

Calhoun County Groundwater Conservation District

Groundwater Management Plan

Calhoun County Groundwater Conservation District Groundwater Management Plan Adoption:	April 24, 2023
Texas Water Development Board Administrative Approval:	

Table of Contents

DISTRICT MISSION..... 4

PURPOSE OF THE GROUNDWATER MANAGEMENT PLAN 4

DISTRICT INFORMATION..... 5

 Creation..... 5

 Directors..... 5

 Authority 5

 Location and Extent..... 5

GROUNDWATER RESOURCES OF CALHOUN COUNTY 6

STATEMENT OF GUIDING PRINCIPLES 7

CRITERIA FOR PLAN APPROVAL 7

 Planning Horizon..... 7

 Notice and Hearing Related to Plan Adoption - TWC §36.1071(a) 7

 Coordination with Regional Surface Water Management Entities - TWC §36.1071(a). 7

 Calhoun County Groundwater Conservation District Board of Director Resolution
 Adopting Management Plan TWC §36.1071(a)..... 8

ESTIMATES OF TECHNICAL INFORMATION REQUIRED BY §36.1071 OF THE
TEXAS WATER CODE AND RULE 356.52 OF TITLE 31 OF THE TEXAS
ADMINISTRATIVE CODE..... 9

 Estimate of Modeled Available Groundwater in the District based on Desired Future
 Conditions – TWC §36.1071(e)(3)(A) and 31 TAC 356.52(a)(5)(A) 9

 Estimate of amount of groundwater being used within the district on an annual basis –
 TWC §36.1071(e)(3)(B) and 31 TAC 356.52(a)(5)(B) 10

 Estimate of annual amount of recharge from precipitation to the groundwater
 resources within the district – TWC §36.1071(e)(3)(C) and 31 TAC 356.52(a)(5)(C). 10

 Estimate for each aquifer, annual volume of water that discharges from the aquifer to
 springs and any surface water bodies, including lakes, streams, and rivers – TWC
 §36.1071(e)(3)(D) and 31 TAC 356.52(a)(5)(D)..... 10

 Estimate of annual volume of flow into and out of the district within each aquifer and
 between aquifers in the district – TWC §36.1071(e)(3)(E) and 31 TAC 356.52(a)(5)(E)
 11

 Estimate of projected surface water supply in the district according to the most
 recently adopted state water plan – TWC §36.1071(e)(3)(F) and 31 TAC
 356.52(a)(5)(F) 11

 Estimate of projected total demand for water in the district according to the most
 recently adopted state water plan – TWC §36.1071(e)(3)(G) and 31 TAC
 356.52(a)(5)(G) 11

CONSIDER THE WATER SUPPLY NEEDS AND WATER MANAGEMENT
STRATEGIES INCLUDED IN THE ADOPTED STATE WATER PLAN – TWC
§36.1071(e)(4) 12

DETAILS ON THE DISTRICT MANAGEMENT OF GROUNDWATER..... 13

ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE FOR PLAN
IMPLEMENTATION – TWC §36.1071(e)(2)..... 15

METHODOLOGY FOR TRACKING DISTRICT PROGRESS IN ACHIEVING
MANAGEMENT GOALS – 31TAC 356.52(a)(4) 15

GOALS, MANAGEMENT OBJECTIVES AND PERFORMANCE STANDARDS..... 15

 Providing the most efficient use of groundwater – TWC §36.1071(a)(1) and 31 TAC
356.52(a)(1)(A)..... 15

 Controlling and preventing waste of groundwater – TWC §36.1071(a)(2) and 31 TAC
356.52(a)(1)(B)..... 16

 Controlling and preventing subsidence – TWC §36.1071(a)(3) and 31 TAC
356.52(a)(1)(C) 16

 Addressing conjunctive surface water management issues – TWC §36.1071(a)(4) and
31 TAC 356.52(a)(1)(D) 16

 Addressing natural resource issues which impact the use and availability of
groundwater, and which are impacted by the use of groundwater – TWC
§36.1071(a)(5) and 31 TAC §356.52(a)(1)(E) 16

 Addressing drought conditions – TWC §36.1071(a)(6) and 31 TAC 356.52(a)(1)(F) . 17

 Addressing conservation, recharge enhancement, rainwater harvesting, precipitation
enhancement, or brush control, where appropriate and cost-effective – TWC
§36.1071(a)(7) and 31 TAC 356.52(a)(1)(G)..... 17

 Addressing the desired future conditions adopted by the district under Section 36.108
– TWC §36.1071(a)(8) and 31 TAC 356.52(a)(1)(H)..... 17

List of Appendices 19

DISTRICT MISSION

The mission of the Calhoun County Groundwater Conservation District is to develop sound water conservation and management strategies designed to conserve, preserve, protect, and prevent waste of groundwater resources for long-term sustainability within Calhoun County for the benefit of the landowners, citizens, economy, and environment of Calhoun County.

The district will implement these strategies through the acquisition and dissemination of hydrogeological information, the development of programs and incentives to conserve and protect groundwater resources, and the adoption and enforcement of fair and appropriate rules governing the production and use of the groundwater resources within the Calhoun County.

PURPOSE OF THE GROUNDWATER MANAGEMENT PLAN

Senate Bill 1, enacted by the 75th Texas Legislature in 1997, and Senate Bill 2, enacted by the 77th Texas Legislature in 2001, established a comprehensive statewide water resource planning process and the actions necessary for groundwater conservation districts to manage and conserve the groundwater resources of the state of Texas. These bills required all groundwater conservation districts to develop a management plan which defines the groundwater needs and groundwater supplies within each district and the goals each district has set to achieve its mission.

In addition, the 79th Texas Legislature enacted House Bill 1763 in 2005 that requires joint planning among districts that are in the same groundwater management area. These districts must jointly agree upon and establish the desired future conditions of the aquifers within their respective groundwater management areas. Through this process, the groundwater conservation districts will submit the desired future conditions to the Executive Administrator of the Texas Water Development Board who, in turn, will provide each district within the groundwater management area with estimates of modeled available groundwater within each district. The modeled available groundwater will be based on the desired future conditions jointly established for each aquifer within the groundwater management area.

Technical information, such as the desired future conditions within the jurisdiction of the district and the amount of modeled available groundwater from such aquifers is required by statute to be included in the management plan of the district and will guide the regulatory and management policies of the district. This management plan is intended to satisfy the requirements of Senate Bill 1, Senate Bill 2, House Bill 1763, the statutory requirements of Chapter 36 of the Texas Water Code, and the rules and requirements of the Texas Water Development Board.

DISTRICT INFORMATION

Creation

The district was created by Senate Bill 1290, 82nd Legislature and continued by Senate Bill 1835, 83rd Legislature, and codified as Chapter 8860, Special District and Local Laws Code. The citizens of Calhoun County through a confirmation election held on November 6, 2014, ratified the district. The district was formed to protect, conserve, and prevent waste of the groundwater resources beneath the area of Calhoun County. To manage the groundwater resources under its jurisdiction, the district is charged with the rights and responsibilities specified in its enabling legislation; the provisions of Chapter 36 of the Texas Water Code; this groundwater management plan, and the rules of the district.

Directors

The Calhoun County Groundwater Conservation District Board of Directors consists of five members. These directors are elected by the voters of Calhoun County and serve a four-year term. The district observes the same four precincts as the Calhoun County Commissioners with an at-large position. The terms of the director positions are staggered on a two-year election interval in even numbered years.

Authority

The district has the rights and responsibilities provided in Chapter 36 of the Texas Water Code and Chapter 356 of Title 31 of the Texas Administrative Code. The district has the authority to undertake hydrogeological studies, adopt a groundwater management plan, provide for the permitting of certain water wells, and implement programs to achieve statutory requirements. The district has rulemaking authority to implement its policies and procedures to manage the groundwater resources of Calhoun County.

Location and Extent

The boundaries of the district are conterminous with those of Calhoun County, Texas. This area encompasses approximately 1,032 square miles. The district is bounded by Refugio County, Victoria County, Jackson County, and Matagorda County.

GROUNDWATER RESOURCES OF CALHOUN COUNTY

Depositions from sediment-laden rivers, currents from the Gulf of Mexico, and storm waves have influenced the geologic formations in Calhoun County. The fluctuation of the coastline over geologic eons contributed to the deposition of sediments within the Calhoun County as well. The geologic formations in the Calhoun County according to their depositional age are summarized in Figure 1. The Gulf Coast Aquifer underlies Calhoun County.

Figure 1: Geologic and Hydrogeological Units of the Gulf Coast Aquifer in Calhoun County.

Stratigraphic Unit		Hydrogeologic Unit
Alluvium		Chicot Aquifer
Beaumont Clay		
Montgomery Formation	Lissie Formation	
Bentley Formation		
Willis Sand		
Goliad Sand		
Fleming Formation		
Oakville Sandstone		Burkeville Confining Unit
Catahoula Sandstone (Tuff)		Jasper Aquifer

The Gulf Coast Aquifer System is conceptualized to comprise of four distinct aquifer components: Chicot, Evangeline, Burkeville Confining Unit, and the Jasper Aquifer (Baker, 1979). These aquifer components are included within the Central Gulf Coast Groundwater Availability Model developed by the Texas Water Development Board (Chowdhury and Mace, 2004).

The Chicot Aquifer is utilized the most within Calhoun County. The Chicot Aquifer crops out across the entirety of Calhoun County. The thickness of the Chicot Aquifer ranges up to approximately 1,200 feet in Calhoun County. The thickness of the Evangeline Aquifer ranges from 1,100 feet to 1,600 feet in Calhoun County. The Chicot Aquifer and Evangeline Aquifer consist of interbedded sands, silts, and clays. The sand content is higher in the Evangeline Aquifer compared to the Chicot Aquifer. The water quality in the Gulf Coast Aquifer generally deteriorates along the coast.

STATEMENT OF GUIDING PRINCIPLES

The district recognizes that the groundwater resources of Calhoun County and the region are of vital importance to the many users who are dependent on these valuable resources. In addition, the district recognizes that landowners have an ownership right in the groundwater resources associated with their properties and are the primary stewards of the groundwater resources associated with their properties. The district will work with interested parties, especially landowners, in Calhoun County to conserve, preserve, protect, and prevent waste of this most valuable resource, for the benefit of the landowners, the public, the local economy, and the environment.

The groundwater management plan of the district is intended to serve as a tool to focus the thoughts and actions of those given the responsibility for the execution of the activities of the district as well as to provide information to the staff of the district, landowners, and others responsible for the execution of, or compliance with, the policies and rules of the district. The district will carry out its programs and responsibilities in implementing this groundwater management plan in a prudent and cost-effective manner. The district, with public input, will adopt and enforce rules necessary to implement this groundwater management plan.

CRITERIA FOR PLAN APPROVAL

Planning Horizon

The planning period for this plan is ten years from the date of approval by the Texas Water Development Board. This plan will be reviewed within five years as required by §36.1072(e) of the Texas Water Code. The district will consider the necessity to amend the plan and re-adopt this groundwater management plan with or without amendments as required by §36.1072(e) of the Texas Water Code.

This groundwater management plan will remain in effect until replaced by a revised management plan approved by the Texas Water Development Board.

Notice and Hearing Related to Plan Adoption - TWC §36.1071(a)

Public notices documenting that this plan was considered and adopted following appropriate public hearings are included in Appendix D.

Coordination with Regional Surface Water Management Entities - TWC §36.1071(a)

Letters transmitting this plan to the surface water management entities of the Calhoun County region for coordination purposes are included in Appendix E.

**Calhoun County Groundwater Conservation District Board of Director Resolution
Adopting Management Plan TWC §36.1071(a)**

A copy of the resolution approved by the Board of Directors of the Calhoun County Groundwater Conservation District adopting this plan is included in Appendix F.

ESTIMATES OF TECHNICAL INFORMATION REQUIRED BY §36.1071 OF THE TEXAS WATER CODE AND RULE 356.52 OF TITLE 31 OF THE TEXAS ADMINISTRATIVE CODE

Estimate of Modeled Available Groundwater in the District based on Desired Future Conditions – TWC §36.1071(e)(3)(A) and 31 TAC 356.52(a)(5)(A)

Modeled available groundwater is defined in §36.001 of the Texas Water Code as "the amount of water that the executive administrator determines may be produced on an average annual basis to achieve a desired future condition established under Section 36.108." Desired future condition (DFC) is defined in §36.001 of the Texas Water Code as "a quantitative description, adopted in accordance with §36.108 of the Texas Water Code, of the desired condition of the groundwater resources in a management area at one or more specified future times." The desired future condition of an aquifer may only be determined through joint planning with other groundwater conservation districts in the same groundwater management area as specified under §36.108 of the Texas Water Code.

The district is located in Groundwater Management Area 15. The representatives of the member district of Groundwater Management Area 15 adopted, by resolution, the desired future condition for Gulf Coast Aquifer within Groundwater Management Area 15 on October 14, 2021.

The resolution adopting the desired future condition for Groundwater Management Area 15 states the gma-specific DFC "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;"

The resolution adopting the desired future condition for Groundwater Management Area 15 states the county-specific DFC for Calhoun County shall not exceed "5 feet of drawdown of the Gulf Coast Aquifer System."

The technical consultant of Groundwater Management Area 15 submitted the adopted desired future conditions and explanatory report for Groundwater Management Area 15 on December 13, 2021, to Texas Water Development Board.

The Texas Water Development Board reported the modeled available groundwater for Groundwater Management Area 15 in GAM Run 21-020 MAG which is incorporated into this management plan as Appendix C.

