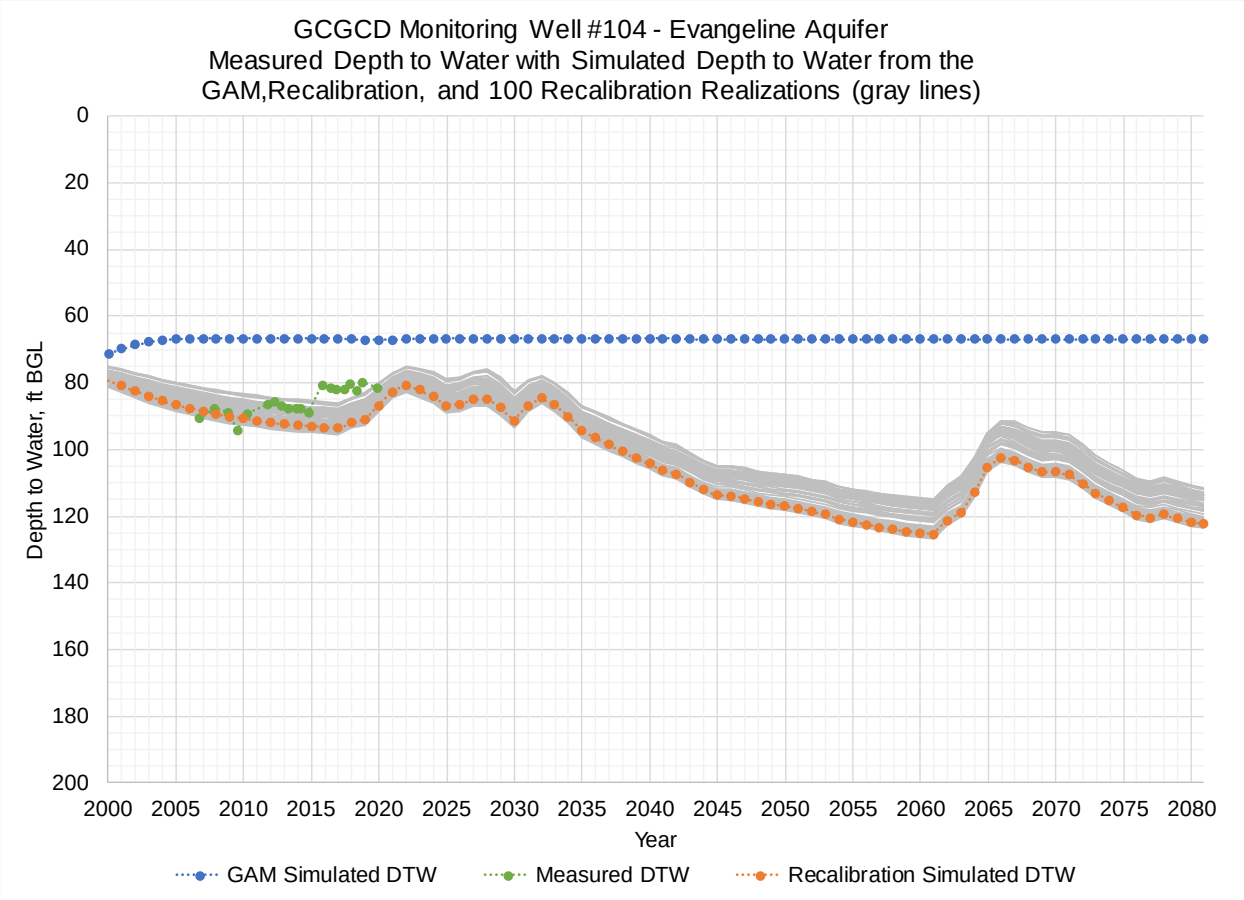

GCGCD Monitoring Well #91 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

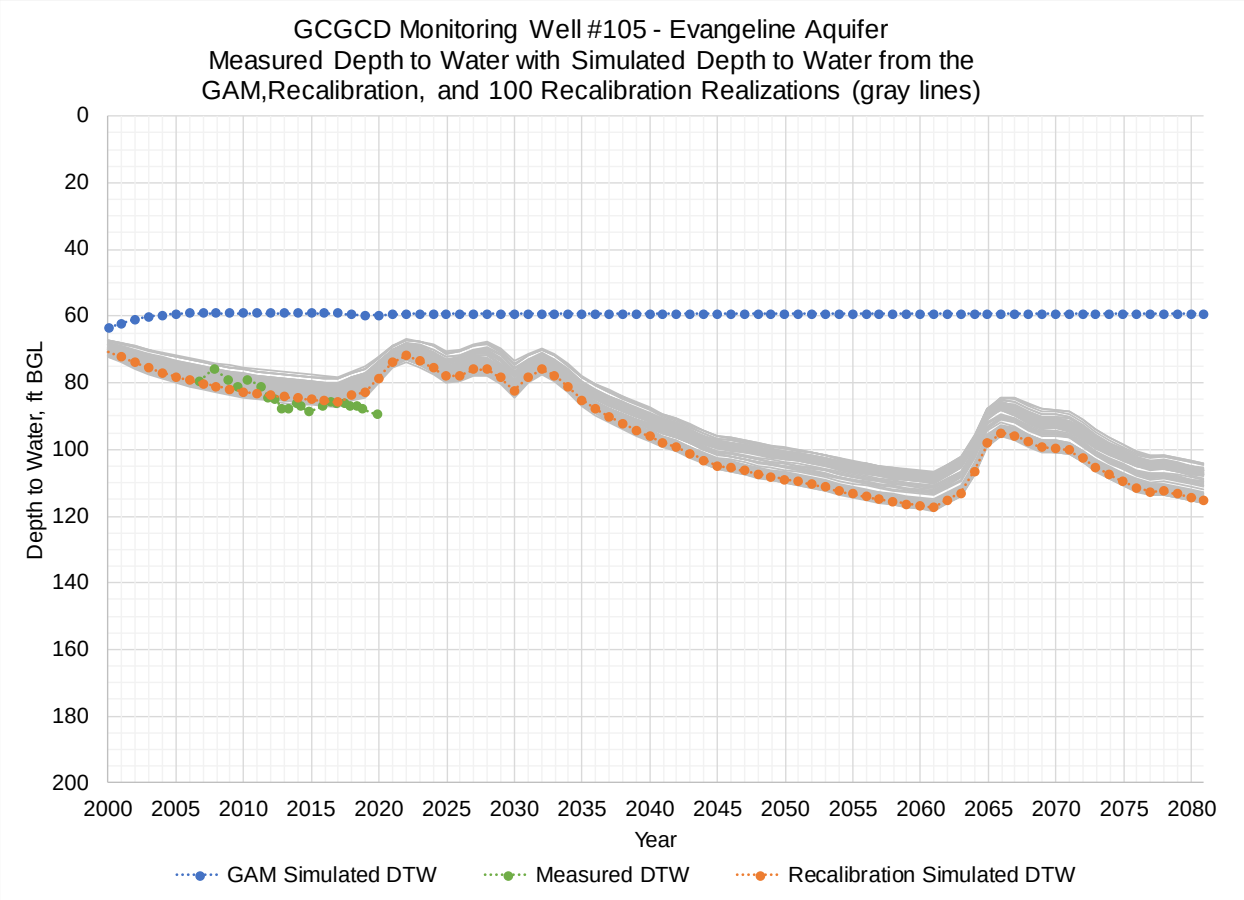

GCGCD Monitoring Well #95 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

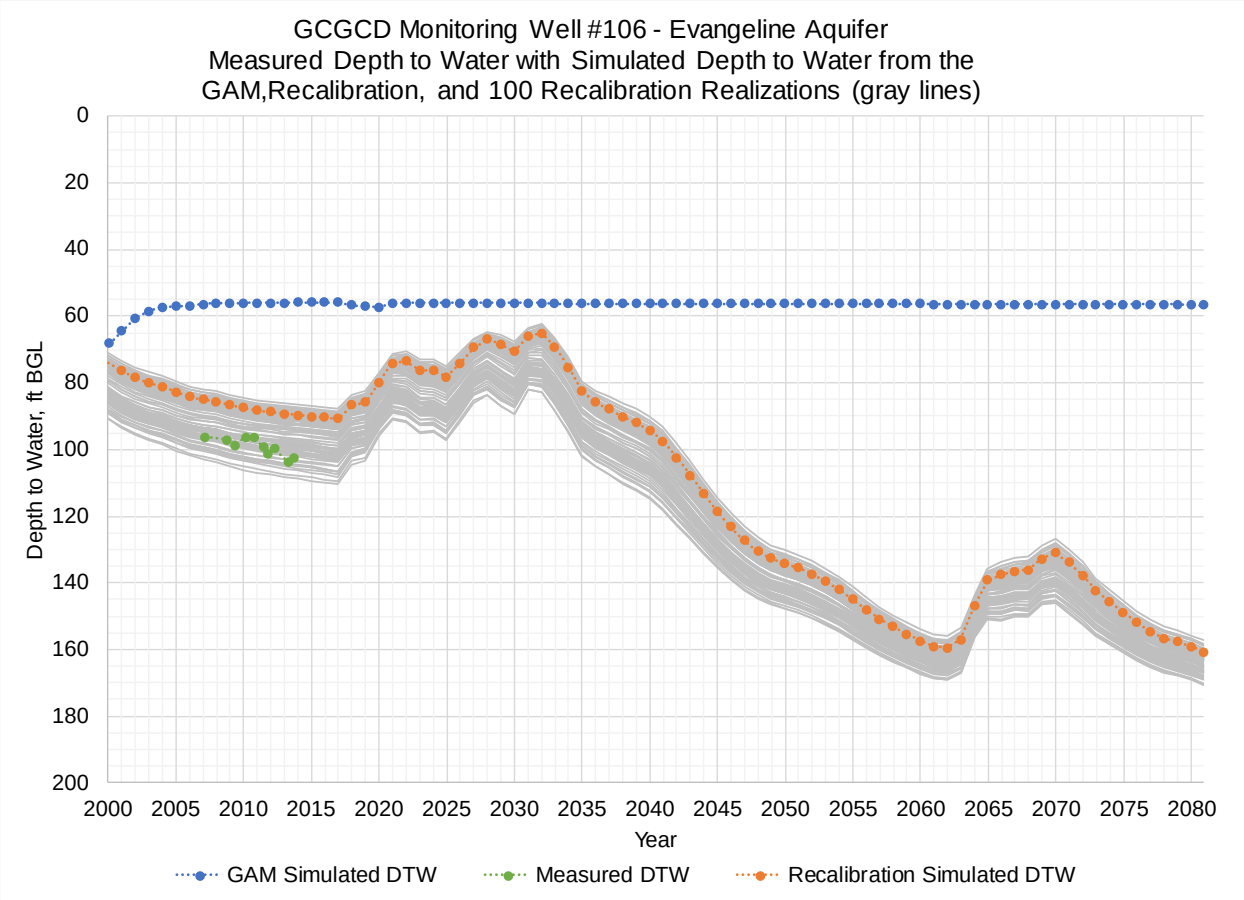

GCGCD Monitoring Well #99 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

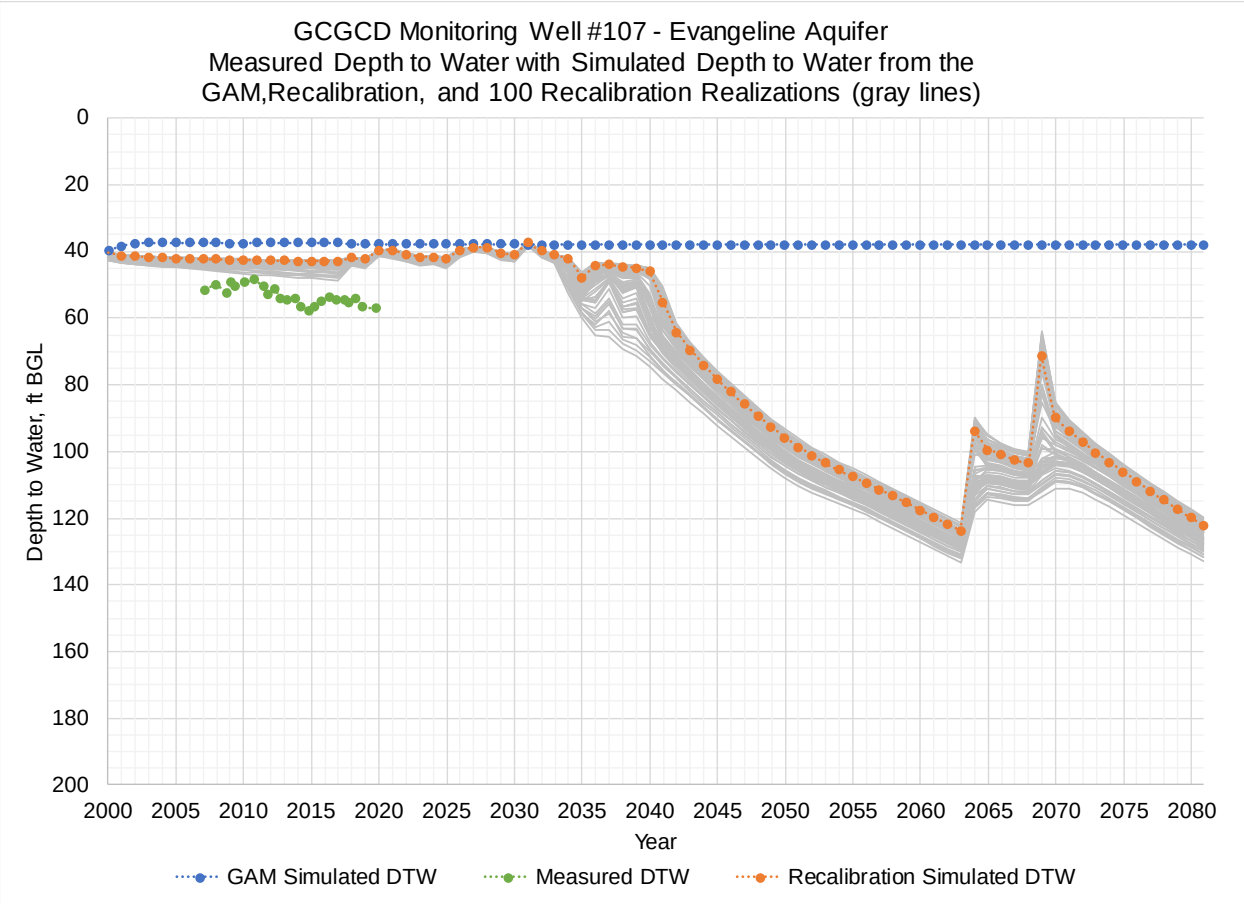

GCGCD Monitoring Well #100 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

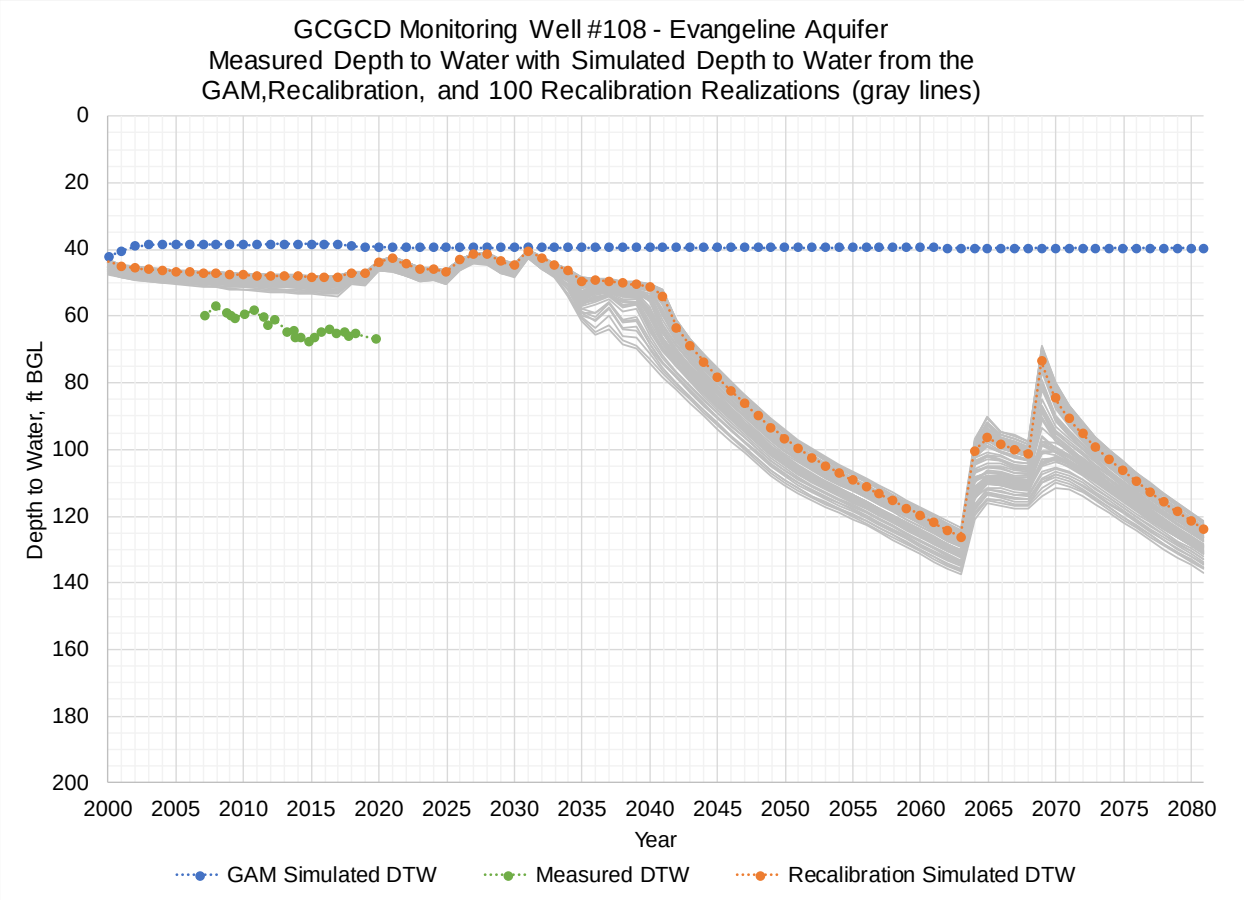

GCGCD Monitoring Well #103 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

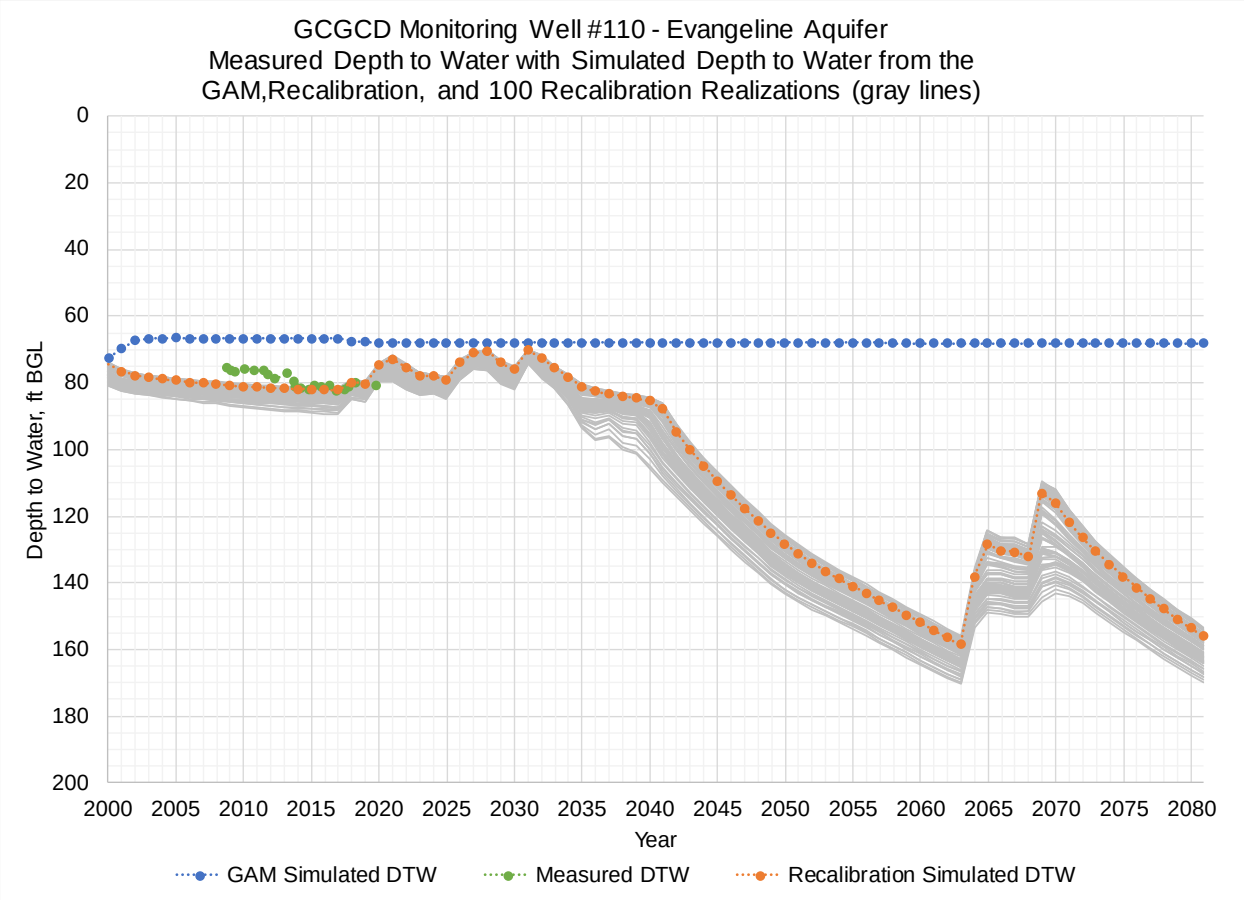

GCGCD Monitoring Well #104 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

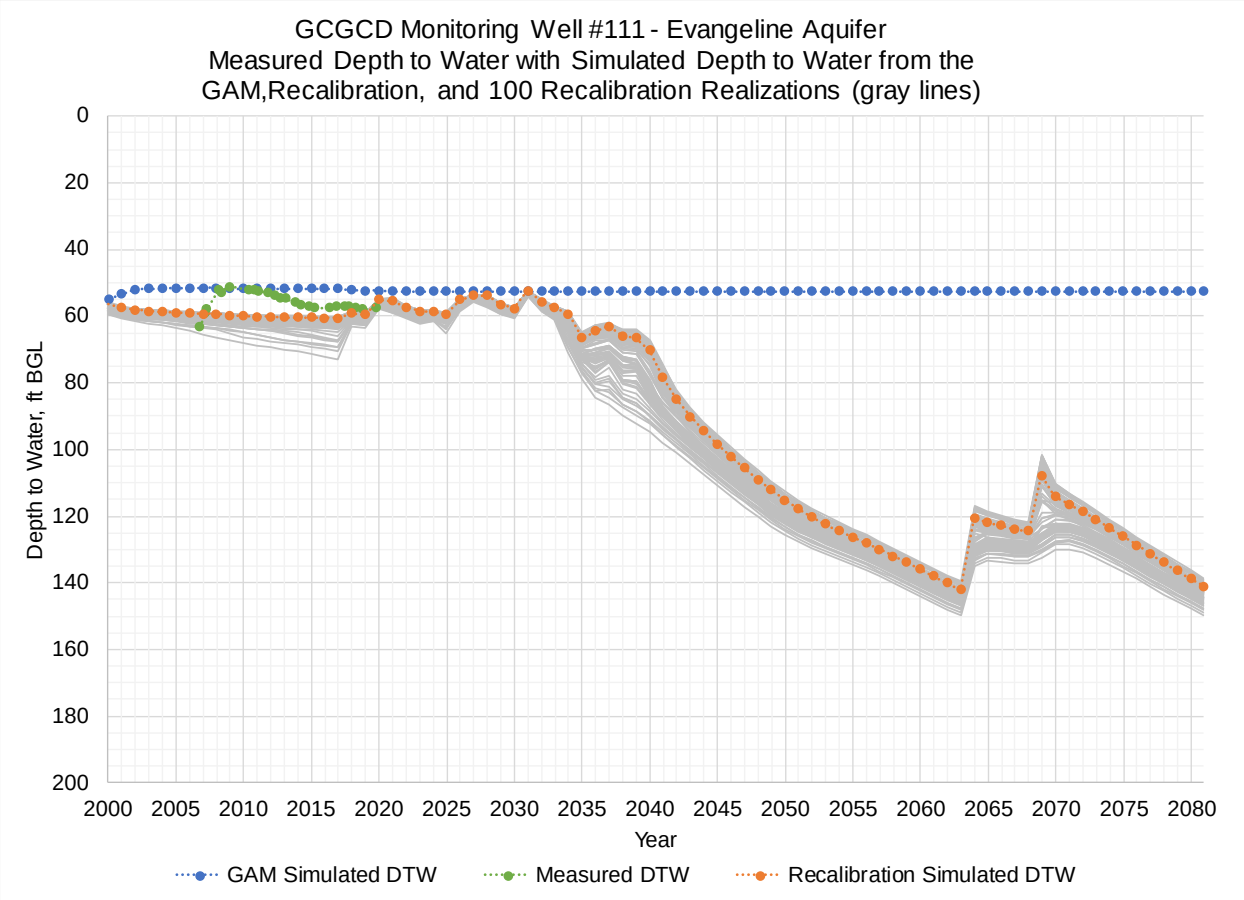

GCGCD Monitoring Well #105 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

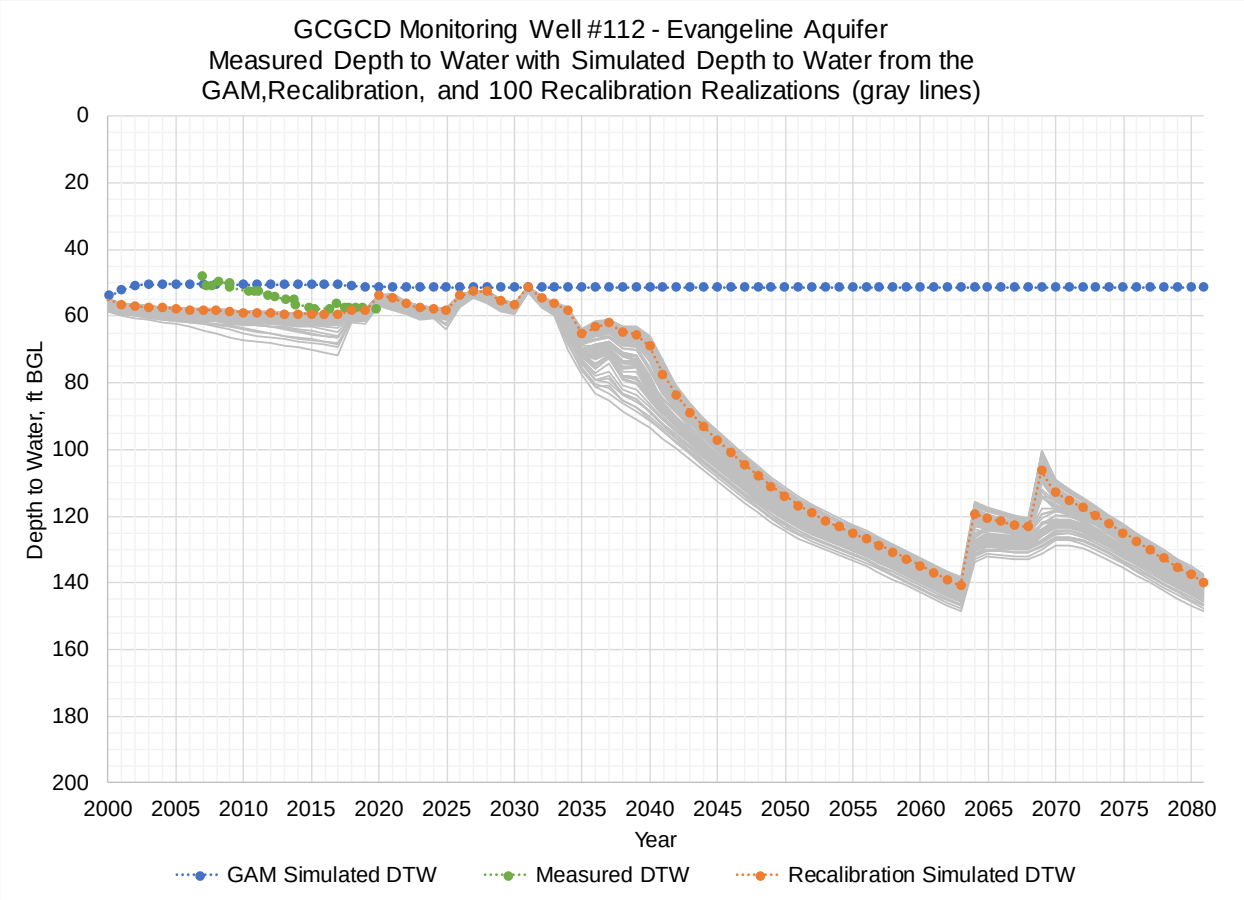

GCGCD Monitoring Well #106 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

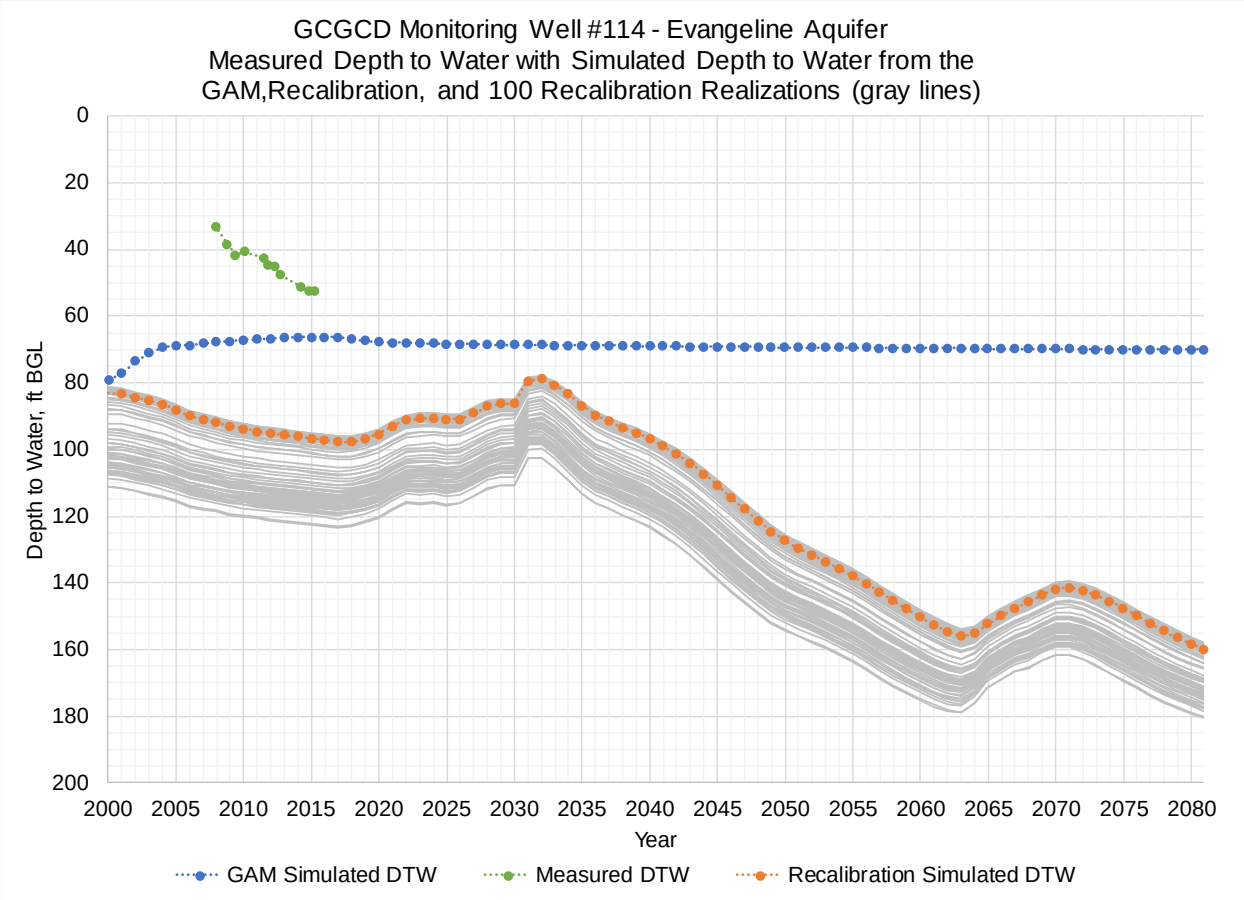

GCGCD Monitoring Well #107 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

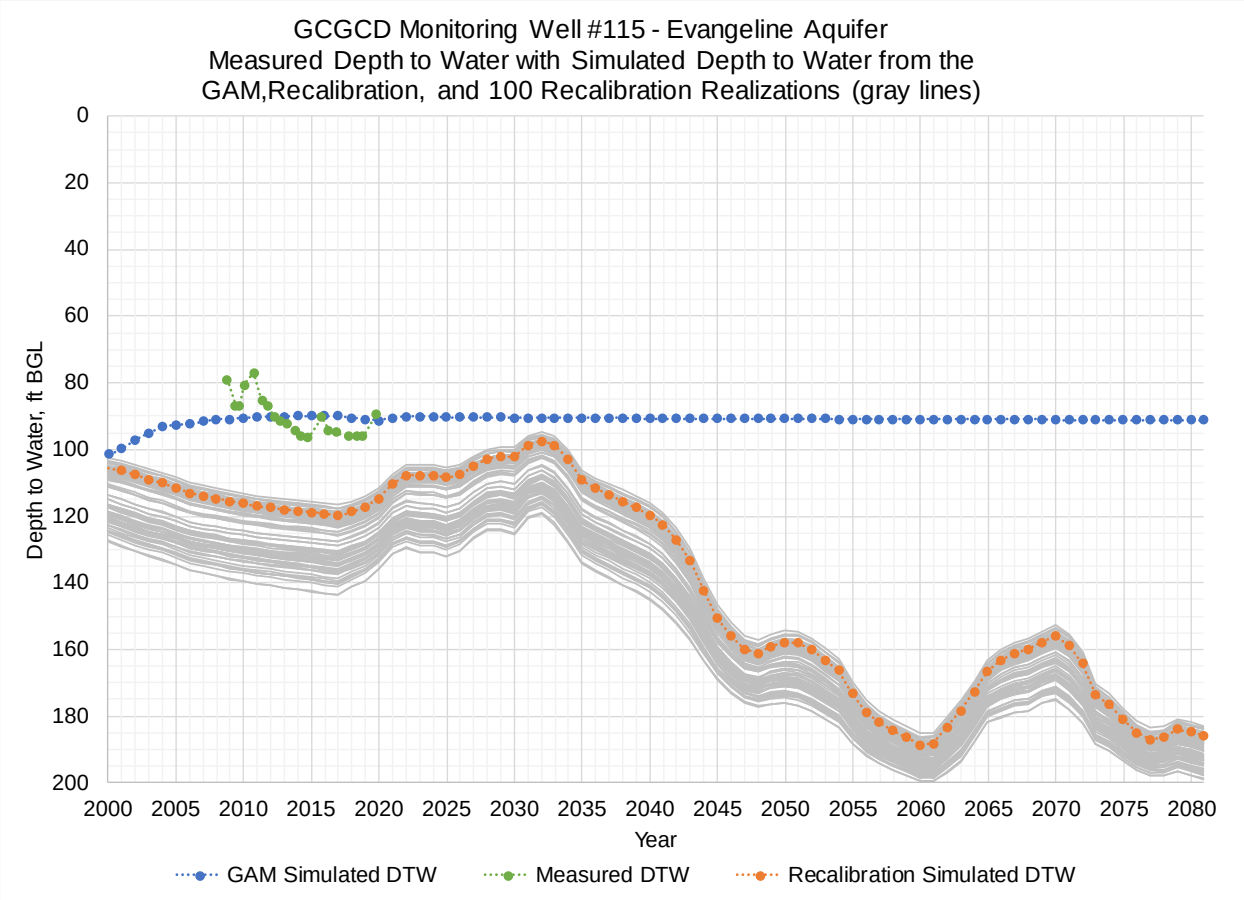

GCGCD Monitoring Well #108 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

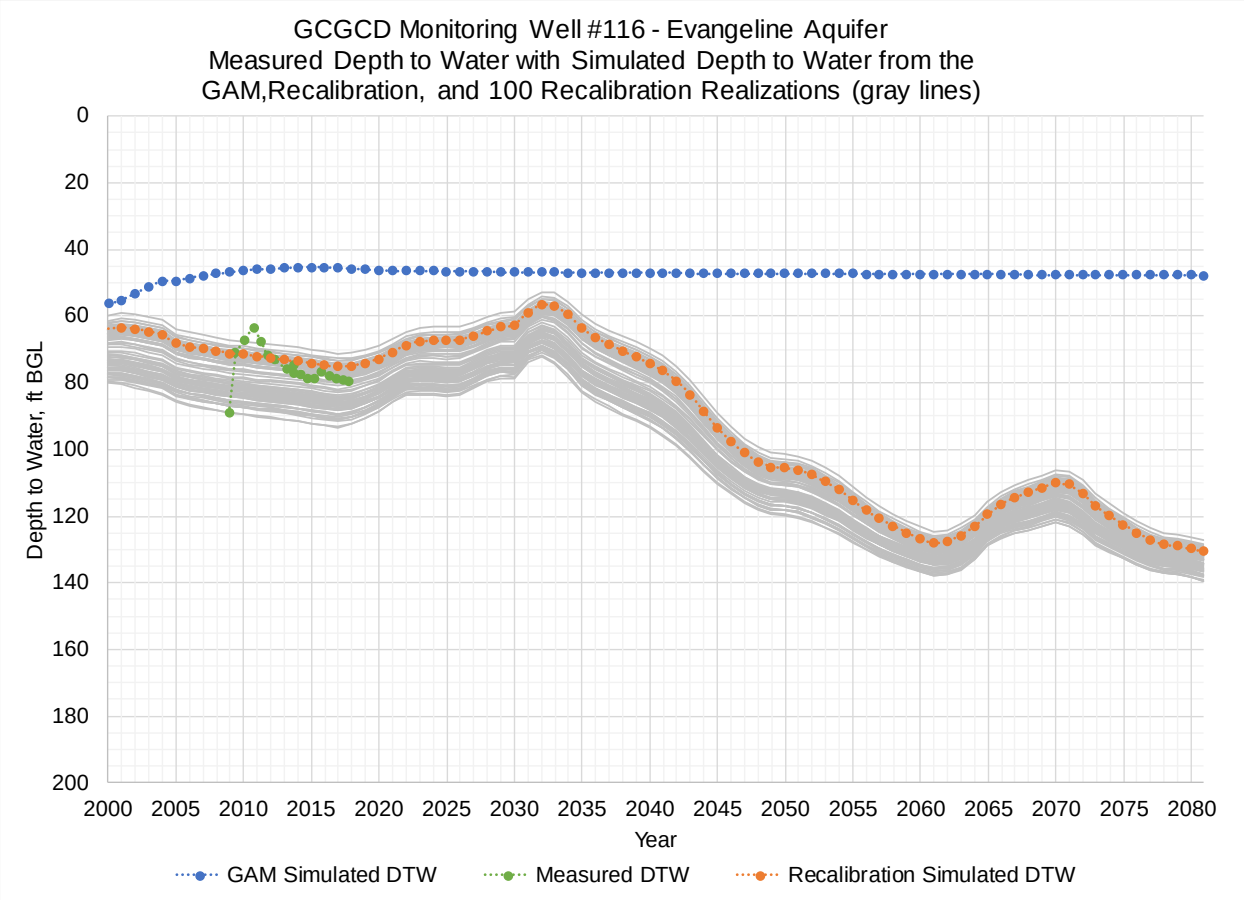

GCGCD Monitoring Well #110 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
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100
120
140
160
180
200
2000
2005
2010
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2025
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

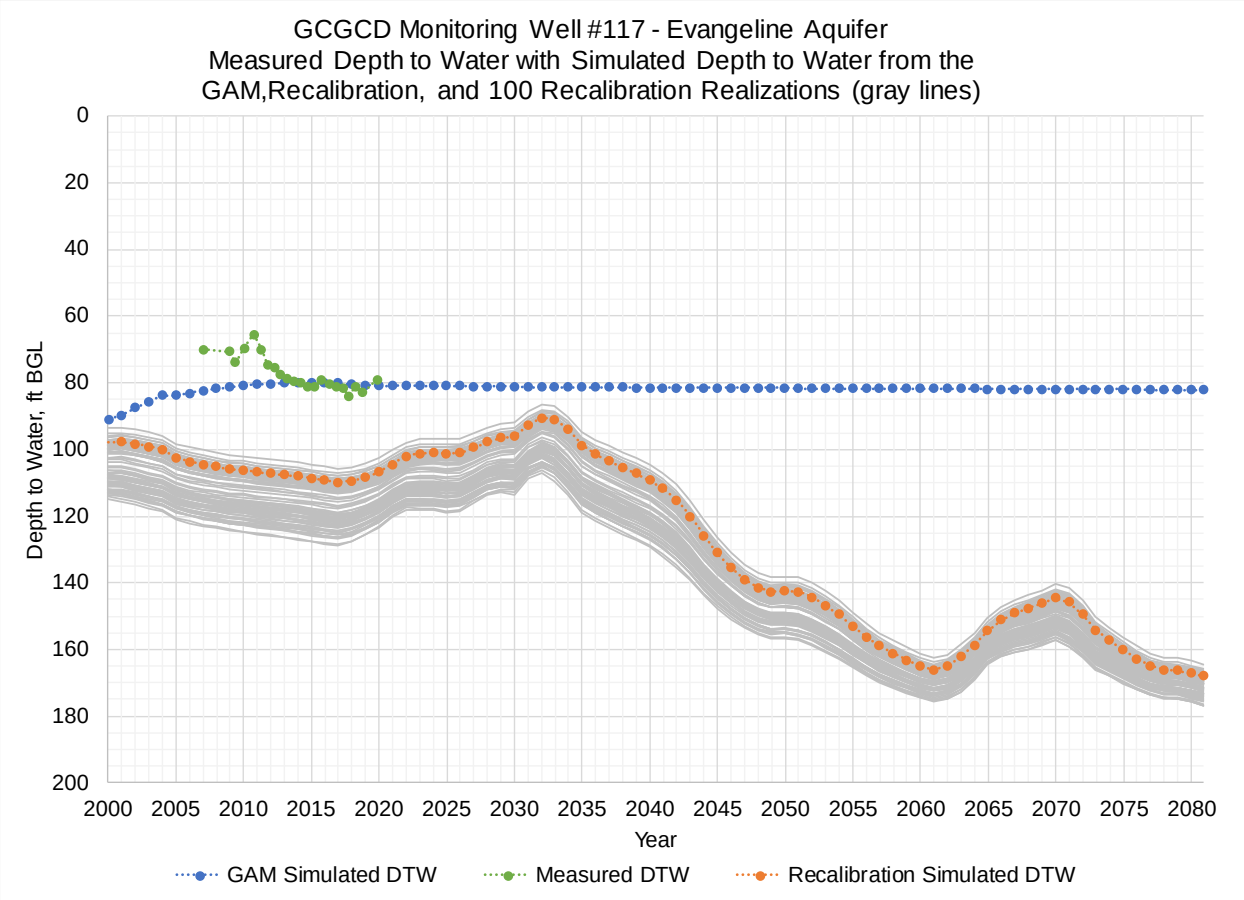

GCGCD Monitoring Well #111 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
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100
120
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

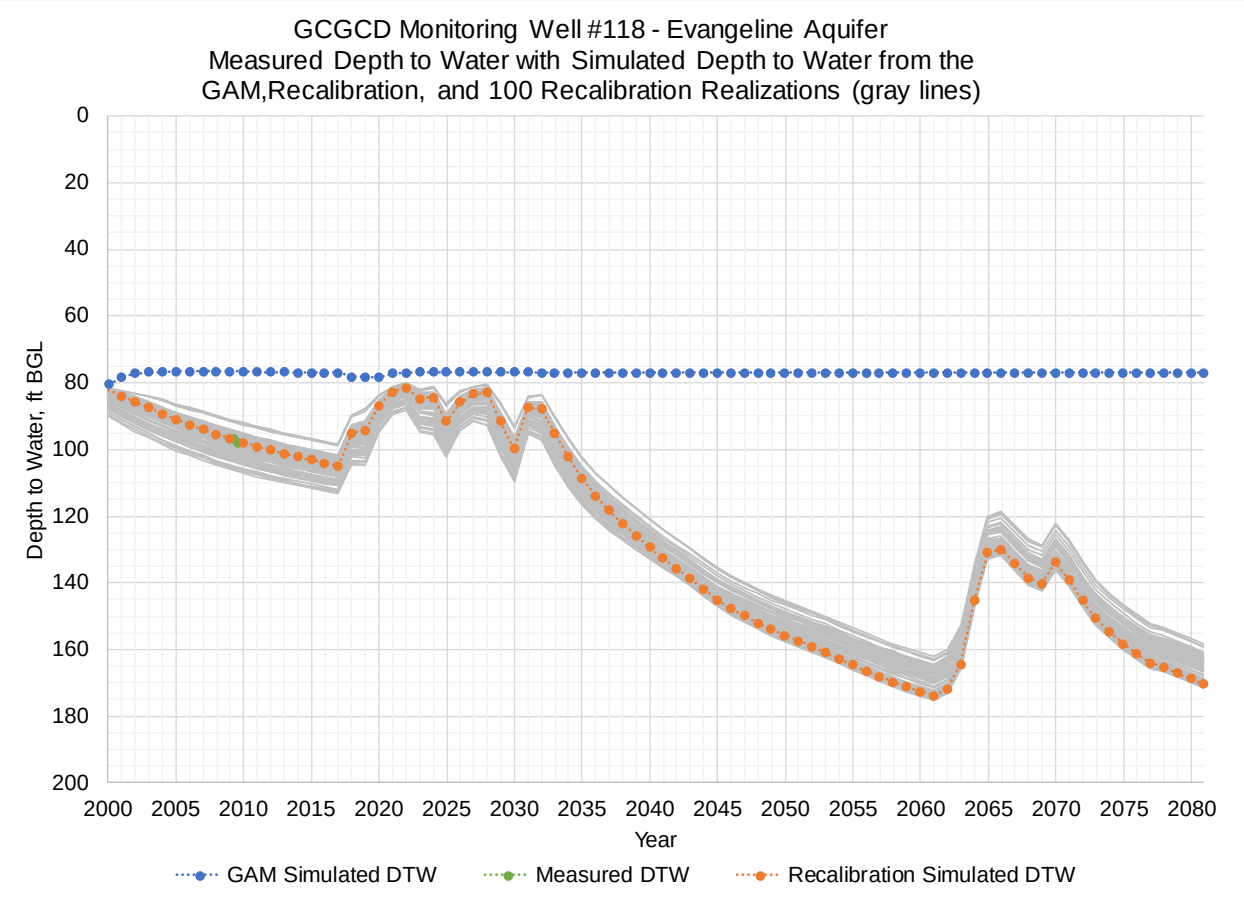

GCGCD Monitoring Well #112 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

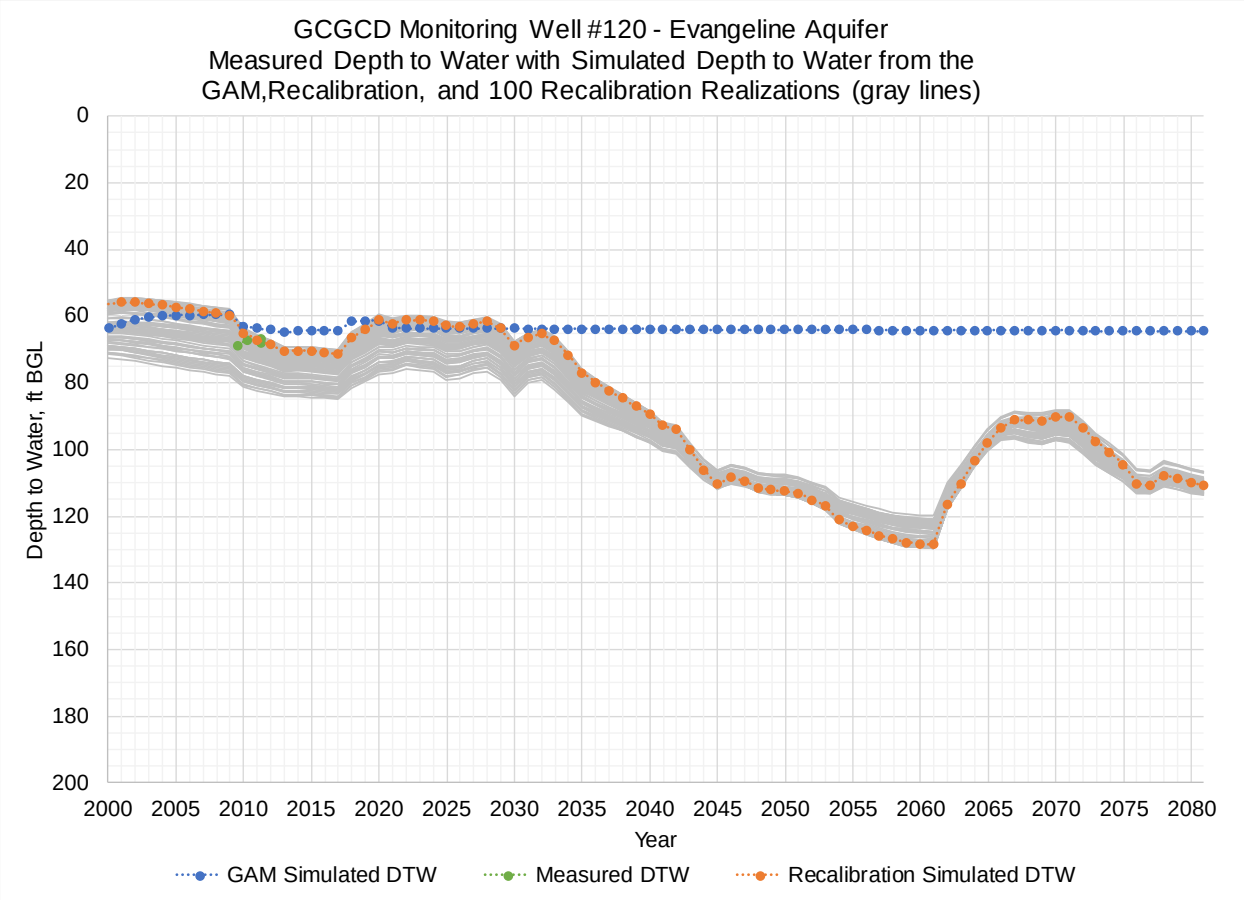

GCGCD Monitoring Well #114 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2010
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

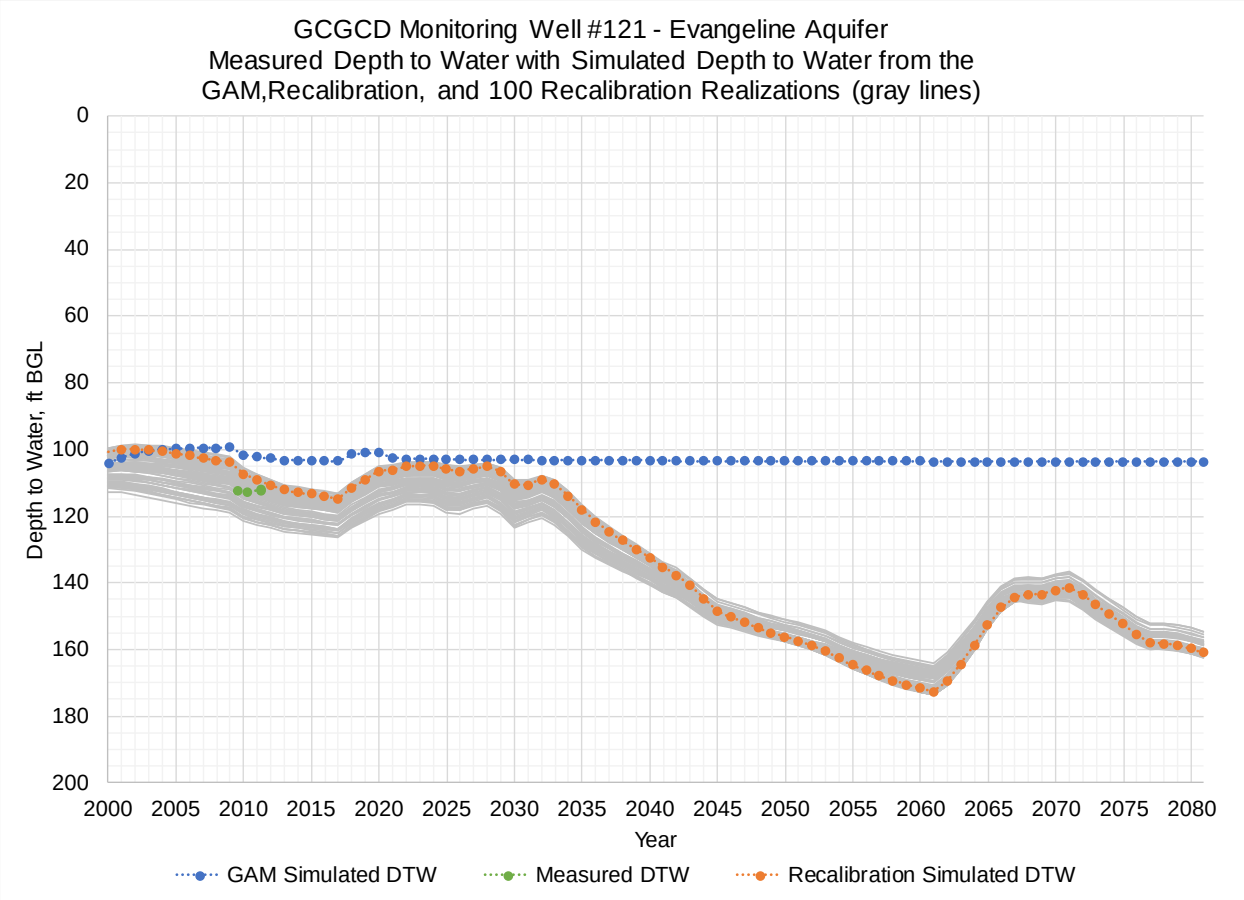

GCGCD Monitoring Well #115 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

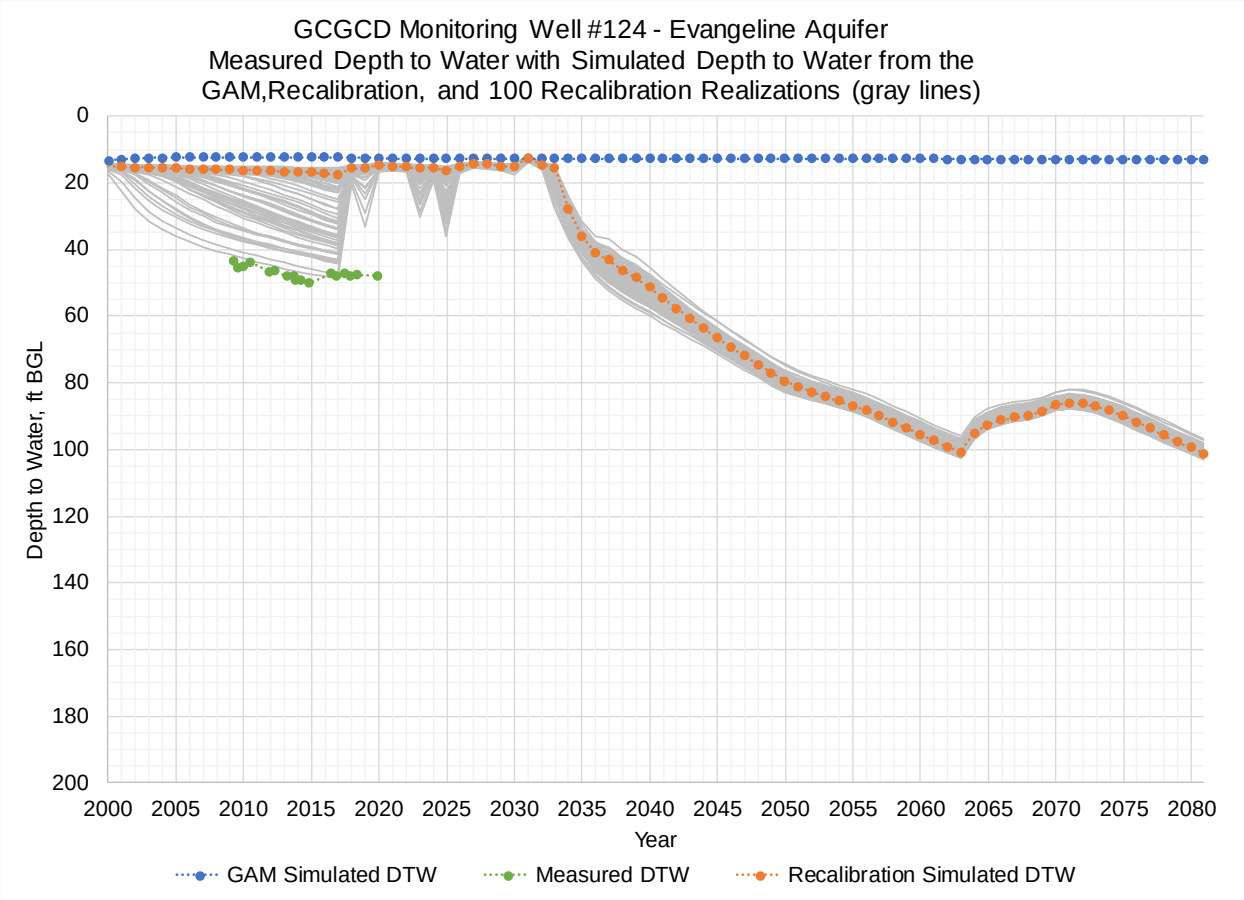

GCGCD Monitoring Well #116 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

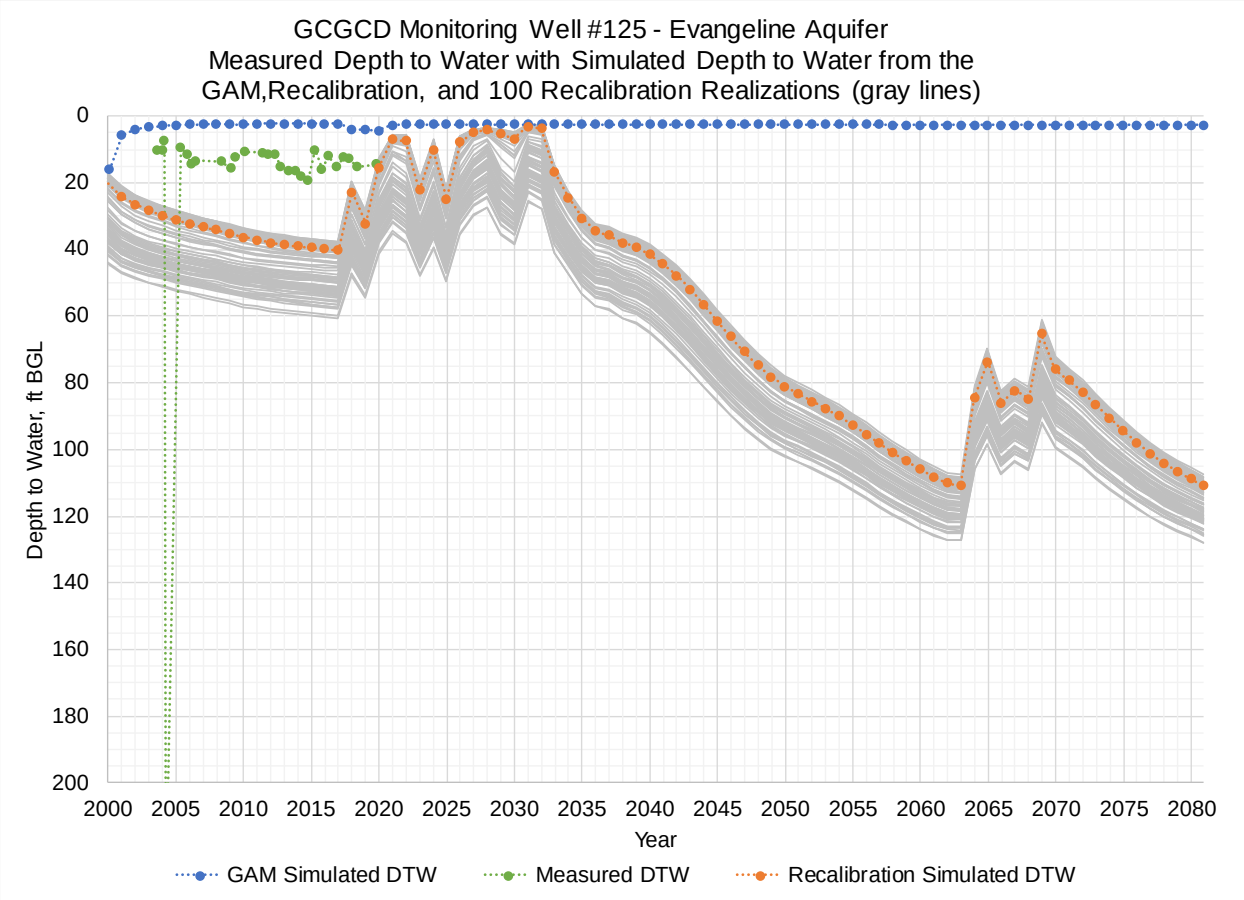

GCGCD Monitoring Well #117 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

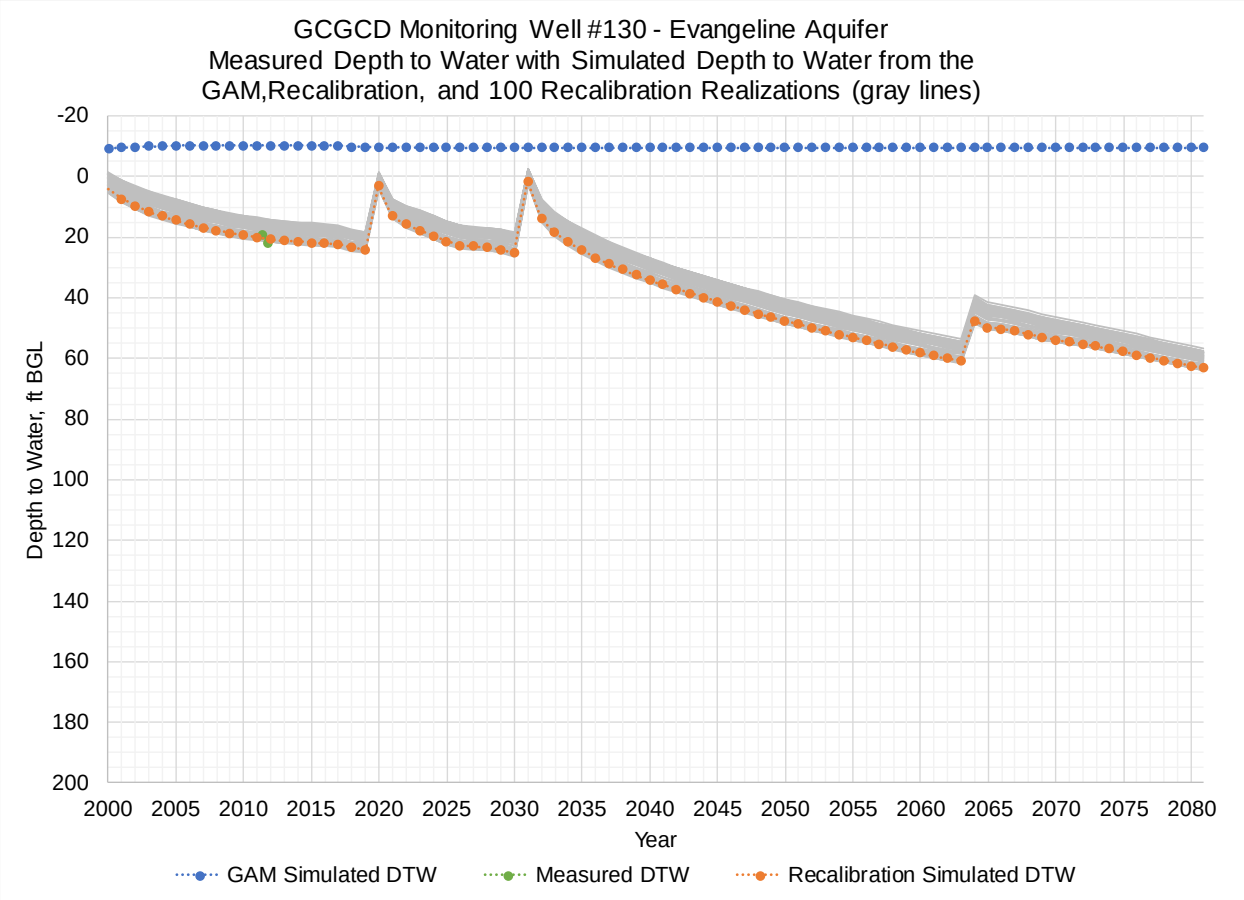

GCGCD Monitoring Well #118 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

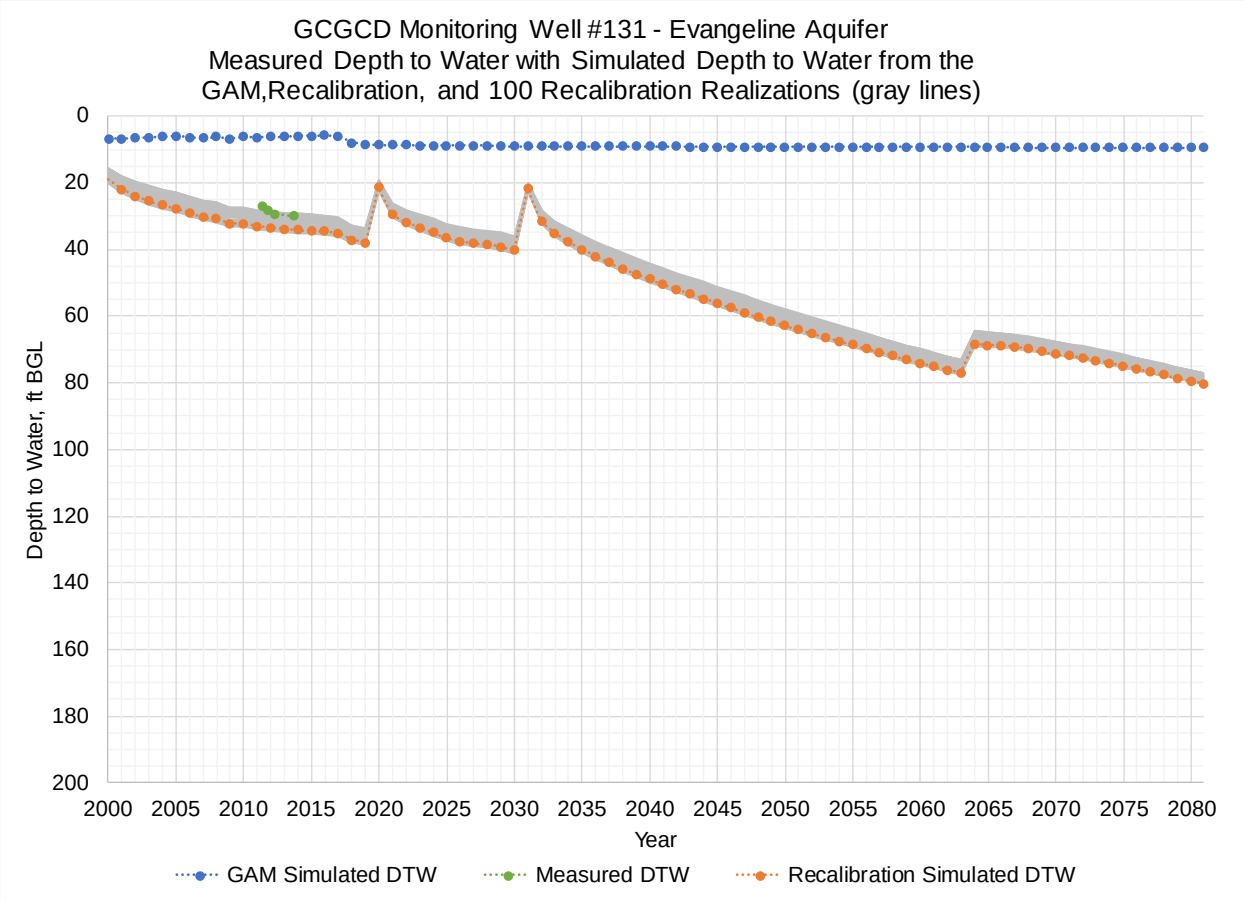

GCGCD Monitoring Well #120 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

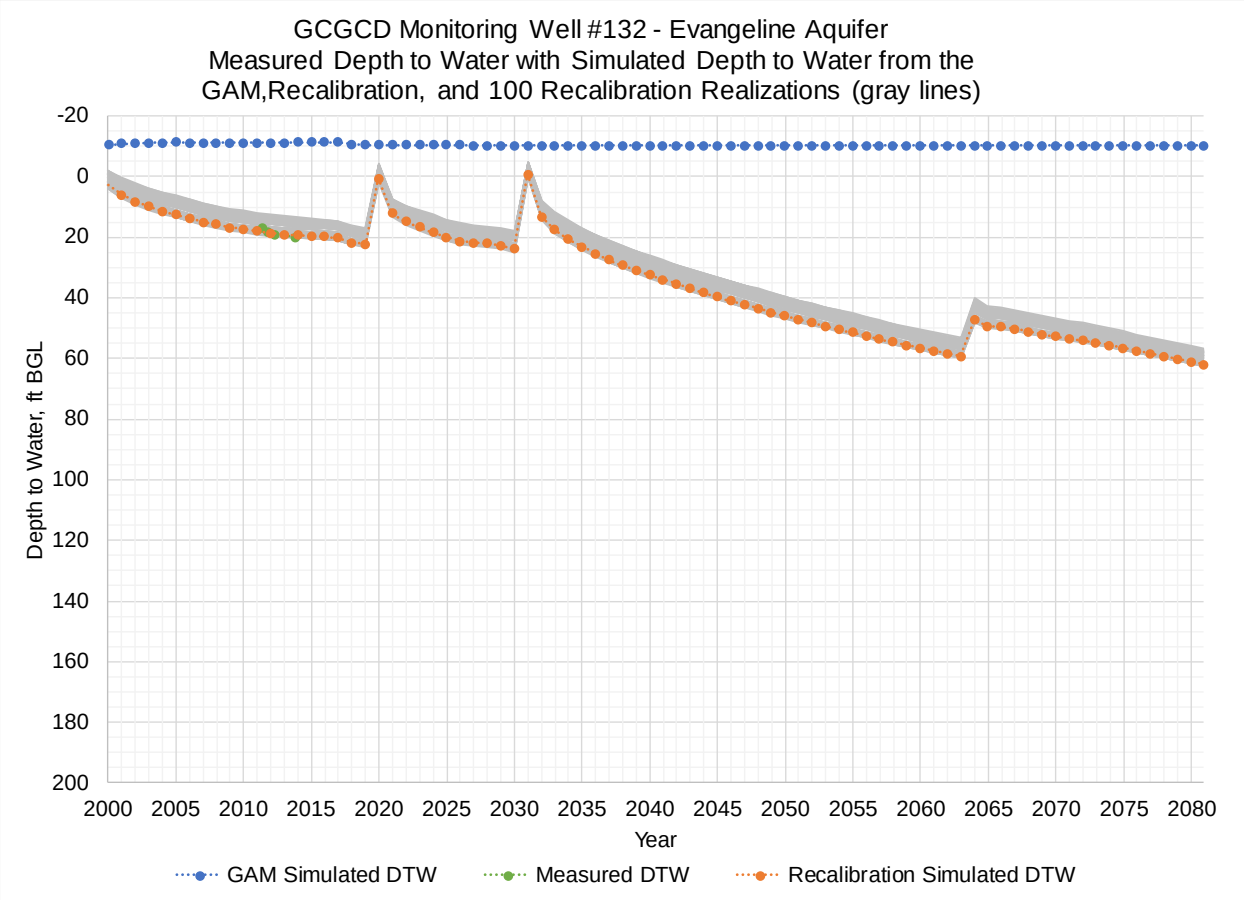

GCGCD Monitoring Well #121 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

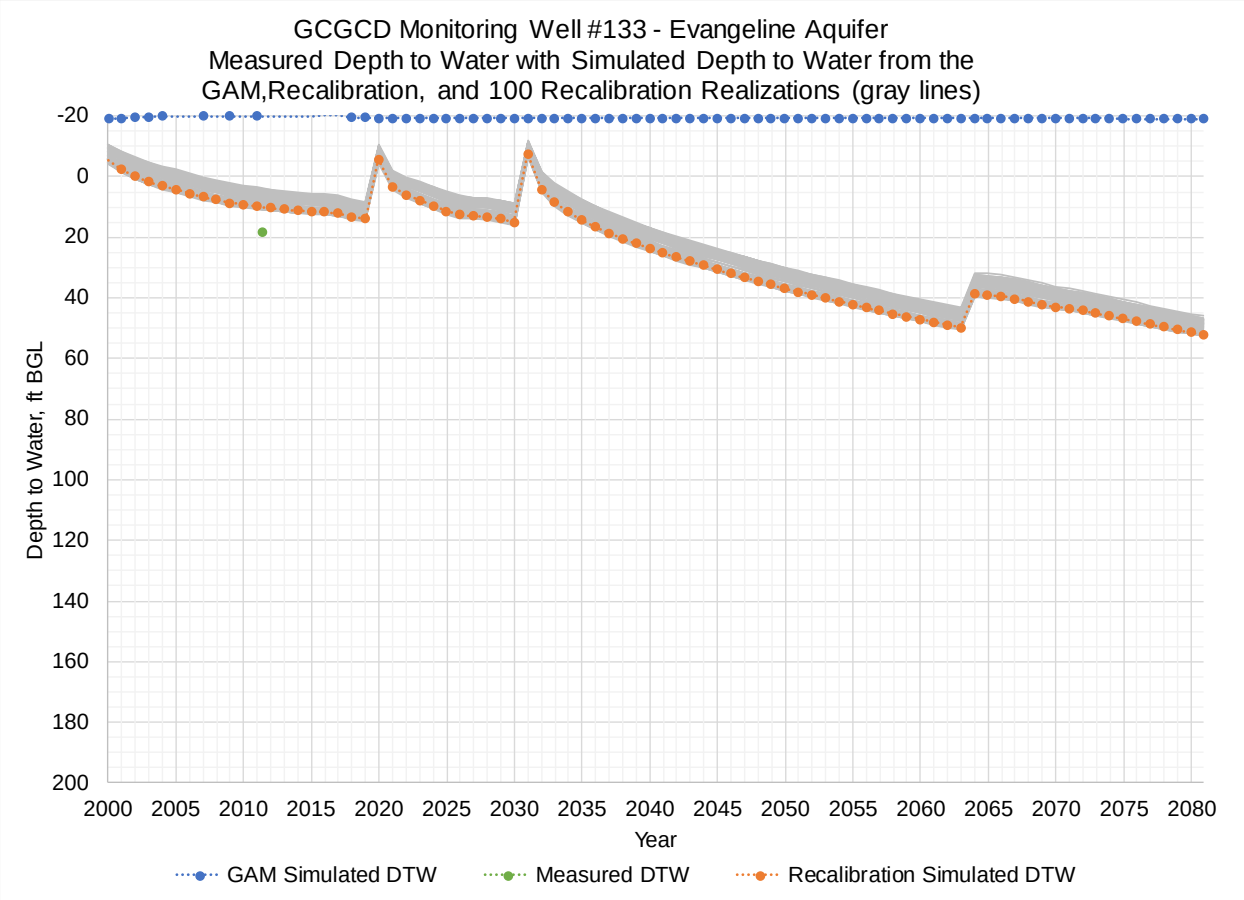

GCGCD Monitoring Well #124 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

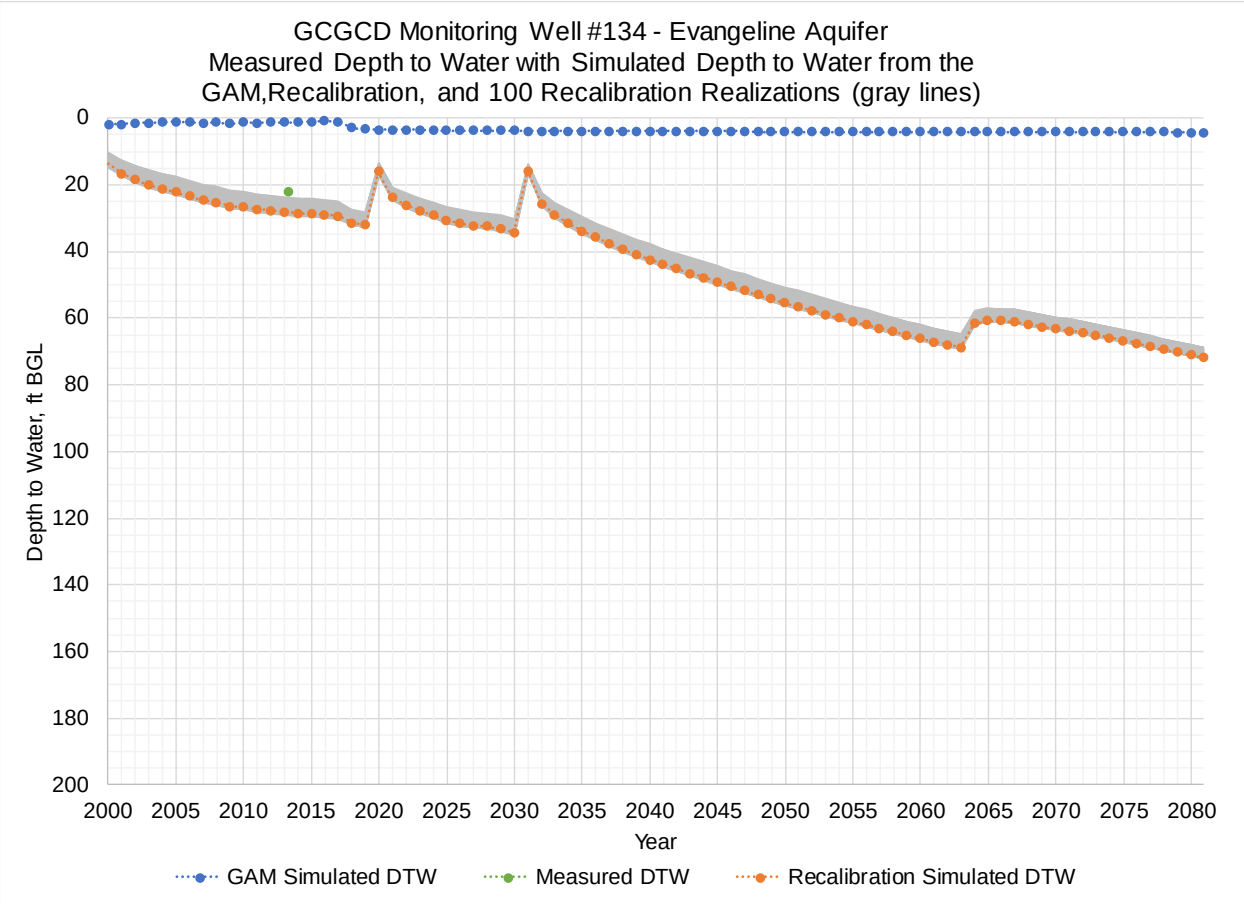

GCGCD Monitoring Well #125 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

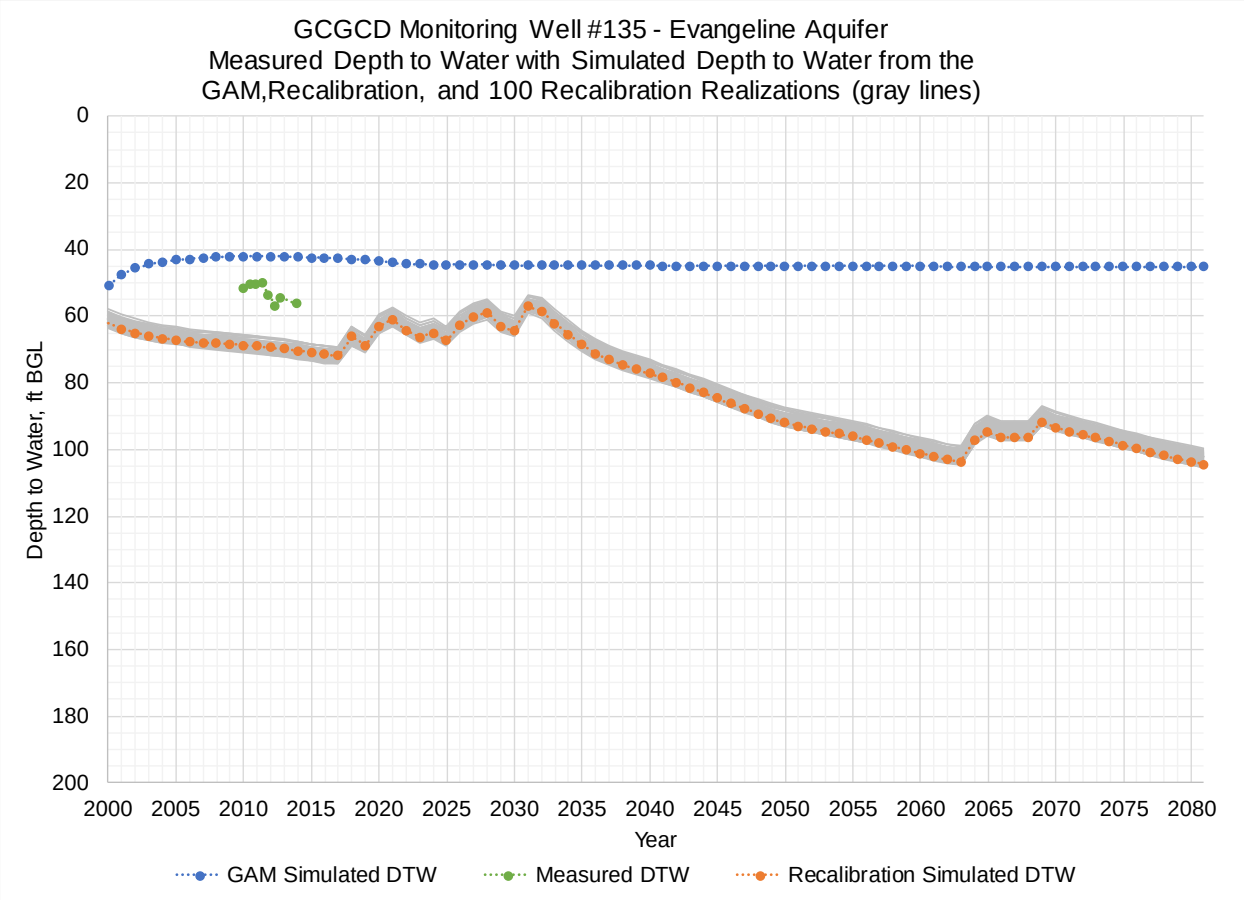

GCGCD Monitoring Well #130 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

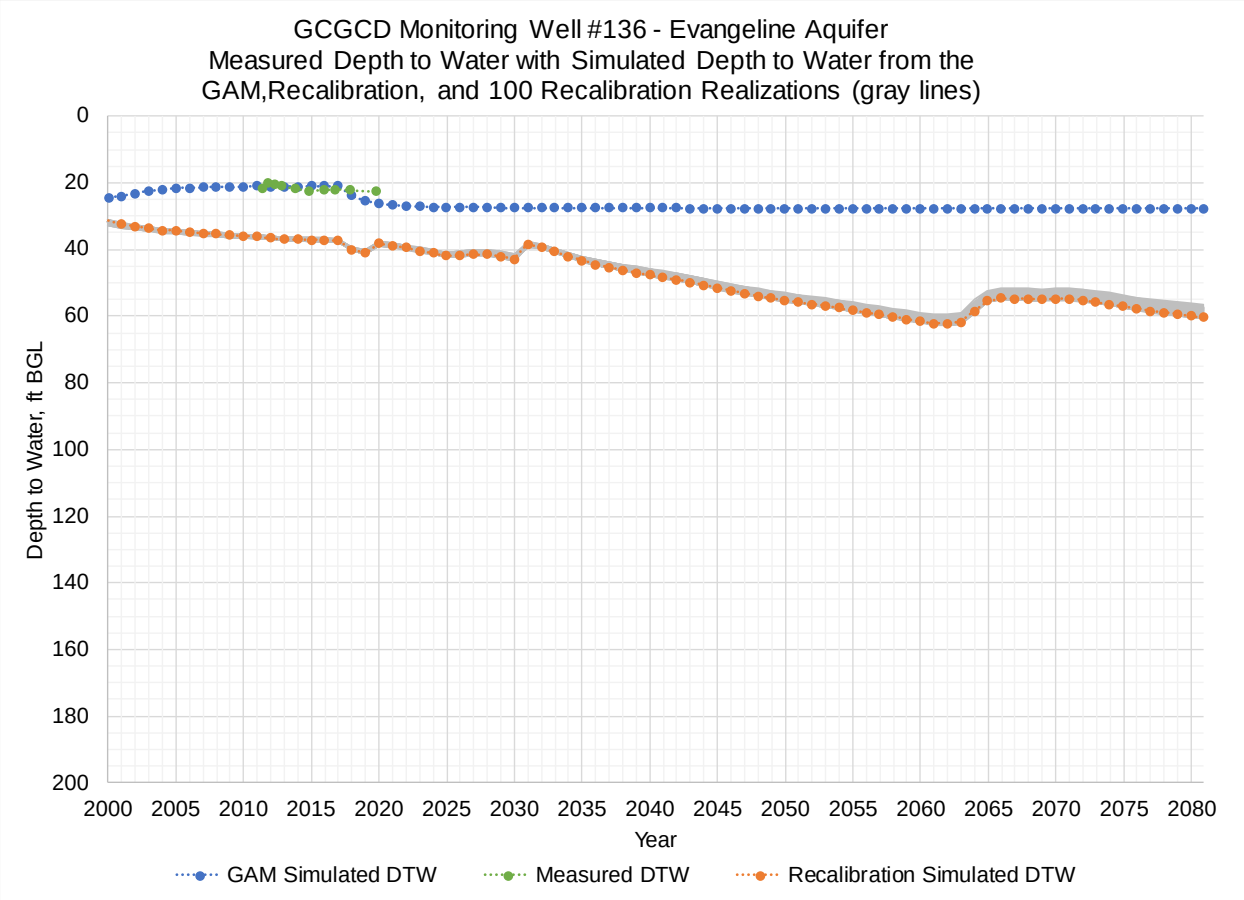

GCGCD Monitoring Well #131 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

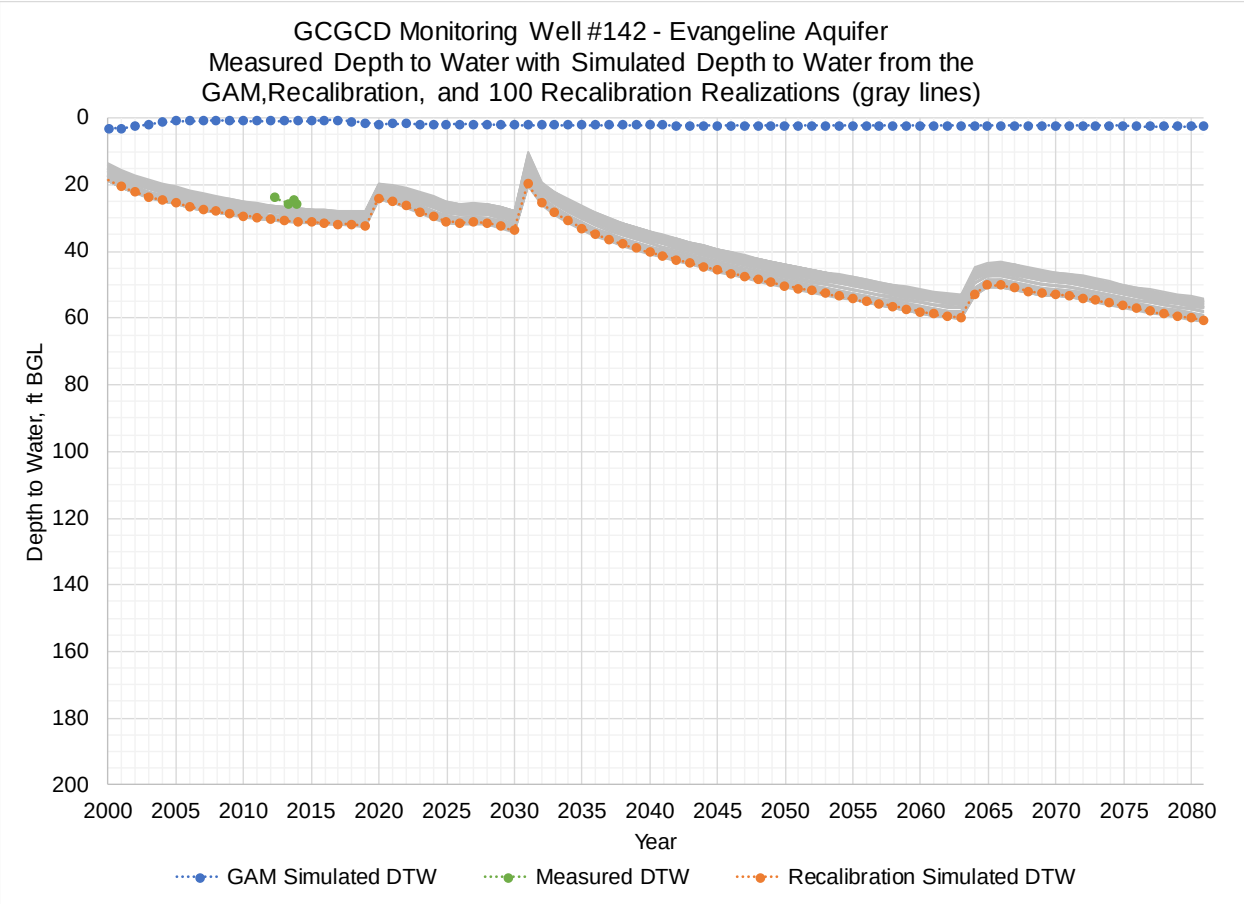

GCGCD Monitoring Well #132 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

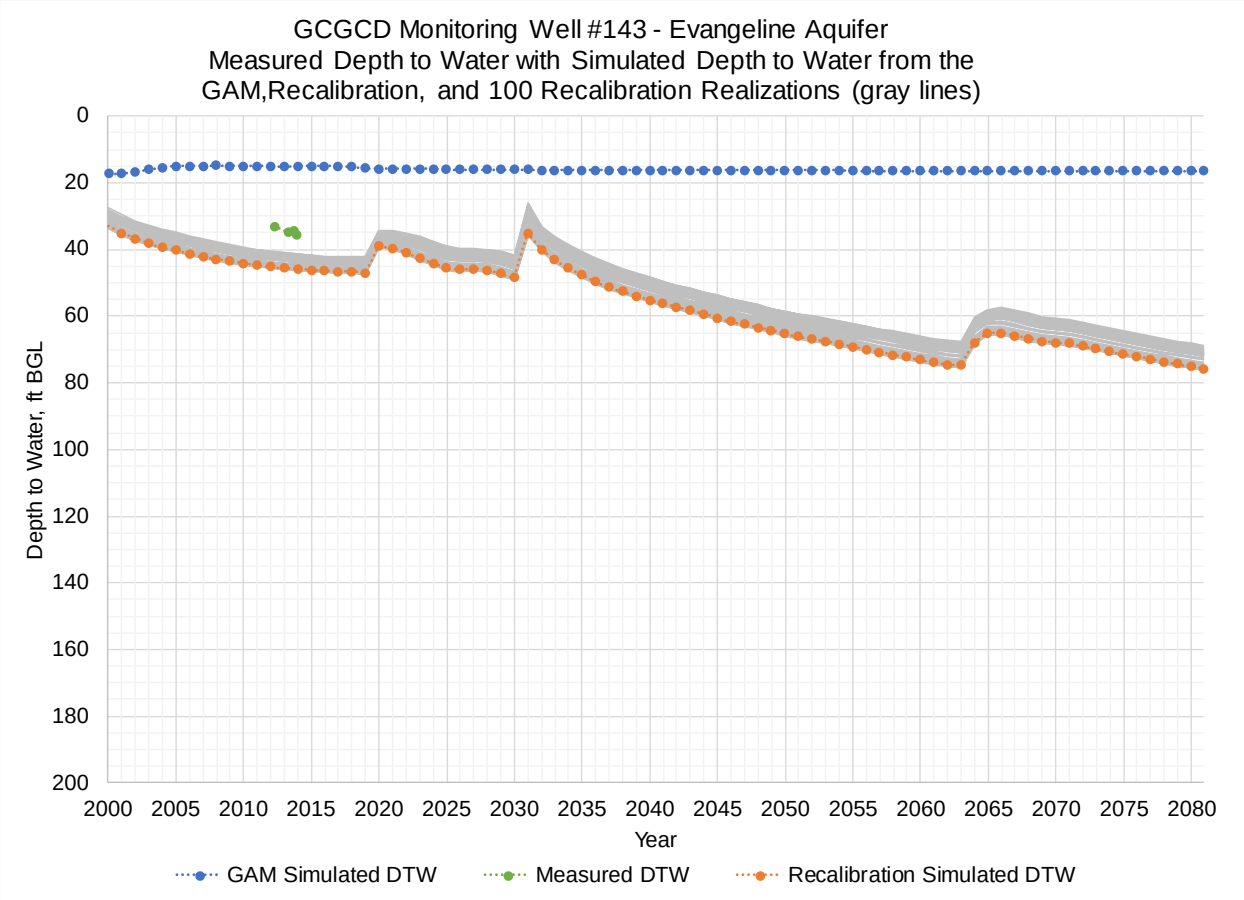

GCGCD Monitoring Well #133 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
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2000
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

