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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:



INTERA Incorporated
Nick Lamkey, PG
Steve Young, PhD, PE, PG

JANURARY 7, 2027

Professional Engineer / Geoscientist Seal(s)

Brief summary of sections worked on, contributions, expertise applied as required by contract, etc.

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Table of Contents

1.0 Introduction 1
1.1 Overview of GMA 15 and Aquifer System 1
1.2 Joint Planning Process 5
1.3 GMA 15 Joint Planning 6
2.0 GMA 15 Desired Future Conditions 12
2.1 Gulf Coast Aquifer System 12
2.2 Carrizo-Wilcox Aquifer 13
2.3 Queen City Aquifer 14
2.4 Sparta Aquifer 14
2.5 Yegua-Jackson Aquifer 15
3.0 Policy Justification 16
3.1 Golida County-Specific Technical Considerations 16
3.2 Changes from the Previous Joint Planning Cycle 17
3.3 District Performance in Achieving DFCs 17
3.4 Public Comment and Recommended Revisions 18
4.0 Technical Justification 19
4.1 Other Desired Future Conditions Considered 21
5.0 Consideration of Factors 22
5.1 Aquifer Uses and Conditions 22
5.2 Water Supply Needs and Water Management Strategies 22
5.3 Hydrological Conditions 23
5.3.1 Total Estimated Recoverable Storage 23
5.3.2 Recharge, Inflows, and Discharge 24
5.4 Environmental Considerations 25
5.5 Subsidence 26
5.6 Socioeconomic Impacts 27
5.7 Private Property Rights 28
5.8 Feasibility of DFCs 28
5.9 Other Considerations 29
6.0 References 31

List of Appendices

Appendix A Meeting Notes and Minutes
Appendix B Modeling and Pumping
Appendix C GCD Summary Reports of DFC Public Hearings and Comments
Appendix D Resolution to Adopt DFCs
Appendix E Additional Information Provided by Goliad County Groundwater Conservation District
Appendix F PowerPoints and Other Information for Consideration of Factors

List of Figures

Figure 1. Delineation of 16 groundwater management areas in Texas. 1
Figure 2. Delineation of GMA 15 showing locations of GCDs. 4
Figure 3. Map of GMA 15 major aquifer boundaries. 4
Figure 4. Map of GMA 15 minor aquifer boundaries. 5
Figure 5. Three-dimensional surfaces and two-dimensional cross-sections showing the model layers for the Central Gulf Coast GAM (Waterstone, 2003) 19
Figure 6. Model domain for the Central Gulf Coast GAM (Waterstone, 2003) 20

List of Tables

Table 1. Hydrogeologic Units in GMA 15 (modified from Keester and others, 2021). 2
Table 2. Population projections from the 2027 State Water Plan by county (TWDB, 2023). 3
Table 3. List of GMA 15 meetings that were convened from 2021 through 2026. 7
Table 4. GAM Simulations Used to Develop and Evaluate DFCs 11
Table 5. Dates of Public Hearings for Proposed DFCs. 11
Table 6. Desired Future Conditions for GMA 15 expressed as an Average Drawdown between January 2000 and December 2079. 12
Table 7. Carrizo-Wilcox Aquifer total estimated recoverable storage within GMA 15. 13
Table 8. Queen City Aquifer total estimated recoverable storage within GMA 15. 14
Table 9. Sparta Aquifer total estimated recoverable storage within GMA 15 15
Table 10. Yegua-Jackson Aquifer total estimated recoverable storage within GMA 15. 15

Acronyms and Abbreviations

ASRCD	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.

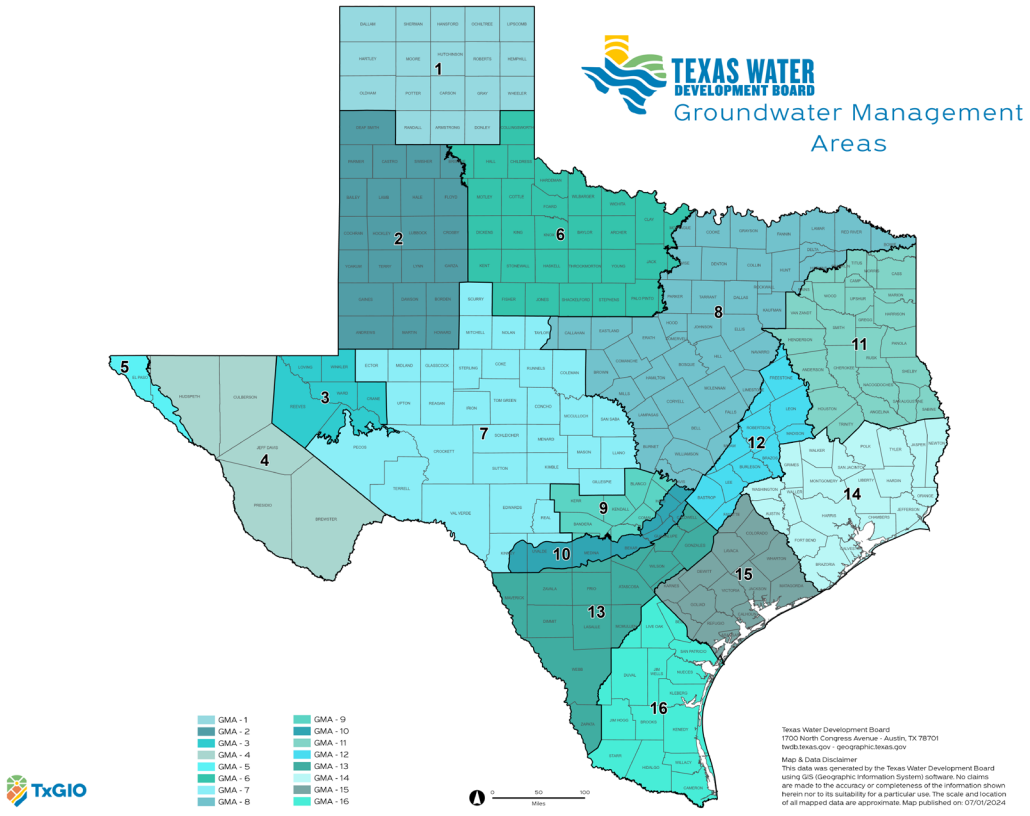


Figure 1. Delineation of 16 groundwater management areas in Texas.

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 (TWDB, 2023).

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

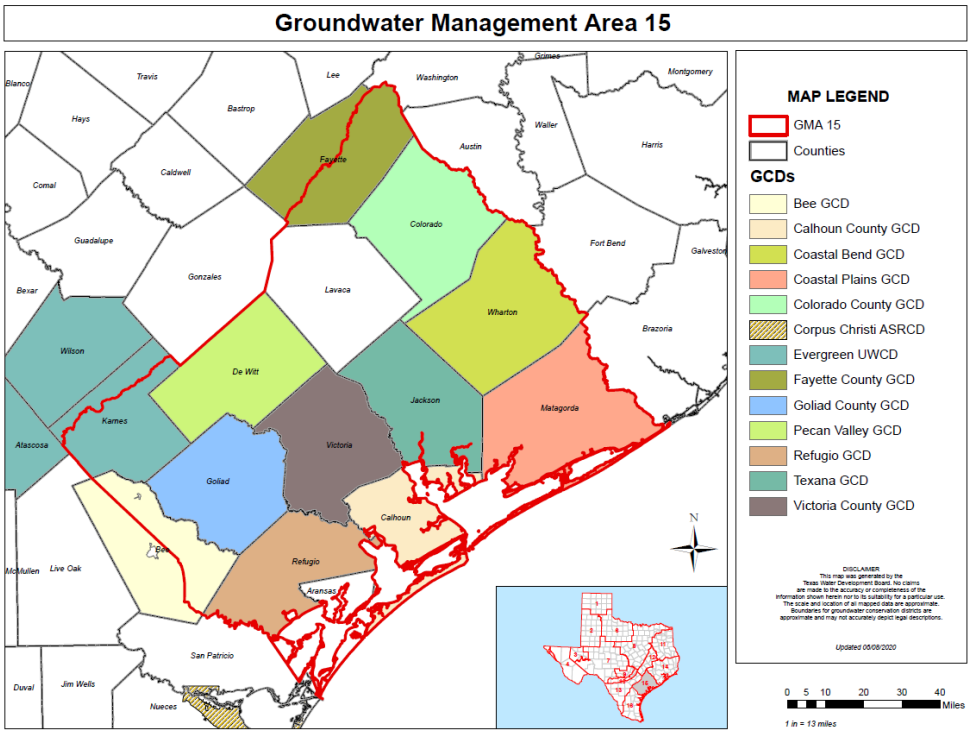


Figure 2. Delineation of GMA 15 showing locations of GCDs.