The modeled available groundwater, in acre-feet per year (AFY), of the Gulf Coast Aquifer within the district per Table 2 of the GAM Run 21-020 MAG specifies the following values for the district:

Year					
2020	2030	2040	2050	2060	2069
7,611	7,611	7,611	7,611	7,611	7,611

All values in acre-feet/year (AFY)

Estimate of amount of groundwater being used within the district on an annual basis – TWC §36.1071(e)(3)(B) and 31 TAC 356.52(a)(5)(B)

The district recognizes the estimate of the amount of groundwater being used within the district on an annual basis, according to information provided by the Texas Water Development Board, totals 1,284 acre-feet in year 2019. Refer to Appendix A and the 2022 State Water Plan Datasets for additional information.

Estimate of annual amount of recharge from precipitation to the groundwater resources within the district – TWC §36.1071(e)(3)(C) and 31 TAC 356.52(a)(5)(C)

The district recognizes the estimate of the amount of water recharging the groundwater resources within the district from precipitation, according to information provided by the Texas Water Development Board, totals 2,573 acre-feet. Refer to Appendix B for additional information.

Estimate for each aquifer, annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers – TWC §36.1071(e)(3)(D) and 31 TAC 356.52(a)(5)(D)

The district recognizes the estimate of the annual volume of water discharging from the aquifer to springs and any surface water bodies for each aquifer, including lakes, streams, and rivers within the district, according to information provided by the Texas Water Development Board, totals 13,511 acre-feet. Refer to Appendix B for additional information.

Estimate of annual volume of flow into and out of the district within each aquifer and between aquifers in the district – TWC §36.1071(e)(3)(E) and 31 TAC 356.52(a)(5)(E)

The district recognizes the estimate of the annual volume of groundwater flowing into the district within each aquifer, according to information provided by the Texas Water Development Board, totals 11,133 acre-feet. The district recognizes the estimate of the annual volume of groundwater flowing out of the district within each aquifer, according to information provided by the Texas Water Development Board, totals 4,909 acre-feet. The estimated net annual volume of flow between each aquifer in the district is not applicable because the model assumes a no flow barrier at the base of the Gulf Coast Aquifer System. Refer to Appendix B for additional information.

Estimate of projected surface water supply in the district according to the most recently adopted state water plan – TWC §36.1071(e)(3)(F) and 31 TAC 356.52(a)(5)(F)

The district recognizes the sum of projected surface water supplies, according to information provided by the Texas Water Development Board, is 66,289 acre-feet for year 2030 and 66,289 acre-feet for year 2070. Refer to Appendix A and the 2022 State Water Plan for additional information.

Estimate of projected total demand for water in the district according to the most recently adopted state water plan – TWC §36.1071(e)(3)(G) and 31 TAC 356.52(a)(5)(G)

The district recognizes the sum of projected water demands, according to information provided by the Texas Water Development Board, is 71,934 acre-feet for year 2030 and 73,004 acre-feet for year 2070. Refer to Appendix A and the 2022 State Water Plan for additional information.

CONSIDER THE WATER SUPPLY NEEDS AND WATER MANAGEMENT STRATEGIES INCLUDED IN THE ADOPTED STATE WATER PLAN – TWC §36.1071(e)(4)

The district recognizes the sum of projected water supply needs within the district, according to information provided by the Texas Water Development Board, is 14,088 acre-feet in 2030 and 14,207 acre-feet in 2070. Refer to Appendix A and the 2022 State Water Plan for additional information.

The district recognizes the GBRA Lower Basin Storage Project, the FE - Hays County Pipeline Project, the GBRA - MBWSP - Surface Water W/ ASR, the GBRA Lower Basin Storage Project, and the Municipal Water Conservation water management strategies are projected to supply 58,499 acre-feet of water in the district in 2030.

The district recognizes the Local Gulf Coast Aquifer Development, GBRA Lower Basin Storage Project, the FE - Western Canyon Expansion, the GBRA - MBWSP - Surface Water W/ ASR, the GBRA Lower Basin Storage Project, and the Municipal Water Conservation water management strategies are projected to supply 50,898 acre-feet of water in the district in 2070.

The district recognizes that persons possessing groundwater rights may seek authorization to produce groundwater from within Calhoun County for many purposes including supplying water to activities projected by TWDB to create water supply needs and the water management strategies identified in the 2022 State Water Plan.

DETAILS ON THE DISTRICT MANAGEMENT OF GROUNDWATER

The Texas Legislature established that groundwater conservation districts are the preferred method of groundwater management in §36.0015 of the Texas Water Code. The district will manage the production of groundwater within Calhoun County in order to protect, preserve, conserve, and prevent waste of the resource while seeking to maintain the economic viability of all resource user groups, public and private. The district seeks to manage the groundwater resources of Calhoun County as practicably as possible as established in the plan. In consideration of the economic and cultural activities occurring within Calhoun County, the district will identify and engage in such activities and practices, that if implemented may result in the reasonable and effective protection, preservation, conservation, waste prevention of groundwater in Calhoun County. The district will manage groundwater resources through rules developed and implemented in accordance with Chapter 36 of the Texas Water Code and the provisions of the enabling legislation of the district.

For the purposes of this management plan, the following definitions are used:

- Protection of groundwater is the activity and practice of seeking to prevent harm or injury to a groundwater resource.
- Preservation of groundwater is the activity and practice of seeking to extend the useful longevity or life of a groundwater resource.
- Conservation of groundwater is the activity and practice of seeking to use a groundwater resource in a manner that appropriately balances the impacts associated with consuming the resource and preserving the resource for the future.
- Waste prevention of groundwater is the activity and practices seeking to prevent the use of groundwater in any manner defined as waste in §36.001 of the Texas Water Code.

The district will monitor aquifer conditions in and around Calhoun County in order to monitor changing water levels and water quality of groundwater resources within Calhoun County. The district will make periodic assessments of aquifer conditions and will report those conditions to the Board of Directors of the district and to the public. The district may undertake, as necessary, investigations of the groundwater resources within Calhoun County and will make the results of investigations available to the public. The district will cooperate with investigations of the groundwater resources of Calhoun County undertaken by other local political subdivisions or agencies of the State of Texas.

In order to better manage groundwater resources, the district may establish management zones for; and adopt different rules for:

1. Each aquifer, subdivision of an aquifer, or geologic strata located in whole or in part within Calhoun County; or
2. Each geographic area overlying an aquifer or subdivision of an aquifer located in whole or in part within Calhoun County.

For the purpose of managing the use of groundwater within Calhoun County, the district may define sustainable use as the use of an amount of groundwater in Calhoun County

as a whole or any management zone established by the district that does not exceed any of the following conditions:

1. the long-term average historical groundwater production from aquifers in Calhoun County established by the district prior to the establishment of the desired future condition of aquifers in a groundwater management area in which the district is located; or
2. the desired future conditions of aquifers in Calhoun County established by a groundwater management area in which the district is located; or
3. The amount of modeled available groundwater resulting from the establishment of a desired future aquifer condition by the district or a groundwater management area in which the district is located; or
4. the estimated long-term average historical amount of annual recharge of the aquifer or aquifer subdivision in which the use occurs as recognized by the district; or
5. any other criteria established by the district as being a threshold of use beyond which further use of the aquifer or aquifer subdivision may result in a specified undesirable or injurious condition.

The district may adopt rules that protect historic use of groundwater in Calhoun County to the maximum extent practical and consistent with this plan and the goals and objectives set forth herein. The district may impose more restrictive conditions on non-historic-use permits and non-historic-use permit amendments to increase use by historic users if the limitations:

1. apply to all non-historic-use permits and non-historic-use permit amendments to increase use by historic users, regardless of the type or location of use;
2. bear a reasonable relationship to the Desired Future Condition of the district; and
3. are reasonably necessary to protect historic use.

The district may adopt rules to regulate groundwater withdrawals by means of spacing and production limits. The relevant factors to be considered in making a determination to grant or deny a permit or limit groundwater withdrawals shall include those set forth in the enabling legislation of the district, Chapter 36 of the Texas Water Code, and the rules of the district. The district may employ technical resources at its disposal, as needed, to evaluate the groundwater resources available within Calhoun County and to determine the effectiveness of regulatory or conservation measures. In consideration of particular individual, localized, or district-wide conditions, including without limitation climatic conditions, the district may, by rule, allow an increase or impose a decrease in the total production in a management zone above or below the sustainable amount for a period of time considered necessary by the district in order to accomplish the purposes set forth in Chapter 36 of the Texas Water Code, or the enabling legislation of the district. The exercise of said discretion by the Board of Directors of the Calhoun County Groundwater Conservation District shall not be construed as limiting the power of the Board of Directors of the Calhoun County Groundwater Conservation District.

ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE FOR PLAN IMPLEMENTATION – TWC §36.1071(e)(2)

The district will implement the provisions of this plan and will utilize the provisions of this plan as a guide for determining the direction or priority for all activities. All operations of the district, all agreements entered into by the district, and any additional planning efforts in which the district may participate will be consistent with the provisions of this plan.

The Rules of the district adopted by the Board of Directors of the Calhoun County Groundwater Conservation District shall comply with Chapter 36 of the Texas Water Code, including §36.113 of the Texas Water Code, and the provisions of this management plan. All rules will be adhered to and enforced. The promulgation and enforcement of the rules will be based on the best technical evidence available to the district.

The rules of the district are available at the following website address:

<https://calhouncountygcd.org/groundwater-policy.html>.

METHODOLOGY FOR TRACKING DISTRICT PROGRESS IN ACHIEVING MANAGEMENT GOALS – 31TAC 356.52(a)(4)

The staff of the district will prepare and present an annual report to the members of the Board of Directors regarding the performance of the district in achieving management goals and objectives. The report will be presented within 180 days following the completion of each fiscal year. The district will maintain the report on file for public inspection at the office of the district upon adoption at a meeting of the Calhoun County Groundwater Conservation District Board of Directors.

GOALS, MANAGEMENT OBJECTIVES AND PERFORMANCE STANDARDS

Providing the most efficient use of groundwater – TWC §36.1071(a)(1) and 31 TAC 356.52(a)(1)(A)

Objective: Develop and maintain a program for processing permitting requests submitted to the district and tracking well registrations and permits issued by the district authorizing groundwater production during the fiscal year.

Performance Standard: The district will summarize within the annual report 1) the status of pending permitting requests and 2) the number of wells registered by the district, and 3) the volume of groundwater authorized to be produced under production permits issued by the district, as of the last day of the preceding fiscal year.

Controlling and preventing waste of groundwater – TWC §36.1071(a)(2) and 31 TAC 356.52(a)(1)(B)

Objective: Develop and maintain a program for inspecting at least twelve (12) water wells within the district during the fiscal year.

Performance Standard: The district will summarize within the annual report the number of wells inspected during the preceding fiscal year and those wells requiring corrective action.

Controlling and preventing subsidence – TWC §36.1071(a)(3) and 31 TAC 356.52(a)(1)(C)

This category of management goal is not applicable to the district at this time because no significant subsidence is occurring in Calhoun County. The district will monitor geological conditions for evidence of subsidence, particularly in high groundwater production areas near the coast and take appropriate action should significant subsidence develop.

The district reviewed the technical report titled *Final Report: Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with Regard to Groundwater Pumping; TWDB Contract Number 1648302062*. The report, in Section 4.2.4, characterizes all portions of Calhoun County as medium or higher risk of subsidence.

Addressing conjunctive surface water management issues – TWC §36.1071(a)(4) and 31 TAC 356.52(a)(1)(D)

Objective: Participate in the regional water planning process by attending and participating in at least one (1) South Central Texas Regional Water Planning Group (Region L) meeting held during the fiscal year.

Performance Standard: The district will summarize within the annual report the dates of meetings of the South Central Texas Regional Water Planning Group attended by representatives of the district during the preceding fiscal year.

Addressing natural resource issues which impact the use and availability of groundwater, and which are impacted by the use of groundwater – TWC §36.1071(a)(5) and 31 TAC §356.52(a)(1)(E)

Objective: Develop and maintain a program to monitor the water quality of at least twelve (12) water wells within the district per year.

Performance Standard: The district will summarize within the annual report 1) the number of wells monitored and 2) the water quality measurements collected during the preceding fiscal year.

Addressing drought conditions – TWC §36.1071(a)(6) and 31 TAC 356.52(a)(1)(F)

Objective: Review drought condition information related to the district and the surrounding region of Texas collected from the following website at least four meetings of the Board of Directors during the fiscal year: <https://www.waterdatafortexas.org/drought/> .

Performance Standard: The district will summarize within the annual report the number of instances drought condition information was considered by the Board of Directors during the preceding fiscal year.

Addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective – TWC §36.1071(a)(7) and 31 TAC 356.52(a)(1)(G)

Objective: Promote conservation, rainwater harvesting, or brush control within Calhoun County at least once during the fiscal year.

Performance Standard: The district will summarize within the annual report the number of instances the district promoted conservation, rainwater harvesting, or brush control during the preceding fiscal year.

Addressing recharge enhancement and precipitation enhancement are deemed to be neither appropriate nor cost-effective activities for the district. The costs of operating a recharge enhancement or precipitation enhancement program are prohibitive and would require the district to increase taxes. Therefore, these goals are not considered applicable to the district at this time.

Addressing the desired future conditions adopted by the district under Section 36.108 – TWC §36.1071(a)(8) and 31 TAC 356.52(a)(1)(H)

Objective: Develop and maintain a program to monitor the water level of at least twelve (12) water wells within the district per year.

Performance Standard: The district will summarize within the annual report 1) the number of wells monitored and 2) the water level

measurements collected during the preceding fiscal year.

Objective: Analyze aquifer monitoring information to evaluate achievement of the desired future conditions of the district based on information available during the fiscal year.

Performance Standard: The district will summarize within the annual report 1) the aquifer monitoring information and 2) the conclusions regarding the achievement of the desired future conditions of the district during the preceding fiscal year.