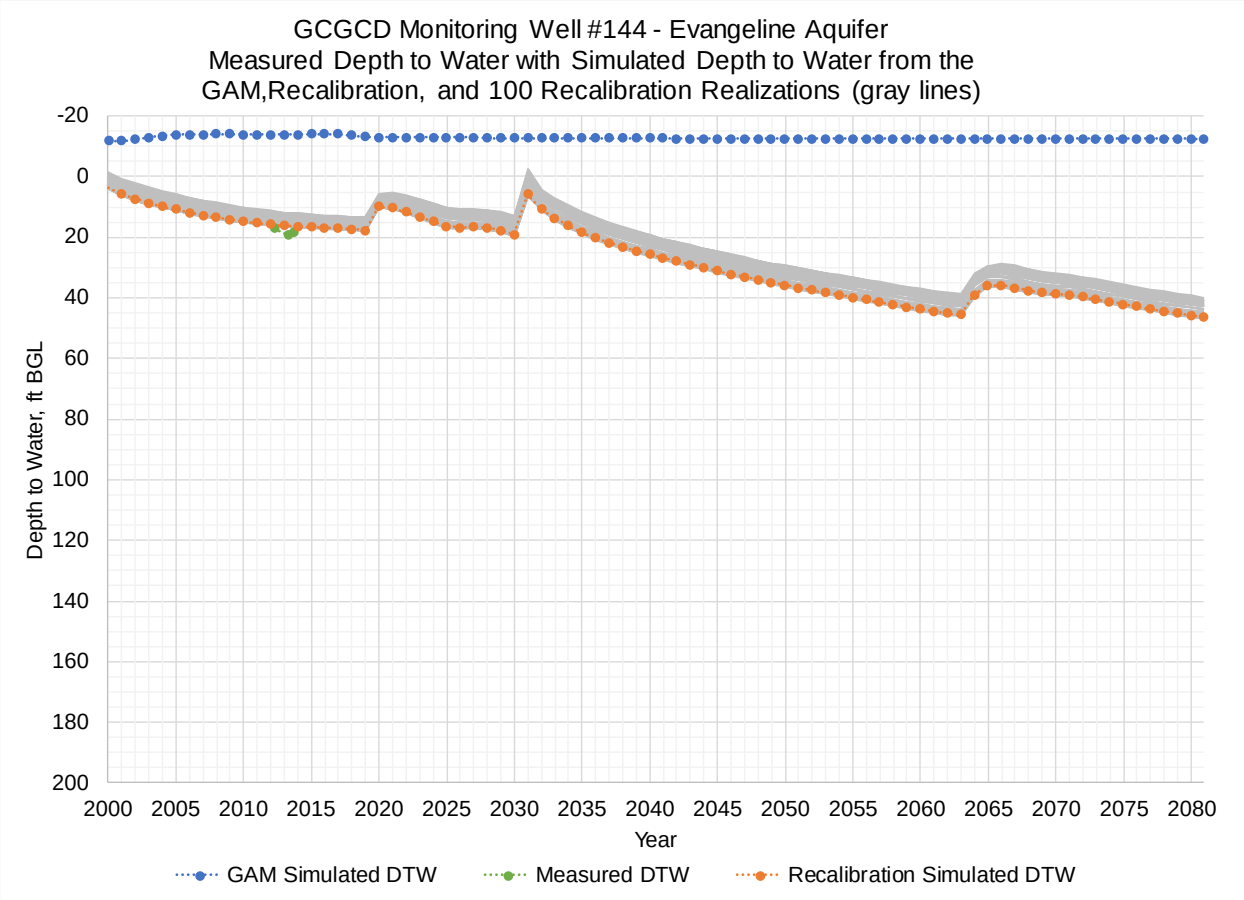

GCGCD Monitoring Well #134 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

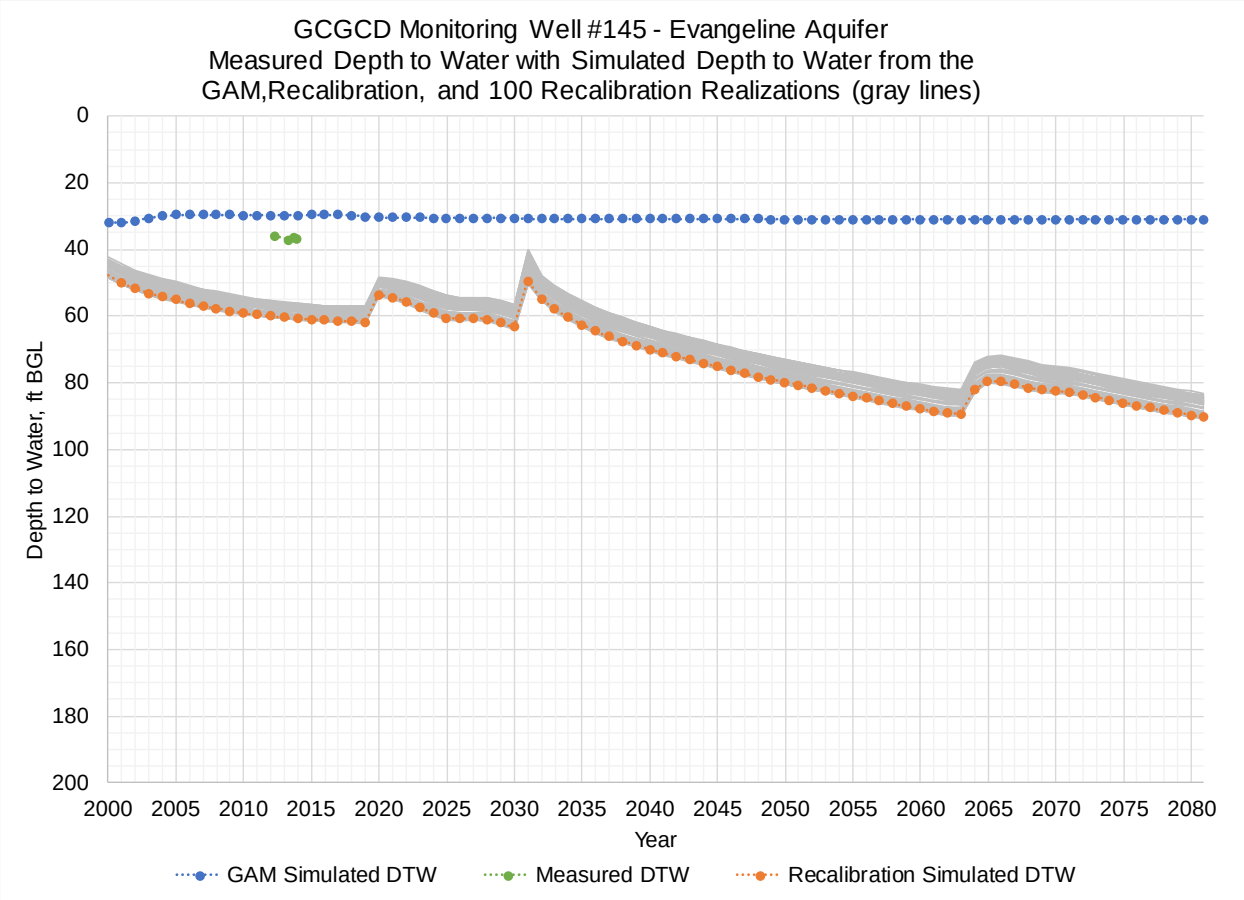

GCGCD Monitoring Well #135 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

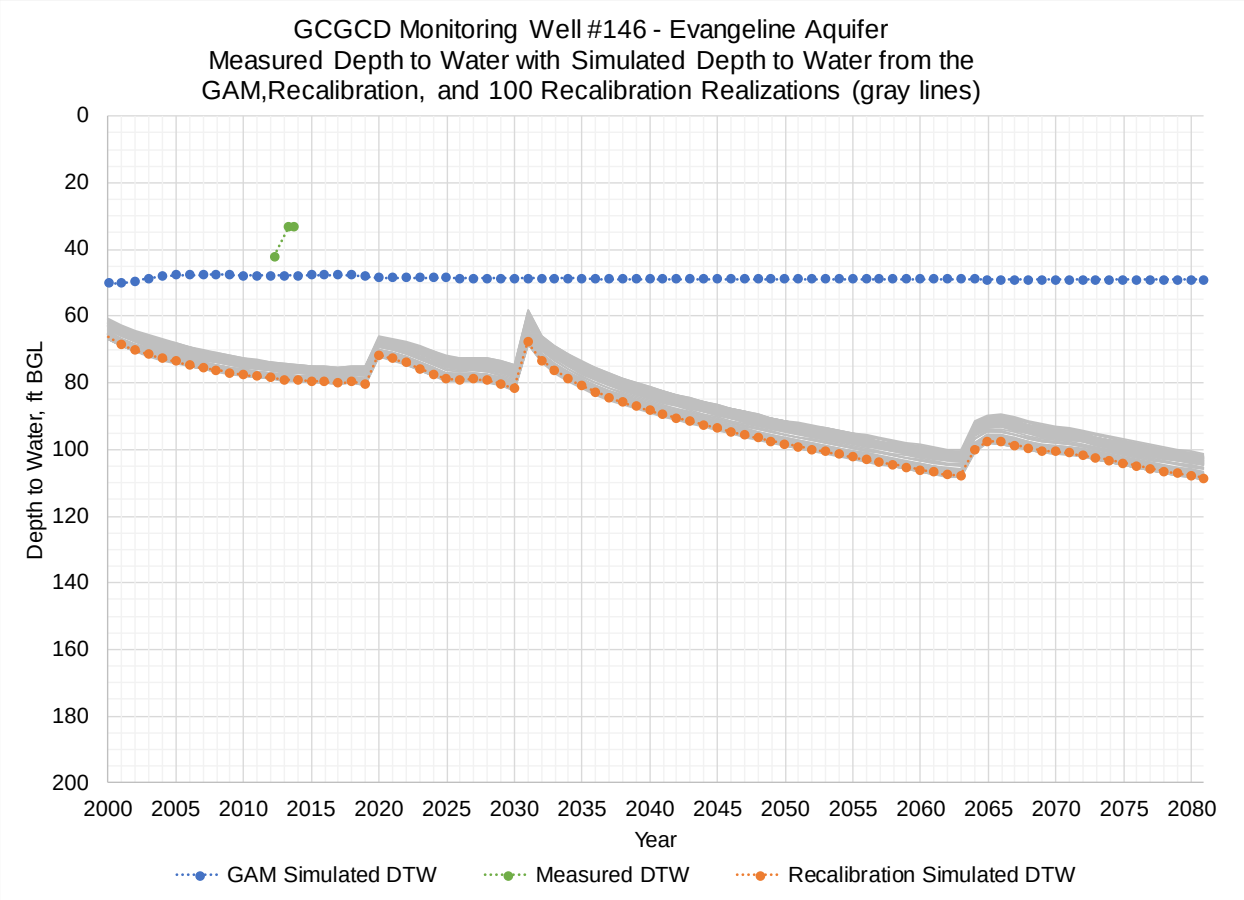

GCGCD Monitoring Well #136 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2005
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2025
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

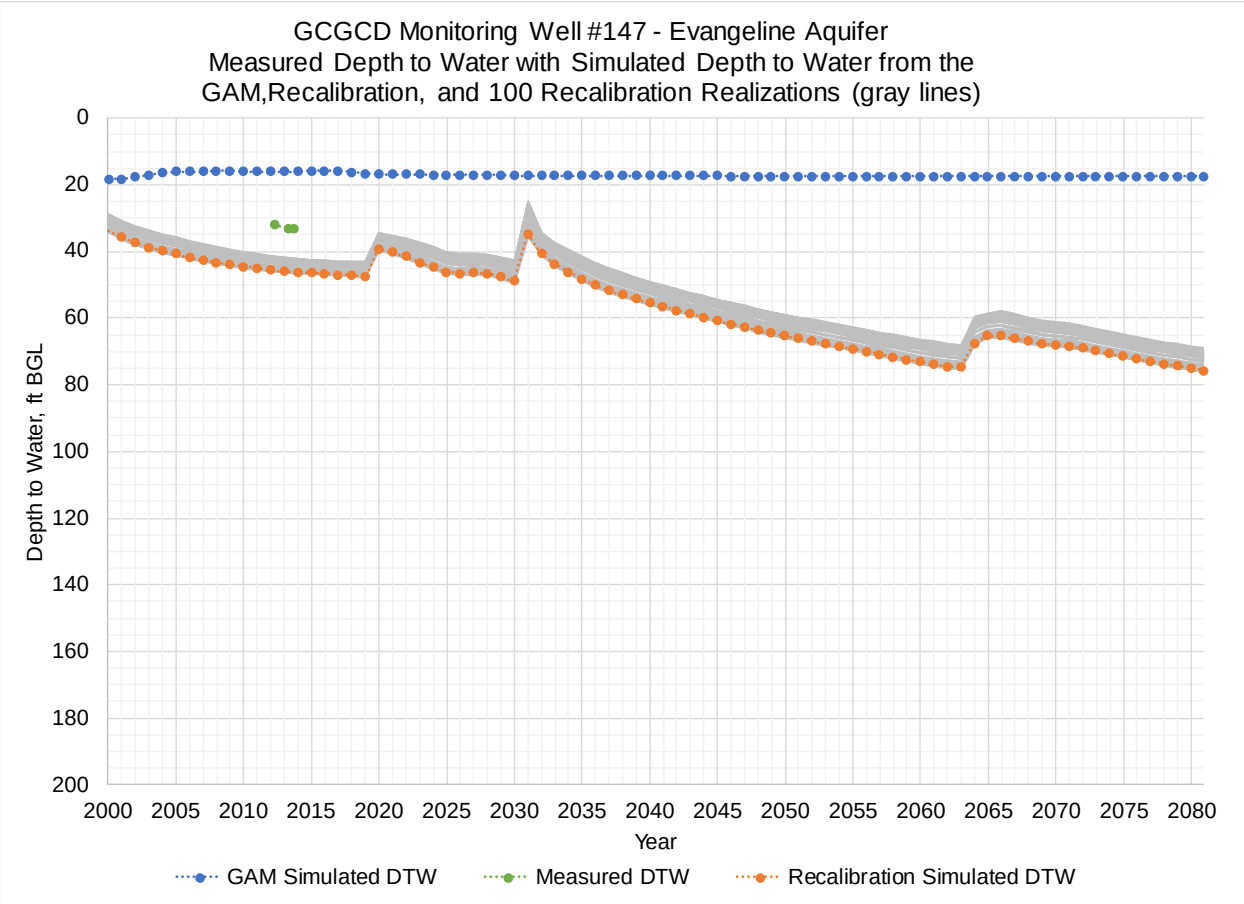

GCGCD Monitoring Well #142 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the
GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2005
2010
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2025
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

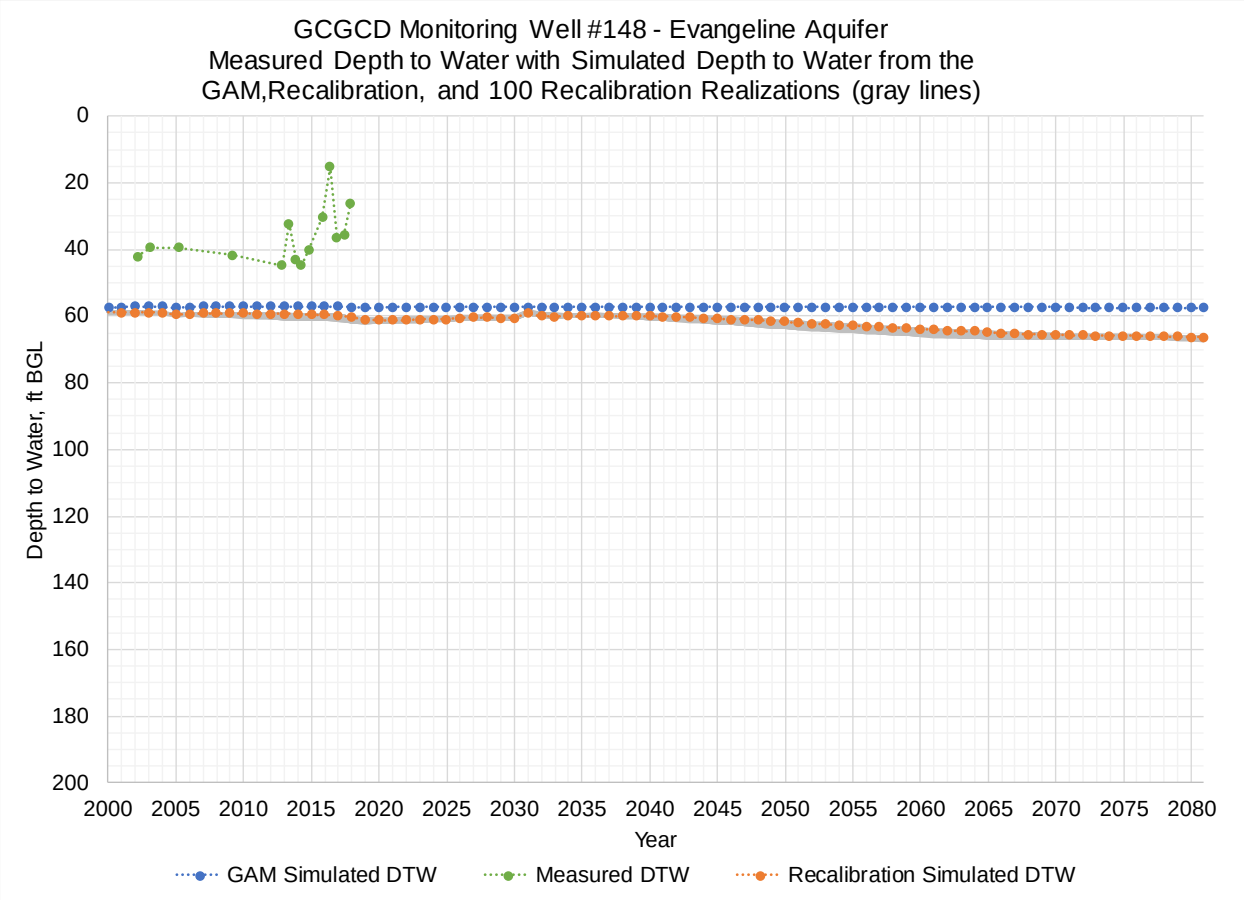

GCGCD Monitoring Well #143 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

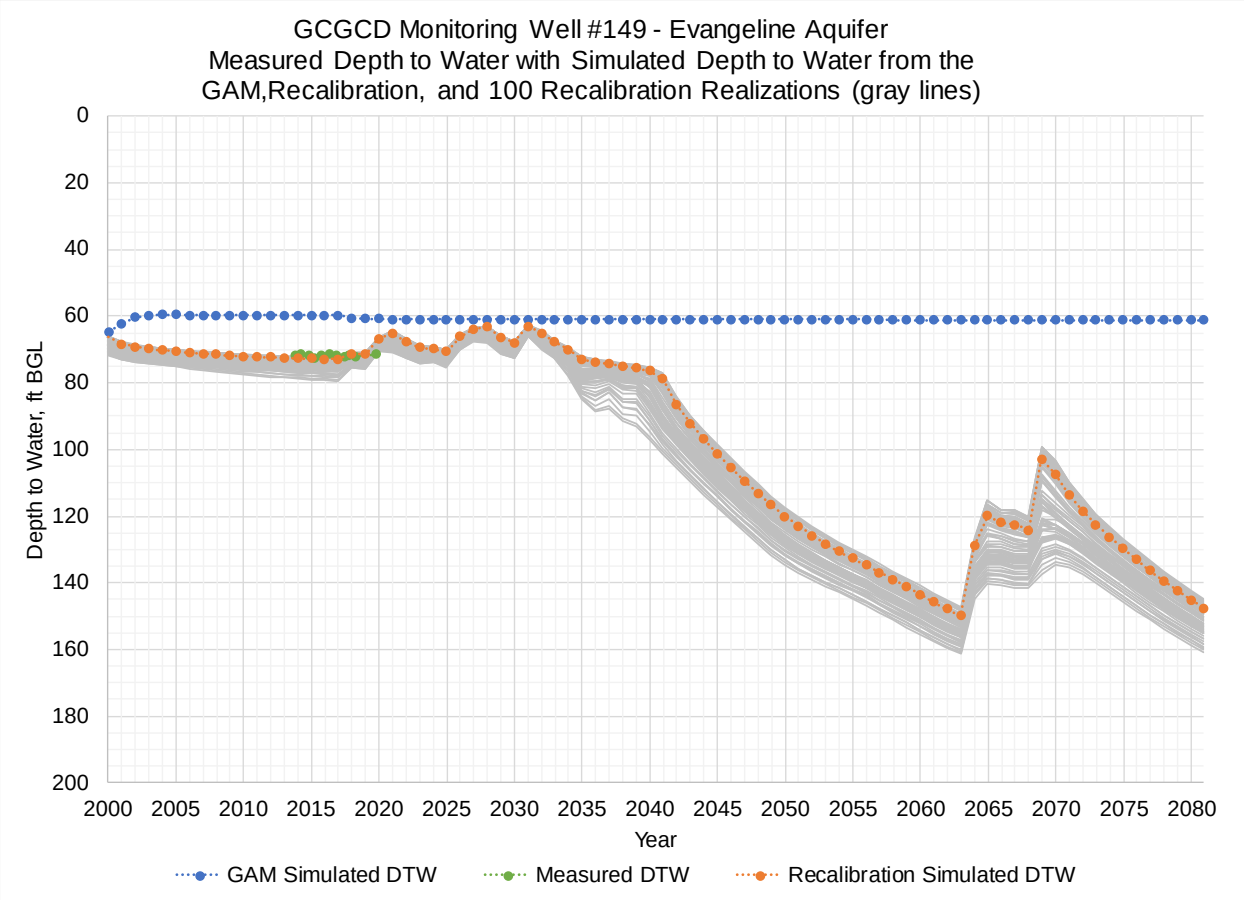

GCGCD Monitoring Well #144 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
-20
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

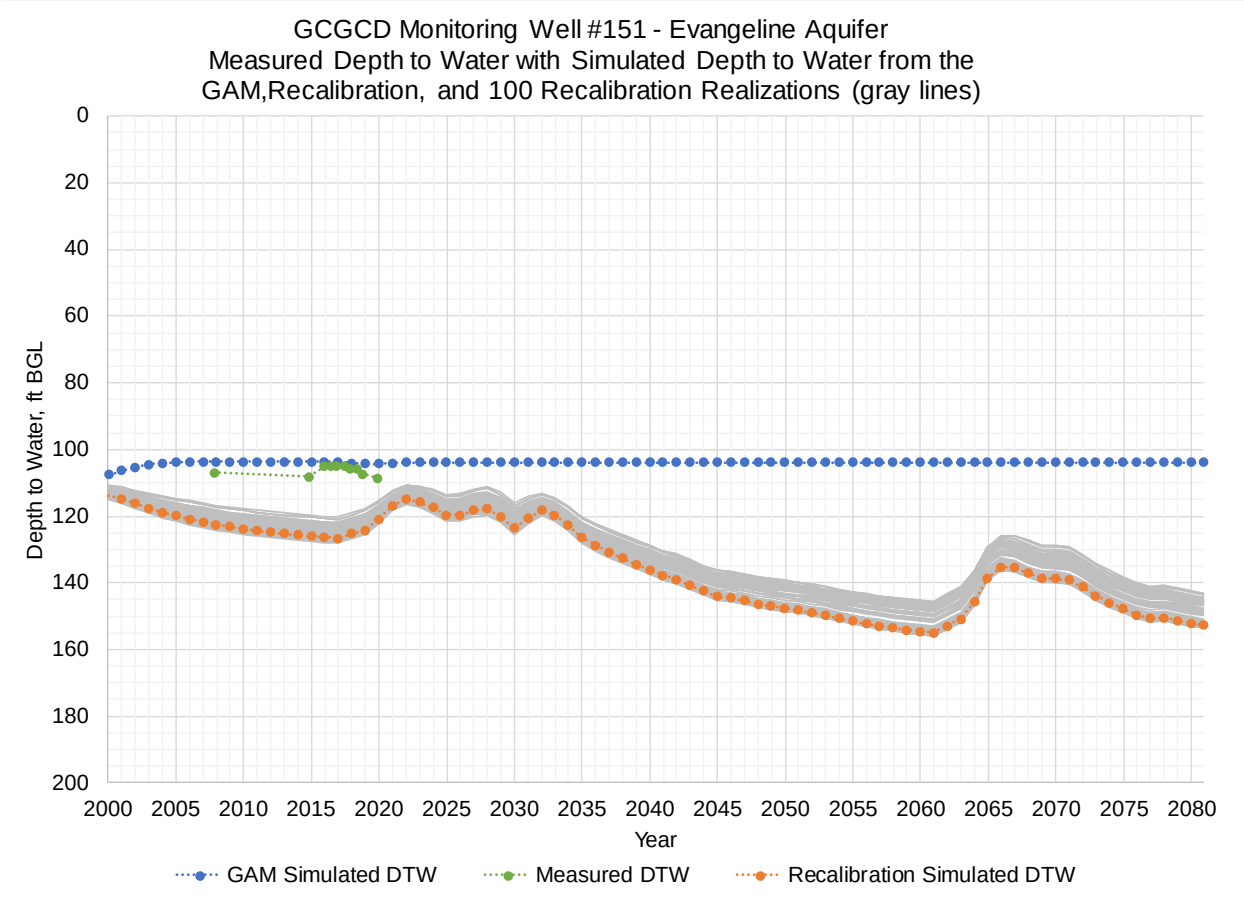

GCGCD Monitoring Well #145 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

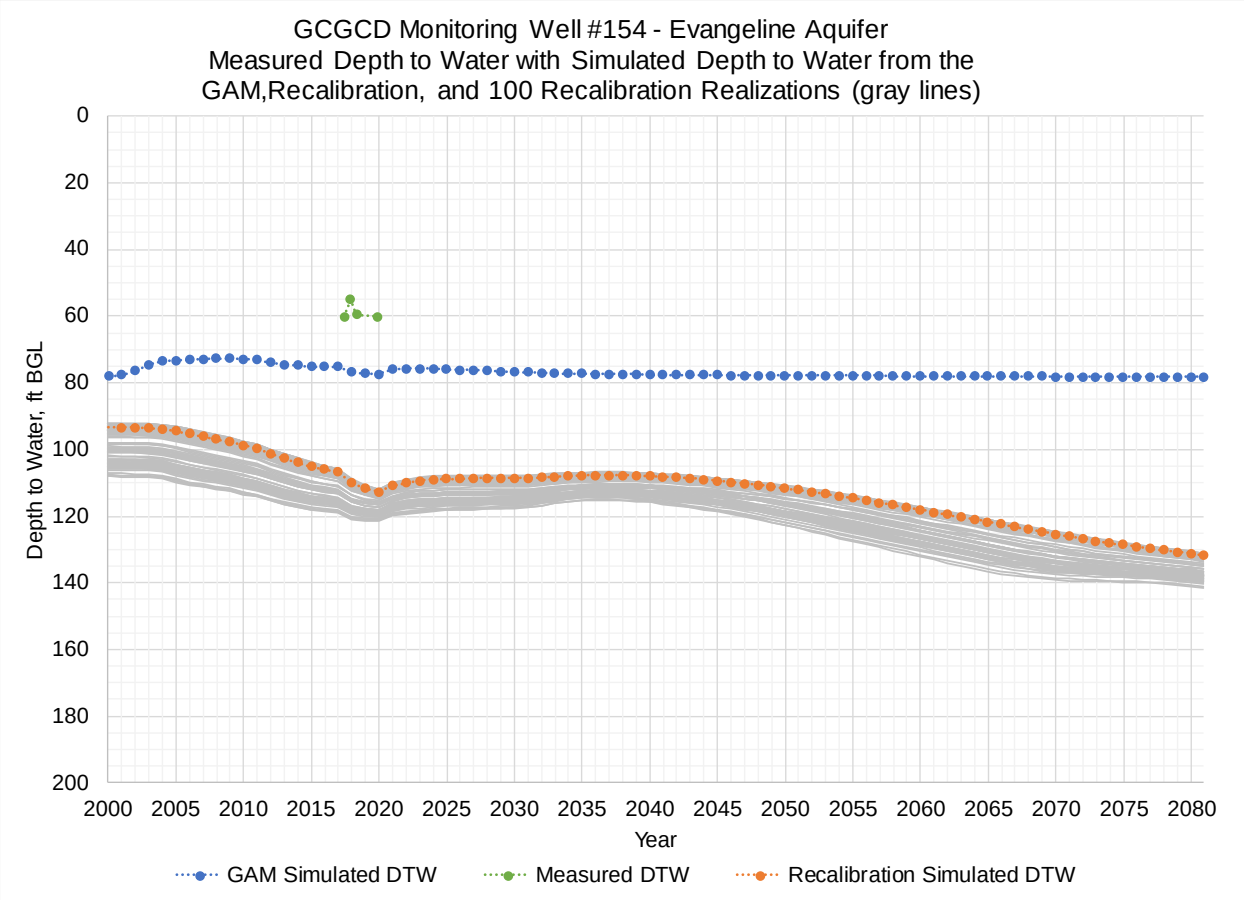

GCGCD Monitoring Well #146 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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100
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2000
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

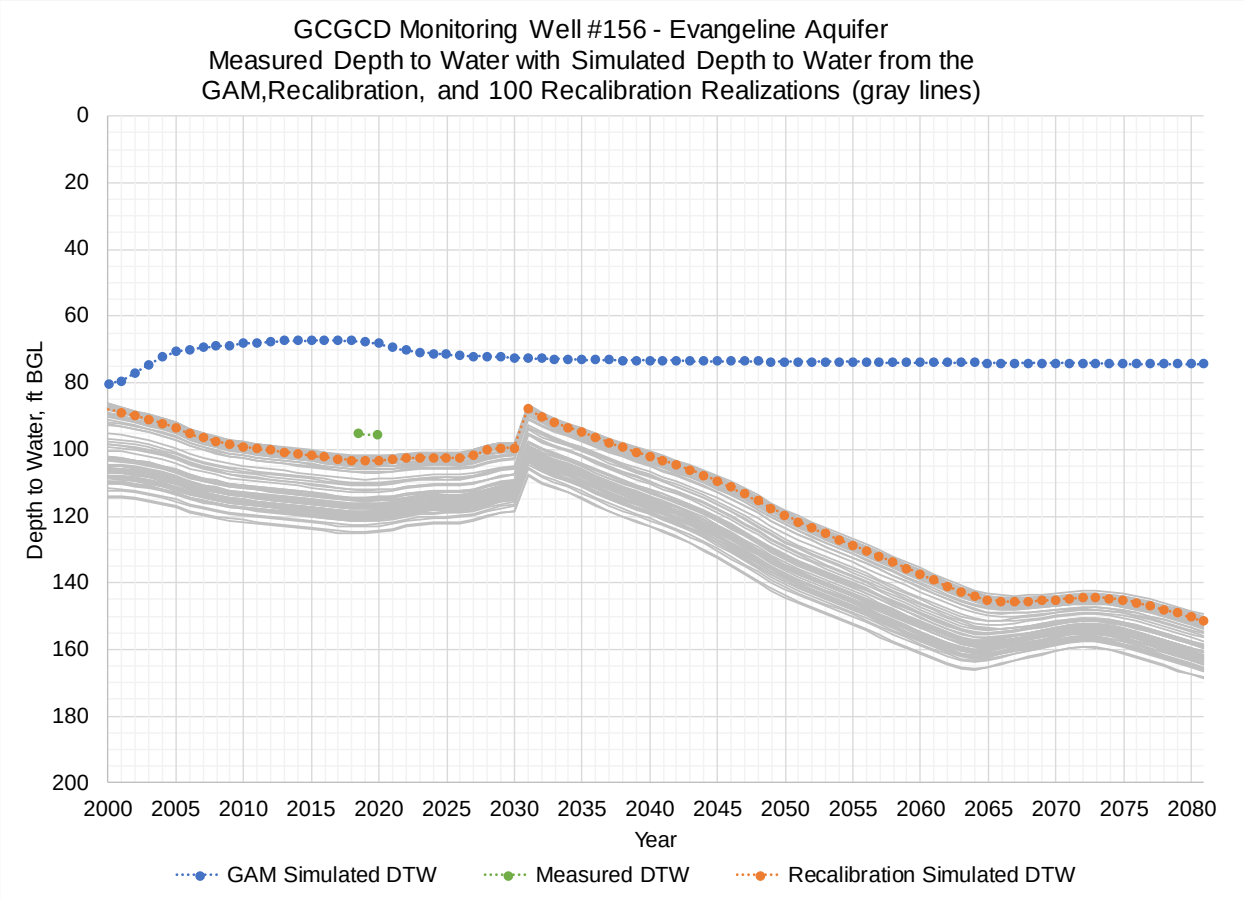

GCGCD Monitoring Well #147 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

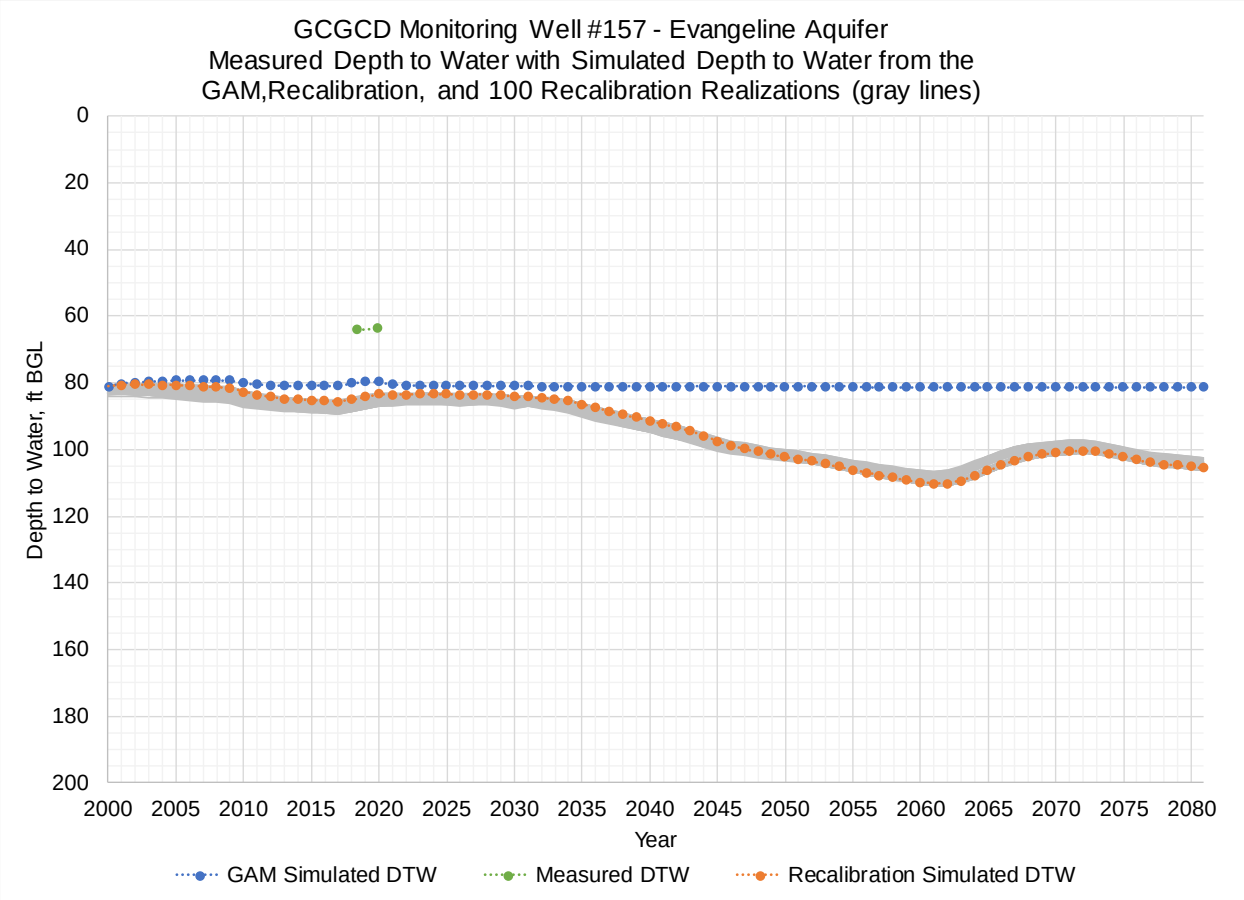

GCGCD Monitoring Well #148 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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100
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

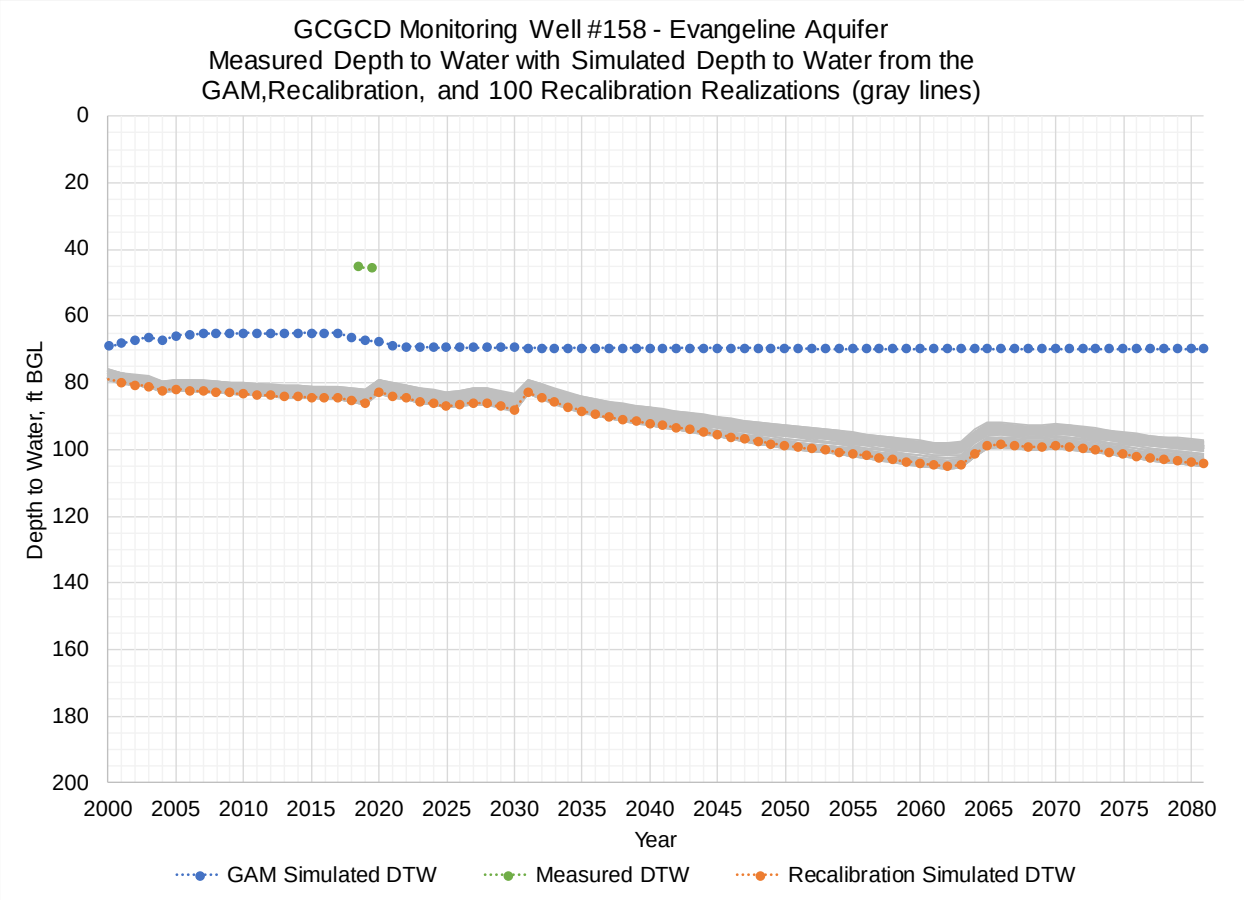

GCGCD Monitoring Well #149 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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100
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140
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

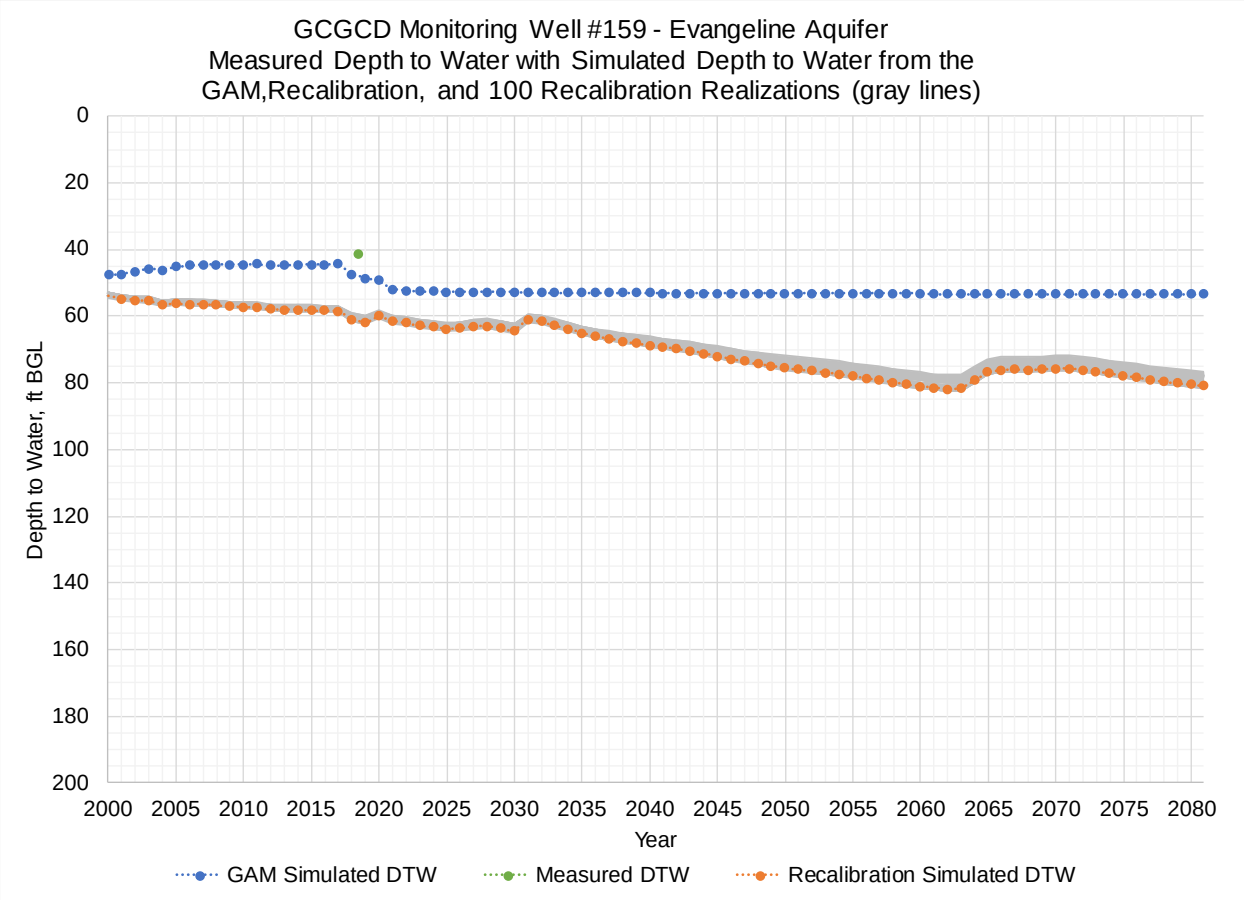

GCGCD Monitoring Well #151 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

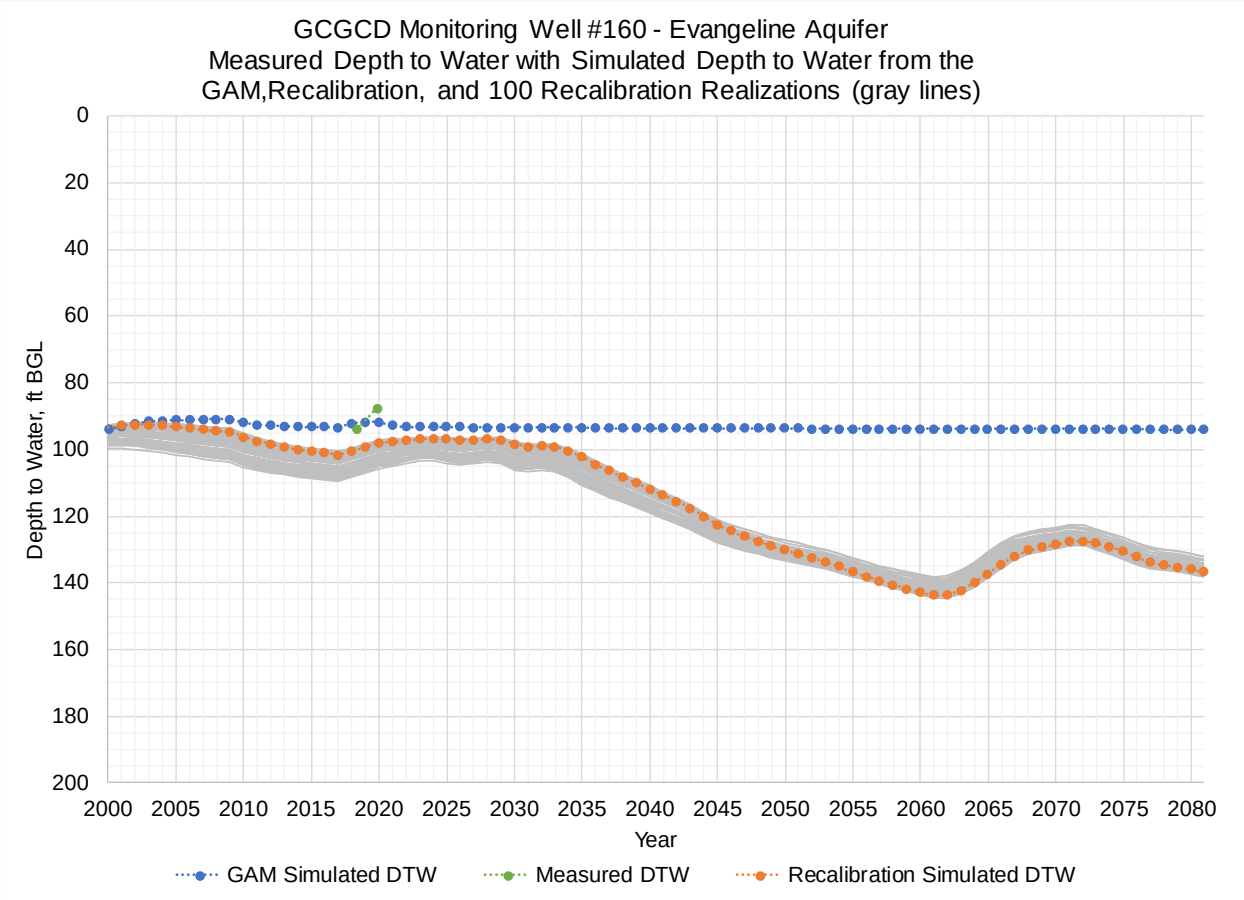

GCGCD Monitoring Well #154 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

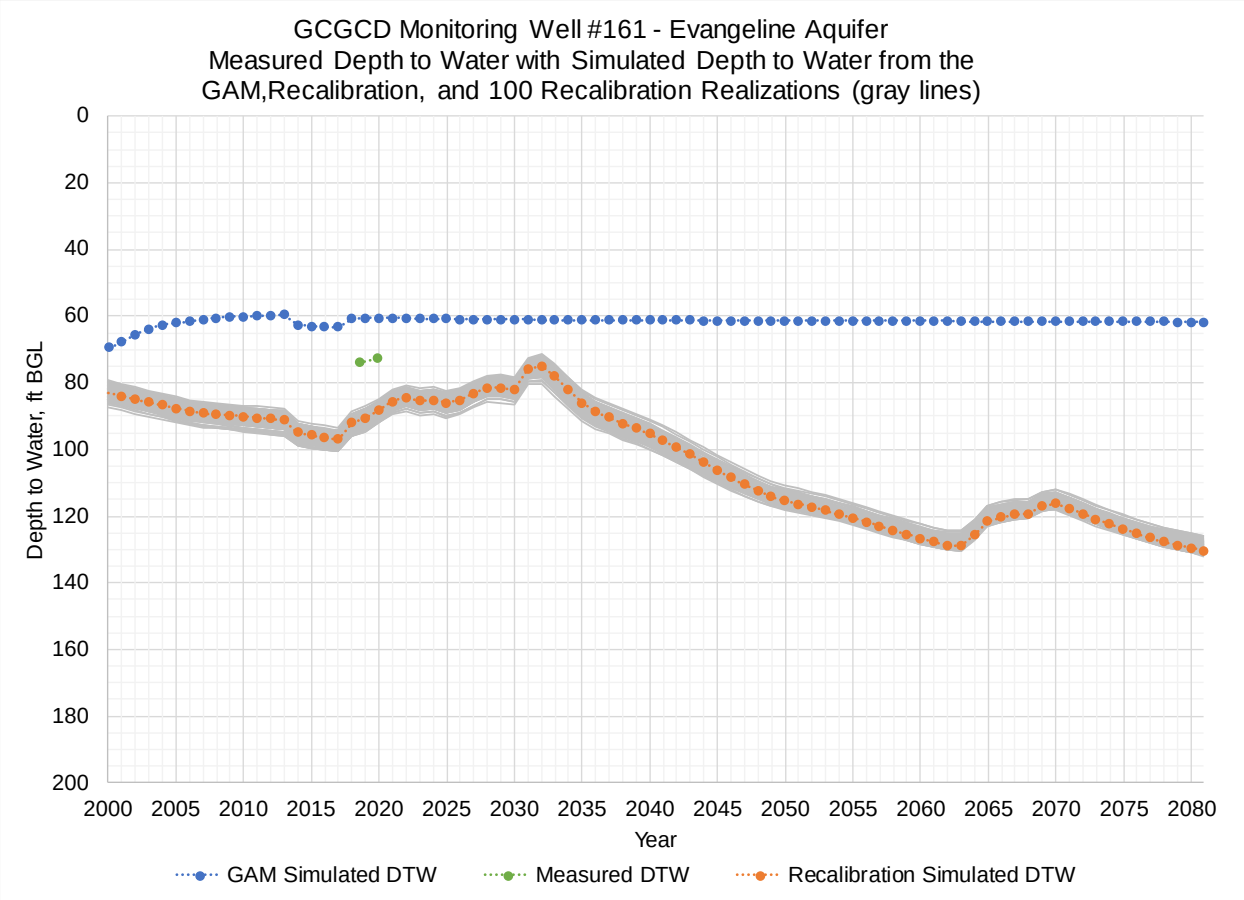

GCGCD Monitoring Well #156 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

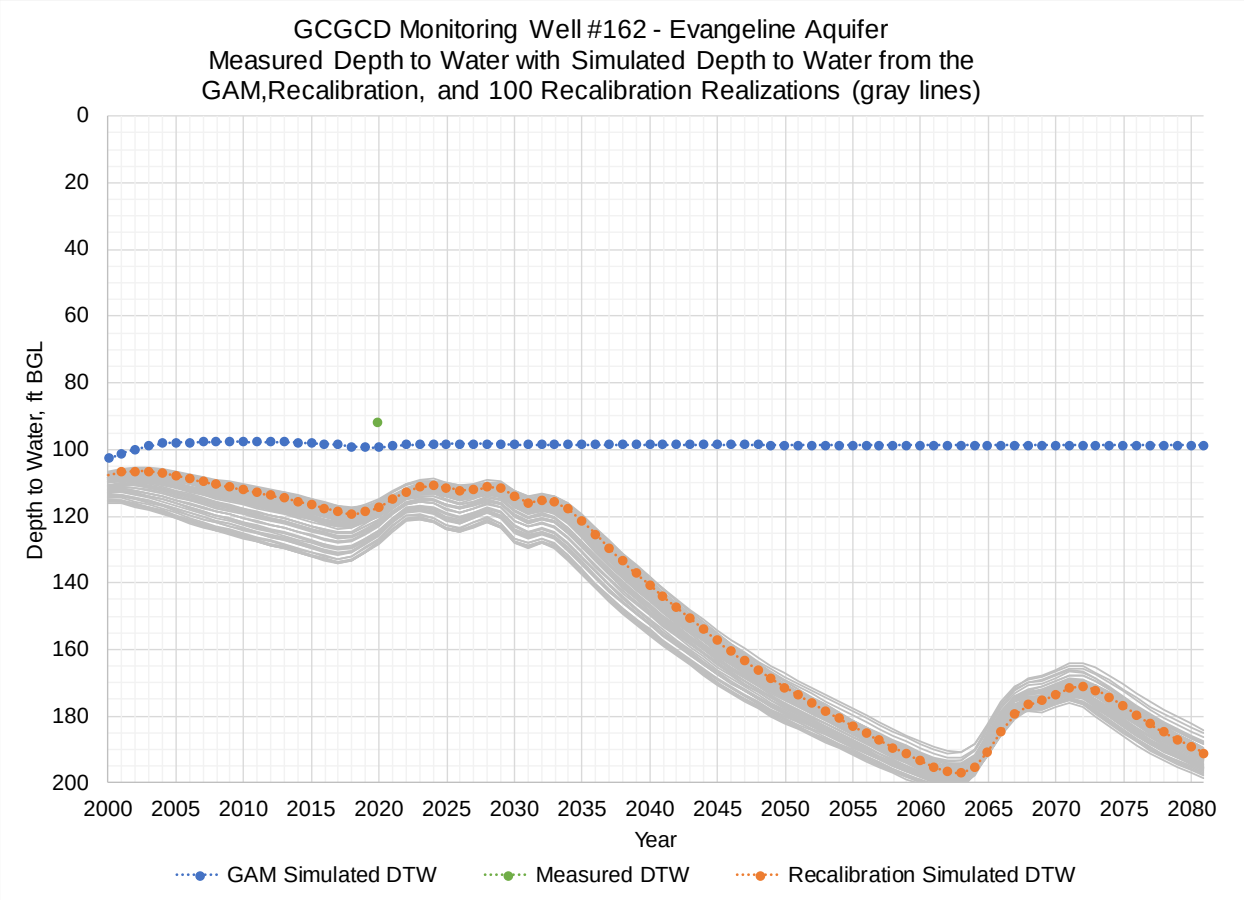

GCGCD Monitoring Well #157 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

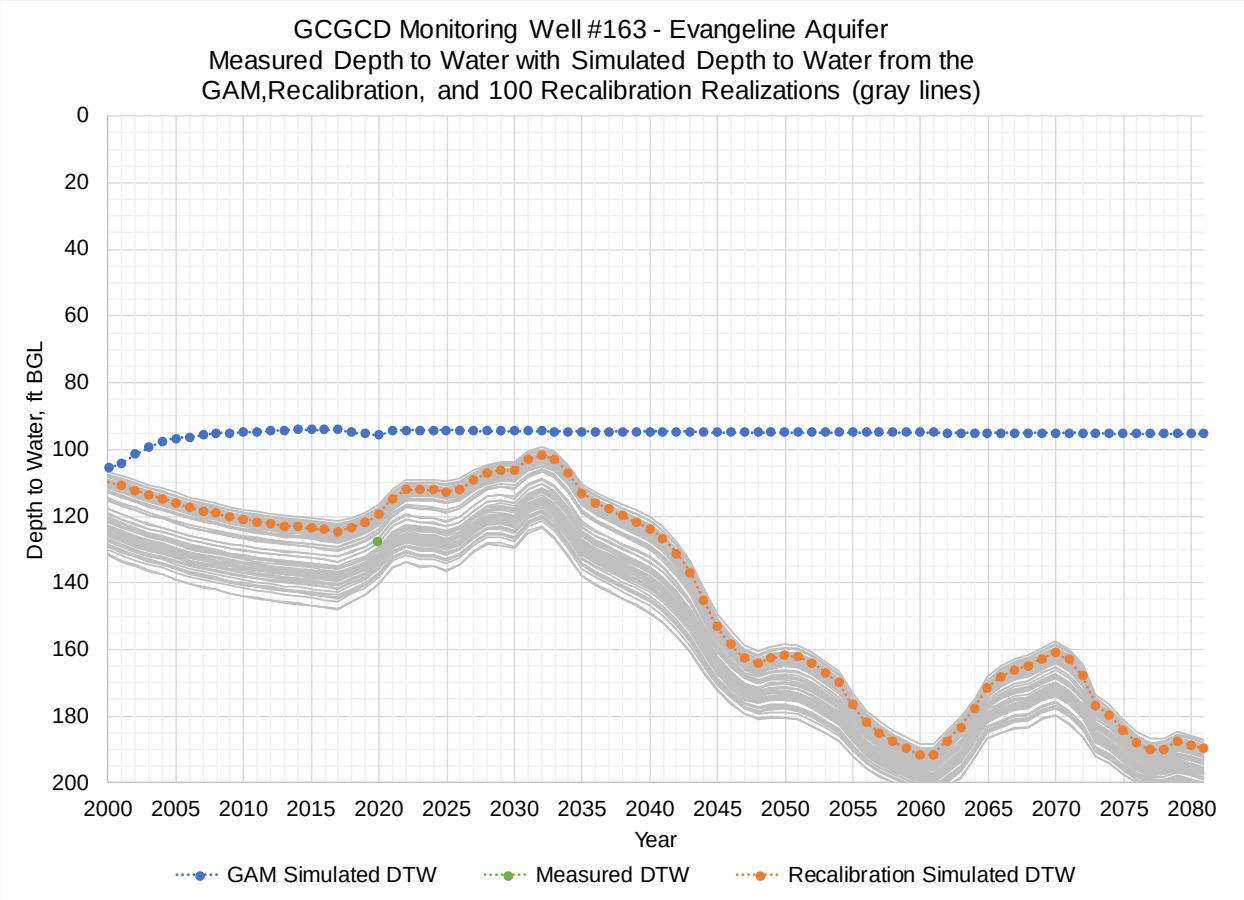

GCGCD Monitoring Well #158 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

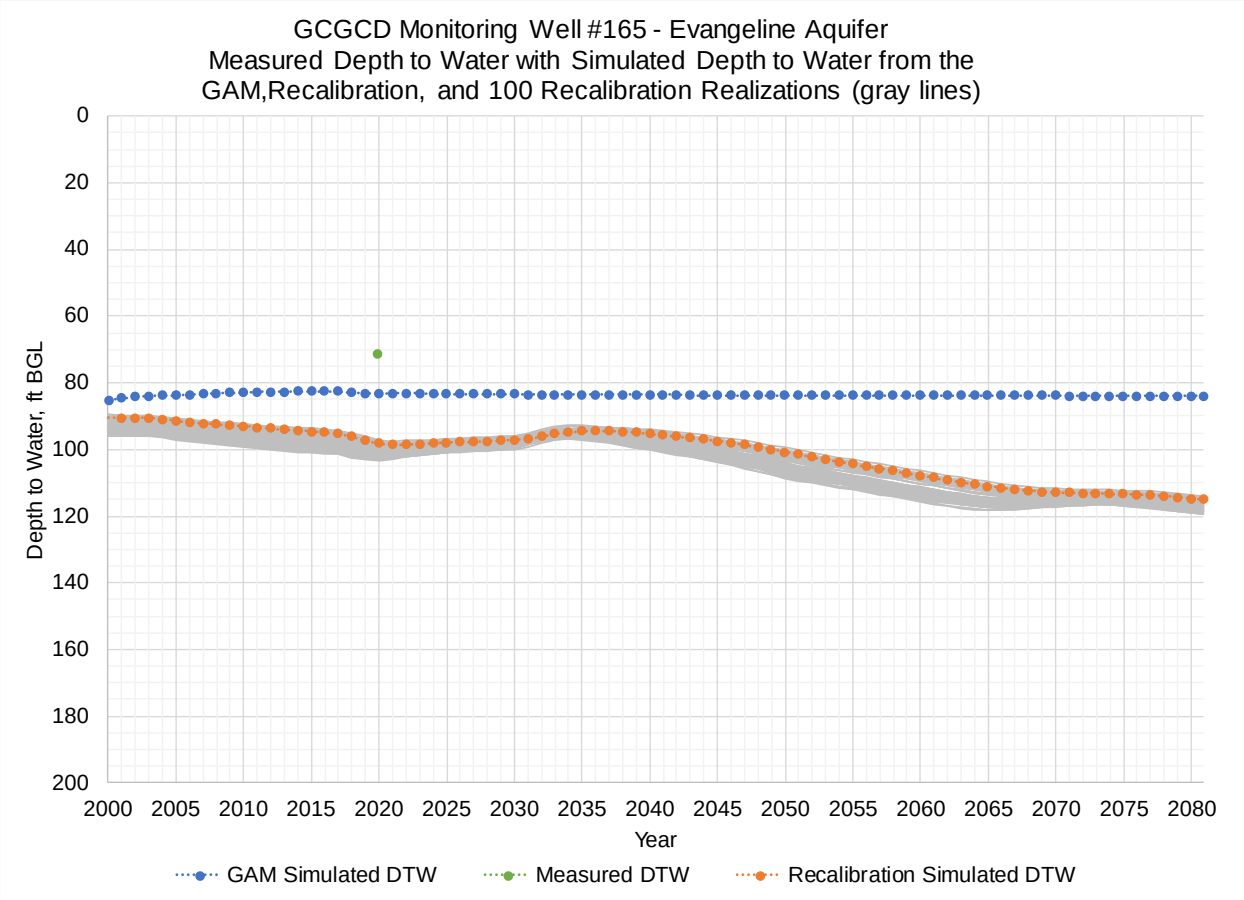

GCGCD Monitoring Well #159 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

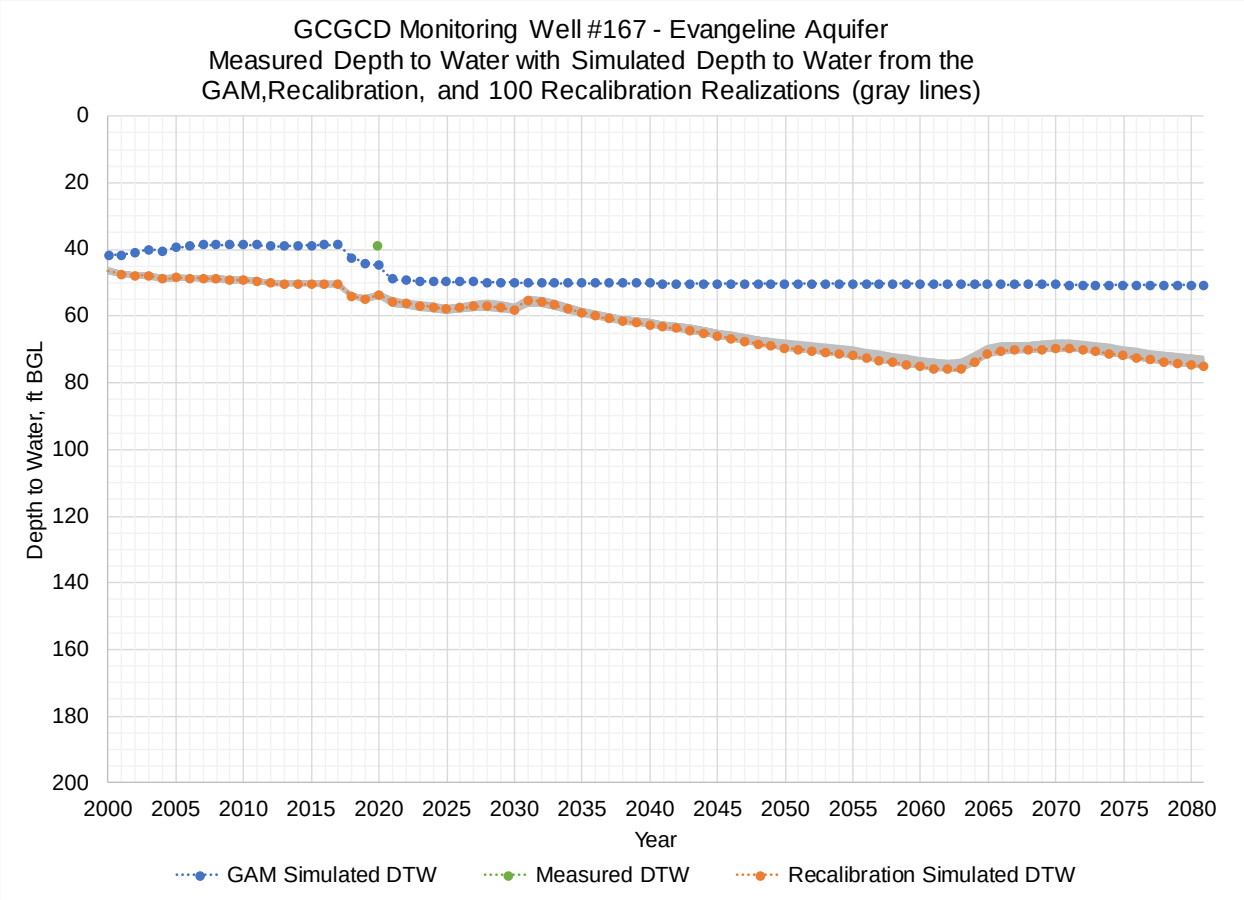

GCGCD Monitoring Well #160 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

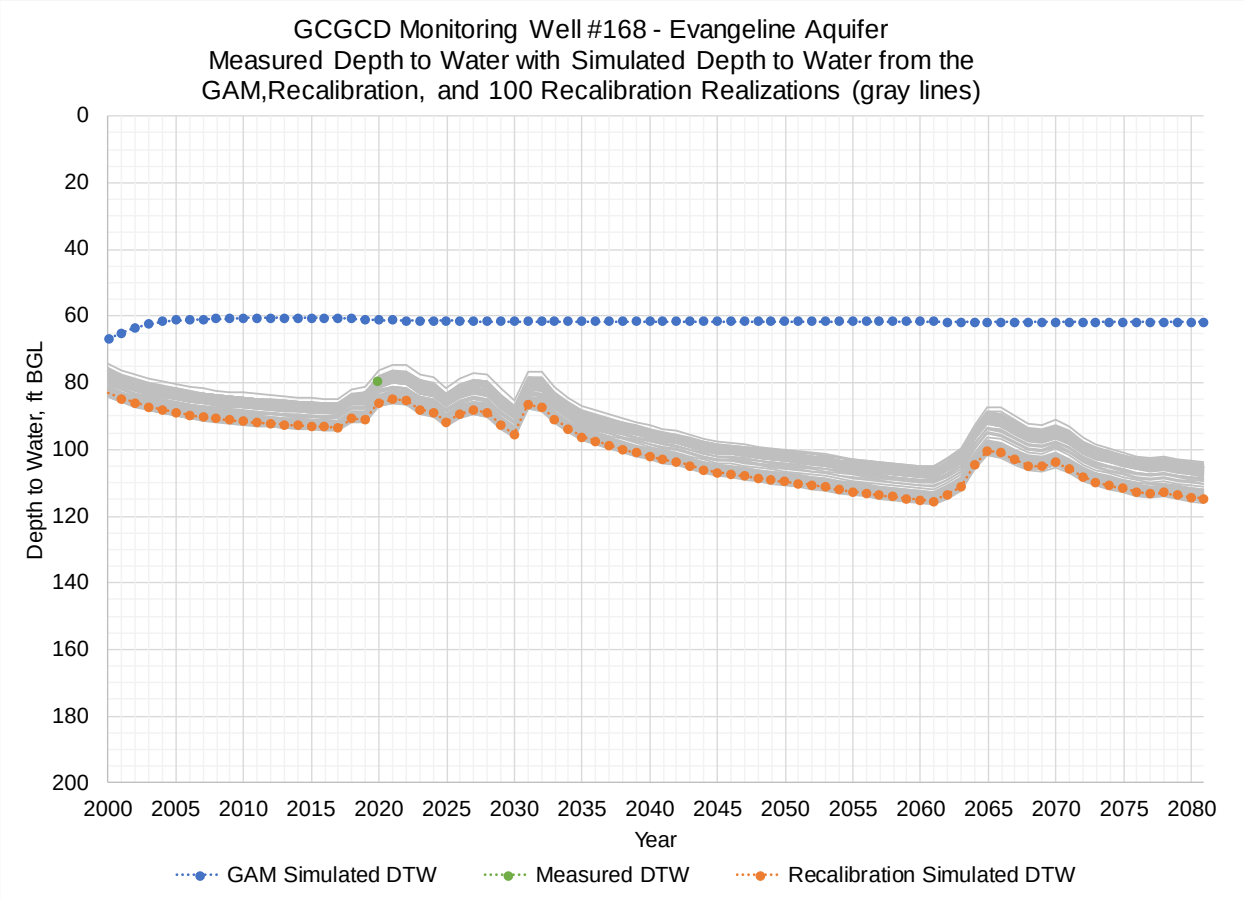

GCGCD Monitoring Well #161 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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100
120
140
160
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2025
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

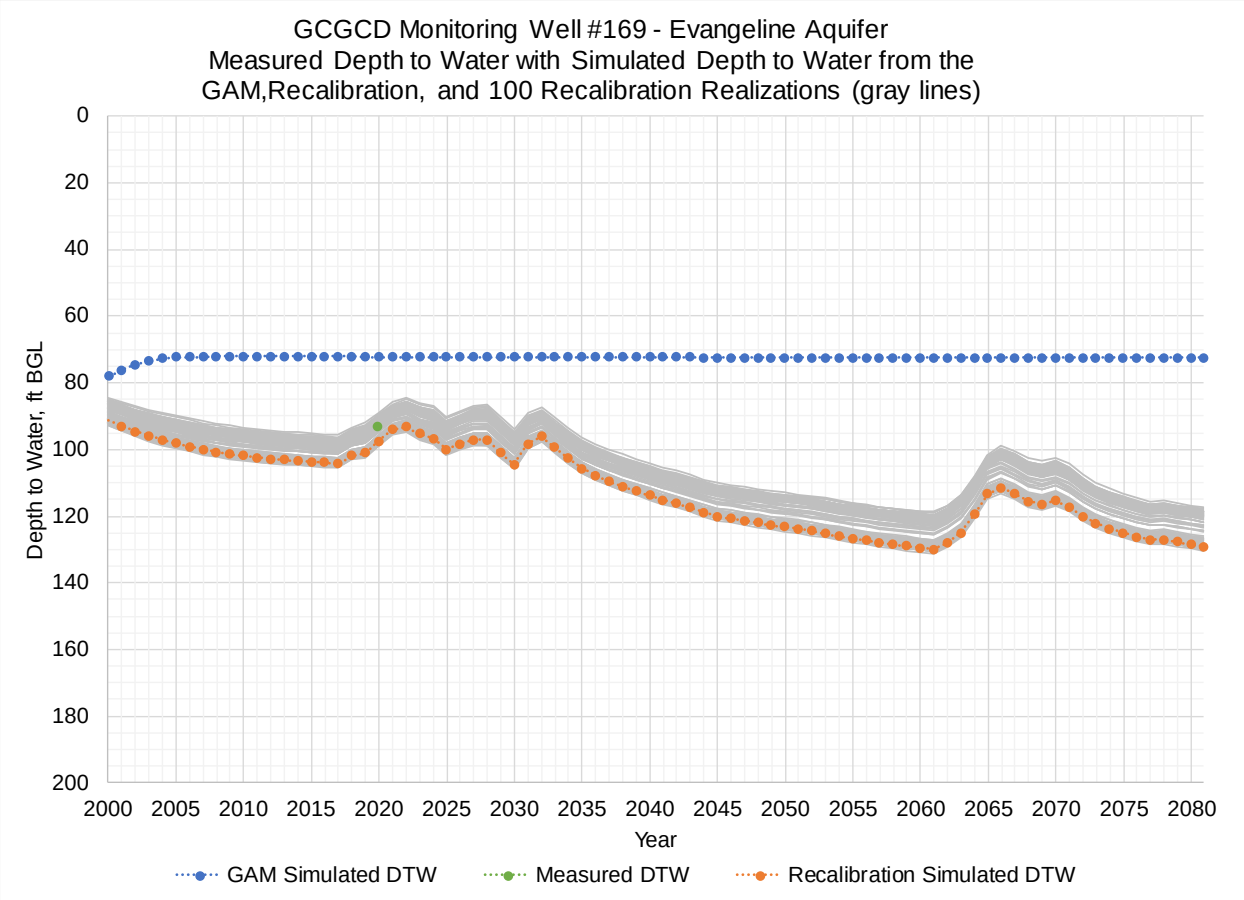

GCGCD Monitoring Well #162 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
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60
80
100
120
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

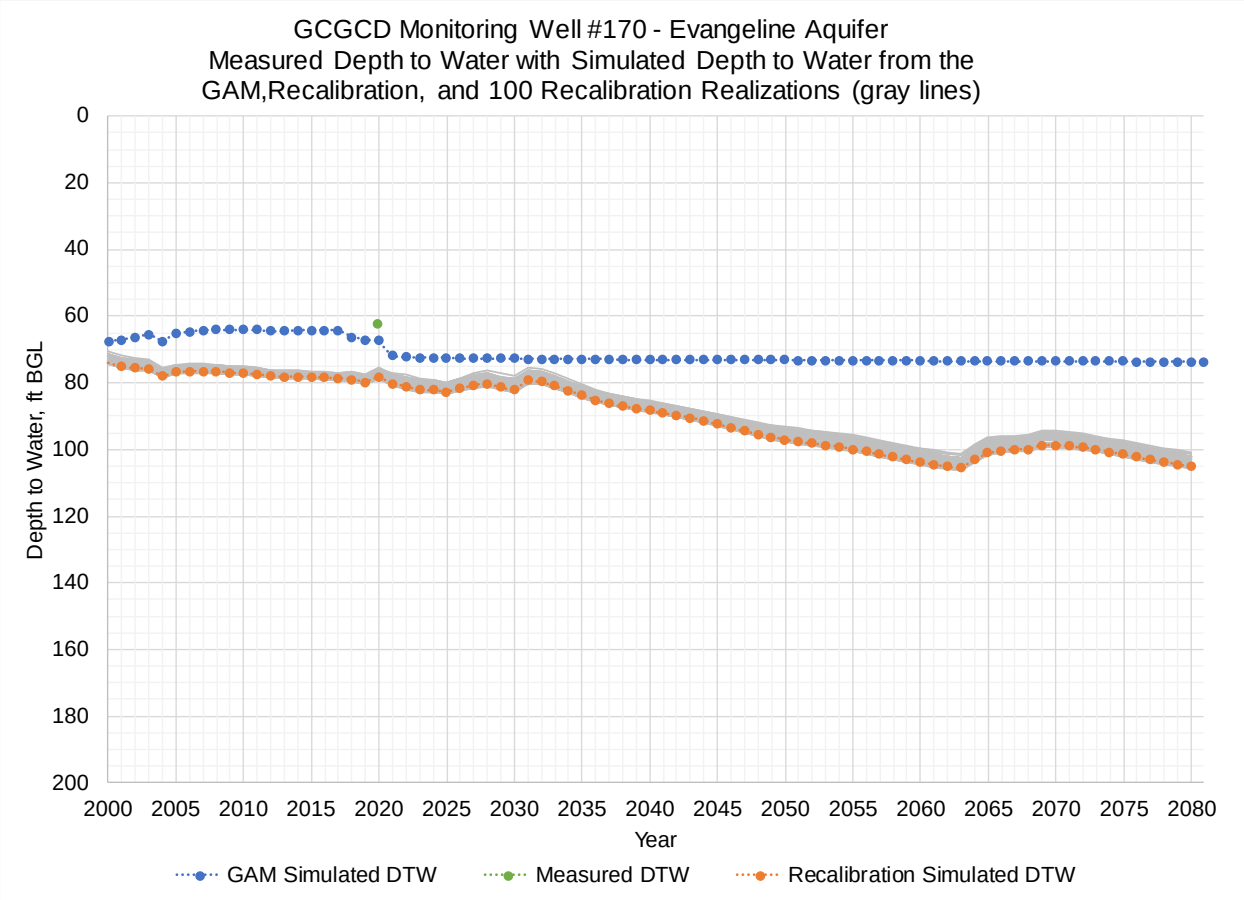

GCGCD Monitoring Well #163 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
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2000
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2025
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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
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2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

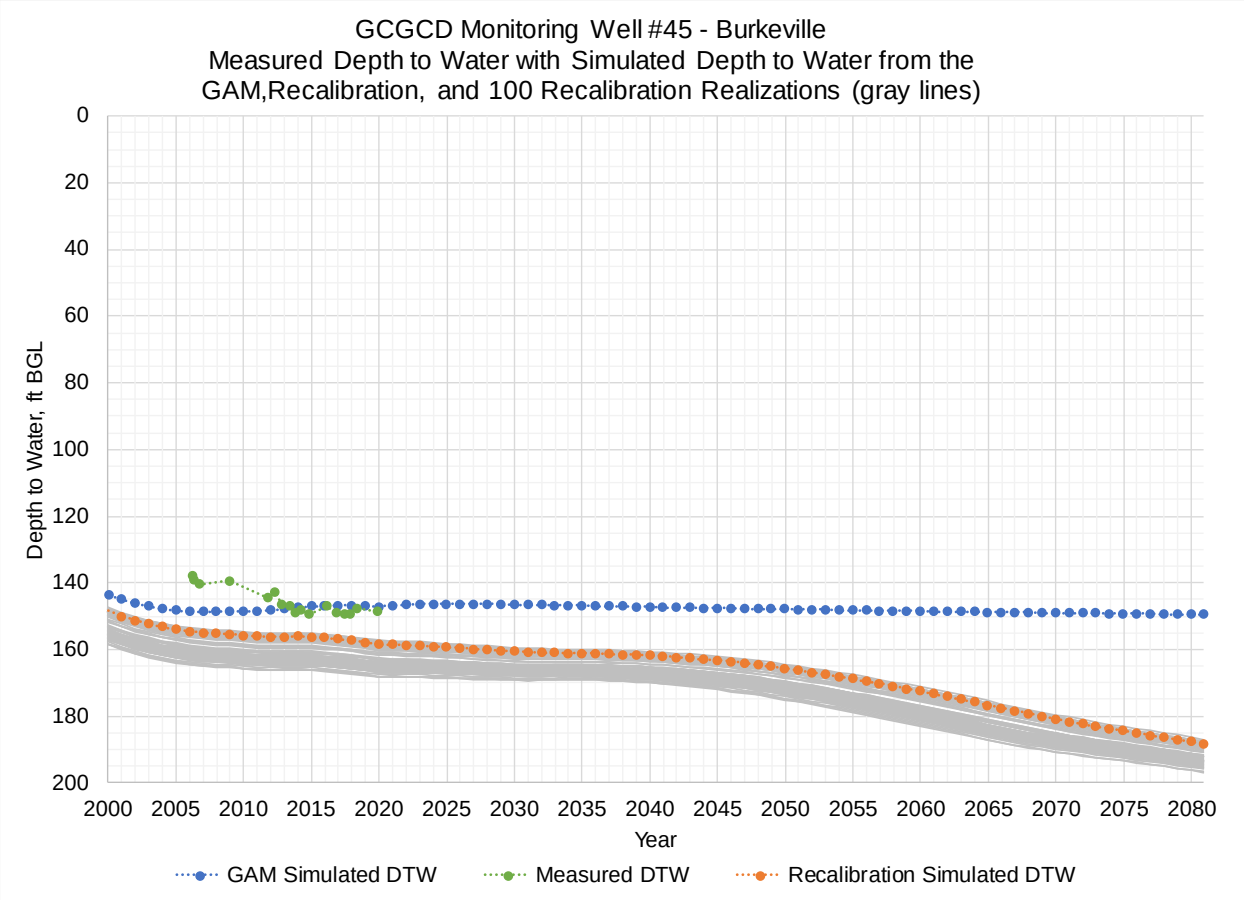

GCGCD Monitoring Well #167 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
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2010
2015
2020
2025
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

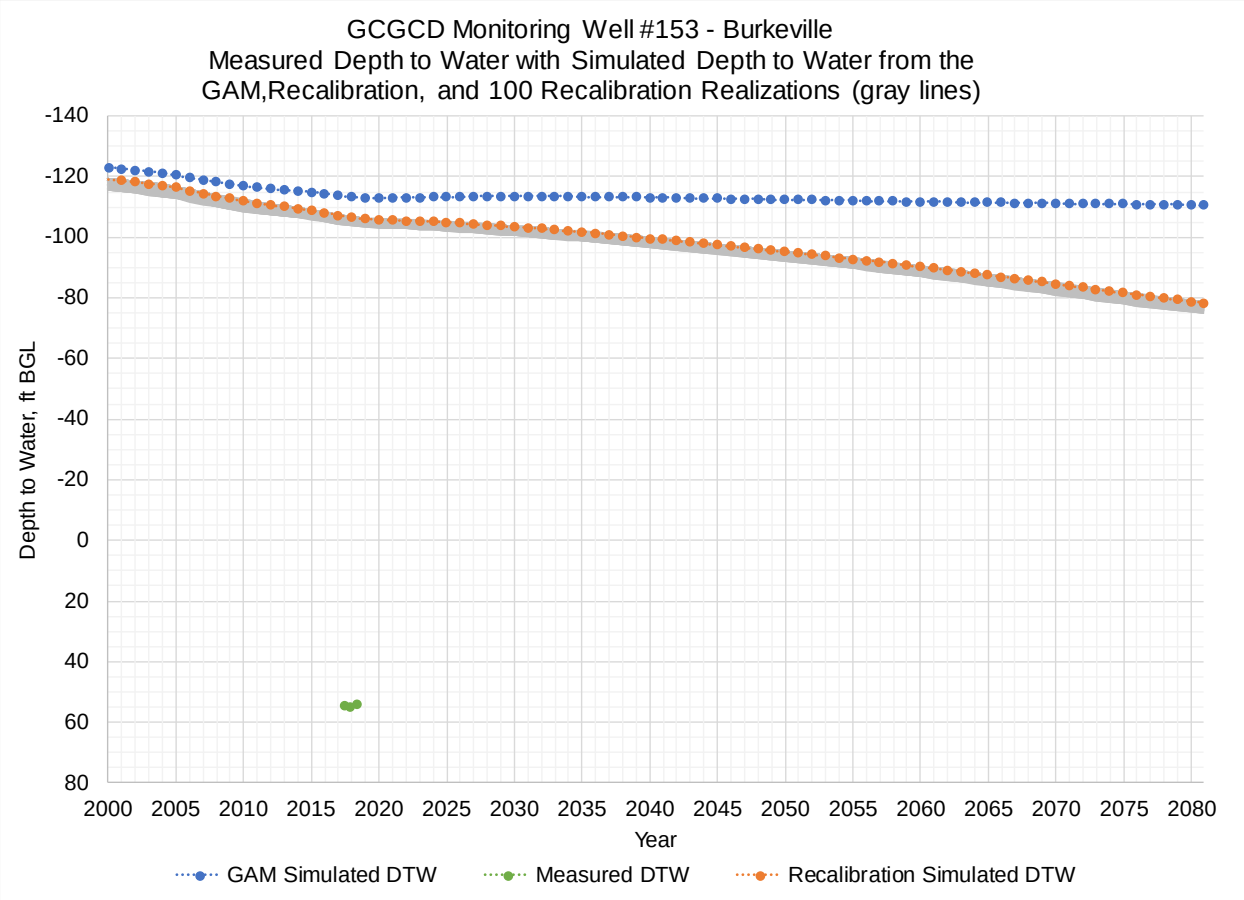

GCGCD Monitoring Well #168 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
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2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

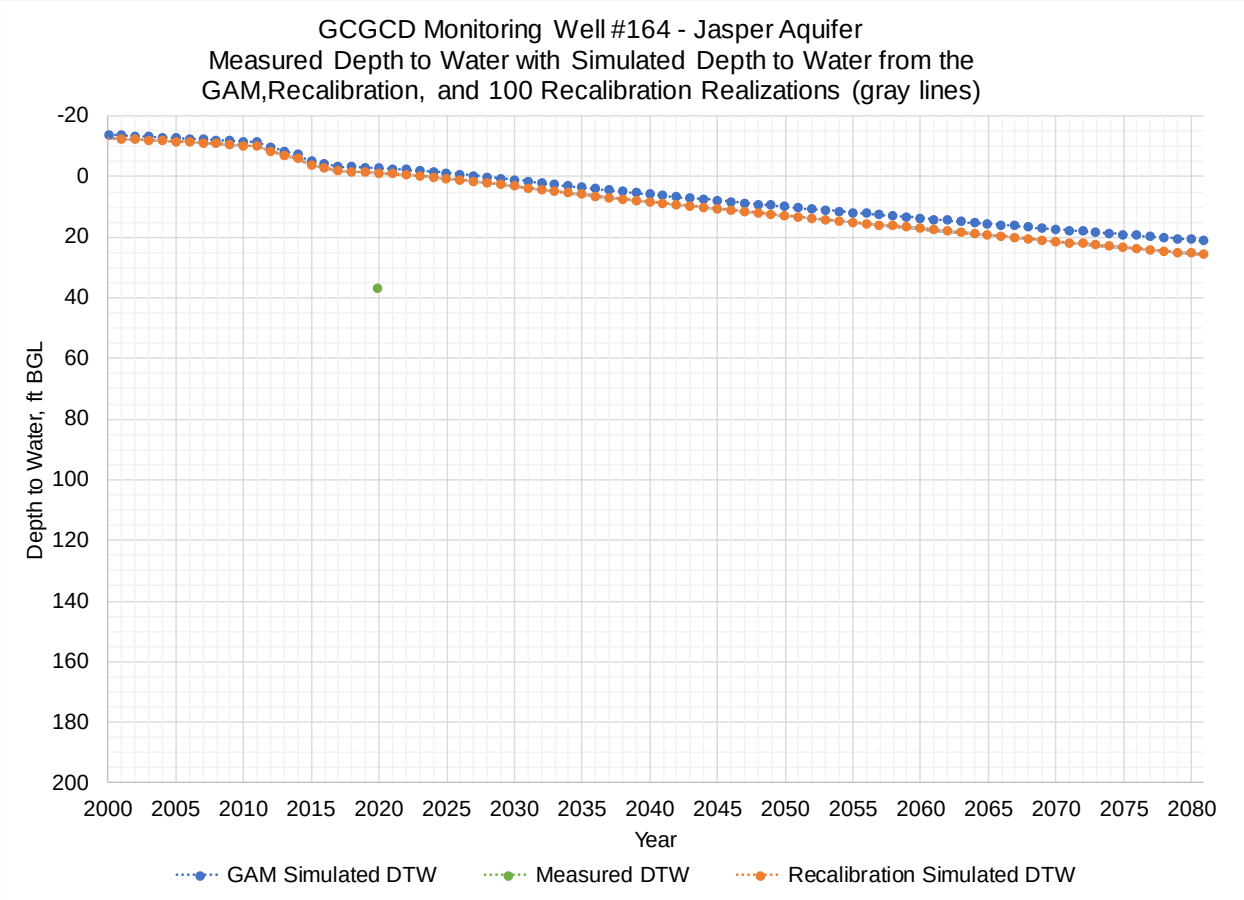

GCGCD Monitoring Well #169 - Evangeline Aquifer
Measured Depth to Water with Simulated Depth to Water from the GAM,Recalibration, and 100 Recalibration Realizations (gray lines)
Depth to Water, ft BGL
0
20
40
60
80
100
120
140
160
180
200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
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
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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
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2025
2030
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2045
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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
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2035
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2055
2060
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2070
2075
2080
Year
GAM Simulated DTW
Measured DTW
Recalibration Simulated DTW

Rec'd 10/9/2025 from T. Graham of GCGCD

GOLIAD COUNTY GROUNDWATER CONSERVATION DISTRICT
118 S. Market St., P.O. Box 562, Goliad, Texas 77963-0562
Telephone: (361) 645-1716 Facsimile: (361) 645-1772
website: www.goliadcogcd.org | email: gcgcd@goliadgcd.org

Board of Directors:
President – Wilfred Korth
Vice-President – Art Dohmann
Secretary – Carl Hummel
Directors –Wesley Ball, Gary Bellows, Barbara Smith, Terrell Graham

November 24, 2021

Groundwater Management Area 15
Tim Andruss – GMA-15 Chair
2805 N. Navarro ST., Suite 210
Victoria, TX. 77901

GMA-15 Member Districts,

Please accept this memorandum for the purpose of justification of the evaluation factors (also known as variances) to Goliad County Groundwater Conservation District (GCGCD) Desired Future Condition (DFC) as requested by GCGCD on November 12, 2021.