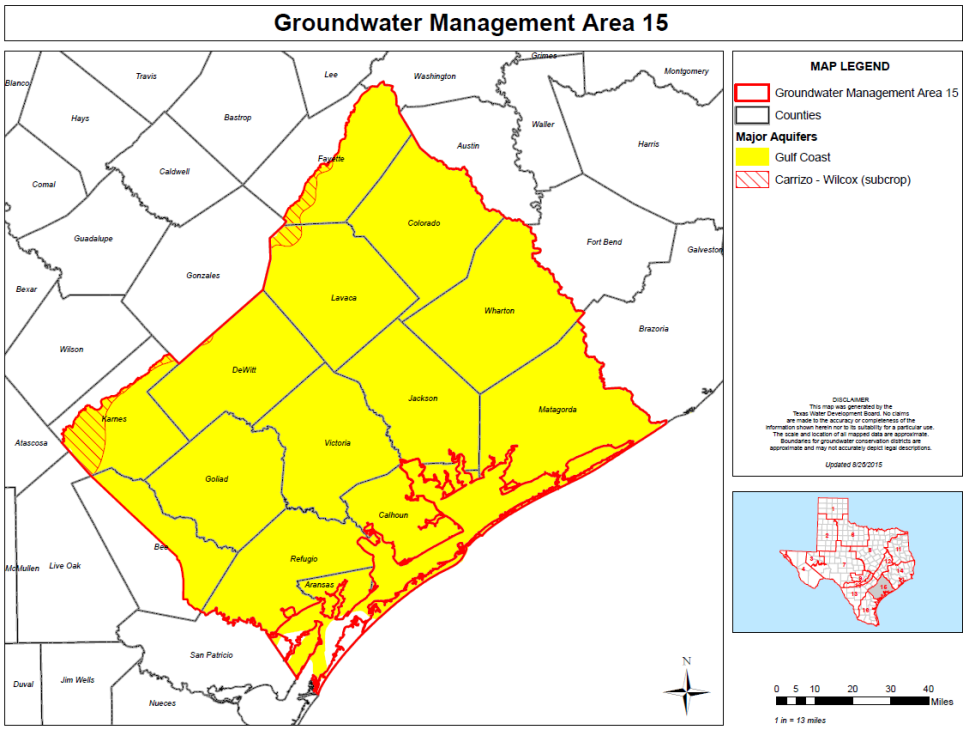


Figure 3. Map of GMA 15 major aquifer boundaries.

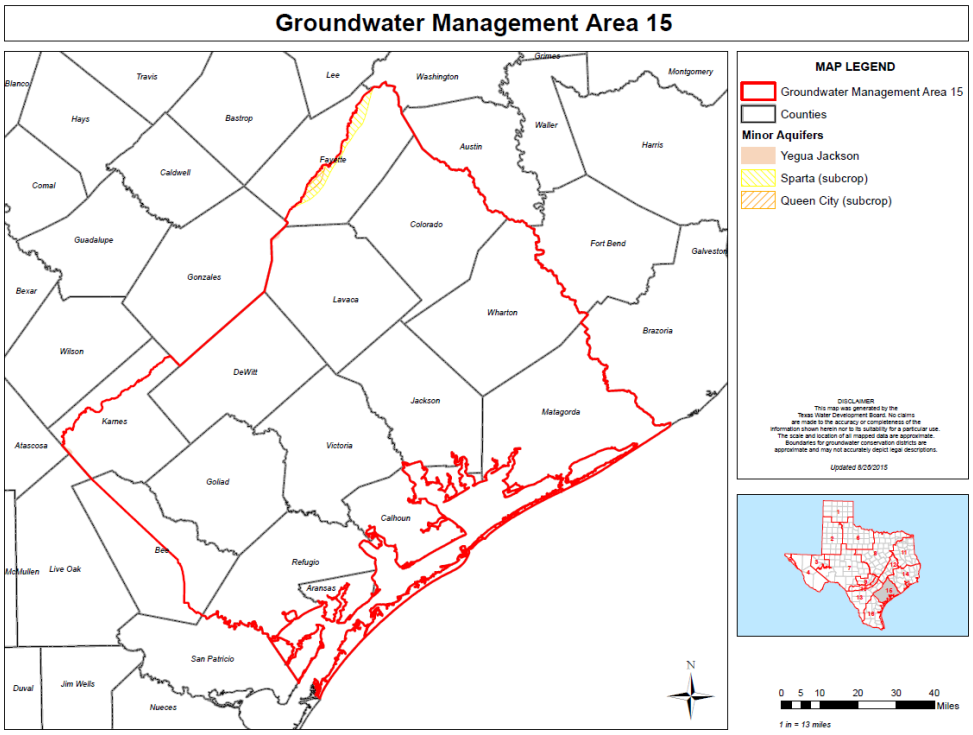


Figure 4. Map of GMA 15 minor aquifer boundaries.

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	Reviewed member-district management plans and accomplishments and the district summaries of comments on the proposed third-cycle DFCs. Considered suggested DFC revisions, including a Goliad County revision that failed for lack of a second. Adopted the third-cycle DFCs and Resolution 2021-01 by a 10–1 record vote; Goliad County GCD voted no, and Fayette County GCD and CCASRCD were absent.
November 12, 2021	Yes	Revisited the October 14 adopted DFCs in response to Goliad County concerns regarding observed aquifer conditions and performance of the Central Gulf Coast GAM. Affirmed the adopted DFCs. Directed the Explanatory Report to request TWDB evaluate feasibility using the submitted model run and ±3-ft evaluation factors for most county DFCs, with larger Goliad-specific factors subject to technical justification.
December 9, 2021	Yes	Reviewed and approved revisions to the 2021 Explanatory Report and incorporated Goliad County GCD's November 24 technical memorandum without expressing judgment on its validity or merit. Authorized the administrator and technical consultant to submit the adopted DFCs, Explanatory Report, and supporting information to TWDB by January 5, 2022. Requested TWDB review the GMA 15/Corpus Christi ASRCD boundary overlap and resulting GMA membership.
April 14, 2022	Yes	Continued post-adoption joint planning following completion of the third-cycle DFC package. Reviewed accomplishments of member districts and management plans of certain GMA 15 districts. Continued coordination on implementation of the adopted DFCs and subsequent joint-planning activities.
July 14, 2022	Yes	Reviewed the proposed TWDB groundwater availability model for the central and southern portions of the Gulf Coast Aquifer System. Discussed the model's potential use in GMA 15 joint planning and the need for additional technical review before relying on the new model for DFC work. Continued discussion of GMA 15 administrative/boundary matters and coordination with TWDB.