List of Appendices

- Appendix A.** Estimated Historical Groundwater Use and 2022 State Water Plan Datasets: Calhoun County Groundwater Conservation District
- Appendix B.** Groundwater Availability Model Run provided by Texas Water Development Board - GAM RUN 22-004: CALHOUN COUNTY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN
- Appendix C.** Modeled Available Groundwater GAM Run 21-020 MAG
- Appendix D.** Public Notices Regarding Hearings Related to Plan Adoption
- Appendix E.** Letters Coordinating with Regional Surface Water Management Entities
- Appendix F.** Calhoun County Groundwater Conservation District Board of Director Resolution Adopting Management Plan
- Appendix G.** Minutes of Calhoun County Groundwater Conservation District Board of Director Meeting related to the public hearings for and adoption of the Management Plan
- Appendix H.** Calhoun County Groundwater Conservation District Contact Information

Appendix A. Estimated Historical Groundwater Use and 2022 State Water Plan
Datasets: Calhoun County Groundwater Conservation District

Estimated Historical Groundwater Use And 2022 State Water Plan Datasets: Calhoun County Groundwater Conservation District

Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
January 10, 2022

GROUNDWATER MANAGEMENT PLAN DATA:

This package of water data reports (part 1 of a 2-part package of information) is being provided to groundwater conservation districts to help them meet the requirements for approval of their five-year groundwater management plan. Each report in the package addresses a specific numbered requirement in the Texas Water Development Board's groundwater management plan checklist. The checklist can be viewed and downloaded from this web address:

<https://www.twdb.texas.gov/groundwater/docs/GCD/GMPChecklist0113.pdf>

The five reports included in this part are:

1. Estimated Historical Groundwater Use (checklist item 2)
from the TWDB Historical Water Use Survey (WUS)
2. Projected Surface Water Supplies (checklist item 6)
3. Projected Water Demands (checklist item 7)
4. Projected Water Supply Needs (checklist item 8)
5. Projected Water Management Strategies (checklist item 9)
from the 2022 Texas State Water Plan (SWP)

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

DISCLAIMER:

The data presented in this report represents the most up-to-date WUS and 2022 SWP data available as of 1/10/2022. Although it does not happen frequently, either of these datasets are subject to change pending the availability of more accurate WUS data or an amendment to the 2022 SWP. District personnel must review these datasets and correct any discrepancies in order to ensure approval of their groundwater management plan.

The WUS dataset can be verified at this web address:

<https://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/>

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

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317).

Estimated Historical Water Use

TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2020. TWDB staff anticipates the calculation and posting of these estimates at a later date.

CALHOUN COUNTY

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	355	328	0	15	392	194	1,284
	SW	2,147	39,803	0	0	4,552	83	46,585
2018	GW	297	332	0	37	416	194	1,276
	SW	2,210	38,507	0	0	4,381	83	45,181
2017	GW	243	485	0	0	298	185	1,211
	SW	2,051	37,442	0	0	585	79	40,157
2016	GW	373	467	0	0	314	192	1,346
	SW	2,162	34,387	0	0	11,113	82	47,744
2015	GW	568	1,440	0	0	355	189	2,552
	SW	2,474	33,579	0	0	3,000	81	39,134
2014	GW	799	1,170	0	0	643	187	2,799
	SW	2,099	36,487	0	0	15,500	79	54,165
2013	GW	901	1,406	0	0	23	191	2,521
	SW	2,092	34,643	0	0	15,225	82	52,042
2012	GW	918	1,575	0	0	0	198	2,691
	SW	2,137	35,237	0	0	20,000	84	57,458
2011	GW	1,075	1,487	0	0	345	221	3,128
	SW	2,550	34,648	0	0	17,000	94	54,292
2010	GW	980	908	23	0	0	222	2,133
	SW	2,319	31,623	14	0	10,459	94	44,509
2009	GW	356	997	12	0	0	252	1,617
	SW	2,505	37,131	8	0	14,900	108	54,652
2008	GW	248	1,111	2	0	0	240	1,601
	SW	2,451	37,389	1	0	14,015	103	53,959
2007	GW	305	1	1,280	0	1,270	229	3,085
	SW	2,350	36,261	910	0	11,000	98	50,619
2006	GW	322	1	1,110	0	0	229	1,662
	SW	2,118	35,802	246	0	15,812	98	54,076
2005	GW	310	2	1,290	0	0	253	1,855
	SW	2,073	39,994	885	0	19,805	109	62,866
2004	GW	326	2	1,249	27	0	195	1,799
	SW	2,028	37,212	1,165	0	15,509	169	56,083

Projected Surface Water Supplies

TWDB 2022 State Water Plan Data

CALHOUN COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
L	GUADALUPE-BLANCO RIVER AUTHORITY	LAVACA-GUADALUPE	CANYON LAKE/RESERVOIR	64	68	72	76	82	88
L	GUADALUPE-BLANCO RIVER AUTHORITY	LAVACA-GUADALUPE	GUADALUPE RUN-OF-RIVER	174	184	194	208	224	240
L	LIVESTOCK, CALHOUN	LAVACA-GUADALUPE	LAVACA-GUADALUPE LIVESTOCK LOCAL SUPPLY	92	92	92	92	92	92
L	LIVESTOCK, CALHOUN	SAN ANTONIO-NUECES	SAN ANTONIO-NUECES LIVESTOCK LOCAL SUPPLY	16	16	16	16	16	16
L	MANUFACTURING, CALHOUN	COLORADO-LAVACA	GUADALUPE RUN-OF-RIVER	17,055	17,046	17,038	17,027	17,013	17,000
L	MANUFACTURING, CALHOUN	COLORADO-LAVACA	TEXANA LAKE/RESERVOIR	18,874	18,874	18,874	18,874	18,874	18,874
L	MANUFACTURING, CALHOUN	LAVACA-GUADALUPE	CANYON LAKE/RESERVOIR	1,534	1,534	1,534	1,534	1,534	1,534
L	MANUFACTURING, CALHOUN	LAVACA-GUADALUPE	GUADALUPE RUN-OF-RIVER	10,776	10,771	10,765	10,758	10,750	10,741
L	MANUFACTURING, CALHOUN	LAVACA-GUADALUPE	TEXANA LAKE/RESERVOIR	11,926	11,926	11,926	11,926	11,926	11,926
L	POINT COMFORT	COLORADO-LAVACA	TEXANA LAKE/RESERVOIR	178	178	178	178	178	178
L	PORT LAVACA	LAVACA-GUADALUPE	GUADALUPE RUN-OF-RIVER	4,480	4,480	4,480	4,480	4,480	4,480
L	PORT OCONNOR MUD	LAVACA-GUADALUPE	GUADALUPE RUN-OF-RIVER	1,120	1,120	1,120	1,120	1,120	1,120
Sum of Projected Surface Water Supplies (acre-feet)				66,289	66,289	66,289	66,289	66,289	66,289

Projected Water Demands

TWDB 2022 State Water Plan Data

Please note that the demand numbers presented here include the plumbing code savings found in the Regional and State Water Plans.

CALHOUN COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
L	COUNTY-OTHER, CALHOUN	COLORADO-LAVACA	48	52	57	61	66	71
L	COUNTY-OTHER, CALHOUN	LAVACA-GUADALUPE	310	333	365	398	429	459
L	COUNTY-OTHER, CALHOUN	SAN ANTONIO-NUECES	5	5	6	6	6	7
L	GUADALUPE-BLANCO RIVER AUTHORITY	LAVACA-GUADALUPE	238	252	266	284	306	328
L	IRRIGATION, CALHOUN	COLORADO-LAVACA	760	760	760	760	760	760
L	IRRIGATION, CALHOUN	LAVACA-GUADALUPE	15,079	15,079	15,079	15,079	15,079	15,079
L	LIVESTOCK, CALHOUN	COLORADO-LAVACA	56	56	56	56	56	56
L	LIVESTOCK, CALHOUN	GUADALUPE	2	2	2	2	2	2
L	LIVESTOCK, CALHOUN	LAVACA-GUADALUPE	219	219	219	219	219	219
L	LIVESTOCK, CALHOUN	SAN ANTONIO-NUECES	13	13	13	13	13	13
L	MANUFACTURING, CALHOUN	COLORADO-LAVACA	28,268	32,159	32,159	32,159	32,159	32,159
L	MANUFACTURING, CALHOUN	LAVACA-GUADALUPE	17,862	20,320	20,320	20,320	20,320	20,320
L	MINING, CALHOUN	COLORADO-LAVACA	26	27	21	15	9	6
L	MINING, CALHOUN	LAVACA-GUADALUPE	26	28	20	15	10	6
L	POINT COMFORT	COLORADO-LAVACA	87	92	98	106	115	123
L	PORT LAVACA	LAVACA-GUADALUPE	1,986	2,144	2,306	2,482	2,678	2,871
L	PORT OCONNOR MUD	LAVACA-GUADALUPE	110	116	123	131	141	151
L	SEADRIFT	LAVACA-GUADALUPE	256	277	299	323	349	374
Sum of Projected Water Demands (acre-feet)			65,351	71,934	72,169	72,429	72,717	73,004

Projected Water Supply Needs

TWDB 2022 State Water Plan Data

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

CALHOUN COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
L	COUNTY-OTHER, CALHOUN	COLORADO-LAVACA	105	101	72	35	87	82
L	COUNTY-OTHER, CALHOUN	LAVACA-GUADALUPE	32	9	0	0	-87	-117
L	COUNTY-OTHER, CALHOUN	SAN ANTONIO-NUECES	0	0	0	0	-1	-2
L	GUADALUPE-BLANCO RIVER AUTHORITY	LAVACA-GUADALUPE	0	0	0	0	0	0
L	IRRIGATION, CALHOUN	COLORADO-LAVACA	-60	-60	-60	-60	-60	-60
L	IRRIGATION, CALHOUN	LAVACA-GUADALUPE	-14,028	-14,028	-14,028	-14,028	-14,028	-14,028
L	LIVESTOCK, CALHOUN	COLORADO-LAVACA	66	66	66	66	66	66
L	LIVESTOCK, CALHOUN	GUADALUPE	0	0	0	0	0	0
L	LIVESTOCK, CALHOUN	LAVACA-GUADALUPE	41	41	41	41	41	41
L	LIVESTOCK, CALHOUN	SAN ANTONIO-NUECES	3	3	3	3	3	3
L	MANUFACTURING, CALHOUN	COLORADO-LAVACA	7,861	3,961	3,953	3,942	3,928	3,915
L	MANUFACTURING, CALHOUN	LAVACA-GUADALUPE	6,374	3,911	3,905	3,898	3,890	3,881
L	MINING, CALHOUN	COLORADO-LAVACA	0	0	0	0	2	0
L	MINING, CALHOUN	LAVACA-GUADALUPE	0	0	0	0	0	0
L	POINT COMFORT	COLORADO-LAVACA	91	86	80	72	63	55
L	PORT LAVACA	LAVACA-GUADALUPE	2,494	2,336	2,174	1,998	1,802	1,609
L	PORT OCONNOR MUD	LAVACA-GUADALUPE	1,120	1,120	1,120	1,120	1,120	1,120
L	SEADRIFT	LAVACA-GUADALUPE	0	0	0	0	0	0
Sum of Projected Water Supply Needs (acre-feet)			-14,088	-14,088	-14,088	-14,088	-14,176	-14,207

Projected Water Management Strategies

TWDB 2022 State Water Plan Data

CALHOUN COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, CALHOUN, COLORADO-LAVACA (L)							
LOCAL GULF COAST AQUIFER DEVELOPMENT	GULF COAST AQUIFER SYSTEM [CALHOUN]	0	0	0	0	54	54
		0	0	0	0	54	54
COUNTY-OTHER, CALHOUN, LAVACA-GUADALUPE (L)							
LOCAL GULF COAST AQUIFER DEVELOPMENT	GULF COAST AQUIFER SYSTEM [CALHOUN]	0	0	0	0	357	356
		0	0	0	0	357	356
COUNTY-OTHER, CALHOUN, SAN ANTONIO-NUECES (L)							
LOCAL GULF COAST AQUIFER DEVELOPMENT	GULF COAST AQUIFER SYSTEM [CALHOUN]	0	0	0	0	1	2
		0	0	0	0	1	2
GUADALUPE-BLANCO RIVER AUTHORITY, LAVACA-GUADALUPE (L)							
FE - GBRA WESTERN CANYON EXPANSION	CANYON LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	1,266	1,148
FE - HAYS COUNTY PIPELINE PROJECT	CANYON LAKE/RESERVOIR [RESERVOIR]	0	1,601	3,743	3,189	0	0
GBRA - MBWSP - SURFACE WATER W/ ASR	CARRIZO-WILCOX AQUIFER ASR [GONZALES]	0	13,631	13,236	12,805	10,806	6,287
GBRA LOWER BASIN STORAGE PROJECT	GBRA LOWER BASIN OFF-CHANNEL LAKE/RESERVOIR [RESERVOIR]	43,158	43,254	43,109	43,124	43,063	43,010
		43,158	58,486	60,088	59,118	55,135	50,445
SEADRIFT, LAVACA-GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION	DEMAND REDUCTION [CALHOUN]	6	13	15	21	31	41
		6	13	15	21	31	41
Sum of Projected Water Management Strategies (acre-feet)		43,164	58,499	60,103	59,139	55,578	50,898

Appendix B. Groundwater Availability Model Run provided by Texas Water Development Board - GAM RUN 22-004: CALHOUN COUNTY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

GAM RUN 22-004: CALHOUN COUNTY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

Shirley Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
(512) 936-0883
February 1, 2022



Shirley C. Wade
2/1/22

This page is intentionally blank

GAM RUN 22-004: CALHOUN COUNTY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

Shirley Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Department
(512) 936-0883
February 1, 2022

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h) (Texas Water Code, 2011), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board (TWDB) in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator.