At the November 12, 2021, meeting GMA-15 tentatively approved the requested evaluation factors pending submittal of a memo documenting justification of the increase beyond +/- 5 feet for the Gulf Coast Aquifer System. The DFC evaluation factors requested and tentatively approved are as follows:

Chicot: +/- 17 feet
Evangeline: +/- 36 feet
Burkeville: +/- 14 feet
Jasper: +/- 7 feet

Justification for the DFC evaluation factors is as follows:

- Data from GCGCD's water level monitoring program is available at http://www.goliadcogcd.org/.
- Prior to any modeling by GMA-15 in this cycle, GCGCD reduced water allocation from 1/2 acre-foot per acre to 3/8 acre-foot per acre per year due to longstanding significant water level decline being measured in the Evangeline and Chicot Aquifers.
- GCGCD contracted with LRE to evaluate the TWDB MAG parameters specific to Goliad County. The result of this work was the development of a recalibrated GAM, sometimes known as the RGAM. In the report, "GAM Recalibration Focusing on Goliad County," dated October 20, 2020, discusses the calibration error between the GAM and the measured water levels in Goliad County. [The recalibration resulted in an improvement with respect to simulation of measured water levels and the trends in measured water levels. Rather than having water levels recovering, the simulated water level followed a declining trend similar to measured levels.]

- The DFC evaluation factors are feasible based upon the Technical Memorandum, "Discussion of Feasibility of Achieving the DFCs," dated January 14, 2021, which discusses the uncertainty associated with the GAM results related to the predictive trend in water levels. The range of average drawdown for each GCAS component in Goliad County in Table 2 of the memorandum are as follows:

  Chicot: -19 to 10 feet
  Evangeline: -67 to 64 feet
  Burkeville: -59 to 68 feet
  Jasper: -39 to 55 feet

GCGCD wishes to thank member districts of GMA-15 for the extra time and consideration in considering the evaluation factors.

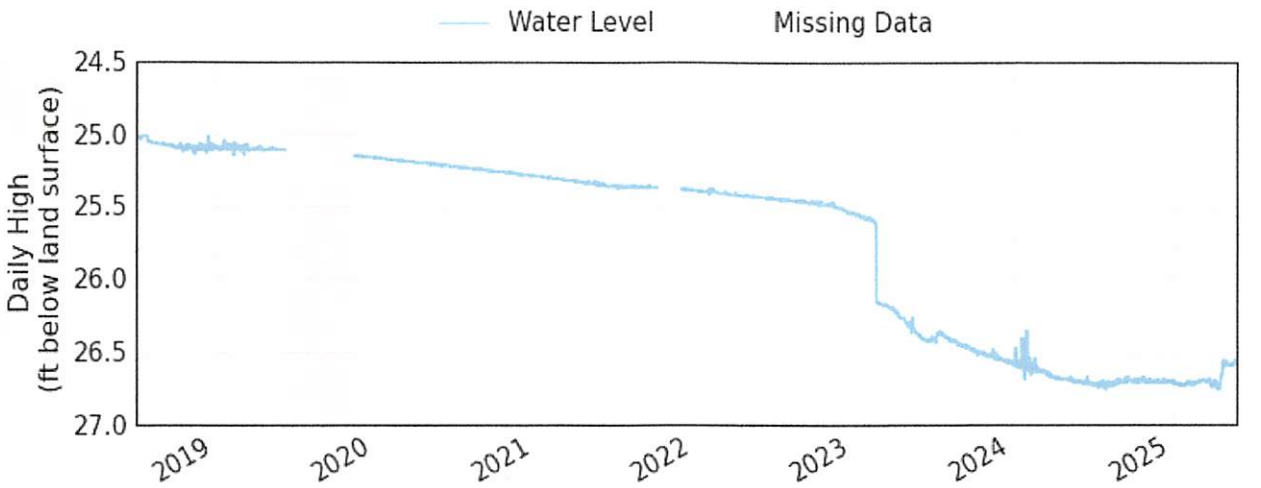
On Behalf of the Board of Directors,

Heather Sumpter

Heather Sumpter
GCGCD General Manager

Recd 10/9/2025 from T. Graham of GCGCD.

State Well Number 7938303 is 26.58 feet below land surface on 2025-05-27



30 Days	1 Year	Period of Record

Well Information

All data are provisional and subject to revision. The Texas Water Development Board (TWDB) specifically disclaims any and all liability for any claims or damages that may result from providing these data. For additional information, including water level and water quality data, search the TWDB Groundwater Database (GWDB). (http://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp)

County	Goliad
State Well Number	7938303
Status	Active
Period of Record	2018-06-29 to 2025-05-27
Entity/Cooperator	Texas Water Development Board
Aquifer	Gulf Coast
Formation	Goliad Sand
Aquifer Type	Unconfined
Well Depth (ft below land surface)	80.00

Rec'd 10/9/2025
from T. Graham
of G.C.G.C.D

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.**

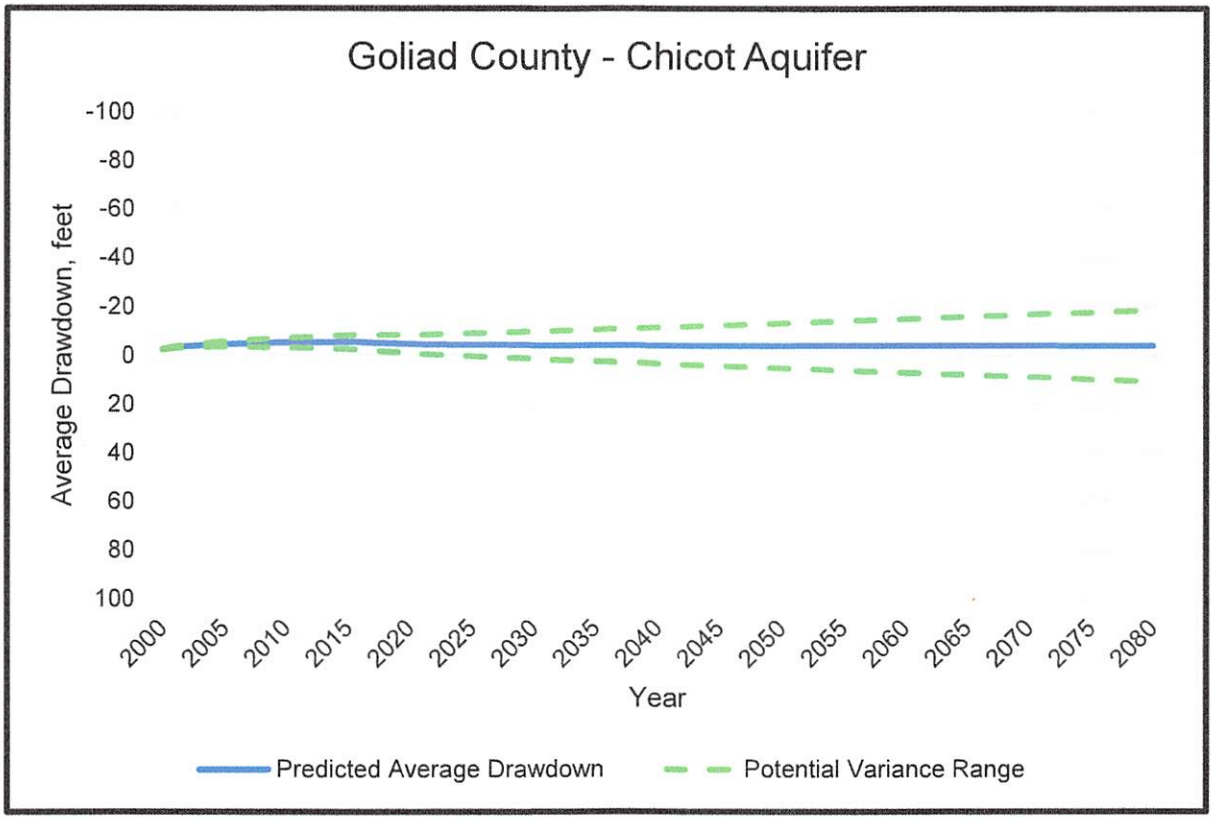
County	Chicot	Evangeline	Burkeville	Jasper	GCAS
Aransas	0.03	—	—	—	0.03
Bee	—	0.05	—	0.18	0.10
Calhoun	0.16	—	—	—	0.16
Colorado	0.14	0.42	—	1.14	0.49
De Witt	—	0.08	—	0.75	0.69
Fayette	—	—	—	0.88	0.88
Goliad	0.18	0.81	—	0.58	0.78
Jackson	0.74	0.69	—	—	0.70
Karnes	—	—	—	0.23	0.23
Lavaca	0.34	0.29	0.27	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**

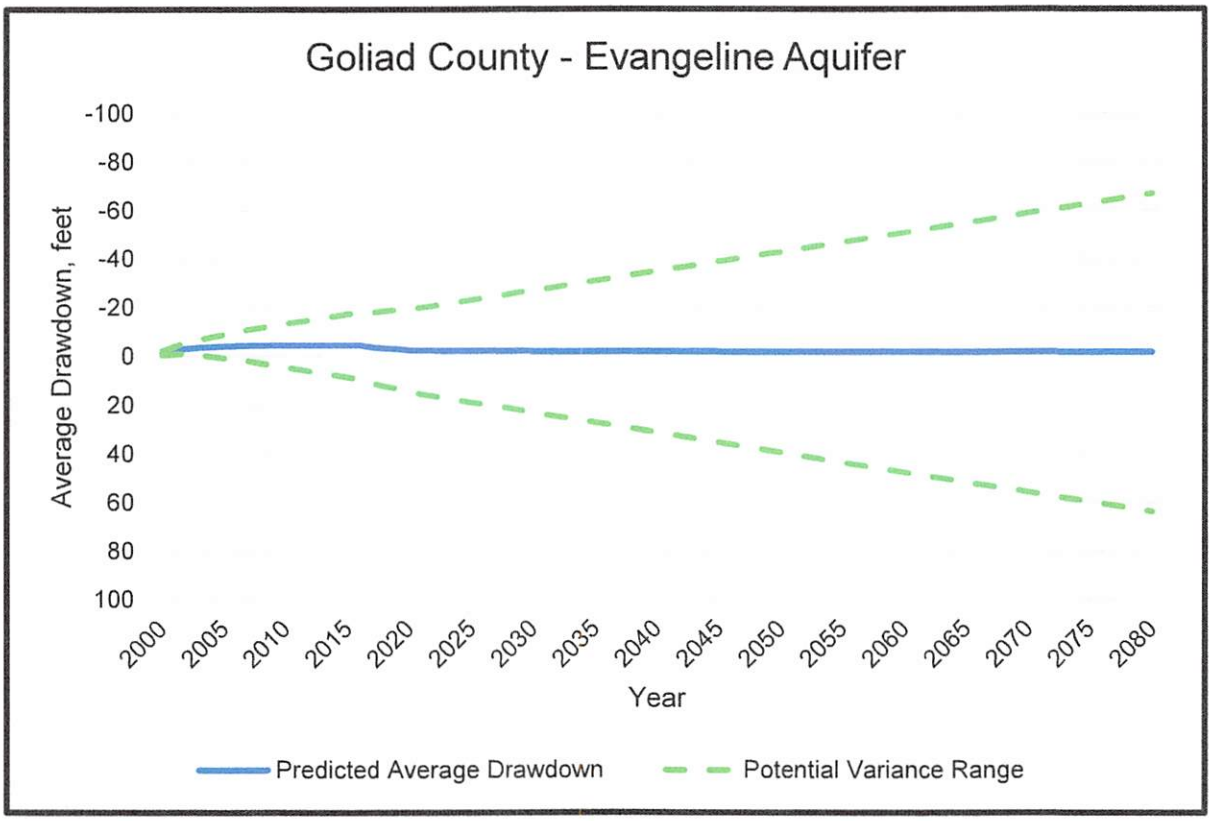
Table 2. **Average drawdown (feet) on 12/31/2080 from 01/01/2000 and the estimated variance (in parenthesis) calculated using the RMSE between the average measured water level trend and the simulated water level trend (Table 1). "—" indicates hydrogeologic unit is not present in the county. If RMSE was 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


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
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

Comparison of the Central Gulf Coast Aquifer System Groundwater Availability Model and the LRE re-calibrated Central Gulf Coast Aquifer System Groundwater Availability Model

Prepared by TWDB Groundwater Modeling Staff
October 10, 2024

Summary

TWDB Groundwater Modeling staff compared the central Gulf Coast Aquifer System groundwater availability model (Chowdhury and others 2004) to a recalibrated groundwater availability model for Goliad County Groundwater Conservation District (GCGCD) (Keester 2020) at the request of Mr. Terrell Graham of GCGCD.

The purpose of this comparison is to determine if the recalibrated model for GCGCD altered the inputs and outputs of model outside of Goliad County.

If the re-calibration efforts were constrained only to GCGCD, we would expect to see different budget values within GCGCD and very similar budget values outside of GCGCD. However, this is not the case. There are significant differences between the original TWDB model and the LRE re-calibrated model outside of GCGCD, mainly arising from the removal of the recharge package for the entire model domain.

Background

Chowdhury and others (2004) developed and calibrated the original TWDB central Gulf Coast Aquifer System groundwater availability model from pre-development (year 1910) through year 1999. In 2020, GCGCD contracted Mike Keester, formerly with LRE Water, for their re-calibration efforts to better match trends and water levels in GCGCD. The following changes were made in the re-calibration effort:

1) The recharge package was removed, with no recharge occurring within the entire model domain.
2) The hydraulic conductivity values were calibrated for the Evangeline aquifer using PEST++ (Welter and others, 2015), with pilot points resulting in one base recalibration and 100 alternative realizations of the recalibrated model.
3) The hydraulic conductivity modifications were limited to Goliad County and “a zone extending approximately three to five miles beyond the county boundary.” (Keester, 2020).

Mr. Terrell Graham of GCGCD requested that the TWDB assess the recalibrated model on April 11, 2024 at the Groundwater Management Area 15 meeting to determine if the

re-calibration was constrained only to GCGCD or if it impacted the rest of the counties in the model domain. The TWDB used the median realization of the recalibrated model to compare the budget results of the original TWDB Central Gulf Coast Aquifer System groundwater availability model with the LRE re-calibrated model.

Results

The attached figures (Appendix A) show a water budget component comparison for every model layer summarizing the results within GCGCD, outside of GCGCD, and for the entire model domain. For each of the components listed below, the TWDB compared budget values in acre-feet per year between 1981 and 1999 for the original TWDB model and the LRE re-calibrated model.

Simulated pumping: Figures 1 through 3 show there is little difference in simulated pumping budget values. There is a small difference in pumping outside of the district in Layer 3 (Burkeville confining unit).

Simulated recharge: Figures 4 through 6 show the simulated recharge budget values. Within GCGCD, the LRE re-calibrated model simulates up to 15,000 acre-feet less in Layer 1 and 12,000 acre-feet less in Layer 2. Outside of GCGCD, the LRE re-calibrated model simulates up to 350,000 acre-feet less in Layer 1 and 70,000 acre-feet less in Layer 2.

Simulated river leakage: Figures 7 through 9 show the simulated river leakage budget values. There are slight differences between the original TWDB model and the LRE re-calibrated model.

Simulated stream leakage: Figures 10 through 12 show the simulated stream leakage budget values. Within GCGCD, the LRE re-calibrated model simulates up to approximately 15,000 acre-feet more in layers 1 and 2. Outside of GCGCD, the LRE re-calibrated model simulates over 380,000 acre-feet more in Layer 1, over 50,000 acre-feet more in Layer 2, and 500 acre-feet more in layers 3 and 4.

Simulated evapotranspiration: Figures 13 through 15 show the simulated evapotranspiration budget values. Within GCGCD, there are only slight differences. Outside of GCGCD, the LRE re-calibrated model simulates over 10,000 acre-feet less in Layer 1, approximately 2,000 acre-feet less in Layer 2, and slight differences in layers 3 and 4.

Simulated drains: Figures 16 through 18 show the simulated drains budget values. There is very little difference within and outside of GCGCD.

Simulated head dependent boundaries: Figures 19 through 21 show the simulated head dependent boundaries budget values. Outside of GCGCD, the LRE re-calibrated model simulates up to 30,000 acre-feet less in Layer 1.

Simulated storage: Figures 22 through 24 show the simulated storage budget values. Outside of GCGCD, the LRE re-calibrated model simulates up to 10,000 acre-feet more in layers 3 and 4.

Simulated constant head: Figures 25 through 27 show the simulated constant head budget values. This budget component is zero for both models.

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.

Keester, M., 2020, GCGCD Model Recalibration for Drawdown Assessment dated October 20, 2020, 159 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, book 7, chap. C12, 54 p., http://dx.doi.org/10.3133/tm7C12.

Appendix A



Figure 1. Simulated wells within Goliad County Groundwater Conservation District.

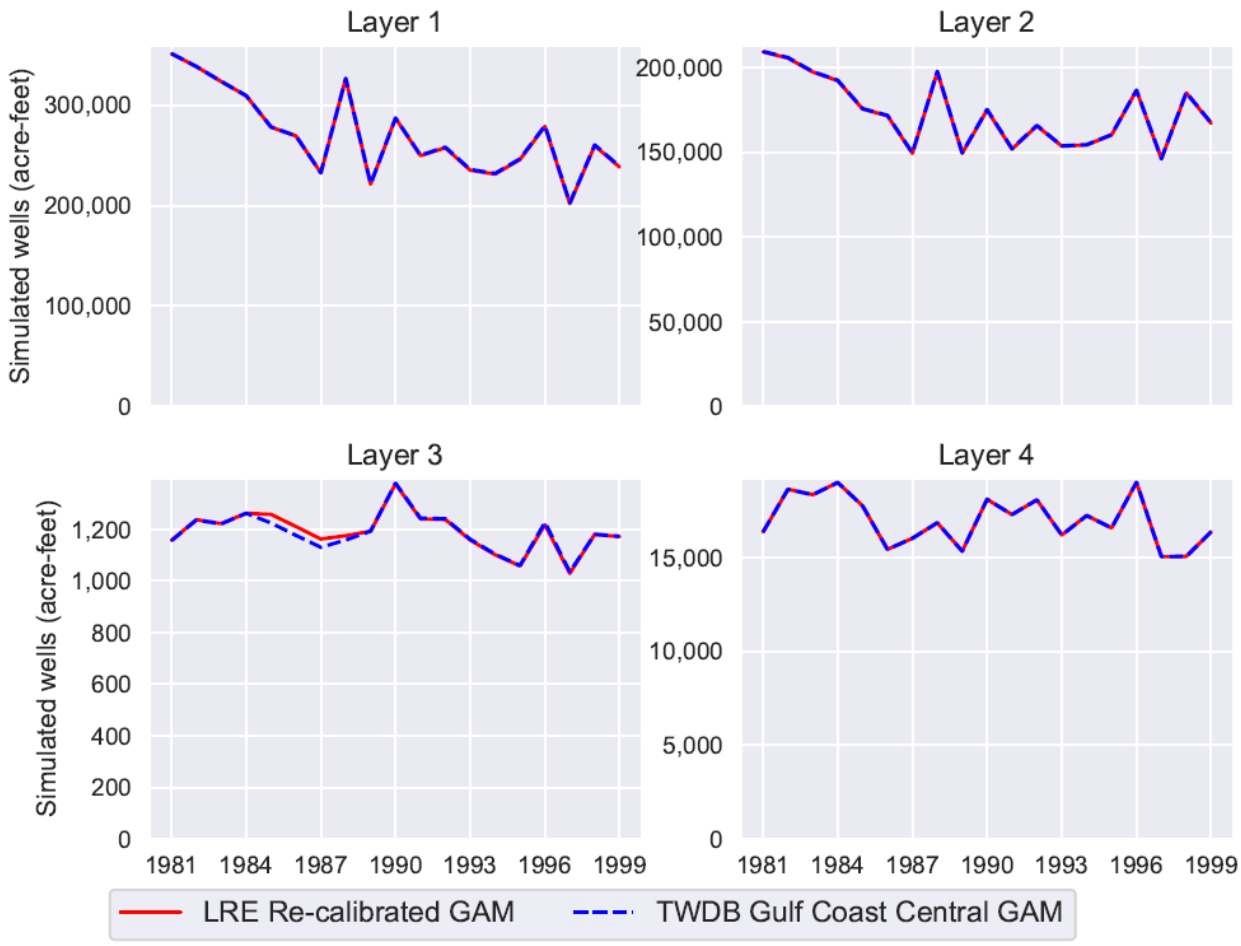


Figure 2. Simulated wells outside Goliad County Groundwater Conservation District.

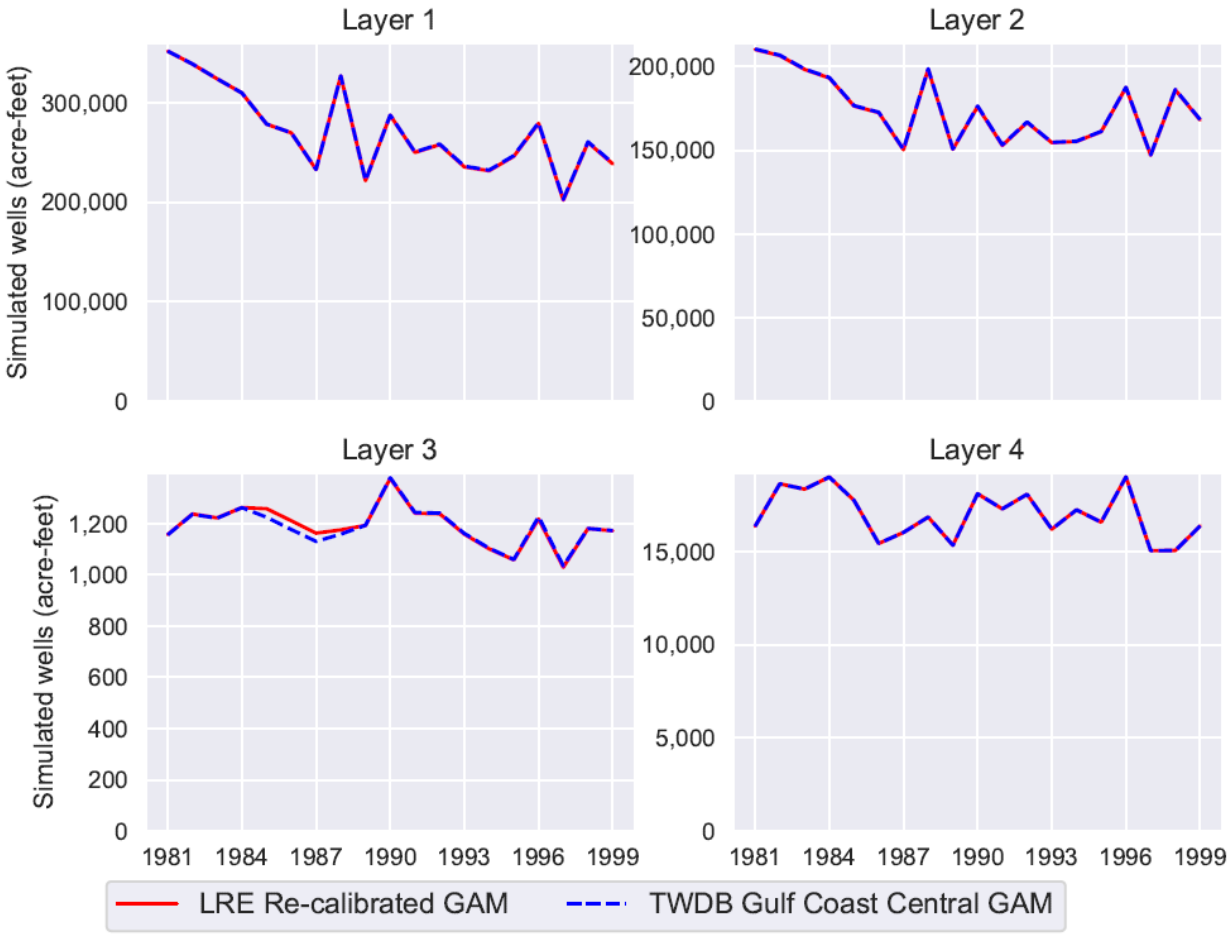


Figure 3. Simulated wells for the entire model domain.



Figure 4. Simulated recharge within Goliad County Groundwater Conservation District.

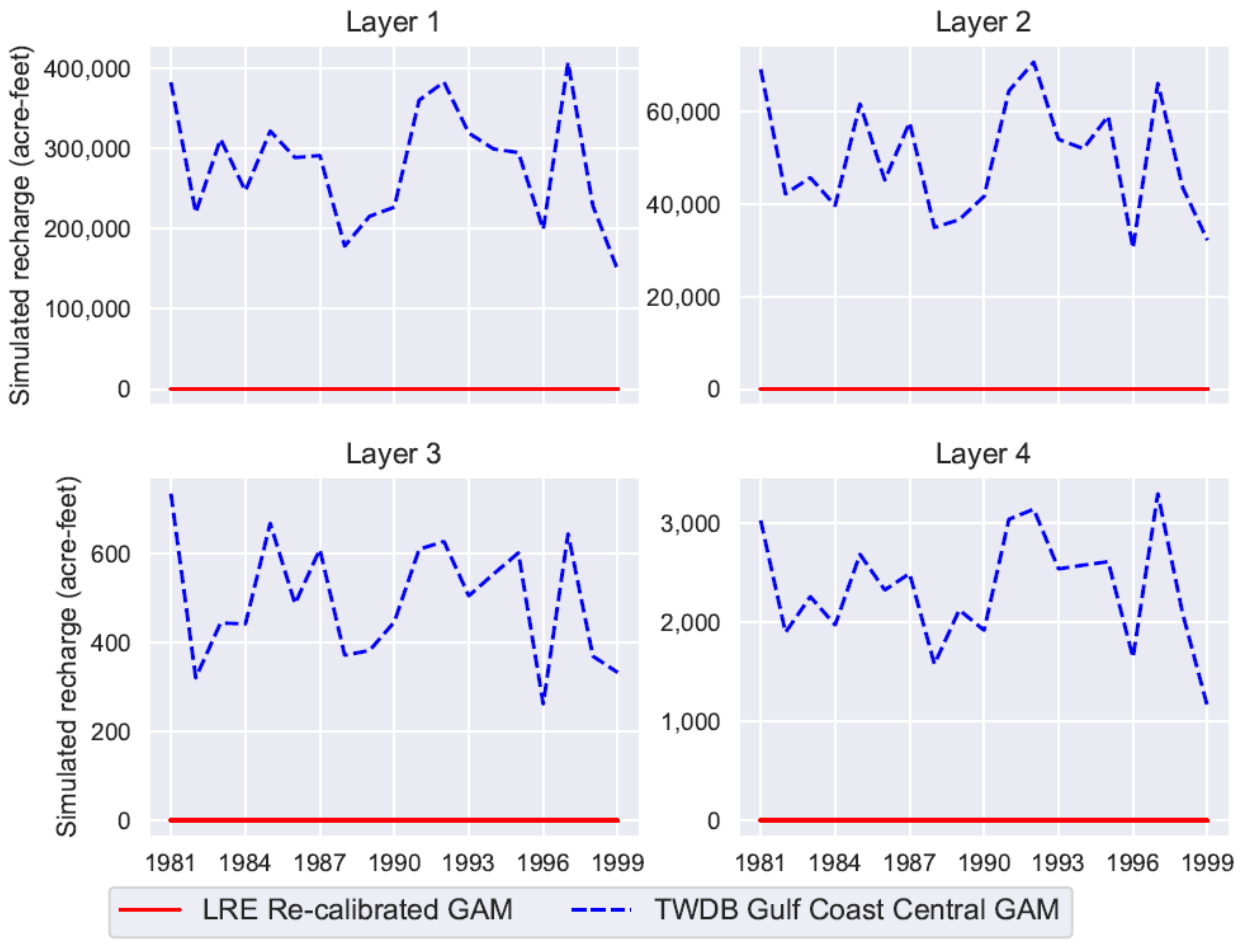


Figure 5. Simulated recharge outside Goliad County Groundwater Conservation District.

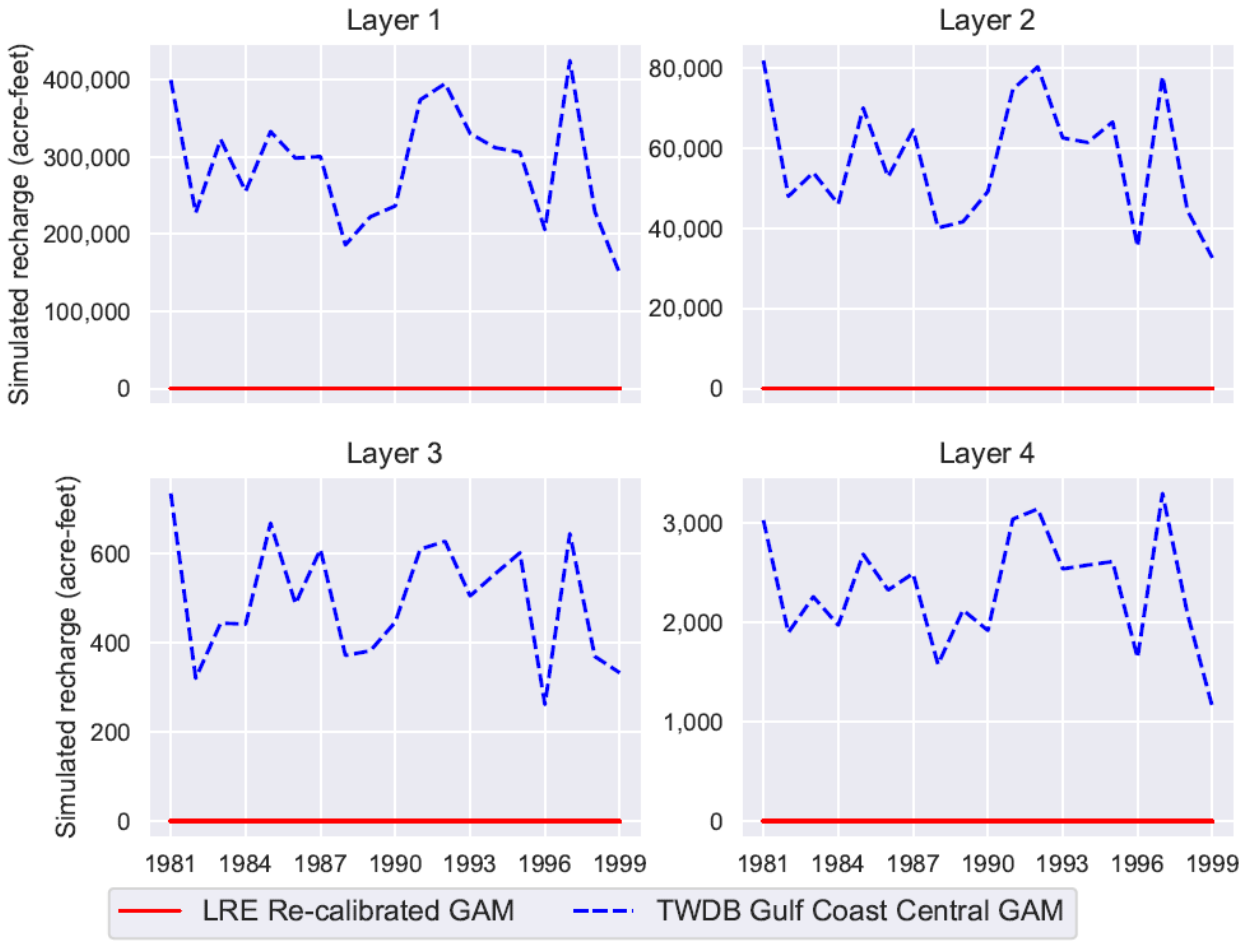


Figure 6. Simulated recharge for entire model domain.

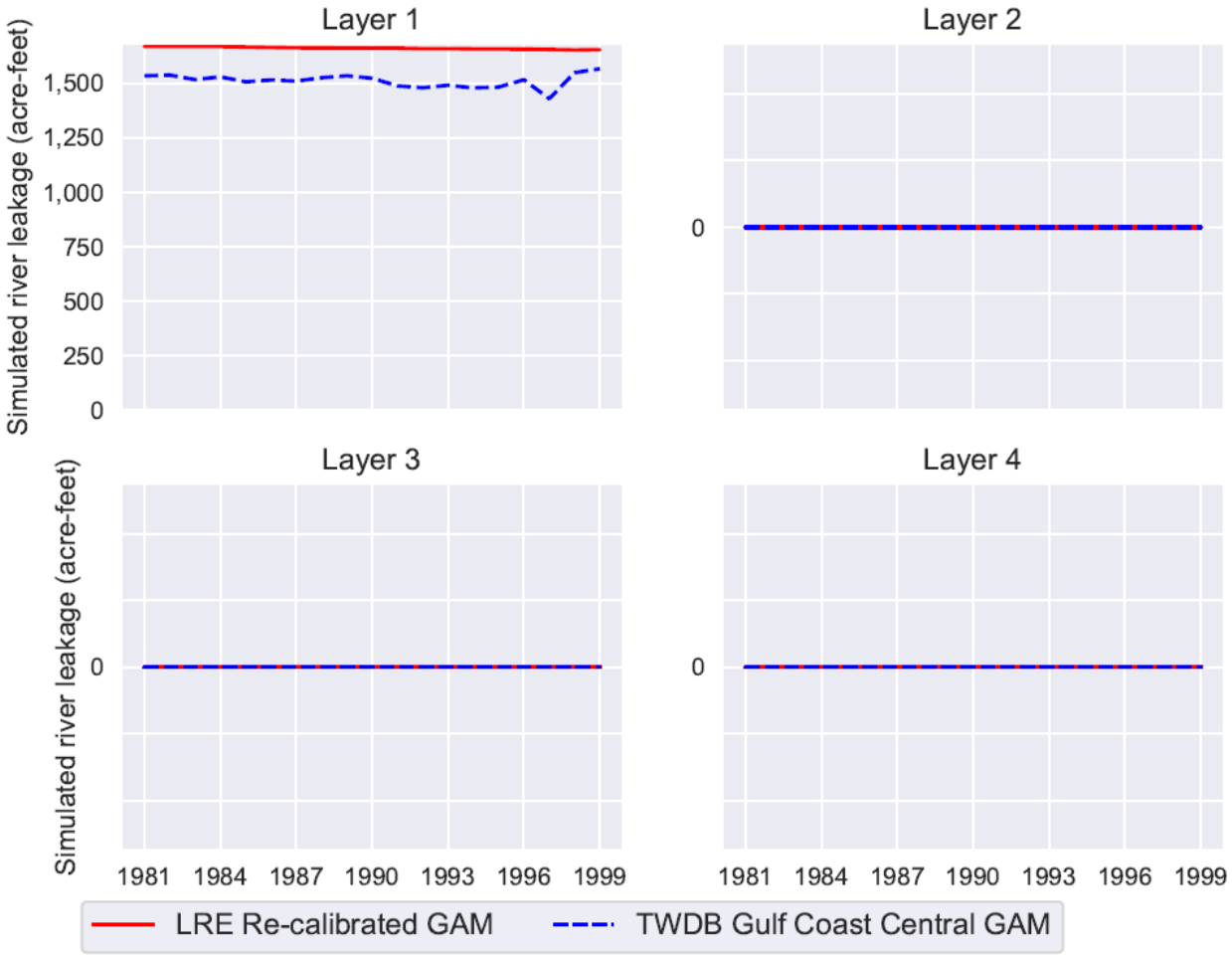


Figure 7. Simulated river leakage within Goliad County Groundwater Conservation District.

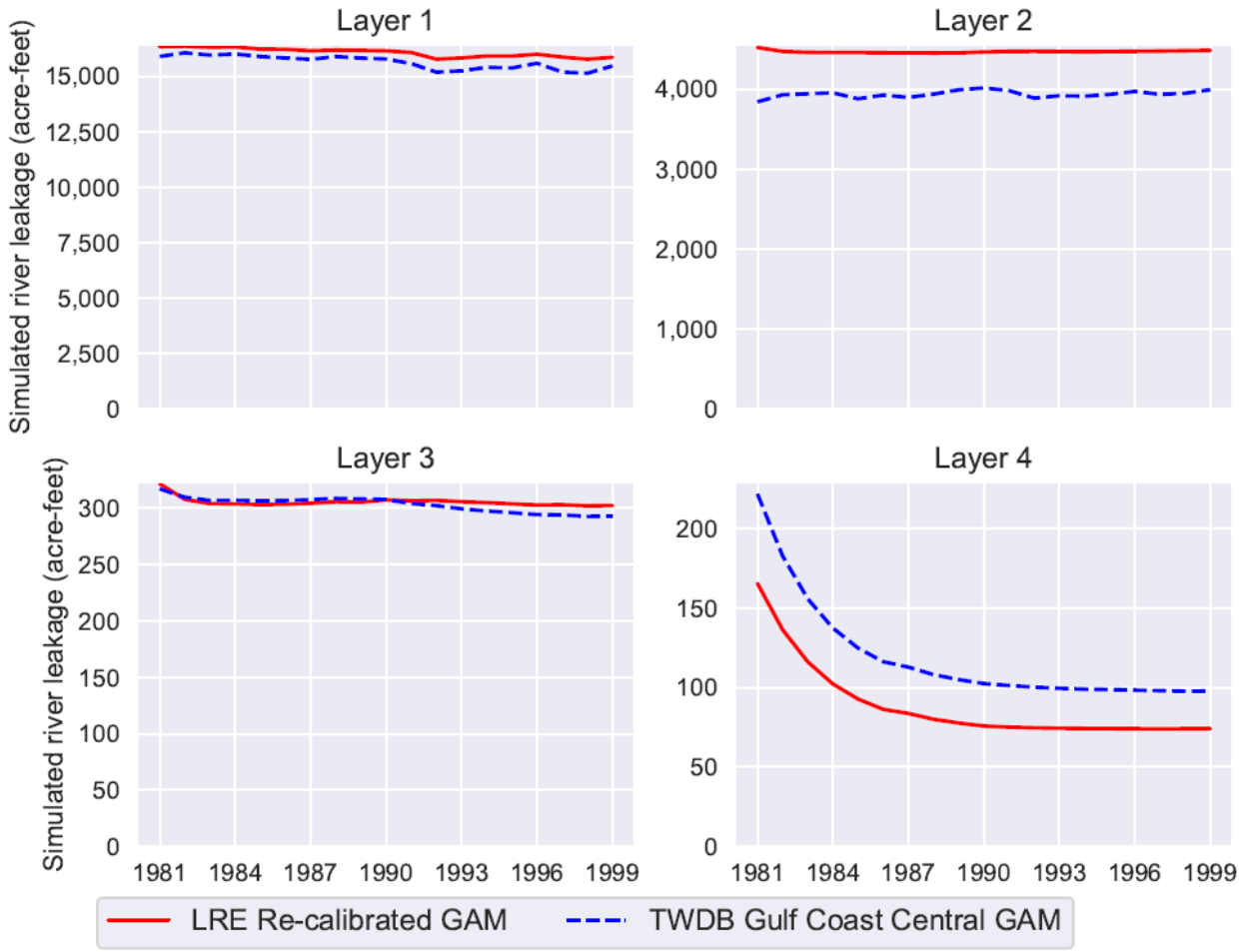


Figure 8. Simulated river leakage outside Goliad County Groundwater Conservation District.

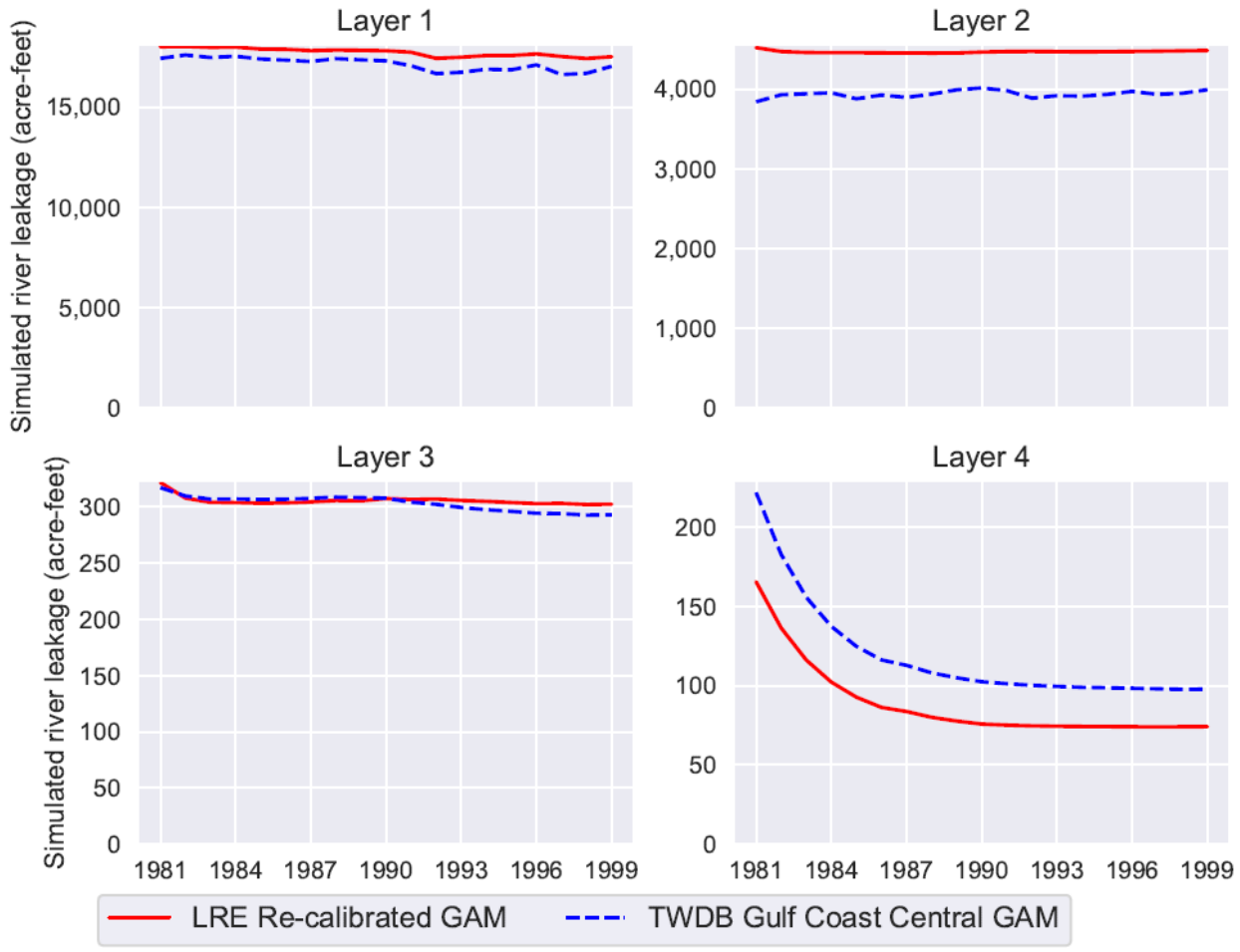


Figure 9. Simulated river leakage for entire model domain.

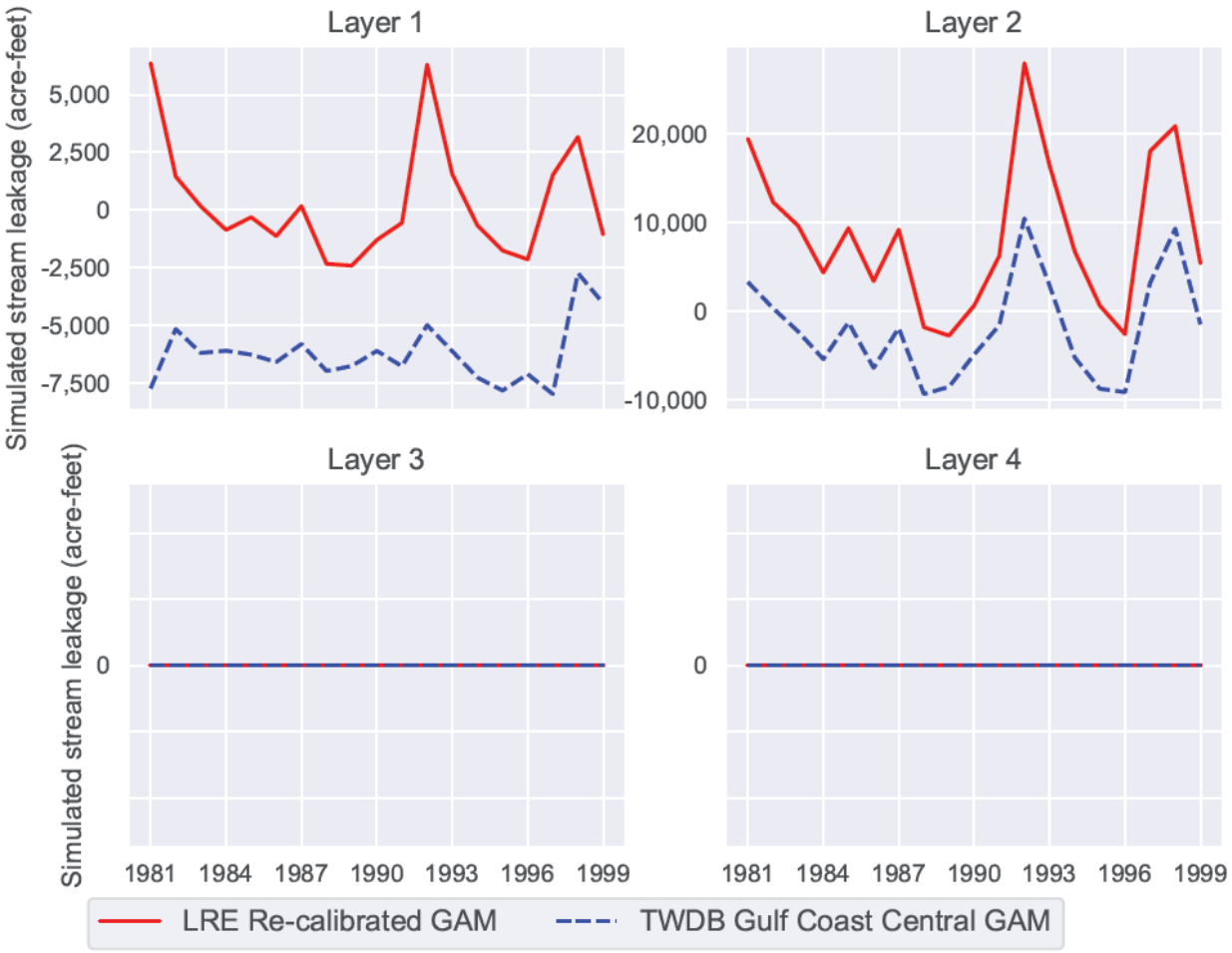


Figure 10. Simulated stream leakage within Goliad County Groundwater Conservation District.

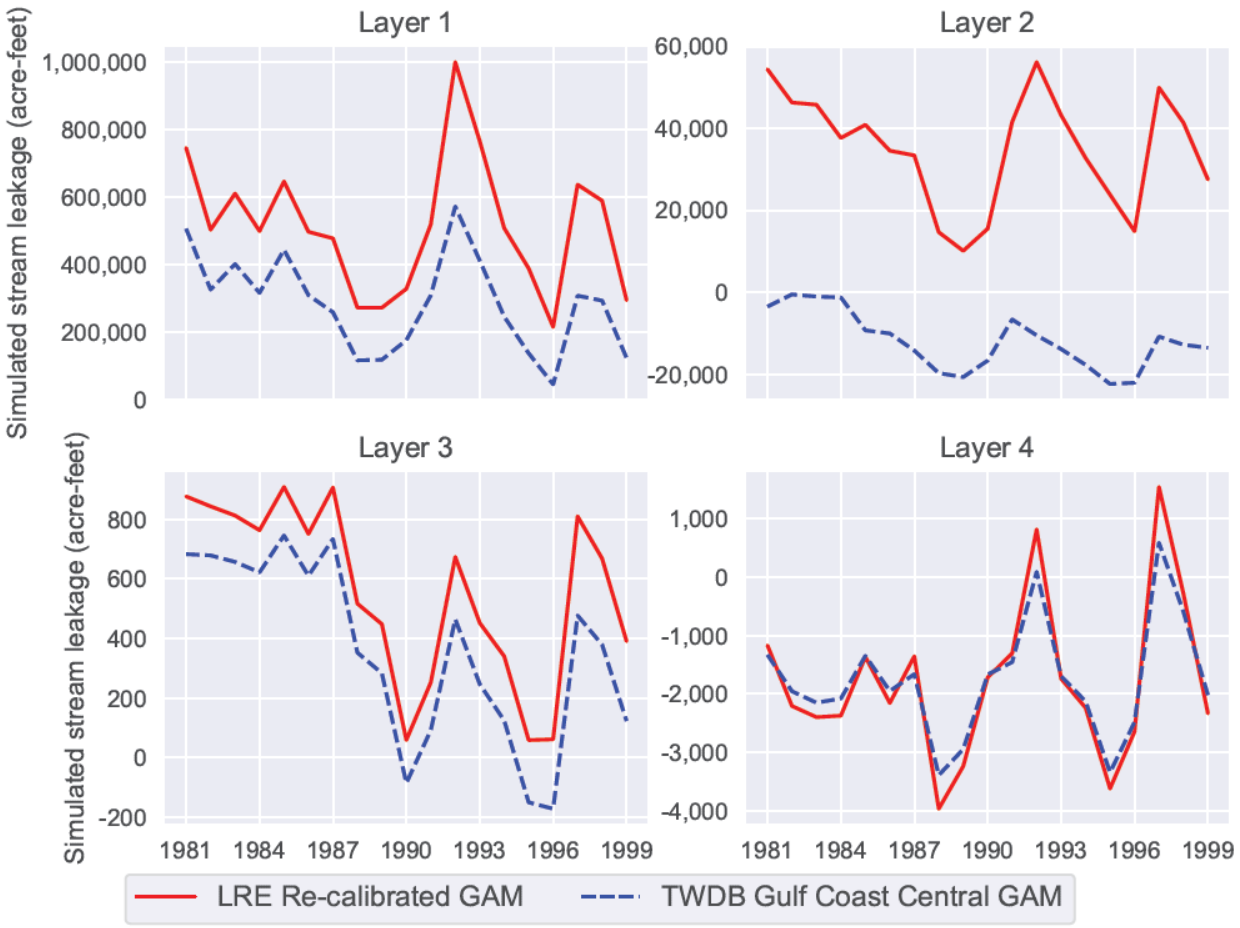


Figure 11. Simulated stream leakage outside Goliad County Groundwater Conservation District.

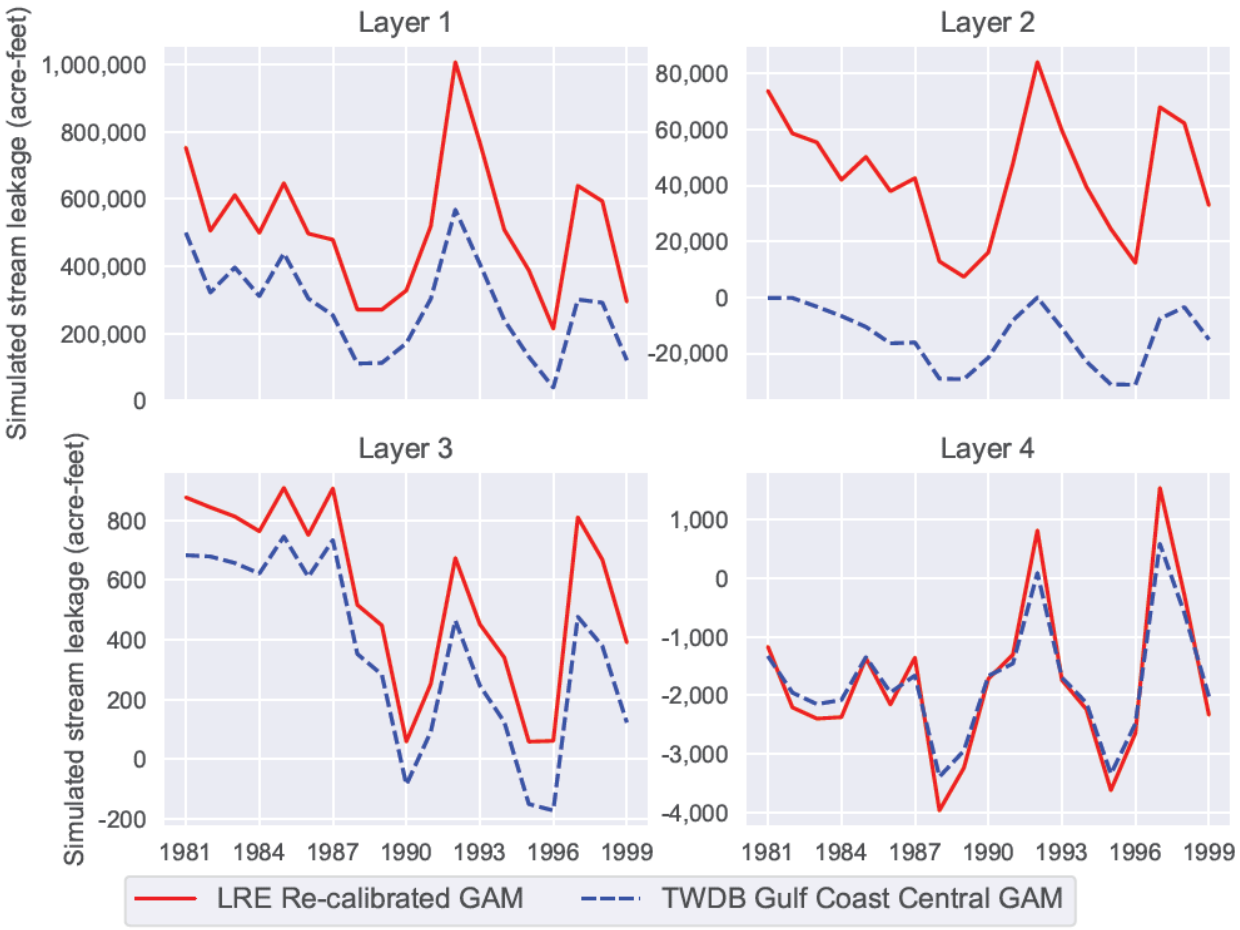


Figure 12. Simulated stream leakage for entire model domain.

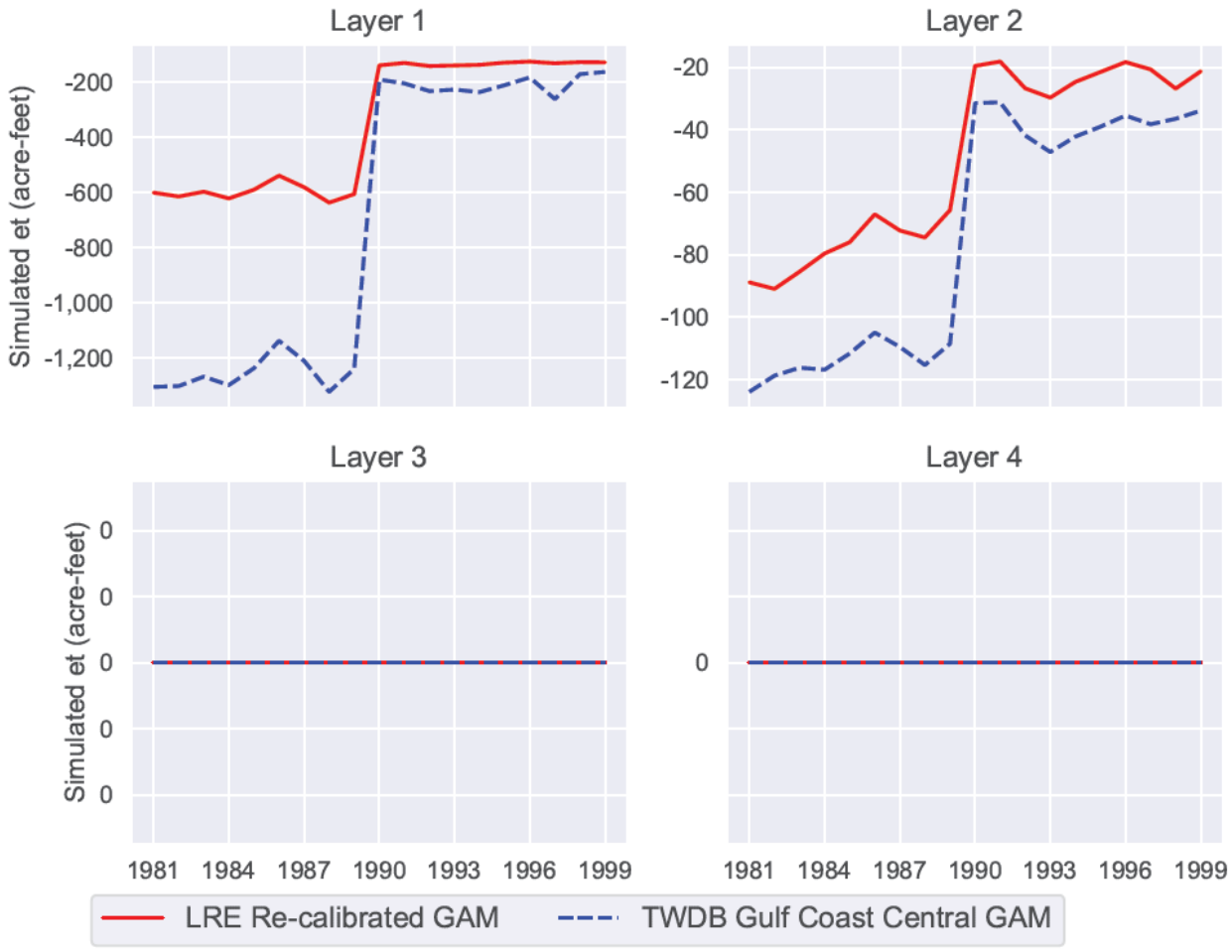


Figure 13. Simulated evapotranspiration within Goliad County Groundwater Conservation District.

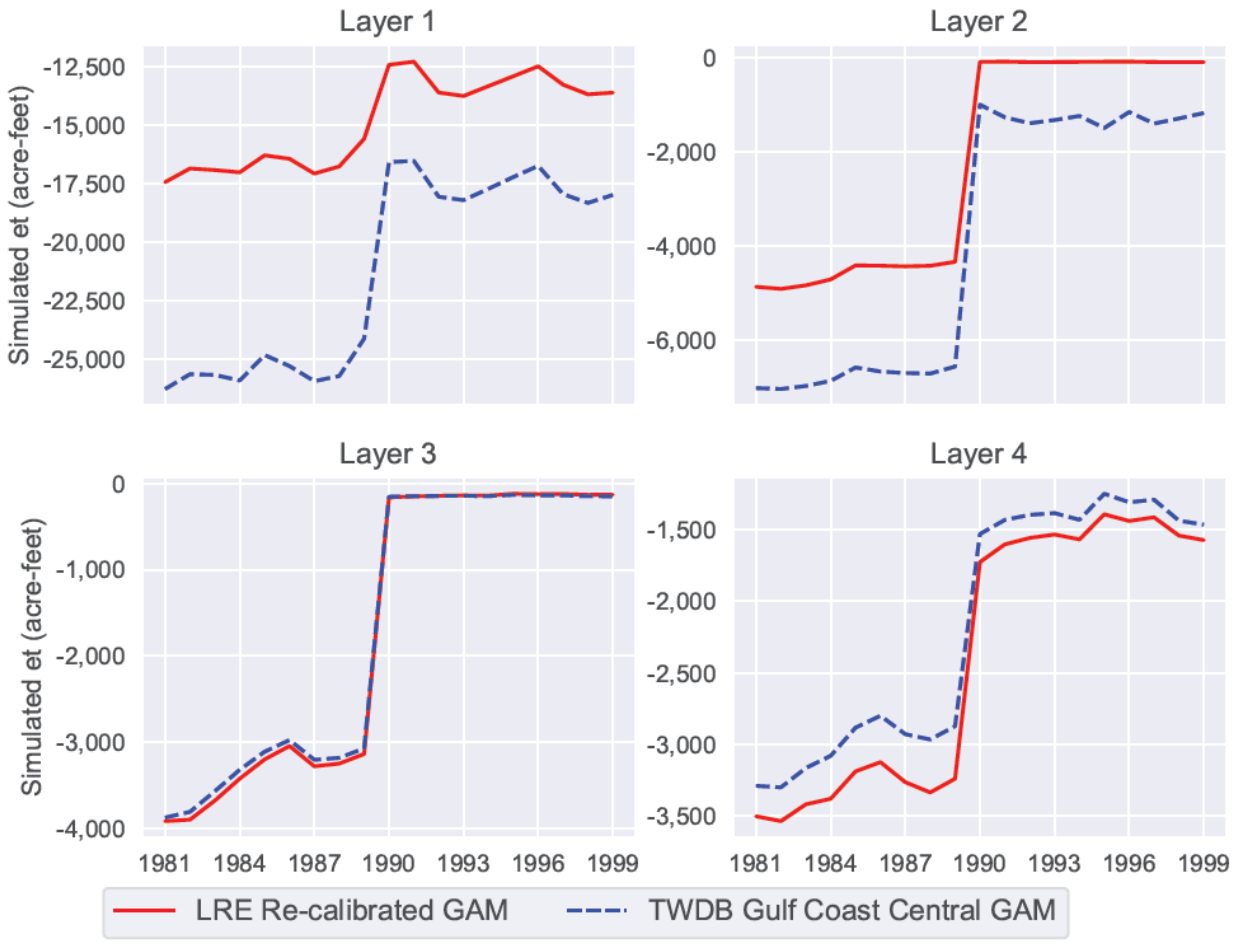


Figure 14. Simulated evapotranspiration outside Goliad County Groundwater Conservation District.

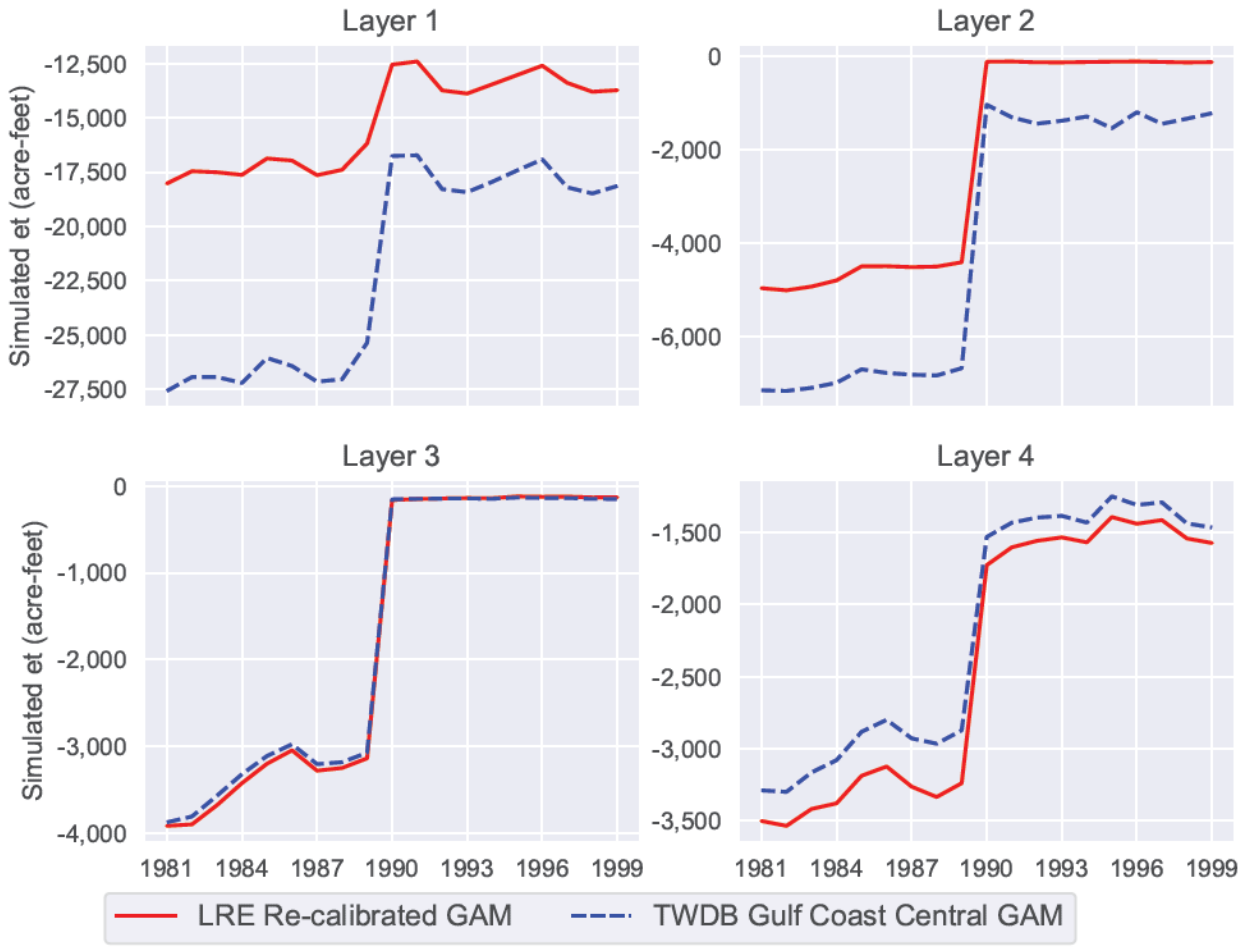


Figure 15. Simulated evapotranspiration for entire model domain.

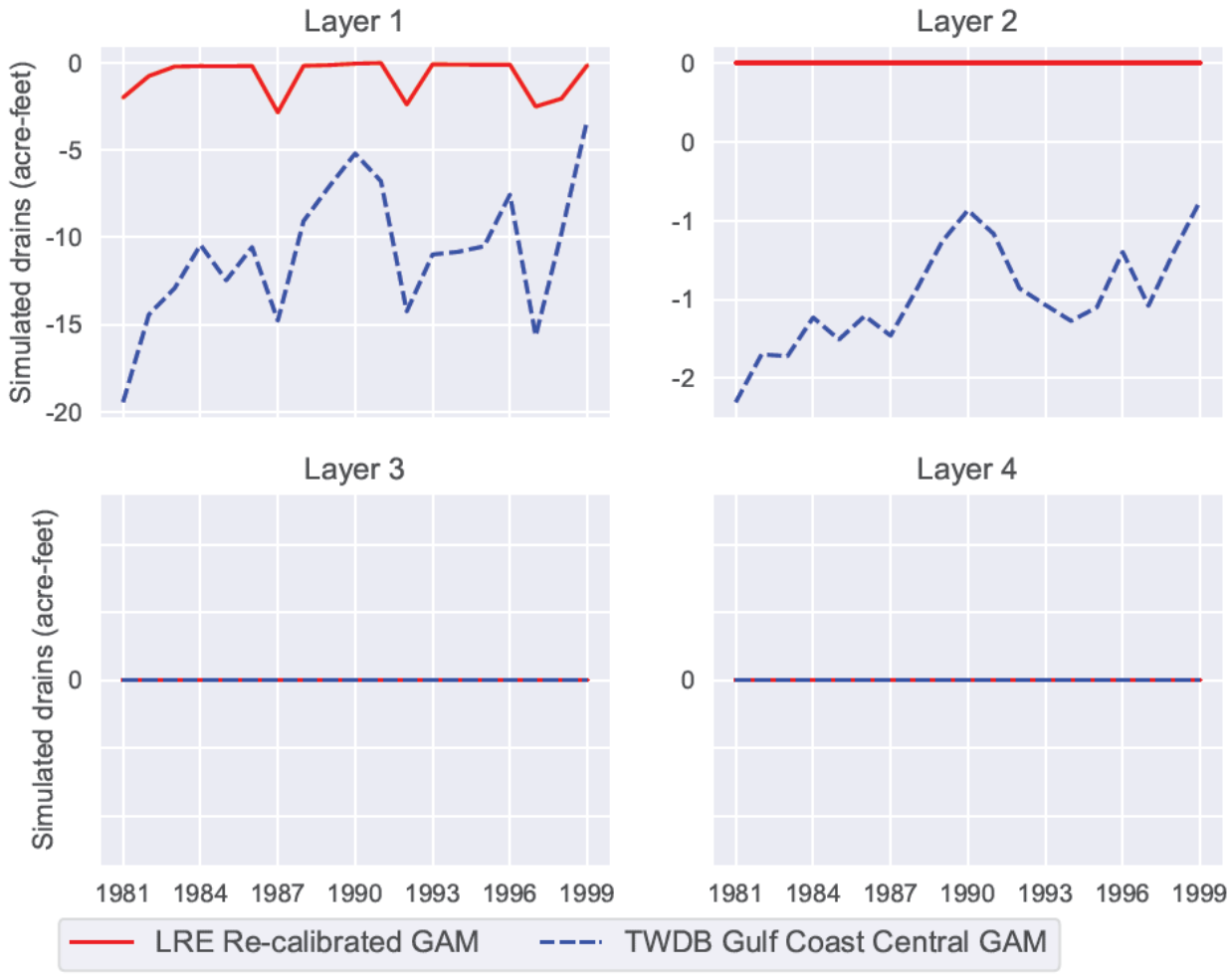


Figure 16. Simulated drains within Goliad County Groundwater Conservation District.

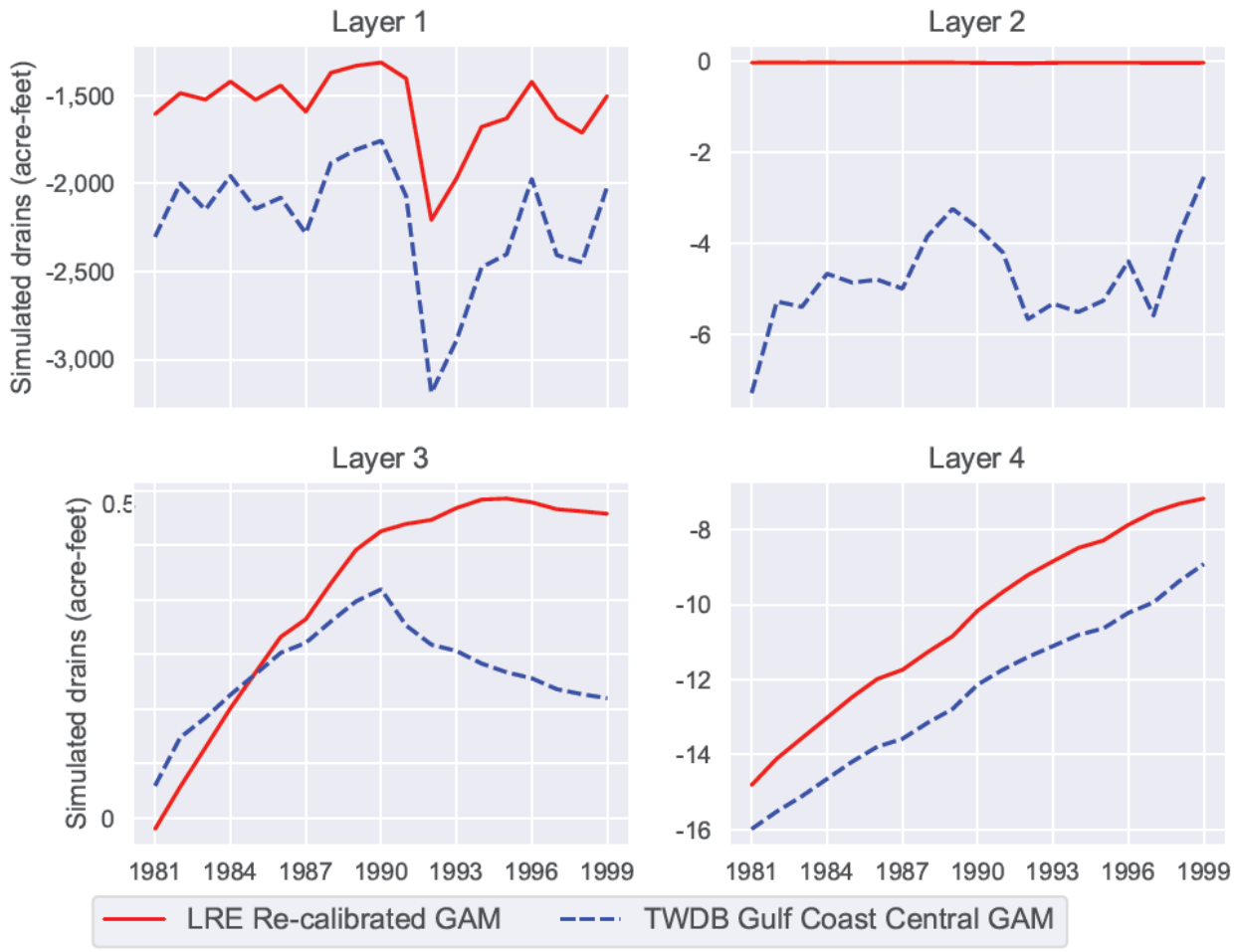


Figure 17. Simulated drains outside Goliad County Groundwater Conservation District.

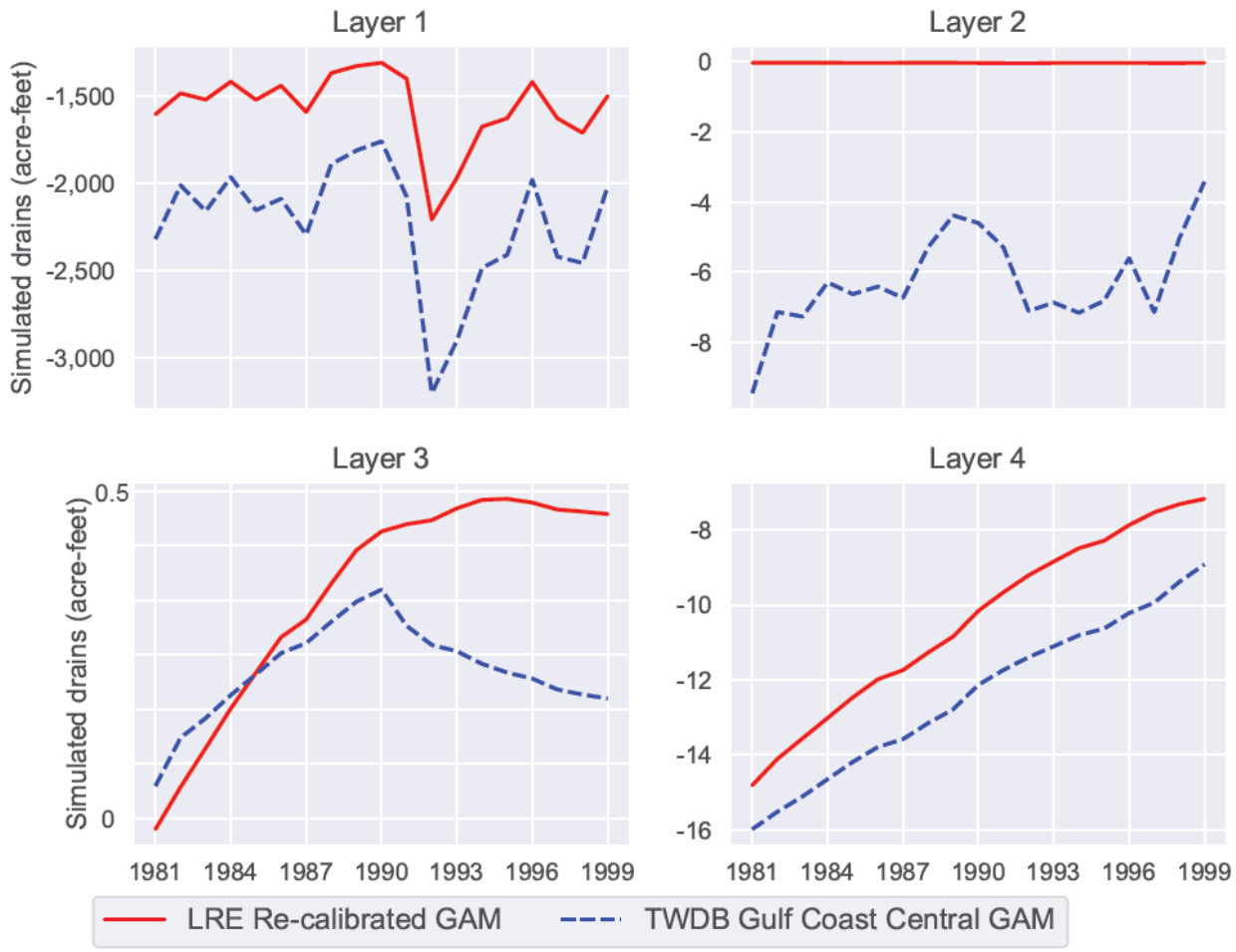


Figure 18. Simulated drains for entire model domain.

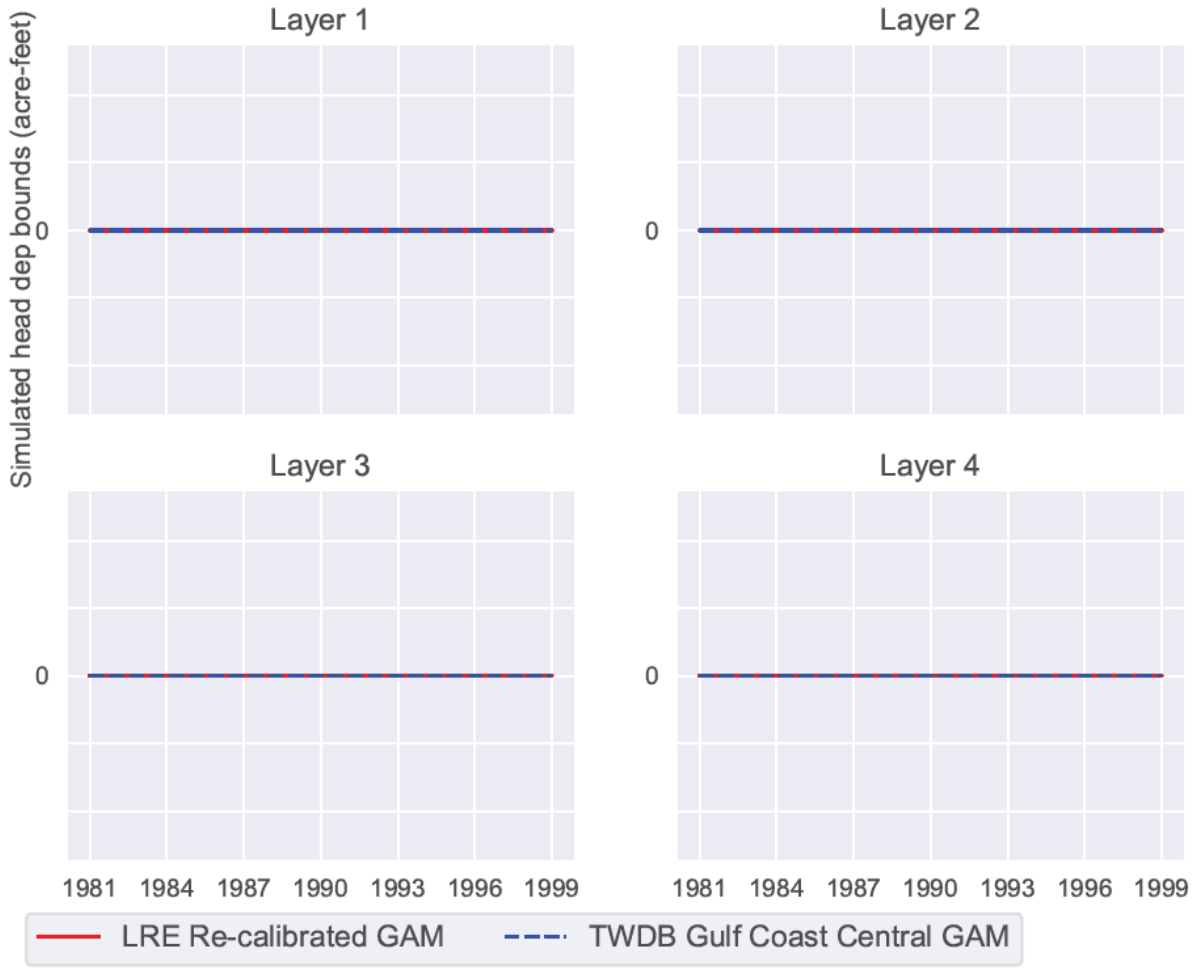


Figure 19. Simulated head dependent bounds within Goliad County Groundwater Conservation District.