Meeting Date	Quorum	Major Discussion Topic
October 13, 2022	Yes	Received TWDB's GAM Run 21-020 MAG report based on the DFCs adopted in 2021. Reviewed member-district and GMA comments on the proposed new Gulf Coast GAM and discussed differences between the new model and the existing Central Gulf Coast GAM. Requested that TWDB complete the predictive component of the new GAM; also discussed the proposed administrative boundary adjustment and CCASRCD participation.
April 13, 2023	Yes	Reviewed the status of the proposed GAM and member-district management plans/accomplishments. Established the framework, bylaws, and cost-sharing approach for fourth-cycle technical services. Designated VCGCD to serve as the GMA 15 administrative hub, hold joint-planning funds, solicit technical-service proposals, and negotiate with the preferred consultant.
July 13, 2023	Yes	Reviewed HB 3278 and other legislation affecting DFC procedures and public access to joint-planning materials. Reviewed member-district accomplishments and management-plan update obligations following DFC adoption. Advanced the RFP for fourth-cycle technical services and implementation of the GMA 15 bylaws/cost-sharing agreement.
October 12, 2023	Yes	Reviewed implementation of the fourth-cycle funding and cost-sharing framework. VCGCD reported that INTERA submitted the only responsive proposal to the technical-services RFP. Identified INTERA as the preferred respondent for fourth-cycle DFC modeling, statutory-factor evaluation, and preparation of the Explanatory Report, subject to completion of contracting/funding steps.
January 11, 2024	Yes	Reviewed the status of fourth-cycle funding and technical-services contracting; INTERA negotiations were being held pending additional district cost-share participation and model information from TWDB. Discussed differences in predictive results from the new GMA 15/16 GAM and TWDB's ongoing sensitivity analysis/review of that model. Continued review of member-district management plans and regional water-planning coordination.
April 11, 2024	Yes	Reviewed TWDB's ongoing review and revision of the new GMA 15/16 groundwater availability model and discussed its suitability for fourth-cycle DFC development. Reviewed management plans for member districts. Approved a request that TWDB authorize use of the prior Central Gulf Coast GAM used during the third cycle for development of fourth-cycle proposed and adopted DFCs.

Meeting Date	Quorum	Major Discussion Topic
July 11, 2024	Yes	TWDB reported it was willing to allow use of the prior Central Gulf Coast GAM if necessary while requesting additional time to complete work on the new GMA 15/16 model. TWDB provided an update on review and adjustment of the new model. VCGCD resumed INTERA contract negotiations as cost-sharing/funding improved; the GMA discussed the remaining funding gap and next steps. No final model-selection action was taken.
October 15, 2024	Yes	Participated in a joint GMA 15/GMA 16 meeting following a TWDB stakeholder presentation concerning the recalibrated GMA 15/16 GAM. Received public comment and continued the broader technical review of the recalibrated model. The formal GMA 15 minutes record no substantive action on the GAM or technical-services items at this meeting.
January 9, 2025	Yes	INTERA reviewed how the prior-cycle DFCs were developed and outlined the process for developing DFCs during the fourth joint-planning cycle. Discussed the fourth-cycle technical work program, schedule, pumping/modeling framework, and upcoming statutory-factor evaluations. Continued coordination regarding the groundwater model and information needed from member districts for scenario development.
April 10, 2025	Yes	Discussed release of the draft recalibrated GMA 15/16 GAM and authorized INTERA/Dr. Young to evaluate the updated model and TWDB benchmark run with current MAGs. INTERA presented the statutory-factor evaluations for aquifer uses and conditions, hydrologic conditions, and subsidence. Member districts were asked to provide preliminary DFC statements and pumping distributions; GMA 15 also requested TWDB compare current-DFC MAG estimates using the new model.
July 10, 2025	Yes	Held a special meeting focused on the recalibrated GMA 15/16 GAM. INTERA presented additional reports evaluating the model's utility for joint planning, and the administrator requested a written summary of the evaluation. Goliad County GCD reiterated concerns regarding model performance and DFC evaluation factors/special consideration; no final model-use or DFC action was recorded.

Meeting Date	Quorum	Major Discussion Topic
July 24, 2025	Yes	Confirmed that GMA 15 and several member districts had submitted comments to TWDB on the recalibrated GMA 15/16 GAM. Reviewed HB 2078 revisions requiring annual accomplishment review, management-plan review, approximately 50-year DFCs with interim values, plain-language explanations of changed DFCs, and summaries of district performance. Accepted INTERA's environmental and socioeconomic factor presentations; approved use of the LRE/Goliad technical report to support Goliad DFC/evaluation-factor justification; received public concern regarding proposed Nueces County groundwater development.
January 8, 2026	Yes	INTERA presented DFC feasibility, other factors, and a draft Explanatory Report; both factor presentations were accepted. Considered and approved proposed DFC amendments: removed the GMA-wide DFC and county DFCs for unregulated Aransas and Lavaca Counties; revised Goliad to 13/34/21/21 ft by aquifer; increased Matagorda Chicot/Evangeline DFC to 15 ft; and established a ±3-ft evaluation factor for county-wide DFCs. Reviewed proposed interim DFC values, member-district accomplishments/performance, management-plan review requirements, and methods for evaluating DFC achievement.
March 12, 2026	Yes	Formally considered the fourth-cycle amended DFC package following the January proposals and statutory-factor review. Unanimously approved proposing the amended DFCs, establishing interim DFC values, and approving the plain-language explanations for changes from the prior cycle for distribution and public review under Texas Water Code §36.108(d-2). Eleven district representatives voted aye; Colorado County GCD and Corpus Christi ASRCD were absent. The proposed DFCs were subsequently mailed to member districts on April 7, 2026.

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 B**. 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 three 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 March 12, 2026, 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.

Groundwater Conservation District	Public Hearing Date
Bee GCD	Tuesday, June 23, 2026
Calhoun County GCD	Monday, July 27, 2026
Coastal Bend GCD	Thursday, July 16, 2026
Coastal Plains GCD	Thursday, August 13, 2026
Colorado County GCD	Wednesday, July 15, 2026
Corpus Christi ASRCD	Not verified
Evergreen UWCD	Friday, June 26, 2026
Fayette County GCD	Not verified
Goliad County GCD	Monday, July 20, 2026
Pecan Valley GCD	Tuesday, July 21, 2026
Refugio GCD	Monday, July 20, 2026
Texana GCD	Thursday, July 16, 2026
Victoria County GCD	Friday, July 10, 2026

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 D**). The adopted DFCs are expressed as average drawdown for each county from January 1, 2000 through December 31, 2079. DFCs for each county within the GMA shall not exceed the values specified in **Table 6**.

Goliad County was evaluated using additional district-specific technical information because monitoring data and previous technical studies identified substantial differences between observed groundwater-level trends and trends simulated by the CGC GAM within portions of the county. Goliad County GCD previously commissioned a recalibration of the CGC GAM focused on improving representation of local groundwater-level conditions and trends. GMA 15 considered this recalibration, subsequent TWDB review of the recalibrated model, and other technical information provided by Goliad County GCD during development of the proposed DFCs. Based on this information, the proposed Goliad County DFCs are 13 feet of drawdown in the Chicot Aquifer, 34 feet in the Evangeline Aquifer, 21 feet in the Burkeville unit, 21 feet in the Jasper Aquifer, and 28 feet for the combined Gulf Coast Aquifer System. Supporting information provided by Goliad County GCD is included in **Appendix E**. The LRE recalibration was developed because the original GAM did not adequately reproduce observed groundwater levels and trends in Goliad County

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

County	Aquifer	DFC 2080
Goliad	Chicot	13
	Evangeline	34
	Burkeville	21
	Jasper	21
	Gulf Coast Aquifer System	28
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	5
Wharton	Chicot & Evangeline	15
Victoria	Gulf Coast Aquifer System	5

In addition to establishing the DFCs shown in Table 6, GMA 15 established DFC evaluation factors to account for uncertainty inherent in the regional groundwater model and to provide a consistent framework for evaluating progress toward achievement of the DFCs. For the county-wide DFCs, GMA 15 established an evaluation factor of plus or minus 3 feet (±3 feet) relative to the applicable DFC value. The evaluation factor does not modify the adopted DFC or establish an additional allowable amount of drawdown. Rather, it provides a range within which modeled or measured conditions may be evaluated when assessing whether groundwater conditions are reasonably consistent with the adopted DFC, recognizing that groundwater models and monitoring data cannot reproduce or measure future aquifer conditions with absolute precision.