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

1. the annual amount of recharge from precipitation, if any, to the groundwater resources within the district;
2. for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface-water bodies, including lakes, streams, and rivers; and
3. the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The groundwater management plan for the Calhoun County Groundwater Conservation District should be adopted by the district on or before April 19, 2022 and submitted to the executive administrator of the TWDB on or before May 19, 2022. The current management plan for the Calhoun County Groundwater Conservation District expires on July 18, 2022.

We used the groundwater availability model for the central portion of the Gulf Coast Aquifer System version 1.01 (Chowdhury and others, 2004) to estimate the management plan information for the Gulf Coast Aquifer System within the Calhoun County Groundwater Conservation District. An updated groundwater availability model for the central portion of the Gulf Coast Aquifer System is currently under development and is expected to be completed in late 2022. Calhoun County Groundwater Conservation District can request a new GAM Run report to update their management plan information when the model is available.

This report replaces the results of GAM Run 15-010 (Bagans and Wade, 2015). Values may differ from the previous report resulting from routine updates to the spatial grid file used to define county, groundwater conservation district, and aquifer boundaries, which can impact the calculated water budget values. Additionally, the approach used for analyzing model results is reviewed during each update and may have been refined to better delineate groundwater flows. This report also includes a new figure not included in the previous report to help groundwater conservation districts better visualize water budget components. Table 1 summarizes the groundwater availability model data required by statute and Figure 1 shows the area of the model from which the values in Table 1 were extracted. Figure 2 provides a generalized diagram of the groundwater flow components provided in Table 1. If, after review of the figures, the Calhoun County Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the groundwater availability model mentioned above was used to estimate information for the Calhoun County Groundwater Conservation District management plan. Water budgets were extracted for the historical model period for the Gulf Coast Aquifer System (1981-1999) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The average annual water budget values for recharge, surface-water outflow, inflow to the district, outflow from the district, and the flow between aquifers within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Gulf Coast Aquifer System

- We used version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer for this analysis. See Chowdhury and others (2004) and Waterstone and others (2003) for assumptions and limitations of the groundwater availability model.
- The model for the central portion of the Gulf Coast Aquifer assumes partially penetrating wells in the Evangeline Aquifer due to a lack of data for aquifer properties in the deeper section of the aquifer located closer to the Gulf of Mexico.
- This groundwater availability model includes four layers, which generally represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the Jasper Aquifer including parts of the Catahoula Formation (Layer 4).
- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the Gulf Coast Aquifer System located within the Calhoun County Groundwater Conservation District and averaged over the historical calibration periods, as shown in Table 1.

1. Precipitation recharge—the areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.
2. Surface-water outflow—the total water discharging from the aquifer (outflow) to surface-water features such as streams, reservoirs, and springs.
3. Flow into and out of district—the lateral flow within the aquifer between the district and adjacent counties.
4. Flow between aquifers—the net vertical flow between the aquifer and adjacent aquifers or confining units. This flow is controlled by the relative

water levels in each aquifer and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

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

TABLE 1: SUMMARIZED INFORMATION FOR THE GULF COAST AQUIFER SYSTEM THAT IS NEEDED FOR THE CALHOUN COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	2,573
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers.	Gulf Coast Aquifer System	13,511 ¹
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	11,133
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	4,909
Estimated net annual volume of flow between each aquifer in the district	Flow between the Gulf Coast Aquifer System and Underlying Units	Not Applicable ²

¹ Includes 11,313 acre-feet per year discharge to bays and 2,198 acre-feet per year discharge to springs and streams

² Not applicable because the model also assumes a no flow barrier at the base of the Gulf Coast Aquifer System

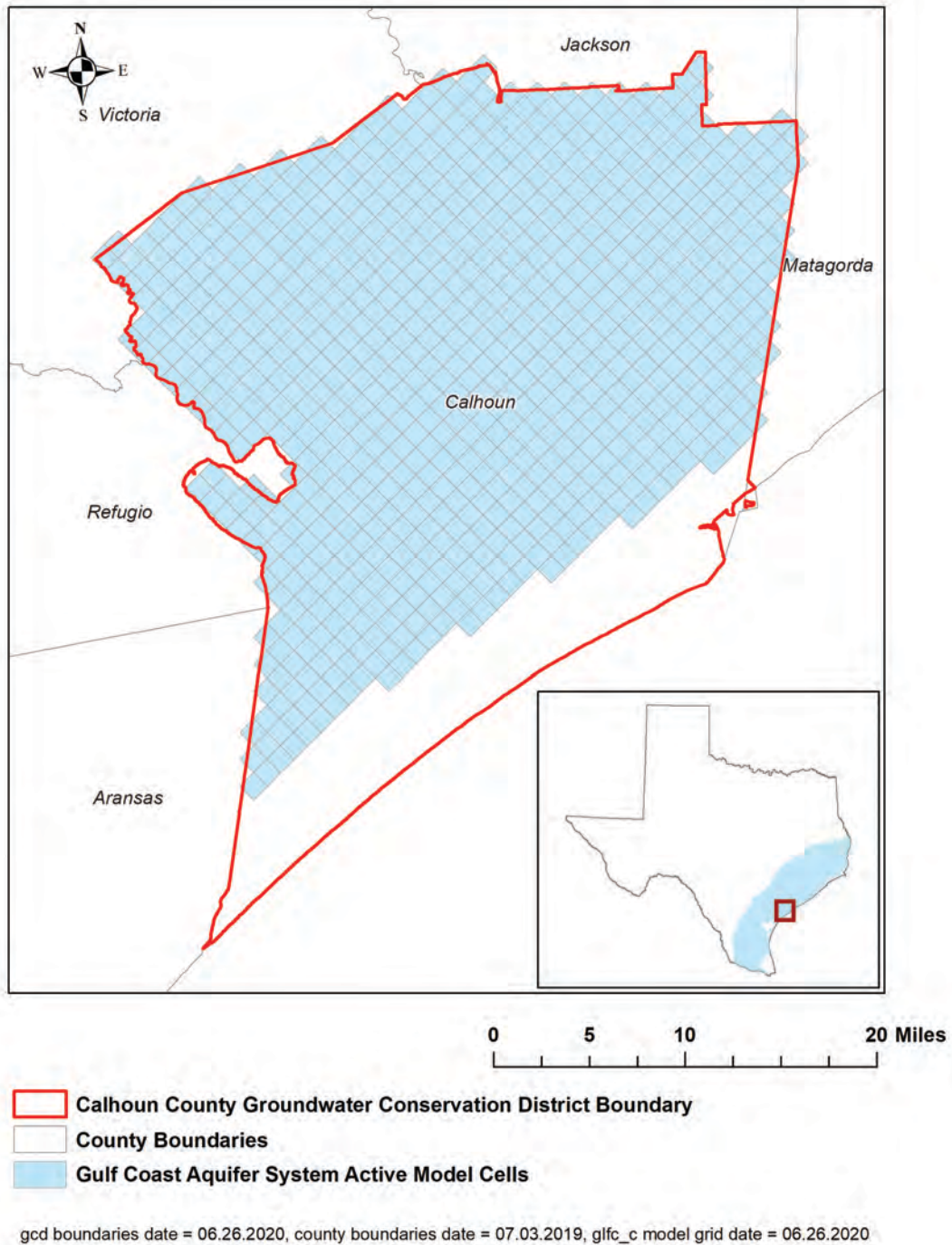
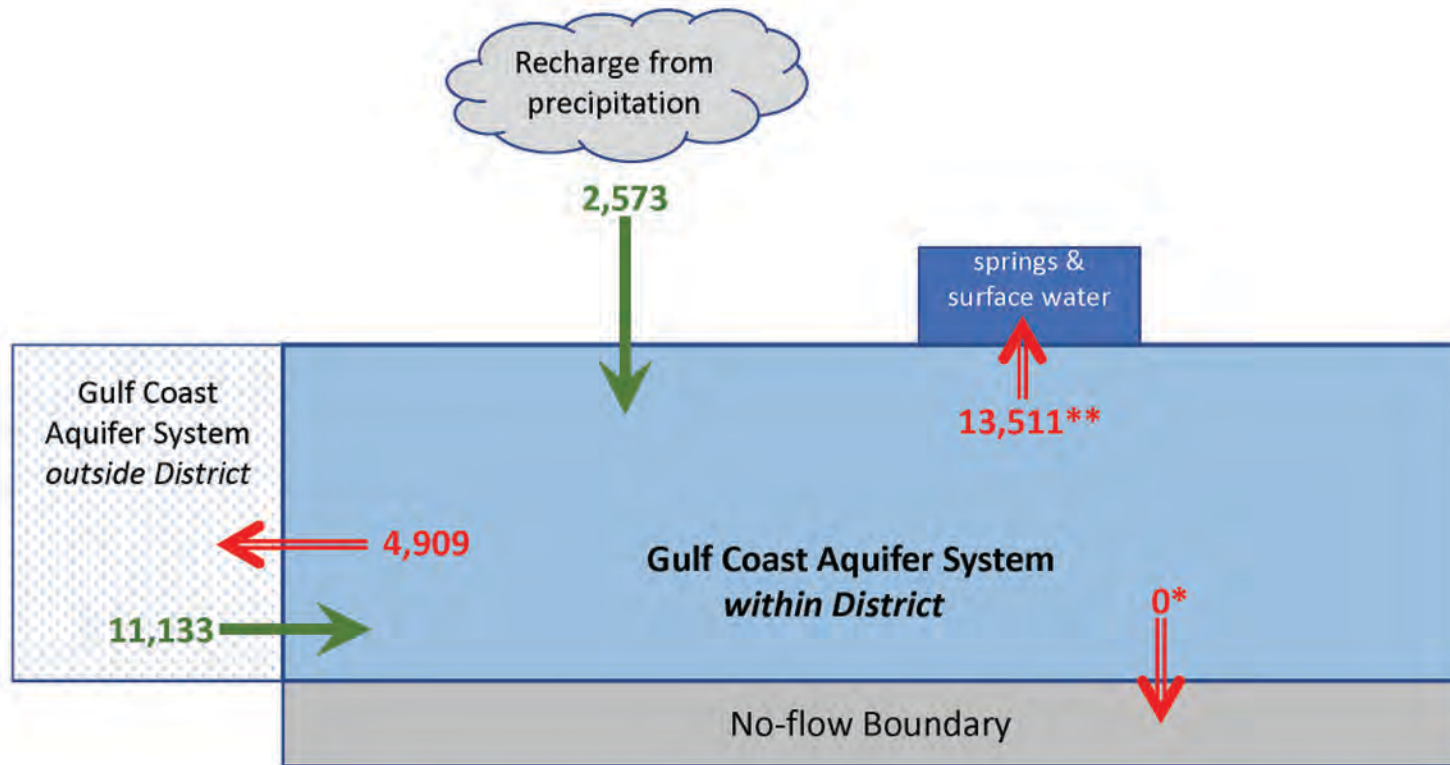


FIGURE 1: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PART OF THE GULF COAST AQUIFER SYSTEM FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE GULF COAST AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).



*The groundwater availability model for the Gulf Coast Aquifer System assumes a no-flow condition at the base.

**Includes 11, 313 acre-feet per year discharge to bays and 2,198 acre-feet per year discharge to springs and streams.

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

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

LIMITATIONS:

The groundwater models used in completing this analysis are the best available scientific tools that can be used to meet the stated objectives. To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

“Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results.”

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historical pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and interaction with streams are specific to particular historic time periods.

Because the application of the groundwater models was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations related to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

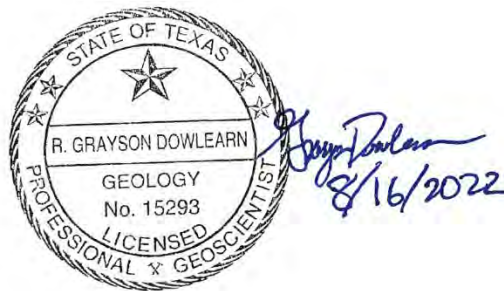
REFERENCES:

- Chowdhury, Ali. 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, 114 p.,
<http://www.twdb.texas.gov/groundwater/models/gam/glfc c/TWDB Recalibration Report.pdf>.
- Harbaugh, A. W., 2009, Zonebudget Version 3.01, A computer program for computing subregional water budgets for MODFLOW ground-water flow models, U.S. Geological Survey Groundwater Software.
- Harbaugh, A. W., and McDonald, M. G., 1996, User's documentation for MODFLOW-96, an update to the U.S. Geological Survey modular finite-difference groundwater-water flow model: U.S. Geological Survey Open-File Report 96-485, 56 p.
- Bagan, R. C. and Wade, S., 2015, GAM Run 15-010: Texas Water Development Board, GAM Run 15-010 Report, 9 p.,
<http://www.twdb.texas.gov/groundwater/docs/GAMruns/GR15-010.pdf>
- National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., http://www.nap.edu/catalog.php?record_id=11972.
- Texas Water Code, 2011, <http://www.statutes.legis.state.tx.us/docs/WA/pdf/WA.36.pdf>
- 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 to the Texas Water Development Board, 157 p.,
<http://www.twdb.texas.gov/groundwater/models/gam/glfc c/Waterstone Conceptual Report.pdf?>

Appendix C. Modeled Available Groundwater GAM Run 21-020 MAG

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



This page is intentionally left blank.

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

EXECUTIVE SUMMARY:

Groundwater Management Area 15 adopted the desired future conditions listed in Table 1 for the Gulf Coast Aquifer System on October 14, 2021. The Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers were declared not relevant by Groundwater Management Area 15 for the purpose of joint planning. Groundwater Management Area 15 submitted model files as part of the Desired Future Conditions Explanatory Report for Groundwater Management Area 15 (Keester and others, 2021), which meet the desired future conditions adopted by the district representatives of Groundwater Management Area 15, to the Texas Water Development Board (TWDB) on December 13, 2021. The TWDB determined that the explanatory report and other materials submitted by the district representatives were administratively complete on April 22, 2022.