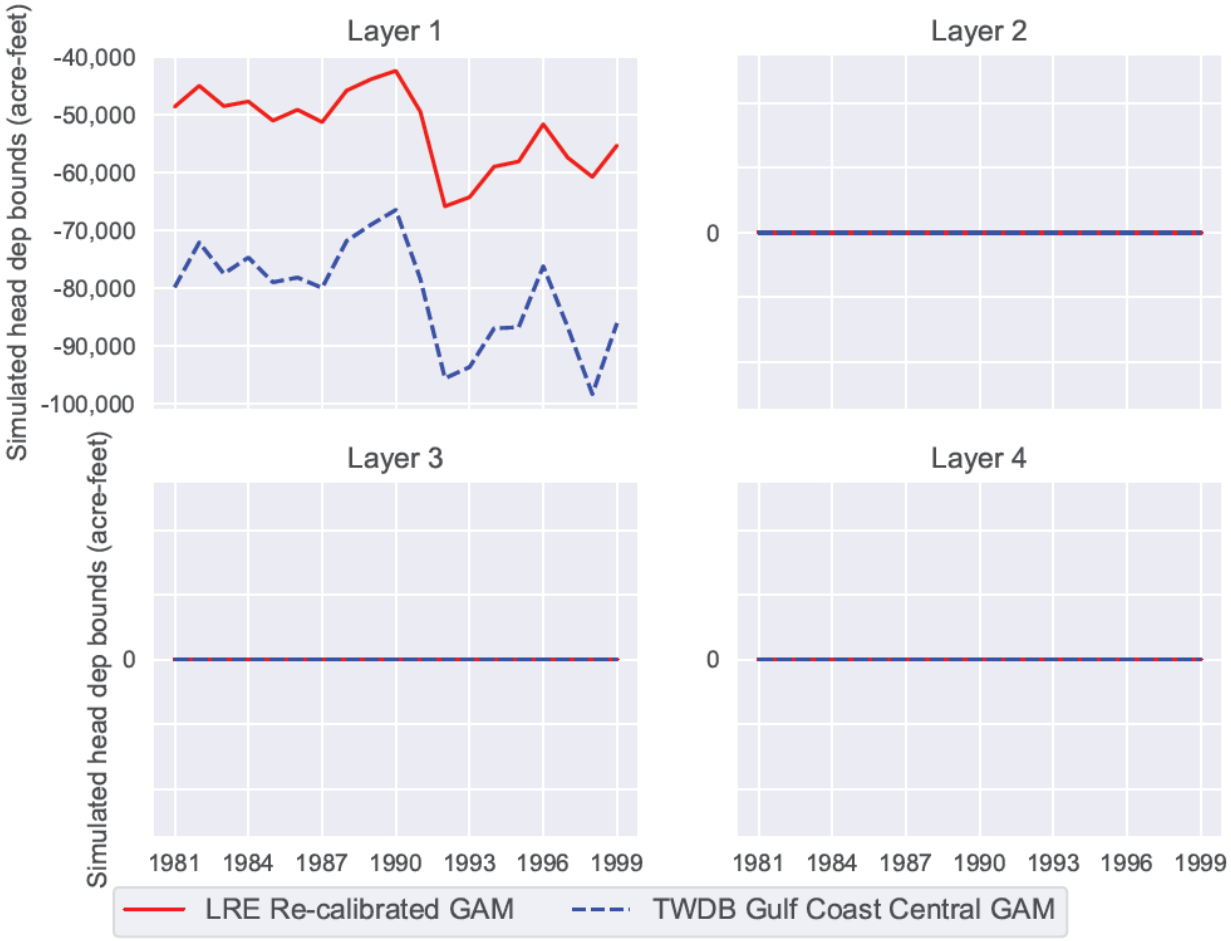


Figure 20. Simulated head dependent bounds outside Goliad County Groundwater Conservation District.

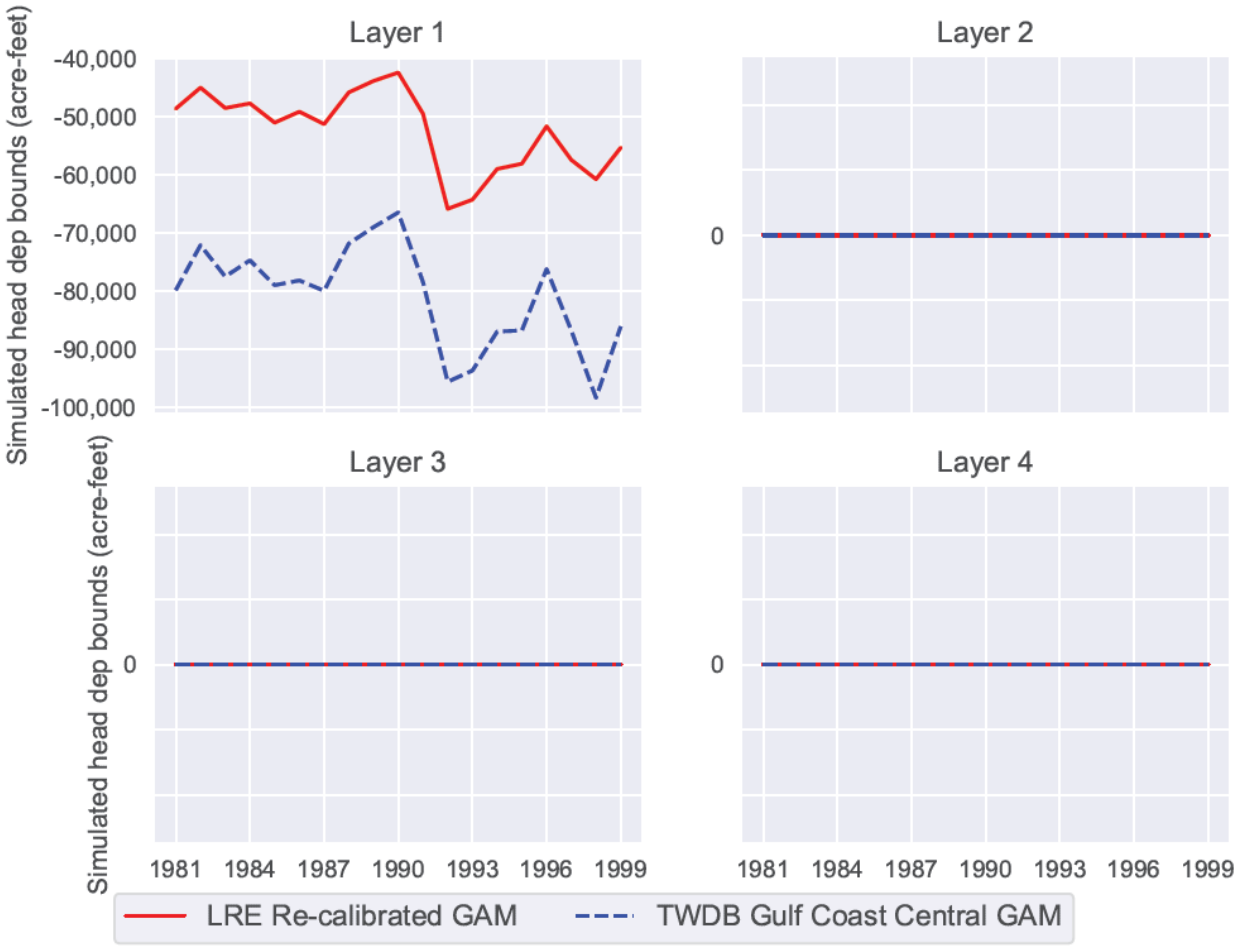


Figure 21. Simulated head dependent bounds for entire model domain.

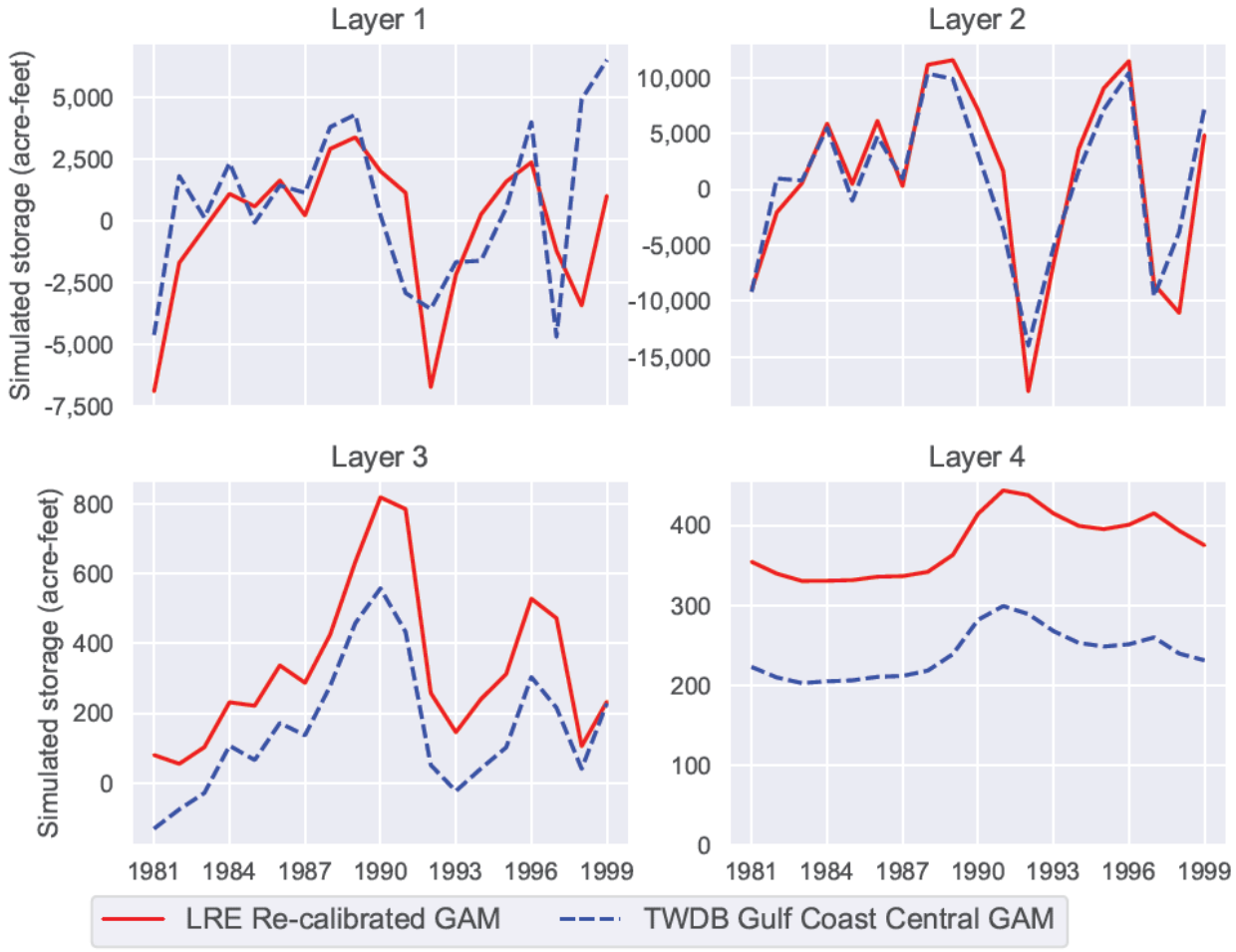


Figure 22. Simulated storage within Goliad County Groundwater Conservation District.

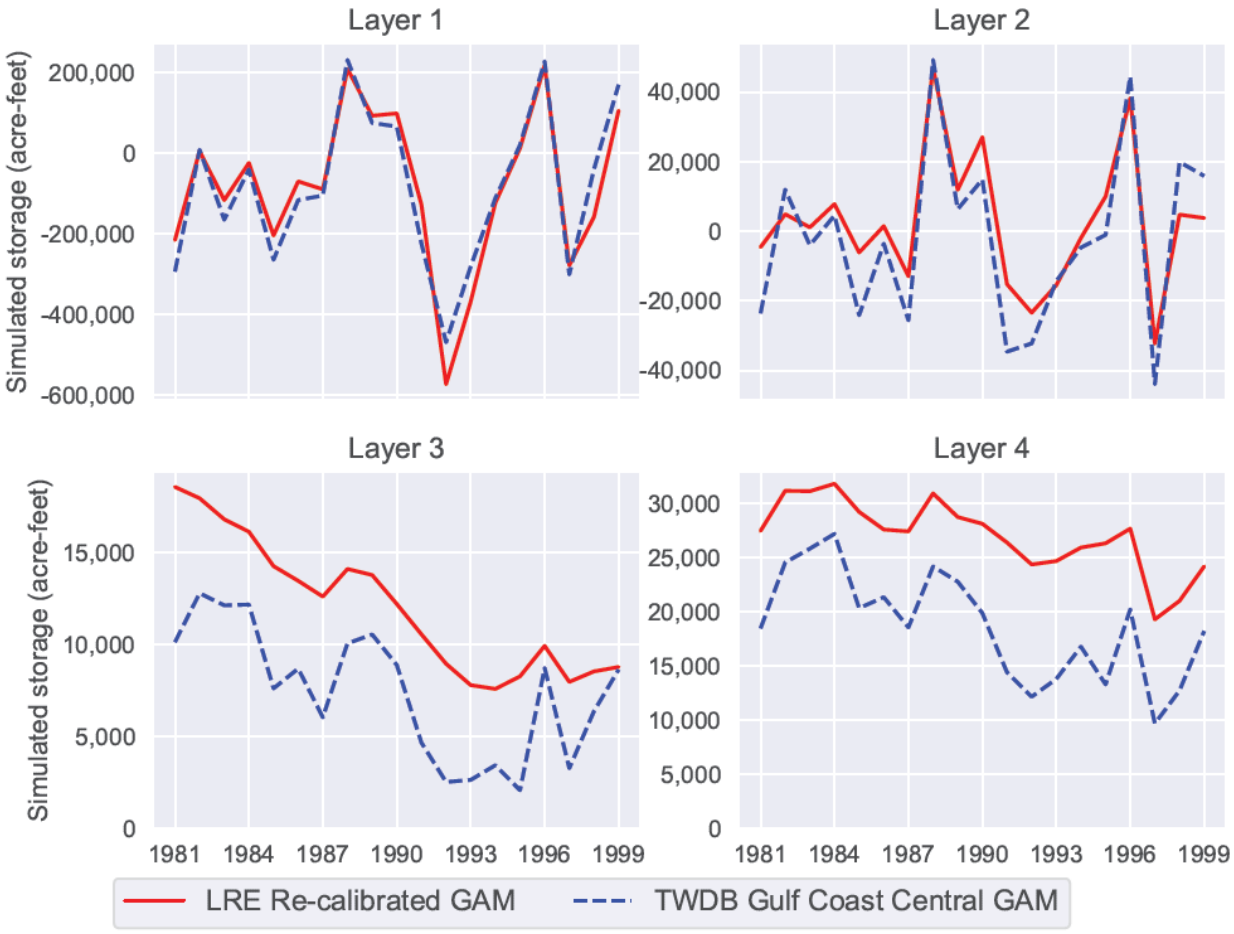


Figure 23. Simulated storage outside Goliad County Groundwater Conservation District.

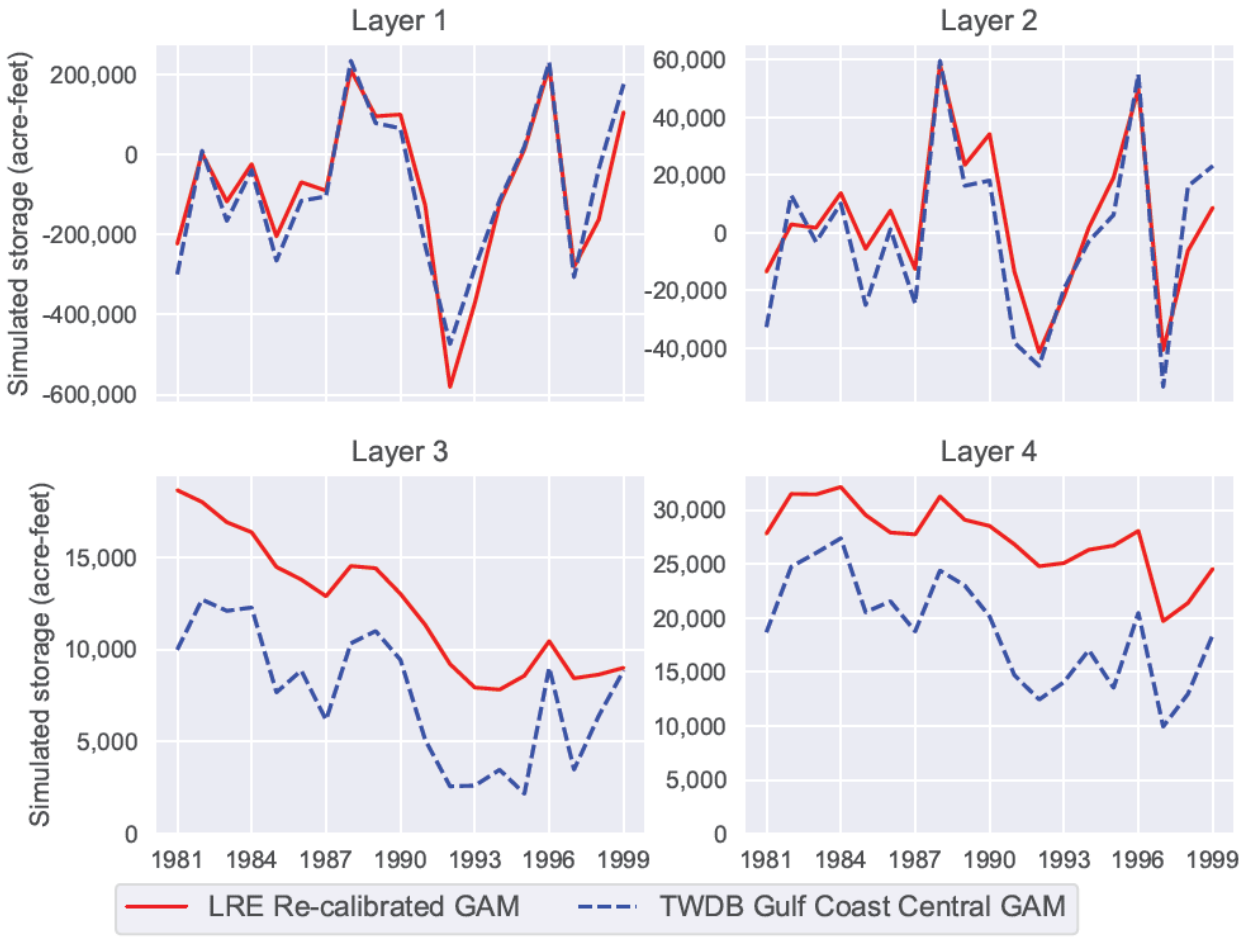


Figure 24. Simulated storage for entire model domain.

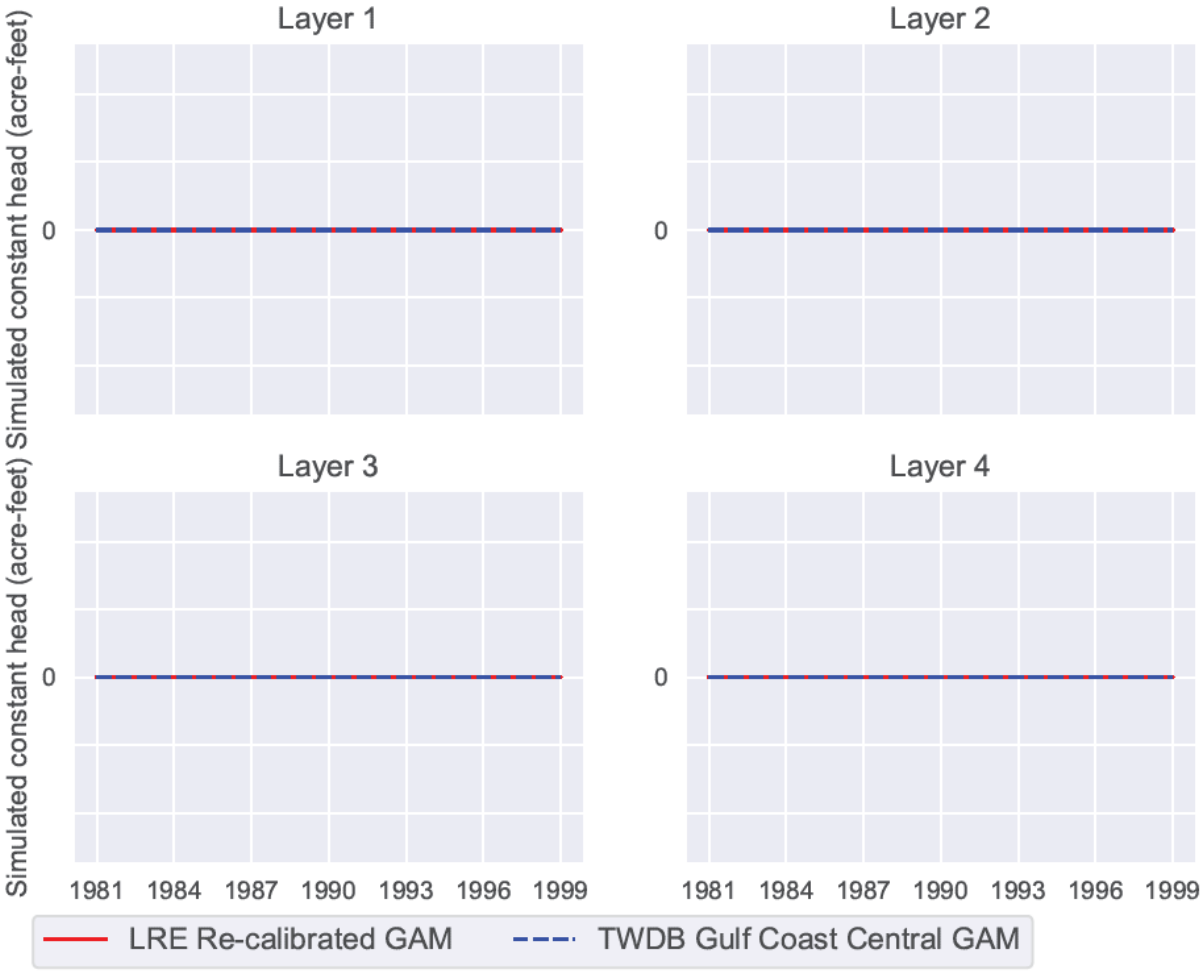


Figure 25. Simulated constant head within Goliad County Groundwater Conservation District.

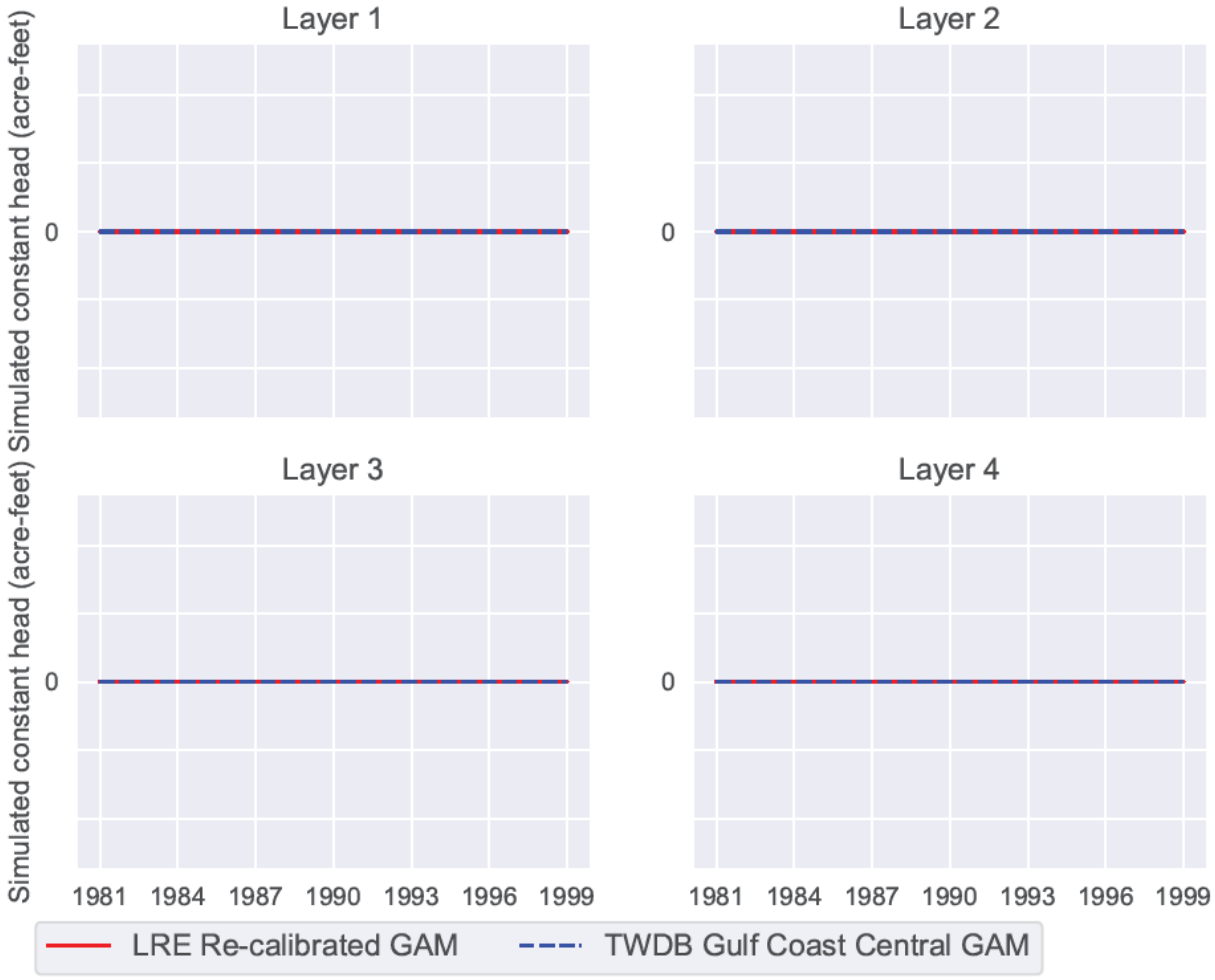


Figure 26. Simulated constant head outside Goliad County Groundwater Conservation District.

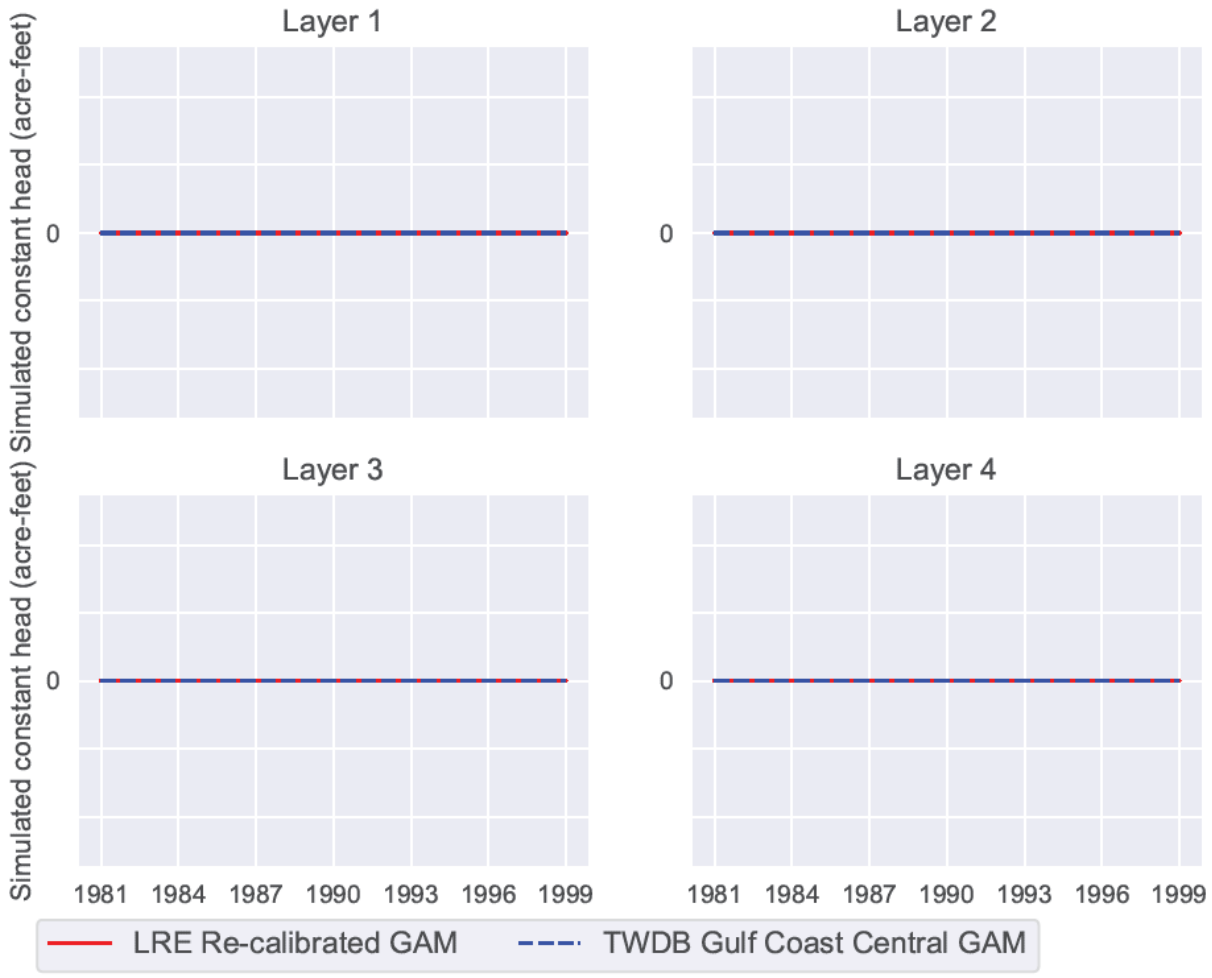


Figure 27. Simulated constant head for entire model domain.

Appendix F

Presentations for the Consideration of Factors

F.1 Aquifer Uses and Conditions

GMA 15
Discussion of Nine Factors in TWC 36.108(d): Aquifer Use & Conditions

Groundwater Management Area 15

April 10, 2025



Presented by:
Steven Young Ph.D, PE, PG
Nick Lamkey PG

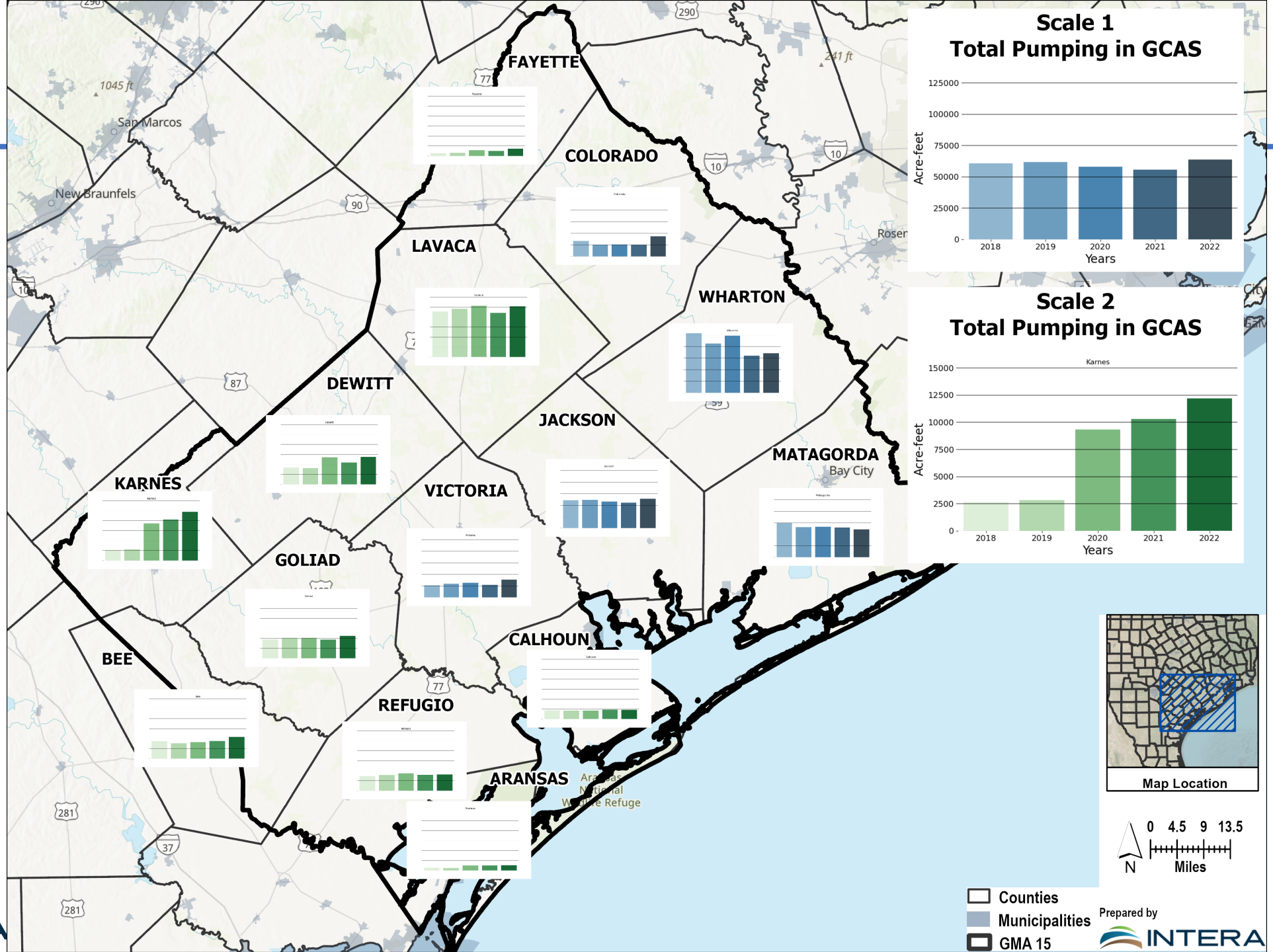
Agenda

- Water Use
  - Amount
  - Type
- Wells
  - Numbers
  - Water Use
  - Aquifer

Aquifer Uses in GMA 15

- Aquifer uses and capacity differ substantially across GMA 15
- Generally, aquifer capacity increases to the northeast and decrease to the southwest
  - Capacity also increases down dip relative to up dip portion of the aquifer
- Northeastern portions of GMA 15
  - Groundwater production is generally higher
  - Colorado, Wharton, Matagorda, and Jackson counties
  - Predominate use is for irrigation
- Central portion of GMA 15
  - Victoria County
  - Predominate use is irrigation, municipal, and industrial
- Northcentral portion of GMA 15
  - DeWitt and Karnes counties
  - Predominate use is domestic, livestock and oil and gas production in the Eagle Ford Shale
- Southwestern portion of GMA 15
  - Predominate use is domestic, livestock, and agricultural

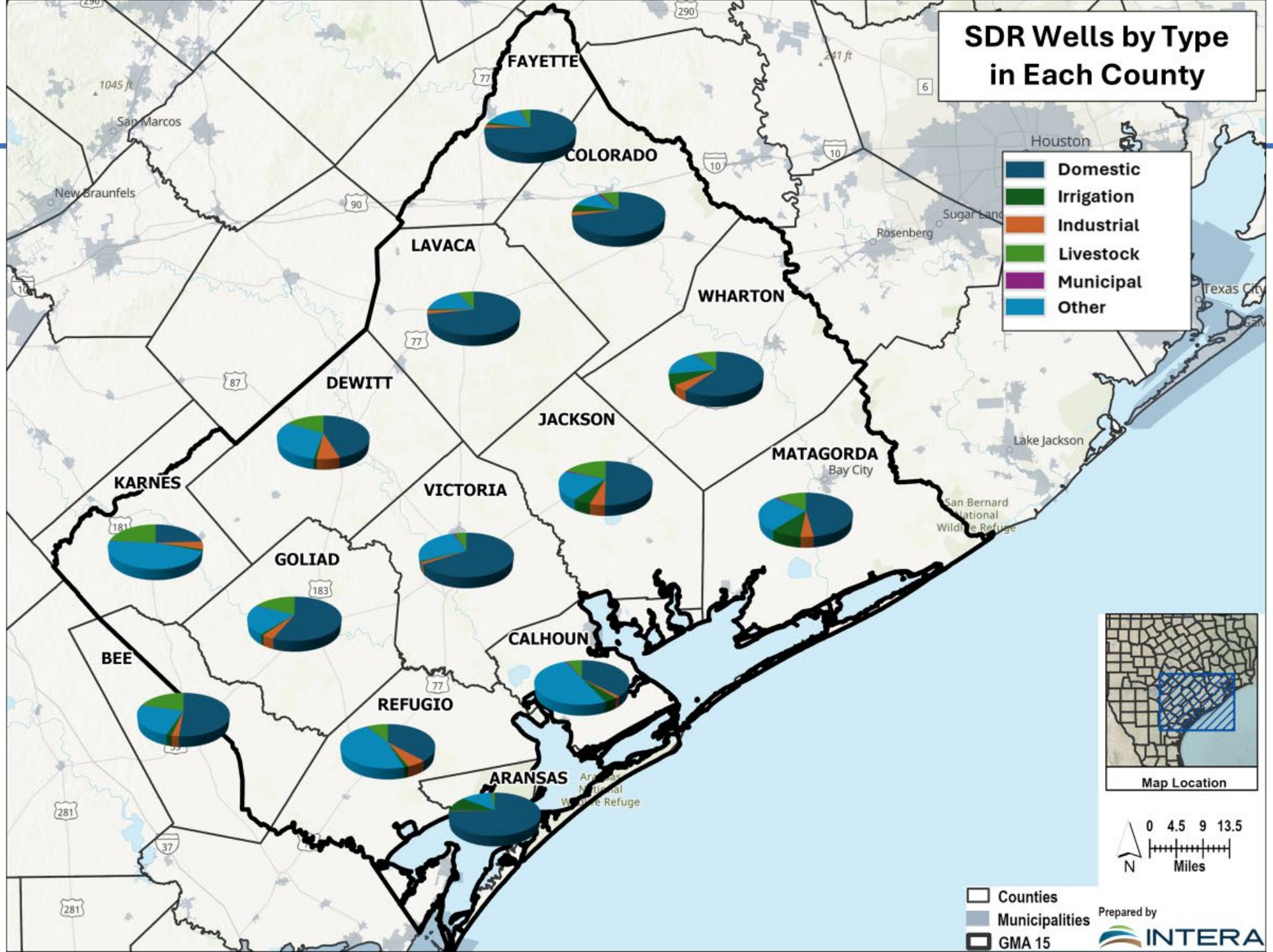
INTERA


FAYETTE
COLORADO
LAVACA
WHARTON
DEWITT
JACKSON
MATAGORDA
Bay City
KARNES
VICTORIA
GOLIAD
CALHOUN
BEE
REFUGIO
ARANSAS
San Marcos
New Braunfels
Scale 1
Total Pumping in GCAS
Acre-feet
125000
100000
75000
50000
25000
0
2018
2019
2020
2021
2022
Years
Scale 2
Total Pumping in GCAS
Karnes
15000
12500
10000
7500
5000
2500
0
Map Location
0 4.5 9 13.5
N
Miles
Counties
Municipalities
GMA 15
Prepared by
INTERA

Summary of GMA 15 Average Groundwater Use in Acre-feet for years 2018 through 2022

GCD/County	Irrigation	Municipal	Livestock	Man/Pwr	Mining	Domestic	Total County	Total 2022
ND Aransas/ Aransas	0	487	18	0	0	--	**504**	**640**
Bee GCD/ Bee	2,177	1,762	434	0	27	1,664	**6,064**	**5,361**
Calhoun County GCD/ Calhoun	444	279	184	188	0	63	**1,158**	**1,151**
Colorado County GCD/ Colorado	24,115	2,654	530	2	3,329	663	**31,293**	**43,388**
Pecan Valley GCD/ Dewitt	494	2,616	904	0	1,444	720	**6,178**	**6,845**
Fayette County GCD/ Fayette	538	367	200	115	0	570	**1,790**	**1,816**
Goliad County GCD/ Goliad	3,764	509	590	175	1	1,070	**6,109**	**5,607**
Texana GCD/ Jackson	58,279	995	442	160	0	357	**60,233**	**63,779**
Evergreen UWCD/ Karnes	764	1,992	322	0	4,366	282	**7,726**	**12,198**
ND Lavaca/ Lavaca	8,041	2,491	1,399	81	0	--	**12,011**	**12,676**
Coastal Plains GCD/ Matagorda	28,169	1,579	677	2,657	0	2,689	**35,770**	**30,259**
Refugio GCD/ Refugio	756	816	419	0	0	153	**2,144**	**2,050**
Victoria County GCD/ Victoria	9,970	2,979	542	1,785	26	1,290	**16,593**	**19,284**
Coastal Bend GCD/ Wharton	99,747	2,361	720	2,078	0	2,689	**107,595**	**85,822**
Total	**237,257**	**21,888**	**7,379**	**7,241**	**9,193**	**12,210**	**295,168**	**290,876**

INTERA


SDR Wells by Type in Each County
Domestic
Irrigation
Industrial
Livestock
Municipal
Other
FAYETTE
COLORADO
LAVACA
WHARTON
DEWITT
JACKSON
MATAGORDA
KARNES
VICTORIA
GOLIAD
CALHOUN
BEE
REFUGIO
ARANSAS
Houston
San Marcos
New Braunfels
Rosenberg
Sugar Land
Texas City
Lake Jackson
Bay City
Map Location
0 4.5 9 13.5
N
Miles
Counties
Municipalities
GMA 15
Prepared by
INTERA

Total SDR Wells by County

County	Domestic	Industrial	Irrigation	Other	Municipal	Livestock	Total Wells
Aransas	1,350	9	204	248	5	25	**1,841**
Bee	350	14	11	178	1	141	**695**
Calhoun	676	28	67	889	10	106	**1,776**
Colorado	2,646	99	207	457	43	282	**3,734**
DeWitt	1,806	267	35	1,218	7	650	**3,983**
Fayette	2,005	68	47	452	14	114	**2,700**
Goliad	1,141	73	18	466	5	348	**2,051**
Jackson	884	74	91	383	13	322	**1,767**
Karnes	513	115	24	923	5	488	**2,068**
Lavaca	2,957	108	41	748	10	272	**4,136**
Matagorda	1,437	108	267	768	23	387	**2,990**
Refugio	469	69	16	536	1	106	**1,197**
Victoria	3,084	79	27	1,248	30	225	**4,693**
Wharton	2,128	168	292	671	18	319	**3,596**
Total	**21,446**	**1,279**	**1,347**	**9,185**	**185**	**3,785**	**37,227**

- **Categories Included in "Other":**
  - **Monitor**
  - **Environmental Soil Boring**
  - **Other**
  - **Rig Supply**
  - **Fracking Supply**
  - **Test Well**
  - **Closed-Loop Geothermal**
  - **Unknown**
  - **Injection**
  - **De-watering**

INTERA

Total SDR Percentages Wells by County

County	Domestic	Industrial	Irrigation	Other	Municipal	Livestock	Total Wells
Aransas	73%	0%	11%	13%	0%	1%	**5%**
Bee	50%	2%	2%	26%	0%	20%	**2%**
Calhoun	38%	2%	4%	50%	1%	6%	**5%**
Colorado	71%	3%	6%	12%	1%	8%	**10%**
DeWitt	45%	7%	1%	31%	0%	16%	**11%**
Fayette	74%	3%	2%	17%	1%	4%	**7%**
Goliad	56%	4%	1%	23%	0%	17%	**6%**
Jackson	50%	4%	5%	22%	1%	18%	**5%**
Karnes	25%	6%	1%	45%	0%	24%	**6%**
Lavaca	71%	3%	1%	18%	0%	7%	**11%**
Matagorda	48%	4%	9%	26%	1%	13%	**8%**
Refugio	39%	6%	1%	45%	0%	9%	**3%**
Victoria	66%	2%	1%	27%	1%	5%	**13%**
Wharton	59%	5%	8%	19%	1%	9%	**10%**
Total	**58%**	**3%**	**4%**	**25%**	**0%**	**10%**	**100%**

INTERA

Total SDR Wells by County in Gulf Coast Aquifer

County	Domestic	Industrial	Irrigation	Other	Municipal	Livestock	Total Wells
Aransas	1,350	9	204	243	5	25	**1,836**
Bee	349	14	11	152	1	141	**668**
Calhoun	675	28	67	869	10	106	**1,755**
Colorado	2,594	99	205	435	41	274	**3,648**
DeWitt	1,778	218	32	904	5	633	**3,570**
Fayette	1,094	7	13	110	2	65	**1,291**
Goliad	1,141	73	18	393	5	348	**1,978**
Jackson	884	74	91	370	13	322	**1,754**
Karnes	287	42	5	430	5	253	**1,022**
Lavaca	2,777	72	35	554	9	255	**3,702**
Matagorda	1,425	108	267	767	23	387	**2,977**
Refugio	469	68	16	534	1	105	**1,193**
Victoria	3,084	79	27	1,126	30	225	**4,571**
Wharton	2,128	168	292	666	18	319	**3,591**
Total	**20,035**	**1,059**	**1,283**	**7,553**	**168**	**3,458**	**33,556**

* Based on surfaces developed by the TWDB GAM for the central CZWX

INTERA

Total SDR Percentages by County in Gulf Coast Aquifer

County	Domestic	Industrial	Irrigation	Other	Municipal	Livestock	Total Wells
Aransas	74%	0%	11%	13%	0%	1%	**5%**
Bee	52%	2%	2%	23%	0%	21%	**2%**
Calhoun	38%	2%	4%	50%	1%	6%	**5%**
Colorado	71%	3%	6%	12%	1%	8%	**11%**
DeWitt	50%	6%	1%	25%	0%	18%	**11%**
Fayette	85%	1%	1%	9%	0%	5%	**4%**
Goliad	58%	4%	1%	20%	0%	18%	**6%**
Jackson	50%	4%	5%	21%	1%	18%	**5%**
Karnes	28%	4%	0%	42%	0%	25%	**3%**
Lavaca	75%	2%	1%	15%	0%	7%	**11%**
Matagorda	48%	4%	9%	26%	1%	13%	**9%**
Refugio	39%	6%	1%	45%	0%	9%	**4%**
Victoria	67%	2%	1%	25%	1%	5%	**14%**
Wharton	59%	5%	8%	19%	1%	9%	**11%**
Total	**60%**	**3%**	**4%**	**23%**	**1%**	**10%**	**100%**

* Based on surfaces developed by the TWDB GAM for the central CZWX

INTERA

Gulf Coast SDR Wells by Aquifer and County

Aquifer	County	Domestic	Industrial	Irrigation	Other	Municipal	Livestock	Total Wells
Chicot	**Aransas**	1,350	9	204	243	5	25	**1,836**
Chicot	**Bee**	36	4		23		8	**71**
Chicot	**Calhoun**	675	28	67	869	10	106	**1,755**
Chicot	**Colorado**	1,341	80	100	331	14	166	**2,032**
Chicot	**DeWitt**	39			3		6	**48**
Chicot	**Goliad**	16	4		4		13	**37**
Chicot	**Jackson**	883	74	82	369	13	322	**1,743**
Chicot	**Lavaca**	292	29	4	80		50	**455**
Chicot	**Matagorda**	1,425	107	264	767	23	387	**2,973**
Chicot	**Refugio**	446	64	12	531	1	103	**1,157**
Chicot	**Victoria**	1,912	48	18	1,040	18	155	**3,191**
Chicot	**Wharton**	2,128	158	260	664	18	319	**3,547**
	Total	**10,543**	**605**	**1,011**	**4,924**	**102**	**1,660**	**18,845**

Aquifer	County	Domestic	Industrial	Irrigation	Other	Municipal	Livestock	Total Wells
Evangeline	**Bee**	287	6	10	83	1	97	**484**
Evangeline	**Colorado**	1,151	17	84	99	21	98	**1,470**
Evangeline	**DeWitt**	883	32	11	406	1	191	**1,524**
Evangeline	**Fayette**	158		2	1		6	**167**
Evangeline	**Goliad**	1,118	67	14	380	5	318	**1,902**
Evangeline	**Jackson**	1		9	1			**11**
Evangeline	**Karnes**	10					4	**14**
Evangeline	**Lavaca**	1,457	32	19	378	4	99	**1,989**
Evangeline	**Matagorda**		1	3				**4**
Evangeline	**Refugio**	23	4	4	3		2	**36**
Evangeline	**Victoria**	1,172	31	9	86	12	70	**1,380**
Evangeline	**Wharton**		10	32	2			**44**
	Total	**6,260**	**200**	**197**	**1,439**	**44**	**885**	**9,025**

* Based on surfaces developed by the TWDB GAM for the central CZWX

INTERA

Gulf Coast SDR Wells by Aquifer and County

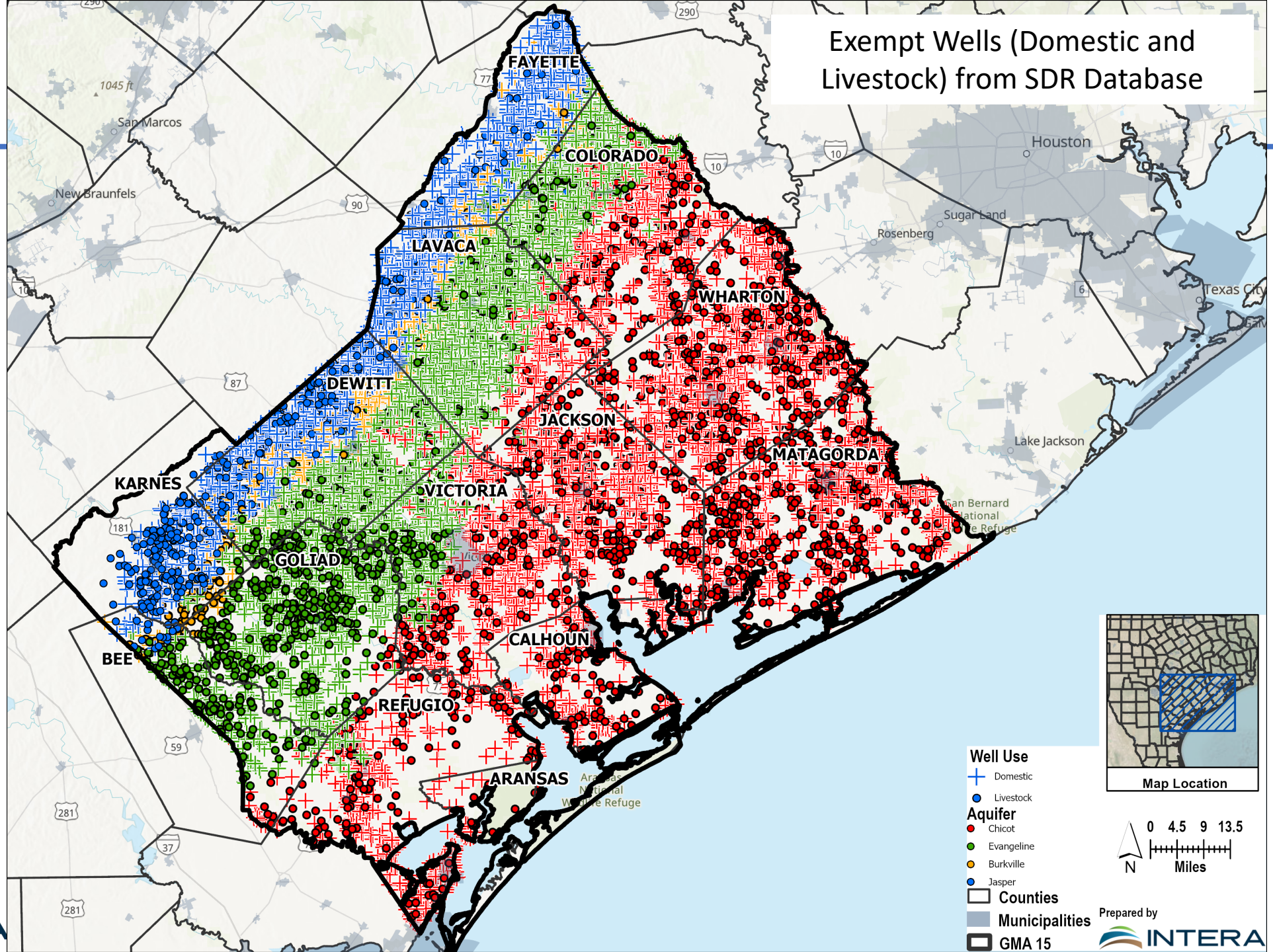
Aquifer	County	Domestic	Industrial	Irrigation	Other	Municipal	Livestock	Total Wells
Burkville	**Bee**	16	1		17		22	**56**
Burkville	**Colorado**	94	2	12	4	3	9	**124**
Burkville	**DeWitt**	251	10	2	80	1	81	**425**
Burkville	**Fayette**	251		2	35		20	**308**
Burkville	**Goliad**	7	2	3	9		17	**38**
Burkville	**Karnes**	55	1		108	1	58	**223**
Burkville	**Lavaca**	357	4	4	39	2	43	**449**
	Total	**1,031**	**20**	**23**	**292**	**7**	**250**	1,623

Aquifer	County	Domestic	Industrial	Irrigation	Other	Municipal	Livestock	Total Wells
Jasper	**Bee**	10	3	1	29		14	**57**
Jasper	**Colorado**	8		9	1	3	1	**22**
Jasper	**DeWitt**	605	176	19	415	3	355	**1,573**
Jasper	**Fayette**	685	7	9	74	2	39	**816**
Jasper	**Goliad**			**1**				**1**
Jasper	**Karnes**	222	41	5	322	4	191	**785**
Jasper	**Lavaca**	671	7	8	57	3	63	**809**
	Total	**2,201**	**234**	**52**	**898**	**15**	**663**	4,063

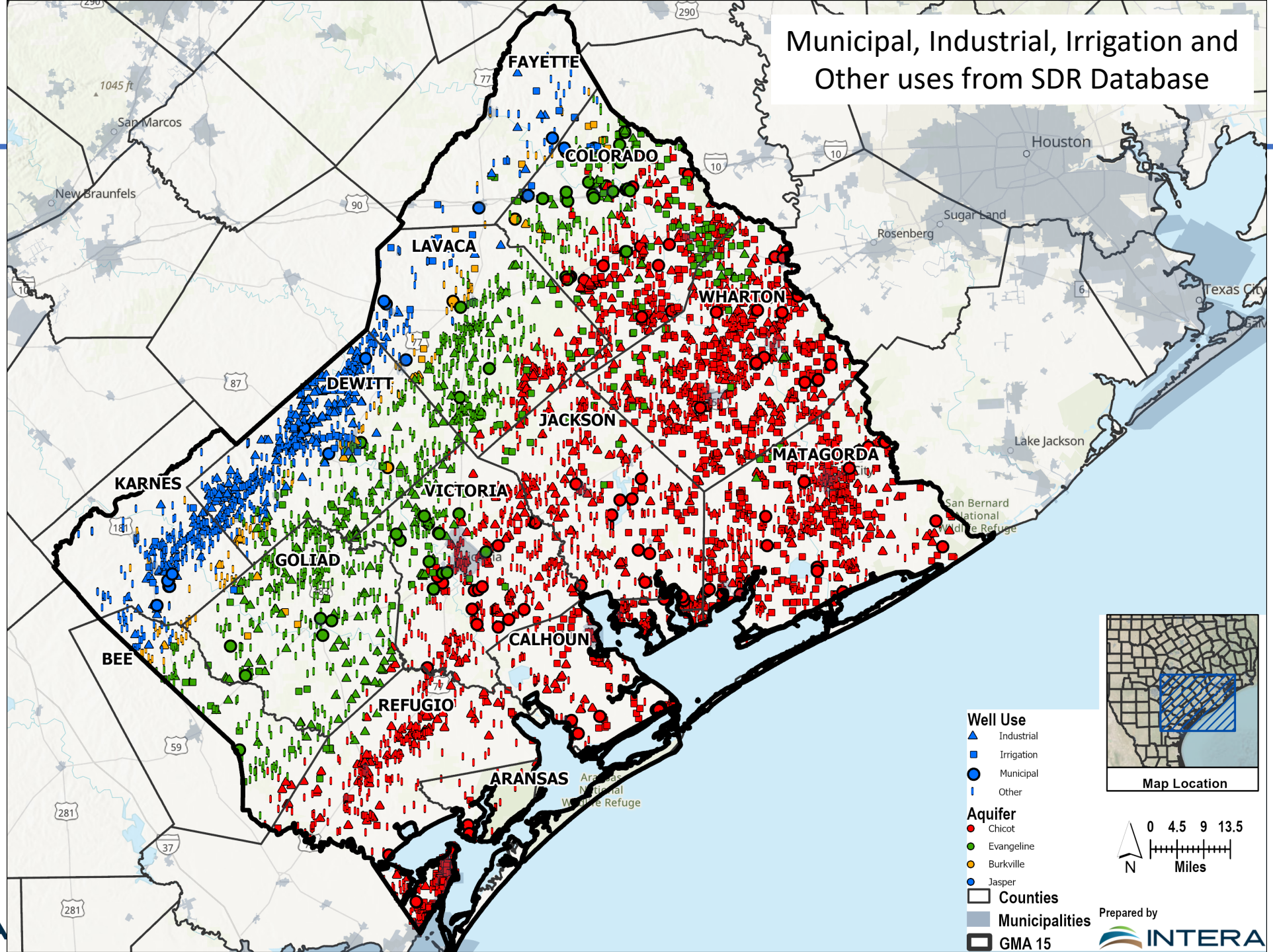
* Based on surfaces developed by the TWDB GAM for the central CZWX

INTERA

Exempt Wells (Domestic and Livestock) from SDR Database

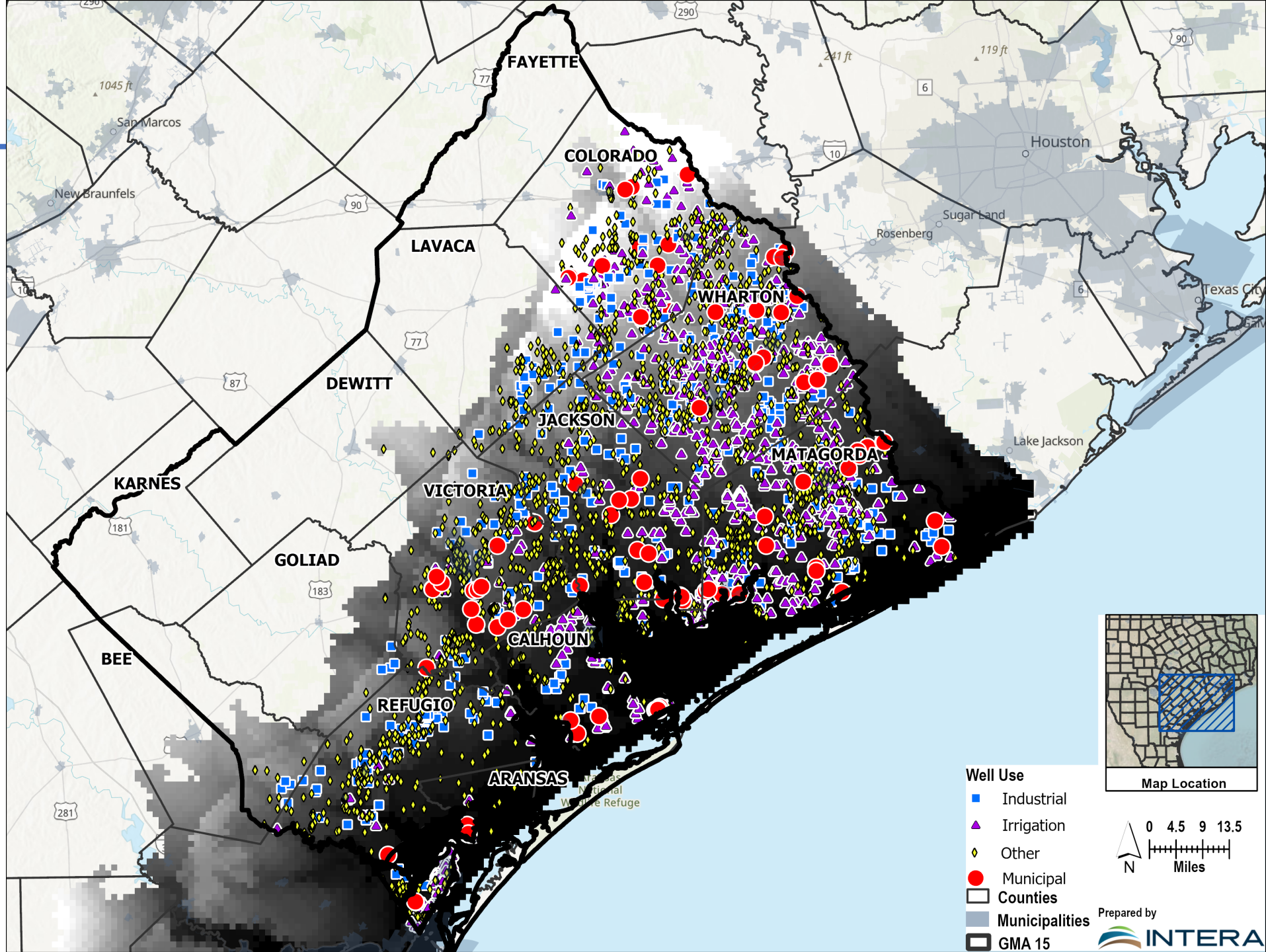


Municipal, Industrial, Irrigation and Other uses from SDR Database



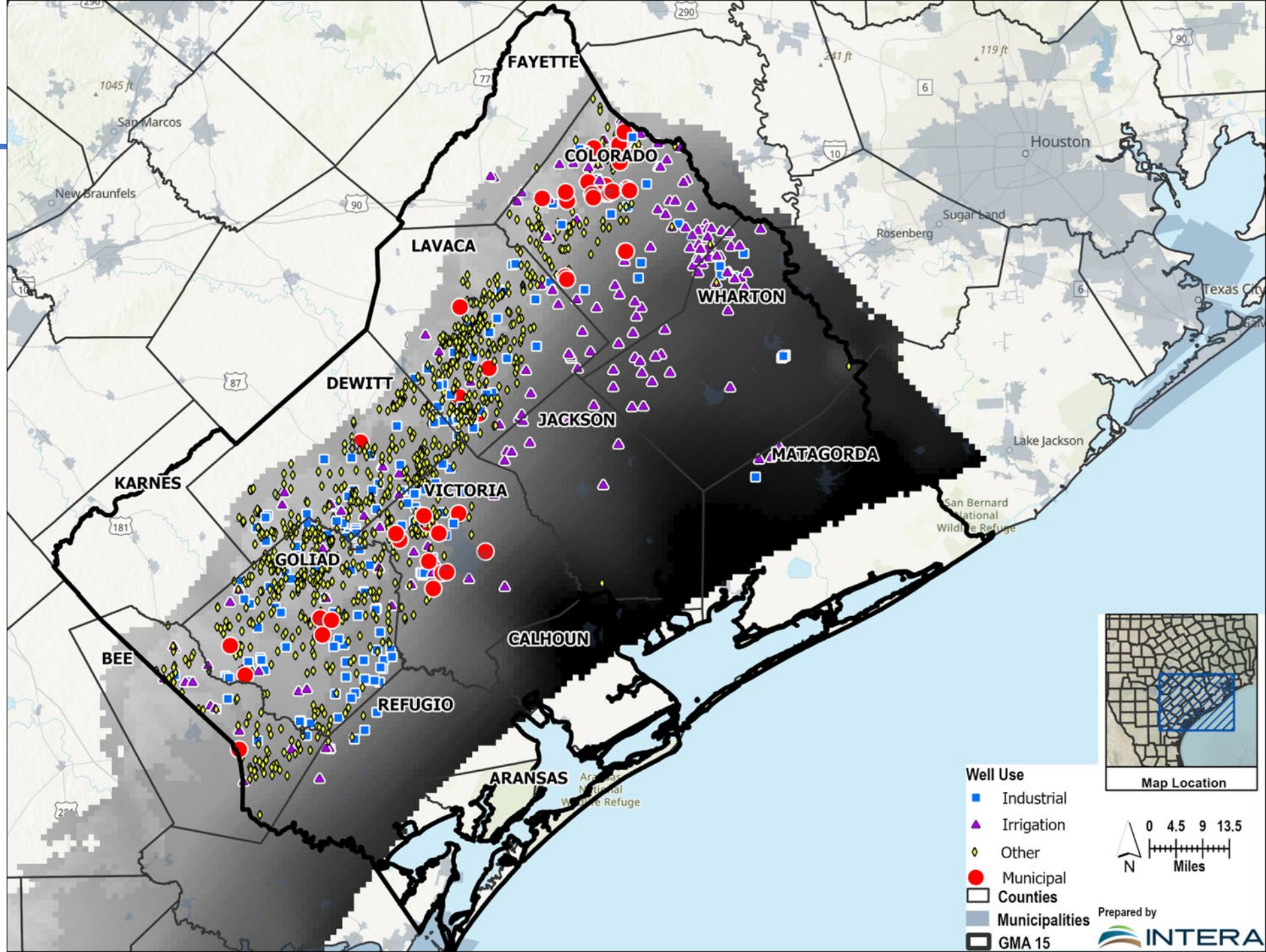
Chicot

Chicot Aquifer Municipal, Industrial, Irrigation and Other uses from SDR Database



Evangeline

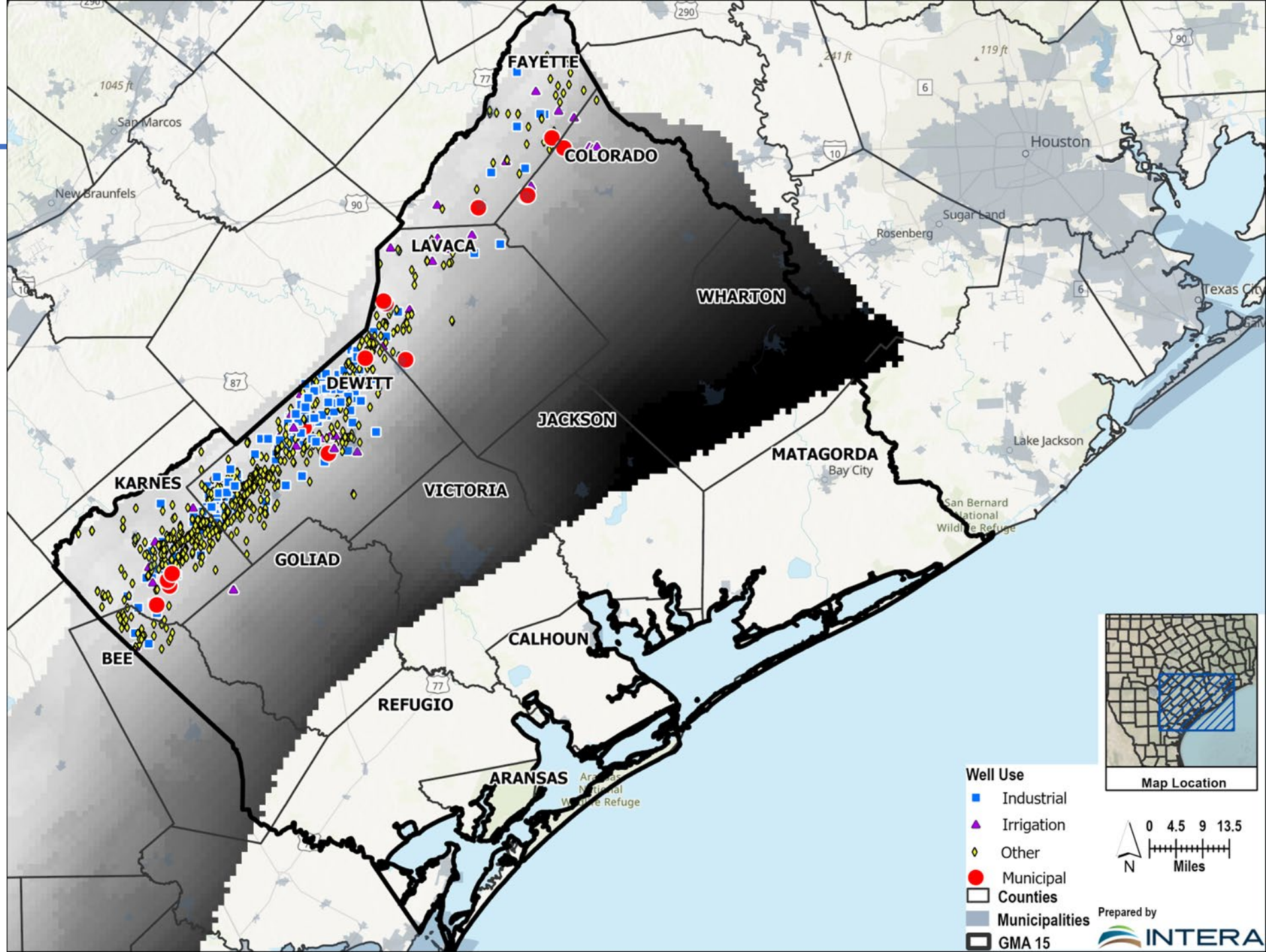
Evangeline Aquifer Municipal, Industrial, Irrigation and Other uses from SDR Database



INTERA

Jasper

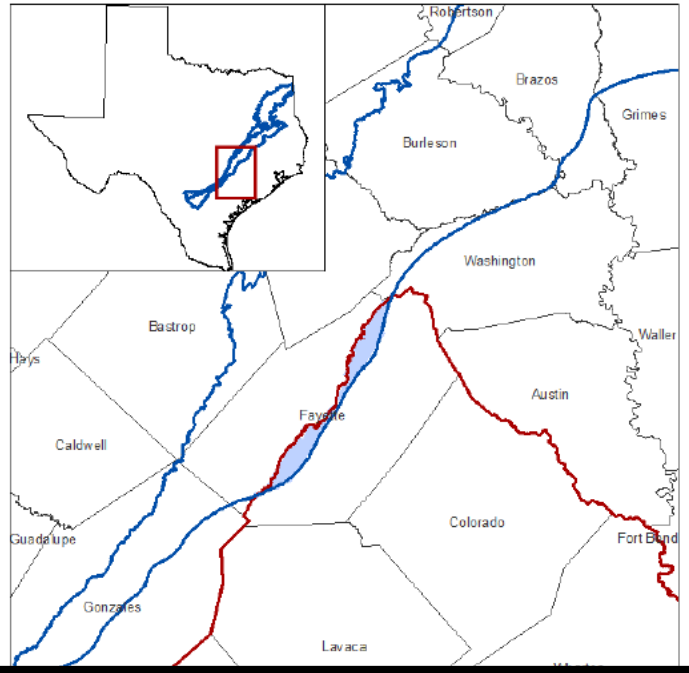
Jasper Aquifer
Municipal, Industrial, Irrigation and Other uses from SDR Database



INTERA

Queen City & Sparta: Non-Relevant Status

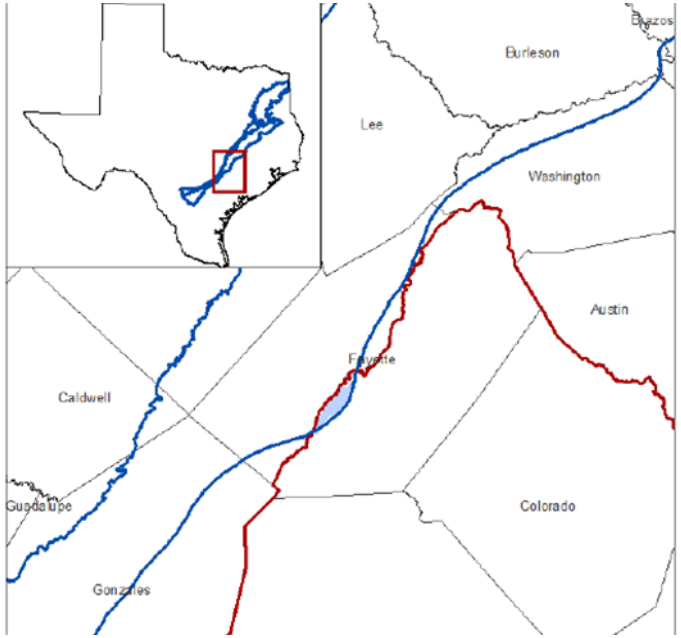
Sparta



County	Sq. Miles	Aquifer	Model
Fayette	2	Sparta	CZWX_S
Fayette	72	Sparta	CZWX_C

GCD	Sq. Miles	Aquifer	Model
Fayette County GCD	2	Sparta	CZWX_S
Fayette County GCD	72	Sparta	CZWX_C

Queen City

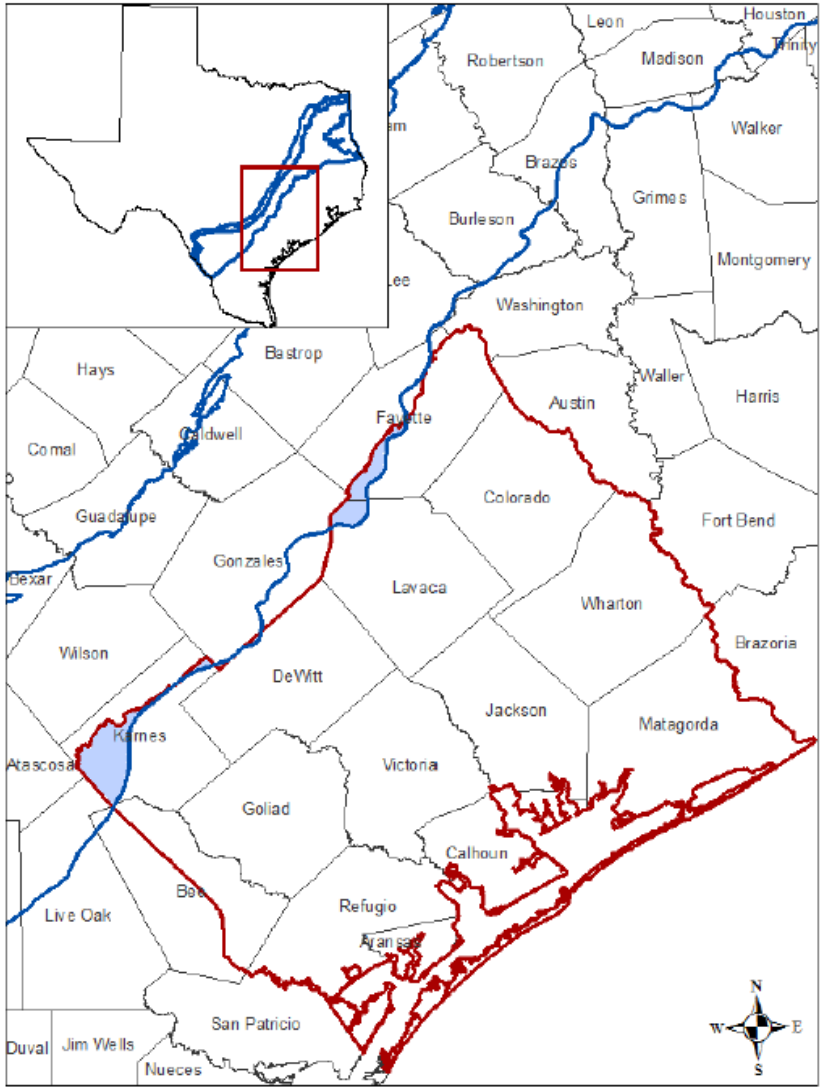


County	Sq. Miles	Aquifer	Model
Fayette	13	Queen City	CZWX_C

GCD	Sq. Miles	Aquifer	Model
Fayette County GCD	13	Queen City	CZWX_C

INTERA

Carrizo-Wilcox: Non-Relevant Status

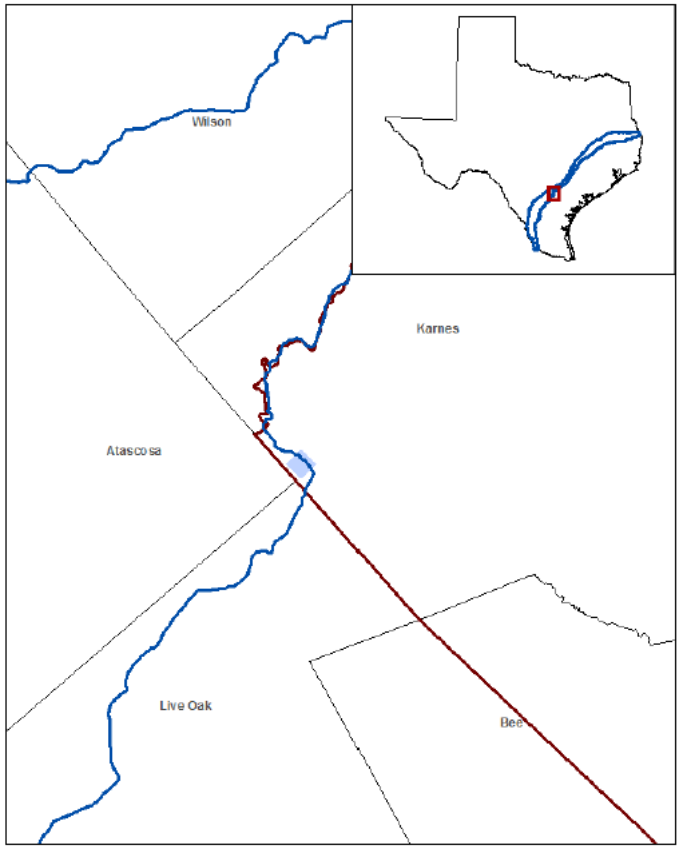


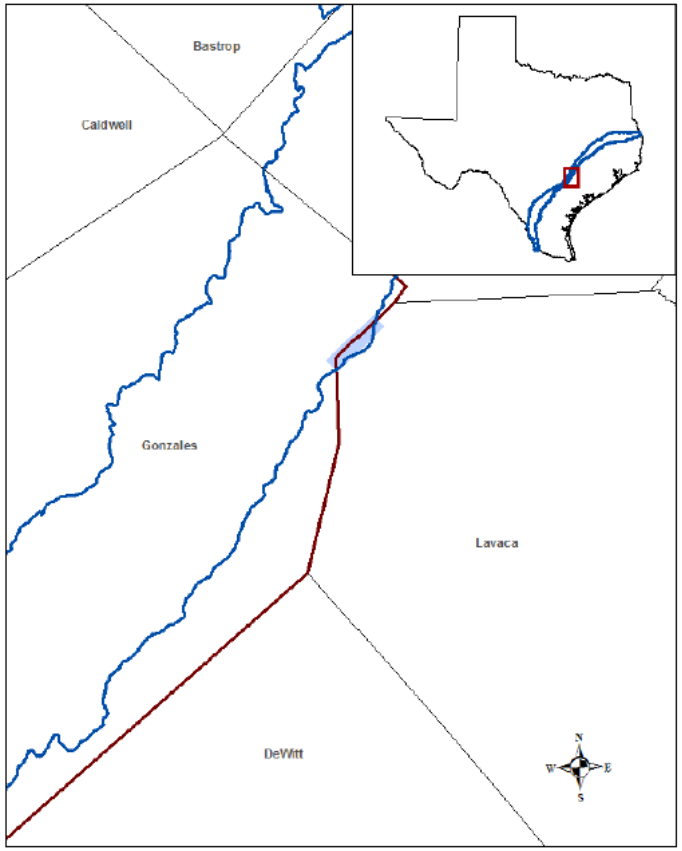
County	Sq. Miles	Aquifer	Model
DeWitt	4	Carrizo-Wilcox	CZWX_S
Fayette	24	Carrizo-Wilcox	CZWX_S
Karnes	160	Carrizo-Wilcox	CZWX_S
Lavaca	37	Carrizo-Wilcox	CZWX_S
DeWitt	3	Carrizo-Wilcox	CZWX_C
Fayette	56	Carrizo-Wilcox	CZWX_C
Karnes	23	Carrizo-Wilcox	CZWX_C
Lavaca	37	Carrizo-Wilcox	CZWX_C

GCD	Sq. Miles	Aquifer	Model
Evergreen UWCD	160	Carrizo-Wilcox	CZWX_S
Fayette County GCD	24	Carrizo-Wilcox	CZWX_S
ND Lavaca	37	Carrizo-Wilcox	CZWX_S
Pecan Valley GCD	4	Carrizo-Wilcox	CZWX_S
Evergreen UWCD	23	Carrizo-Wilcox	CZWX_C
Fayette County GCD	56	Carrizo-Wilcox	CZWX_C
ND Lavaca	37	Carrizo-Wilcox	CZWX_C
Pecan Valley GCD	3	Carrizo-Wilcox	CZWX_C

INTERA

Yegua-Jackson:Non-Relevant Status



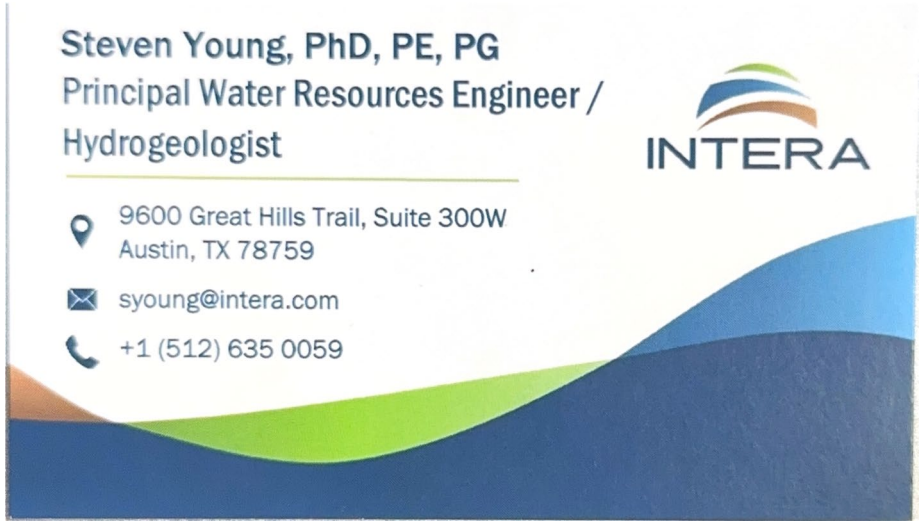


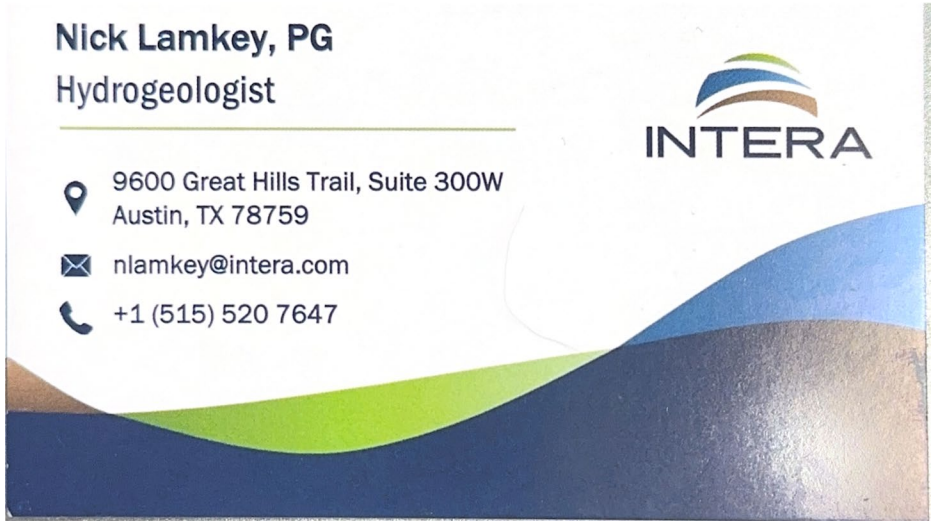
County	Sq. Miles	Aquifer	Model
Fayette	9	Yegua-Jackson	YGJK
Karnes	5	Yegua-Jackson	YGJK
Lavaca	4	Yegua-Jackson	YGJK

GCD	Sq. Miles	Aquifer	Model
Evergreen UWCD	5	Yegua-Jackson	YGJK
Fayette County GCD	9	Yegua-Jackson	YGJK
ND Lavaca	4	Yegua-Jackson	YGJK

INTERA

Questions?