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.

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.

3.1 Golida County-Specific Technical Considerations

Goliad County was evaluated using additional district-specific technical information because groundwater-level monitoring and previous technical studies identified substantial differences between

observed groundwater-level trends and trends simulated by the Central Gulf Coast GAM within portions of Goliad County. Goliad County GCD previously commissioned a recalibration of the Central Gulf Coast GAM to improve representation of groundwater levels and water-level trends within and near the district.

During the fourth-cycle joint-planning process, GMA 15 considered the Goliad County recalibration, subsequent TWDB review of that model, groundwater-monitoring information, and other technical information submitted by Goliad County GCD. On October 9, 2025, GMA 15 approved use of the Goliad/LRE technical information to support the justification of the Goliad County DFCs and associated evaluation considerations within the Explanatory Report.

Based on the technical information considered during joint planning, GMA 15 proposed separate DFCs for the Chicot, Evangeline, Burkeville, and Jasper units within Goliad County, as well as a combined Gulf Coast Aquifer System DFC. The technical information considered for Goliad County and the basis for these DFCs are provided in **Appendix E**.

3.2 Changes from the Previous Joint Planning Cycle

Texas Water Code Section 36.108(d-3) requires the Explanatory Report to include a plain-language explanation of why an adopted DFC was changed when it differs from the DFC adopted during the preceding five-year joint-planning period.

On March 12, 2026, GMA 15 approved proposed amended DFCs, associated interim values, and plain-language explanations for the changes from the previous joint-planning cycle for distribution to the member districts and public review. The proposed DFCs were mailed to the member districts on April 7, 2026.

The changes reflect differences in regulatory jurisdiction, locally available technical information, groundwater-management considerations, and the information considered by GMA 15 during the fourth-cycle joint-planning process.

3.3 District Performance in Achieving DFCs

Texas Water Code Section 36.108(d-3) also requires the Explanatory Report to include a summary of how each member district is performing in achieving the DFCs. During the fourth-cycle joint-planning process, GMA 15 requested information from the member districts regarding district accomplishments, implementation of their management plans and rules, groundwater-monitoring programs, and methods used to evaluate progress toward achievement of the existing DFCs.

GMA 15 reviewed the district information as part of the joint-planning process, including the methods used by the individual districts to monitor aquifer conditions and evaluate DFC achievement. Because groundwater conditions, monitoring networks, and management programs differ among the districts, the methods used to evaluate DFC performance also vary. These methods may include evaluation of measured groundwater levels and trends, comparison with applicable DFCs and DFC evaluation factors, review of groundwater production, and implementation of district management-plan performance measures.

Appendix C, GCD Summary Reports, contains the information provided by the member districts regarding their accomplishments, management activities, and methods for evaluating progress toward achievement of the DFCs.

3.4 Public Comment and Recommended Revisions

As required by Texas Water Code Section 36.108(d-2), the proposed DFCs approved by GMA 15 on March 12, 2026 were distributed to the member districts for public review. The proposed DFCs were mailed to the member districts on April 7, 2026, initiating the statutory public-comment process. Each member district provided an opportunity for public comment and prepared a summary of relevant comments, suggested revisions, and supporting information for consideration by GMA 15. The district public-hearing and comment summaries are included in Appendix C.

Most member districts reported that no relevant comments were received and recommended no revisions to the proposed DFCs. Refugio GCD reported comments and questions concerning the proposed DFCs and the groundwater-management implications of areas within GMA 15 that lie outside the jurisdiction of a groundwater conservation district. Victoria County GCD received comments from the Port of Victoria concerning the proposed 5-foot DFC for the Gulf Coast Aquifer System in Victoria County, proposed district rule revisions, projected manufacturing and industrial water-supply needs, and access to deep-saline groundwater. Neither Refugio GCD nor Victoria County GCD recommended revision of the proposed DFCs or development of a revised GAM simulation.

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).

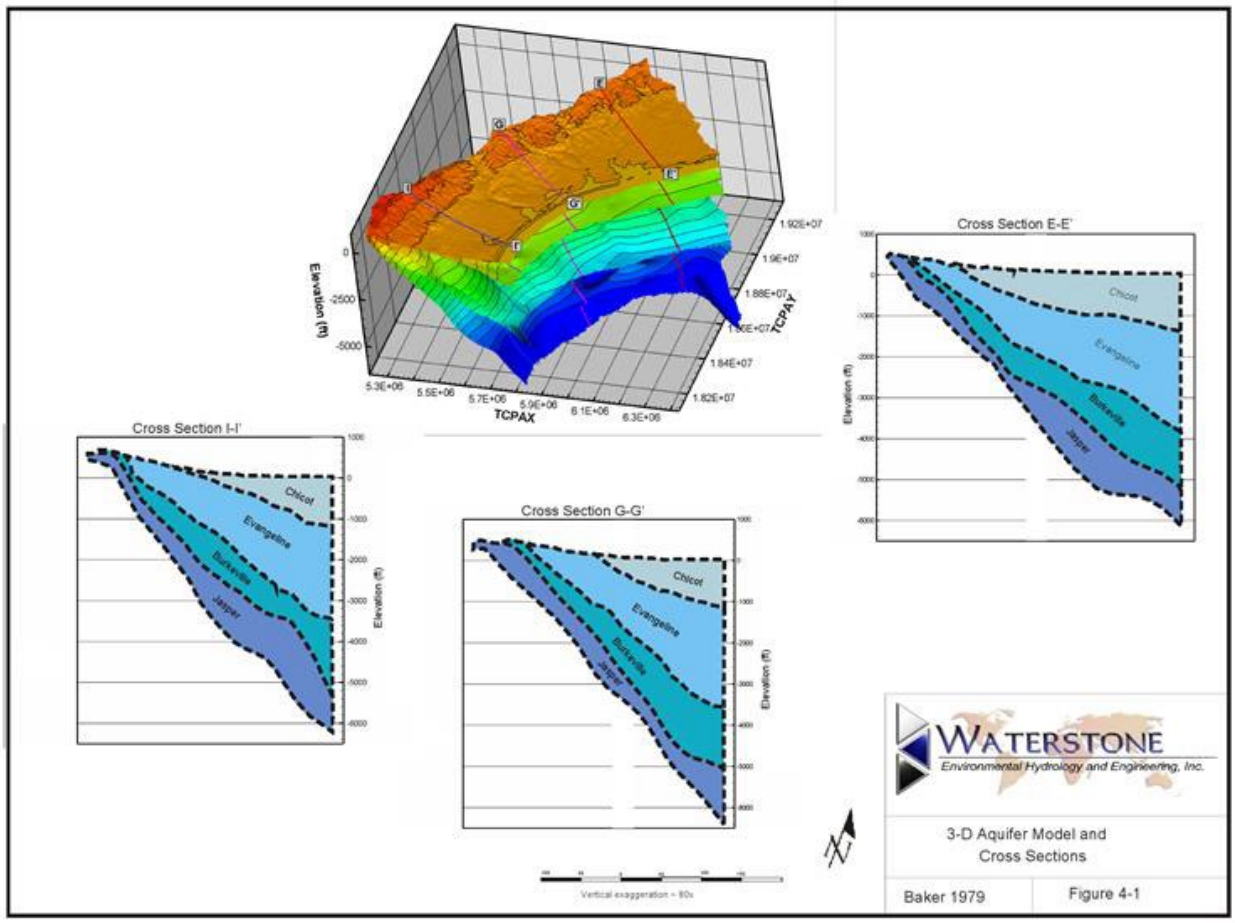


Figure 5. Three-dimensional surfaces and two-dimensional cross-sections showing the model layers for the Central Gulf Coast GAM (Waterstone, 2003)