The modeled available groundwater values that meet the adopted desired future conditions for the Gulf Coast Aquifer System and its associated aquifers within Groundwater Management Area 15 are summarized by decade from 2020 to 2080 in Table 2 by groundwater conservation district and county. Figure 1 provides the groundwater conservation district and county boundaries within GMA 15. Table 3 provides modeled available groundwater values by decade from 2030 to 2080 summarized by county, regional water planning area, and river basin, for use in the regional water planning process. Figure 2 provides the county, regional water planning area, and river basin boundaries within Groundwater Management Area 15. Modeled available groundwater values fluctuate within Groundwater Management Area 15 over time, ranging from a maximum of 529,006 acre-feet per year in 2030 to a minimum of 522,307 acre-feet per year in 2040. The estimates were extracted from results of a model run using the groundwater availability model for the central portion of the Gulf Coast Aquifer System (Version 1.01; Chowdhury and others, 2004).

August 16, 2022

Page 4 of 21

REQUESTOR:

Mr. Tim Andruss, Chair and Administrator of Groundwater Management Area 15.

DESCRIPTION OF REQUEST:

Mr. Tim Andruss provided the TWDB with the desired future conditions of the Gulf Coast Aquifer System on behalf of Groundwater Management Area (GMA) 15 in a letter dated December 10, 2021. Groundwater conservation district representatives in Groundwater Management Area 15 adopted desired future conditions for the Gulf Coast Aquifer System on October 14, 2021, as described in Resolution No. 2021-01 (Appendix 2 in Keester and others, 2021). The desired future conditions included in Table 1 are average water level drawdowns by county between January 2000 and December 2080 based on the predictive groundwater flow Scenario GMA15_2019_001_v1 (Keester and others, 2021). The predictive simulations were developed from the groundwater availability model for the Gulf Coast Aquifer System (Version 1.01; Chowdhury and others, 2004).

TABLE 1. DESIRED FUTURE CONDITIONS FOR EACH COUNTY WITHIN GROUNDWATER MANAGEMENT AREA 15 EXPRESSED AS AVERAGE DRAWDOWN BETWEEN JANUARY 2000 AND DECEMBER 2080 IN FEET SUBMITTED BY GROUNDWATER MANAGEMENT AREA 15. (ADAPTED FROM SUBMITTED RESOLUTION)

County	Aquifer	Desired future condition
Aransas	Gulf Coast Aquifer System	0
Bee	Gulf Coast Aquifer System	7
Calhoun	Gulf Coast Aquifer System	5
Colorado	Chicot and 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 and Evangeline	11
Refugio	Gulf Coast Aquifer System	5
Victoria	Gulf Coast Aquifer System	5
Wharton	Chicot and Evangeline	15
Groundwater Management Area 15	Gulf Coast Aquifer System	13

After review of the explanatory report and model files, the TWDB was able to confirm that the submitted model files satisfactorily met the desired future conditions and did not require additional clarifications from Groundwater Management Area 15.

METHODS:

The TWDB ran the central portion of the Gulf Coast Aquifer System groundwater availability model (Version 1.01; Chowdhury and others, 2004) using the predictive model files submitted with the explanatory report (Keester and others, 2021) to calculate the drawdown and modeled available groundwater values for the Gulf Coast Aquifer System within Groundwater Management Area 15. The submitted predictive model files included the Scenario GMA15_2019_001_v1 (Keester and others, 2021) pumping file and the GAM Run 10-008 Addendum (Wade, 2010) model files extended to the year 2080. Drawdown was calculated for each county and model layer by first excluding model cells that went dry and model cells that fall outside of the official aquifer footprint, and then summing the drawdown (difference between the water levels from January 2000 [initial heads] to December 2080 [stress period 81]) in the remaining cells of each county and dividing by the number of model cells within that county. Drawdown values were compared to the desired future conditions and were determined to fall within the accepted tolerance for Groundwater Management Area 15.

Modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Annual pumping rates by aquifer are presented from 2020 to 2080 by county and groundwater conservation district, subtotaled by groundwater conservation district, and summed for Groundwater Management Area 15 (Table 2). Annual pumping rates are also presented from 2030 to 2080 by county, river basin, and regional water planning area within Groundwater Management Area 15 for use in regional water planning (Table 3).

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code (2011), “modeled available groundwater” is the estimated average amount of water that may be produced annually to achieve a desired future condition. Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits.

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the modeled available groundwater estimates are described below:

- Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System by Chowdhury and others (2004) was the base model for this analysis. See Chowdhury and others (2004) for assumptions and limitations of the historical calibrated model. Keester and others (2021) constructed a predictive

August 16, 2022

Page 7 of 21

model simulation to extend the base model to 2080 for planning purposes. See Keester and others (2021) for assumptions of the predictive model simulation.

- The model has four layers representing the Chicot aquifer (Layer 1), the Evangeline aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the Jasper aquifer and parts of the Catahoula Formation in direct hydrologic communication with the Jasper aquifer (Layer 4). Figures 3 to 6 show the extent of these active model layers within GMA 15.
- Pumping was not modeled in the Burkeville Confining Unit within Colorado, Matagorda, and Wharton counties and as such, this layer is excluded from the modeled available groundwater calculation in these counties.
- Pumping was not modeled in the Jasper aquifer within Matagorda and Wharton counties and as such this layer is excluded from the modeled available groundwater calculations in these counties.
- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).
- Pumping volumes are reduced to zero if a cell becomes dry during the predictive model run. For this reason, the modeled available groundwater values from the ZONEBUDGET output may not match the pumping values in the input well file.
- Drawdown averages and modeled available groundwater volumes were calculated based on the extent of the official TWDB aquifer boundary. The most recent TWDB model grid file dated June 26, 2020 (glfc_c_grid_poly062620.csv) was used to determine model cell entity assignment (county, groundwater management area, groundwater conservation district, river basin, regional water planning area).
- Drawdowns for cells that became dry during the simulation were excluded from the drawdown averages. Pumping in dry cells was excluded from the modeled available groundwater calculations.
- To be consistent with Groundwater Management Area 15's assumptions (see Keester and others, 2021), a tolerance of three feet was assumed when comparing desired future conditions to modeled drawdown results for all counties except Goliad County. Goliad County was given a tolerance of ± 17 feet for the Chicot aquifer, ± 36 feet for the Evangeline aquifer, ± 14 feet for the Burkeville Confining Unit, and ± 7 feet for the Jasper aquifer. Goliad County Groundwater Conservation District plans to monitor achievement of their desired future conditions within these tolerances because they rely more heavily on their extensive monitoring program rather than modeled results.

August 16, 2022

Page 8 of 21

- Estimates of modeled drawdown and available groundwater from the model simulation were rounded to whole numbers.

RESULTS:

The modeled available groundwater values for the Gulf Coast Aquifer System that achieve the desired future conditions adopted by Groundwater Management Area 15 fluctuate over time, ranging from 529,006 acre-feet per year in 2030 to 522,307 acre-feet per year in 2040. The modeled available groundwater values are summarized by groundwater conservation district and county in Table 2. Table 3 summarizes the modeled available groundwater values by county, river basin, and regional water planning area for use in the regional water planning process.

The Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers were declared not relevant for the purpose of joint planning by Groundwater Management Area 15; therefore, modeled available groundwater values were not calculated for those aquifers.

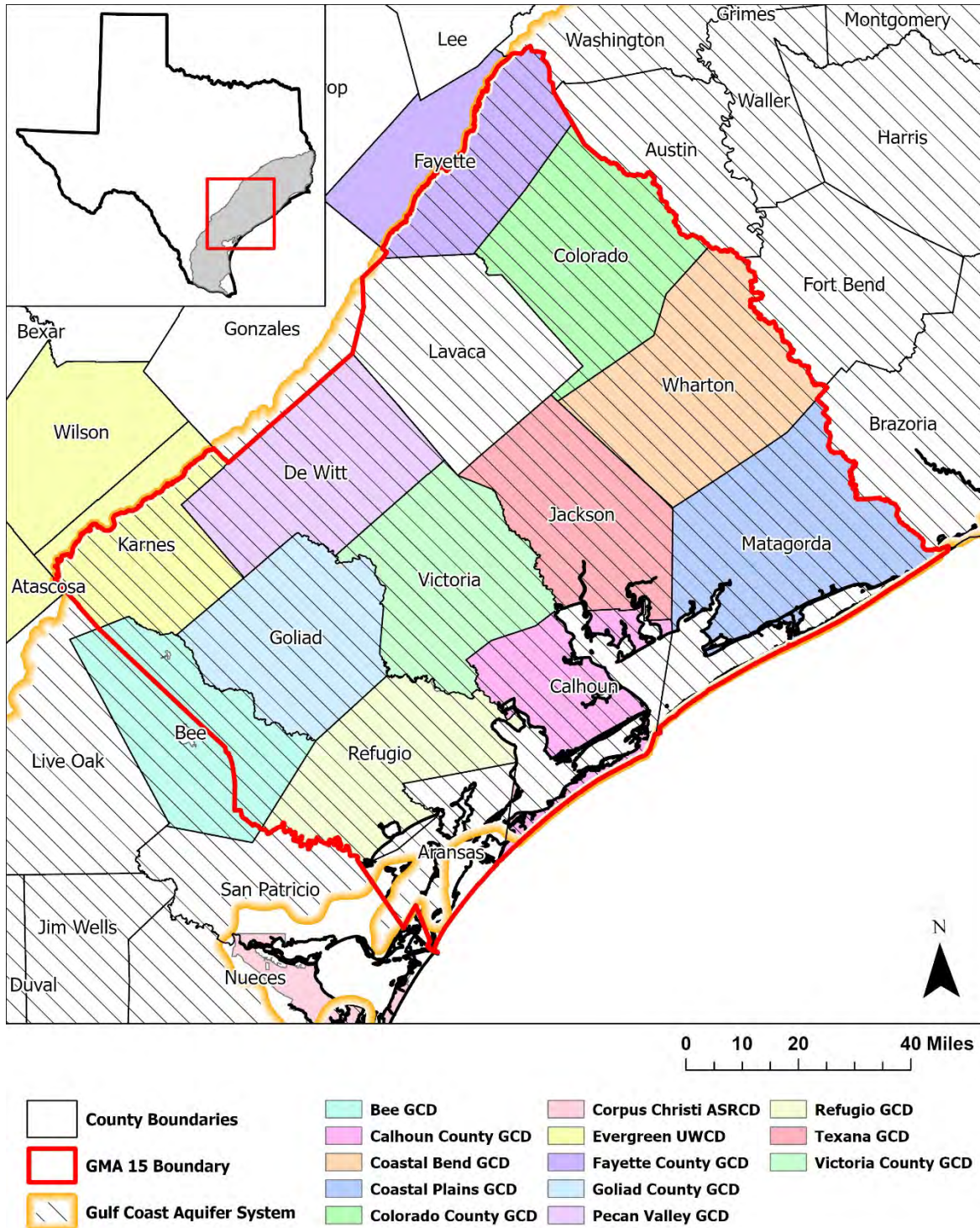


FIGURE 1. MAP SHOWING GROUNDWATER MANAGEMENT AREA (GMA) 15, GROUNDWATER CONSERVATION DISTRICTS (GCD), COUNTIES, AND THE EXTENT OF ACTIVE MODEL CELLS. (UWCD = UNDERGROUND WATER CONSERVATION DISTRICT)

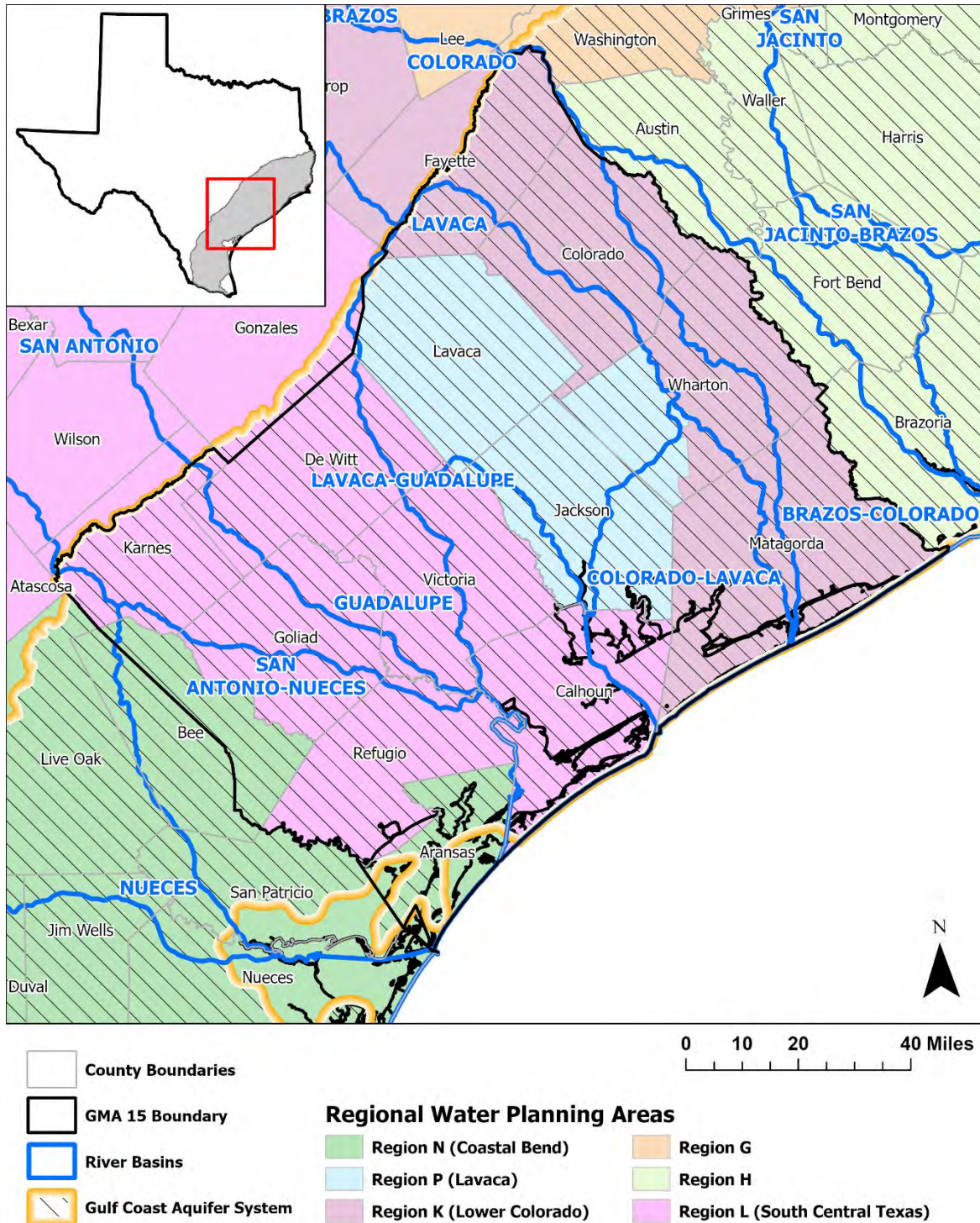


FIGURE 2. MAP SHOWING GROUNDWATER MANAGEMENT AREA (GMA) 15, REGIONAL WATER PLANNING AREAS, RIVER BASINS, COUNTIES, AND EXTENT OF ACTIVE MODEL CELLS.