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F.2 Water Supply Needs and Water Management Strategies

GMA 15
Consideration of Water Supply Needs and Management Strategies

Groundwater Management Area 15

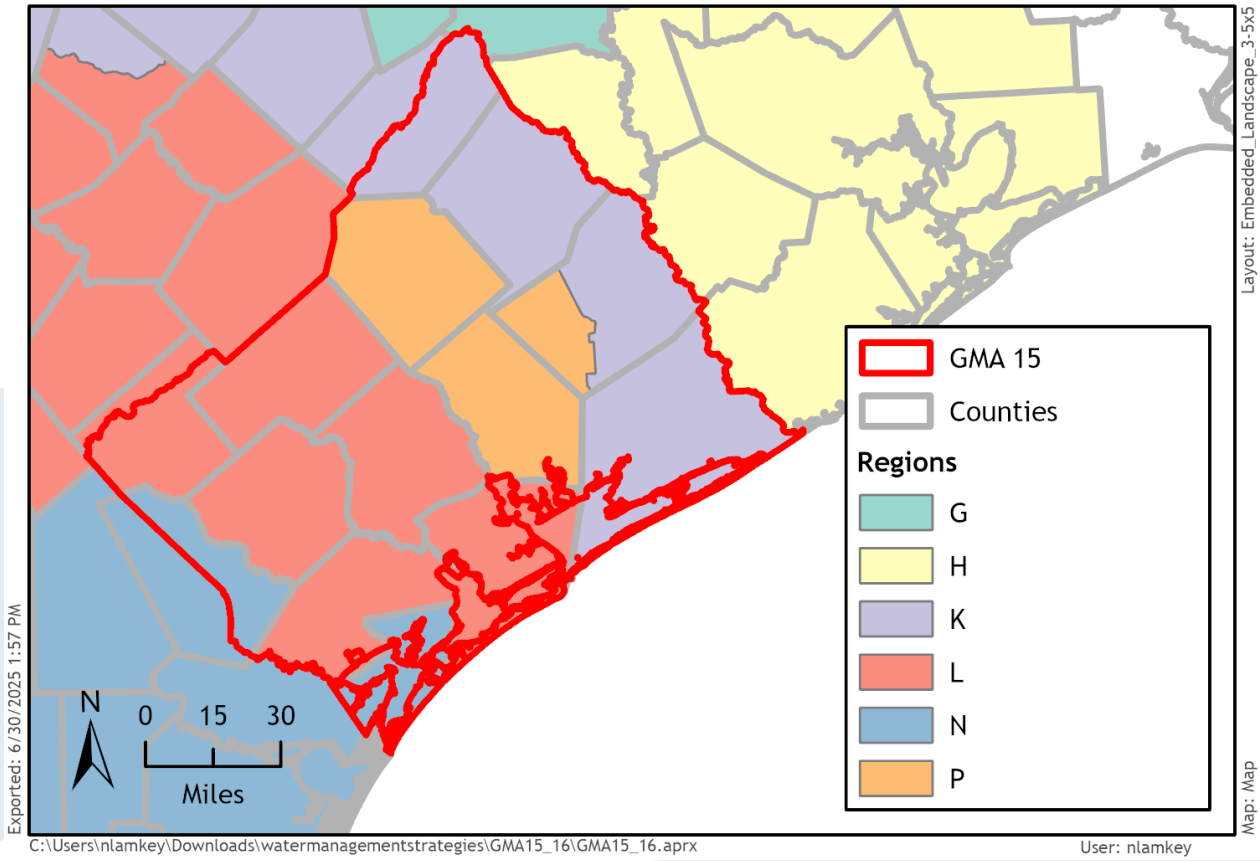
July 10, 2025



Presented by:
Steven Young Ph.D, PE, PG
Nick Lamkey PG

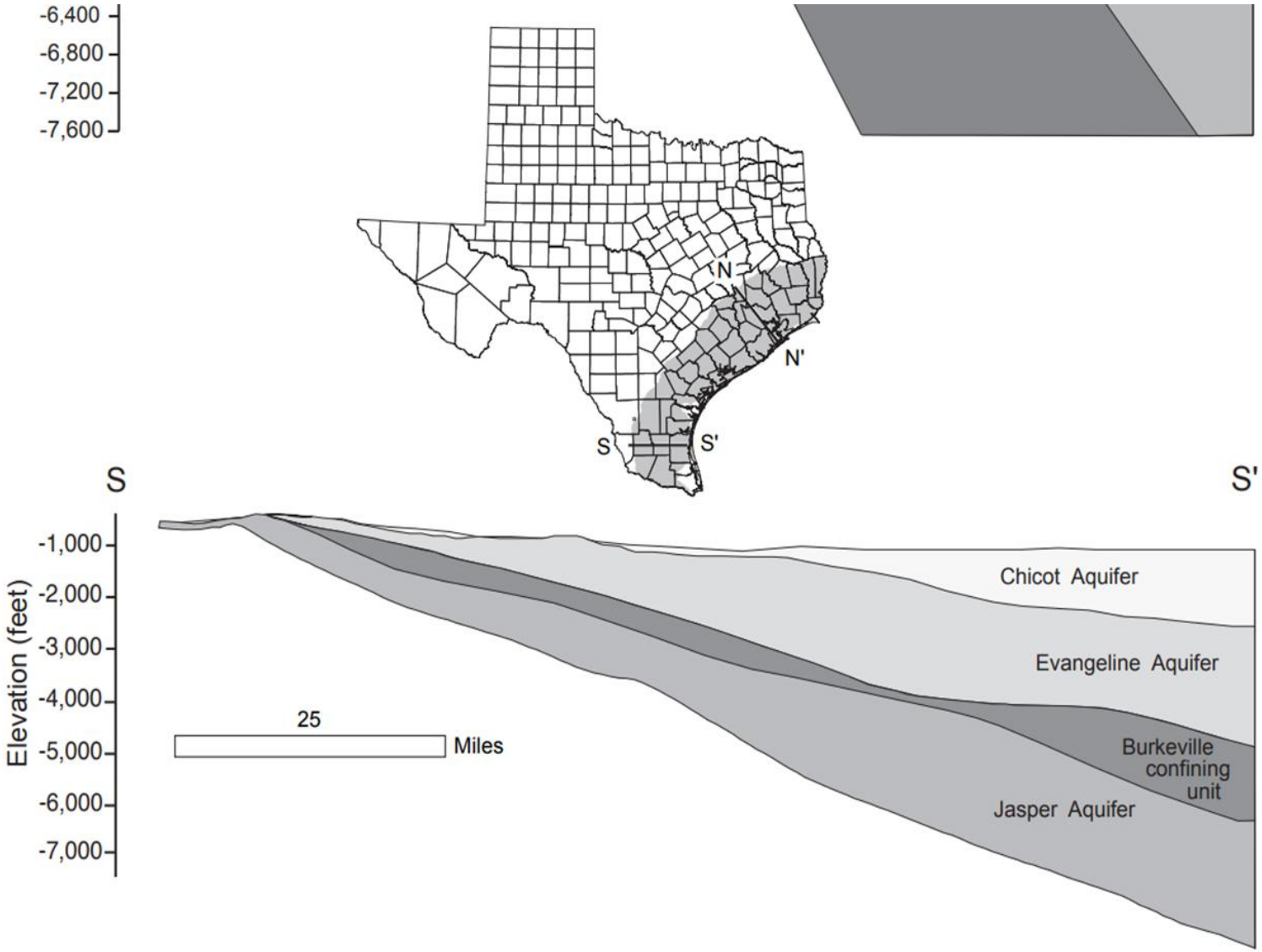
Consideration of Water Supply Needs and Management Strategies

- Texas Water Code Section 36.108(d)(2)
- Describe the water supply needs and water management strategies included in the state water plan
- Texas State Water Plan is a compilation of Regional Water Plans
- GMA 15 contains parts of 4 Regional Water Planning Areas

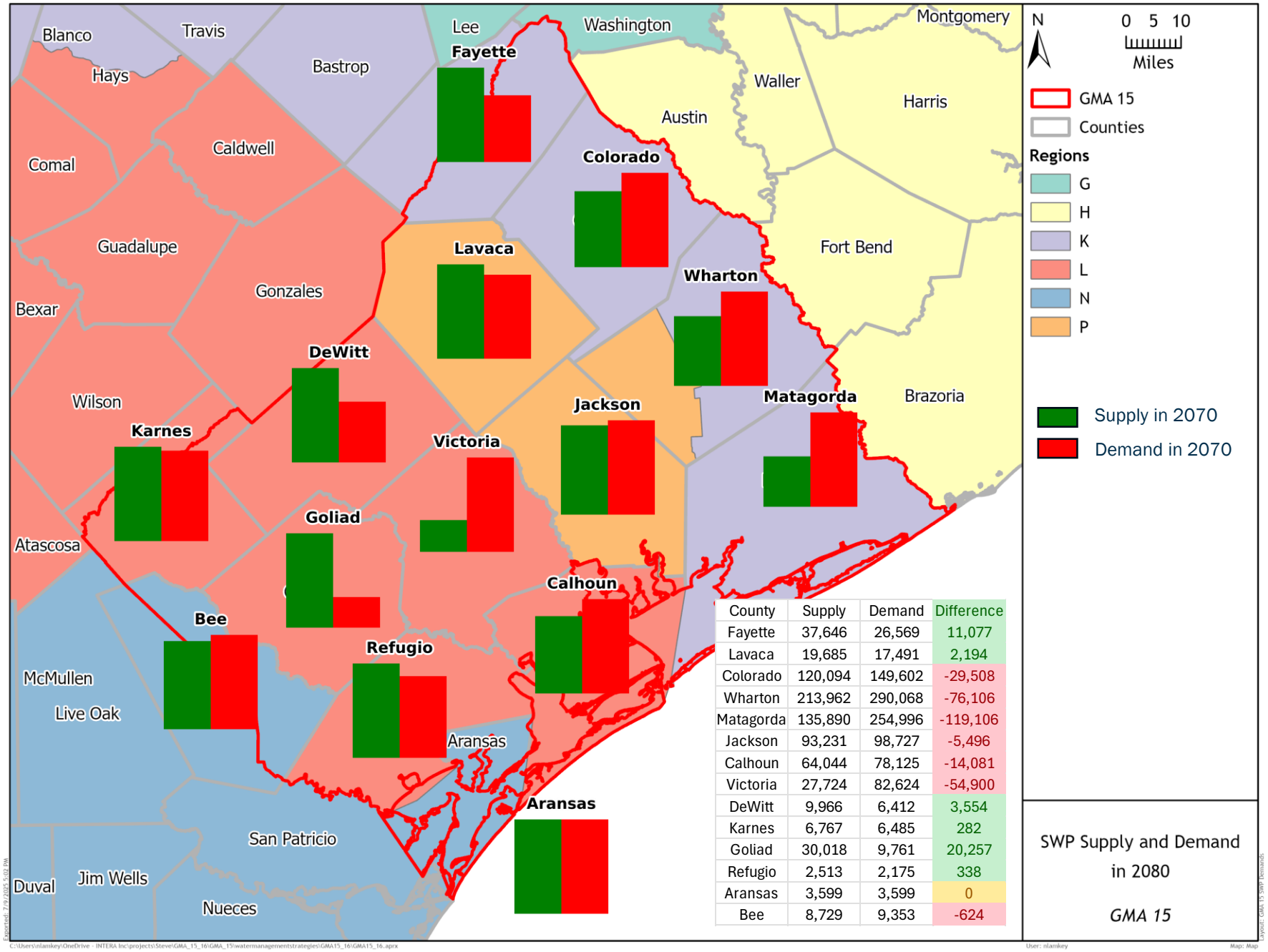


Gulf Coast Aquifer System

- Gulf Coast Aquifer is the only groundwater source listed for all GMA 15 counties except Fayette and Karnes
- Regional Water Planning values only specify the major aquifer name (Gulf Coast Aquifer)
- Regional Planning values do not distinguish between the 4 aquifer layers



Demands



County	Supply	Demand	Difference
Fayette	37,646	26,569	11,077
Lavaca	19,685	17,491	2,194
Colorado	120,094	149,602	-29,508
Wharton	213,962	290,068	-76,106
Matagorda	135,890	254,996	-119,106
Jackson	93,231	98,727	-5,496
Calhoun	64,044	78,125	-14,081
Victoria	27,724	82,624	-54,900
DeWitt	9,966	6,412	3,554
Karnes	6,767	6,485	282
Goliad	30,018	9,761	20,257
Refugio	2,513	2,175	338
Aransas	3,599	3,599	0
Bee	8,729	9,353	-624

SWP Supply and Demand in 2080

GMA 15

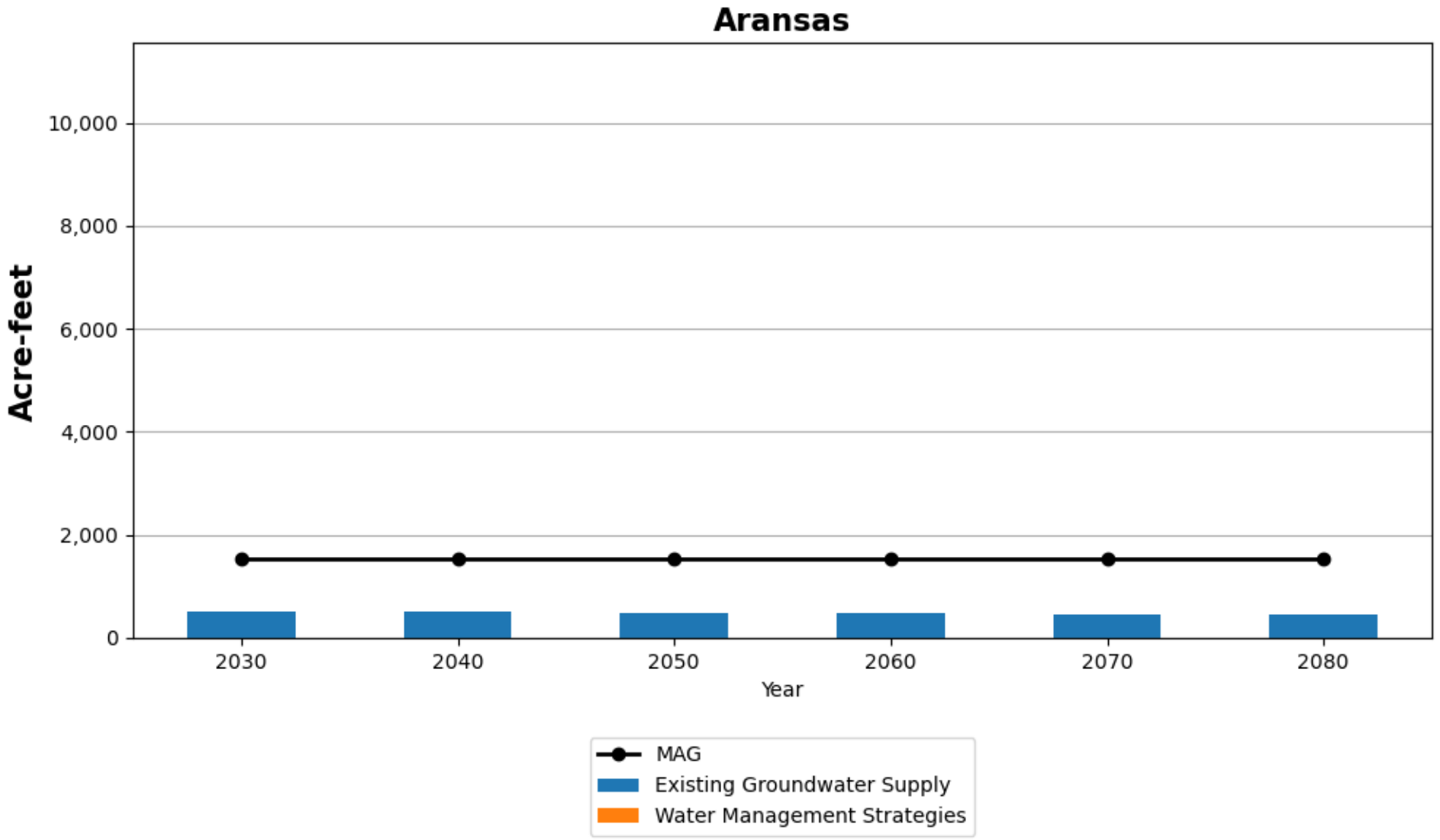
INTERA

*Bar plots not on same scal

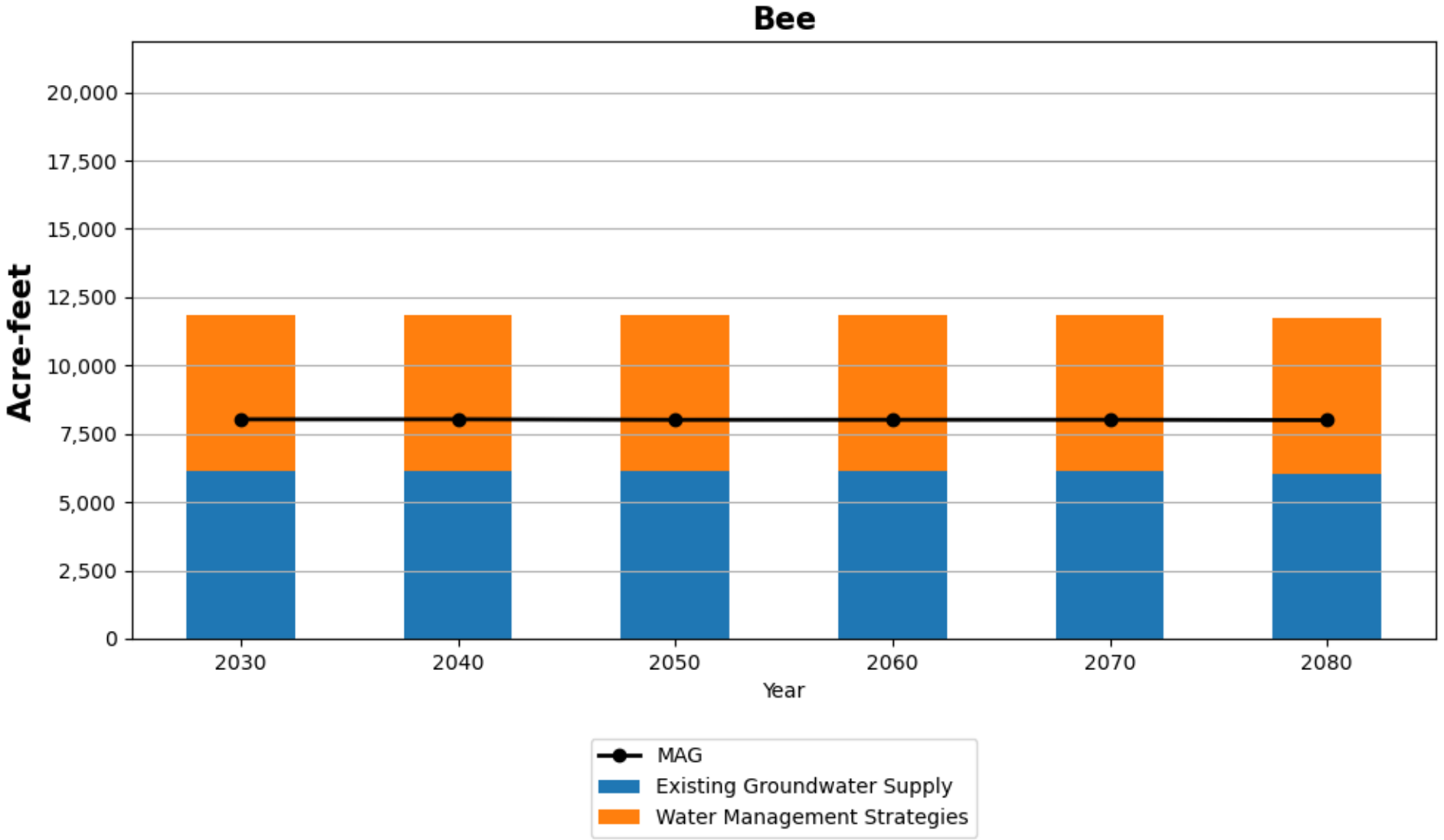
GCAS Groundwater Supplies Plots

- Note axes are different scales for each county
- Showing groundwater values for Gulf Coast Aquifer System

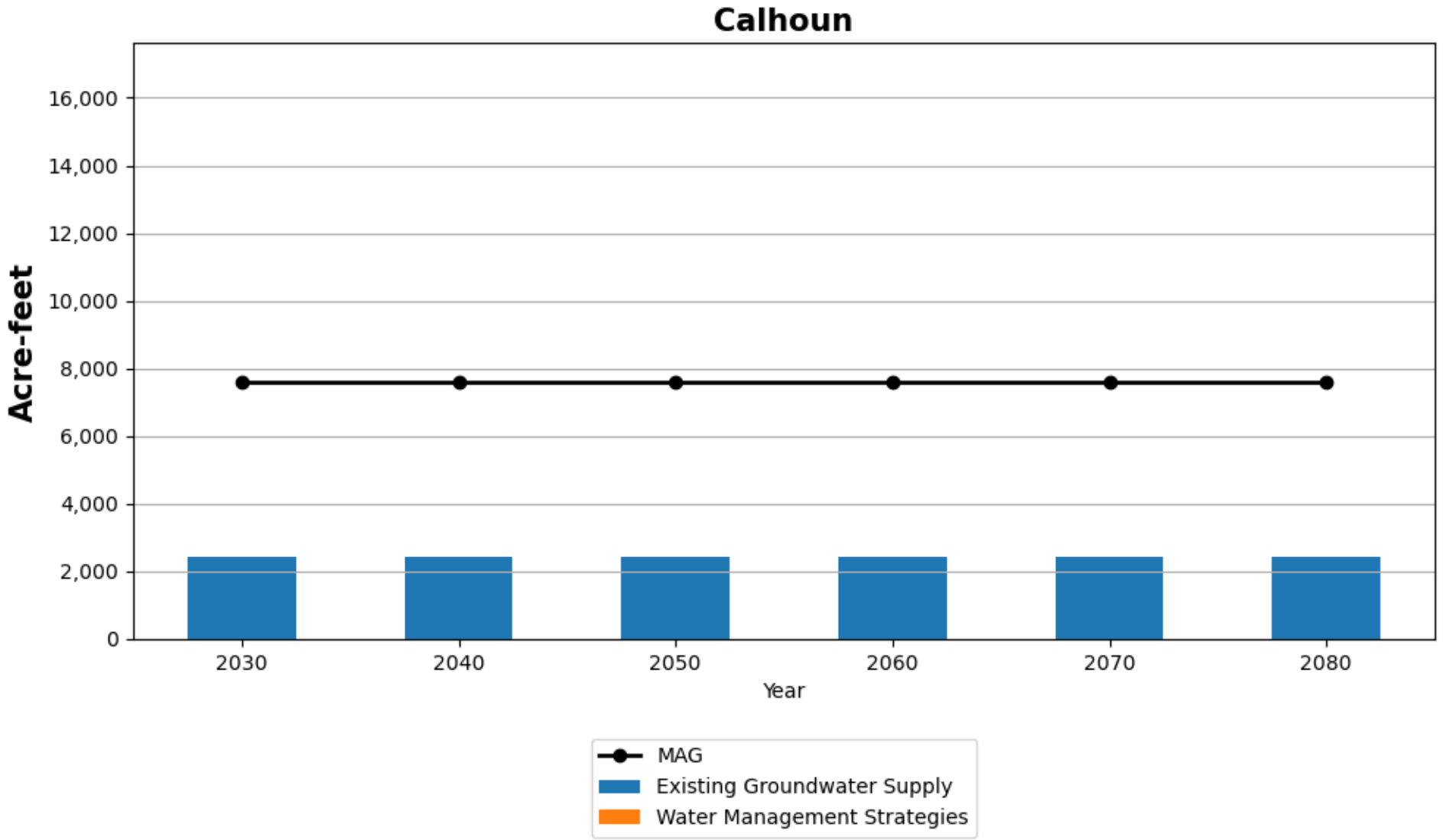
Aransas


Aransas
Acre-feet
10,000
8,000
6,000
4,000
2,000
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

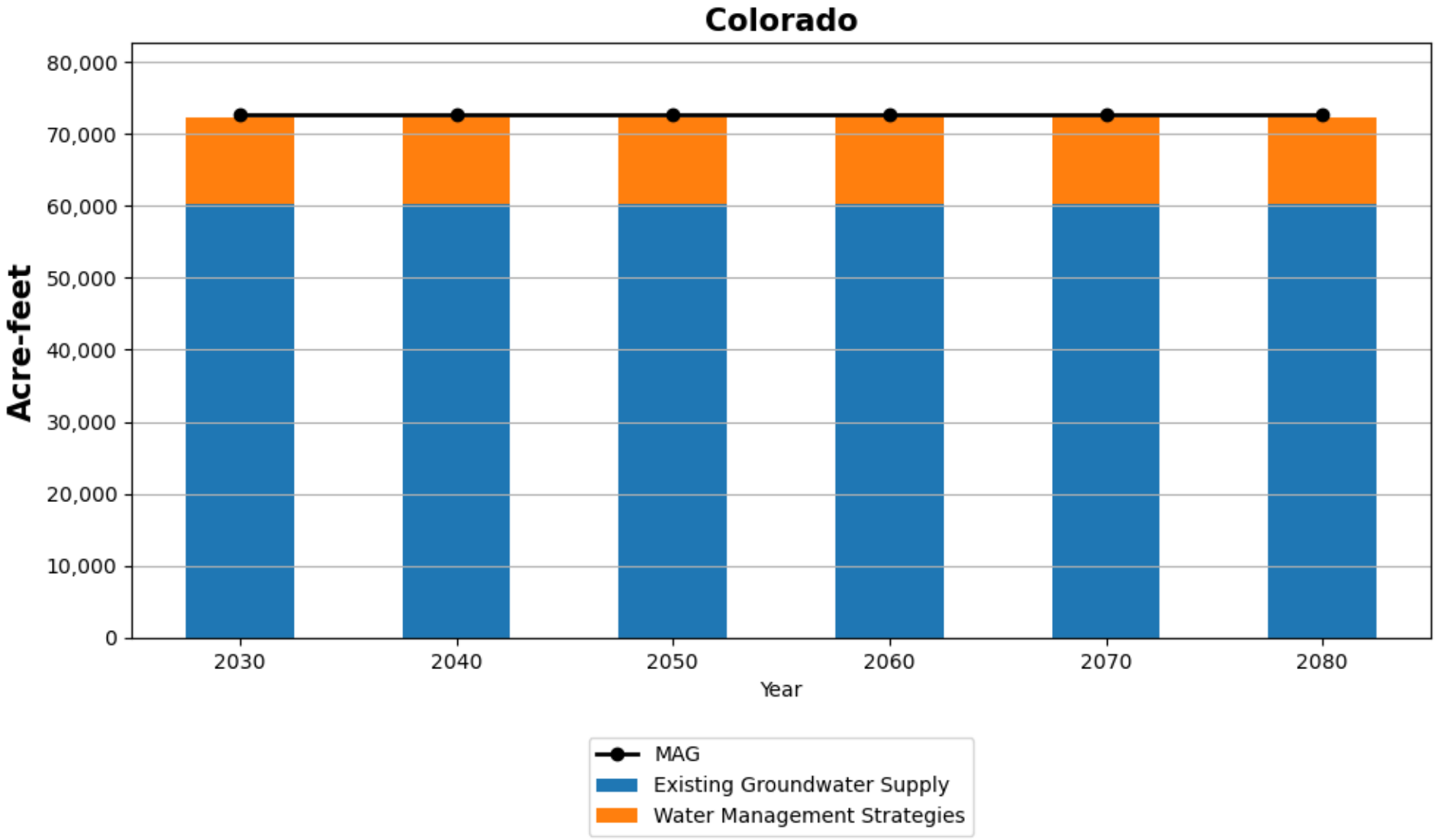
Bee County


Bee
Acre-feet
20,000
17,500
15,000
12,500
10,000
7,500
5,000
2,500
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

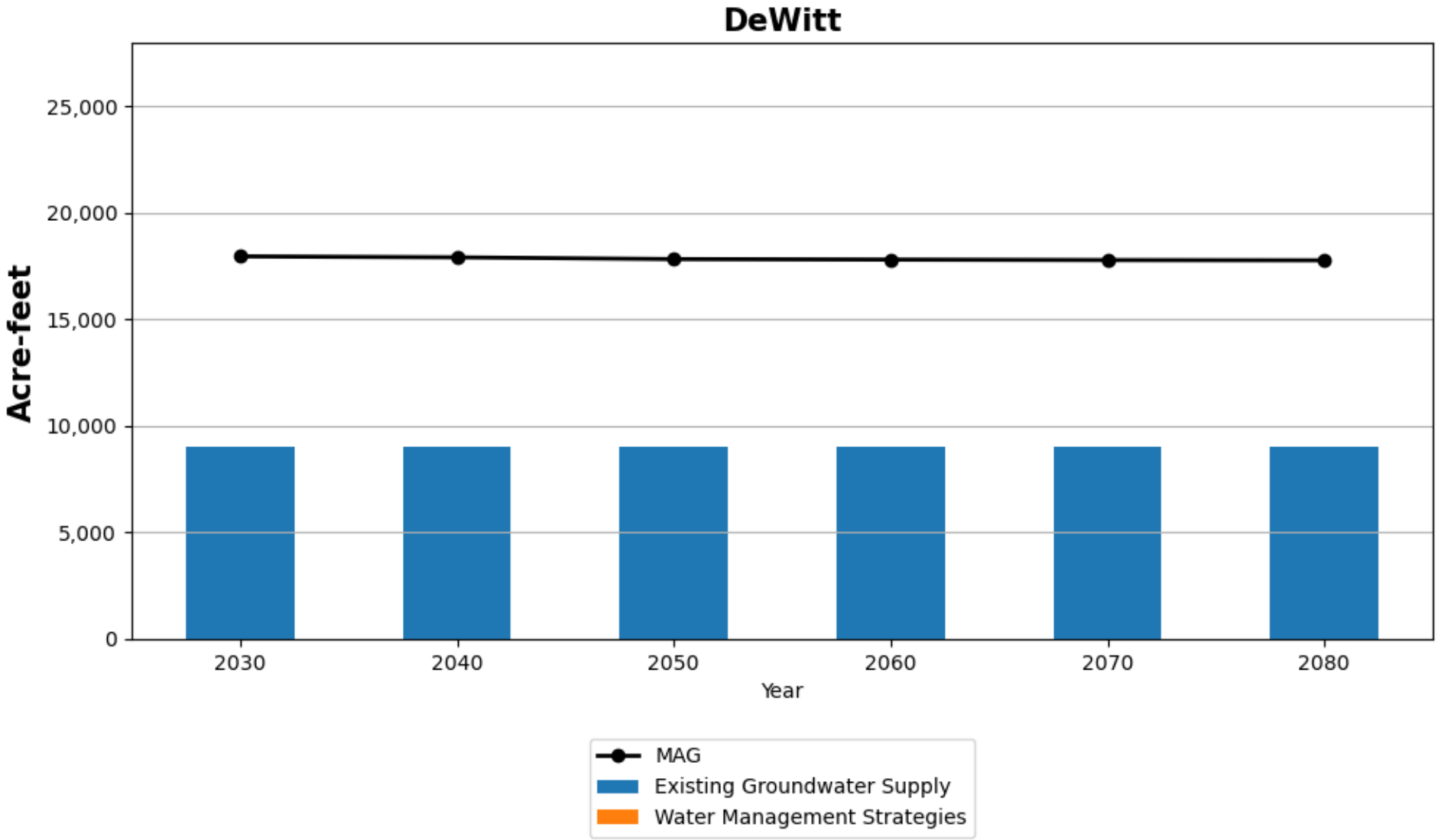
Calhoun


Calhoun
Acre-feet
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

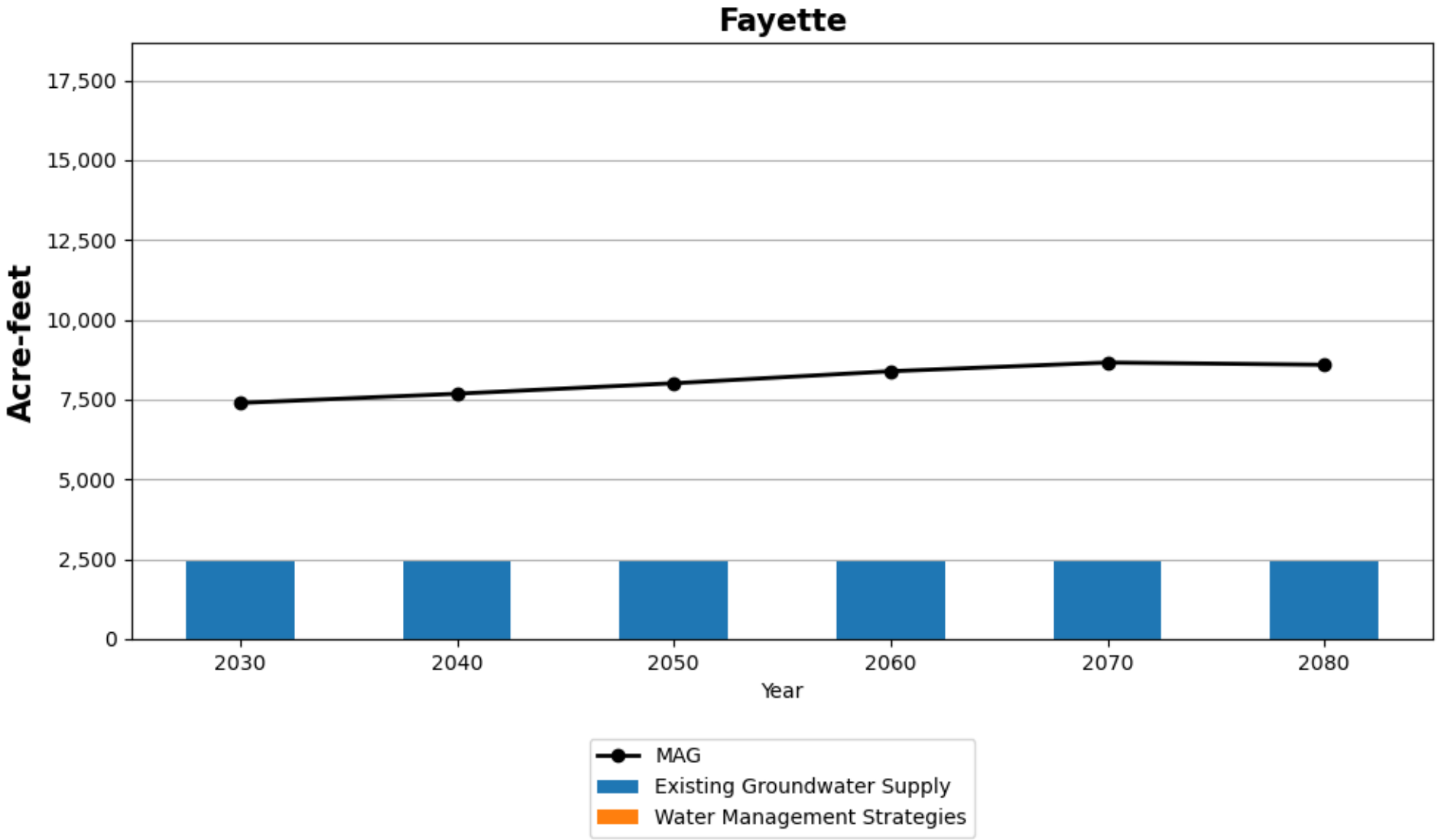
Colorado


Colorado
Acre-feet
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

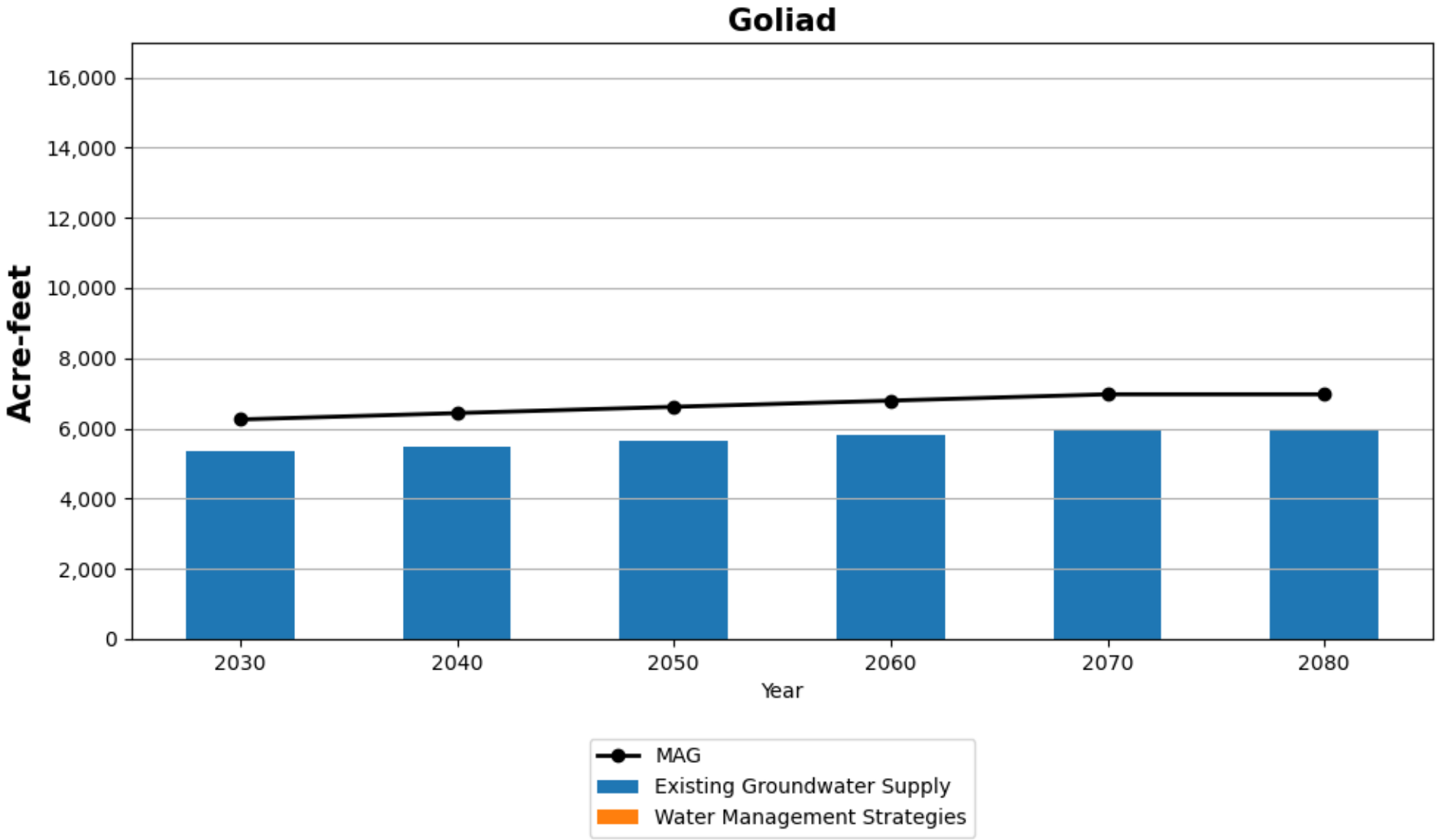
De Witt


DeWitt
Acre-feet
25,000
20,000
15,000
10,000
5,000
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

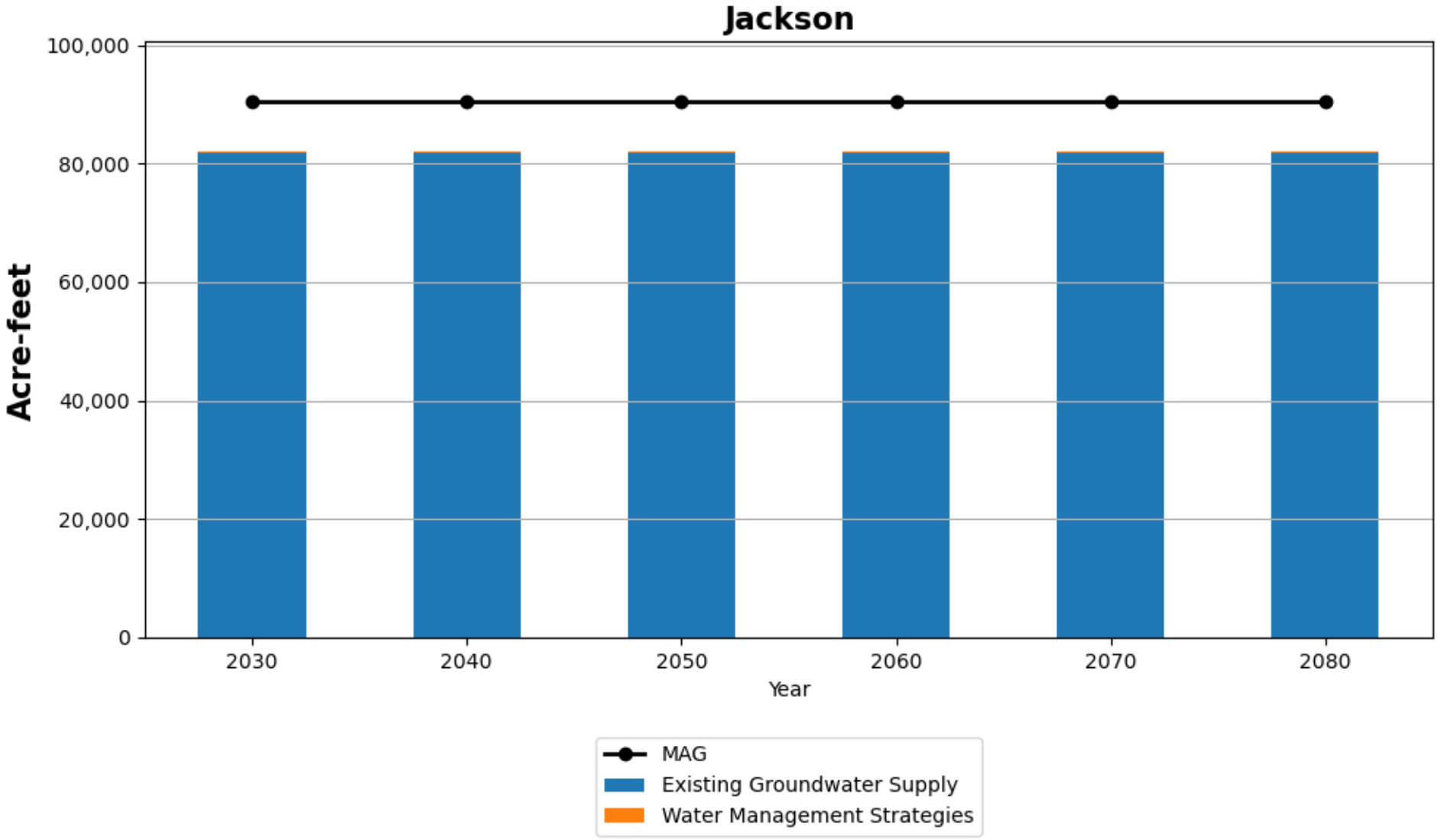
Fayette


Fayette
17,500
15,000
12,500
10,000
7,500
5,000
2,500
0
Acre-feet
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

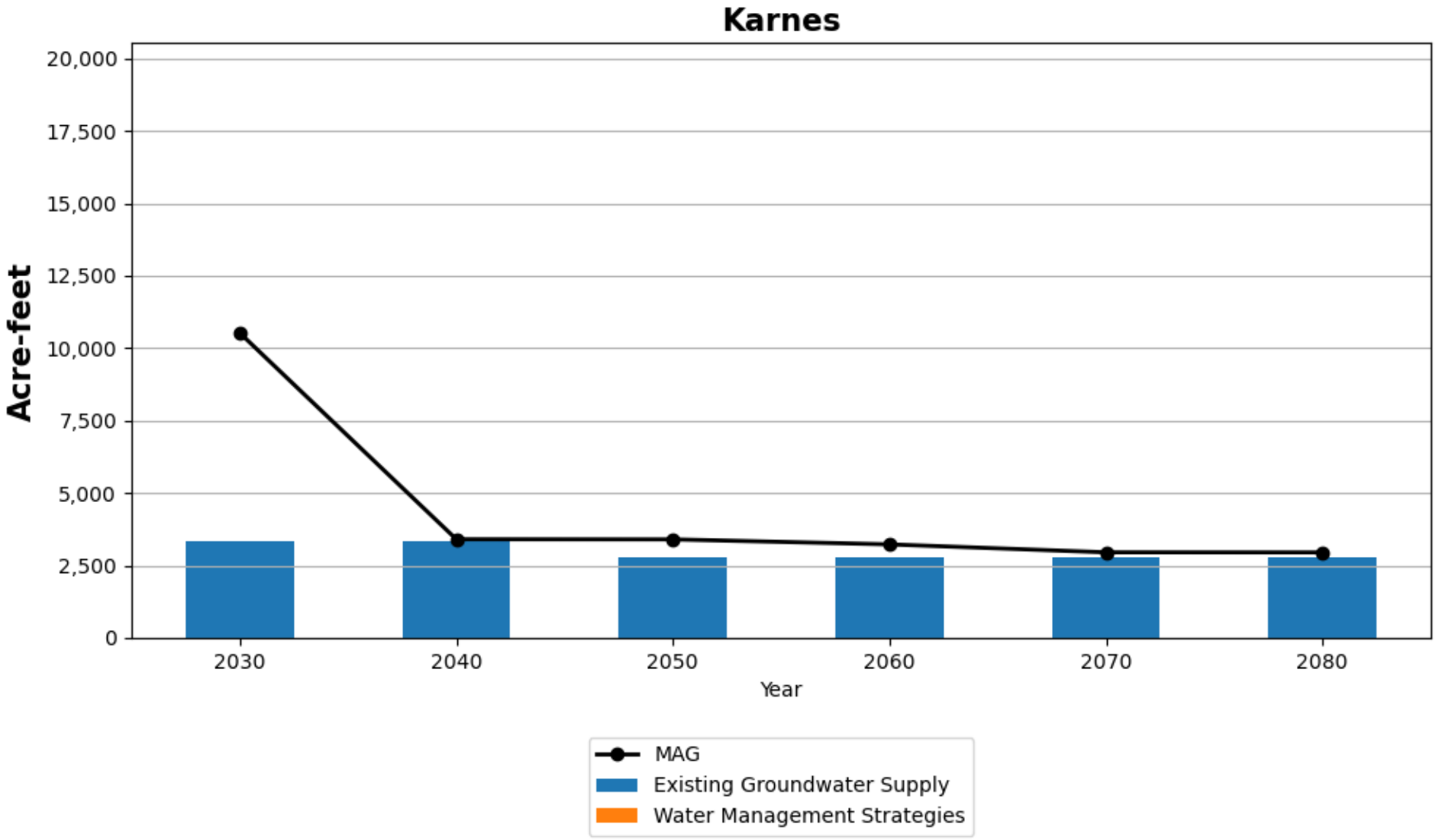
Goliad


Goliad
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Acre-feet
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

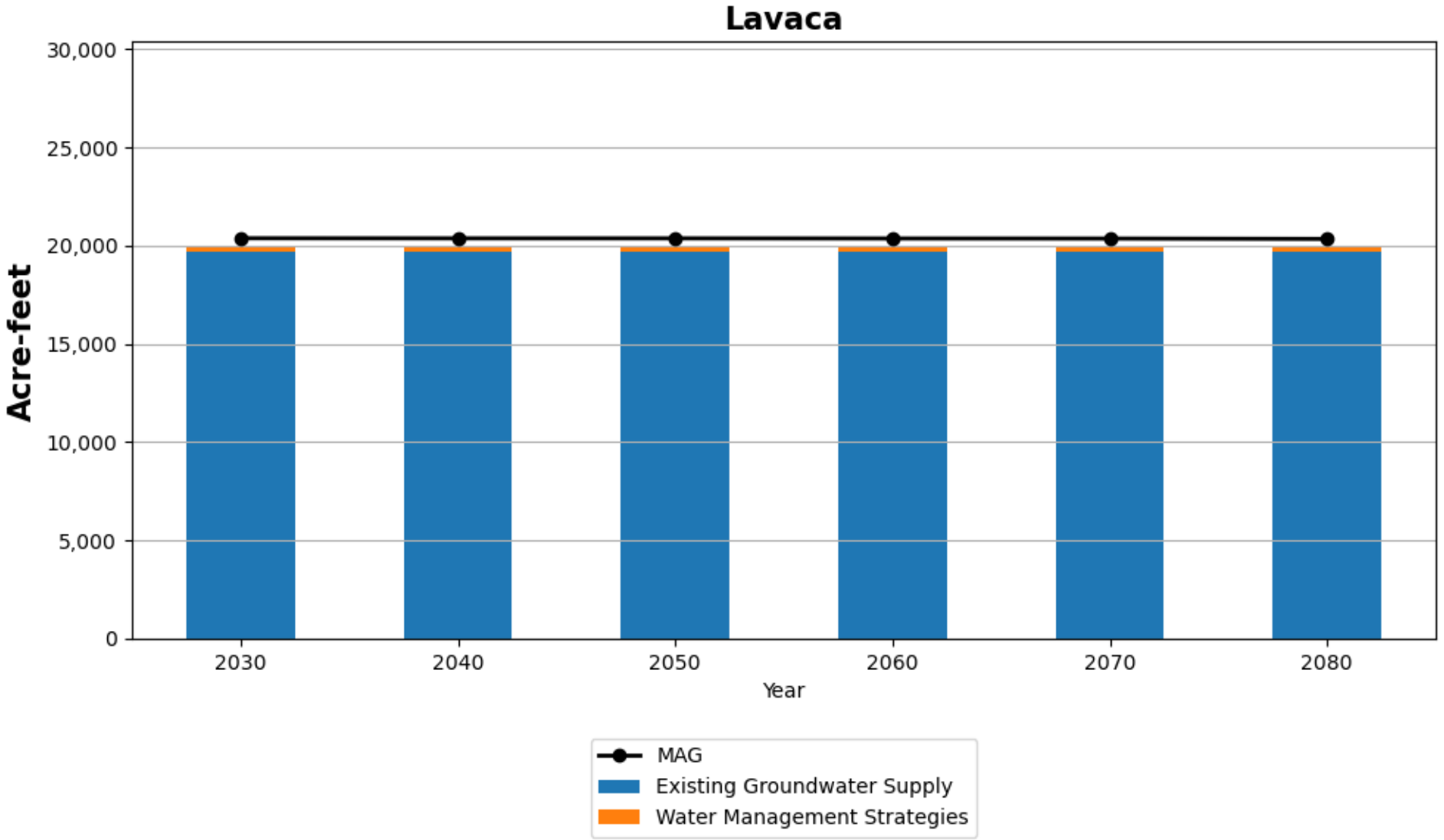
Jackson


Jackson
100,000
80,000
60,000
40,000
20,000
0
Acre-feet
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

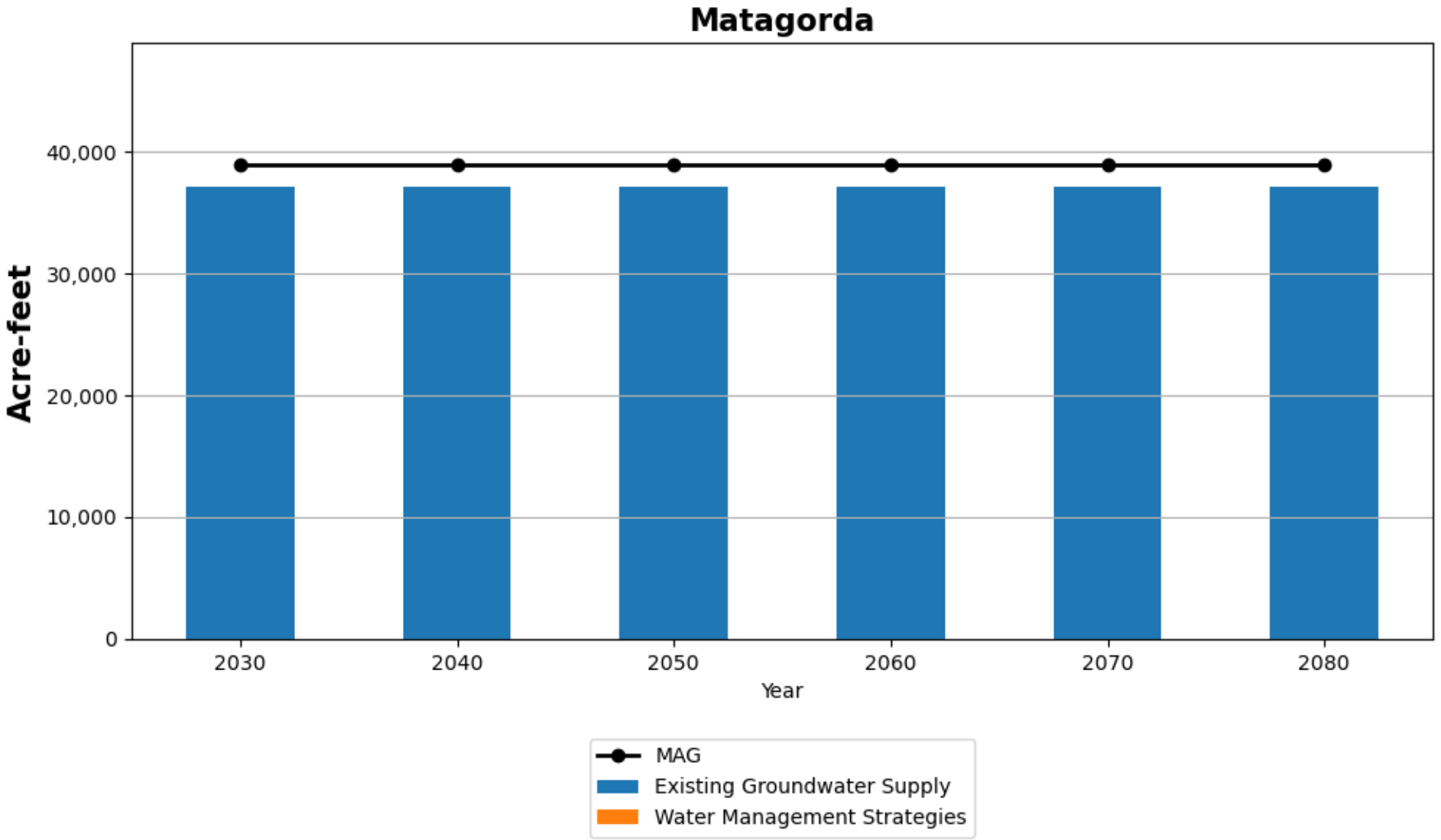
Karnes


Karnes
Acre-feet
20,000
17,500
15,000
12,500
10,000
7,500
5,000
2,500
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

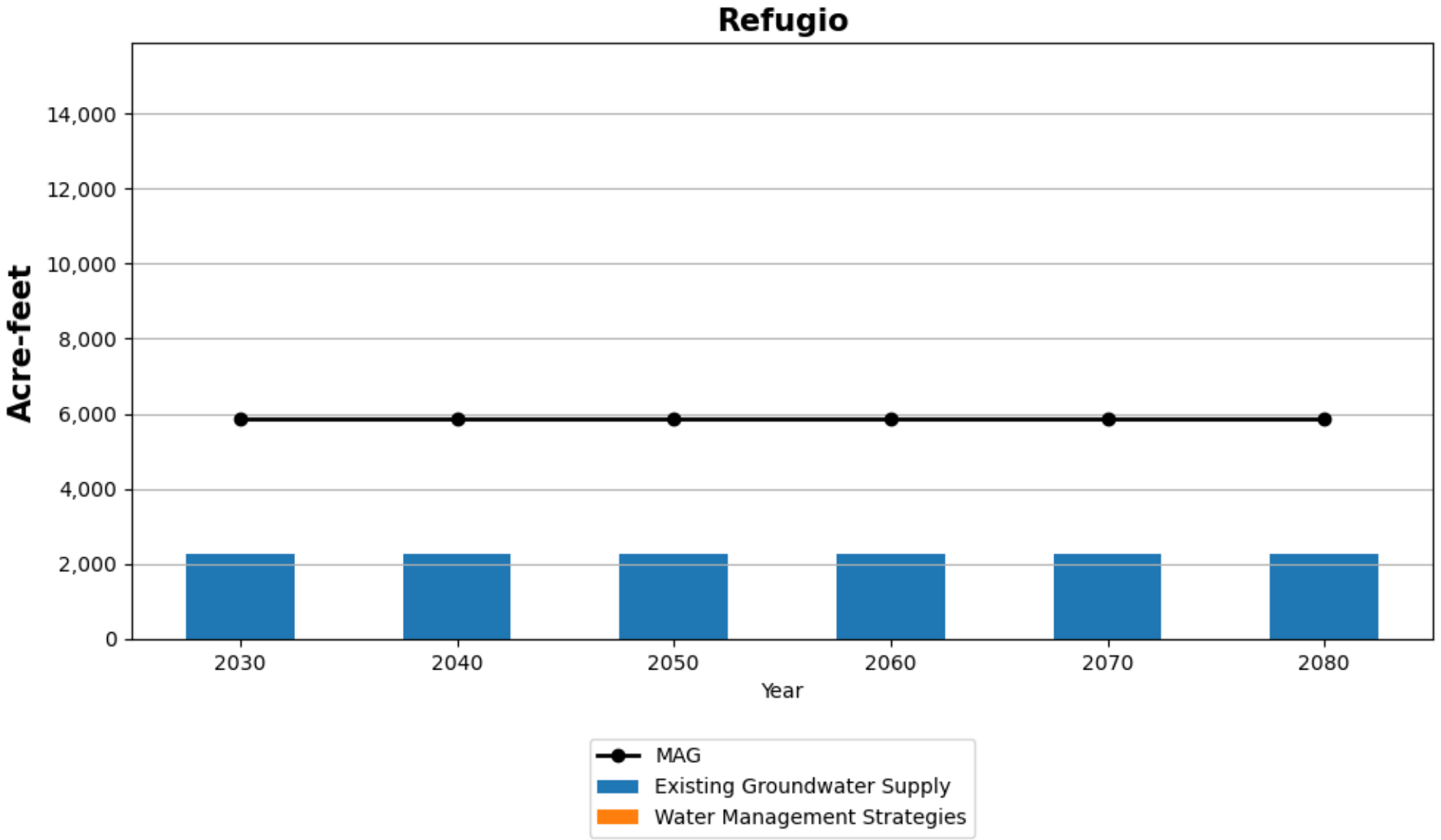
Lavaca


Lavaca
30,000
25,000
20,000
15,000
10,000
5,000
0
Acre-feet
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

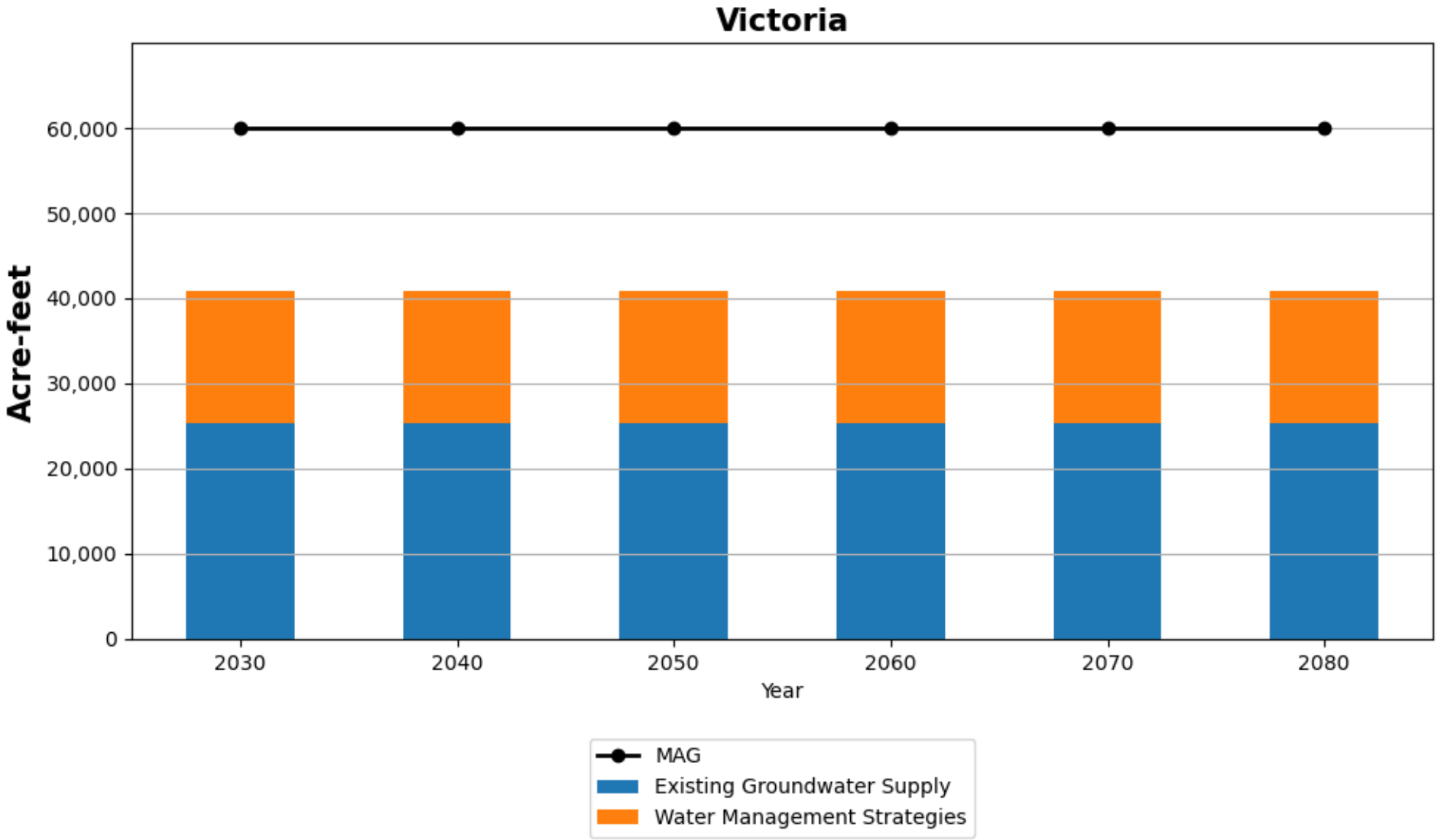
Matagorda


Matagorda
Acre-feet
40,000
30,000
20,000
10,000
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

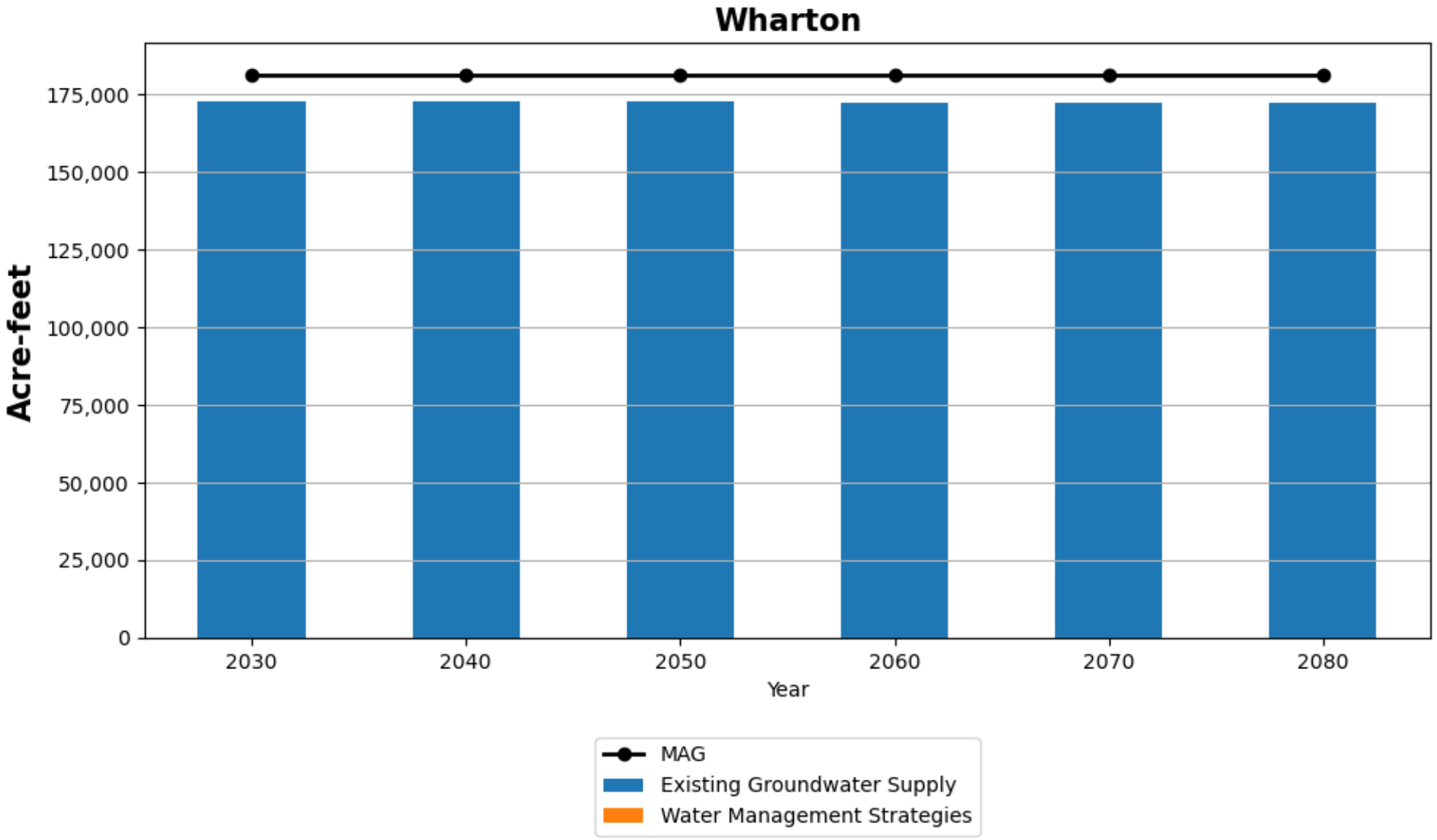
Refugio


Refugio
Acre-feet
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

Victoria


Victoria
Acre-feet
60,000
50,000
40,000
30,000
20,000
10,000
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

Wharton


Wharton
Acre-feet
175,000
150,000
125,000
100,000
75,000
50,000
25,000
0
2030
2040
2050
2060
2070
2080
Year
MAG
Existing Groundwater Supply
Water Management Strategies

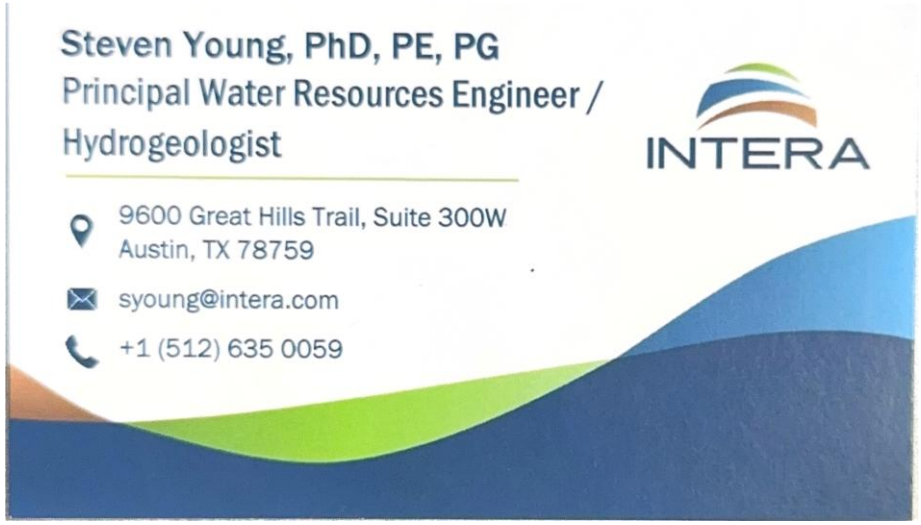
Summary

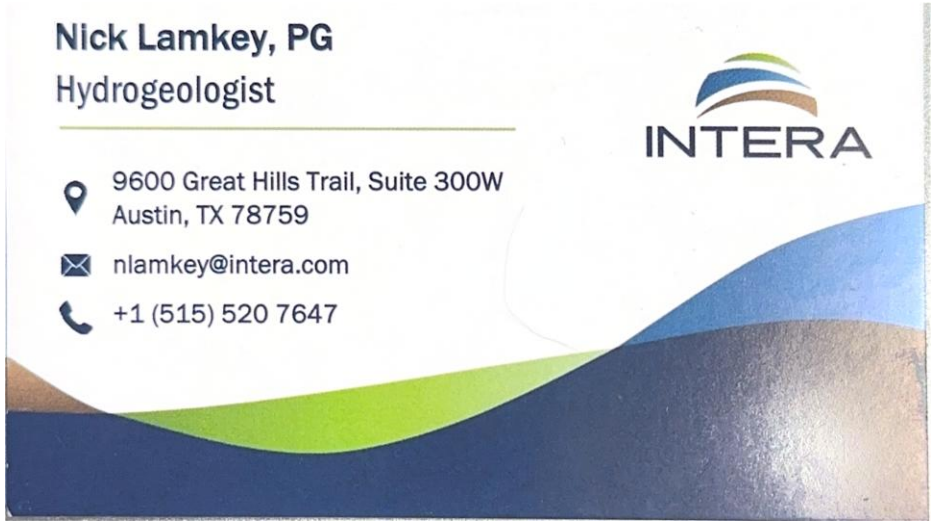
	Surface Water Supply	Groundwater Supply	Total Demand	Strategies	MAG	Needs
Aransas	2,949	453	3,599	0	1,547	0
Bee	2,418	6,012	9,353	5,704	7,989	624
Calhoun	61,412	2,448	78,125	0	7,611	17,914
Colorado	59,898	60,196	149,602	12,000	72,583	31,678
DeWitt	869	9,036	6,412	0	17,772	0
Fayette	30,495	2,458	26,569	0	8,590	201
Goliad	24,062	5,956	9,761	0	6,972	0
Jackson	11,432	81,799	98,727	217	90,571	5,516
Karnes	578	2,783	6,485	0	2,949	751
Lavaca	0	19,685	17,491	294	20,350	500
Matagorda	98,799	37,091	254,996	0	38,892	122,507
Refugio	231	2,282	2,175	0	5,858	0
Victoria	2,341	25,383	82,624	15,440	59,948	56,605
Wharton	41,538	172,424	290,068	0	181,446	86,362

* Demand includes total demand (including all groundwater and surface water sources)
* Surface Water Includes all sources of Surface water
* MAG GCAS 2080
* Groundwater supply GCAS 2080
* Strategies GCAS 2080
* Needs includes all water needs 2080

INTERA

Questions?


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F.3 Hydrological Conditions

GMA 15
Discussion of Nine Factors in TWC 36.108(d): Hydrologic Conditions

Groundwater Management Area 15

April 10, 2025



Presented by:
Steven Young Ph.D, PE, PG
Nick Lamkey PG
Shou Yang Ph.D,

Agenda

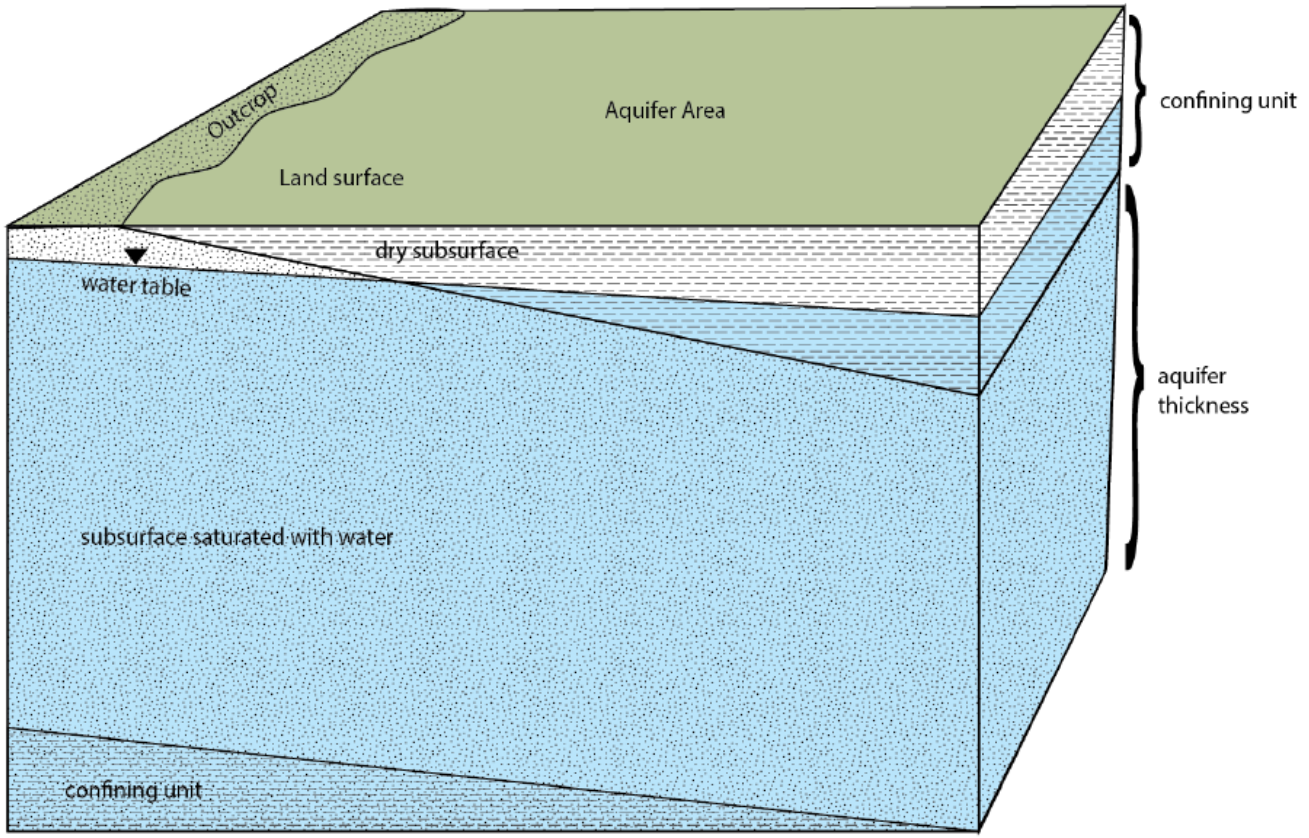
- Mechanics of Groundwater Storage
  - Unconfined Aquifer
  - Confined Aquifer
- Case Examples of Pumping Impacts
- Calculated TERS for GMA 15
- GAM Simulations with Updated TWDB Pumping
- Water Budgets

INTERA

Total Estimated Recoverable Storage (TERS)

Total Estimated Recoverable Storage—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

Texas Administrative Code Sec. 356.10



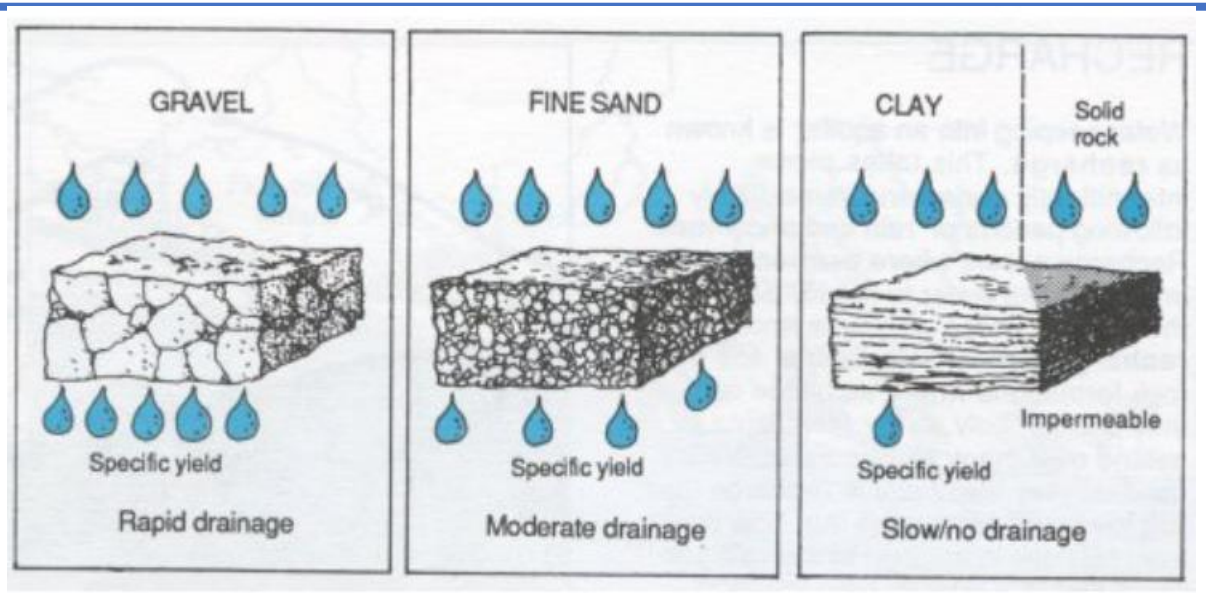
Storage volume = area x thickness x specific yield
(Plus some for the confined storage)

Water From Storage: Drainage

Specific Yield —is the ratio of the volume of water that a saturated rock or soil will yield by gravity to the total volume of the rock or soil

Factors affecting Specific yield

a) soild texture
b) time
c) depth to water table



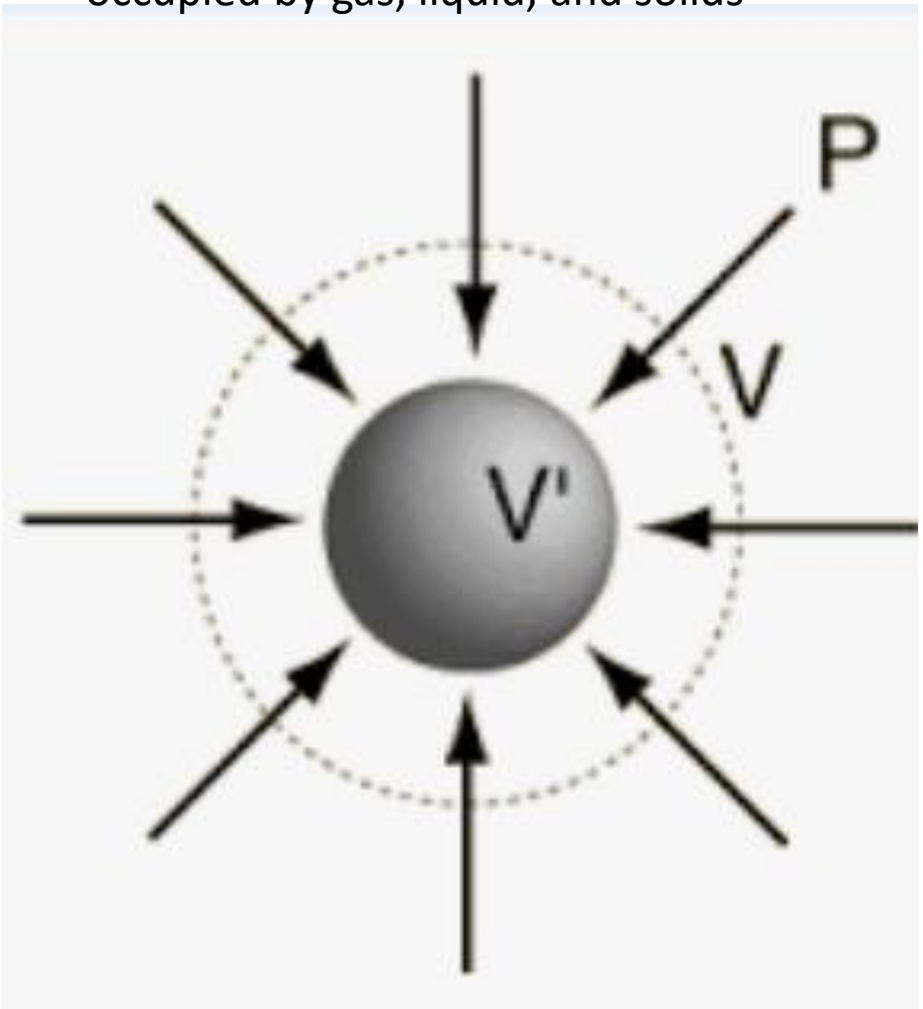
Formation	S_y (range) %
Clay	0 - 5
Sandy clay	3 - 12
Silt	3 - 19
Fine sand	10 - 28
Medium sand	15 - 32
Coarse sand	20 - 35
Gravelly sand	20 - 35
Fine gravel	21 - 35
Medium gravel	13 - 26
Coarse gravel	12 - 26
Limestone	

Water From Storage: Compressibility of Water

Specific Storage —terms used to account for the change in volume of groundwater as pressure change.