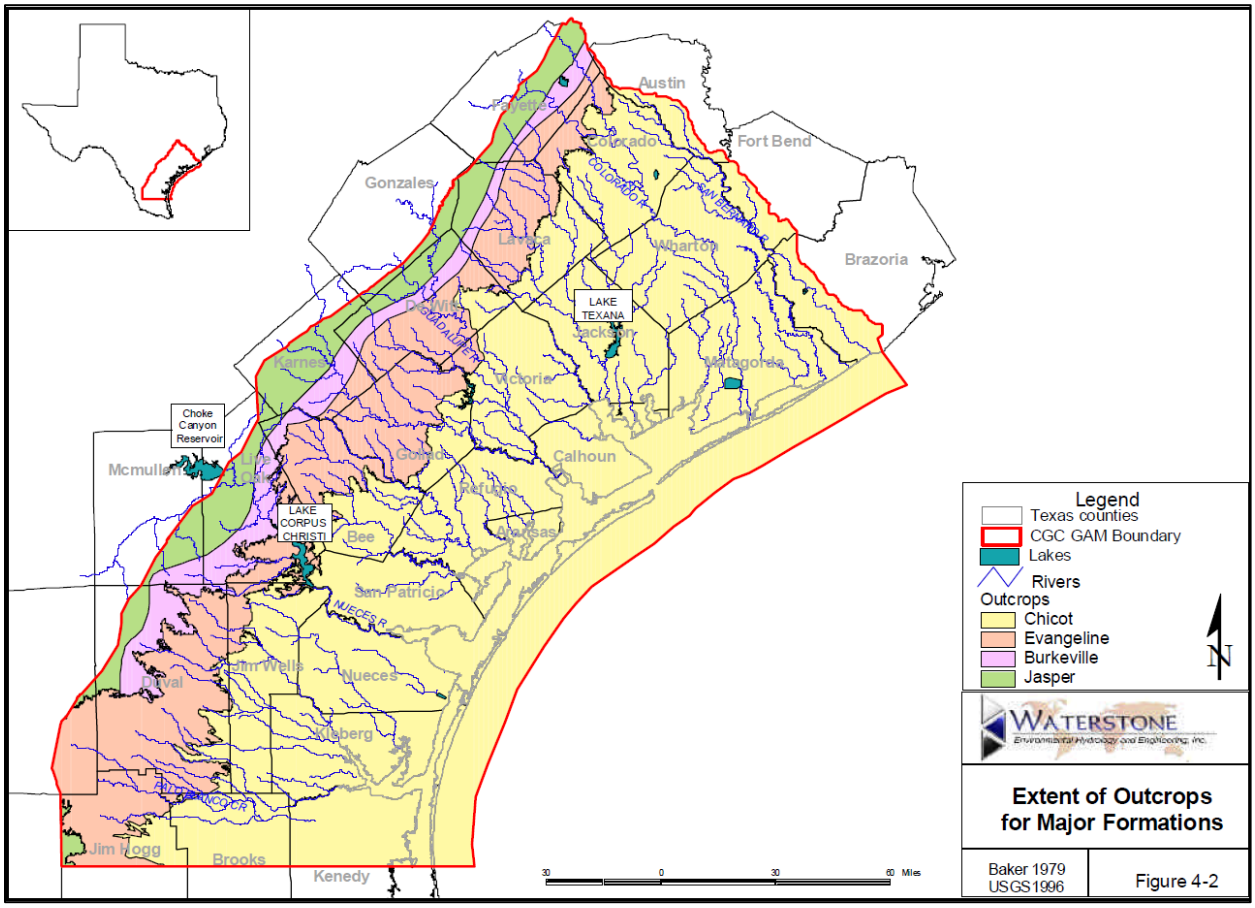


Figure 6. Model domain for the Central Gulf Coast GAM (Waterstone, 2003)

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.

4.1 Other Desired Future Conditions Considered

GMA 15 did not formally consider a separate alternative set of DFCs during the fourth round of joint planning. The pumping scenarios described above were used to evaluate the effects of different groundwater-production assumptions and inform development of the proposed DFCs.

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

Texas Water Code §36.108(d)(1) requires the districts to consider aquifer uses and conditions within the management area, including conditions that differ substantially from one geographic area to another. GMA 15 considered historical groundwater pumping, the distribution of groundwater use by water-use category, the number and reported use of wells, and differences in groundwater development among the counties and hydrogeologic units within the management area. INTERA presented this information to GMA 15 on April 10, 2025, in the presentation *GMA 15 Discussion of Nine Factors in TWC §36.108(d): Aquifer Use & Conditions*, which is included in Appendix F.

Aquifer use and groundwater-development patterns differ substantially across GMA 15. Aquifer capacity and groundwater production generally increase toward the northeastern and downdip portions of the Gulf Coast Aquifer System. Groundwater production in Colorado, Wharton, Matagorda, and Jackson counties is comparatively high and dominated by irrigation. Victoria County supports a more diverse mixture of irrigation, municipal, and industrial uses. In DeWitt and Karnes counties, groundwater use includes domestic, livestock, municipal, and mining-related demands, while domestic, livestock, and agricultural uses are more prevalent in portions of the southwestern management area.

Based on TWDB historical pumping information reviewed during joint planning, average groundwater use during 2018 through 2022 was approximately 295,000 acre-feet per year across the counties considered, of which approximately 80 percent was associated with irrigation. The distribution of wells differs from the distribution of pumping volume; Submitted Drillers Report information indicates that domestic wells constitute a substantial portion of the well inventory even where irrigation accounts for most groundwater production. These differences in aquifer capacity, groundwater use, and groundwater-development patterns were considered by GMA 15 in establishing geographically different DFCs within the Gulf Coast Aquifer System.

5.2 Water Supply Needs and Water Management Strategies

Texas Water Code §36.108(d)(2) requires the districts to consider water-supply needs and water-management strategies included in the State Water Plan. GMA 15 overlaps Regional Water Planning Areas K, L, N, and P. INTERA presented information regarding projected water demands, existing supplies, groundwater-based water-management strategies, and modeled available groundwater at the July 10, 2025 GMA 15 meeting in presentation titled *GMA 15 Considerations of Water Supply Needs and Management Strategies*. The presentation is included in Appendix F.

The regional planning information demonstrates substantial geographic variation in projected water needs. Several counties, including Matagorda, Wharton, Victoria, Colorado, and Calhoun, have projected total water needs during the planning horizon, whereas several other GMA 15 counties have smaller or no projected deficits. These county-level values include both groundwater and surface-water demands and may include portions of counties outside the GMA boundary; therefore, they were used as regional planning context rather than as direct estimates of groundwater demand attributable solely to GMA 15.

GMA 15 also reviewed existing Gulf Coast Aquifer supplies, groundwater-based water-management strategies, and MAG values when evaluating the future pumping assumptions used in the DFC simulations. The comparison provided a reasonableness check on whether the pumping assumptions considered during joint planning were consistent with the magnitude and geographic distribution of anticipated future water needs.