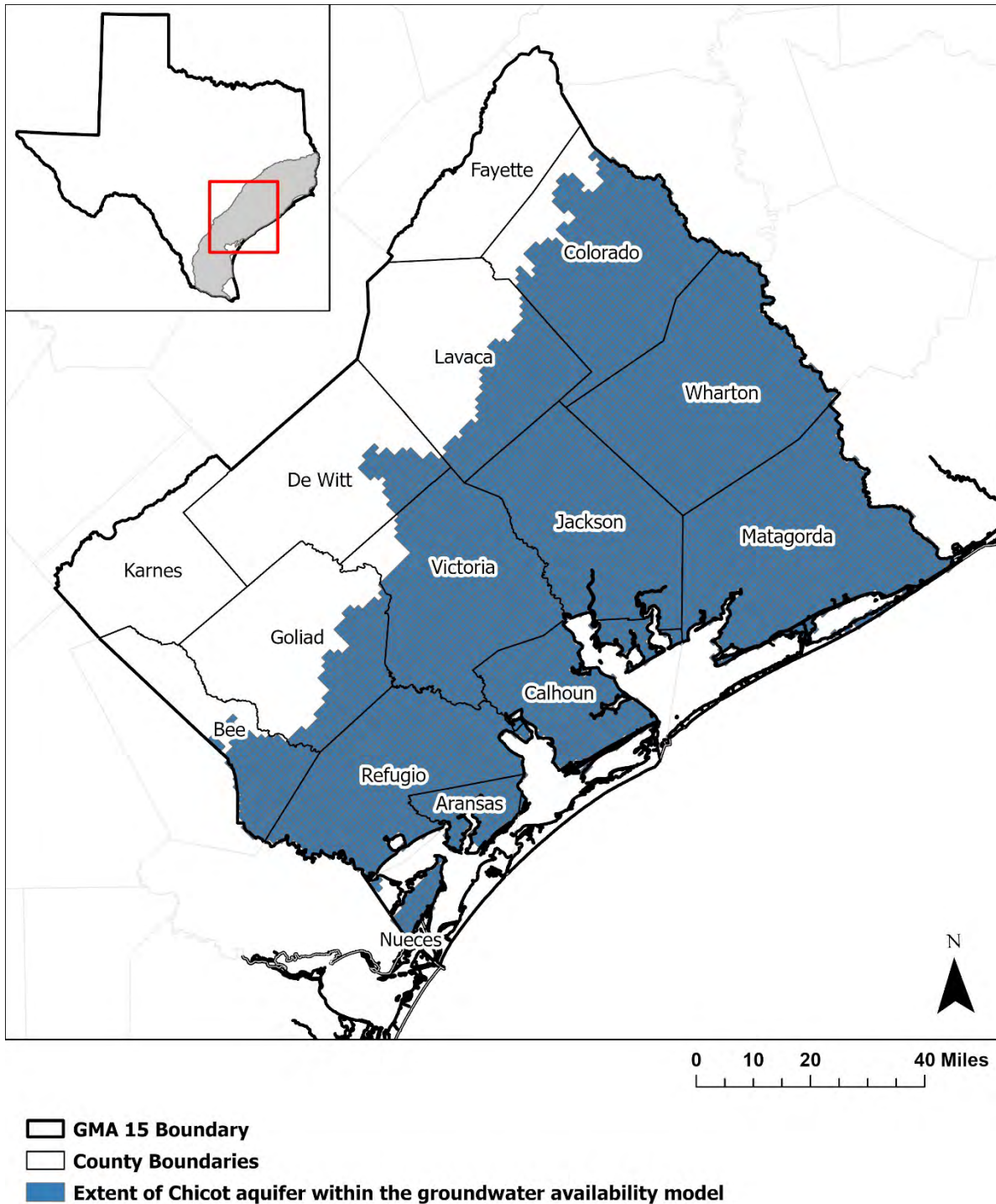


FIGURE 3. MAP SHOWING THE ACTIVE MODEL CELLS WITHIN GROUNDWATER MANAGEMENT AREA (GMA) 15 REPRESENTING THE CHICOT AQUIFER IN LAYER 1 OF THE CENTRAL GULF COAST AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL.

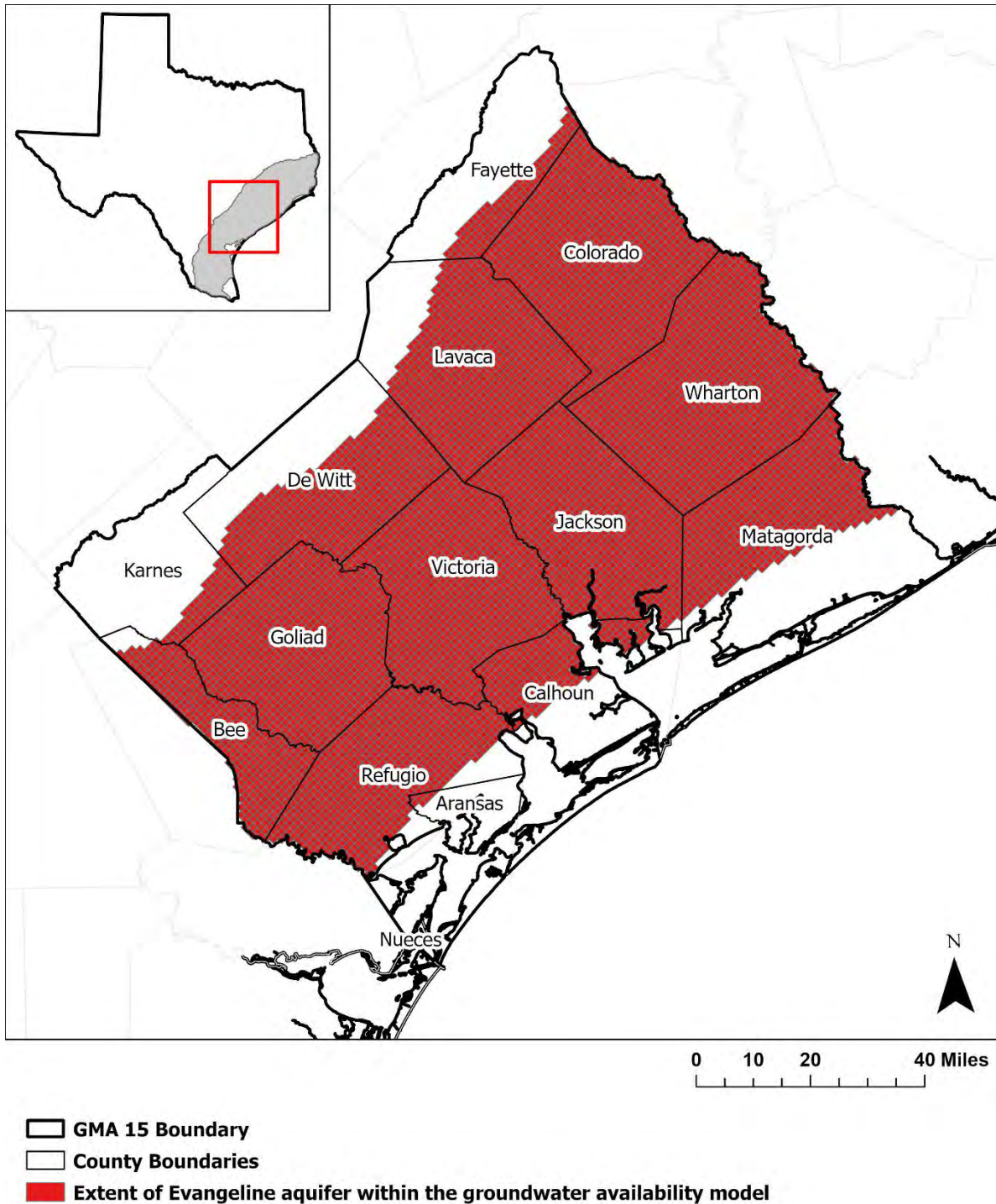


FIGURE 4. MAP SHOWING THE ACTIVE MODEL CELLS WITHIN GROUNDWATER MANAGEMENT AREA (GMA) 15 REPRESENTING THE EVANGELINE AQUIFER IN LAYER 2 OF THE CENTRAL GULF COAST AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL.

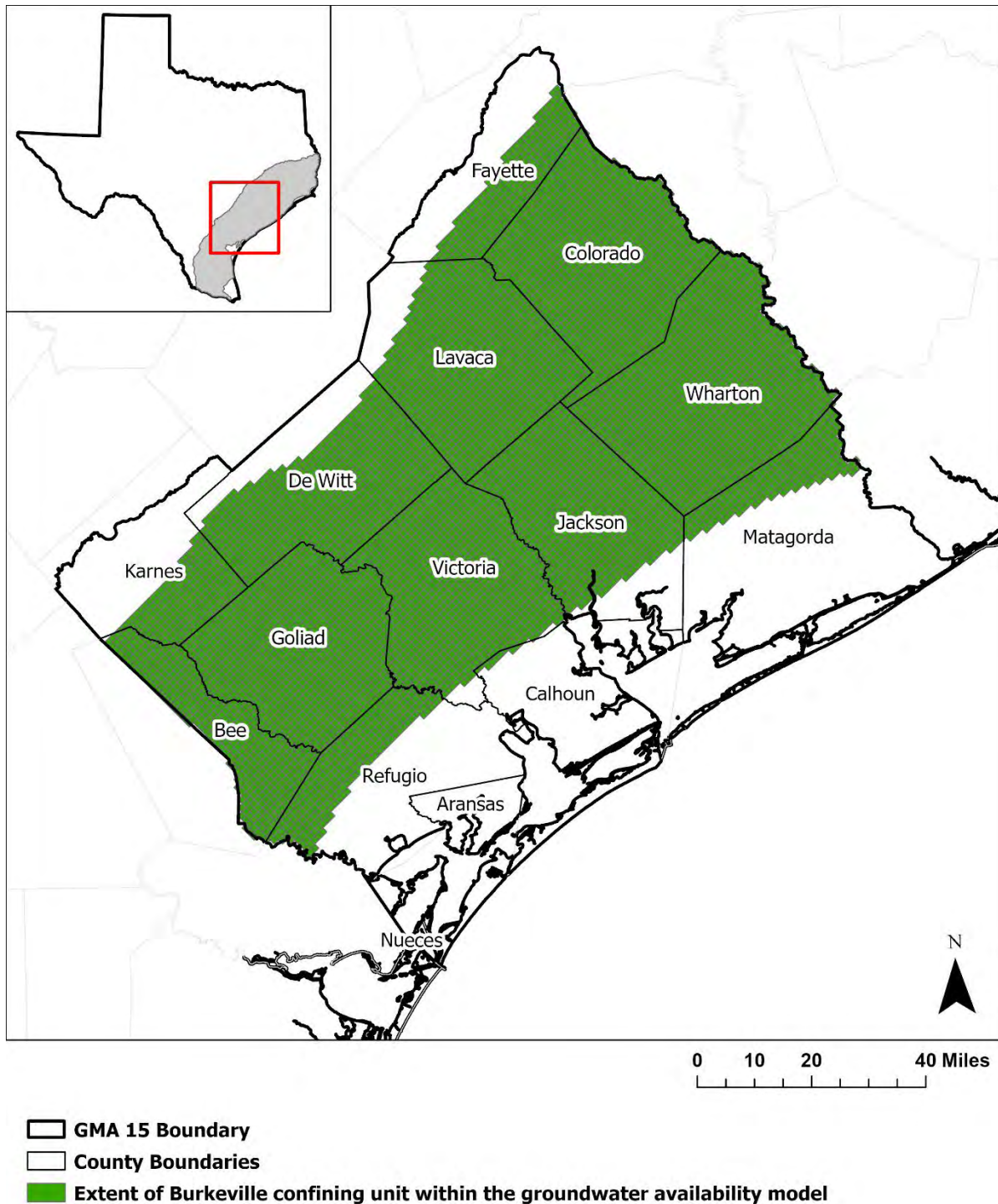


FIGURE 5. MAP SHOWING THE ACTIVE MODEL CELLS WITHIN GROUNDWATER MANAGEMENT AREA (GMA) 15 REPRESENTING THE BURKEVILLE CONFINING UNIT IN LAYER 3 OF THE CENTRAL GULF COAST AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL.