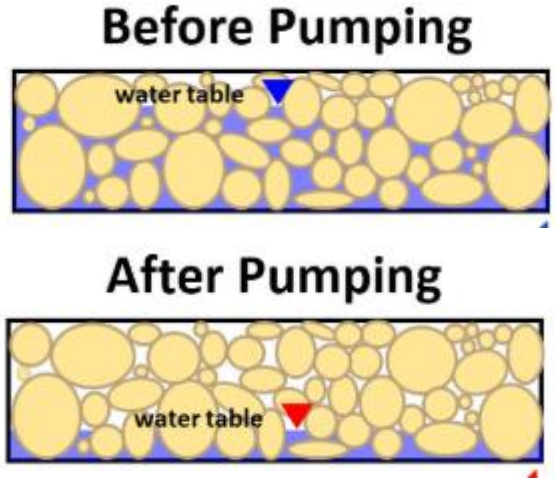
- Defined as change in volume per change in pressure.
- 1,000 to 100,000 times les that specific yield. Express as a percentage

Water and soil is compressible. Change in pressure affects the amount of space occupied by gas, liquid, and solids



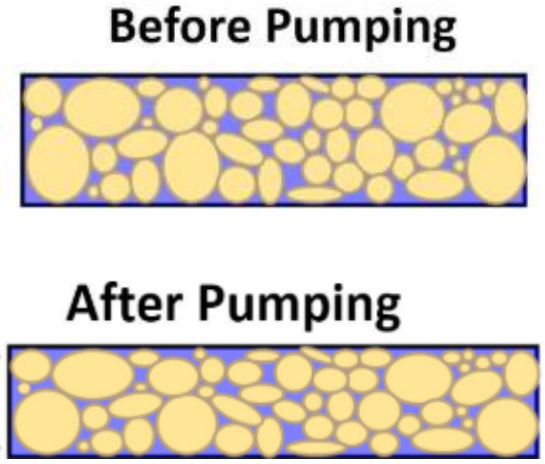
Water From Storage: Pumping Effects on Storage

Unconfined Aquifer



Water has drained from pores and has been replaced by air

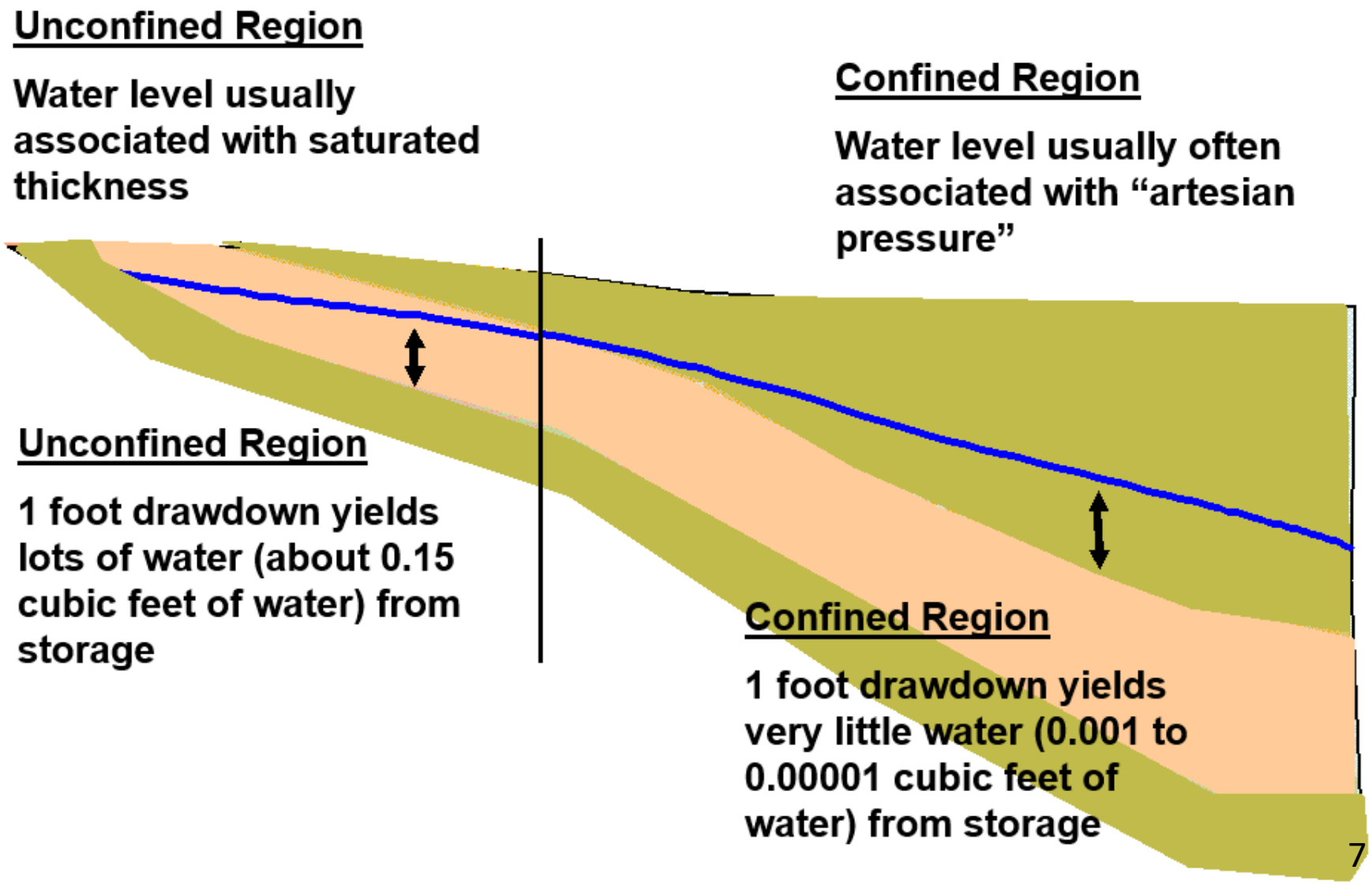
Confined Aquifer



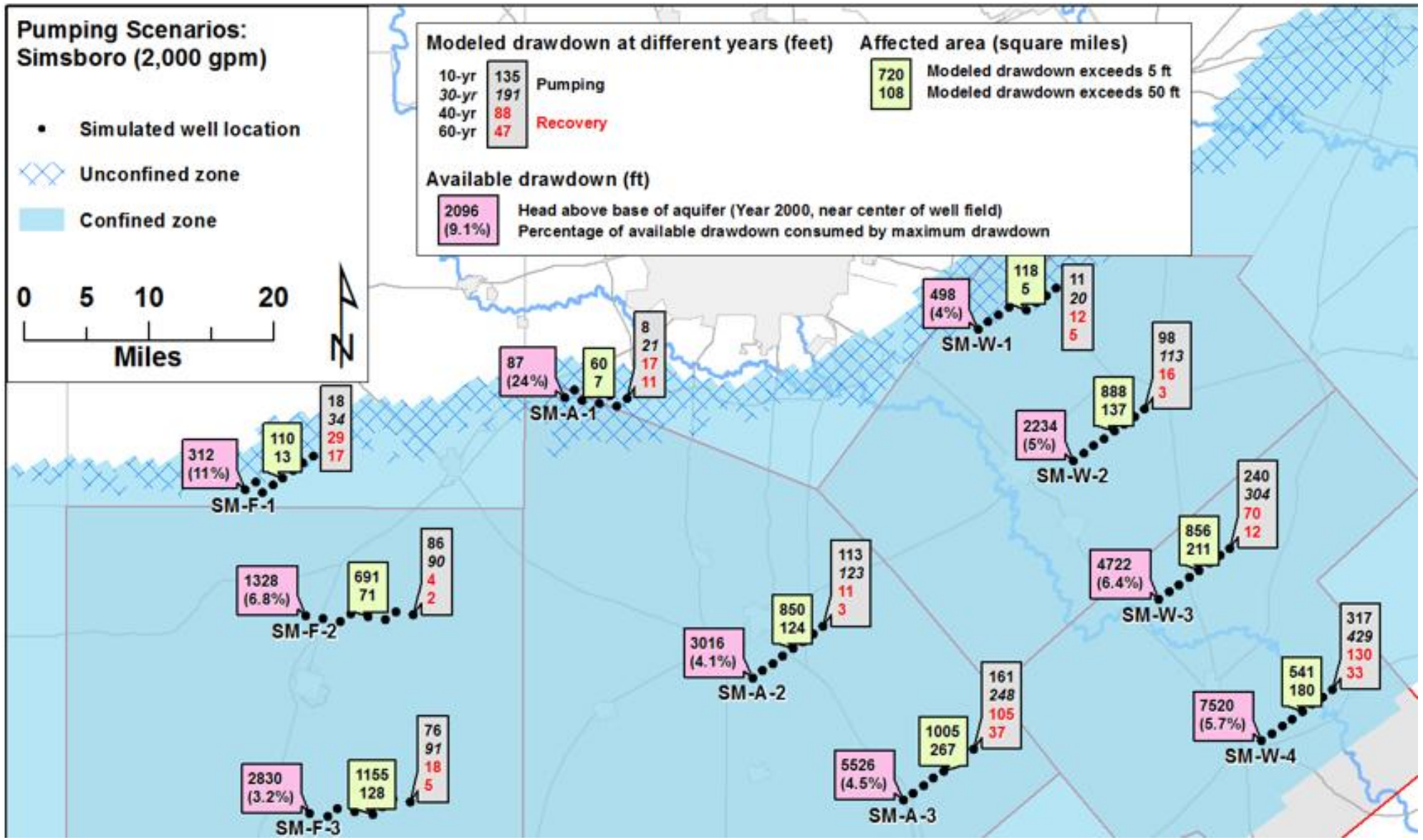
Water has expanded because of lowering of hydraulic presssure and soil has contracted be because of increase pressure or load from weight of soil above. Aquifer is a little smaller (subsidence)

Impacts from Pumping: Unconfined vs Confined

Pumping impacts on drawdown is site specific



Impacts from Pumping: Unconfined vs Confined

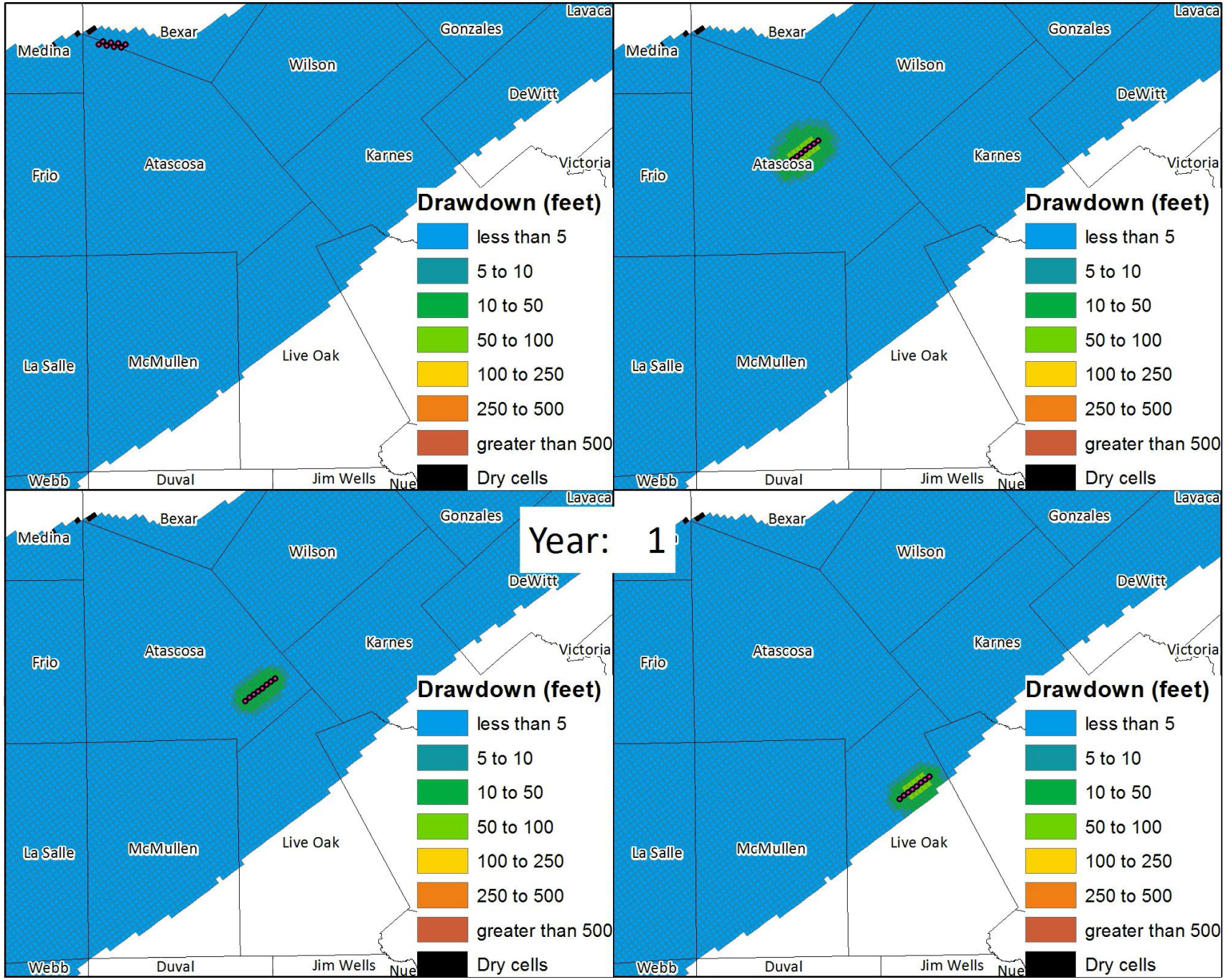


Impacts from Location of Pumping: MAG

GCD	Aquifer	MAG[1] (acre-feet per year)	Average Drawdown (feet) from 2011 to 2070 based on Pumping Distribution	
			Based on Run S-19	Based on Distributing Pumping from Run S-19 Across the Entire Aquifer by County
LPGCD	Carrizo	12,980	134	49
	Simsboro	79,945	238	61
POSGCD	Carrizo	18,206	146	56
	Simsboro	79,422	236	87

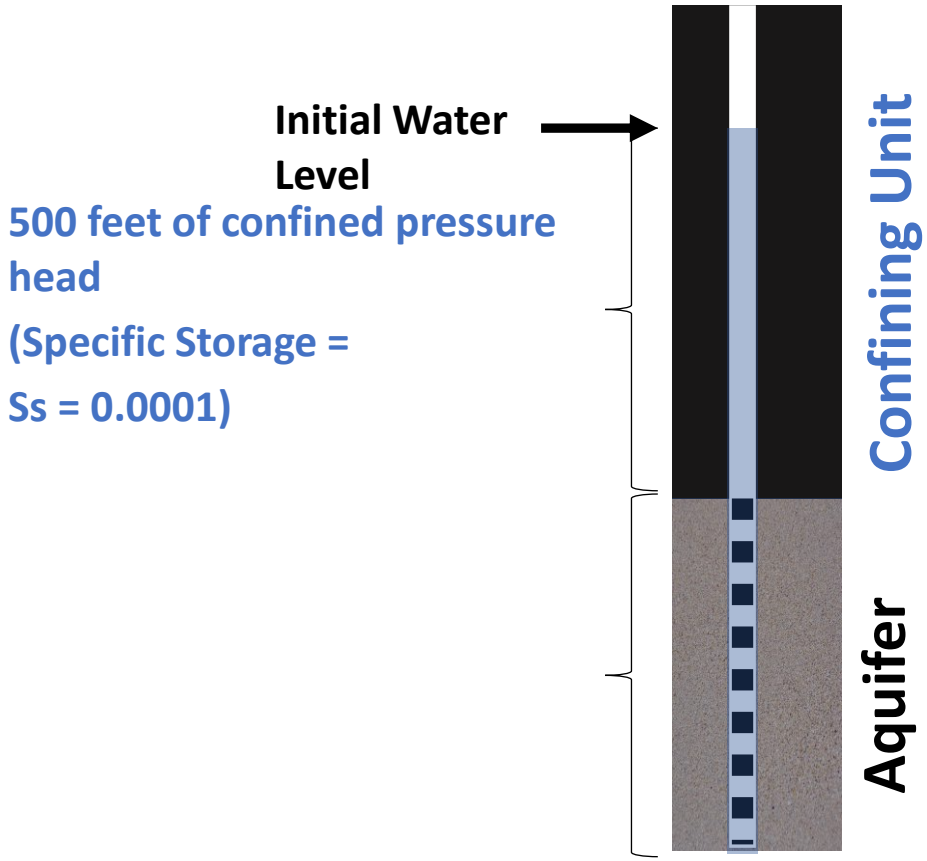
[1]modeled available groundwater

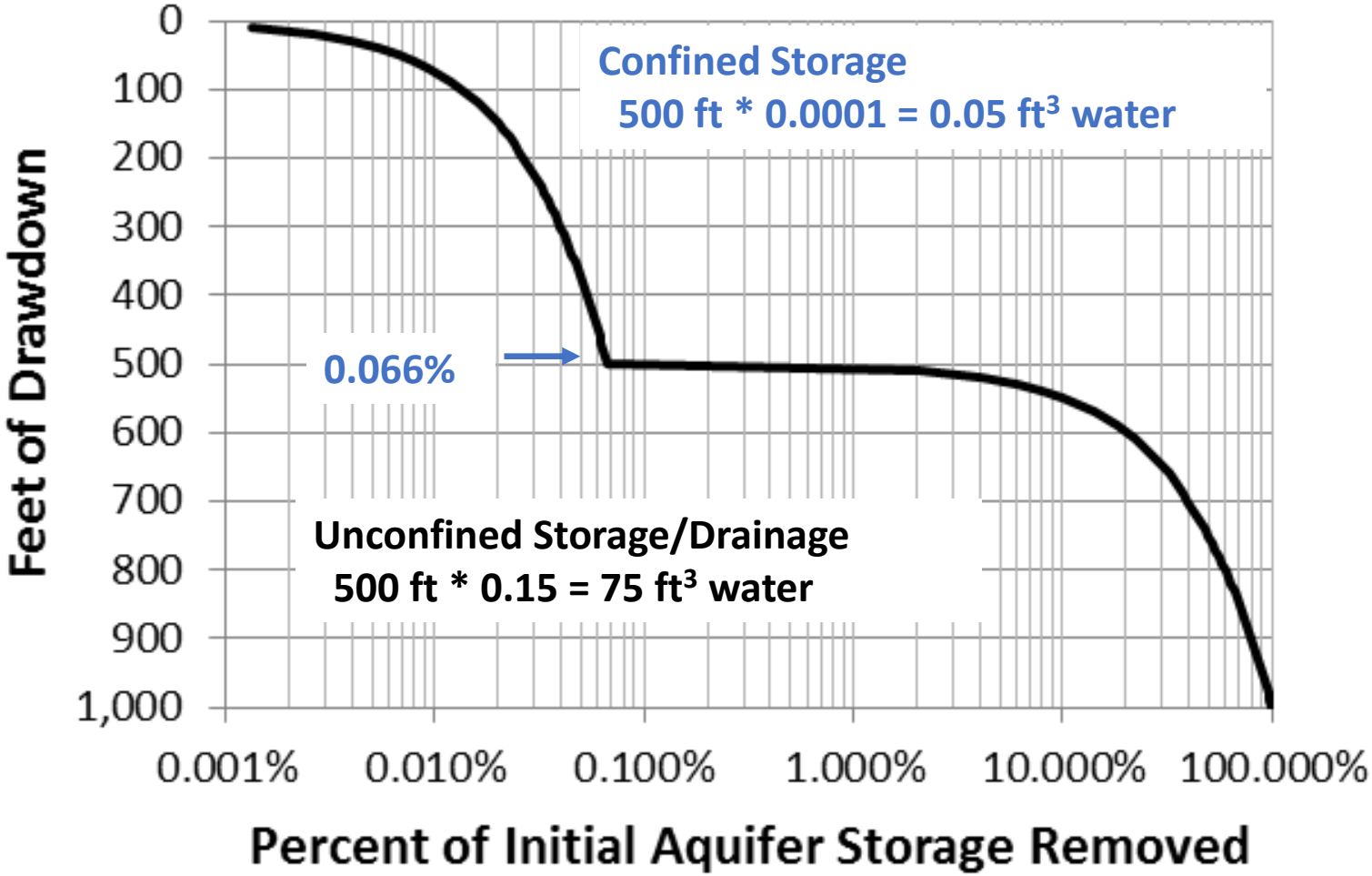
Texas Water Journal
Volume 15, Number 1, March 19, 2024
Pages 34-54


Year: 1
Drawdown (feet)
less than 5
5 to 10
10 to 50
50 to 100
100 to 250
250 to 500
greater than 500
Dry cells
Medina
Bexar
Wilson
Gonzales
Lavaca
DeWitt
Frio
Atascosa
Karnes
Victoria
La Salle
McMullen
Live Oak
Webb
Duval
Jim Wells

TERS: Example of Depletion of a Confined Aquifer

Example Aquifer





TERS: GMA 15 Aquifers

Gulf Coast

County	Total Storage (acre-feet)
Aransas	5,500,000
Bee	12,000,000
Calhoun	17,000,000
Colorado	28,000,000
De Witt	21,000,000
Fayette	3,900,000
Goliad	26,000,000
Jackson	45,000,000
Karnes	6,400,000
Lavaca	22,000,000
Matagorda	48,000,000
Refugio	23,000,000
Victoria	39,000,000
Wharton	72,000,000
Total	368,800,000

Aquifers Deemed Non Relevant

Carrizo-WIlcox

County	Total Storage (acre-feet)
De Witt	1,200,000
Fayette	16,000,000
Karnes	43,000,000
Lavaca	9,700,000
Total	69,900,000

Sparta

County	Total Storage (acre-feet)
Fayette	2,900,000
Total	2,900,000

Queen City

County	Total Storage (acre-feet)
Fayette	640,000
Total	640,000

Yegua Jackson

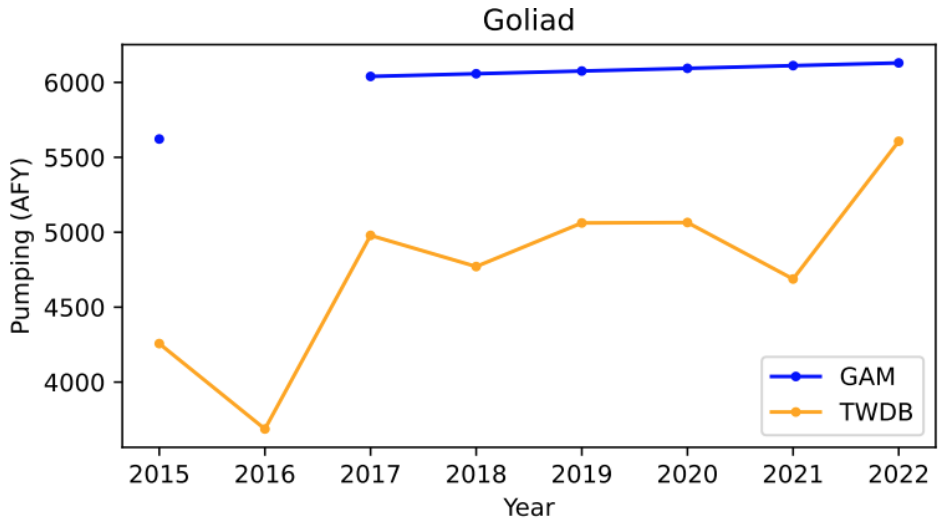
County	Total Storage (acre-feet)
Lavaca	620,000
Karnes	190,000
Total	810,000

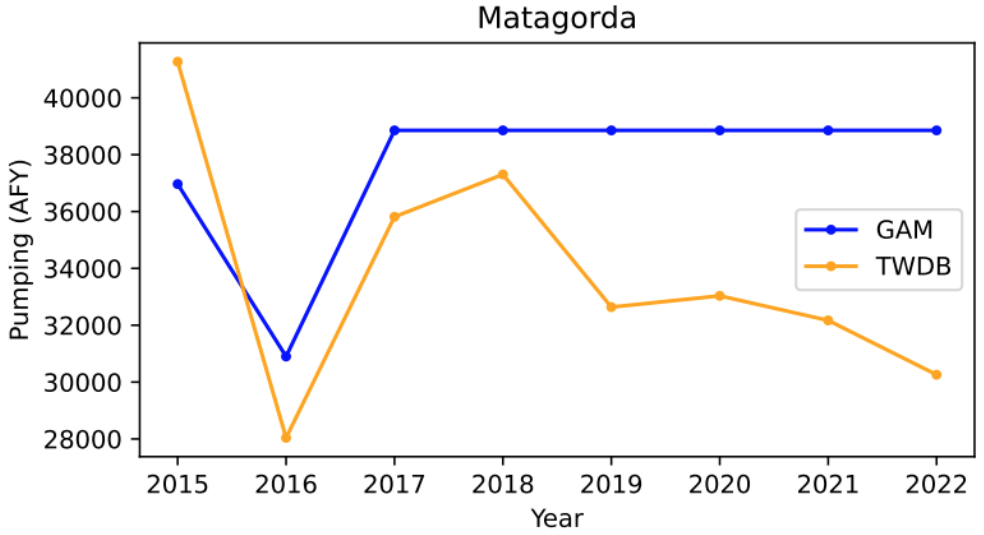
TERS: Considerations and Constraints

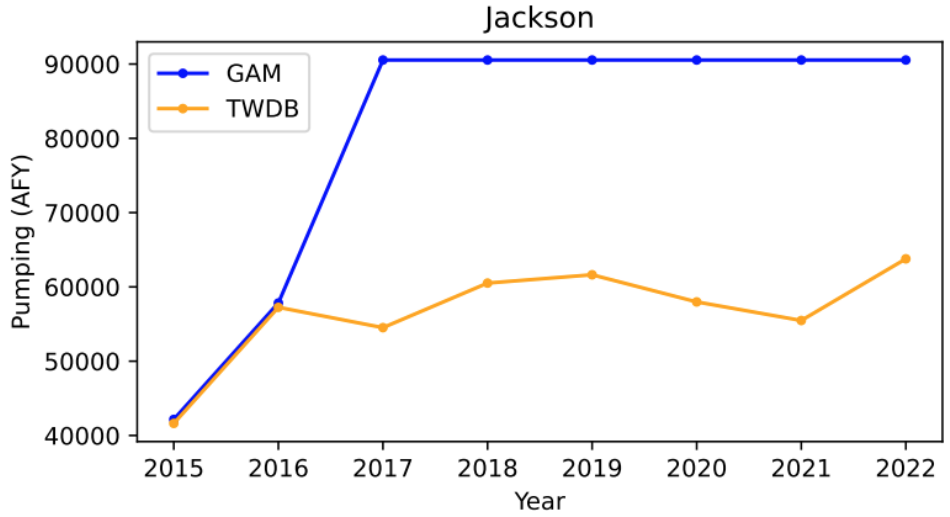
- TWDB Definition – between 25% and 75% of the porosity-adjusted aquifer volume

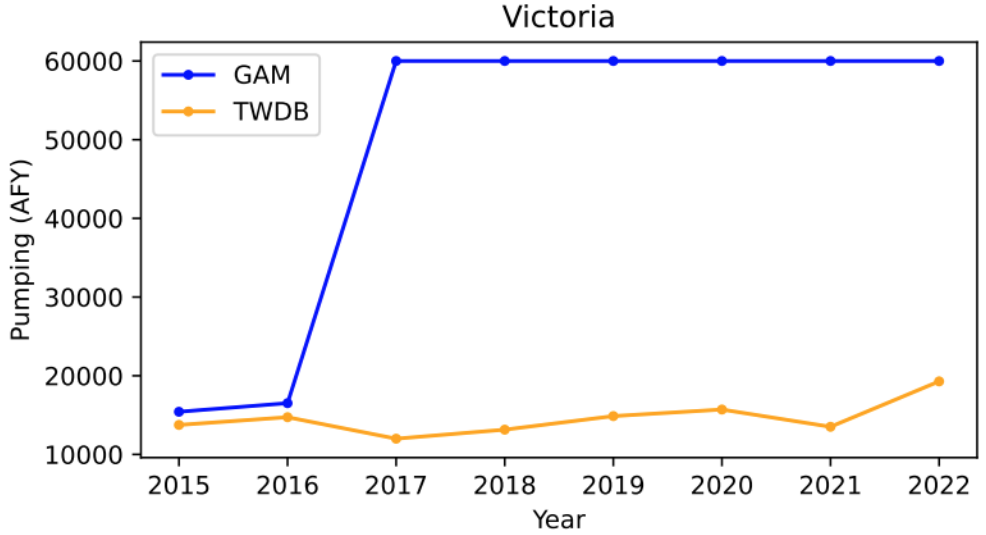
- No considerations
  - Unreasonable impacts
    - Groundwater & surface resources
    - Existing wells
  - Aquifer water quality
  - Water levels dropping below pumps
  - Land surface subsidence
  - Degradation of water quality
  - Changes to surface water-groundwater interaction
  - **Practicality/economics of development**
  - **Groundwater physics of removing of removing the**

Current GAM Pumping and Modification using TWDB Pumping







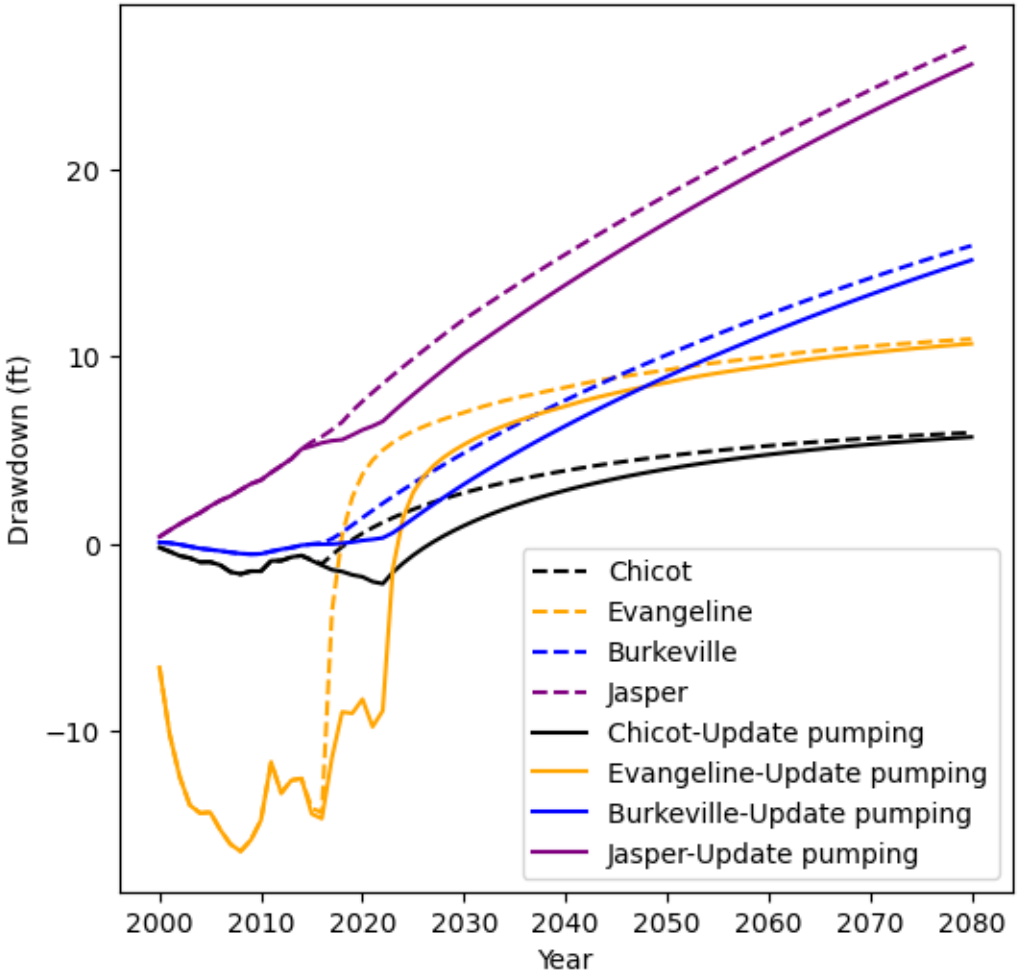


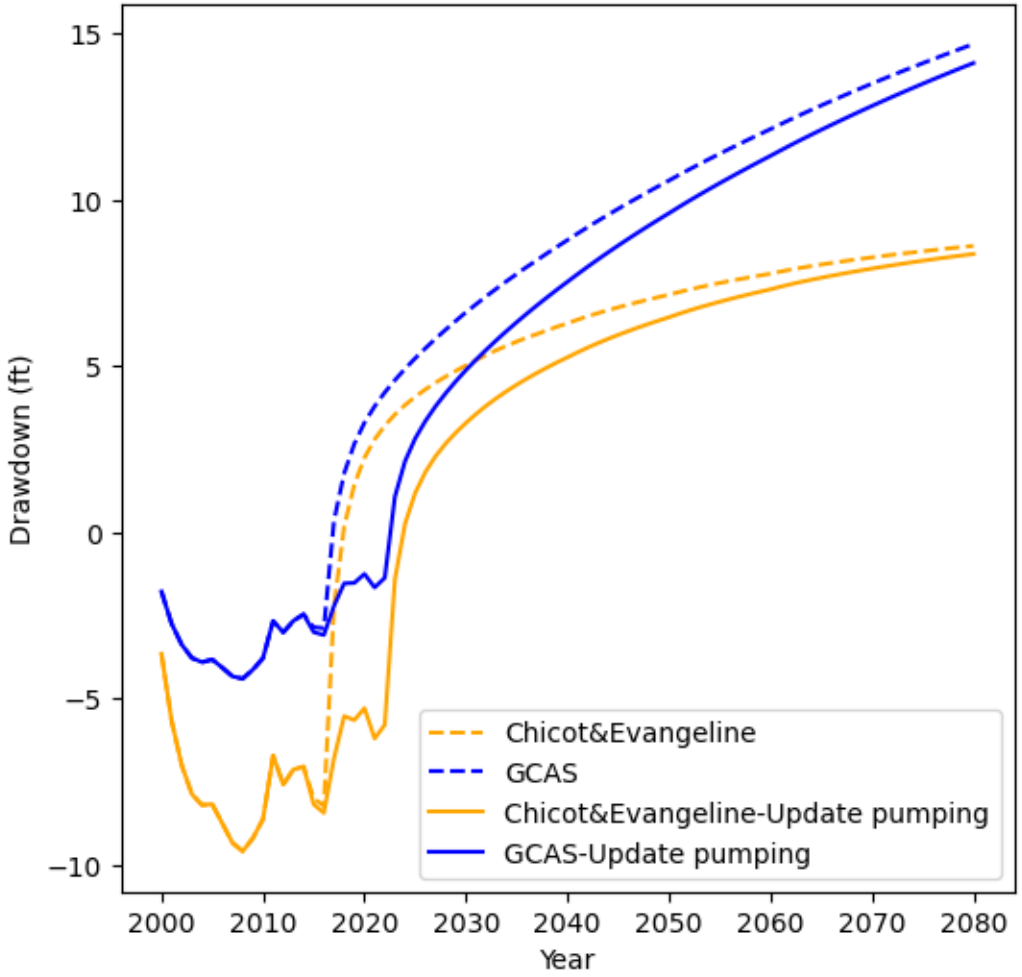
Note: Current GAM was calibrated to water levels in 1999

TWDB Factors Applied to GAM Pumping

County	Year							
	2015	2016	2017	2018	2019	2020	2021	2022
Aransas	0.36	0.36	0.24	0.19	0.18	0.35	0.35	0.36
Bee	0.79	0.81	0.19	0.19	0.17	0.18	0.19	0.24
Calhoun	0.57	0.53	0.11	0.14	0.13	0.13	0.15	0.14
Colorado	0.96	0.96	0.35	0.46	0.35	0.35	0.35	0.60
De witt	0.41	0.55	0.68	0.23	0.22	0.37	0.30	0.38
Fayette	0.22	0.23	0.23	0.20	0.11	0.20	0.17	0.25
Goliad	0.76		0.83	0.79	0.83	0.83	0.77	0.92
Jackson	0.98	0.99	0.60	0.67	0.68	0.64	0.61	0.70
Karnes	0.65	0.56	0.24	0.23	0.25	0.82	0.91	1.08
Lavaca	0.86	0.86	0.48	0.55	0.59	0.62	0.54	0.62
Matagorda	1.12	0.91	0.92	0.96	0.84	0.85	0.83	0.78
Refugio	0.81	0.84	0.35	0.30	0.32	0.36	0.33	0.34
Victoria	0.89	0.89	0.20	0.22	0.25	0.26	0.23	0.32
Wharton	0.94	0.95	0.64	0.71	0.59	0.68	0.44	0.47

Drawdown Predicted by Current GAM and GAM with Pumping Updated Using TWDB Pumping through 2022





Average drawdown relative to Jan. 2000 in GMA15 Predicted by the GAM.

DFC for Current GAM and GAM with TWDB Pumping through 20ww

Average Drawdown (Jan. 2000 – Dec. 2080) for Counties in GMA15 Predicted by the GAM and updated GAM.

County	Chicot		Evangeline		Chicot & Evangeline		Burkeville		Jasper		Gulf Coast Aquifer System	
	GAM	GAM-update pumping	GAM	GAM-update pumping	GAM	GAM-update pumping	GAM	GAM-update pumping	GAM	GAM-update pumping	GAM	GAM-update pumping
Fayette			11.3	11.3	11.3	11.3	42.6	42.5	53.7	53.6	44.4	44.3
Jackson	15.5	15	20.3	19.9	17.9	17.4	14	12.7	21.7	20.3	17.5	16.7
Refugio	-0.5	-0.5	6.9	6.9	3	3	2.5	2.3			2.9	2.9
Goliad	-4.3	-4.3	-1.9	-2	-2.4	-2.4	8.4	8.1	13.3	12.8	5.4	5.2
Karnes			0	-0.2	0	-0.2	22.3	21.8	27.1	25.6	23.4	22.3
Matagorda	4.7	4.6	17.2	16.9	9	8.9	15.8	15.1			9.7	9.5
De Witt	0.2	0.2	4.7	4.5	4	3.9	16.3	16.2	34.5	33.4	20.1	19.6
Victoria	-4	-4.1	5.6	5.5	1	0.9	4.8	4.2	8.2	7.2	3.2	2.9
Wharton	14.5	14	12.2	11.7	13.3	12.9	24.3	22.9	27.4	26.1	19.4	18.5
Colorado	12.2	11.7	25.8	25.4	19.7	19.3	23.7	22.5	28.2	26.9	23	22.1
Calhoun	-1.2	-1.2	9.8	9.7	2.6	2.6	2.9	2.7			2.7	2.6
Bee	0.9	0.8	7.9	7.8	5.6	5.4	7.5	6.9	5.9	5	6.2	5.8
Lavaca	7	6.5	6.8	6.5	6.9	6.5	16.5	15.7	32.2	31	18.1	17.3
Aransas	-0.2	-0.2	5.6	5.6	0.1	0.1					0.1	0.1
GMA15	5.9	5.7	10.9	10.7	8.6	8.4	15.9	15.1	26.7	25.6	14.7	14.1

Water Budget: Sources and Sinks

- Sources:
  - recharge from precipitation;
  - flow from rivers;
  - lateral inflow;
  - vertical flow from other aquifers
  - Storage in place
- Sinks
  - pumping;
  - evapotranspiration;
  - flow to rivers;
  - lateral outflow;
  - vertical flow to other aquifers
  - storage in place

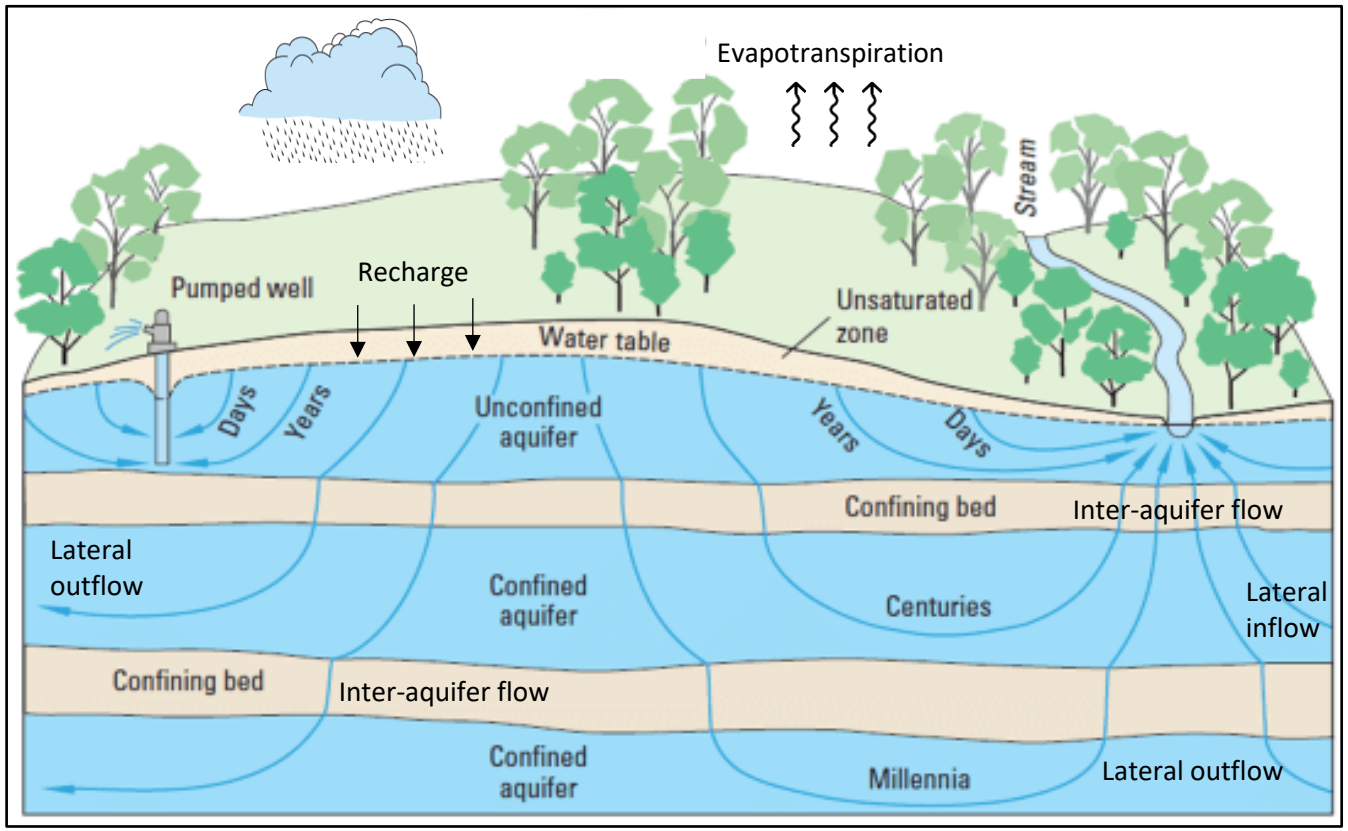
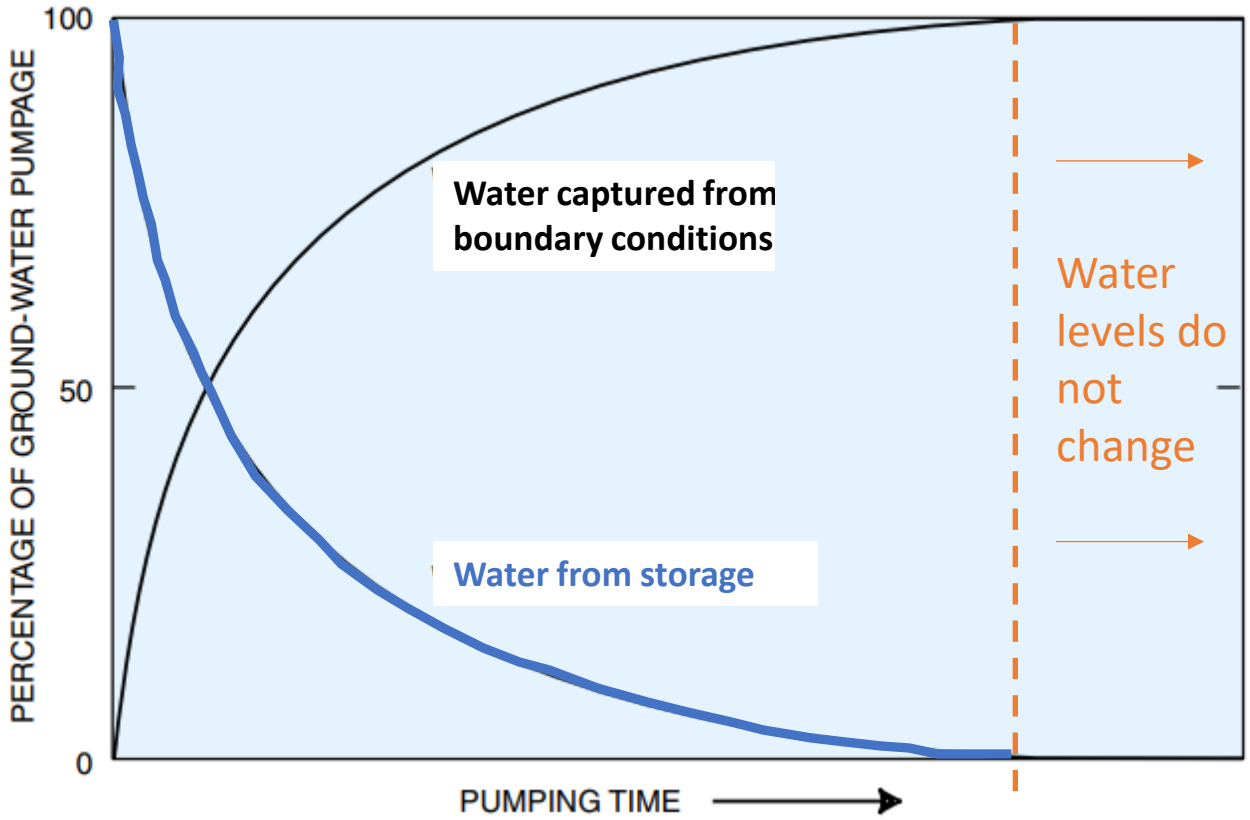


Illustration of water budget components in an aquifer system.

Water Budget: Evolution over Time

- Sources for Pumped Water
  - Initial water is from aquifer itself (storage)
  - As cone-of-depression spreads outwards, additional sources of water besides storage
  - At very late times, cone-of-depression stops migration and water levels remains constant
  - At very late times, all water is from boundary conditions
- Hydraulic Boundary Conditions
  - Streams, lakes, creeks, springs
  - Recharge from precipitation
  - Adjacent aquifers



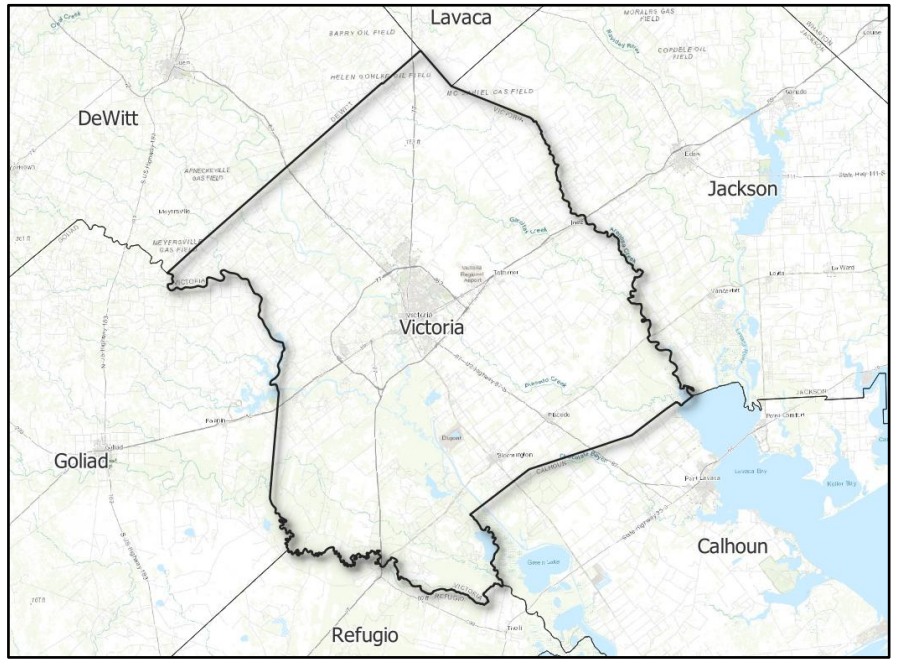
Water Budget: Entire Gulf Coast

Water inflow to Gulf Coast Aquifer System in Victoria County.

Boundary Conditions	Pre-Dev.	1981	1990	1991	2000	2010	2020	2080
Storage	0.0	2272.57	14175.72	1128.26	696.14	585.8	963.57	724.38
River Leakage	0.0	1053.38	1055.79	1055.79	1055.79	1044.3	1048.75	1055.79
Head Dep Bounds	0.0	374.63	0.0	0.0	0.0	0.0	0.0	0.0
Recharge	8131.96	31188.51	20228.97	35419.19	25557.23	25557.23	25557.23	25557.23
Stream Leakage	41644.59	52727.85	7759.26	23695.09	62761.67	43306.52	41908.0	57578.28
Lavaca County	441.22	647.83	571.12	564.92	592.1	526.87	502.64	603.45
Dewitt County	5351.76	7626.66	6526.96	7033.51	6573.62	6029.87	5800.85	6955.75
Jackson County	1959.2	2412.3	1523.69	1535.75	3085.91	2067.14	1953.07	2095.42
Goliad County	4114.05	5445.17	5650.62	5413.37	5262.28	4677.24	4498.91	5692.62
Calhoun County	2880.97	2470.69	1168.79	1198.65	1233.65	2820.11	2956.9	3430.59
Refugio County	1554.92	2069.53	1928.3	1881.73	1950.28	1624.68	1883.81	3298.57

Water outflow of Gulf Coast Aquifer System in Victoria County.

Boundary Conditions	Pre-Dev.	1981	1990	1991	2000	2010	2020	2080
Storage	0.0	25767.37	1319.31	19278.19	46644.01	6014.94	1444.44	0.0
Drains	1634.95	250.61	97.66	116.57	973.36	1630.33	1646.44	1331.15
Et	0.0	1273.12	610.46	599.49	801.68	1011.97	1026.38	870.96
Head Dep Bounds	778.45	0.0	48.55	76.85	322.52	569.66	606.3	391.71
Stream Leakage	42249.3	21557.85	17580.93	20109.85	20706.5	41072.46	41464.03	22752.33
Wells	0.0	39938.26	26872.58	24052.69	24815.23	15384.21	15736.37	59995.01
Lavaca County	1205.92	1317.66	1054.85	1019.72	1323.98	1451.5	1491.16	1262.43
Dewitt County	44.33	37.91	0.0	0.0	0.0	0.0	0.0	3.65
Jackson County	7757.89	12883.83	7362.33	8027.89	5781.64	8304.62	11485.07	9482.05
Goliad County	1520.65	1403.09	1258.65	1164.21	1484.6	1709.64	1728.07	1469.32
Calhoun County	8691.53	1802.05	2630.4	2631.92	3950.18	8375.51	7889.1	7635.34
Refugio County	2195.66	2057.15	1753.35	1848.76	1942.34	2713.47	2556.38	1798.33



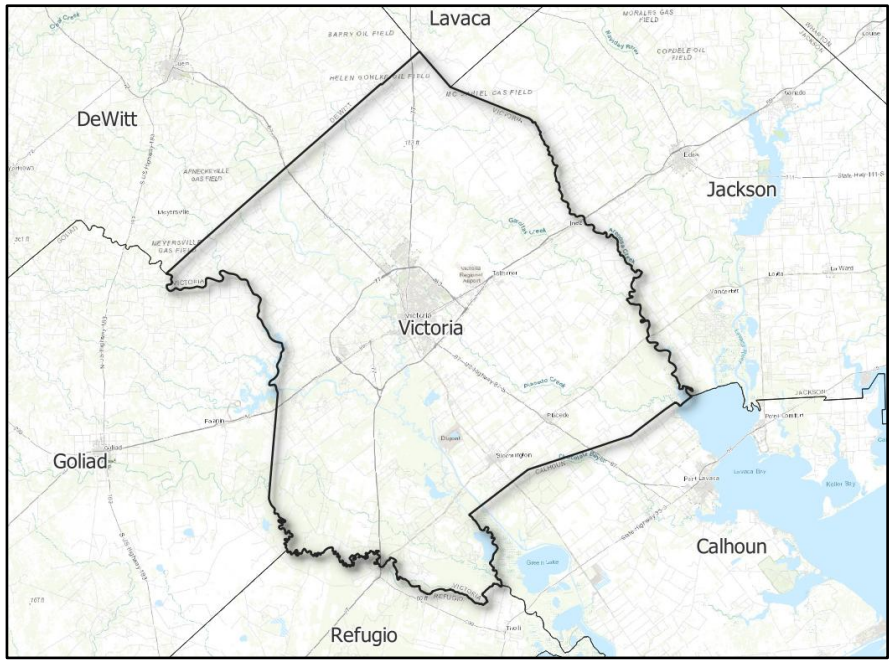
*Unit: AFY.

Water Budget: Entire Gulf Coast

Net flow to Gulf Coast Aquifer System in Victoria County.

Boundary Conditions	Pre-Dev.	1981	1990	1991	2000	2010	2020	2080
Storage	0.0	-23494.8	12856.42	-18149.93	-45947.87	-5429.14	-480.87	724.38
Drains	-1634.95	-250.61	-97.66	-116.57	-973.36	-1630.33	-1646.44	-1331.15
River Leakage	0.0	1053.38	1055.79	1055.79	1055.79	1044.3	1048.75	1055.79
Et	0.0	-1273.12	-610.46	-599.49	-801.68	-1011.97	-1026.38	-870.96
Head Dep Bounds	-778.45	374.63	-48.55	-76.85	-322.52	-569.66	-606.3	-391.71
Recharge	8131.96	31188.51	20228.97	35419.19	25557.23	25557.23	25557.23	25557.23
Stream Leakage	-604.71	31170.0	-9821.67	3585.24	42055.17	2234.07	443.97	34825.94
Wells	0.0	-39938.26	-26872.58	-24052.69	-24815.23	-15384.21	-15736.37	-59995.01
Lavaca County	-764.69	-669.83	-483.72	-454.8	-731.89	-924.63	-988.53	-658.97
Dewitt County	5307.43	7588.75	6526.96	7033.51	6573.62	6029.87	5800.85	6952.09
Jackson County	-5798.68	-10471.52	-5838.64	-6492.14	-2695.74	-6237.48	-9532.0	-7386.63
Goliad County	2593.4	4042.08	4391.97	4249.16	3777.68	2967.6	2770.84	4223.31
Calhoun County	-5810.57	668.63	-1461.61	-1433.27	-2716.53	-5555.4	-4932.2	-4204.75
Refugio County	-640.74	12.38	174.94	32.96	7.94	-1088.79	-672.57	1500.24

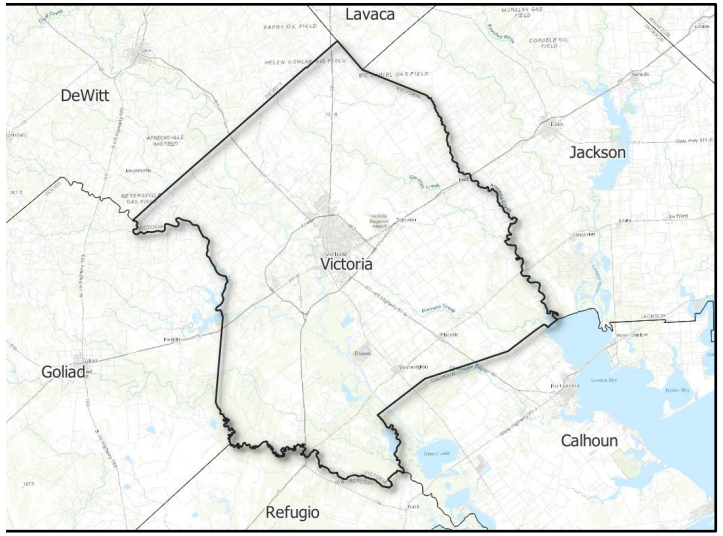
*Unit: AFY.



Water Budget: Gulf Coast Aquifer – Chicot, Evangeline Inflows

Table 79: Victoria county Inflows (Units: Acre-Feet per Year)

	Boundary Conditions	Pre-Dev.	1981	1990	1991	2000	2010	2020	2080
Chicot	Storage	0.0	720.26	12802.22	311.34	66.97	153.99	698.09	172.27
	River Leakage	0.0	1053.38	1055.79	1055.79	1055.79	1044.3	1048.75	1055.79
	Head Dep Bounds	0.0	374.63	0.0	0.0	0.0	0.0	0.0	0.0
	Recharge	7579.37	30511.28	19717.49	34363.59	24815.13	24815.13	24815.13	24815.13
	Stream Leakage	40393.27	50987.58	7235.9	22143.72	60252.12	41499.65	40293.7	54998.49
	Lavaca County	293.03	348.44	337.11	323.13	350.44	316.22	314.3	360.11
	Dewitt County	1132.26	1497.62	1457.65	1843.12	1469.88	1281.28	1238.47	1431.28
	Jackson County	1392.18	1661.22	943.8	932.27	2509.33	1547.94	1372.32	1448.58
	Goliad County	755.49	1058.68	1056.71	1087.6	1018.3	1065.83	1055.49	1032.59
	Calhoun County	2856.24	2016.3	923.6	963.46	888.06	2689.37	2771.54	2593.93
	Refugio County	1052.75	1086.27	1098.67	1058.82	1124.5	1031.64	1039.03	1317.59
	Evangeline Aquifer	4299.89	307.46	399.27	420.49	382.37	1348.94	1143.15	62.16
Evangeline	Storage	0.0	17.01	453.13	0.0	32.7	357.27	194.75	9.55
	Recharge	552.59	677.23	511.48	1055.6	742.1	742.1	742.1	742.1
	Stream Leakage	1251.31	1740.27	523.36	1551.37	2509.56	1806.87	1614.31	2579.79
	Lavaca County	137.6	284.82	219.84	227.71	227.79	197.1	176.45	233.31
	Dewitt County	3817.18	5728.28	4671.75	4795.13	4712.35	4370.07	4241.02	5230.66
	Jackson County	547.21	707.1	540.28	564.85	547.27	495.1	556.67	625.34
	Goliad County	3095.76	4099.69	4299.06	4029.84	3943.45	3309.6	3142.44	4347.62
	Calhoun County	24.51	454.07	244.86	234.85	345.24	130.38	185.0	836.21
	Refugio County	500.54	981.52	827.86	821.15	824.0	591.25	842.98	1978.72
	Chicot Aquifer	2130.52	14023.7	9871.74	9326.43	12660.51	6944.18	6380.22	16305.63
	Burkeville Aquifer	567.03	2177.66	1488.79	1297.39	1121.24	272.55	218.36	1037.69

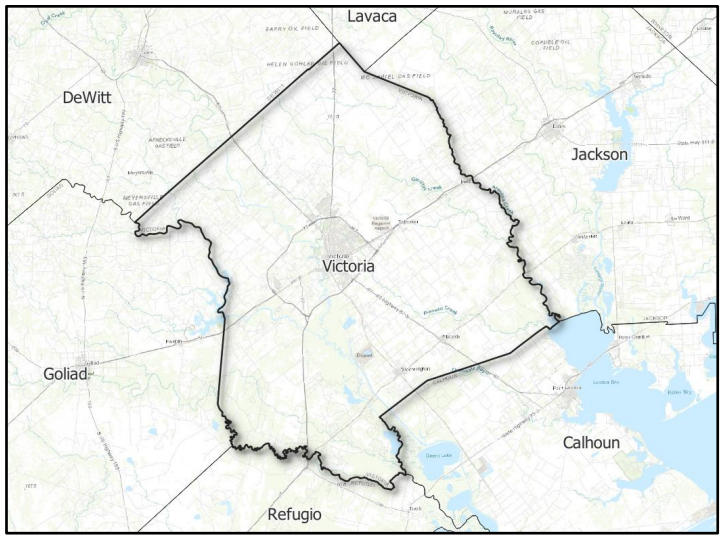


*Unit: AFY.

Water Budget: Gulf Coast Aquifer – Chicot, Evangeline Outflows

Table 80: Victoria county Outflows (Units: Acre-Feet per Year)

	Boundary Conditions	Pre-Dev.	1981	1990	1991	2000	2010	2020	2080
Chicot	Storage	0.0	25355.34	1043.5	17758.31	45905.49	5500.09	875.39	0.0
	Drains	1634.95	250.61	97.66	116.57	973.36	1630.33	1646.44	1331.15
	Et	0.0	1251.82	592.29	580.58	775.75	985.19	999.33	845.16
	Head Dep Bounds	778.45	0.0	48.55	76.85	322.52	569.66	606.3	391.71
	Stream Leakage	37533.7	18884.76	15338.27	17367.62	17906.88	37406.31	37441.58	20878.0
	Wells	0.0	18599.17	11263.44	9520.58	4772.71	5977.59	8429.93	32146.81
	Lavaca County	755.75	694.73	458.1	453.26	696.77	789.91	852.15	704.22
	Dewitt County	44.33	37.91	0.0	0.0	0.0	0.0	0.0	1.84
	Jackson County	6837.83	9108.51	4455.47	5351.4	4362.7	6508.66	8487.72	7110.98
	Goliad County	673.07	677.3	468.27	495.33	554.81	771.31	773.2	608.81
	Calhoun County	7836.48	1359.23	2254.48	2231.01	3666.86	7714.91	7344.95	7628.7
	Refugio County	1529.42	1379.85	1136.32	1225.27	1313.66	1995.4	1950.71	1334.91
	Evangeline Aquifer	2130.52	14023.7	9871.74	9326.43	12660.51	6944.18	6380.22	16305.63
Evangeline	Storage	0.0	409.89	205.58	1362.56	595.12	0.04	0.0	0.0
	Et	0.0	21.3	18.17	18.91	25.93	26.78	27.05	25.8
	Stream Leakage	4715.6	2673.09	2242.66	2742.24	2799.62	3666.15	4022.44	1874.33
	Wells	0.0	21339.09	15609.14	14532.11	20042.52	9406.62	7306.44	27848.21
	Lavaca County	434.04	608.51	581.99	551.64	610.88	643.27	617.42	526.09
	Jackson County	882.33	3757.03	2887.11	2656.41	1394.42	1759.74	2947.41	2309.36
	Goliad County	773.15	653.47	717.74	596.44	857.47	864.72	885.14	788.98
	Calhoun County	854.17	442.2	375.35	400.34	282.78	660.05	543.61	6.39
	Refugio County	663.96	675.05	614.79	621.24	626.43	715.83	603.43	461.45
	Chicot Aquifer	4299.89	307.46	399.27	420.49	382.37	1348.94	1143.15	62.16
	Burkeville Aquifer	1.11	4.26	0.35	1.94	46.92	123.65	200.0	23.7

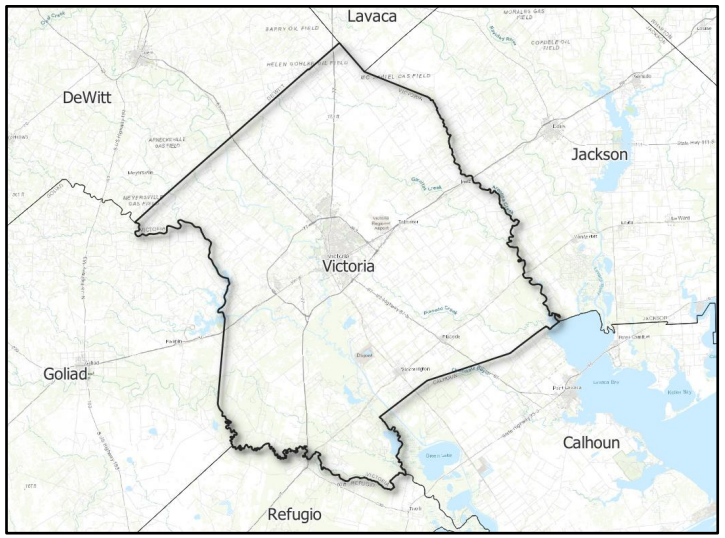


*Unit: AFY.

Water Budget: Gulf Coast Aquifer – Chicot, Evangeline Net

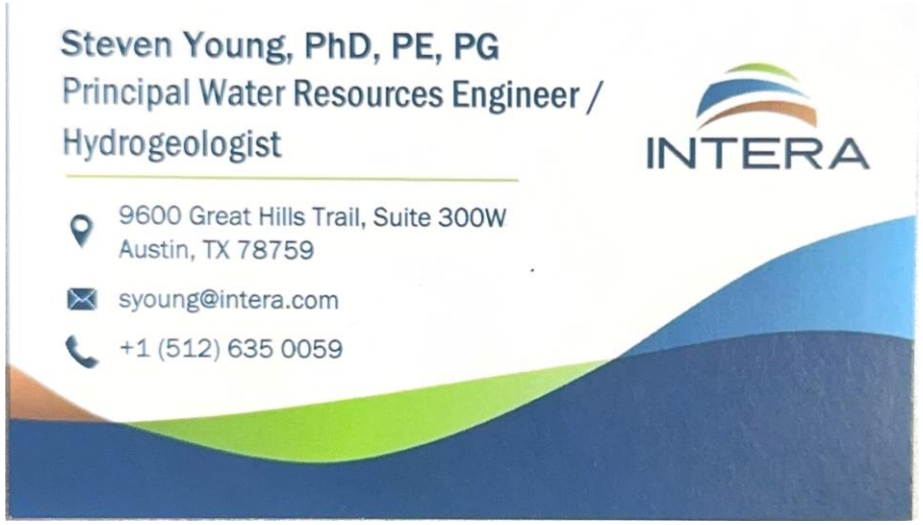
Table 81: Victoria county Nets (Units: Acre-Feet per Year)

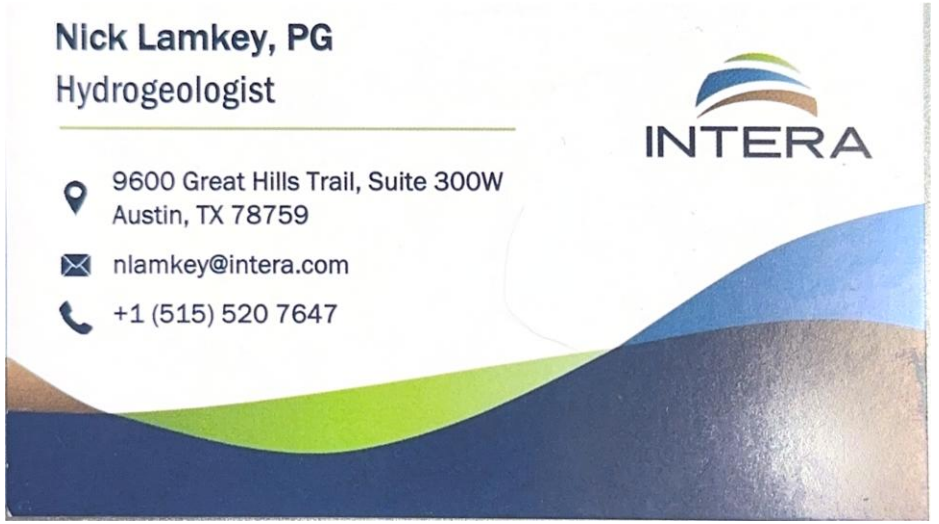
	Boundary Conditions	Pre-Dev.	1981	1990	1991	2000	2010	2020	2080
Chicot	Storage	0.0	-24635.08	11758.73	-17446.97	-45838.51	-5346.1	-177.29	172.27
	Drains	-1634.95	-250.61	-97.66	-116.57	-973.36	-1630.33	-1646.44	-1331.15
	River Leakage	0.0	1053.38	1055.79	1055.79	1055.79	1044.3	1048.75	1055.79
	Et	0.0	-1251.82	-592.29	-580.58	-775.75	-985.19	-999.33	-845.16
	Head Dep Bounds	-778.45	374.63	-48.55	-76.85	-322.52	-569.66	-606.3	-391.71
	Recharge	7579.37	30511.28	19717.49	34363.59	24815.13	24815.13	24815.13	24815.13
	Stream Leakage	2859.58	32102.82	-8102.37	4776.1	42345.24	4093.35	2852.11	34120.49
	Wells	0.0	-18599.17	-11263.44	-9520.58	-4772.71	-5977.59	-8429.93	-32146.81
	Lavaca County	-462.72	-346.29	-120.98	-130.13	-346.33	-473.69	-537.85	-344.11
	Dewitt County	1087.93	1459.71	1457.65	1843.12	1469.88	1281.28	1238.47	1429.44
	Jackson County	-5445.65	-7447.29	-3511.67	-4419.14	-1853.37	-4960.73	-7115.4	-5662.4
	Goliad County	82.42	381.39	588.44	592.27	463.49	294.51	282.29	423.78
	Calhoun County	-4980.24	657.07	-1330.88	-1267.55	-2778.8	-5025.54	-4573.41	-5034.78
	Refugio County	-476.67	-293.57	-37.65	-166.45	-189.16	-963.76	-911.68	-17.32
	Evangeline Aquifer	2169.37	-13716.24	-9472.47	-8905.94	-12278.15	-5595.25	-5237.07	-16243.47
Evangeline	Storage	0.0	-392.88	247.56	-1362.56	-562.42	357.24	194.75	9.55
	Et	0.0	-21.3	-18.17	-18.91	-25.93	-26.78	-27.05	-25.8
	Recharge	552.59	677.23	511.48	1055.6	742.1	742.1	742.1	742.1
	Stream Leakage	-3464.29	-932.82	-1719.3	-1190.86	-290.06	-1859.28	-2408.14	705.46
	Wells	0.0	-21339.09	-15609.14	-14532.11	-20042.52	-9406.62	-7306.44	-27848.21
	Lavaca County	-296.44	-323.68	-362.15	-323.92	-383.09	-446.18	-440.97	-292.78
	Dewitt County	3817.18	5728.28	4671.75	4795.13	4712.35	4370.07	4241.02	5230.66
	Jackson County	-335.12	-3049.93	-2346.83	-2091.55	-847.14	-1264.64	-2390.74	-1684.02
	Goliad County	2322.61	3446.22	3581.32	3433.4	3085.98	2444.88	2257.3	3558.64
	Calhoun County	-829.66	11.87	-130.49	-165.48	62.47	-529.67	-358.61	829.81
	Refugio County	-163.42	306.47	213.08	199.9	197.56	-124.58	239.55	1517.27
	Chicot Aquifer	-2169.37	13716.24	9472.47	8905.94	12278.15	5595.25	5237.07	16243.47
	Burkeville Aquifer	565.92	2173.4	1488.44	1295.45	1074.31	148.9	18.35	1013.98



*Unit: AFY.

Questions?


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F.4 Environmental Impacts

GMA 15
Environmental Impacts

Groundwater Management Area 15

October 9, 2025

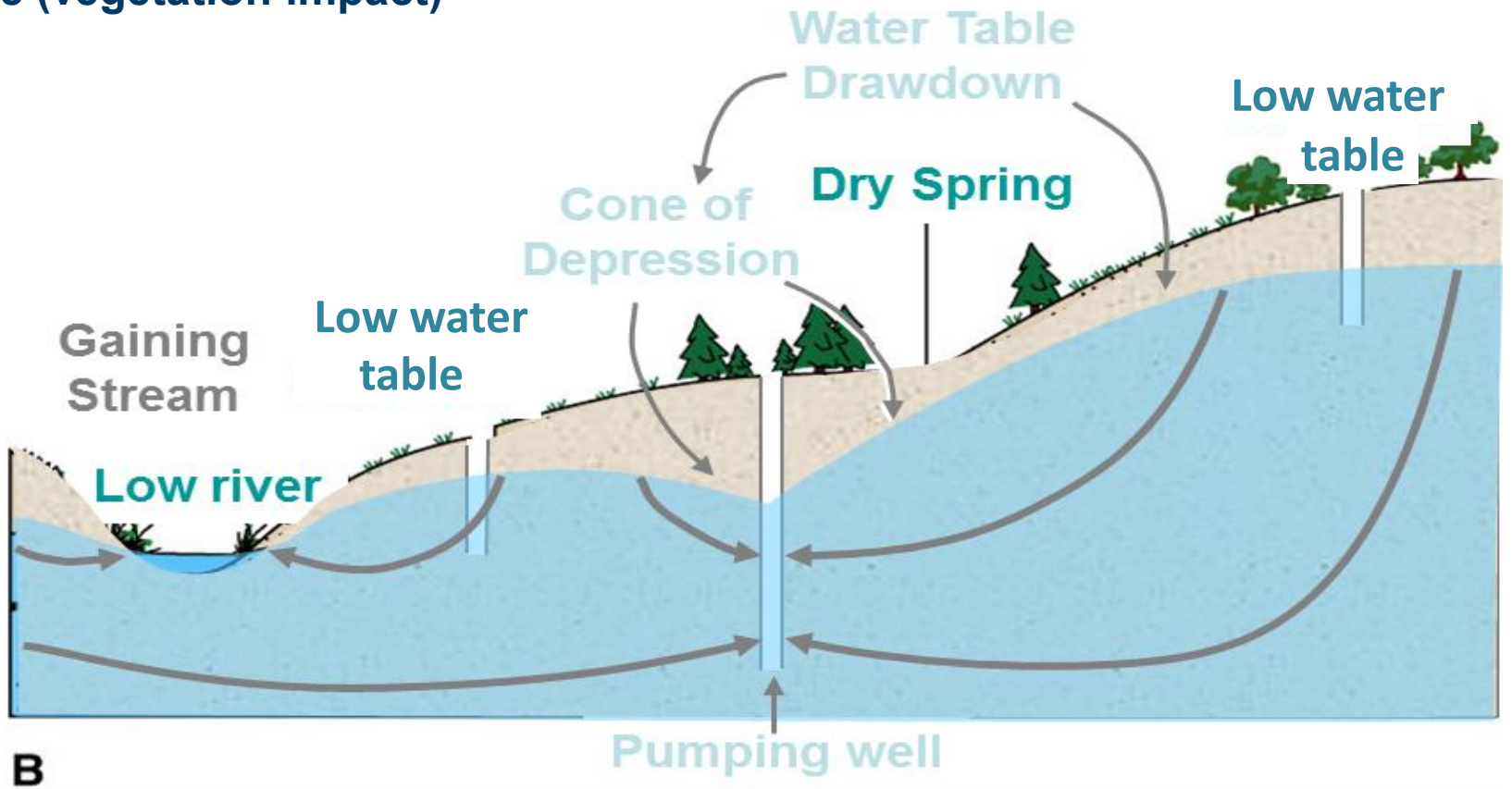


Presented by:
Nick Lamkey PG
Steven Young Ph.D, PE, PG

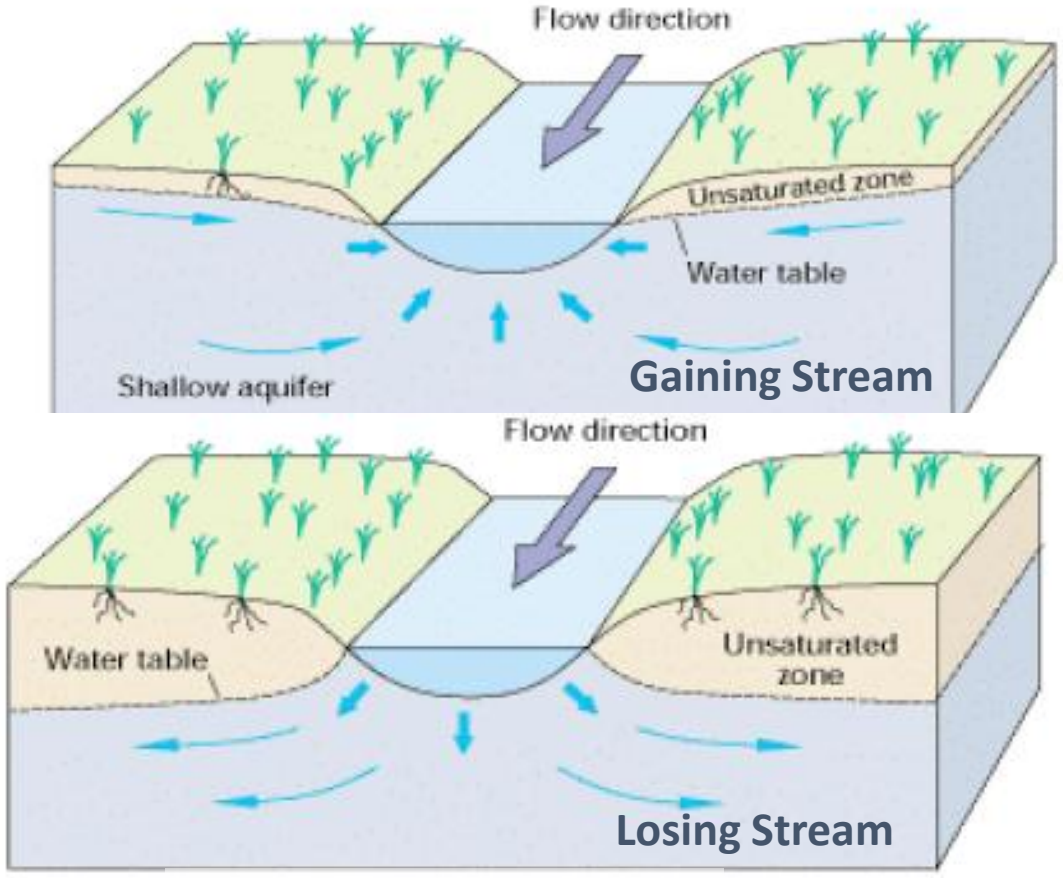
Impacts Associated with Pumping

- **Reduced flows to rivers**
- **Withdrawal from rivers (losing streams)**
- **Reduced spring flows**
- **Dried springs**
- **Lowered water table (vegetation impact)**

Caused by lower of water levels



Gaining and Losing Streams

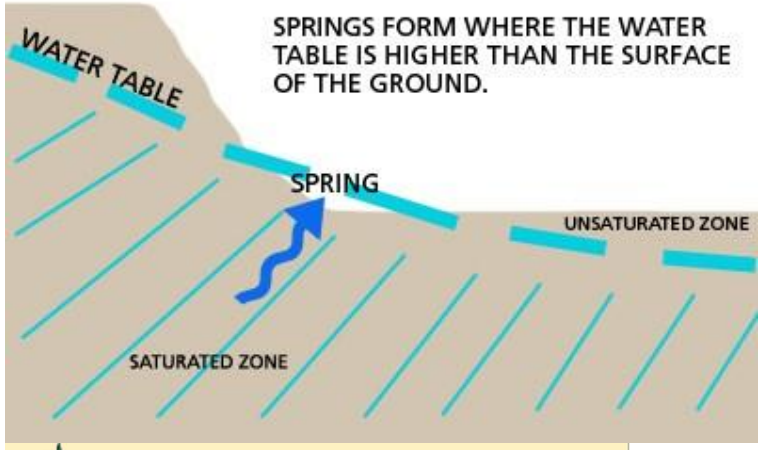


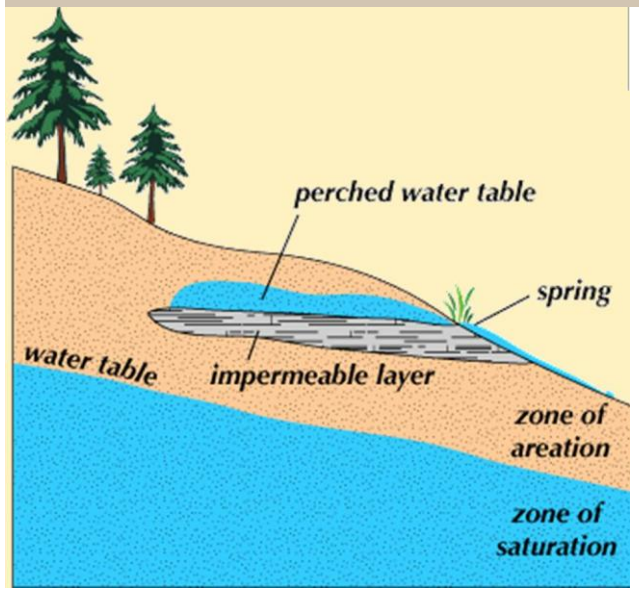
USGS Circular 1186, 1999

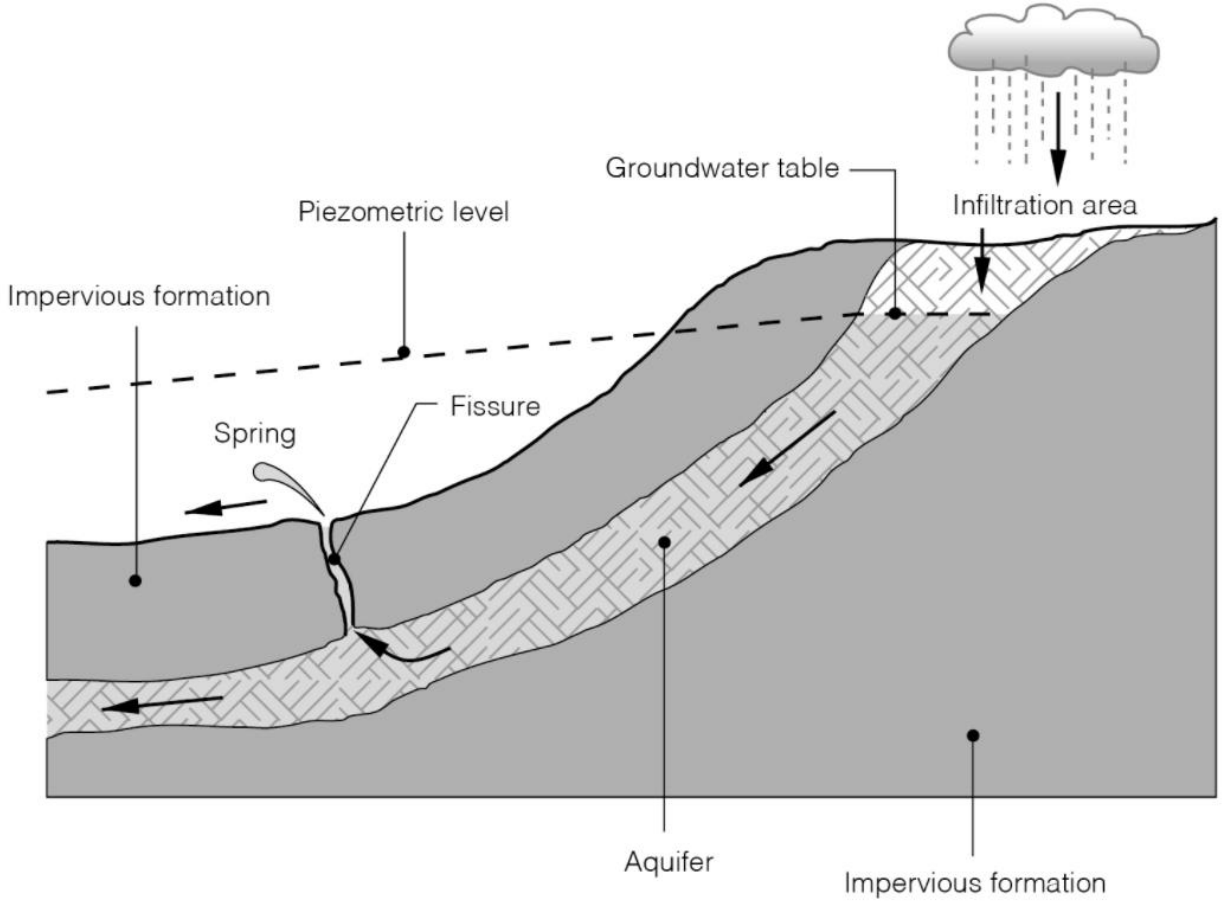
- Gaining:
  - Net discharge of groundwater to surface water "baseflow"
- Losing:
  - Net discharge of surface water to groundwater "recharge"

The TCEQ rules define baseflow as "*[t]he portion of streamflow uninfluenced by recent rainfall or flood runoff and is comprised of springflow, seepage, discharge from artesian wells or other groundwater sources, and the delayed drainage of large lakes and swamps.*

Springs

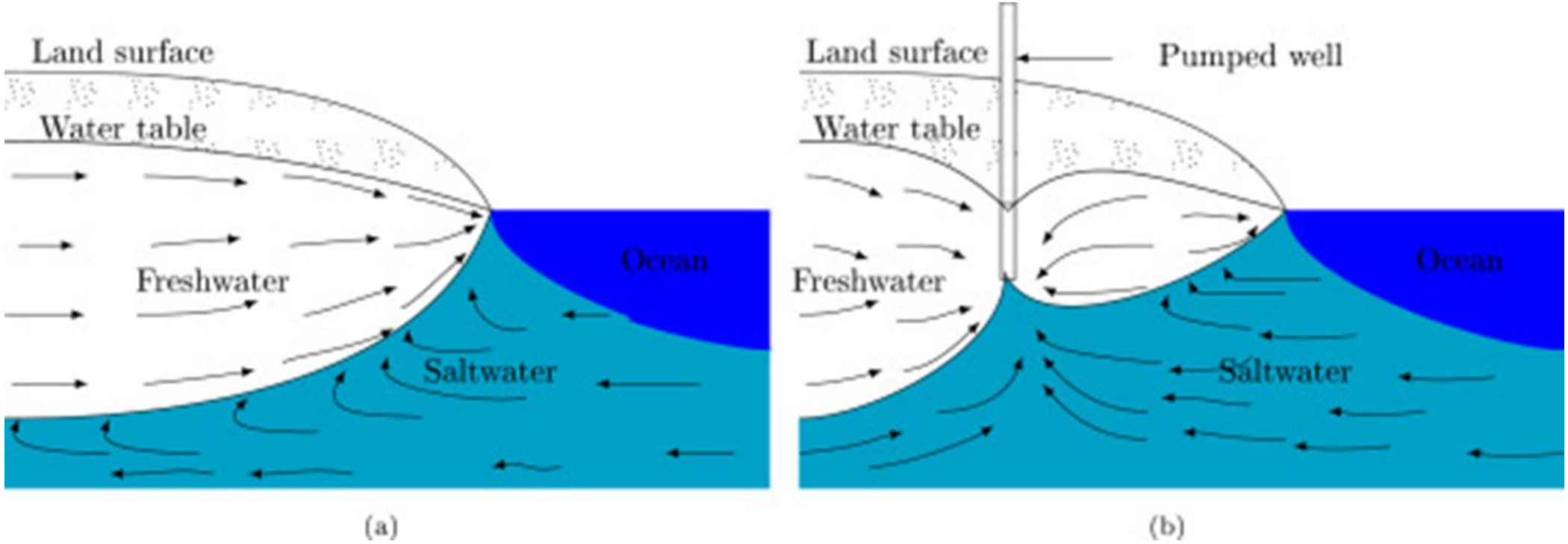






https://www.nps.gov/thro/learn/nature/springs.htm

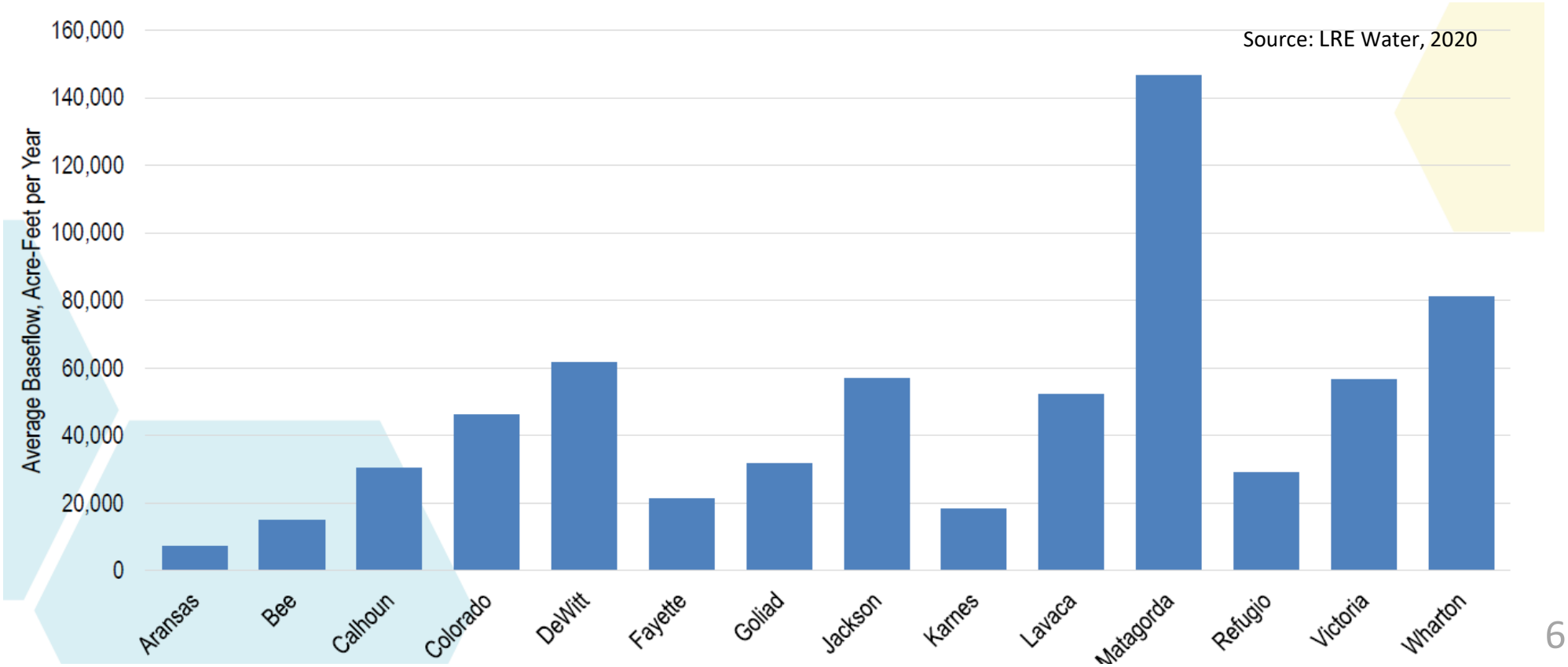
Sea Water Intrusion



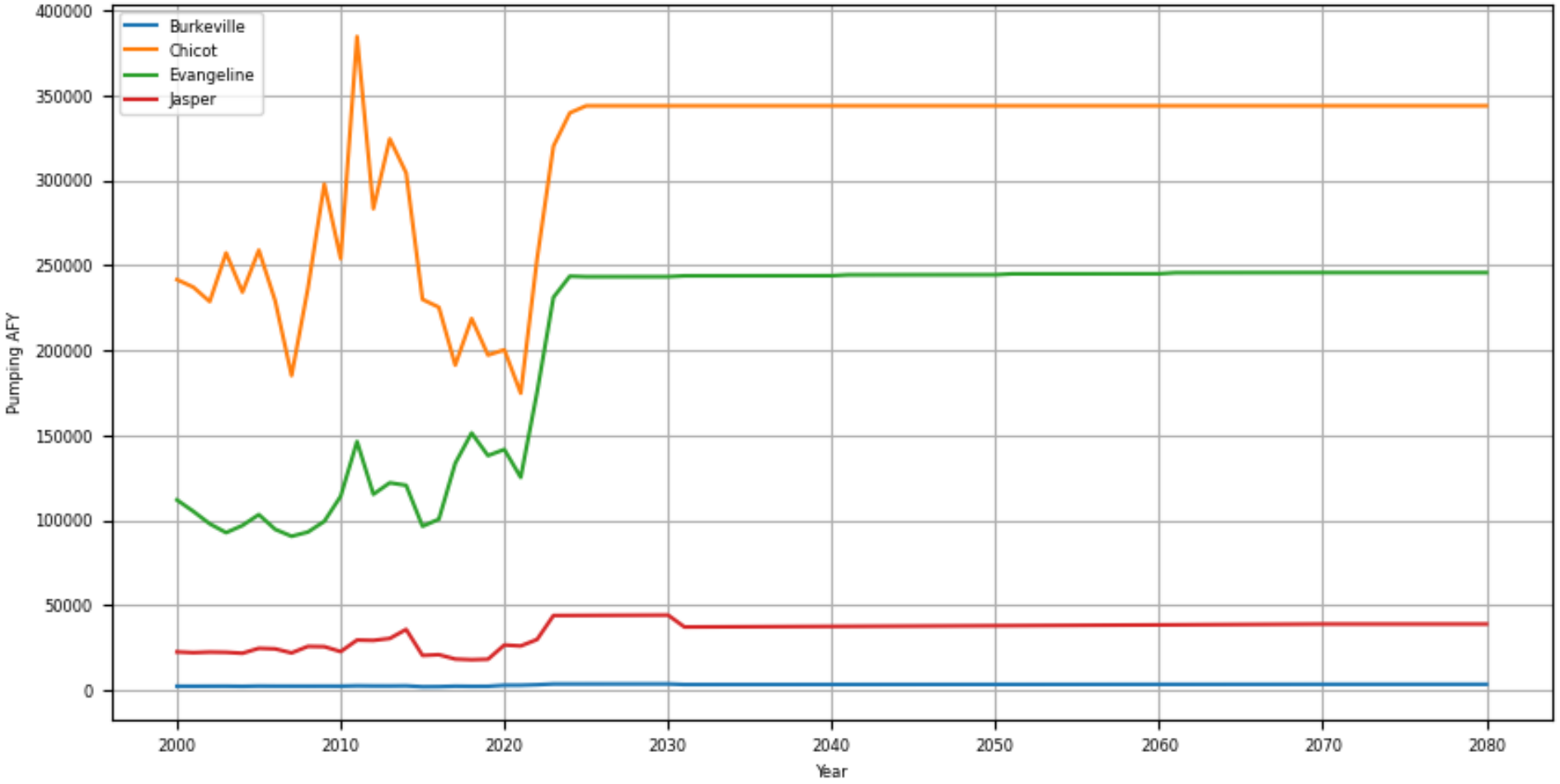
https://www.sciencedirect.com/science/article/abs/pii/S0378475418301538

Surface Water – Groundwater Exchange

- Average Baseflow from TWDB 2016 Study used USGS Stream gage data to assess contribution of groundwater to stream baseflow



Current Pumping



Surface Water – Groundwater Exchange

- Table to interpret Water Budgets and tables

Component	Sign convention in model output	Positive % change means…	Negative % change means…
Recharge	Positive = flow *into* the aquifer	More recharge in 2080 (gain)	Less recharge in 2080 (loss)
Stream	Positive = flow *from* streams *into* aquifer (gain)	More stream inflow or less stream leakage	Less inflow or more leakage to streams
Lateral	Sign can vary by boundary	Larger inflow or smaller outflow laterally	Smaller inflow or larger outflow laterally
Vertical	Positive = inflow from overlying or underlying aquifers	Increased vertical inflow from other aquifers	Decreased inflow or increased leakage to other aquifers
Storage	Negative = aquifer releasing water (depletion)	System losing less water to storage (less depletion)	System losing more water to storage (greater depletion)
Wells	Negative = pumping (outflow)	Pumping *decreased* (less extraction)	Pumping *increased* (more extraction)
Ocean/Lake	Positive = flow into aquifer	More inflow from boundaries	More discharge to boundaries
Spring/Wetland	Positive = discharge from aquifer	Greater spring discharge (larger outflow)	Reduced spring discharge

Surface Water – Groundwater Exchange

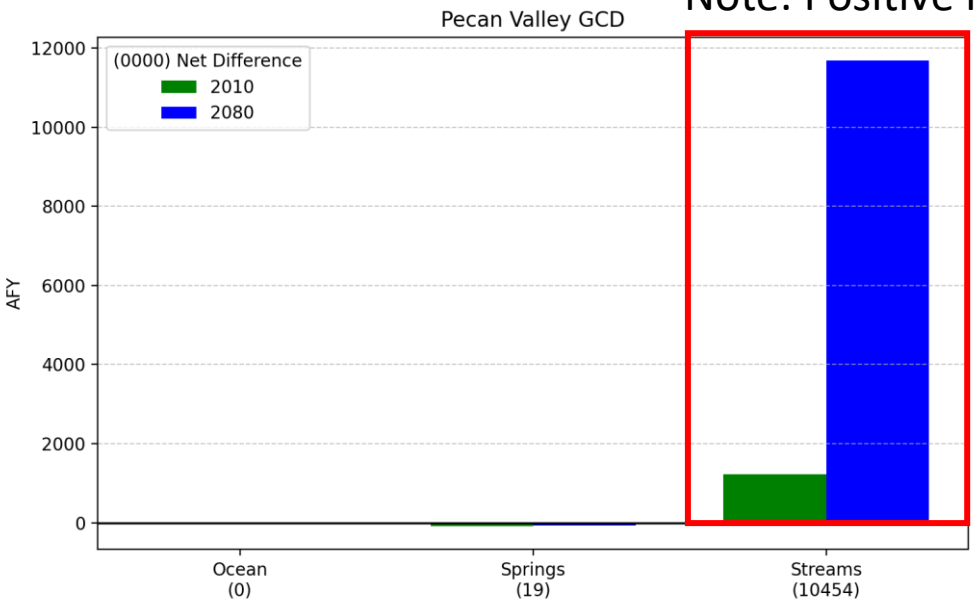
- Table of percent change in net flow from 2010 to 2080