5.3 Hydrological Conditions

Texas Water Code Section 36.108(d)(3) requires that, during the joint-planning process, groundwater conservation districts consider "hydrological conditions, including for each aquifer in the management area the total estimated recoverable storage as provided by the executive administrator, and the average annual recharge, inflows, and discharge." In developing the proposed DFCs, GMA 15 and its member districts considered information regarding groundwater storage, the response of confined and unconfined aquifers to pumping, the location and magnitude of groundwater production, Total Estimated Recoverable Storage (TERS), updated historical pumping estimates, simulated groundwater-level changes, and groundwater-budget components within the Gulf Coast Aquifer System. INTERA presented this information to GMA 15 at the April 10, 2025 public meeting in a presentation titled *GMA 15 Discussion of Nine Factors in TWC 36.108(d): Hydrologic Conditions*. The presentation included discussion of groundwater-storage mechanics, pumping impacts, TERS, updates to GAM pumping using TWDB historical pumping estimates through 2022, resulting changes in simulated drawdown, and groundwater-budget sources and sinks.

5.3.1 Total Estimated Recoverable Storage

TERS represents an estimate of the volume of groundwater within an aquifer based on recovery scenarios ranging from 25 to 75 percent of the porosity-adjusted aquifer volume. For the Gulf Coast Aquifer System within GMA 15, the TERS estimates considered during joint planning total approximately 368.8 million acre-feet. The analysis also included TERS estimates for aquifers previously determined to be non-relevant within GMA 15, including approximately 69.9 million acre-feet for the Carrizo-Wilcox Aquifer, 2.9 million acre-feet for the Sparta Aquifer, 0.64 million acre-feet for the Queen City Aquifer, and 0.81 million acre-feet for the Yegua-Jackson Aquifer.

Although TERS provides useful information regarding the magnitude of groundwater physically stored within an aquifer, GMA 15 recognized that TERS is not an estimate of the amount of groundwater that can necessarily be developed without additional consequences or constraints. The TERS calculation does not account for potential impacts to existing groundwater or surface-water resources, groundwater quality, water levels falling below well pumps, land subsidence, degradation of water quality, changes in groundwater–surface-water interaction, or the economic and practical feasibility of developing the

groundwater. In addition, the hydrologic response to removal of groundwater from storage differs substantially between confined and unconfined portions of an aquifer. In unconfined conditions, groundwater production may remove comparatively large volumes of water through drainage of pore space, whereas in confined conditions substantial water-level declines may occur while relatively little groundwater is released from storage. GMA 15 therefore considered TERS together with simulated groundwater-level response and the other statutory factors rather than treating the TERS volume as an estimate of available groundwater production.

5.3.2 Recharge, Inflows, and Discharge

GMA 15 also evaluated groundwater-budget components and the response of the Gulf Coast Aquifer System to updated pumping assumptions. Because the Central Gulf Coast GAM was calibrated using groundwater levels through 1999, INTERA compared pumping represented in the existing GAM with TWDB historical groundwater-pumping estimates through 2022. County- and year-specific adjustment factors were applied to the model pumping to better represent more recent groundwater-use conditions. The comparison showed that updated historical pumping generally produced only modest changes in simulated GMA-wide and county-level average drawdown, although the magnitude and direction of those changes varied among counties and aquifer units. For example, the modeled GMA-wide Gulf Coast Aquifer System drawdown decreased from approximately 14.7 feet using the original GAM pumping to approximately 14.1 feet using the updated pumping assumptions.

Groundwater budgets were used to evaluate the sources and sinks that contribute to the simulated response of the aquifer system. Sources of groundwater in the model include recharge from precipitation, flow from rivers, lateral inflow, vertical flow from adjacent aquifers, and groundwater released from storage. Simulated sinks include groundwater pumping, evapotranspiration, discharge to rivers, lateral outflow, vertical flow to adjacent aquifers, and changes in storage. The relative contribution of these components changes through time as pumping alters groundwater levels and hydraulic gradients. Initially, a larger portion of pumped groundwater may be supplied from aquifer storage; as the cone of depression expands, an increasing portion of groundwater may be supplied through changes in recharge, groundwater flow, and exchanges represented by model boundary conditions.

The water-budget analyses presented to GMA 15 included county- and aquifer-specific evaluations of storage, recharge, pumping, lateral and vertical groundwater flow, and groundwater–surface-water exchange. These results were used to understand how changes in groundwater production may affect the regional groundwater system and to provide hydrologic context for development of the proposed DFCs. Because the Central Gulf Coast GAM is a regional-scale groundwater-flow model developed primarily to evaluate groundwater levels and regional drawdown, GMA 15 considered individual groundwater-budget components together with other hydrologic information and the remaining statutory factors rather than treating individual budget terms as precise predictions of localized groundwater or surface-water impacts.

5.4 Environmental Considerations

Texas Water Code Section 36.108(d)(4) requires that, during the joint-planning process, groundwater conservation districts consider "other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water." In developing the proposed DFCs, GMA 15 and its member districts considered the potential for groundwater-level declines associated with pumping to affect streamflow, springflow, shallow groundwater conditions, and groundwater–surface-water exchange. INTERA presented this information to GMA 15 at the October 9, 2025 public meeting in a presentation titled *GMA 15 Environmental Impacts*. The presentation discussed the mechanisms by which declining groundwater levels may reduce groundwater discharge to gaining streams, increase leakage from streams to the aquifer, reduce springflow, dry springs, lower shallow water tables that support vegetation, and potentially affect freshwater–saltwater relationships in coastal portions of the aquifer system.

GMA 15 also reviewed available information regarding existing groundwater–surface-water interaction within the management area. Baseflow estimates developed using USGS stream-gage information demonstrate that groundwater contributes to streamflow in portions of GMA 15, although the magnitude of that contribution varies substantially among counties and watersheds. The groundwater model represents these interactions through stream, spring/wetland, ocean/lake, recharge, and other boundary-condition terms. INTERA evaluated changes in these model-budget components between 2010 and 2080 to assess how the simulated groundwater system responds to projected pumping. The analysis showed that changes in groundwater production can alter simulated stream exchange, spring/wetland discharge, lateral groundwater flow, storage, and other components, and that the magnitude and direction of these changes vary geographically across GMA 15.

The modeled results indicate that future pumping may increase the amount of surface water entering the groundwater system in portions of GMA 15 or reduce groundwater discharge to surface-water features as groundwater levels decline. For example, the water-budget evaluation showed substantial increases in modeled stream-to-aquifer flow in several counties between 2010 and 2080, including DeWitt, Fayette, Lavaca, Victoria, and portions of the northeastern GMA. Other areas showed comparatively small changes or different responses depending on local hydrogeologic conditions and the distribution of pumping. GMA 15 considered these results as evidence that groundwater development can affect groundwater–surface-water interaction and that those effects are spatially variable across the management area.

The Central Gulf Coast GAM is a regional-scale groundwater-flow model developed primarily to evaluate regional groundwater levels and drawdown. Accordingly, GMA 15 recognized that simulated stream, spring, wetland, and coastal-boundary flows should be interpreted as indicators of the direction and relative magnitude of potential hydrologic change rather than as precise predictions of impacts at a specific stream reach, spring, wetland, or ecological resource. The modeled environmental-response information was therefore considered together with observed hydrologic conditions, projected groundwater-level changes, and the other statutory factors required by Texas Water Code Section 36.108(d) in developing the proposed DFCs.