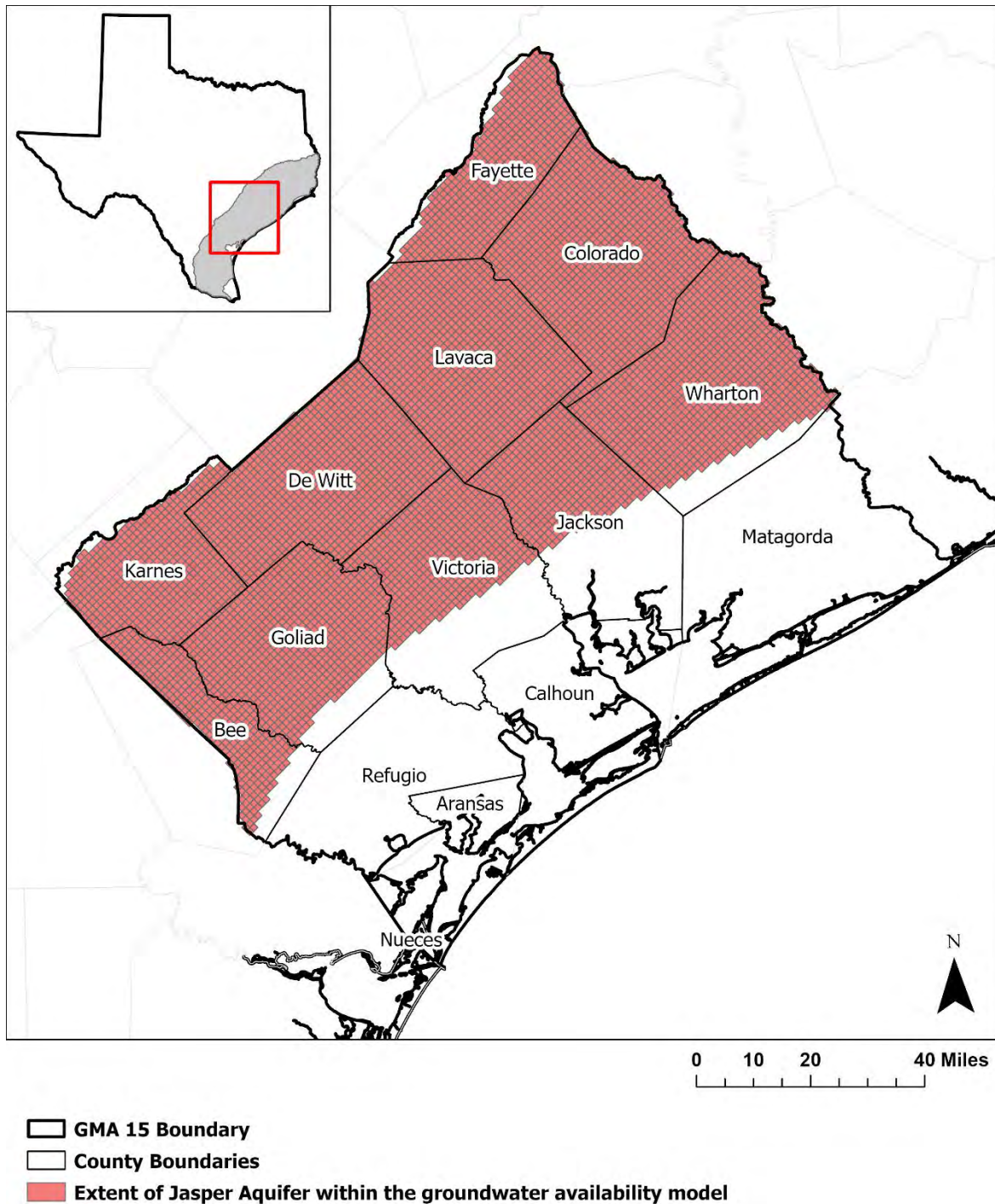


FIGURE 6. MAP SHOWING THE ACTIVE MODEL CELLS WITHIN GROUNDWATER MANAGEMENT AREA (GMA) 15 REPRESENTING THE JASPER AQUIFER AND CATAHOULA FORMATION IN DIRECT HYDROLOGIC CONNECTION WITH THE JASPER AQUIFER IN LAYER 4 OF THE CENTRAL GULF COAST AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL.

TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR. (UWCD = UNDERGROUND WATER CONSERVATION DISTRICT; ND = NO DISTRICT))

Groundwater Conservation District	County	Portion of Gulf Coast Aquifer System	2020	2030	2040	2050	2060	2070	2080
Bee GCD	Bee	Total	8,017	8,018	8,020	8,000	8,002	8,003	7,989
Calhoun County GCD	Calhoun	Total	7,611	7,611	7,611	7,611	7,611	7,611	7,611
Coastal Bend GCD	Wharton	Chicot and Evangeline	181,446	181,446	181,446	181,446	181,446	181,446	181,446
Coastal Plains GCD	Matagorda	Chicot and Evangeline	38,892	38,892	38,892	38,892	38,892	38,892	38,892
Colorado County GCD	Colorado	Chicot and Evangeline	71,665	71,665	71,665	71,665	71,665	71,665	71,665
	Colorado	Jasper	918	918	918	918	918	918	918
Colorado County GCD Total	Colorado	Total	72,583	72,583	72,583	72,583	72,583	72,583	72,583
Evergreen UWCD	Karnes	Total	10,694	10,525	3,404	3,399	3,227	2,952	2,949
Fayette County GCD	Fayette	Total	7,168	7,394	7,683	8,011	8,387	8,660	8,590
Goliad County GCD	Goliad	Chicot	418	421	426	430	432	436	436
	Goliad	Evangeline	4,983	5,044	5,105	5,165	5,225	5,287	5,287
	Goliad	Burkeville	425	451	478	505	532	559	559
	Goliad	Jasper	250	338	427	515	602	690	690
Goliad County GCD Total	Goliad	Total	6,076	6,254	6,436	6,615	6,791	6,972	6,972
Pecan Valley GCD	DeWitt	Total	17,993	17,958	17,912	17,827	17,806	17,784	17,772
Refugio GCD	Refugio	Total	5,858	5,858	5,858	5,858	5,858	5,858	5,858
Texana GCD	Jackson	Total	90,571	90,571	90,571	90,571	90,571	90,571	90,571
Victoria County GCD	Victoria	Total	59,948	59,948	59,948	59,948	59,948	59,948	59,948
Total (GCDs)		Total	506,857	507,058	500,364	500,761	501,122	501,280	501,181

TABLE 2. CONTINUED: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR. (UWCD = UNDERGROUND WATER CONSERVATION DISTRICT; ND = NO DISTRICT))

Groundwater Conservation District	County	Portion of Gulf Coast Aquifer System	2020	2030	2040	2050	2060	2070	2080
ND Aransas	Aransas	Total	1,547	1,547	1,547	1,547	1,547	1,547	1,547
ND Bee	Bee	Total	9	9	9	9	9	9	9
ND Lavaca	Lavaca	Total	20,384	20,384	20,379	20,379	20,372	20,368	20,350
ND Refugio	Refugio	Total	8	8	8	8	8	8	8
No District-County Total		Total	21,948	21,948	21,943	21,943	21,936	21,932	21,914
GMA 15 Total		Total	528,805	529,006	522,307	522,704	523,058	523,212	523,095

TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15. RESULTS ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE FROM 2030 TO 2080. VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Portion of Gulf Coast Aquifer System	2030	2040	2050	2060	2070	2080
Aransas	N	San Antonio-Nueces	Total	1,547	1,547	1,547	1,547	1,547	1,547
Bee	N	Nueces	Total	26	26	26	26	26	26
	N	San Antonio-Nueces	Total	8,001	8,003	7,983	7,985	7,986	7,972
Calhoun	L	Colorado-Lavaca	Total	5,221	5,221	5,221	5,221	5,221	5,221
	L	Guadalupe	Total	18	18	18	18	18	18
	L	Lavaca-Guadalupe	Total	2,365	2,365	2,365	2,365	2,365	2,365
	L	San Antonio-Nueces	Total	7	7	7	7	7	7
Colorado	K	Brazos-Colorado	Chicot and Evangeline	15,352	15,352	15,352	15,352	15,352	15,352
	K	Colorado	Chicot and Evangeline	20,079	20,079	20,079	20,079	20,079	20,079
	K	Lavaca	Chicot and Evangeline	36,234	36,234	36,234	36,234	36,234	36,234
	K	Brazos-Colorado	Jasper	49	49	49	49	49	49
	K	Colorado	Jasper	273	273	273	273	273	273
	K	Lavaca	Jasper	596	596	596	596	596	596
DeWitt	L	Guadalupe	Total	14,055	14,042	13,966	13,946	13,927	13,917
	L	Lavaca	Total	2,638	2,626	2,620	2,620	2,620	2,620
	L	Lavaca-Guadalupe	Total	298	298	298	298	298	298
	L	San Antonio	Total	967	946	943	942	939	937
Fayette	K	Brazos	Total	19	21	22	24	26	26
	K	Colorado	Total	4,894	5,041	5,196	5,370	5,406	5,392
	K	Lavaca	Total	2,481	2,621	2,793	2,993	3,228	3,172

TABLE 3. CONTINUED: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15. RESULTS ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE FROM 2030 TO 2080. VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Portion of Gulf Coast Aquifer System	2030	2040	2050	2060	2070	2080
Goliad	L	Guadalupe	Chicot	10	11	11	11	11	11
	L	San Antonio	Chicot	136	137	139	140	141	141
	L	San Antonio-Nueces	Chicot	275	278	280	281	284	284
	L	Guadalupe	Evangeline	2,056	2,081	2,105	2,129	2,155	2,155
	L	San Antonio	Evangeline	2,660	2,692	2,724	2,755	2,788	2,788
	L	San Antonio-Nueces	Evangeline	328	332	336	341	344	344
	L	Guadalupe	Burkeville	0	0	0	0	0	0
	L	San Antonio	Burkeville	451	478	505	532	559	559
	L	San Antonio-Nueces	Burkeville	0	0	0	0	0	0
	L	Guadalupe	Jasper	0	1	1	1	1	1
	L	San Antonio	Jasper	338	426	514	601	689	689
L	San Antonio-Nueces	Jasper	0	0	0	0	0	0	
Jackson	P	Colorado-Lavaca	Total	28,157	28,157	28,157	28,157	28,157	28,157
	P	Lavaca	Total	49,484	49,484	49,484	49,484	49,484	49,484
	P	Lavaca-Guadalupe	Total	12,930	12,930	12,930	12,930	12,930	12,930
Karnes	L	Guadalupe	Total	18	18	18	18	18	18
	L	Nueces	Total	1,059	79	79	79	79	79
	L	San Antonio	Total	9,362	3,221	3,217	3,050	2,781	2,780
	L	San Antonio-Nueces	Total	86	86	85	80	74	72
Lavaca	P	Guadalupe	Total	41	41	41	41	41	41
	P	Lavaca	Total	19,942	19,937	19,937	19,930	19,926	19,908
	P	Lavaca-Guadalupe	Total	401	401	401	401	401	401

TABLE 3. CONTINUED: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15. RESULTS ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE FROM 2030 TO 2080. VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Portion of Gulf Coast Aquifer System	2030	2040	2050	2060	2070	2080
Matagorda	K	Brazos-Colorado	Chicot and Evangeline	15,321	15,321	15,321	15,321	15,321	15,321
	K	Colorado	Chicot and Evangeline	3,219	3,219	3,219	3,219	3,219	3,219
	K	Colorado-Lavaca	Chicot and Evangeline	20,352	20,352	20,352	20,352	20,352	20,352
Refugio	L	San Antonio	Total	329	329	329	329	329	329
	L	San Antonio-Nueces	Total	5,537	5,537	5,537	5,537	5,537	5,537
Victoria	L	Guadalupe	Total	27,611	27,611	27,611	27,611	27,611	27,611
	L	Lavaca	Total	234	234	234	234	234	234
	L	Lavaca-Guadalupe	Total	30,421	30,421	30,421	30,421	30,421	30,421
	L	San Antonio	Total	1,682	1,682	1,682	1,682	1,682	1,682
Wharton	K	Brazos-Colorado	Chicot and Evangeline	50,560	50,560	50,560	50,560	50,560	50,560
	K	Colorado	Chicot and Evangeline	35,934	35,934	35,934	35,934	35,934	35,934
	K	Colorado-Lavaca	Chicot and Evangeline	16,207	16,207	16,207	16,207	16,207	16,207
	K	Lavaca	Chicot and Evangeline	579	579	579	579	579	579
	P	Colorado	Chicot and Evangeline	874	874	874	874	874	874
	P	Colorado-Lavaca	Chicot and Evangeline	14,100	14,100	14,100	14,100	14,100	14,100
	P	Lavaca	Chicot and Evangeline	63,193	63,193	63,193	63,193	63,193	63,193
GMA 15 Total				529,007	522,308	522,705	523,059	523,213	523,096

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objectives. To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

“Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results.”

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and streamflow are specific to a particular historic time period.

Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and groundwater levels in the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

Chowdhury, Ali. 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, 114 p.,

<http://www.twdb.texas.gov/groundwater/models/gam/glfc c/TWDB Recalibration Report.pdf>.

Harbaugh, A. W., 2009, Zonebudget Version 3.01, A computer program for computing sub-regional water budgets for MODFLOW ground-water flow models, U.S. Geological Survey Groundwater Software.

Harbaugh, A. W., and McDonald, M. G., 1996, User's documentation for MODFLOW-96, an update to the U.S. Geological Survey modular finite-difference groundwater-water flow model: U.S. Geological Survey Open-File Report 96-485, 56 p.

Keester, M., Danielson, V., Donnelly, A., 2021, GMA 15 2021 Joint Planning Desired Future Conditions Explanatory Report, 1047 p.

National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., http://www.nap.edu/catalog.php?record_id=11972.