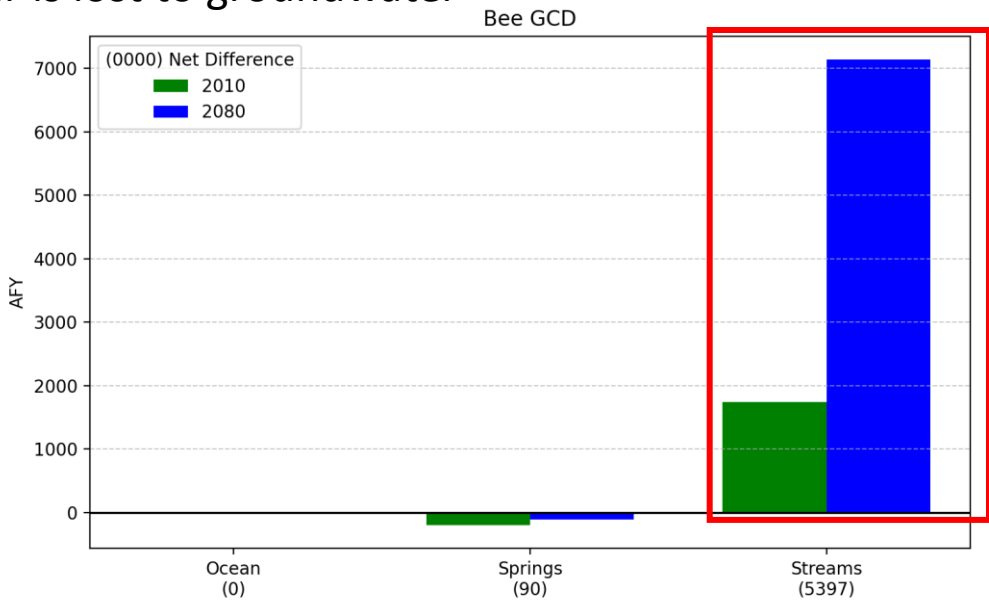
	Percentage change in Net Flow from 2010 to 2080							
	Other Budget Terms					GW-SW Interactions		
County	Storage	Recharge	Lateral	Vertical	Wells	Ocean/Lake	Spring/Wetland	Stream
Aransas	102	0	-5	0	-96	21	1	2
Austin	-40	0	-135	-296	0	0	0	140
Bee	319	0	22	0	-183	0	46	310
Brazoria	204	0	-47	-264	0	18	6	2
Brooks	69	0	-2	-50	-1	0	0	0
Calhoun	101	0	-21	-124	-334	51	7	-4
Colorado	-67	0	-26	2	-36	0	28	175
DeWitt	95	0	7	0	-297	0	23	850
Duval	-66	0	5	0	0	0	27	0
Fayette	80	0	58	0	-222	0	45	619
Fort Bend	202	0	-25	-1,167	-24	0	46	758
Goliad	236	0	-19	-100	-30	0	10	57
Gonzales	3	0	-36	0	-13	0	47	0
Jackson	382	0	-4	700	-80	405	35	223
Jim Hogg	66	0	-6	0	0	0	0	0
Jim Wells	-37	0	-6	-100	0	0	1	0
Karnes	-37	0	-76	0	14	0	73	205
Kenedy	105	0	-3	0	0	-2	0	0
Kleberg	-53	0	3	400	8	1	0	4
Lavaca	199	0	-75	300	-117	0	0	2,687
Live Oak	-6	0	-43	-100	0	0	37	-1
Matagorda	6	0	-224	-16,540	-74	13	6	117
McMullen	-40	0	-24	0	0	0	26	21
Nueces	-73	0	-96	-200	0	2	3	33
Refugio	131	0	-52	115	-175	5	3	0
San Patricio	-75	0	2	-200	2	18	20	10
Victoria	112	0	124	-650	-290	29	16	735
Washington	43	0	-60	0	0	0	0	0
Webb	100	0	-5	0	0	0	0	0
Wharton	279	0	239	-900	-38	0	22	16

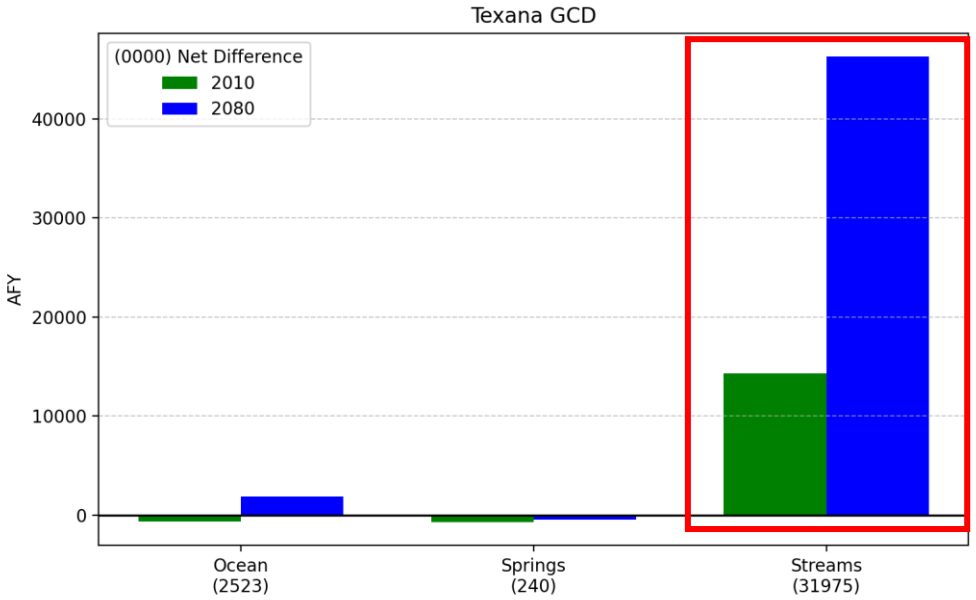
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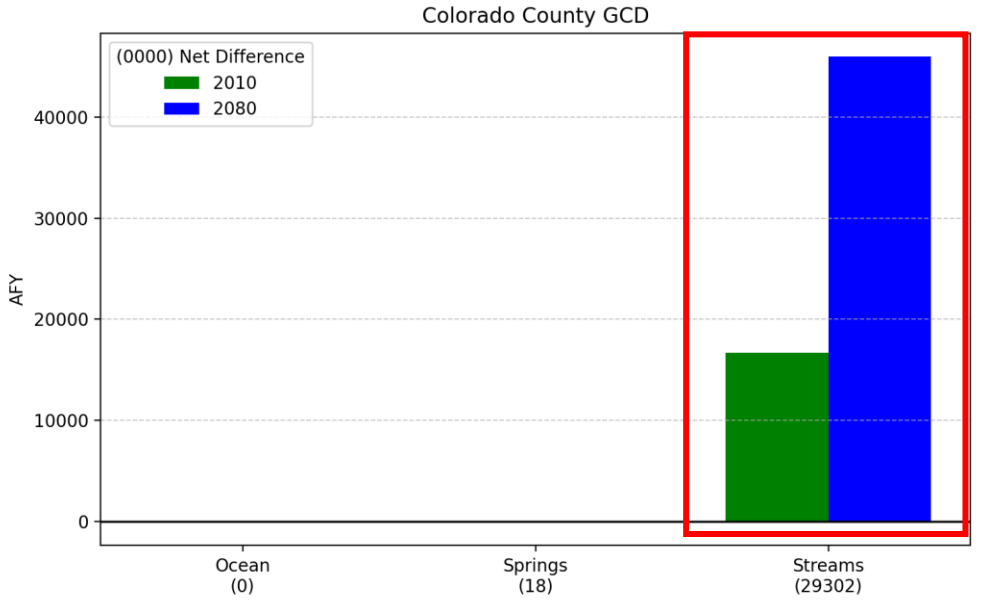
Surface-Water Groundwater Exchange

Note: Positive numbers indicate surface water is lost to groundwater

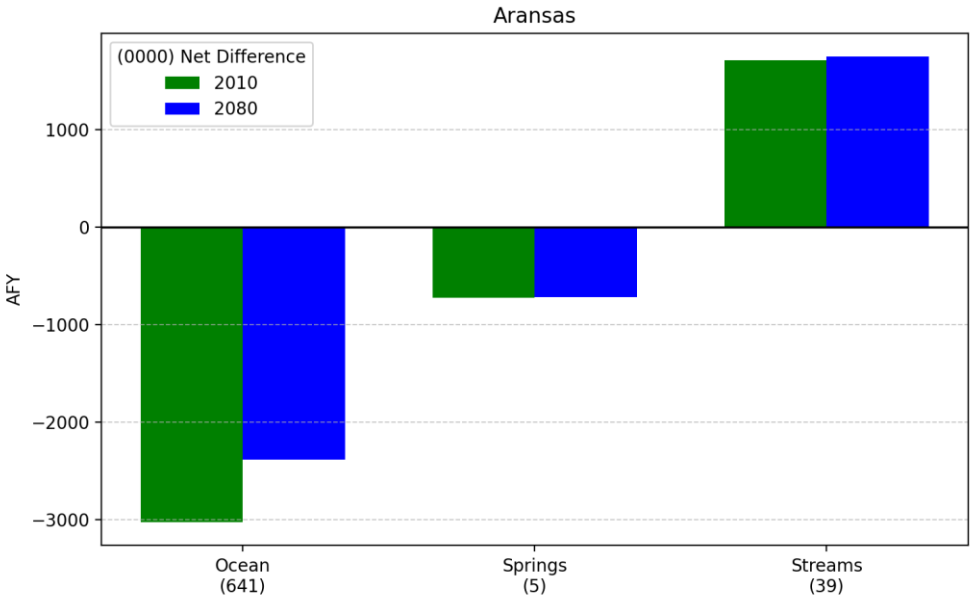


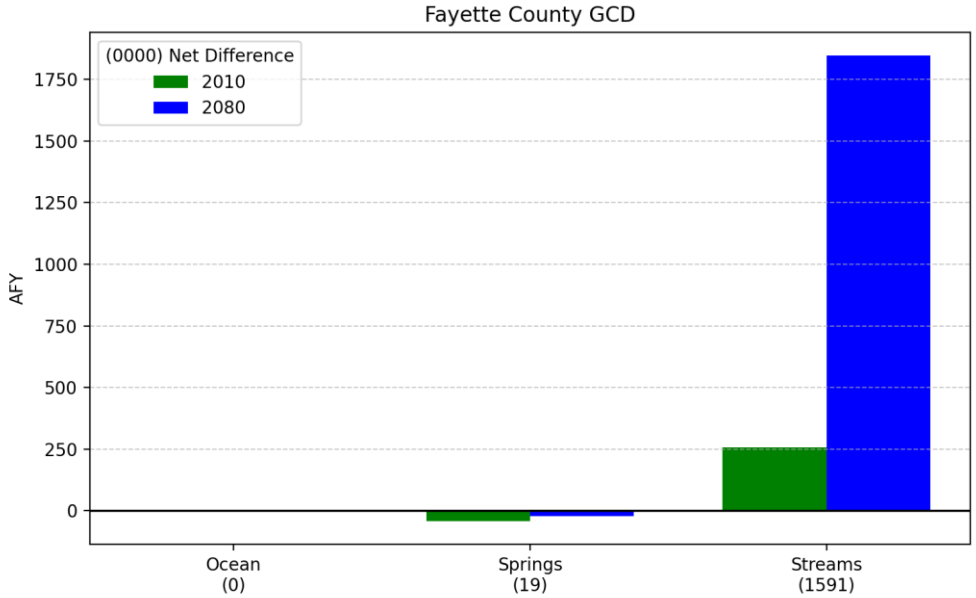


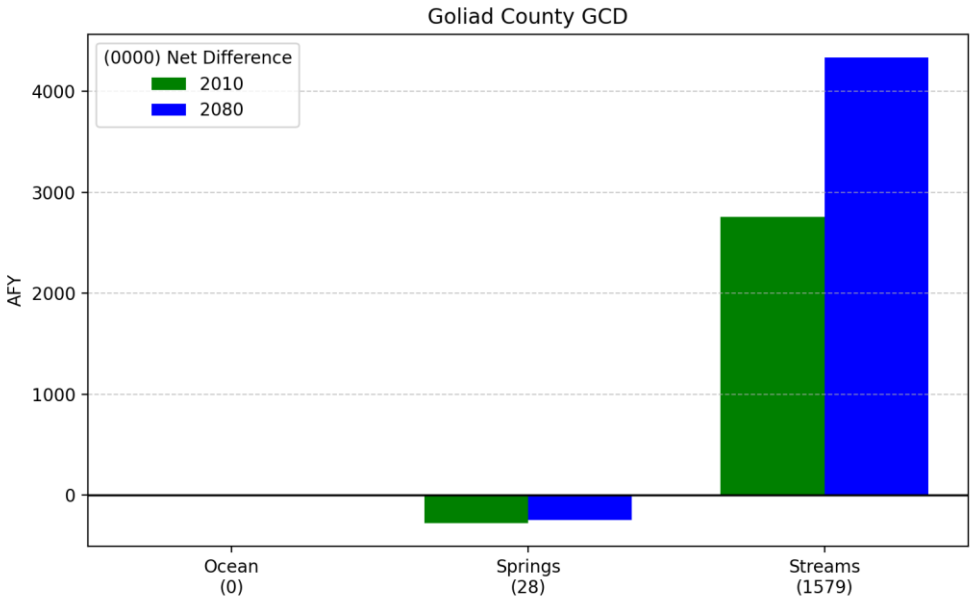


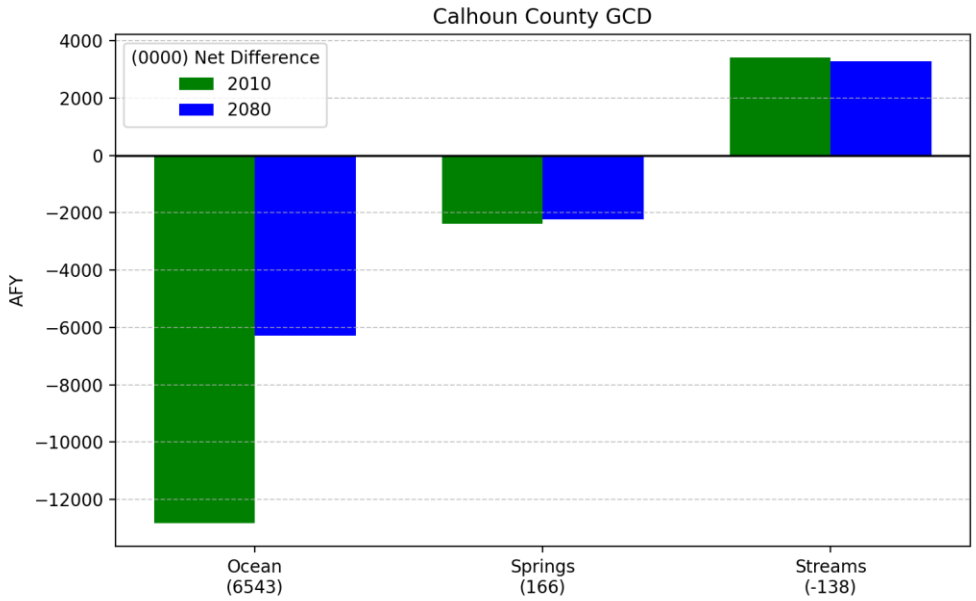


Surface-Water Groundwater Exchange

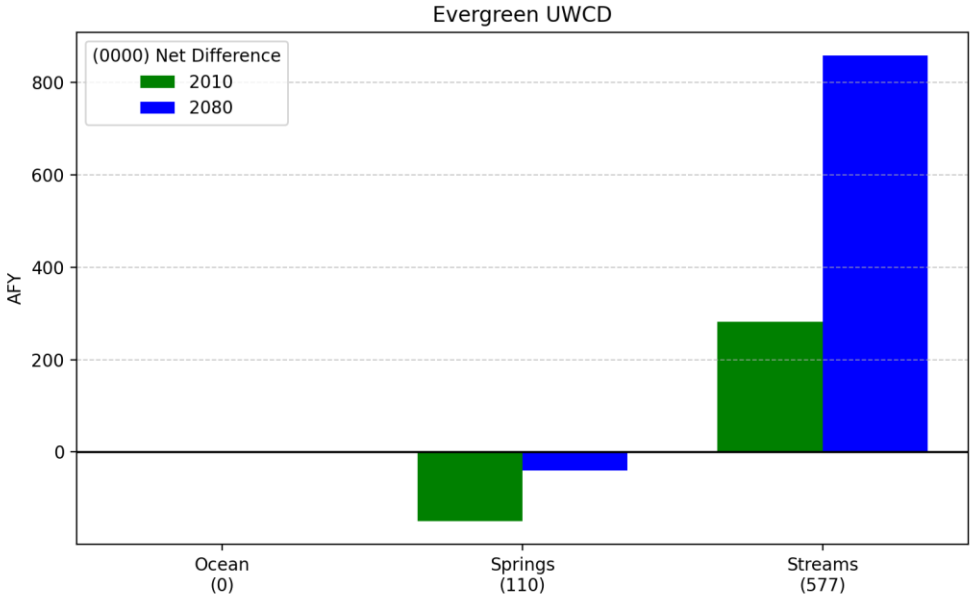


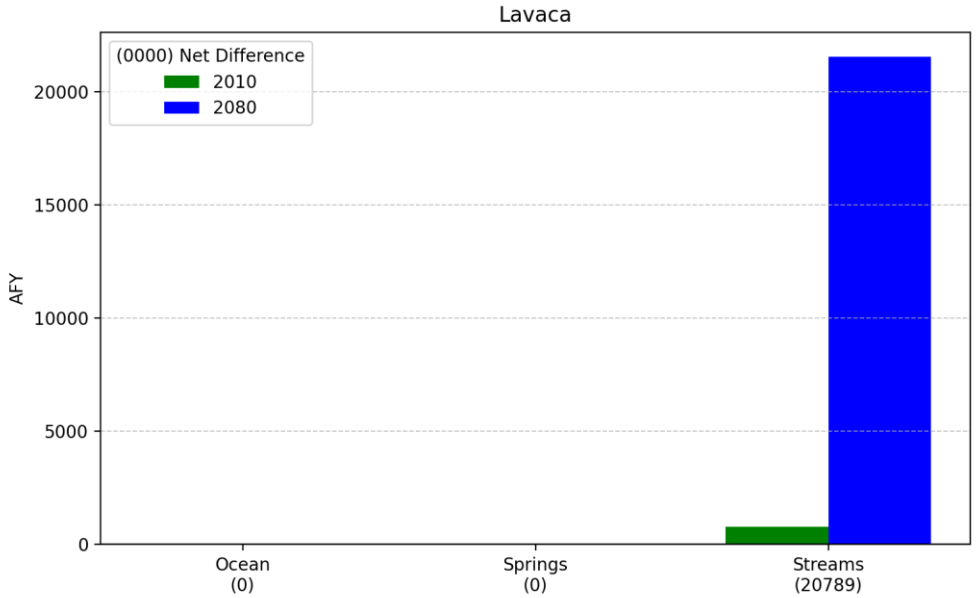


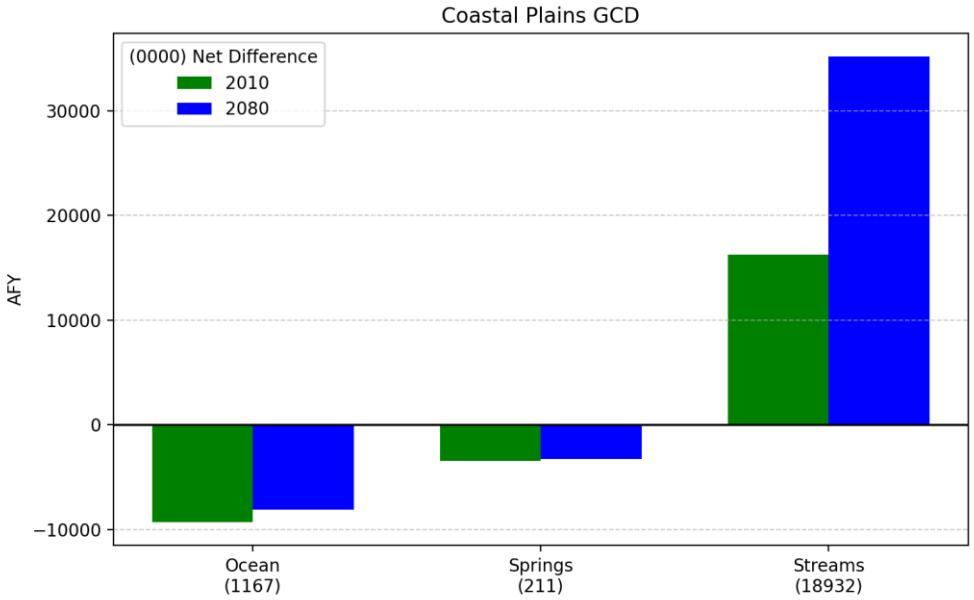


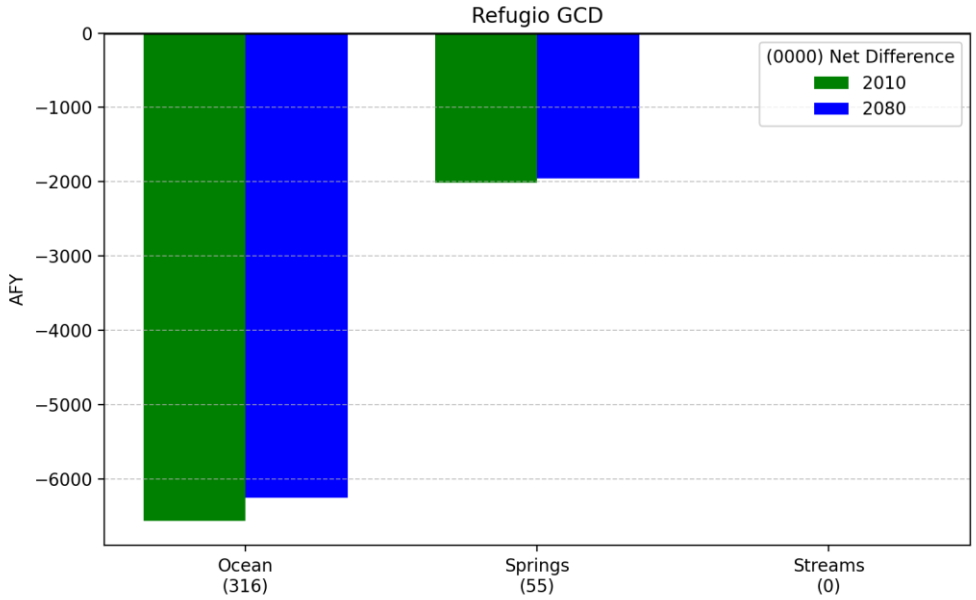


Surface-Water Groundwater Exchange

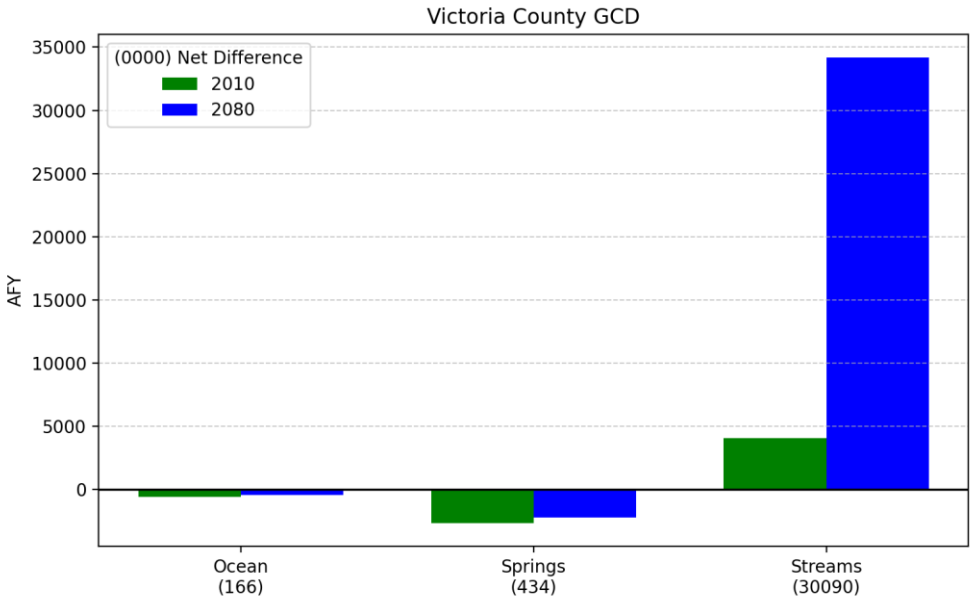


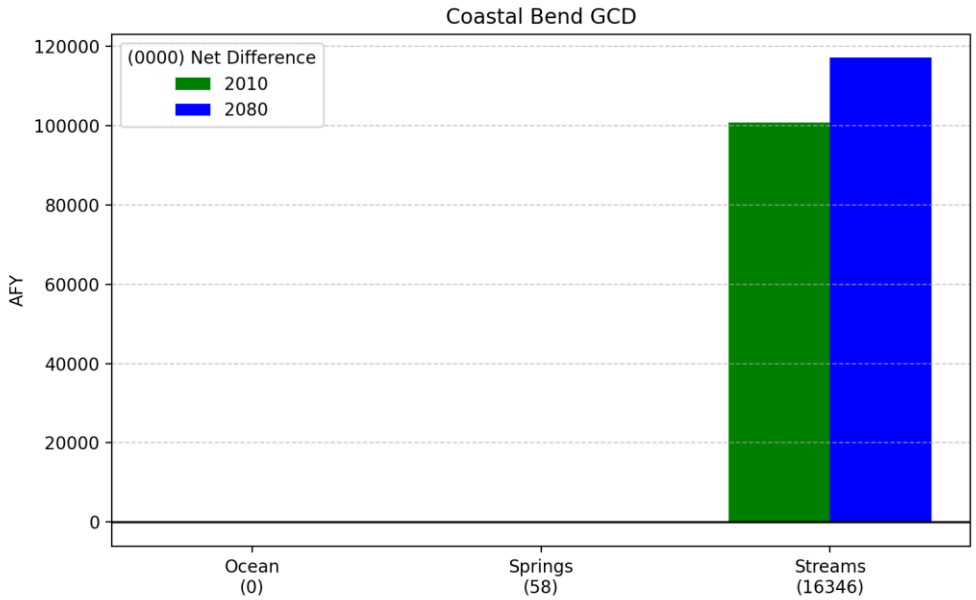






Surface-Water Groundwater Exchange





DeWitt County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	-12.88	4566.67	0	1223.87	-20.8	-1668	-3990.11	-98.73
Evangeline	-1349.87	5769.47	0	532.91	-59.14	-6072.58	2191.7	-1011.61
Burkeville	-22.23	15.1	0	287.7	0	-37.4	-74.55	-168.57
Jasper	1386.45	242.44	0	161.32	0	-532.35	1872.96	-3130.77
Total	1.47	10593.68	0	2205.8	-79.94	-8310.33	-2.27	-4409.68
2010								
Chicot	0.27	4566.67	0	905.41	-24.17	-1496.58	-3842.51	-109.06
Evangeline	18.42	5769.47	0	0	-60.41	-5782.63	1895.03	-1120.55
Burkeville	161.79	15.08	0	324.25	0	-38.55	-284.02	-178.56
Jasper	1412.63	242.46	0	0	0	-803.22	2231.5	-3072.76
Total	1593.11	10593.68	0	1229.66	-84.59	-8120.98	0	-4480.93
2020								
Chicot	2.34	4566.67	0	1049.99	-22.65	-1452.8	-3831.83	-311.64
Evangeline	399.21	5769.47	0	0	-59.42	-5677.9	1610.51	-2024.38
Burkeville	150.21	15.05	0	357.27	0	-36.27	-382.65	-103.59
Jasper	1423.8	242.49	0	590.71	0	-586.77	2603.97	-4273.38
Total	1975.56	10593.68	0	1997.97	-82.07	-7753.74	0	-6712.99
2080								
Chicot	0.63	4566.67	0	2291.59	-9.55	-1597.1	-4416.74	-835.5
Evangeline	57.99	5756.55	0	4849.82	-55.83	-6110.49	879.53	-5377.54
Burkeville	109.44	26.28	0	604.82	0	-34.26	-575.25	-131.06
Jasper	2941.1	244.18	0	3937.91	0	200.04	4112.46	-11436.1
Total	3109.16	10593.68	0	11684.14	-65.38	-7541.81	0	-17780.2

INTERA

Jackson County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	7138.09	11752.2	-1656.39	18457.42	-743.21	3095.92	-10020.7	-32097.8
Evangeline	-4759.61	0	0	0	0	9004.26	10598.37	-14833.9
Burkeville	-63.04	0	0	0	0	24.76	38.28	0
Jasper	448.36	0	0	0	0	167.55	-615.91	0
Total	2763.80	11752.2	-1656.39	18457.42	-743.21	12292.49	-7.96	-46931.7
2010								
Chicot	623.98	11752.2	-622.65	14332.93	-694.94	6867.70	-3152.42	-33194.3
Evangeline	88.15	0	0	0	0	9040.35	3197.46	-12327.9
Burkeville	-445.83	0	0	0	0	25.8	420.03	0
Jasper	281.18	0	0	0	0	183.86	-465.07	0
Total	547.48	11752.2	-622.65	14332.93	-694.94	16117.71	-5.68	-45522.2
2020								
Chicot	-3679.61	11752.2	-420.87	28172.85	-634.5	10453.61	-7483.29	-42287.5
Evangeline	134.19	0	0	0	0	7567.86	7985.8	-15691.5
Burkeville	79.74	0	0	0	0	25.93	-105.68	0
Jasper	225.17	0	0	0	0	171.5	-396.83	0
Total	-3240.51	11752.2	-420.87	28172.85	-634.5	18218.9	2.27	-57979
2080								
Chicot	1688.92	11752.2	1900.4	46307.88	-454.72	13210.58	-12419.6	-66168.2
Evangeline	43.38	0	0	0	0	2241.41	13424.19	-15713.8
Burkeville	637.09	0	0	0	0	14.42	-651.49	0
Jasper	267.12	0	0	0	0	85.7	-353.11	0
Total	2636.51	11752.2	1900.4	46307.88	-454.72	15552.11	3.41	-81882

INTERA

Bee County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	-4179.31	18909.56	0	0	-165.95	-8387.49	-4019.86	-429.63
Evangeline	-2385.62	5001.57	0	2658.42	-0.8	-4887.91	3297.57	-3681.9
Burkeville	449.7	1.41	0	81.52	0	-61.05	-137.71	-333.88
Jasper	602.31	23.47	0	0	0	-113.99	860	-1248.55
Total	-5512.92	23936.01	0	2739.94	-166.75	-13450.4	0	-5693.96
2010								
Chicot	177.25	18909.56	0	0	-195.96	-8875.89	-5297.19	-475.54
Evangeline	-9.99	5001.57	0	1660.29	-0.94	-4894.16	4160.81	-5917.09
Burkeville	96.71	1.41	0	80.62	0	-61.26	99.94	-217.44
Jasper	127.49	23.47	0	0	0	22.81	1036.44	-1095.99
Total	391.46	23936.01	0	1740.91	-196.9	-13808.5	0	-7706.06
2020								
Chicot	133.77	18909.56	0	0	-197.03	-9009.12	-4009.49	-1779.16
Evangeline	-603.29	5001.57	0	653.99	-2.62	-5536.58	2736.16	-2249.42
Burkeville	-292.43	1.41	0	84.36	0	-66.87	288.2	-14.65
Jasper	-641.02	23.47	0	0	0	-171.12	985.13	-87.77
Total	-1402.97	23936.01	0	738.35	-199.66	-14783.7	0	-4131
2080								
Chicot	738.18	18813.78	0	2143.38	-107.19	-7093.15	-5550.3	-8944.85
Evangeline	259.64	5073.21	0	4819.87	-0.09	-3287.77	5449.74	-12314.5
Burkeville	310.44	25.55	0	96.77	0	-69.14	-283.07	-80.53
Jasper	332.15	23.47	0	78.26	0	-329.47	383.63	-488.48
Total	1640.41	23936.01	0	7138.28	-107.28	-10779.5	0	-21828.4

INTERA

Aransas County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	-798.22	104.42	-2676.82	2009.22	-718.01	2661.47	61.83	-764.61
Evangeline	-2.85	0	0	0	0	64.77	-61.83	-0.09
Burkeville	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	0	0	0	0
Total	-801.07	104.42	-2676.82	2009.22	-718.01	2726.24	0	-764.7
2010								
Chicot	-14.52	104.42	-3027.24	1708.93	-727.25	2685.54	64.09	-865.03
Evangeline	-0.75	0	0	0	0	66.68	-64.09	-1.83
Burkeville	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	0	0	0	0
Total	-15.27	104.42	-3027.24	1708.93	-727.25	2752.22	0	-866.86
2020								
Chicot	89.72	104.42	-3338.35	1690.92	-729.85	2675.85	59.03	-599.97
Evangeline	1.43	0	0	0	0	57.64	-59.03	0
Burkeville	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	0	0	0	0
Total	91.15	104.42	0	1690.92	0	2733.49	0	-599.97
2080								
Chicot	0.23	104.42	-2386.39	1748.22	-721.95	2593.01	33.8	-1695.72
Evangeline	0.02	0	0	0	0	33.79	-33.8	0
Burkeville	0	0	0	0	0	0	0	0
Jasper	0	0	0	0	0	0	0	0
Total	0.25	104.42	-2386.39	1748.22	-721.95	2626.8	0	-1695.72

INTERA

Calhoun County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	-1244.4	3083.37	-11915.63	3598.13	-2025.96	8023.06	-21.05	-1094.07
Evangeline	-115.92	0	0	0	0	98.53	25.11	-5.72
Burkeville	3.86	0	0	0	0	0.19	-4.06	0
Jasper	0	0	0	0	0	0	0	0
Total	-1356.46	3083.37	-11915.63	3598.13	-2025.96	8121.78	-8.88	-1099.79
2010								
Chicot	-1991.92	3083.37	0	3415.18	0	8611.27	865.78	-1842.39
Evangeline	-1.6	0	0	0	0	871.62	-864.49	-5.72
Burkeville	1.1	0	0	0	0	0.19	-1.29	0
Jasper	0	0	0	0	0	0	0	0
Total	-1992.42	3083.37	0	3415.18	0	9483.08	-3.64	-1848.11
2020								
Chicot	-635.91	3083.37	-14421.82	3447.12	-2446.11	8960.71	59.43	-1020.32
Evangeline	124.93	0	0	0	0	-55.02	-57.72	-8.67
Burkeville	1.53	0	0	0	0	0.18	-1.71	0
Jasper	0	0	0	0	0	0	0	0
Total	-509.45	3083.37	-14421.82	3447.12	-2446.11	8905.87	8.88	-1028.99
2080								
Chicot	16.42	3083.37	-6283.25	3277.05	-2228.98	9180.01	-1703.67	-7949.93
Evangeline	3.86	0	0	0	0	-1645	1708.51	-67.59
Burkeville	5.04	0	0	0	0	-0.21	-4.84	0
Jasper	0	0	0	0	0	0	0	0
Total	25.32	3083.37	-6283.25	3277.05	-2228.98	7534.8	-8.17	-8017.52

INTERA

Colorado County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	-10232	35101.88	0	16982.66	-63.68	-10769.3	-21184.1	-11247.6
Evangeline	-1604.09	2499.22	0	262.68	-0.78	-6287.74	21466.58	-16339.6
Burkeville	416.86	0	0	0	0	-12.7	-354.61	-49.55
Jasper	102.99	0	0	0	0	256.92	72.13	-432.04
Total	-11316.3	37601.1	0	17245.34	-64.46	-16812.8	0	-28068.8
2010								
Chicot	8318.74	35101.88	0	15517.47	-65.09	-10041.9	-25096.2	-25142.6
Evangeline	1253.45	2499.22	0	1195.23	-0.51	-2794.72	25326.60	-27478.3
Burkeville	415.52	0	0	0	0	-12.68	-357.8	-45.05
Jasper	298.15	0	0	0	0	313.59	127.4	-739.16
Total	10285.86	37601.1	0	16712.7	-65.6	-12535.7	1.45	-53405.1
2020								
Chicot	-2350.68	35101.88	0	10631.96	-64.96	-12136.3	-21390.1	-11196.8
Evangeline	-246.43	2499.22	0	9.47	-0.66	-9351.49	21285.72	-14195.7
Burkeville	82.89	0	0	0	0	-17.17	-65.72	0
Jasper	66.01	0	0	0	0	89.34	170.09	-325.52
Total	-2448.21	37601.1	0	10641.43	-65.62	-21415.6	1.02	-25718
2080								
Chicot	1788.35	35101.88	0	42507.1	-47.26	-11091.5	-38064.9	-31601.3
Evangeline	88.68	2499.22	0	3507.36	0	-4378.64	38349.03	-40065.4
Burkeville	928.46	0	0	0	0	-20.78	-907.64	0
Jasper	539.45	0	0	0	0	-244.44	623.49	-918.73
Total	3344.94	37601.1	0	46014.46	-47.26	-15735.4	1.48	-72585.4

INTERA

Fayette County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	0	0	0	0	0	0	0	0
Evangeline	-122.96	1736.12	0	0	0	-390.5	-305.61	-272.58
Burkeville	45.52	3.28	0	153.61	-20.96	-17.9	202.82	-173.49
Jasper	4202.06	356.94	0	93.42	-29.08	-385.53	102.79	-1661.91
Total	4124.62	2096.34	0	247.03	-50.04	-793.93	-1.42	-2107.98
2010								
Chicot	0	0	0	0	0	0	0	0
Evangeline	-0.15	1736.12	0	0	0	-381.94	-309.4	-286.52
Burkeville	100.09	3.28	0	159.04	-18.9	-19.69	75.3	-182.36
Jasper	2561.74	356.94	0	97.87	-23.45	-503.95	234.1	-2261.45
Total	2661.68	2096.34	0	256.91	-42.35	-905.58	0	-2730.33
2020								
Chicot	0	0	0	0	0	0	0	0
Evangeline	-122.64	1736.12	0	0	0	-421.71	-274.77	-59.91
Burkeville	-25.74	3.28	0	163.33	-18.86	-17.29	63.9	-38.13
Jasper	1447.11	356.94	0	103.33	-18.86	-343.02	210.87	-1355.35
Total	1298.73	2096.34	0	266.66	-37.72	-782.02	0	-1453.39
2080								
Chicot	0	0	0	0	0	0	0	0
Evangeline	51.12	1736.12	0	515.25	0	-614.59	-1301.69	-386.22
Burkeville	153.91	2.59	0	391.68	-18.68	-5.72	-633.01	-169.03
Jasper	4576.13	353.65	0	940.71	-4.82	239.5	1934.7	-8245.74
Total	4781.16	2092.36	0	1847.64	-23.5	-380.81	0	-8800.99

INTERA

Goliad County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	-2848.5	10504.01	0	1511.87	-189.33	-3556.4	-802.92	-212.78
Evangeline	-6177.44	7975.45	0	4955.43	-37.59	-5380.07	994.76	-2330.86
Burkeville	166.31	0	0	0	0	-12.2	-75.18	-78.93
Jasper	698.74	0	0	0	0	-66.91	-116.66	-515.17
Total	-8160.89	18479.46	0	6467.3	-226.92	-9015.58	2.84	-3137.74
2010								
Chicot	-319.16	10504.01	0	1463.51	-233.53	-3656.95	-718.09	-163.5
Evangeline	-33.37	7975.45	0	1294.37	-42.28	-5173.28	625.94	-4646.96
Burkeville	73.08	0	0	0	0	-9.29	17.65	-81.44
Jasper	450.66	0	0	0	0	-60.64	74.5	-464.62
Total	171.21	18479.46	0	2757.88	-275.82	-8900.16	2.84	-5356.52
2020								
Chicot	154.29	10504.01	0	1467.87	-232.65	-3733.06	-1069.09	-348.96
Evangeline	-175.06	7975.45	0	489.91	-43.11	-5002.9	909.53	-4153.37
Burkeville	353.39	0	0	0	0	-19.24	19.80	-353.96
Jasper	113.09	0	0	0	0	-44.25	139.76	-208.72
Total	445.71	18479.46	0	1957.78	-275.77	-8799.45	5.68	-5065.01
2080								
Chicot	2.63	10504.01	0	1501.47	-208.77	-3781.74	-1990.96	-435.7
Evangeline	25.34	7975.45	0	2835.38	-38.84	-6957.51	1446.7	-5286.6
Burkeville	263.3	0	0	0	0	-16.61	312.94	-559.62
Jasper	284.27	0	0	0	0	174.12	231.32	-690.19
Total	575.54	18479.46	0	4336.85	-247.62	-10581.7	0	-6972.11

INTERA

Karnes County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	0	0	0	0	0	0	0	0
Evangeline	-94.86	883.4	0	0	-1.62	-460.51	-117.14	-11.03
Burkeville	20.29	2.78	0	102.47	-1.81	-5.27	-103.43	-15.59
Jasper	2935.4	417.95	0	102.6	-159.06	-108.91	220.57	-3408.56
Total	2860.83	1304.13	0	205.07	-162.48	-574.69	0	-3435.18
2010								
Chicot	0	0	0	0	0	0	0	0
Evangeline	6.44	883.4	0	0	-1.42	-361.85	-157.39	-24.73
Burkeville	269.82	2.78	0	181.58	-0.81	-8.59	-369.63	-75.11
Jasper	2640	417.95	0	99.84	-147.16	-202.35	527.02	-3335.49
Total	2916.26	1304.13	0	281.42	-149.4	-572.79	0	-3435.33
2020								
Chicot	0	0	0	0	0	0	0	0
Evangeline	-4.02	883.4	0	0	-0.51	-330.53	-201.74	-86.26
Burkeville	458.54	2.61	0	332.25	-0.68	1.71	-310.19	-484.31
Jasper	6643.79	418.11	0	912.2	-113.26	-100.98	511.93	-8272.12
Total	7098.31	1304.12	0	1244.45	-114.45	-429.8	0	-8842.69
2080								
Chicot	0	0	0	0	0	0	0	0
Evangeline	3.24	883.4	0	7.27	-0.1	-448.32	-340.44	-105.06
Burkeville	56.61	1.69	0	276.76	-0.68	7.07	-139.12	-202.31
Jasper	1779.4	415.13	0	574.32	-39.13	-564.16	479.56	-2645.46
Total	1839.25	1300.22	0	858.35	-39.9	-1005.41	0	-2952.83

INTERA

Lavaca County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	-2158.69	18264.55	0	3629.07	0	-12661.8	-6796.24	-273.96
Evangeline	-1589.44	6103.45	0	1453.16	0	-7508.27	6624.87	-5080.02
Burkeville	34.98	2.04	0	131.49	0	-25.78	-137.79	-4.73
Jasper	2429.25	171.07	0	343.26	0	-60.62	309.16	-3162.87
Total	-1283.9	24541.11	0	5556.98	0	-20256.5	1.14	-8521.58
2010								
Chicot	-687.61	18264.55	0	0	0	-10405.1	-5939.94	-765.33
Evangeline	374.22	6103.45	0	153.55	0	-6186.64	5381.53	-5820.67
Burkeville	368.97	2.04	0	148.51	0	-18.8	-433.96	-65.86
Jasper	1002.02	171.07	0	471.71	0	131.45	992.37	-2740.84
Total	1057.6	24541.11	0	773.77	0	-16479.1	1.14	-9392.7
2020								
Chicot	-123.19	18264.55	0	0	0	-10774.3	-5150.33	-1932.91
Evangeline	145.22	6103.45	0	3449.98	0	-6226.82	4431.55	-7899.2
Burkeville	118.24	2.04	0	192.01	0	-17.45	-200.3	-94.29
Jasper	1109.7	171.07	0	525.05	0	103.61	919.08	-2808.45
Total	1249.97	24541.11	0	4167.04	0	-16915	2.27	-12734.9
2080								
Chicot	690.81	18264.55	0	9865.21	0	-17730.9	-7992.17	-3094.67
Evangeline	35.42	6103.45	0	10619.62	0	-10942.6	6834.77	-12647
Burkeville	444.99	1.78	0	289.63	0	-23.68	-593.93	-118.79
Jasper	1987.82	171.32	0	788.29	0	-202.16	1751.33	-4496.45
Total	3159.04	24541.1	0	21562.75	0	-28899.3	4.55	-20356.9

INTERA

Matagorda County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	15774.97	22869.53	-11771.55	7076.68	-3591.25	3312.9	-4992.44	-28833.4
Evangeline	-4963.28	0	0	0	0	-164.79	5161.48	0
Burkeville	169.44	0	0	0	0	-0.4	-169.04	0
Jasper	0	0	0	0	0	0	0	0
Total	10981.13	22869.53	-11771.55	7076.68	-3591.25	3147.71	-2.84	-28833.4
2010								
Chicot	556.15	22869.53	-9282.16	16237.23	-3465.1	-54.16	-200.53	-26765.2
Evangeline	1.06	0	0	0	0	-77.34	198.66	-122.14
Burkeville	-2.37	0	0	0	0	0.51	1.87	0
Jasper	0	0	0	0	0	0	0	0
Total	554.84	22869.53	-9282.16	16237.23	-3465.1	-130.99	-4.44	-26887.4
2020								
Chicot	-2049.91	22869.53	-10546.05	19609.11	-3444.86	1267.56	-4704.93	-22995
Evangeline	744.2	0	0	0	0	-790.11	4890.59	-4847.83
Burkeville	184.67	0	0	0	0	0.99	-185.66	0
Jasper	0	0	0	0	0	0	0	0
Total	-1121.04	22869.53	-10546.05	19609.11	-3444.86	478.44	-1.42	-27842.8
2080								
Chicot	235.83	22869.53	-8114.87	35169.57	-3253.74	-1865.74	-11304.4	-33777.6
Evangeline	28.14	0	0	0	0	1444.67	11624.72	-13102.7
Burkeville	323.09	0	0	0	0	-2.78	-320.3	0
Jasper	0	0	0	0	0	0	0	0
Total	587.06	22869.53	-8114.87	35169.57	-3253.74	-423.85	-7.34	-46880.2

INTERA

Refugio County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	-5909.31	14658.3	-6304.31	0	-1944.2	1395.5	3710.45	-2043.86
Evangeline	-48.84	0	0	0	0	3992.9	-3669.09	-274.36
Burkeville	14.41	0	0	0	0	26.96	-41.36	0
Jasper	0	0	0	0	0	0	0	0
Total	-5943.74	14658.3	-6304.31	0	-1944.2	5415.36	1.28	-2318.22
2010								
Chicot	-273.36	14658.3	-6568.41	0	-2012.48	2242.37	4029.26	-1774.37
Evangeline	-23.37	0	0	0	0	4437.32	-3997.41	-416.5
Burkeville	5.23	0	0	0	0	26.62	-31.85	0
Jasper	0	0	0	0	0	0	0	0
Total	-291.5	14658.3	-6568.41	0	-2012.48	6706.31	-9.24	-2190.87
2020								
Chicot	107.64	14658.3	-6751.19	0	-2014.88	2228.52	3464.12	-1214.09
Evangeline	85.22	0	0	0	0	4293.89	-3427.17	-948.91
Burkeville	10.83	0	0	0	0	26.12	-36.95	0
Jasper	0	0	0	0	0	0	0	0
Total	203.69	14658.3	-6751.19	0	-2014.88	6548.53	-1.85	-2163
2080								
Chicot	27.86	14658.3	-6252.42	0	-1957.91	181.61	440.02	-3382.61
Evangeline	2.63	0	0	0	0	2997.74	-356.41	-2643.78
Burkeville	59.86	0	0	0	0	23.75	-83.61	0
Jasper	0	0	0	0	0	0	0	0
Total	90.35	14658.3	-6252.42	0	-1957.91	3203.10	1.42	-6026.39

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Victoria County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	-45838.5	24815.13	-322.52	42345.24	-1749.11	-3234.29	-12278.2	-4772.71
Evangeline	-562.42	742.1	0	0	-25.93	6828.13	13352.46	-20042.5
Burkeville	176.06	0	0	0	0	30.83	-206.88	0
Jasper	277	0	0	0	0	590.43	-867.43	0
Total	-45947.9	25557.23	-322.52	42345.24	-1775.04	4215.1	-4.55	-24815.2
2010								
Chicot	-5347.1	24815.13	-569.7	4092.71	-2615.52	-9847.68	-5593.8	-5977.59
Evangeline	357.06	742.1	0	0	0	4451.62	5742.56	-9406.62
Burkeville	-306.58	0	0	0	0	27.4	279.18	0
Jasper	-133.84	0	0	0	0	561.8	-427.94	0
Total	-5430.46	25557.23	-569.7	4092.71	-2642.3	-4806.86	2.27	-15384.2
2020								
Chicot	-176.08	24815.13	-610.32	2824.43	-2646.02	-11613.2	-5228.04	-8414.59
Evangeline	185.92	742.1	0	0	-27.05	3552.87	5245.79	-7289.41
Burkeville	-334.05	0	0	0	0	25.53	308.53	0
Jasper	-164.39	0	0	0	0	490.86	-326.28	0
Total	-488.6	25557.23	-610.32	2824.43	-2673.07	-7543.98	0	-15704
2080								
Chicot	154.49	24815.13	-403.44	33514.36	-2182.44	-9328.37	-15478.7	-32146.8
Evangeline	8.54	742.1	0	668.57	-25.81	10004.59	16450.35	-27848.2
Burkeville	301.83	0	0	0	0	31.46	-333.29	0
Jasper	196.17	0	0	0	0	441.84	-638.32	0
Total	661.03	25557.23	-403.44	34182.93	-2208.25	1149.52	-1.25	-59995

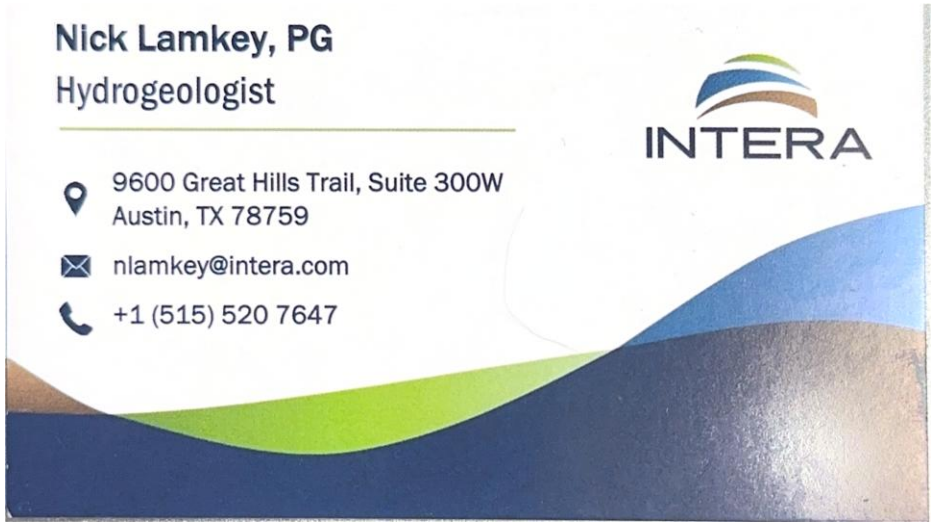
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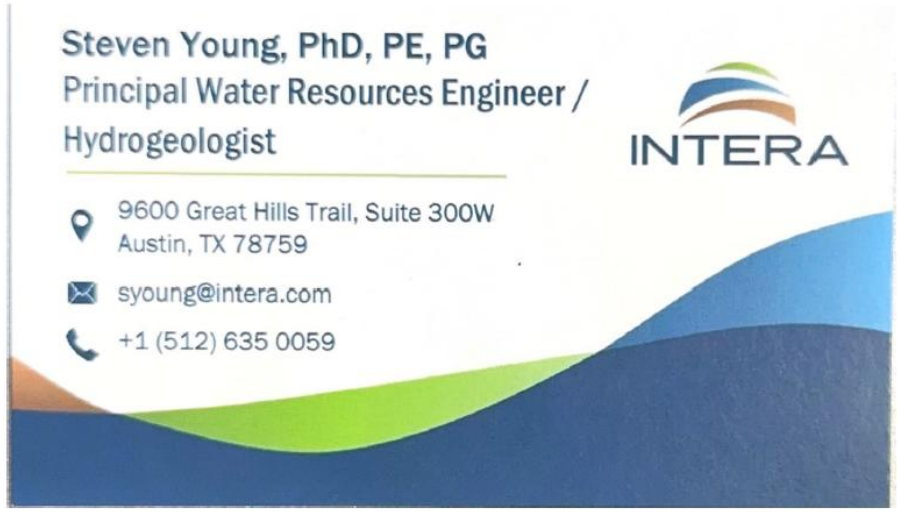
Wharton County Budget

Aquifer	Storage	Recharge	Surface Water – Groundwater Interaction			Groundwater Flow		Wells
			Ocean/ Lake	Stream	Spring/ Wetlands	Lateral	Vertical	
2000								
Chicot	20760.99	21659.1	0	96524.6	-259.96	5683.97	-18858.5	-126040
Evangeline	-16595	0	0	0	0	6250.31	19765.32	-9422.96
Burkeville	-252.73	0	0	0	0	27.98	224.76	0
Jasper	1095.64	0	0	0	0	35.92	-1131.57	0
Total	5008.92	21659.1	0	96524.6	-259.96	11998.18	1.36	-135463
2010								
Chicot	-2668.8	21659.1	0	100889.9	-259.5	8830.12	-5794.67	-123202
Evangeline	232.88	0	0	0	0	2043.35	5607.56	-7888.92
Burkeville	-881.92	0	0	0	0	27.86	854.05	0
Jasper	579.62	0	0	0	0	87.19	-666.94	0
Total	-2738.22	21659.1	0	100889.9	-259.5	10988.52	3.41	-131091
2020								
Chicot	-21131.1	21659.1	0	92599.66	-266.41	6073.67	-24926.8	-74551.9
Evangeline	400.56	0	0	0	0	16025.37	26770.54	-43205.1
Burkeville	1130.22	0	0	0	0	27.06	-1157.32	0
Jasper	599.9	0	0	0	0	85.89	-686.41	0
Total	-19000.4	21659.1	0	92599.66	-266.41	22211.99	-5.68	-117757
2080								
Chicot	2242.37	21659.1	0	117235.8	-201.4	15837.09	-42439.8	-114875
Evangeline	71.9	0	0	0	0	21347.1	45145.53	-66573.3
Burkeville	1609.66	0	0	0	0	37.17	-1646.76	0
Jasper	988	0	0	0	0	69.72	-1058.94	0
Total	4911.93	21659.1	0	117235.8	-201.4	37291.08	-2.73	-181448

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Questions?


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F.5 Socioeconomic Impacts

GMA 15
Socioeconomic Impacts

Groundwater Management Area 15

October 9, 2025



Presented by:
Nick Lamkey PG
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Socioeconomic Impacts

- For quantitative estimate of Socioeconomic Impacts we reviewed materials from Dr. John Ellis for the 2026 regional water plans for Regions K, L, N and P
- Reports contain estimated impacts for not meeting projected water needs for each county calculated in terms of income losses and job losses
- To estimate the socioeconomic impact associated with the potential DFC's we calculated drawdown from 2000 to 2080 for wells received in the data request and the SDR wells to look at impacts on wells in the GCAS

INTERA

Summary of Income Losses

- Income losses in millions of $ for counties in GMA 15 if water needs are not met
- Estimates include whole county including areas outside GMA 15
- DeWitt, Aransas and Refugio were had no estimates in the State Water Plan
  - Only counties with projected economic impacts for at least one decade had values calculated
- For counties or water use categories not shown there is no estimated impacts in the 2026 regional water plans
- Values in 2023 $
- Highest income losses would be from not meeting manufacturing needs
- Example: For year 2030 if projected water needs are not met during a drought of record year the total economic activity tied to manufacturing could drop by 7.9 billion dollars

County	Region	Water Use	2030	2040	2050	2060	2070	2080
Bee	N	Mining	$0.35	$0.35	$0.35	$0.35	$0.35	-
		Municipal	$8.02	$7.53	$6.66	$5.57	$4.37	$3.01
Calhoun	L	Irrigation	$5.83	$5.83	$5.83	$5.83	$5.83	$5.83
		Manufacturing	-	-	-	$28.72	$125.10	$277.09
Colorado	K	Irrigation	$10.74	$9.17	$7.72	$6.40	$5.21	$4.13
		Municipal	$0.03	$0.02	$0.02	$0.01	$0.00	-
Fayette	K	Municipal	-	0.02	$0.01	$0.08	$0.21	$0.24
Goliad	L	Irrigation	$0.00	-	-	-	-	-
Jackson	P	Manufacturing	$2,150.64	$2,816.35	$2,839.34	$2,862.16	$2,886.07	$2,912.77
Karnes	L	Irrigation	$0.08	$0.08	$0.70	$0.70	$0.70	$0.70
		Mining	$1,138.29	$1,138.29	$1,138.29	$1,138.29	$1,138.29	-
Lavaca	P	Irrigation	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Matagorda	K	Irrigation	$25.98	$25.15	$24.35	$23.57	$22.81	$22.07
		Manufacturing	-	-	-	$45.45	$105.78	$181.62
		Municipal	$0.00	$0.00	-	-	-	-
Victoria	L	Manufacturing	$5,720.25	$5,934.47	$6,156.61	$6,386.98	$6,625.86	$6,873.55
		Mining	$47.86	$50.56	$52.96	$54.80	$56.50	$57.78
		Municipal	$74.25	$76.12	$76.62	$75.94	$75.17	$74.28
		Steam Electric Power	$29.67	$29.67	$29.67	$29.67	$29.67	$29.67
Wharton	K	Irrigation	$24.51	$22.43	$20.46	$18.60	$16.85	$15.20
	P	Irrigation	$1.81	$1.75	$1.69	$1.62	$1.56	$1.49
GMA 15		Mining	$1,186.50	$1,189.20	$1,191.60	$1,193.44	$1,195.14	$57.78
		Municipal	$82.30	$83.69	$83.31	$81.60	$79.75	$77.53
		Irrigation	$68.95	$64.41	$60.75	$56.72	$52.96	$49.42
		Manufacturing	$7,870.89	$8,750.82	$8,995.95	$9,323.31	$9,742.81	$10,245.03
		Power	$29.67	$29.67	$29.67	$29.67	$29.67	$29.67
		Livestock	NI	NI	NI	NI	NI	NI

- Ellis, R. John, 2026 Region L, P, K, N Socioeconomic Impacts Projected Water Shortages Reports

INTERA

Summary of Job Losses

- Job losses for counties in GMA 15 if water needs are not met
- Estimates include whole county including areas outside GMA 15
- DeWitt, Aransas and Refugio were had no estimates in the State Water Plan
  - Only counties with projected economic impacts for at least one decade had values calculated
- For counties or water use categories not shown there is no estimated impacts in the 2026 regional water plans
- Highest job losses would be from not meeting manufacturing needs

County	Region	Water Use	2030	2040	2050	2060	2070	2080
Bee	N	Mining	2	2	2	2	2	-
		Municipal	113	106	94	79	62	42
Calhoun	L	Irrigation	314	314	314	314	314	314
		Manufacturing	-	-	-	130	565	1,251
Colorado	K	Irrigation	266	227	191	158	129	102
		Municipal	0	0	0	0	0	-
Fayette	K	Municipal	-	0	0	1	2	3
Goliad	L	Irrigation	0	-	-	-	-	-
Jackson	P	Manufacturing	13,502	17,681	17,826	17,969	18,119	18,287
Karnes	L	Irrigation	2	2	15	15	15	15
		Mining	3,755	3,755	3,755	3,755	3,755	-
Lavaca	P	Irrigation	0	0	0	0	0	0
Matagorda	K	Irrigation	1,330	1,288	1,246	1,206	1,167	1,130
		Manufacturing	-	-	-	149	347	595
		Municipal	0	0	-	-	-	-
Victoria	L	Manufacturing	32,912	34,145	35,423	36,748	38,123	39,548
		Mining	250	264	277	286	295	302
		Municipal	958	982	989	980	970	959
		Steam Electric Power	-	-	-	-	-	-
Wharton	K	Irrigation	812	743	678	616	558	504
	P	Irrigation	60	58	56	54	52	49
GMA 15		Mining	4,007	4,021	4,034	4,043	4,052	302
		Municipal	1,071	1,088	1,083	1,060	1,034	1,004
		Irrigation	2,784	2,632	2,500	2,363	2,235	2,114
		Manufacturing	46,414	51,826	53,249	54,996	57,154	59,681
		Power	NI	NI	NI	NI	NI	NI
		Livestock	NI	NI	NI	NI	NI	NI

- Ellis, R. John, 2026 Region L, P, K, N Socioeconomic Impacts Projected Water Shortages Reports

INTERA

Summary of Drawdown Impacts on Wells by County

	GCD Wells	Drawdown Category							
County	Aquifer	<-20	-20 to -10	-10 to 0	0 to 10	10 to 20	20 to 40	>40	Total Wells
Aransas	Chicot	0	0	3	0	0	0	0	3
Calhoun	Chicot	0	1	209	152	0	0	0	362
Goliad	Evangeline	0	0	0	1	1	0	0	2
Jackson	Chicot	0	0	40	589	260	416	0	1,305
Jackson	Evangeline	0	0	4	18	9	11	1	42
Matagorda	Chicot	0	0	0	0	1	0	0	1
Refugio	Chicot	0	0	578	287	0	0	0	865
Refugio	Evangeline	0	0	0	242	13	1	0	256
San Patricio	Chicot	0	0	0	1	0	0	0	1
Victoria	Chicot	5	213	1,568	406	110	75	32	2,377
Victoria	Evangeline	23	7	94	557	30	0	0	711
Victoria	Jasper	0	0	0	1	0	0	0	1
	Total	28	221	2,496	2,254	424	503	33	5,926

	SDR Wells	Drawdown Category							
County	Aquifer	<-20	-20 to -10	-10 to 0	0 to 10	10 to 20	20 to 40	>40	Total Wells
Aransas	Chicot	0	0	170	1666	0	0	0	1836
Bee	Burkville	1	0	0	0	27	28	0	56
Bee	Chicot	0	0	1	58	11	0	0	70
Bee	Evangeline	0	0	4	355	102	20	3	484
Bee	Jasper	0	0	1	3	26	27	0	57
Calhoun	Chicot	0	3	896	848	8	0	0	1755
Colorado	Burkville	0	0	2	0	20	63	39	124
Colorado	Chicot	0	0	186	896	539	391	0	2012
Colorado	Evangeline	0	0	34	596	717	93	30	1470
Colorado	Jasper	0	0	0	0	0	14	8	22
DeWitt	Burkville	0	0	1	31	103	181	29	345
DeWitt	Chicot	0	0	0	40	0	0	0	40
DeWitt	Evangeline	0	0	55	1271	170	27	0	1523
DeWitt	Jasper	0	0	0	145	125	651	652	1573
Fayette	Burkville	0	0	0	6	37	61	136	240
Fayette	Evangeline	0	0	0	81	60	23	0	164
Fayette	Jasper	0	0	2	22	32	111	621	788
Goliad	Burkville	0	0	0	4	21	12	1	38
Goliad	Chicot	0	0	35	2	0	0	0	37
Goliad	Evangeline	0	13	1366	461	62	0	0	1902
Goliad	Jasper	0	0	0	0	0	0	1	1
Jackson	Chicot	0	0	61	674	417	591	0	1743
Jackson	Evangeline	0	0	1	6	1	3	0	11
Karnes	Burkville	0	1	2	4	15	83	4	109
Karnes	Evangeline	0	0	0	12	1	0	0	13
Karnes	Jasper	0	2	9	96	93	433	128	761
Lavaca	Burkville	0	0	0	33	310	59	2	404
Lavaca	Chicot	0	0	4	301	82	60	0	447
Lavaca	Evangeline	0	0	48	1868	67	2	0	1985
Lavaca	Jasper	0	0	0	28	153	392	232	805
Matagorda	Chicot	0	0	409	2168	349	47	0	2973
Matagorda	Evangeline	0	0	0	0	0	0	4	4
Refugio	Chicot	0	0	866	291	0	0	0	1157
Refugio	Evangeline	0	0	0	36	0	0	0	36
Victoria	Chicot	17	461	2218	362	83	27	20	3188
Victoria	Evangeline	8	50	178	949	195	0	0	1380
Wharton	Chicot	0	0	99	1882	1020	546	0	3547
Wharton	Evangeline	0	0	0	0	0	7	37	44
	Total	26	530	6648	15195	4846	3952	1947	33144

INTERA

Summary of Drawdown Impacts on Wells by County Percentages

	GCD	Drawdown Category							
County	Aquifer	<-20	-20 to -10	-10 to 0	0 to 10	10 to 20	20 to 40	>40	Total Wells
Aransas	Chicot	0%	0%	100%	0%	0%	0%	0%	100%
Calhoun	Chicot	0%	0%	58%	42%	0%	0%	0%	100%
Goliad	Evangeline	0%	0%	0%	50%	50%	0%	0%	100%
Jackson	Chicot	0%	0%	3%	45%	20%	32%	0%	100%
Jackson	Evangeline	0%	0%	10%	43%	21%	26%	2%	100%
Matagorda	Chicot	0%	0%	0%	0%	100%	0%	0%	100%
Refugio	Chicot	0%	0%	67%	33%	0%	0%	0%	100%
Refugio	Evangeline	0%	0%	0%	95%	5%	0%	0%	100%
San Patricio	Chicot	0%	0%	0%	100%	0%	0%	0%	100%
Victoria	Chicot	0%	9%	66%	17%	5%	3%	1%	100%
Victoria	Evangeline	3%	1%	13%	78%	4%	0%	0%	100%
Victoria	Jasper	0%	0%	0%	100%	0%	0%	0%	100%
	Total	0%	4%	42%	38%	7%	8%	1%	100%

		Drawdown Category							
County	Aquifer	<-20	-20 to -10	-10 to 0	0 to 10	10 to 20	20 to 40	>40	Total Wells
Aransas	Chicot	0%	0%	9%	91%	0%	0%	0%	100%
Bee	Burkville	2%	0%	0%	0%	48%	50%	0%	100%
Bee	Chicot	0%	0%	1%	83%	16%	0%	0%	100%
Bee	Evangeline	0%	0%	1%	73%	21%	4%	1%	100%
Bee	Jasper	0%	0%	2%	5%	46%	47%	0%	100%
Calhoun	Chicot	0%	0%	51%	48%	0%	0%	0%	100%
Colorado	Burkville	0%	0%	2%	0%	16%	51%	31%	100%
Colorado	Chicot	0%	0%	9%	45%	27%	19%	0%	100%
Colorado	Evangeline	0%	0%	2%	41%	49%	6%	2%	100%
Colorado	Jasper	0%	0%	0%	0%	0%	64%	36%	100%
DeWitt	Burkville	0%	0%	0%	9%	30%	52%	8%	100%
DeWitt	Chicot	0%	0%	0%	100%	0%	0%	0%	100%
DeWitt	Evangeline	0%	0%	4%	83%	11%	2%	0%	100%
DeWitt	Jasper	0%	0%	0%	9%	8%	41%	41%	100%
Fayette	Burkville	0%	0%	0%	3%	15%	25%	57%	100%
Fayette	Evangeline	0%	0%	0%	49%	37%	14%	0%	100%
Fayette	Jasper	0%	0%	0%	3%	4%	14%	79%	100%
Goliad	Burkville	0%	0%	0%	11%	55%	32%	3%	100%
Goliad	Chicot	0%	0%	95%	5%	0%	0%	0%	100%
Goliad	Evangeline	0%	1%	72%	24%	3%	0%	0%	100%
Goliad	Jasper	0%	0%	0%	0%	0%	0%	100%	100%
Jackson	Chicot	0%	0%	3%	39%	24%	34%	0%	100%
Jackson	Evangeline	0%	0%	9%	55%	9%	27%	0%	100%
Karnes	Burkville	0%	1%	2%	4%	14%	76%	4%	100%
Karnes	Evangeline	0%	0%	0%	92%	8%	0%	0%	100%
Karnes	Jasper	0%	0%	1%	13%	12%	57%	17%	100%
Lavaca	Burkville	0%	0%	0%	8%	77%	15%	0%	100%
Lavaca	Chicot	0%	0%	1%	67%	18%	13%	0%	100%
Lavaca	Evangeline	0%	0%	2%	94%	3%	0%	0%	100%
Lavaca	Jasper	0%	0%	0%	3%	19%	49%	29%	100%
Matagorda	Chicot	0%	0%	14%	73%	12%	2%	0%	100%
Matagorda	Evangeline	0%	0%	0%	0%	0%	0%	100%	100%
Refugio	Chicot	0%	0%	75%	25%	0%	0%	0%	100%
Refugio	Evangeline	0%	0%	0%	100%	0%	0%	0%	100%
Victoria	Chicot	1%	14%	70%	11%	3%	1%	1%	100%
Victoria	Evangeline	1%	4%	13%	69%	14%	0%	0%	100%
Wharton	Chicot	0%	0%	3%	53%	29%	15%	0%	100%
Wharton	Evangeline	0%	0%	0%	0%	0%	16%	84%	100%
	Total	0%	2%	20%	46%	15%	12%	6%	100%

INTERA

Summary of Drawdown Impacts on Wells

- Drawdown Analysis for submitted GCD Wells and SDR (submitted drillers reports from TWDB)
- Includes all wells that had either total depth information and/or screen depth information
  - If data only had total depth, screen was estimated to be the last 50 ft interval of the total depth
- Drawdown categories are feet of drawdown from 2000 to 2080
  - Positive values indicate a fall in water levels from 2000 to 2080
  - Negative values indicate a rise in water levels from 2000 to 2080

GCD Wells

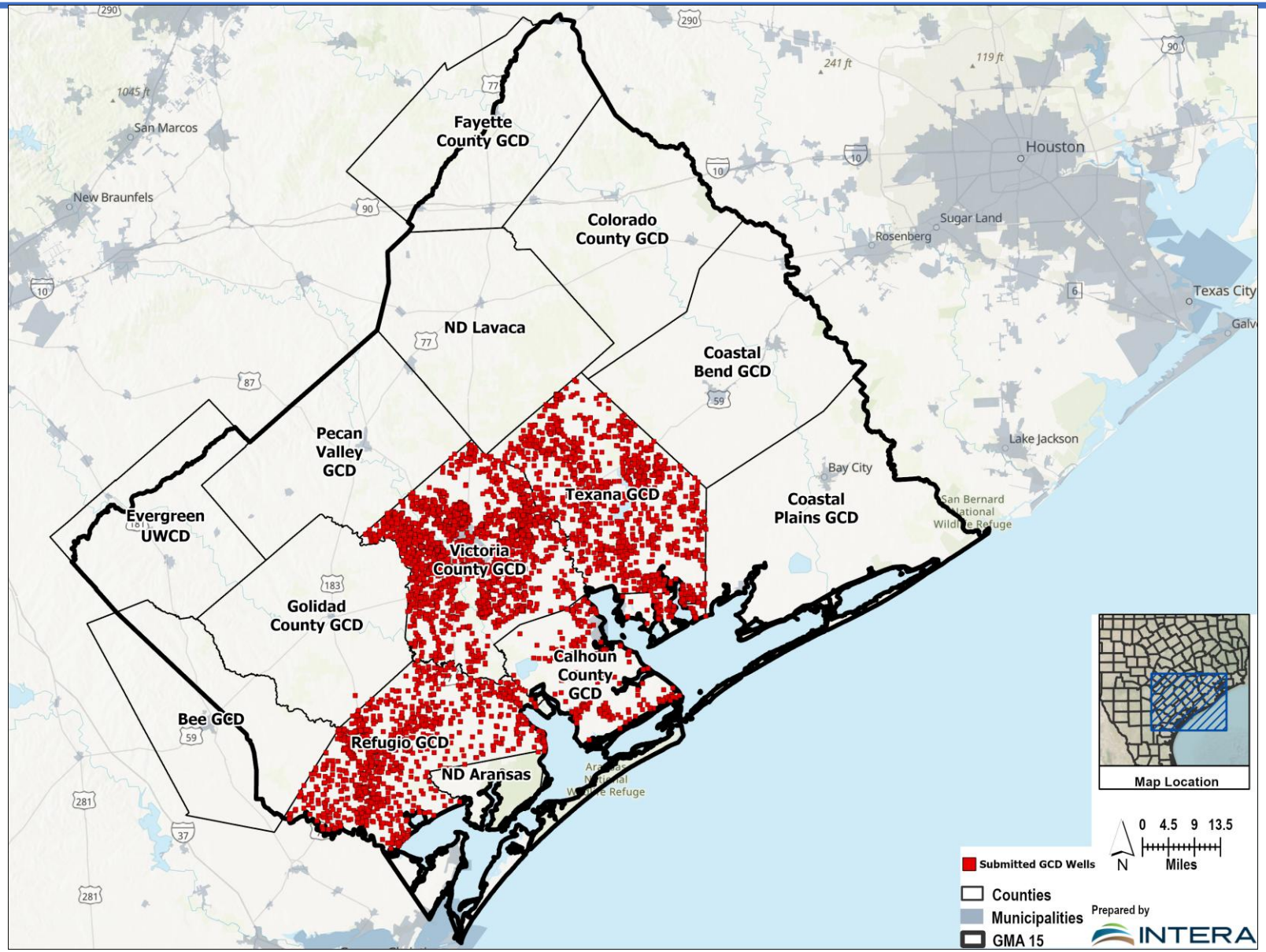
	Drawdown Category							
Aquifer	**< -20**	**-20 to -10**	**-10 to 0**	**0 to 10**	**10 to 20**	**20 to 40**	**> 40**	**Total Wells**
Chicot	**5**	**214**	**2,398**	**1,435**	**371**	**491**	**32**	**4,946**
Evangeline	**23**	**7**	**98**	**818**	**53**	**12**	**1**	**1,012**
Jasper	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**
Total	**28**	**221**	**2,496**	**2,254**	**424**	**503**	**33**	**5,959**

SDR Wells

	Drawdown Category							
Aquifer	**<-20**	**-20 to -10**	**-10 to 0**	**0 to 10**	**10 to 20**	**20 to 40**	**>40**	**Total Wells**
Chicot	**17**	**464**	**4,945**	**9,188**	**2,509**	**1,662**	**20**	**18,805**
Evangeline	**8**	**63**	**1,686**	**5,635**	**1,375**	**175**	**74**	**9,016**
Jasper	**0**	**2**	**12**	**294**	**429**	**1,628**	**1,642**	**4,007**
Total	**25**	**529**	**6,643**	**15,117**	**4,313**	**3,465**	**1,736**	**31,828**

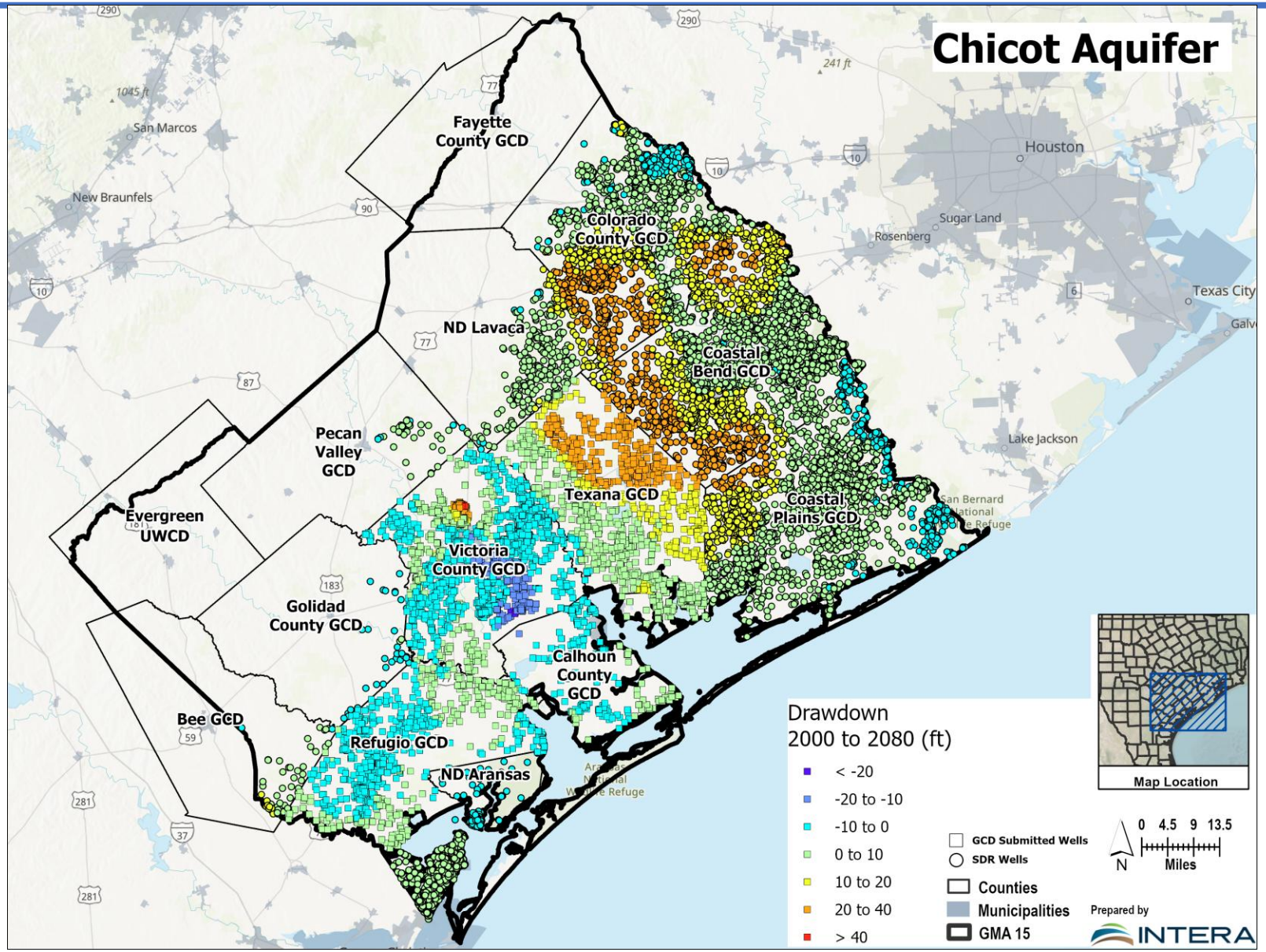
INTERA

Wells Received from Data Request



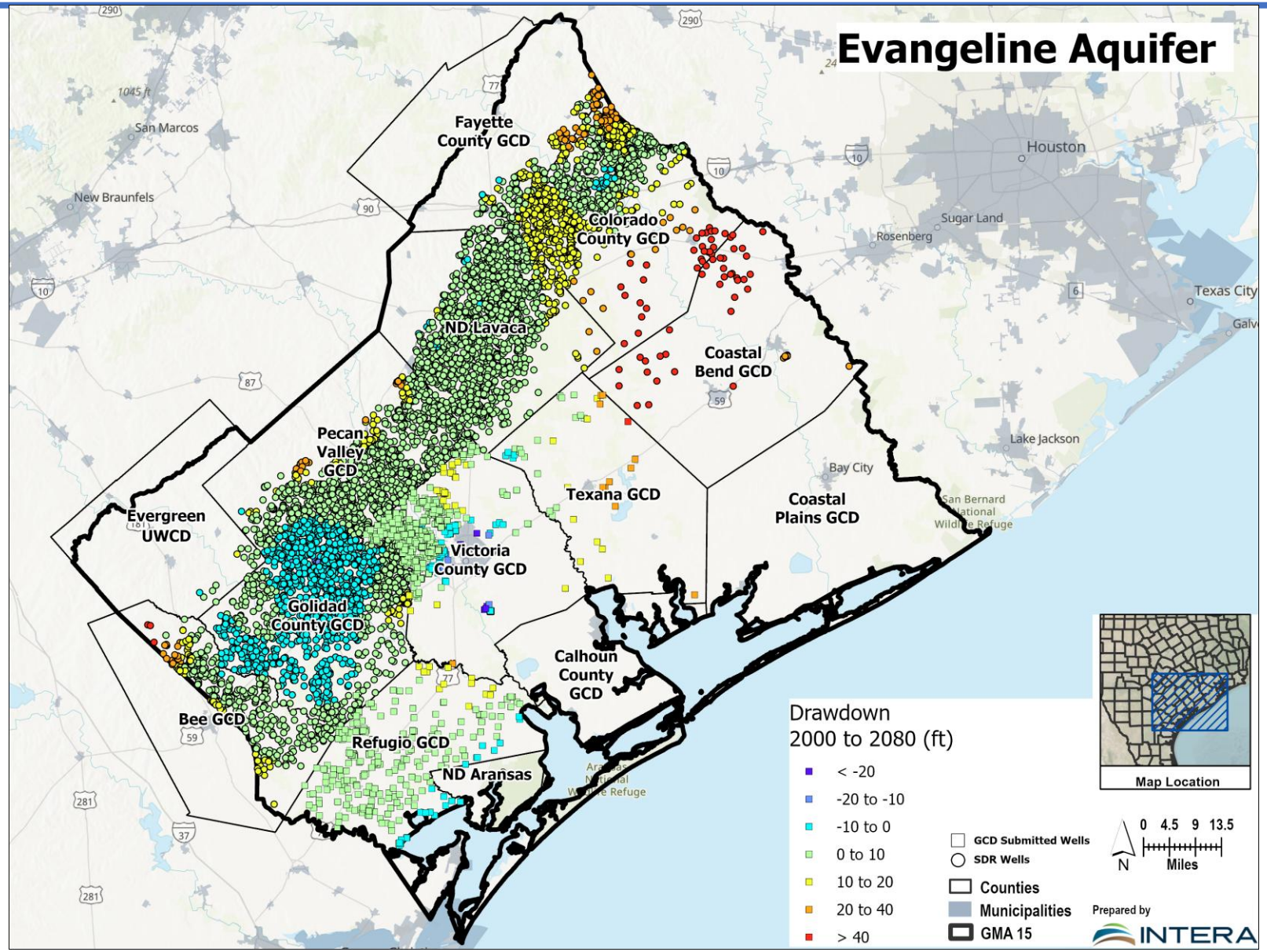
Chicot Aquifer Impacts

- Water levels decreasing towards northeast and increasing through southwest



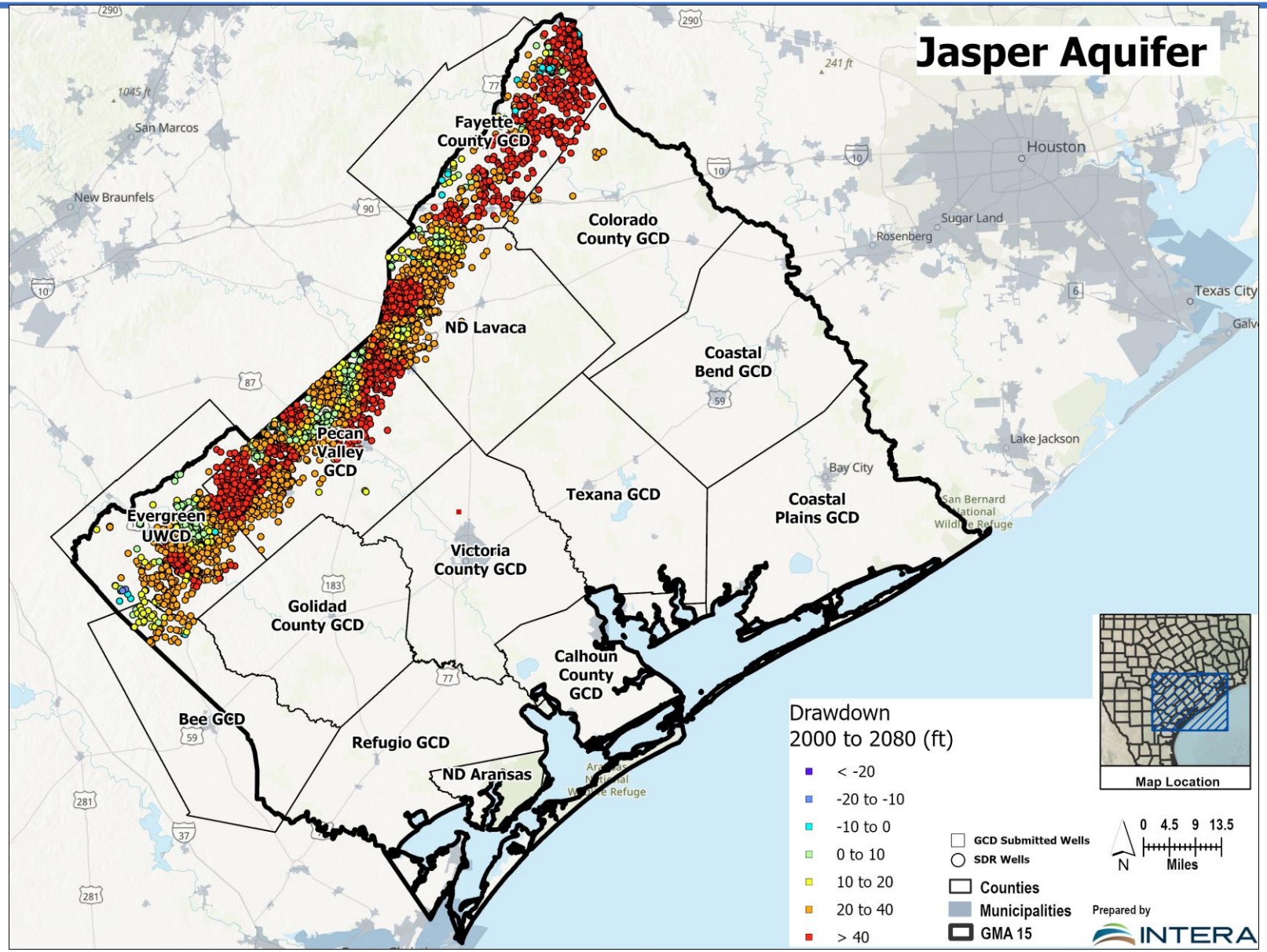
Evangeline Aquifer Impacts

- Water levels decreasing towards northeast and increasing through southwest

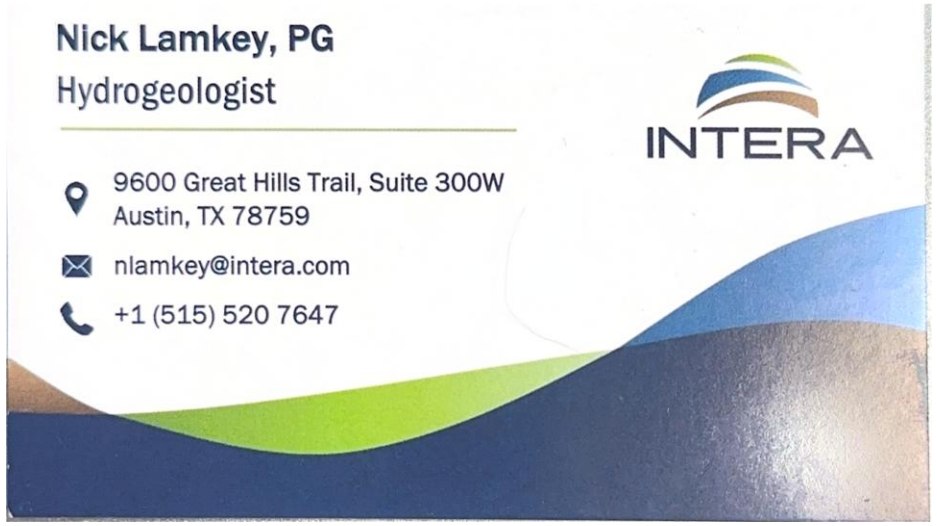


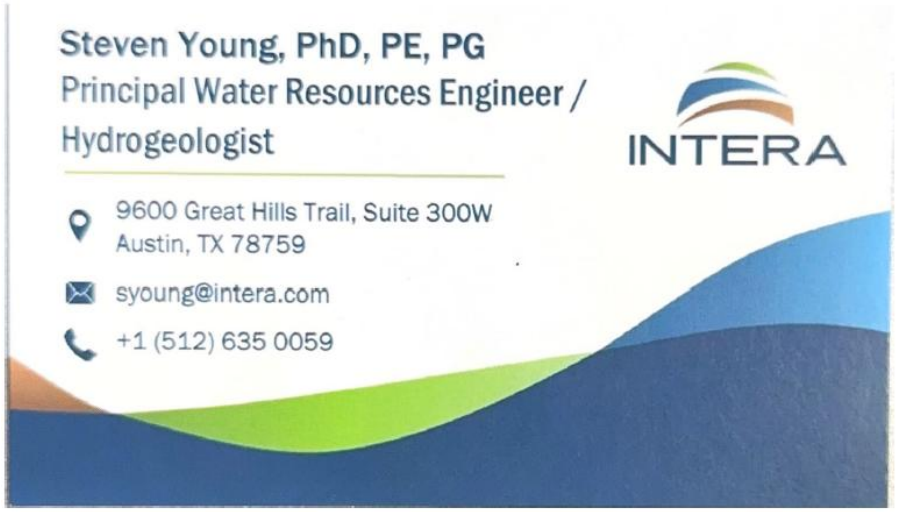
Jasper Aquifer Impacts

- Water levels decreasing 20+ feet in most areas



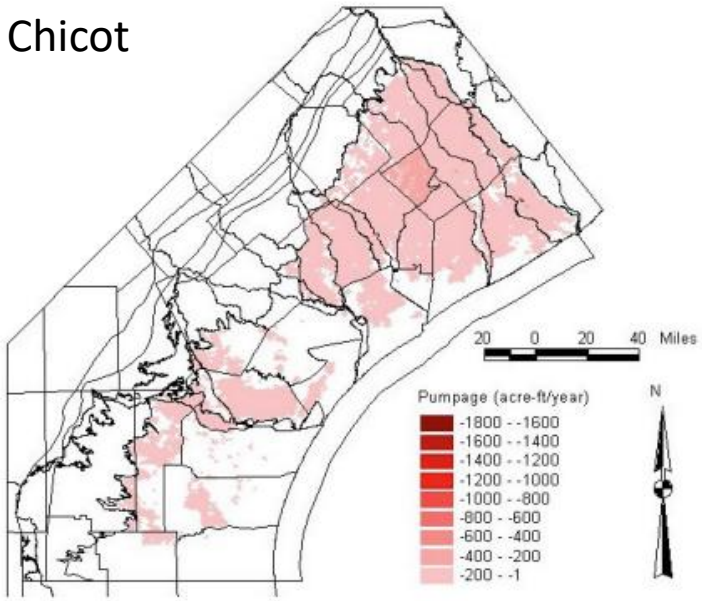
Questions?