5.5 Subsidence

Texas Water Code Section 36.108(d)(5) requires that, during the joint-planning process, groundwater conservation districts consider "the impact on subsidence." In developing the proposed DFCs, GMA 15 and its member districts considered the physical mechanisms that cause land subsidence, historical evidence of subsidence within portions of the management area, methods for measuring land-surface deformation, factors controlling the susceptibility of Gulf Coast sediments to compaction, and methods available for estimating future subsidence associated with groundwater-level decline. INTERA presented this information to GMA 15 at the April 10, 2025 public meeting in a presentation titled *GMA 15 Discussion of Nine Factors in TWC 36.108(d): Subsidence Impacts*. The presentation included historical subsidence studies, InSAR and continuous GPS observations, the TWDB subsidence-vulnerability methodology, alternative modeling approaches, and screening-level predictions of potential subsidence associated with future groundwater-level declines.

Land subsidence may result from several natural and anthropogenic processes; however, the principal mechanism considered in relation to groundwater production is compaction of compressible aquifer-system sediments caused by declining groundwater levels. Reductions in hydraulic pressure increase the effective stress carried by the aquifer matrix, which can result in compaction of clay-rich sediments and corresponding lowering of the land surface. The magnitude of groundwater-related subsidence depends principally on the amount of groundwater-level decline, the total thickness of compressible clay, and the compressibility of those clay units. Clay type, burial depth, age, compaction history, permeability, and individual clay-layer thickness can also affect the magnitude and timing of subsidence.

GMA 15 reviewed historical and recent observations to provide context for subsidence within the management area. Historical leveling data compiled by Ratzlaff (1982) document subsidence within portions of the central Texas Gulf Coast between 1918 and 1973, although the historical study did not cover the entire GMA 15 area. INTERA's 2016 evaluation also estimated historical land-surface change within portions of GMA 15 using groundwater-level decline, clay thickness, and available subsidence information. More recent InSAR analyses in Wharton County indicate measurable land-surface deformation during 2016 through 2019, with example continuous GPS/InSAR comparisons showing deformation rates of approximately 1.2 to 3.5 millimeters per year at selected locations (Young et al., 2020). The Wharton County evaluation also found that groundwater levels at 86 monitoring-well locations had been relatively stable over approximately the preceding 20 years and that recent groundwater production was generally lower than production during the mid-1960s, providing context for the relatively low recent subsidence rates observed there.

Based on these considerations, GMA 15 recognized that groundwater-level declines associated with future pumping have the potential to contribute to land subsidence in portions of the management area, particularly where substantial drawdown coincides with thick sequences of compressible clay. No member district proposed a separate subsidence-based DFC for the current joint-planning cycle. Subsidence was instead considered together with projected groundwater-level change and the other factors required by Texas Water Code Section 36.108(d) in developing the proposed groundwater-level DFCs.

5.6 Socioeconomic Impacts

Texas Water Code Section 36.108(d)(6) requires that, during the joint-planning process, groundwater conservation districts consider "socioeconomic impacts reasonably expected to occur." In developing the proposed DFCs, GMA 15 and its member districts considered both the potential socioeconomic consequences of unmet future water-supply needs and the potential effects of groundwater-level changes on existing groundwater users. INTERA presented this information to GMA 15 at the October 9, 2025 public meeting in a presentation titled *GMA 15 Socioeconomic Impacts*. The analysis reviewed socioeconomic-impact estimates prepared for the 2026 Regional Water Plans for Regions K, L, N, and P (Ellis, 2025a–d) and also evaluated modeled groundwater-level changes at wells provided by the member districts and wells contained in the TWDB Submitted Drillers Report database.

The regional water-planning analyses estimate potential income and employment losses that could occur if projected water needs are not met during drought-of-record conditions. The results presented to GMA 15 identified manufacturing as the water-use category associated with the largest projected economic impacts, with additional potential impacts associated with municipal, irrigation, mining, and power-generation water needs. However, TWDB subsequently determined that the 2026 Regional Water Plan manufacturing-sector drought-impact estimates likely contain a significant overestimation. TWDB's August 2025 addendum states that the methodology likely produced upwardly biased estimates of manufacturing-related income losses, jobs at risk, and tax impacts. Accordingly, GMA 15 considered the manufacturing-sector estimates as screening-level indicators of the potential economic importance of unmet water needs rather than precise predictions of future losses. The regional planning estimates also apply to entire counties, including portions located outside GMA 15, and represent the consequences of unmet projected water needs rather than socioeconomic impacts attributable directly to a GMA 15 DFC.

GMA 15 also considered the potential effect of modeled groundwater-level changes on existing groundwater users. INTERA evaluated wells supplied by the member districts and TWDB Submitted Drillers Reports for which sufficient total-depth or screen-depth information was available and calculated modeled groundwater-level change from 2000 through 2080 at those locations. The analysis included approximately 6,000 district-provided wells and 32,000 SDR wells. Most district-provided wells were located in areas with less than 20 feet of modeled drawdown, although larger declines occurred at some locations. The SDR analysis similarly showed substantial geographic and aquifer-specific variation, with larger modeled declines occurring primarily in the northeastern portion of GMA 15 and in deeper portions of the Gulf Coast Aquifer System, particularly the Jasper Aquifer.

The well-impact evaluation was intended as a regional screening analysis and should not be interpreted as a prediction that an individual well will fail or require modification. Actual effects on a well depend on factors including well depth, screened interval, pump setting, available water column, local aquifer conditions, and the location and magnitude of future pumping. GMA 15 therefore considered the socioeconomic information as two complementary lines of evidence: the regional planning analyses illustrate the potential economic consequences of insufficient water supplies, while the well analysis illustrates the potential effects of groundwater-level decline on existing users. These considerations were evaluated together with the other statutory factors in balancing opportunities for future

groundwater production with protection of existing groundwater users and long-term management of the Gulf Coast Aquifer System.

5.7 Private Property Rights

Texas Water Code Section 36.108(d)(7) requires that, during the joint-planning process, groundwater conservation districts consider impacts on the interests and rights in private property, including the rights of groundwater owners. In developing the proposed DFCs, GMA 15 and its member districts considered how different groundwater-management outcomes could affect owners with differing interests in groundwater production, conservation, and long-term resource availability. INTERA presented this information to GMA 15 at the July 10, 2025 public meeting in a presentation titled *GMA 15 Discussion of Nine Factors in TWC 36.108(d): Impacts on the Interests and Rights in Private Property*. The presentation emphasized that consideration of property-right impacts during the DFC process is not a determination that a regulatory taking has occurred; rather, it is an evaluation of how alternative groundwater-management outcomes may affect private-property interests.

GMA 15 considered that property-right interests may be affected differently depending on the degree of groundwater production allowed under a DFC. DFCs that allow greater groundwater-level decline may favor interests associated with the highest practicable use of groundwater by allowing greater production and development opportunities, but may also increase interference among groundwater users, affect long-term groundwater availability, and increase potential impacts to springs and stream reaches. Conversely, DFCs that maintain higher groundwater levels may favor conservation-oriented interests by extending groundwater supplies, reducing interference between groundwater users, supporting higher water levels, and reducing the potential for land subsidence, while potentially requiring more restrictive production limits or greater acreage to support permitted production.

GMA 15 also recognized that the DFC itself establishes a planning goal rather than directly regulating an individual groundwater owner's use of groundwater. The potential effect on a property owner may depend on the rules, permitting requirements, spacing requirements, production limits, and other management actions adopted by an individual groundwater conservation district to achieve the DFC. Accordingly, GMA 15 considered both production-oriented and conservation-oriented property interests in developing the proposed DFCs and balanced those interests together with the other statutory factors required by Texas Water Code Section 36.108(d).