Texas Water Code, 2011, <http://www.statutes.legis.state.tx.us/docs/WA/pdf/WA.36.pdf>.

Wade, S., 2010, GAM Run 10-008 Addendum: Texas Water Development Board, 8 p., <https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR10-08addendum.pdf>

Appendix D. Public Notices Regarding Hearings Related to Plan Adoption

Public Hearing Notice

Pursuant to Chapter 36, Texas Water Code, the Calhoun County Groundwater Conservation District will conduct a public hearing on the Management Plan of the District with proposed revisions at 5:30 PM on April 24, 2023, at 131-A N. Virginia St., Port Lavaca, Texas. The hearing will be conducted to receive comments and suggestions from the public concerning the proposed management plan.

The Management Plan of the District with proposed revisions was developed using the best available data and addresses the following management goals, as applicable: (1) providing the most efficient use of groundwater; (2) controlling and preventing waste of groundwater; (3) controlling and preventing subsidence; (4) addressing conjunctive surface water management issues; (5) addressing natural resource issues; (6) addressing drought conditions; (7) addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective; and (8) addressing the desired future conditions adopted by the district under Section 36.108.

The Management Plan of the District with proposed revisions (1) identifies the performance standards and management objectives under which the district will operate to achieve the management goals ; (2) specifies the actions, procedures, performance, and avoidance that are or may be necessary to effect the plan; (3) includes estimates of (A) modeled available groundwater in the district based on the desired future condition established under Section 36.108; (B) the amount of groundwater being used within the district on an annual basis; (C) the annual amount of recharge from precipitation, if any, to the groundwater resources within the district; (D) for each aquifer, the annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers; (E) the annual volume of flow into and out of the district within each aquifer and between aquifers in the district, if a groundwater availability model is available; (F) the projected surface water supply in the district according to the most recently adopted state water plan; and (G) the projected total demand for water in the district according to the most recently adopted state water plan; and (4) considers the water supply needs and water management strategies included in the adopted state water plan.

A copy of the Management Plan of the District with proposed revisions may be reviewed or copied at the District's office located at 131-A N. Virginia St, Port Lavaca, TX, Calhoun County. The Management Plan of the District with proposed revisions is available on the District's website at www.ccgcd.org. Questions or comments should be directed to Tim Andruss, General Manager at Calhoun County Groundwater Conservation District, 131-A N. Virginia St, Port Lavaca, TX 77979 or admin@ccgcd.org or (361) 482-0357.

AT 8:10 FILED a O'CLOCK a M

APR 10 2023

BY: Anna Goodman ANNA GOODMAN
COUNTY CLERK CALHOUN COUNTY TEXAS
DEPUTY

AT 1:03 FILED P O'CLOCK M

**Calhoun County Groundwater Conservation District
Meeting Notice and Agenda**

APR 10 2023

BY: Anna Goodman CLERK
ANNA GOODMAN
CLERK
has been given in accordance with the Open Meetings Act, Chapter 551, Government Code, Section 551.036.064 of the Texas Water Code that the Calhoun County Groundwater Conservation District Board of Directors will hold a meeting on April 24, 2023, at 5:30 PM at the 131-A N. Virginia St., Port Lavaca, Texas.

AGENDA

1. Call the meeting to order and welcome guests.
2. Receive public comments.
3. Consideration of and possible action on matters related to groundwater management including the efforts and activities of the District regarding permitting, complaints, investigations, violations, and enforcement cases associated with permitting.
 - Permit Hearing – Mr. Harold Green for Port Alto HOA District 1 seeks, under permitting request case PRC-20230315-01, a historic-use production permit protecting the historic production of groundwater from grandfathered well GW-00080 for public water system uses at rates not to exceed 68 gallons per minute or 7.08 acre-feet per year. The subject well is located on a 0.18-acre tract of land near the intersection of Spur 159 and County Rd. 307 in Calhoun County, Texas.
 - Permit Hearing – Mr. Harold Green for Port Alto HOA District 1 seeks, under permitting request case PRC-20230315-02, a historic-use production permit protecting the historic production of groundwater from grandfathered well GW-00081 for public water system uses at rates not to exceed 64 gallons per minute or 1 acre-foot per year. The subject well is located on a 0.18-acre tract of land near the intersection of Spur 159 and County Rd. 307 in Calhoun County, Texas.
 - Permit Hearing – Mr. Jesse Wood for Farmers Transport seeks, under permitting request case PRC-20230315-03, a historic-use production permit protecting the historic production of groundwater from grandfathered well GW-00082 for commercial uses at rates not to exceed 200 gallons per minute or 29.88 acre-feet per year. The subject well is located on a 6.29-acre tract of land near the intersection of County Rd. 306 and Sunidolfin Dr. in Calhoun County, Texas.
4. Consideration of and possible action on matters related to groundwater protection including complaints, investigations, violations, and enforcement cases related to groundwater contamination and waste.
5. Consideration of and possible action on matters related to groundwater monitoring.
6. Consideration of and possible action on matters related to groundwater conservation.
7. Consideration of and possible action on matters related to groundwater resource planning including Groundwater Management Area 15 Joint Planning and regional water planning.
8. Consideration of and possible action on matters related to groundwater policy including the Management Plan of the District, the proposed Management Plan of the District, the Rules of the District, and fee schedule.
 - Hearing on proposed Management Plan of the District.
 - Hearing on petition to amend the rules of the district APAR-20230127-01.
 - Hearing on petition to amend the rules of the district APAR-20230127-02.
 - Hearing on petition to amend the rules of the district APAR-20230127-03.
9. Consideration of and possible action on matters related to meeting management including minutes of previous meetings.
10. Consideration of and possible action on matters related to financial management including the annual budget of the district, bank accounts, investments, financial reports of the district, bills and invoices of the district.
11. Consideration of and possible action on matters related to office administration and management including management goals and objectives of the district, administrative policies,

**Calhoun County Groundwater Conservation District
Meeting Notice and Agenda**

Notice is hereby given in accordance with the Open Meetings Act, Chapter 551, Government Code and Section 36.064 of the Texas Water Code that the Calhoun County Groundwater Conservation District Board of Directors will hold a meeting on April 24, 2023, at 5:30 PM at the 131-A N. Virginia St., Port Lavaca, Texas.

election of officers of the board, staffing, consultant agreements, interlocal cooperation agreements, and support services provided to and from other groundwater conservation districts.

12. Consideration of and possible action on matters related to legal counsel report.
13. Adjourn.

The Calhoun County Groundwater Conservation District may close the meeting, if necessary, to conduct private consultation with legal counsel regarding matters protected by the attorney-client privilege pursuant to Section 551.071 of the Government Code or to discuss matters regarding personnel pursuant to Section 551.074 of the Government Code. The Calhoun County Groundwater Conservation District will return to open meeting, if necessary, to take any action deemed necessary based on discussion in closed meeting pursuant to Section 551.102 of the Government Code.

In Accordance with Title III of the Americans with Disabilities Act, we invite all attendees to advise us of any special accommodations due to disability. Please submit your request as far as possible in advance of event you wish to attend.

Appendix E. Letters Coordinating with Regional Surface Water Management Entities

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | www.calhouncountygcd.org

May 16, 2023

Via Certified Mail: 7021 0350 0000 2790 8192

Guadalupe Blanco River Authority,
933 East Court Street,
Seguin, Texas 78155

RE: Management Plan of the District

To whom it may concern,

On April 24, 2023, the Board of Directors of the Calhoun County Groundwater Conservation District adopted a revised management plan for the district. A copy of the adopted management plan is attached to this letter for your review.

If you have any questions or comments regarding the plan, please contact me at your convenience.

Regards,



Tim Andruss
General Manager

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | www.calhouncountygcd.org

May 16, 2023

Via Certified Mail: 7021 0350 0000 2790 8208

San Antonio River Authority
100 E. Guenther St.
San Antonio, Texas 78204

RE: Management Plan of the District

To whom it may concern,

On April 24, 2023, the Board of Directors of the Calhoun County Groundwater Conservation District adopted a revised management plan for the district. A copy of the adopted management plan is attached to this letter for your review.

If you have any questions or comments regarding the plan, please contact me at your convenience.

Regards,



Tim Andruss
General Manager

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | www.calhouncountygcd.org

May 16, 2023

Via Certified Mail: 7021 0350 0000 2790 8215

South Central Texas Regional Water Planning Group
c/o San Antonio River Authority
P.O. Box 839980
San Antonio, Texas 78283

RE: Management Plan of the District

To whom it may concern,

On April 24, 2023, the Board of Directors of the Calhoun County Groundwater Conservation District adopted a revised management plan for the district. A copy of the adopted management plan is attached to this letter for your review.

If you have any questions or comments regarding the plan, please contact me at your convenience.

Regards,

A handwritten signature in black ink, appearing to read 'Tim Andruss', with a long horizontal flourish extending to the right.

Tim Andruss
General Manager

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | www.calhouncountygcd.org

May 16, 2023

Via Certified Mail: 7021 0350 0000 2790 8222

Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711-3231

RE: Management Plan of the District

To whom it may concern,

On April 24, 2023, the Board of Directors of the Calhoun County Groundwater Conservation District adopted a revised management plan for the district. A copy of the adopted management plan is attached to this letter for your review.

If you have any questions or comments regarding the plan, please contact me at your convenience.

Regards,



Tim Andruss
General Manager

Appendix F. Calhoun County Groundwater Conservation District Board of Director
Resolution Adopting Management Plan

RESOLUTION

Resolution Adopting the Calhoun County Groundwater Conservation
District Management Plan

WHEREAS on April 10, 2023, a Notice of Hearing was posted with the County Clerk of Calhoun County, regarding the public hearing on the Management Plan of the District with proposed revisions; and

WHEREAS on April 8, 2023, a Notice of Hearing was published in the Victoria Advocate, a newspaper paper with general circulation within Calhoun County, regarding the public hearing on the Management Plan of the District with proposed revisions; and

WHEREAS on April 24, 2023, the Victoria County Groundwater Conservation District Board of Directors with a quorum being present, conducted a public hearing regarding the adoption of the Calhoun County Groundwater Conservation District Management Plan; and

WHEREAS, the Calhoun County Groundwater Conservation District Management Plan had been developed in coordination with surface water management entities and other interested parties;


NOW THEREFORE BE IT RESOLVED that the Calhoun County Groundwater Conservation District Management Plan is ADOPTED as described in the Calhoun Groundwater Conservation District Management Plan attached hereto and made part hereof for all purposes and that said management plan shall be submitted to the Executive Administrator of the Texas Water Development Board for review and approval with all necessary documentation.

Adopted by a vote of 5 ayes and 0 nays on this 24th day of April 2023.



President, Calhoun County Groundwater Conservation District

I, the undersigned, do hereby certify that the above resolution was adopted by the Board of Directors of the Calhoun County Groundwater Conservation District on the 24th day of April 2023.



Director, Calhoun Groundwater Conservation District

Appendix G. Minutes of Calhoun County Groundwater Conservation District Board of Director Meeting related to the public hearings for and adoption of the Management Plan

Appendix H. Calhoun County Groundwater Conservation District Contact Information



Groundwater Conservation District Registration Form

Legal Name of District Calhoun County Groundwater Conservation District

Mailing Address PO Box 1395 City Port Lavaca TX Zip Code 77979
(9 Digits)

Physical Address 131 A. North Virginia City Port Lavaca TX Zip Code 77979
(9 Digits)

Phone Number 361-482-0357 Website www.calhouncountygcd.org

District E-mail admin@calhouncountygcd.org

BOARD MEMBERS

TITLE	FULL NAME (First Middle Last)	ADDRESS	BUSINESS PHONE	HOME PHONE	E or A	TERM BEGINS (mm/dd/yyyy)	TERM ENDS (mm/dd/yyyy)
President	Harold May	2886 US Hwy 87, Port Lavaca, TX 77979		361-652-6056	E	11/2022	11/2026
Vice President	Wesley Brett	6608 US Hwy 87, Port Lavaca, TX 77979		361-482-9018	E	11/2022	11/2026
Secretary	Galen Johnson	246 CR 304 W., Port Lavaca, TX 77979		361-920-0330	E	11/2020	11/2024
Treasurer	Michael Hahn	1212 Farik Rd., Port Lavaca, TX 77979		361-920-0889	E	11/2022	11/2026
Director	Steven Dierschke	468 Coloma Rd., Port Lavaca, TX 77979		361-920-3544	E	11/2020	11/2024

All information provided herein is subject to the Public Information Act and will be made available on the [TCEQ Website](#)



Groundwater Conservation District Registration Form

CONSULTANTS and REPRESENTATIVES

POSITION	FULL NAME	FIRM / ORGANIZATION	ADDRESS	BUSINESS PHONE	FAX
General Manager	Tim Andruss	Calhoun County Groundwater Conservation Dis	PO Box 1395, Port Lavaca, TX 77979	361-482-0357	
Attorney	James Allison	Allison, Bass & Magee, LLP	402 W. 12th St., Austin, TX 78701	512-482-0701	

I certify that the information contained herein is correct and complete to the best of my knowledge.

Signature *Caitlynn Davenport*
 Printed Name/Title Caitlynn Davenport / Administrative Coordinator

Date Signed 2/20/23

Individuals are entitled to request and review personal information the TCEQ gathers on its forms. For assistance with this form or to request your personal information and correct any errors, contact us at (512) 239-2789

STATUTORY AND RULE REQUIREMENTS

Texas Water Code statutory requirements can be found at [TWC Chapter 36](#).
Texas Administrative Code Section 293.20 rule requirements can be found at [TAC 293.20](#).

To submit your completed form: Press the SUBMIT button (if using electronic signature); E-mail to GPAT@tceq.texas.gov; Fax to (512) 239-2214; or, Mail to:

Texas Commission on Environmental Quality
Groundwater Planning & Assessment
MC-147, PO Box 13087
Austin, Texas 78711-3087

SUBMIT