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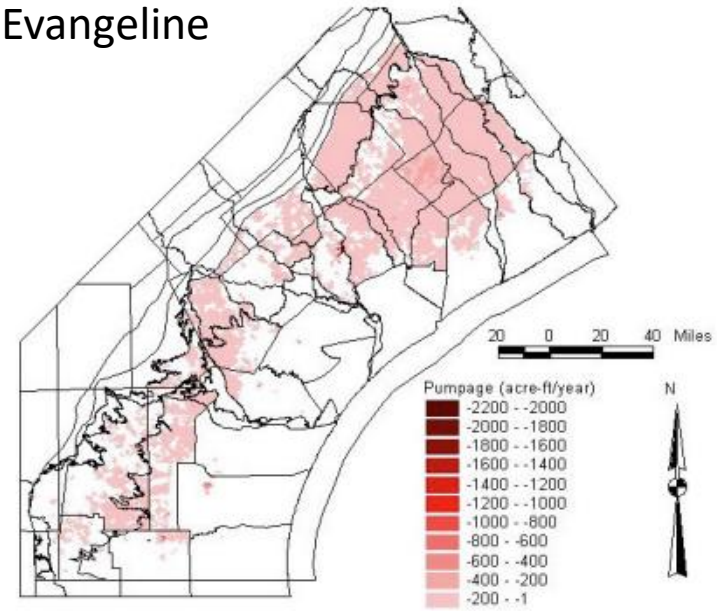

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Pumping Distributions

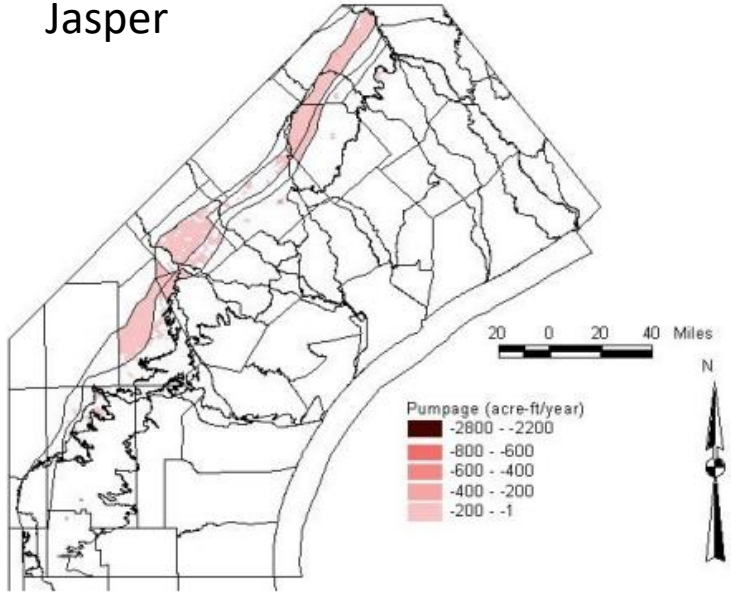
Chicot



Evangeline

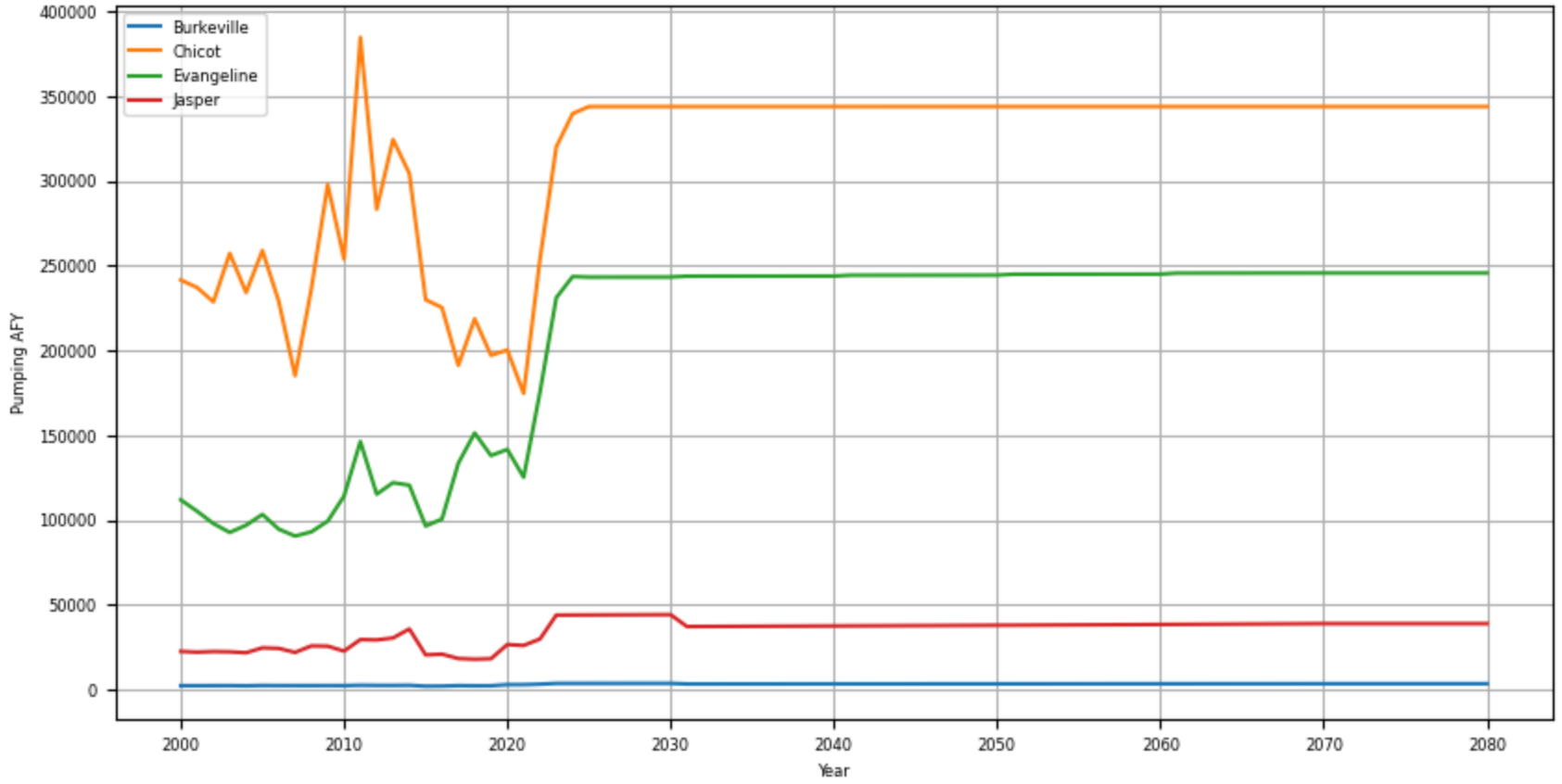


Jasper



INTERA

Current Pumping



F.6 Impacts of Desired Future Conditions on the Interests and Rights in Private Property

GMA 15
Discussion of Nine Factors in TWC 36.108(d): Impacts on the Interests and Rights in Private Property

Groundwater Management Area 15

July 10, 2025



Presented by:
Steven Young Ph.D, PE, PG
Nick Lamkey PG

Consideration of Potential DFC Impacts

- "Considerations" analyze how property rights could be impacted.
- Impacts ≠ takings in this process
- A GMA must consider the rights of all owners of private property, including all owners of groundwater within the GMA. All interests, whether they favor highest practicable use or conservation, have property rights under the law.
- Impacts may be viewed as both restricting and enhancing property rights.
- Rules adopted by a District to achieve a DFC may have a potential impact on property rights

Effects on the Balancing Requirement for DFC

Highest Practicable Use



Conservation

- Interests and rights that are benefitted or enhanced by the present use of groundwater.
- Interests and rights that are benefitted or enhanced by the use of groundwater in the near future.
- Interests and rights that are benefitted or enhanced by the ability to use groundwater over the long-term.
- Interests and rights that are benefitted or enhanced by leaving a significant amount of groundwater in place.

How DFCs Could Impact Property Rights

- A DFC that allows for lower aquifer levels could favorably impact property interests identified on the “highest practicable use” in the balance; while negatively impacting interests identified as “conservation”



- A DFC that aims for a higher aquifer levels could favorably impact property interests identified as “conservation” in the balance; while negatively impacting interests identified as “highest practicable use”

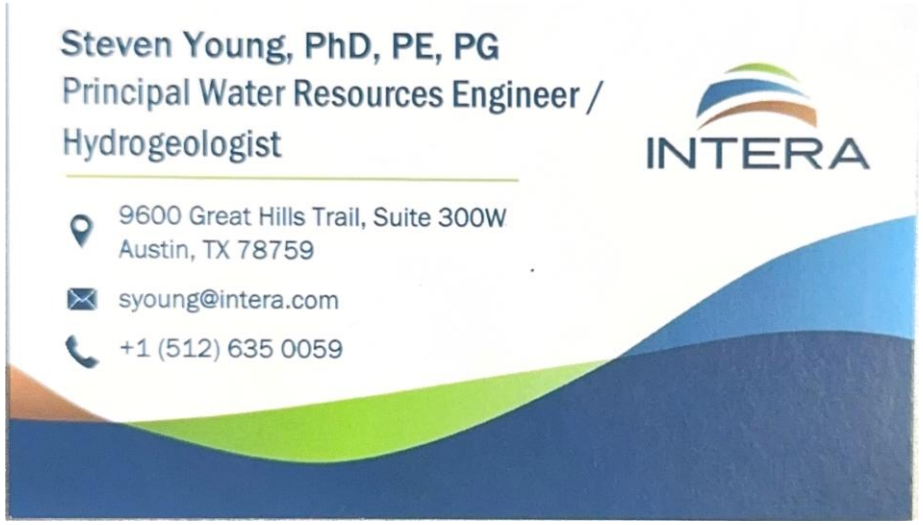
Potential Impacts on Property Rights of DFCs Favoring "highest practical production"

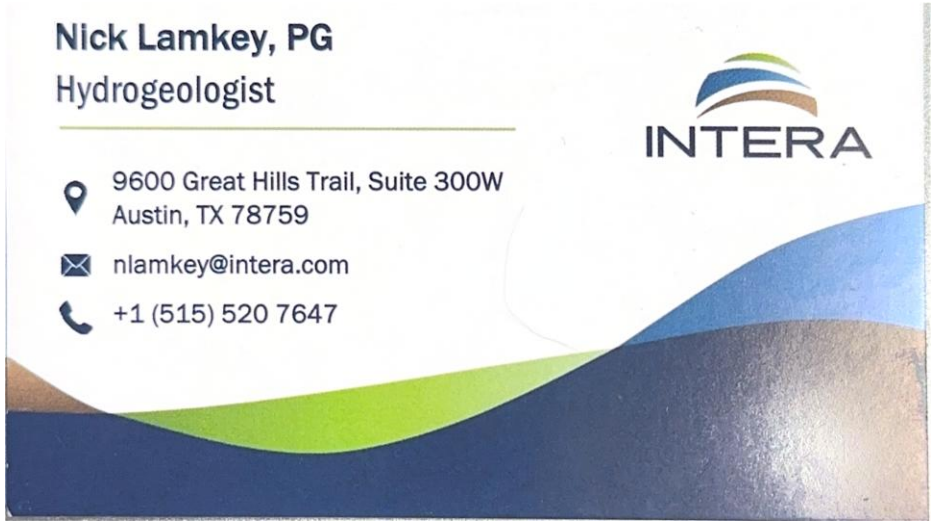
- lenient production restrictions that allow existing users to produce more groundwater with less acreage.
- may endanger long-term water supply and sustainability of groundwater resource
- may endanger springs and promote losing-segments along stream reaches
- may increase interference between groundwater right owners.

Potential Impacts on Property Rights of DFCs Favoring conservation, preservation, protection, and recharging

- may help abate low spring flows
- may lead to larger acreages for permitted productions
- may extend groundwater supply and levels to reduce costs for well operations
- may extend the productive life of the aquifer.
- may help reduce interference between groundwater right owners.
- Reduced potential for land subsidence

Questions?


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F.7 Subsidence

GMA 15
Discussion of Nine Factors in TWC 36.108(d): Subsidence Impacts

Groundwater Management Area 15

April 10, 2025



Presented by:
Steven Young Ph.D, PE, PG
Nick Lamkey PG

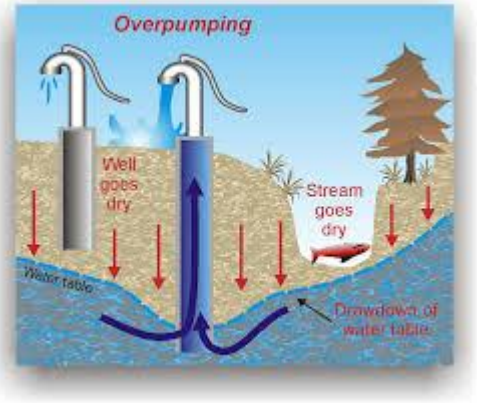
Agenda

- Causes
- Approach for Estimating Subsidence
- Case Study
- TWDB Vulnerability Matrix
- Options for Modeling Subsidence
- Subsidence Prediction

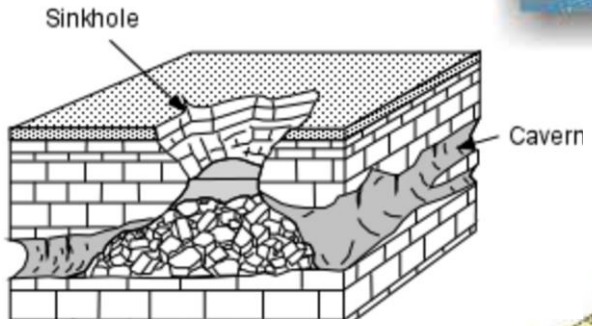
INTERA

Causes of Land Subsidence

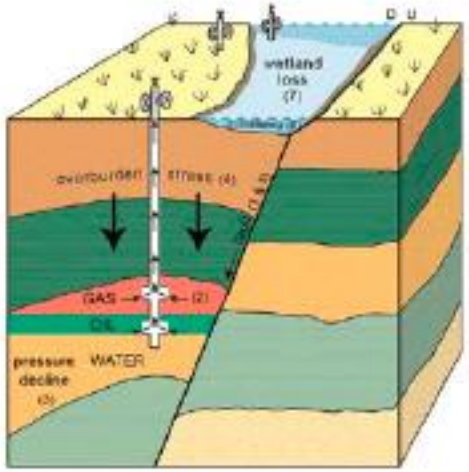
- Compaction-related subsidence can occur because of :
  - Accumulating soft sediments that sink under their own weight over time
  - Dissolution of calcium-rich rocks
  - Over-pumping of groundwater
  - Removal of high pressurized fluids/gases in oil and gas producing areas
  - Tectonic subsidence occurs from movement along faults



Collapse



Faulting and Geostatic Pressure

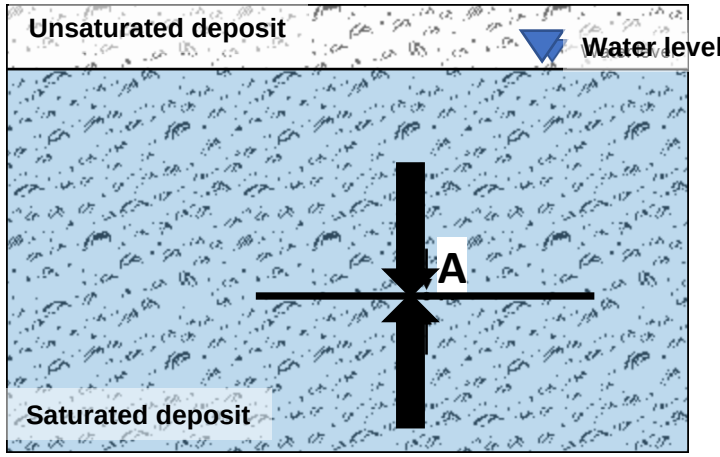


Land Subsidence Caused by Consolidation of Sediments

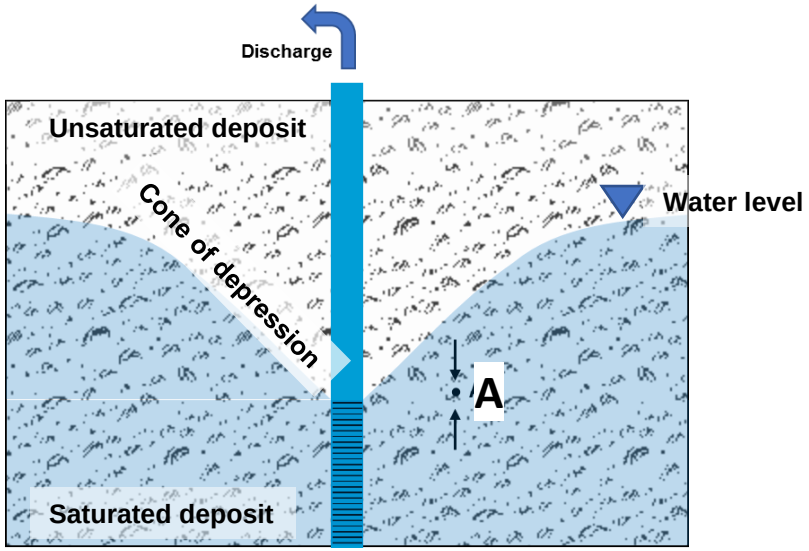
Compressibility of Sediments Occurs As Result of Increased Pressure on Aquifer Matrix:

- Downward force at Point A: weight of soils above Point A minus buoyancy provided by groundwater
- Upward force at Point A: Structural support provided by aquifer-system skeleton and hydraulic pressure of groundwater

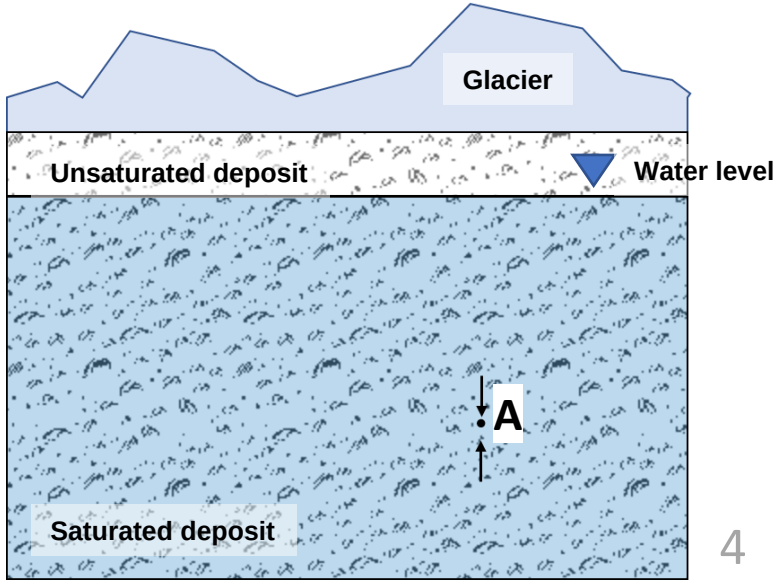
No Land Subsidence Occurring



Land Subsidence Caused by Over Pumping

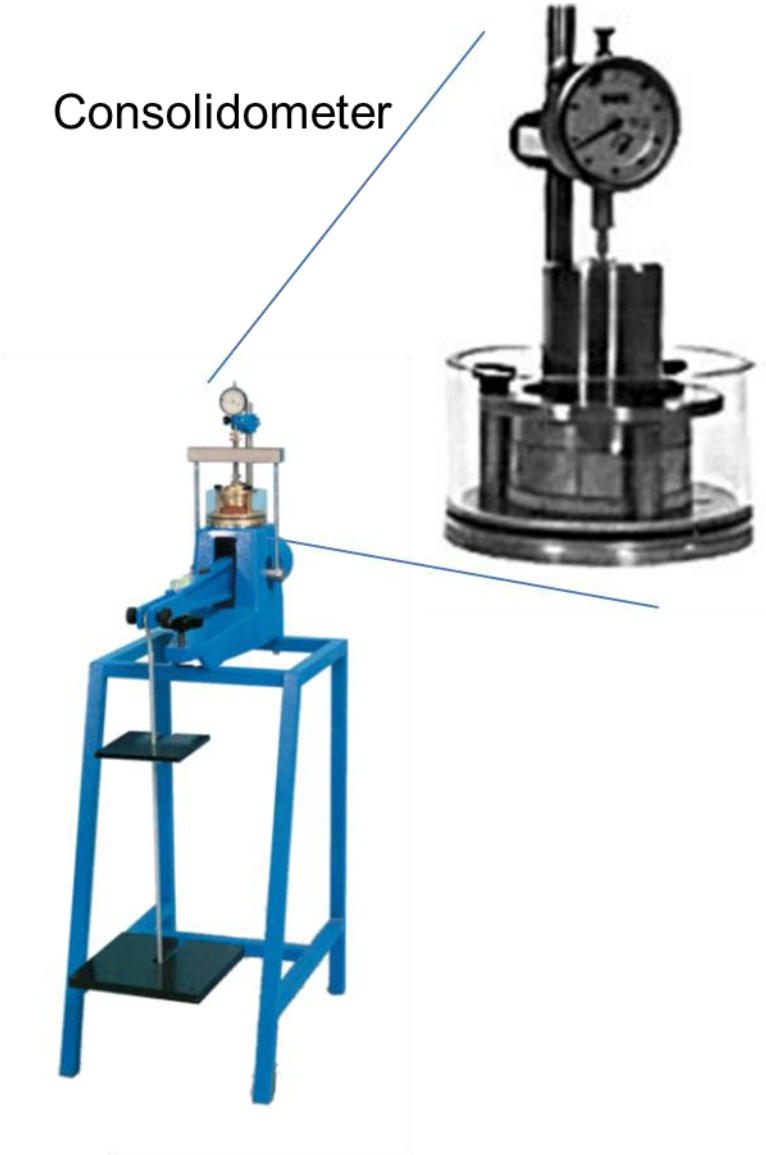


Land Subsidence Caused by Increased Load

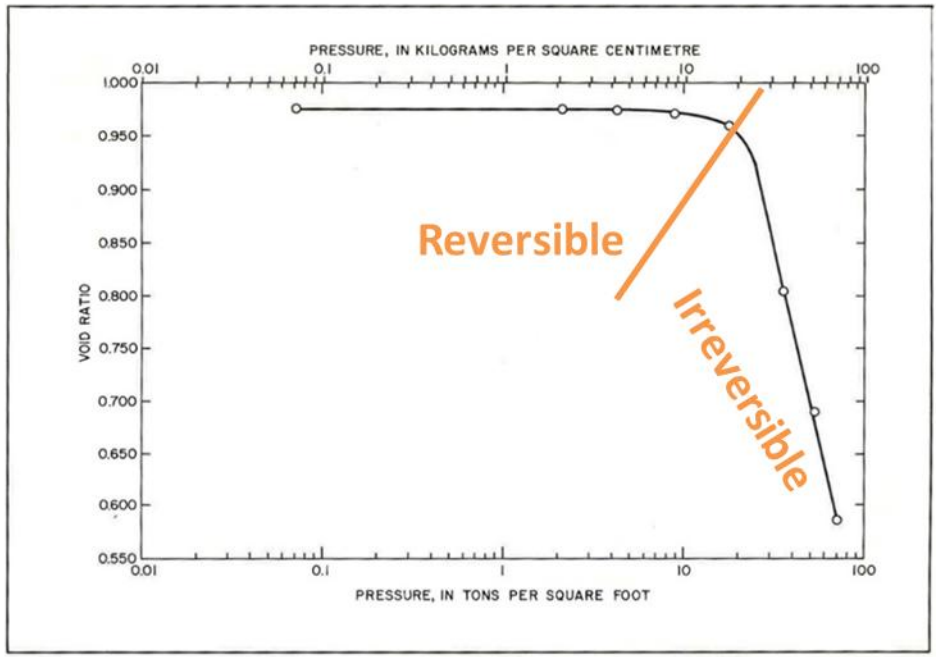


INTERA

Measurement of Compressibility

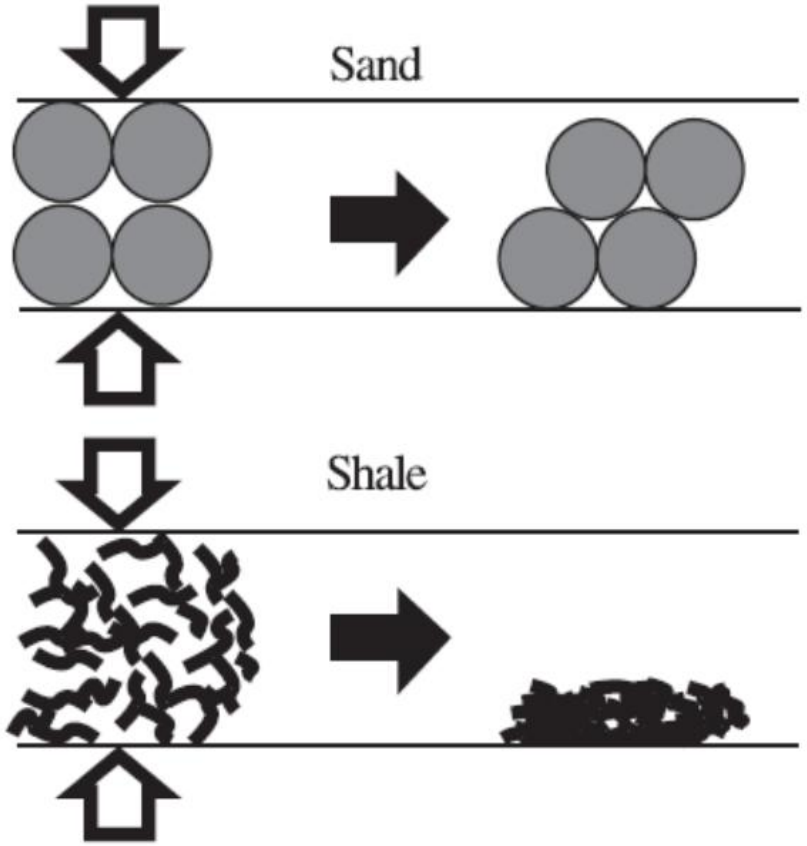


Consolidometer Test Results



Factors Controlling Land Subsidence

- Three key factors to assess potential for land subsidence:
  - Amount of drawdown
  - Total thickness of clay
  - Compressibility of clay
- Factors affecting Compressibility of Clay:
  - Type of clay
  - Depth of burial
  - Age of clay
  - History of compaction
- Other potentially important factors:
  - Permeability of clay (affects timing)
  - Thickness of individual clay layers



Schematic showing the reorientation and shifting of sand grains and clay particles associated with compaction caused by increased effective stress

Simplified Equation for Estimating Subsidence

$$\Delta b = \Delta d * \alpha_{eff} * C_t$$

Where:

Δb = the thickness that the aquifer has compacted (L)

Δd = Amount of drawdown in the aquifer since predevelopment (L)

α_{eff} = Effective compressibility coefficient for clays in the aquifer (L^{-1})

C_t = Total thickness of the clay units in the aquifer (L)

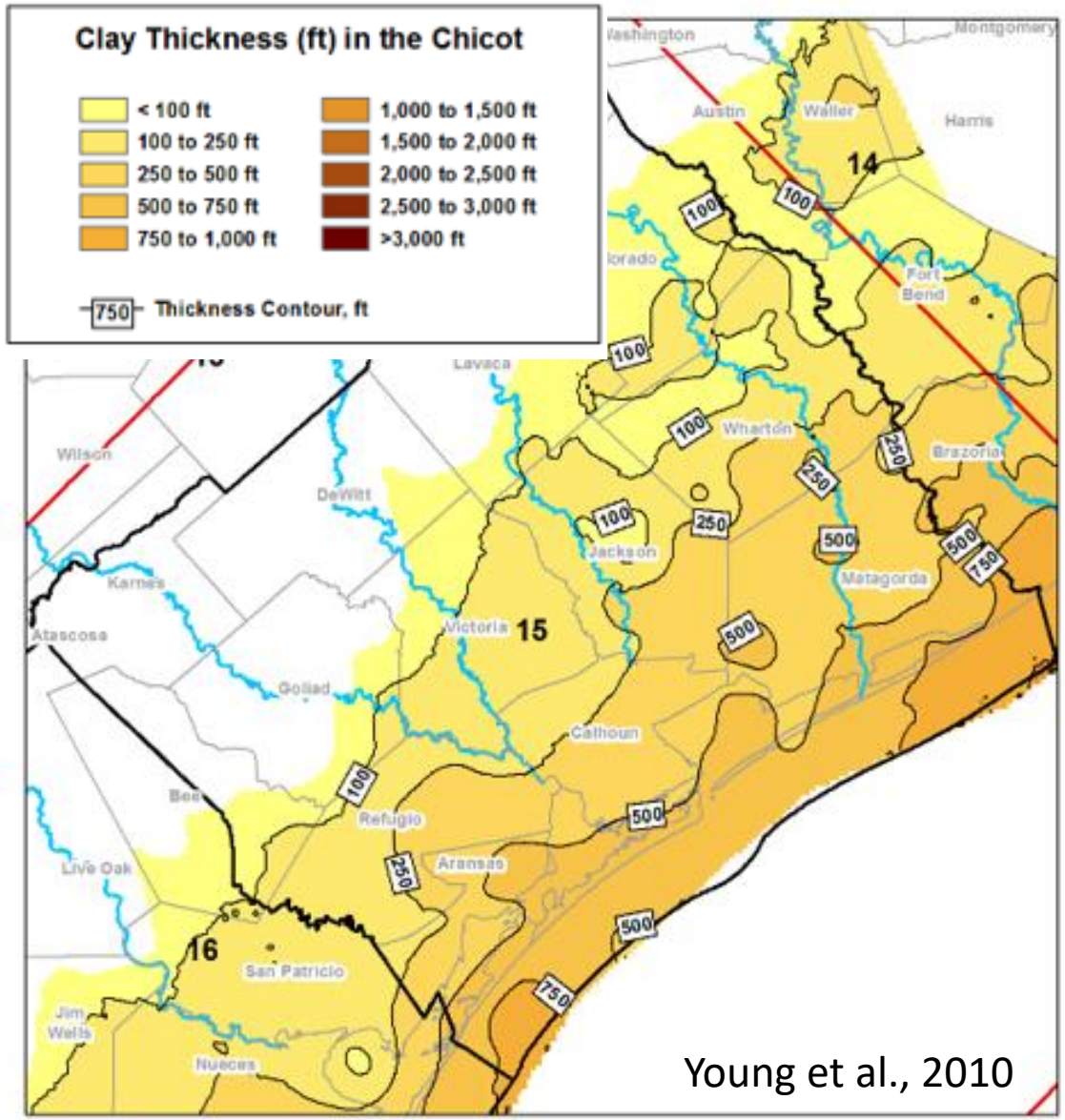
Gabrysch studies (USGS reports 1975 to 1990)

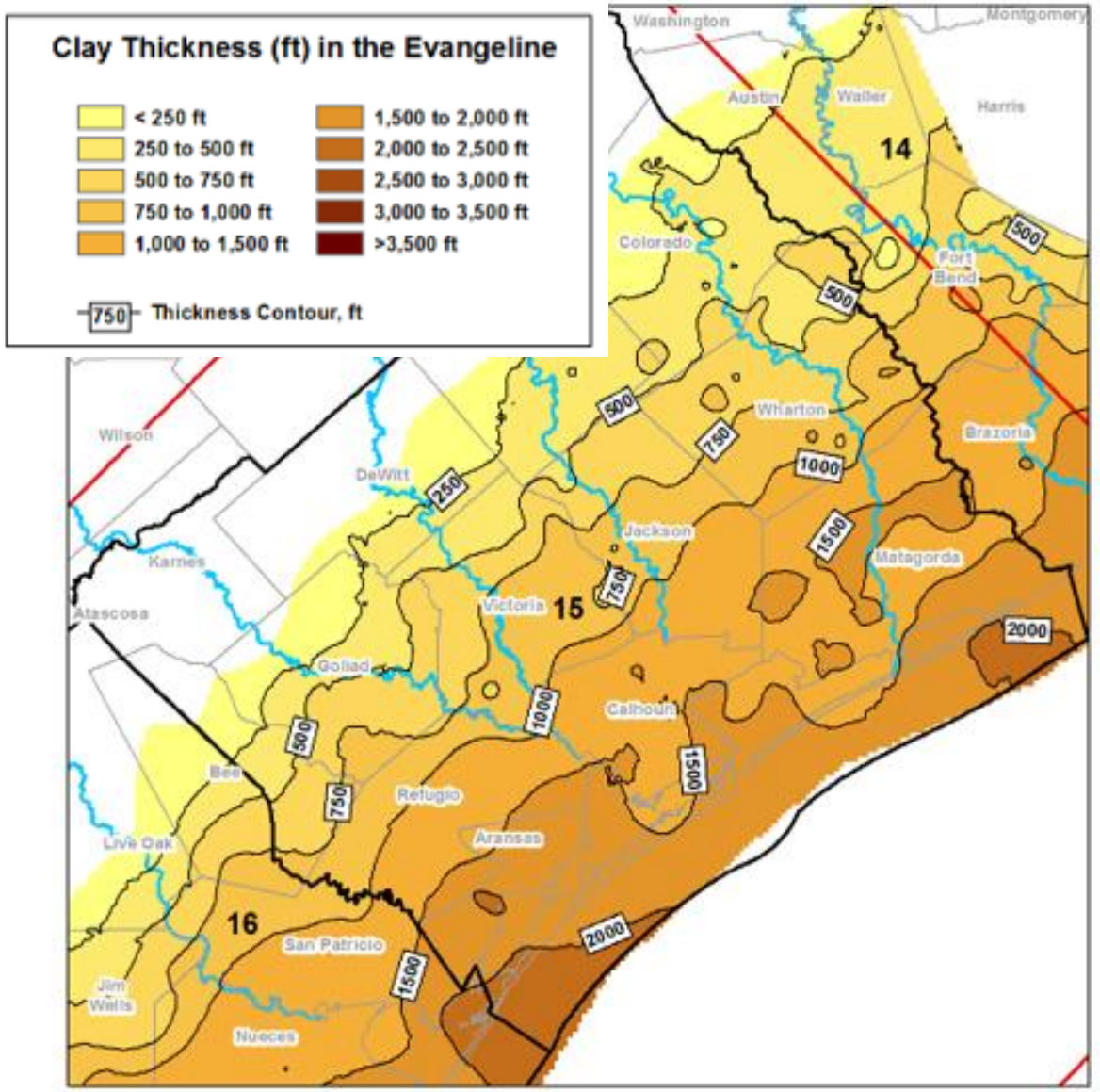
-- Ct: values range between 7.2×10^{-6} ft^{-1} and 4.0×10^{-5} ft^{-1}

average and geometric average of the values are 2.1×10^{-5} ft^{-1} and 1.8×10^{-5} ft^{-1}

INTERA

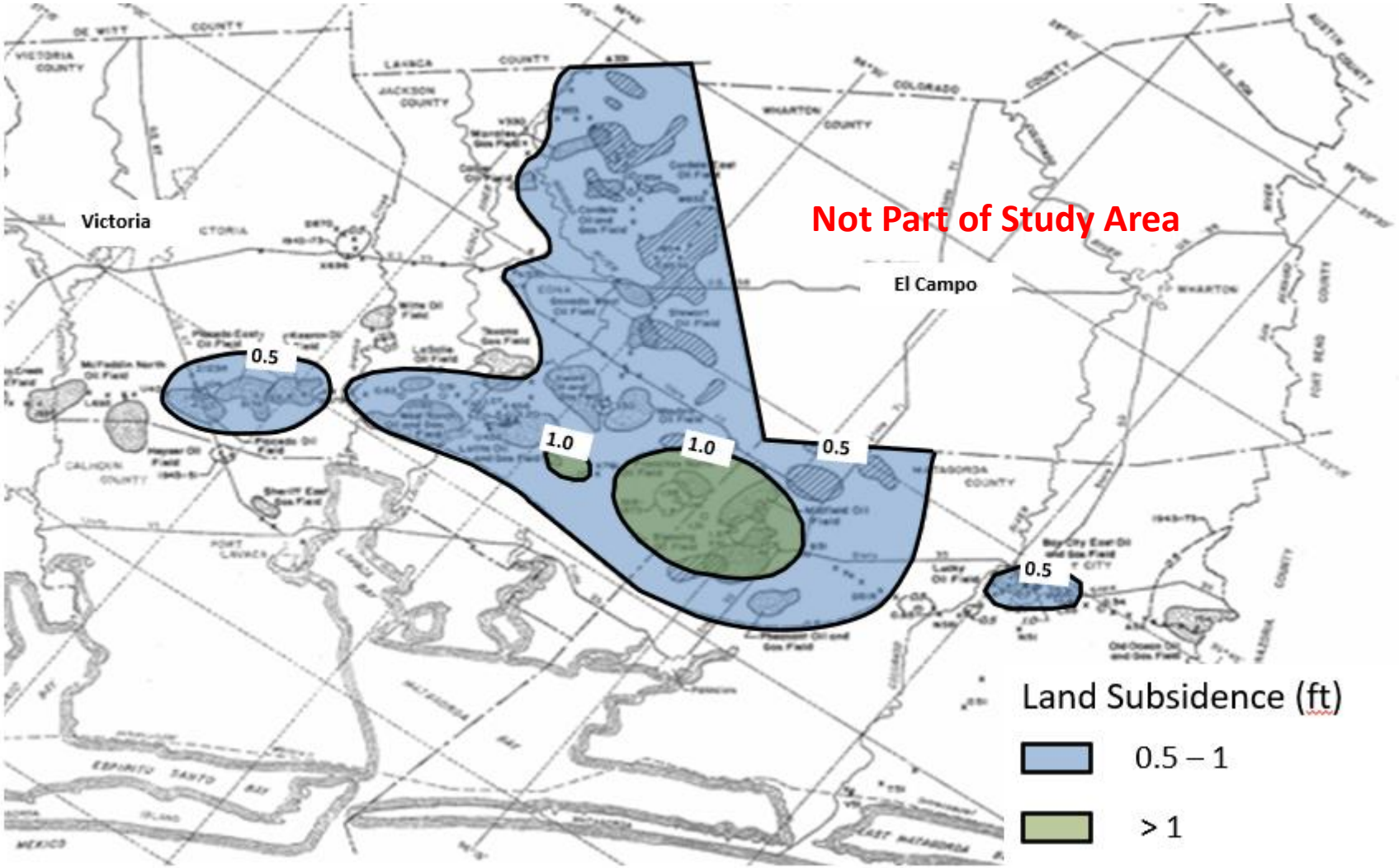
Clay Thicknesses:



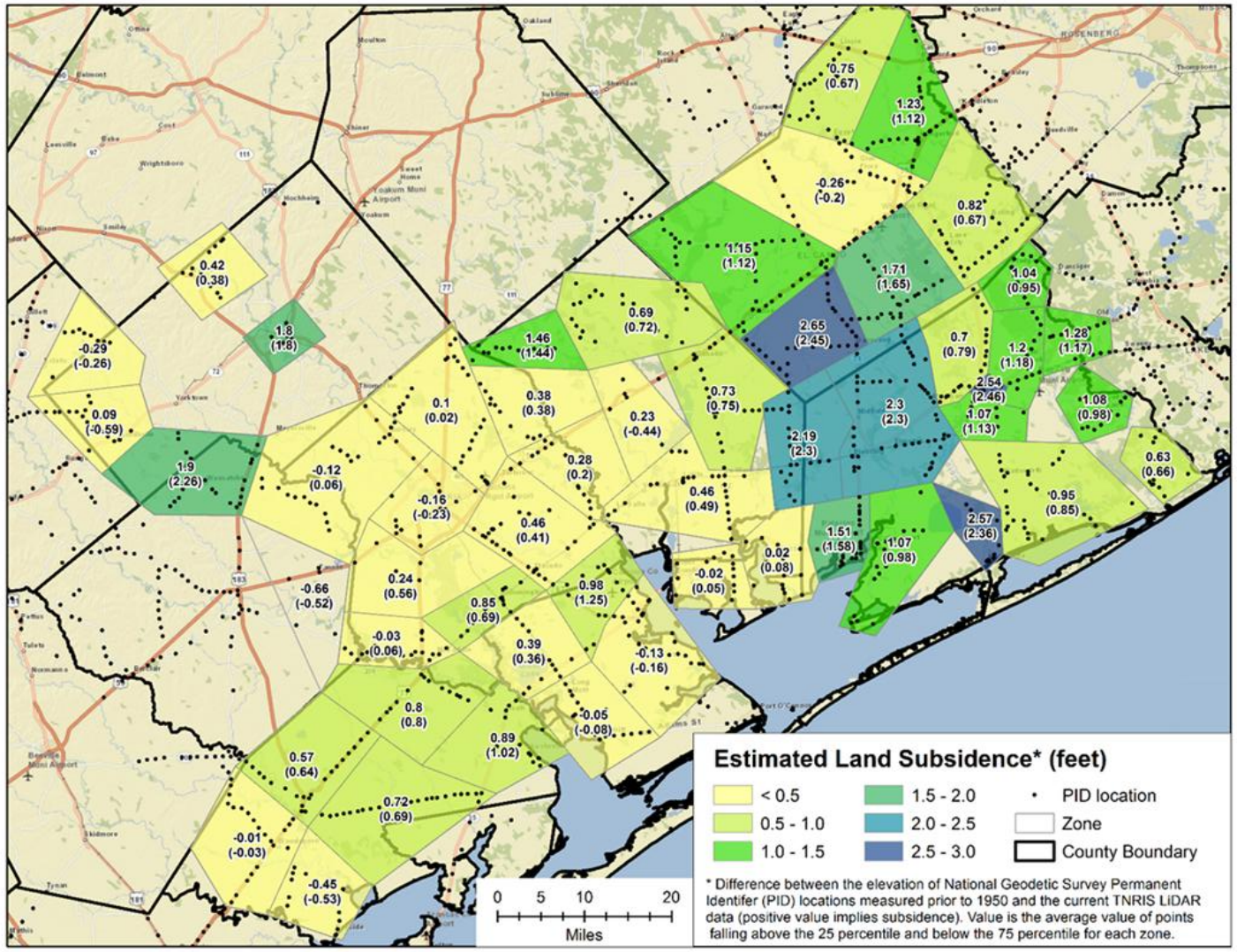


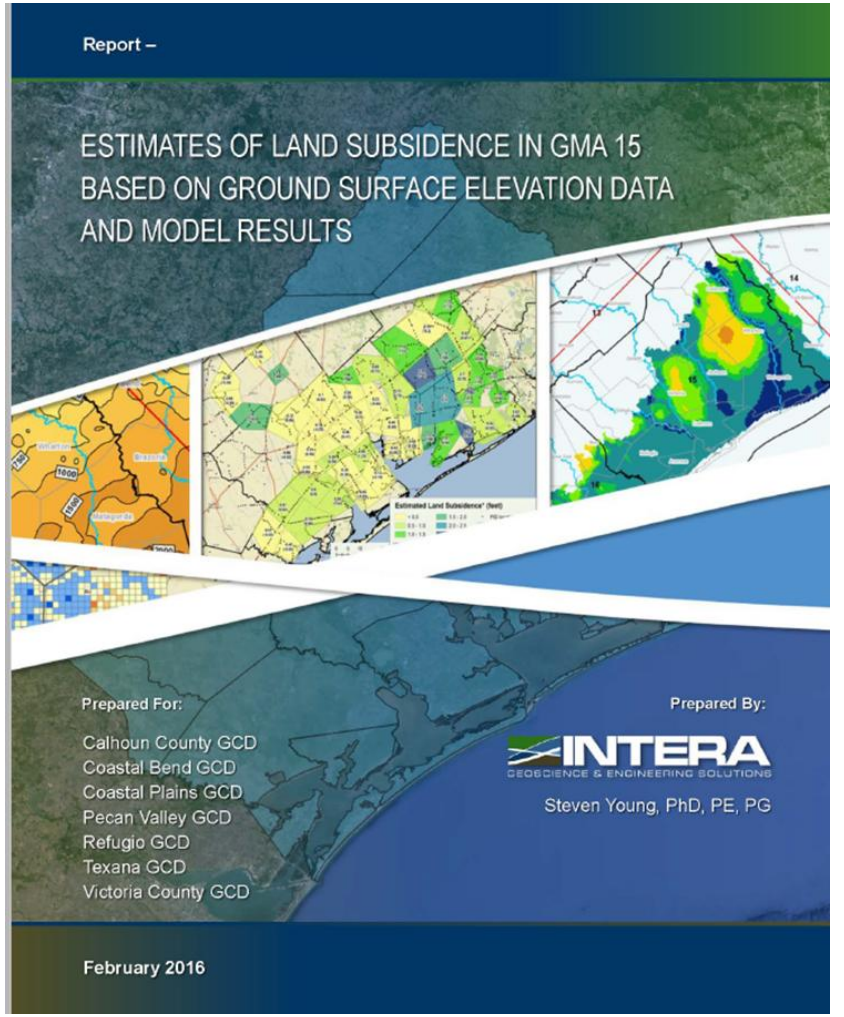
Young et al., 2010

Documented Cases: 1918 to 1973 (Ratzlaff, 1982)

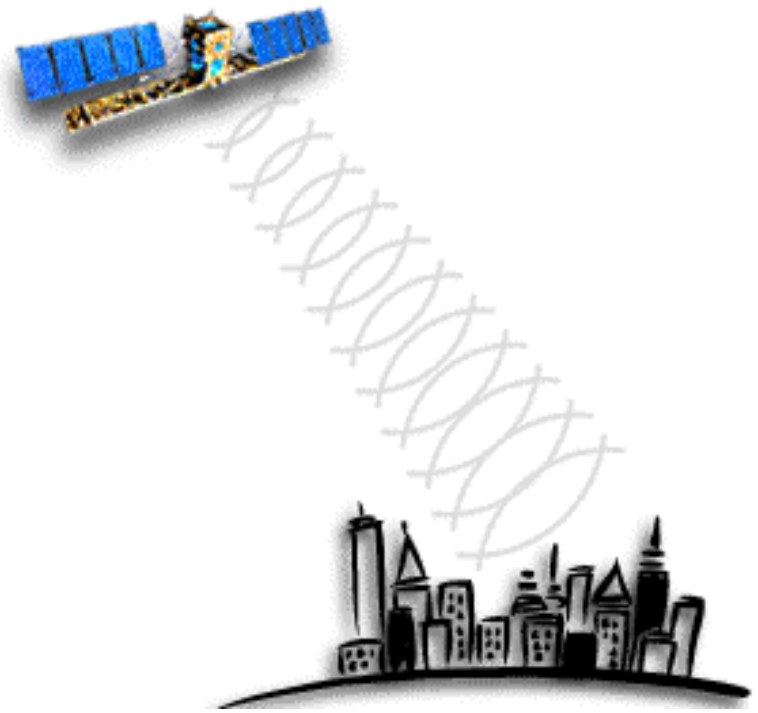


Documented Cases: ~1950 to 2013 (INTERA, 2016)





Radar and Remote Sensing



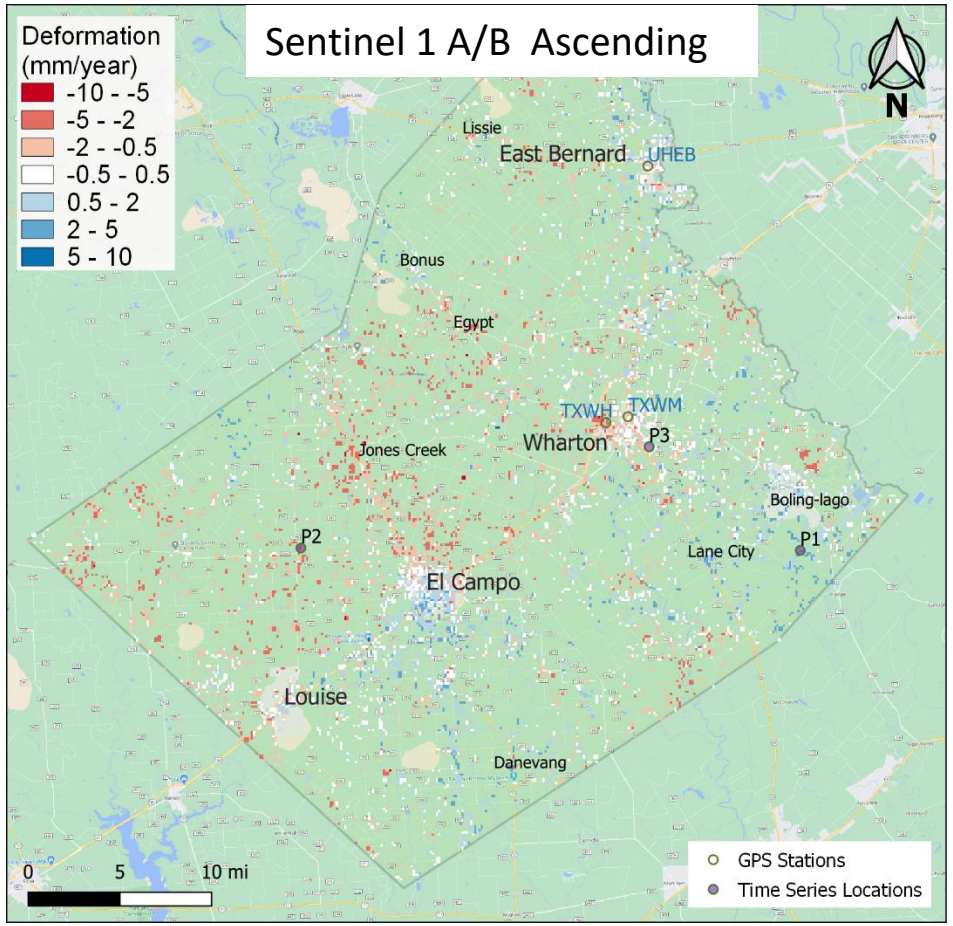
In its simplest form, a radar operates by:

- Sending a signal into space - when the signal encounters an object then some of the signal redirected back to the radar antenna
- Receiving the “echoed” signal back from the encountered objects

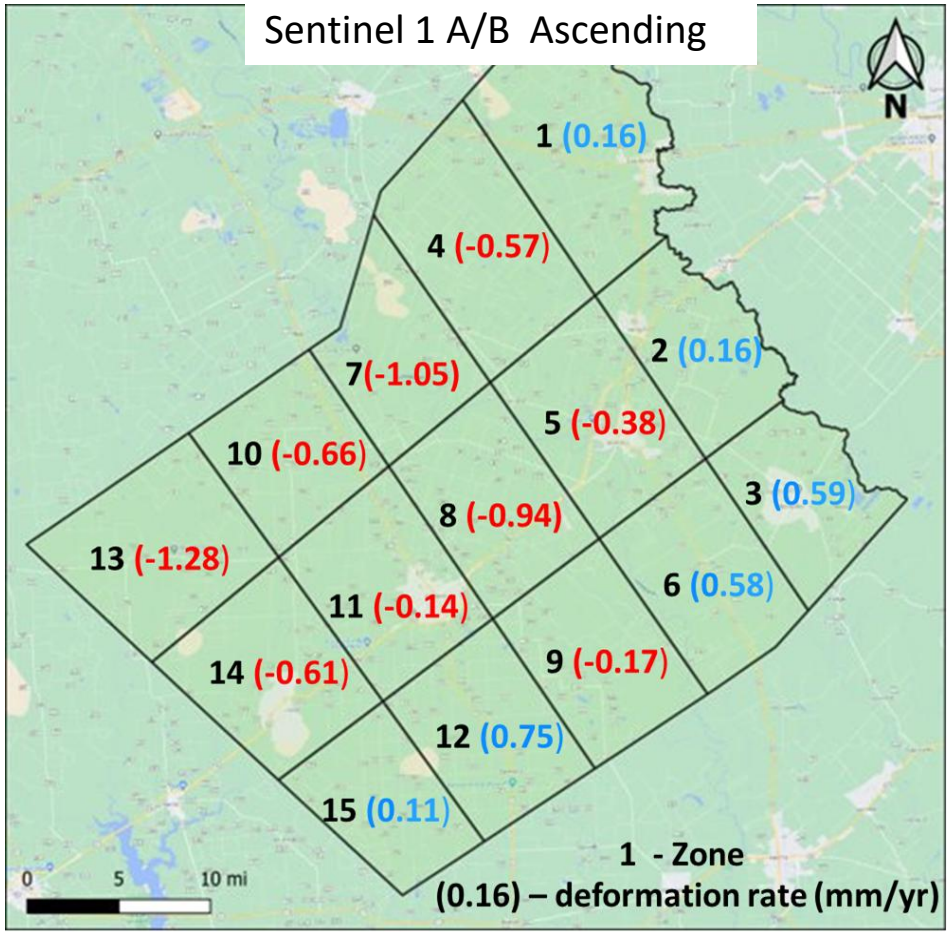
Precise timing of the echo delays allows determining of the distance and or “range”

INTERA

Application of INSAR: Wharton County (Young, 2020)



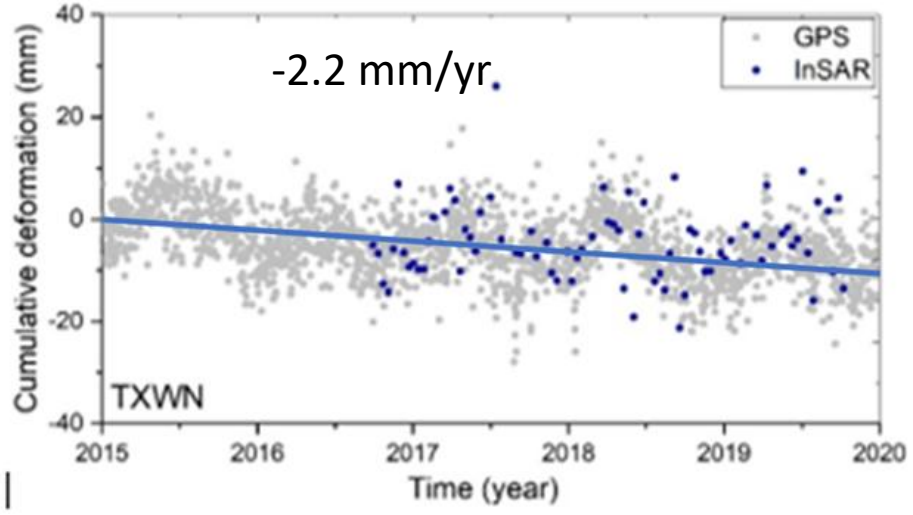
Deformation is average over 2016 to 2019



IN (Young et al., 2020)

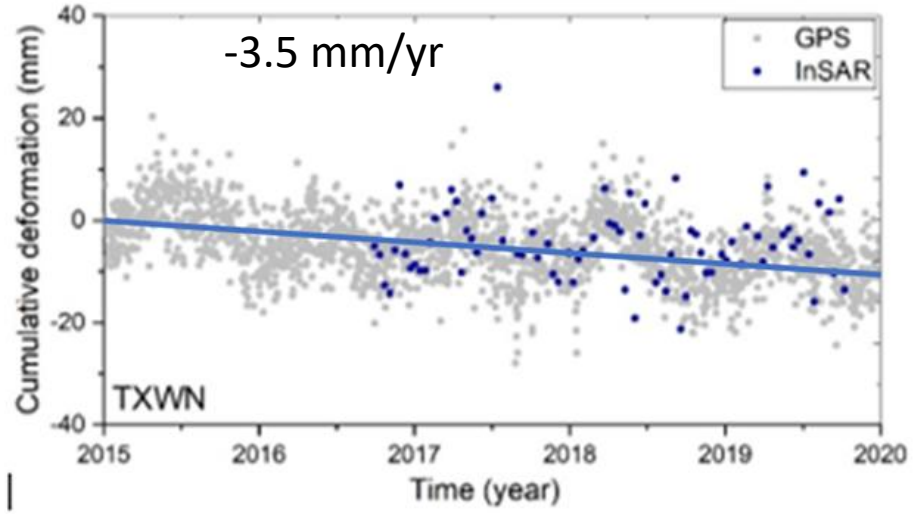
Comparison Between CORS and InSAR Deformation Rates

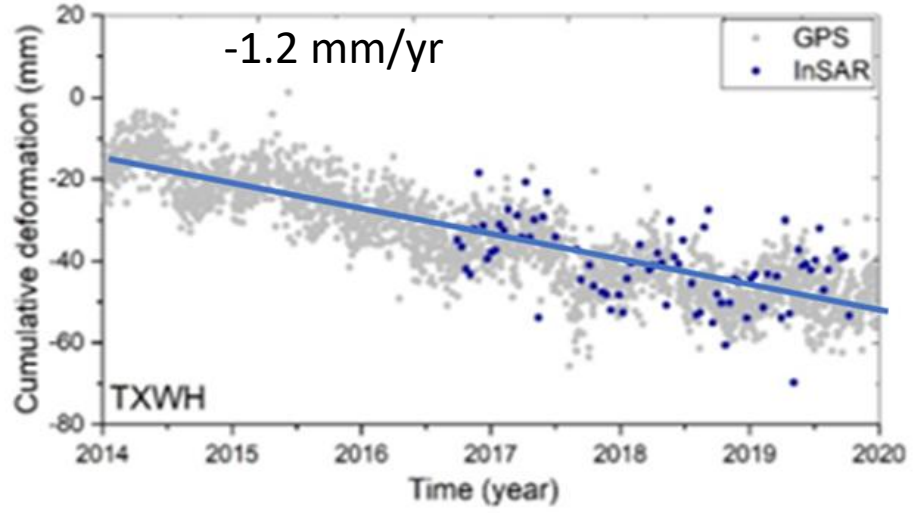
- Wharton County (Young et al. 2020)



- Ascending data has 75 to 80 data points from 2016 to 2019

- Slope of blue line provides deformation rate





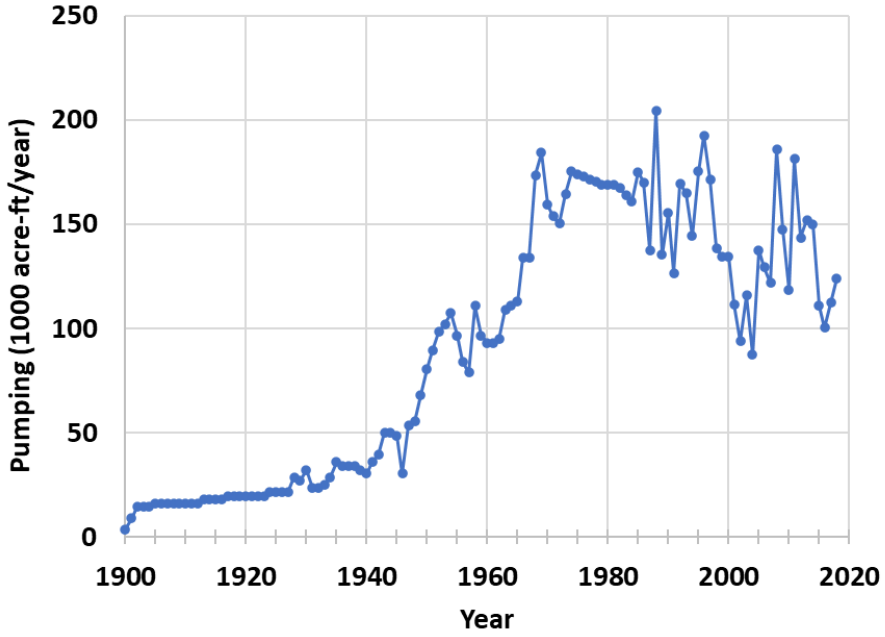
(Young et al., 2020)

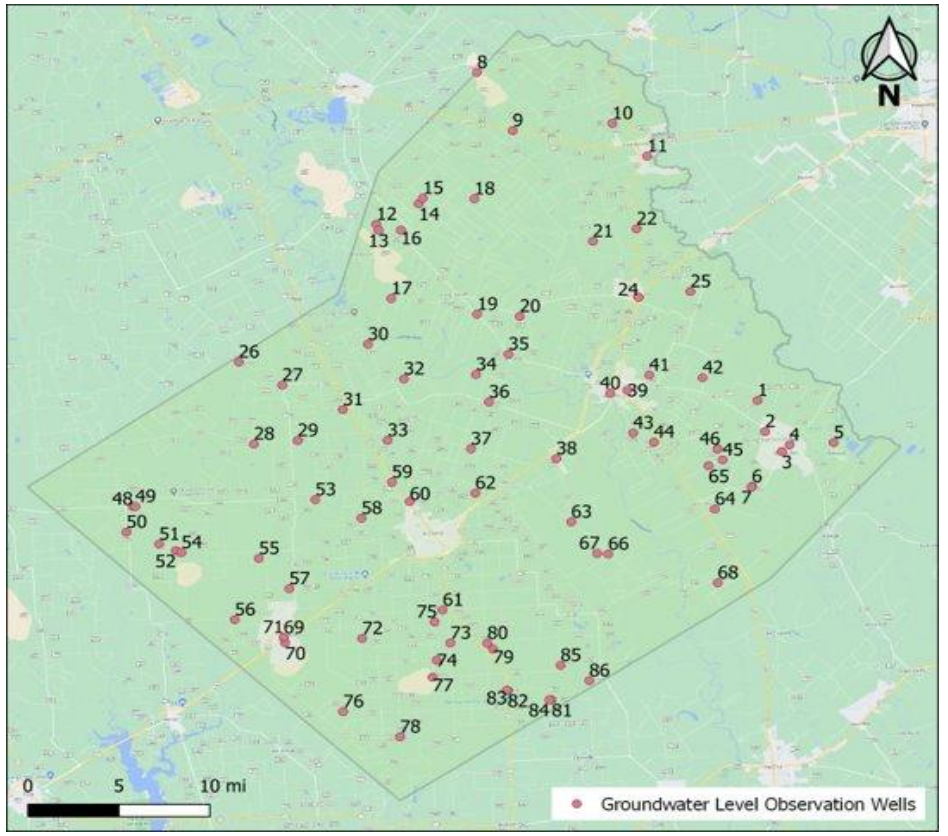
Rationale for Low Subsidence Rates: Water Levels

- Wharton County (Young et al. 2020)

1.) Water levels have been relatively stable the last twenty years at 86 well locations

2) Average for recent annual productions lower than 1965-1965 averages





TWDB Risk Vulnerability Matrix*:

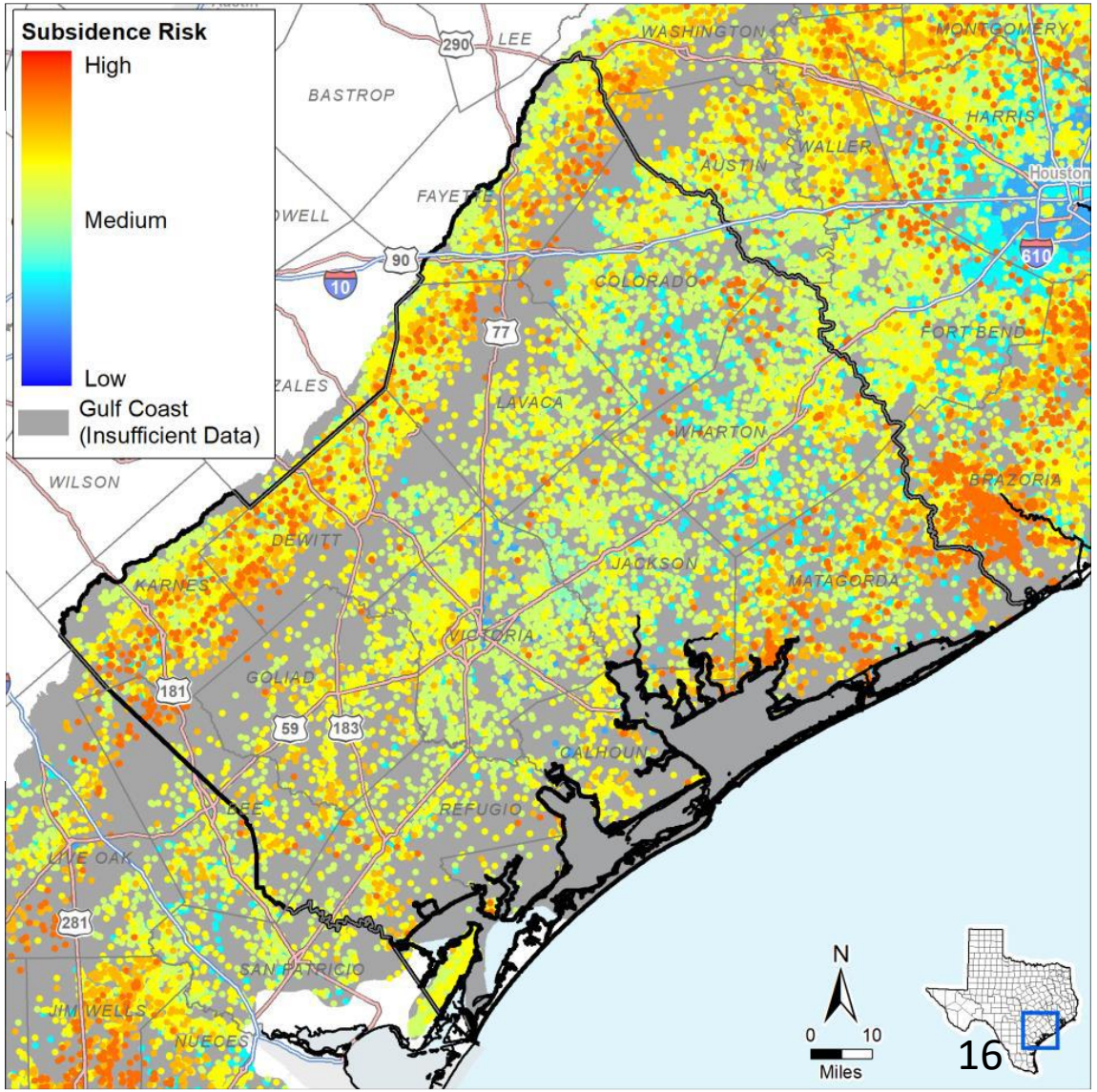
Subsidence Risk Factor (Weight)	Subsidence Risk Factor Class	Subsidence Risk Value	Max Score
Clay Layer Saturated Thickness and Extent (6)	Regional Extent – Greater than 300 feet	5	30
	Regional Extent – 200 to 300 feet	4	
	Regional Extent – 100 to 200 feet	3	
	Regional Extent – Greater than 0 to 100 feet	2	
	Local Extent or No Clay	1	
Clay Compressibility (5)	Plastic Clay	3	15
	Stiff Clay	2	
	Hard or No Clay	1	
Aquifer Lithology (4)	Unconsolidated Clastic	4	16
	Consolidated Clastic	3	
	Carbonate/Evaporite	2	
	Igneous	1	
Preconsolidation Characterization (3)	Current Static Water Level Less than Historic Low Water Level Plus 25 Feet	3	9
	Current Static Water Level Greater than Historic Low Water Level Plus 25 Feet and Less than Historic Low Water Level Plus 50 Feet	2	
	Current Static Water Level Greater than Historic Low Water Level Plus 50 Feet	1	
Predicted 50-Year Water Level Decline based on Trend (2)	Greater than 200 feet	5	10
	Between 100 and 200 feet	4	
	Between 50 and 100 feet	3	
	Between 0 and 50 feet	2	
	Less than 0 feet	1	
Predicted DFC* Water Level Decline (1)	Greater than 200 feet	5	5
	Between 100 and 200 feet	4	
	Between 50 and 100 feet	3	
	Between 0 and 50 feet	2	
	Less than 0 feet	1	
*DFC = Desired Future Condition			85

*Furnans and others, 2017

Potential Concerns with Land-Subsidence Study

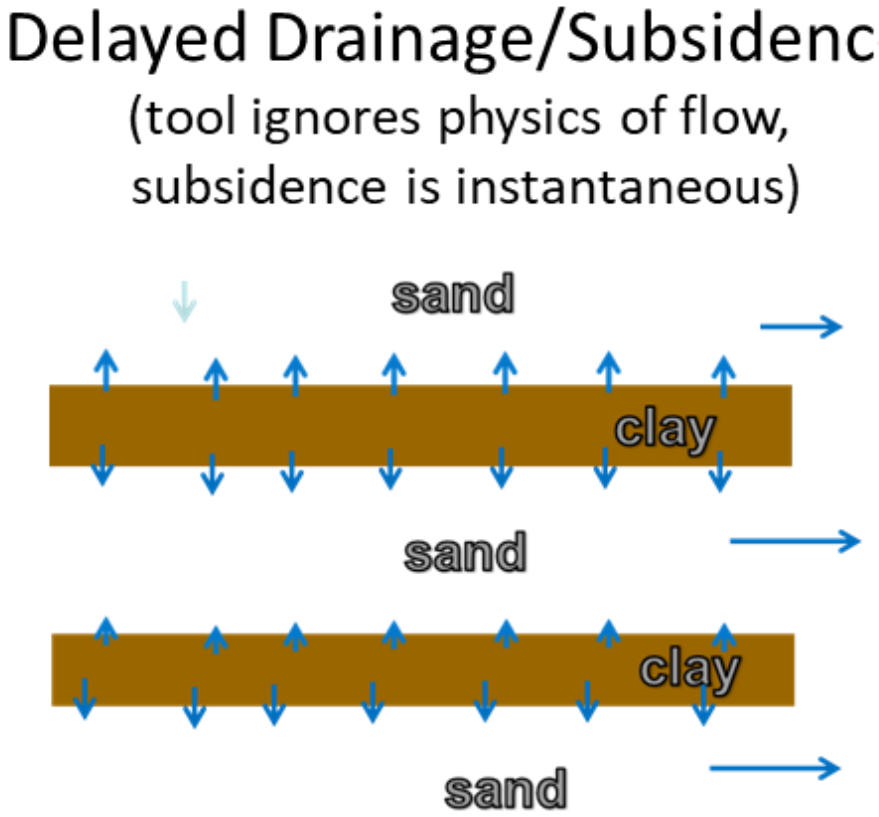
Table 1.2. High total weighted risk by aquifer (ranked by third quartile cutoff).

Aquifer	Aquifer Type	Predominant Aquifer Lithology	Number of Wells Analyzed	Average Aquifer Thickness (ft)	Average Clay Thickness within Aquifer (ft)	Estimated Water Level Trend (negative for decline) (ft/year)	Third Quartile Cutoff on Total Weighted Risk for All Wells Analyzed in Aquifer	Weighted Subsidence Risk Category
Gulf Coast	Major	Unconsolidated Clastic	105,292	650	66	-0.000167	5.9	High: Subsidence Risk is high with high subsidence risk in large areas of the aquifer
Yegua-Jackson	Minor	Unconsolidated Clastic	3,373	828	110	0.0000372	5.9	
Pecos Valley	Major	Unconsolidated Clastic	1,952	549	36	-0.266	5.5	
Hueco-Mesilla Bolson	Major	Unconsolidated Clastic	2,360	810	23	-0.00276	5.4	
Brazos River Alluvium	Minor	Unconsolidated Clastic	985	54	1	-0.000237	5.3	
Ogallala	Major	Unconsolidated Clastic	63,522	223	17	-0.864	5.2	
Carrizo-Wilcox	Major	Unconsolidated Clastic	23,519	401	66	-0.332	4.7	



Concerns with Subsidence Risk Vulnerability Matrix

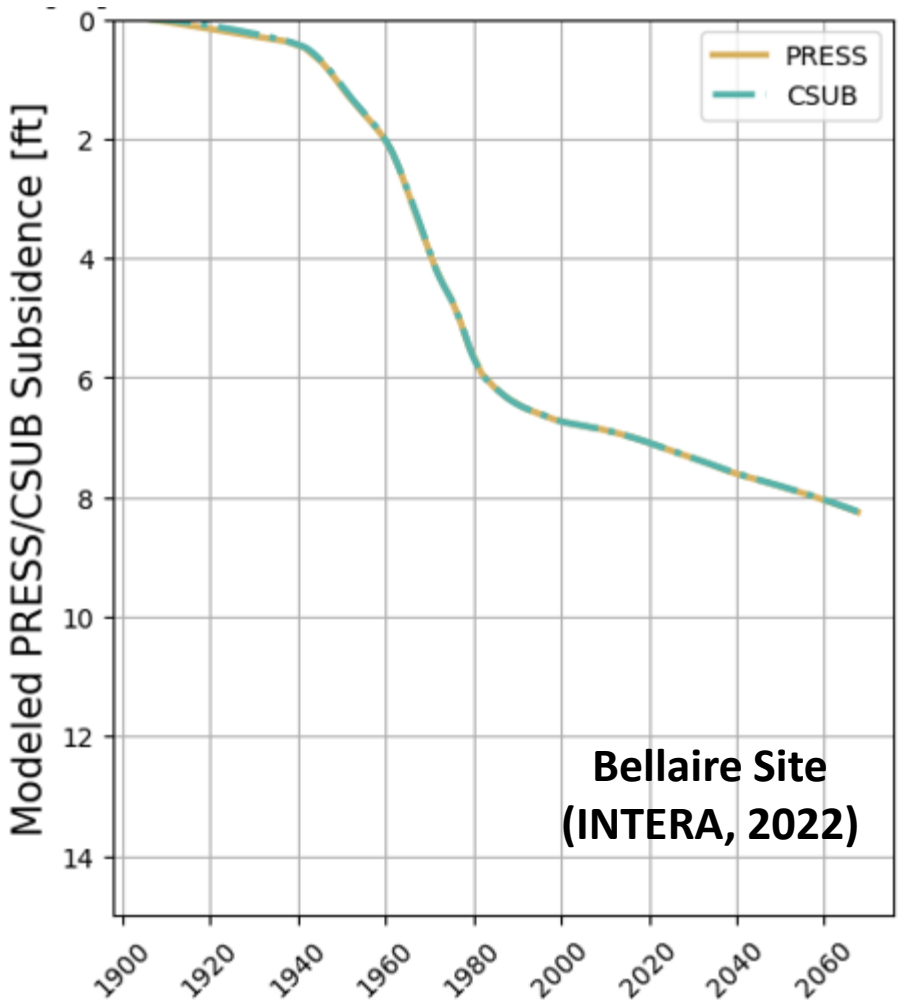
- Unclear what the risk factor for subsidence vulnerability represents
  - important factors are missing such as age of clay, permeability of clay, type of clay, and depth or burial
  - no data to show a correlation of risk factor and actual land subsidence
- No maps of measured land subsidence in report
- No validation or checking of tool for predicting subsidence with measured subsidence



Options for Predicting Subsidence

- PRESS Model
  - 1-Dimensional
  - Needs to drawdown inputs
  - Helm, 1975
  - Used >15 years in Harris County
  - 26 sites

- CSUB Model
  - 1-Dimensional
  - Modflow-based (Hughes et al, 2022)
  - Two Solution Schemes
    - Water Pressure Solution
    - Effective Stress Solution



Predictions Using Simplified Assumptions (No Physics)

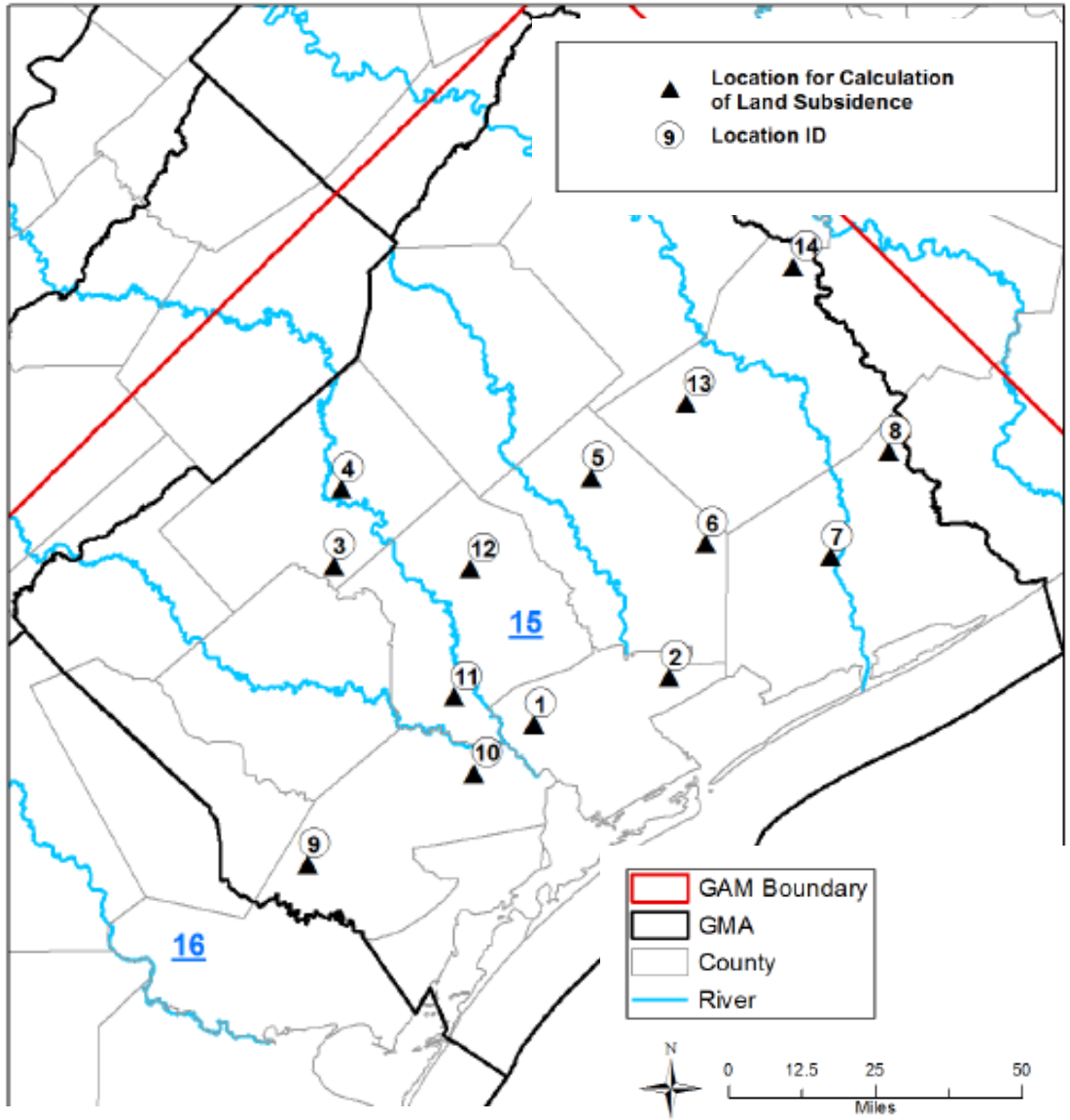
$$\Delta b = \Delta d * \alpha_{eff} * C_t$$

Δb = subsidence

Δd = drawdown

α_{eff} = compressibility coefficient

C_t = clay thickness



Predictions Using Simplified Assumptions (No Physics)

$$\Delta b = \Delta d * \alpha_{eff} * C_t$$

Δb = subsidence

Δd = drawdown

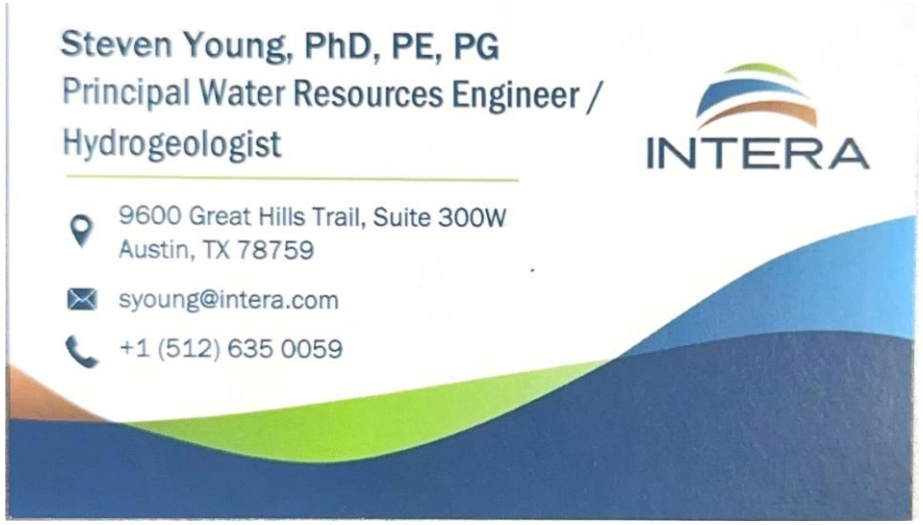
α_{eff} = compressibility coefficient

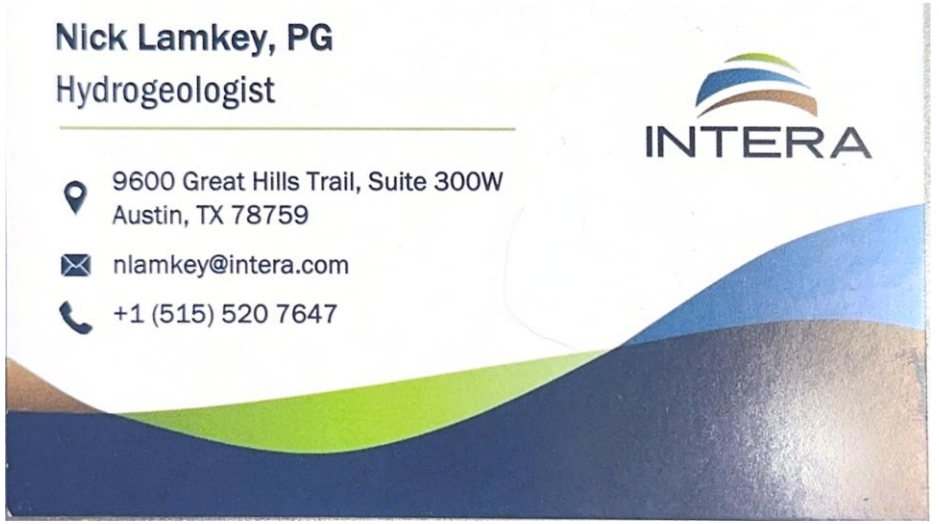
C_t = clay thickness

Table 6-1 Land subsidence predicted at fourteen sites in GMA 15 using Equation 6-1 with a αeff of 2.0x10-5 ft-1, drawdown simulated by the Central Gulf Coast GAM (Chowdhury and others, 1999), and clay thickness data from Young and others (2010; 2012)

ID	County	Drawdown (ft)								Clay Thickness (ft)				Land Subsidence (ft)	
		Chicot		Evangeline		Burkeville		Jasper							
		1940-2000	1940-2070	1940-2000	1940-2070	1940-2000	1940-2070	1940-2000	1940-2070	Chicot	Evangeline	Burkeville	Jasper	1940-2000	1940-2070
1	Calhoun	7.4	3.4	12.4	18.9	-	-	-	-	226	1299	418	925	0.4	0.5
2	Calhoun	-0.8	2.2	22.9	40.6	-	-	-	-	369	1442	407	1377	0.7	1.2
3	Dewitt	-	-	0.8	1.0	3.4	9.8	7.9	24.1	-	349	318	516	0.1	0.3
4	Dewitt	-	-	9.5	15.6	51.7	73.0	142.3	185.2	-	116	331	537	1.9	2.5
5	Jackson	18.7	55.7	64.7	88.1	39.2	56.3	22.0	45.4	139	683	224	618	1.4	2.2
6	Jackson	12.1	32.4	55.9	78.4	33.0	52.6	-	-	360	1096	339	966	1.5	2.3
7	Matagorda	-1.7	1.2	39.4	57.4	-	-	-	-	482	1569	652	1220	1.2	1.8
8	Matagorda	2.1	0.8	37.9	49.0	13.1	27.0	-	-	203	1264	415	1400	1.1	1.5
9	Refugio	5.2	1.8	3.4	10.1	-0.1	3.9	-	-	128	835	270	722	0.1	0.2
10	Refugio	0.3	1.2	4.1	15.5	-	-	-	-	264	1141	264	726	0.1	0.4
11	Victoria	5.0	8.0	13.2	40.1	1.7	6.4	-	-	207	757	225	550	0.2	0.7
12	Victoria	27.0	34.9	45.3	52.5	38.0	43.9	26.2	33.0	108	605	190	785	1.2	1.4
13	Wharton	75.4	94.1	156.7	149.8	61.9	90.2	27.9	59.9	84	780	266	610	3.2	3.7
14	Wharton	8.7	27.5	57.4	91.0	44.5	80.9	38.2	72.2	78	599	287	842	1.6	2.8

Questions?


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F.8 Feasibility of Achieving DFCs

F.9 Other Factors