5.8 Feasibility of DFCs

Texas Water Code Section 36.108(d)(8) requires that, during the joint-planning process, groundwater conservation districts consider the feasibility of achieving the proposed DFCs. As part of this evaluation, INTERA presented an analysis of measured and simulated groundwater-level trends to GMA 15 at the January 8, 2026 meeting. The analysis combined groundwater-level measurements supplied by the member districts and the TWDB Groundwater Database and used the Theil-Sen method to estimate long-term water-level trends. Measured trends were compared with simulated trends from the Central Gulf Coast GAM to evaluate the degree to which the regional model reproduces observed groundwater-system behavior. The analysis showed that measured and simulated trends are generally consistent at

the regional scale, but that the magnitude and direction of model-data discrepancies vary by county and aquifer.

The feasibility analysis also evaluated model uncertainty using statistical comparisons of measured and simulated water-level trends. Root mean square error, mean absolute error, mean error, and confidence intervals were used to characterize differences between modeled and observed trends, and those differences were extrapolated through the predictive period to illustrate how uncertainty may increase toward 2080. The resulting uncertainty ranges were intentionally broad and demonstrated that long-term GAM projections should be interpreted as estimates of regional groundwater-system response rather than exact predictions of future water levels. The analysis concluded that achievement of the DFCs was generally feasible from a hydrologic perspective, provided that uncertainty in the regional model and its long-term predictions is recognized.

At the January 8, 2026 meeting, GMA 15 accepted the feasibility presentation for consideration as part of the statutory-factor analysis; however, the representatives did not adopt the statistical trend analysis or the projected uncertainty ranges as DFCs or as DFC evaluation criteria. Instead, GMA 15 separately considered the proposed DFCs and their evaluation framework. The representatives approved amendments to the proposed DFCs for Goliad and Matagorda counties and established a single evaluation factor of plus or minus 3 feet for the county-wide DFCs. Thus, the measured-versus-simulated trend analysis was used to inform GMA 15's consideration of model performance and predictive uncertainty, while the numerical criteria used to evaluate achievement of the county-wide DFCs were established separately by action of the representatives.

GMA 15 therefore considered the proposed DFCs feasible within the context of the regional planning process while recognizing that the Central Gulf Coast GAM contains uncertainty and does not reproduce observed groundwater-level trends equally well in all areas. The GAM remains appropriate for evaluating broad regional groundwater responses and the physical compatibility of the proposed DFCs, but observed groundwater levels, district monitoring programs, and other local technical information remain important for evaluating progress toward DFC achievement. Goliad County was considered separately using locally developed technical information because of documented differences between observed groundwater conditions and simulated conditions in that portion of the management area.

5.9 Other Considerations

Texas Water Code Section 36.108(d)(9) requires that, during the joint-planning process, groundwater conservation districts consider “any other information relevant to the specific desired future conditions.” INTERA presented additional information to GMA 15 at the January 8, 2026 public meeting in a presentation titled *GMA 15 Other Factors*. The information included additional context regarding Total Estimated Recoverable Storage (TERS), the occurrence and potential development of brackish groundwater within the Gulf Coast Aquifer System, and limitations of the Central Gulf Coast GAM relevant to interpretation of modeled groundwater conditions. TERS and its limitations are discussed in Section 5.3; therefore, the discussion below focuses primarily on brackish groundwater and model limitations considered by GMA 15.

GMA 15 considered brackish groundwater as a potentially important future water-supply resource within the management area. The information presented defined brackish groundwater as groundwater containing between approximately 1,000 and 10,000 milligrams per liter of total dissolved solids (TDS), with slightly saline groundwater ranging from 1,000 to 3,000 mg/L and moderately saline groundwater ranging from 3,000 to 10,000 mg/L. The presentation also noted that brackish groundwater production zones established pursuant to House Bill 30 generally focus on groundwater having TDS concentrations greater than approximately 3,000 mg/L to reduce potential competition with freshwater resources. Available regional studies indicate that brackish groundwater is laterally extensive within portions of the Gulf Coast Aquifer System and, in many areas, occurs at greater depths than the principal freshwater-producing intervals. Consequently, GMA 15 considered development of these resources as a potential means of supplementing future water supplies while recognizing that the quantity, quality, depth, treatment requirements, and economic feasibility of development vary substantially across the management area.

GMA 15 also considered limitations of the Central Gulf Coast GAM when interpreting projected groundwater conditions and evaluating potential development of deeper portions of the aquifer system. The January 8 presentation identified several limitations, including the age of the model calibration, locations where simulated water-level trends differ from observed trends, limitations in the calibration of hydraulic properties and groundwater–surface-water interaction, incomplete representation of deeper aquifer units in portions of the southern model area, and limited representation of pumping effects originating in adjacent GMA 14. These limitations are particularly relevant when considering large-scale development of deeper or more saline groundwater because the regional GAM was developed principally to evaluate regional freshwater groundwater levels and drawdown and was not specifically constructed to simulate the movement of salinity or all hydrologic responses associated with development of brackish groundwater.

GMA 15 therefore considered brackish groundwater to be an important potential future resource but did not interpret the estimated volume of groundwater in storage as equivalent to groundwater that can practically or sustainably be produced. The other-factors presentation emphasized that TERS indicates the quantity of groundwater physically present within an aquifer but does not account for water quality, impacts to existing wells, subsidence, groundwater–surface-water interaction, or the economics and practicality of groundwater development. Accordingly, GMA 15 considered information regarding brackish groundwater, groundwater storage, and model limitations as additional context for the proposed DFCs rather than as independent measures of groundwater availability. These considerations were evaluated together with the other factors required by Texas Water Code Section 36.108(d).

6.0 References

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

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

Ellis, J.R., 2025a, Socioeconomic Impacts of Projected Water Shortages for the Lower Colorado (Region K) Regional Water Planning Area: Prepared in Support of the 2026 Region K Regional Water Plan, Texas Water Development Board, June 2025.

Ellis, J.R., 2025b, Socioeconomic Impacts of Projected Water Shortages for the South Central Texas (Region L) Regional Water Planning Area: Prepared in Support of the 2026 Region L Regional Water Plan, Texas Water Development Board, June 2025.

Ellis, J.R., 2025c, Socioeconomic Impacts of Projected Water Shortages for the Coastal Bend (Region N) Regional Water Planning Area: Prepared in Support of the 2026 Region N Regional Water Plan, Texas Water Development Board, June 2025.

Ellis, J.R., 2025d, Socioeconomic Impacts of Projected Water Shortages for the Lavaca (Region P) Regional Water Planning Area: Prepared in Support of the 2026 Region P Regional Water Plan, Texas Water Development Board, June 2025.

Keester, M., Danielson, V., and Donnelly, A.C.A., 2021, 2021 Joint Planning – Desired Future Conditions Explanatory Report: Report prepared for Groundwater Management Area 15, 32 p.

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

Texas Water Development Board (TWDB), 2023, 2026 Regional Water Plan Board-Adopted Population and Municipal Demand Projections: Texas Water Development Board, adopted November 9, 2023.

Texas Water Development Board (TWDB), 2025, Addendum to Socioeconomic Impact Analysis for the 2026 Regional Water Plans: Texas Water Development Board, August 2025.

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

Waterstone Environmental Hydrology and Engineering, Inc., and Parsons, 2003, Groundwater Availability of the Central Gulf Coast Aquifer: Numerical Simulations to 2050, Central Gulf Coast, Texas: Contract report prepared for the Texas Water Development Board, 157 p.

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

Young, S., Pham, H., Lu, Z., and Qu, F., 2020, Mapping of Ground Surface Deformation Rates in Wharton County Based on the Analysis of Remote Sensing Data: Prepared for Coastal Bend Groundwater Conservation District by INTERA Incorporated, Austin, Texas.