Refugio Groundwater Conservation District

Management Plan

Refugio Groundwater Conservation District Board of Directors Management Plan Revision Adoption:	**July 21, 2014**
Texas Water Development Board Administrative Management Plan Revision Approval:	

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DISTRICT MISSION

The mission of the Refugio Groundwater Conservation District (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 Refugio County for the benefit of Refugio County's landowners, citizens, economy, and environment.

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 District rules governing the production and use of the groundwater resources within the District.

PURPOSE OF THE 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 the amount 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 District's jurisdiction and the amount of modeled available groundwater from such aquifers is required by statute to be included in the DISTRICT's management plan and will guide the DISTRICT's regulatory and management policies. 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 1911, 76th Legislature and continued by House Bill 2046, 77th Legislature, and codified as Chapter 8854, Special District and Local Laws Code. The citizens of Refugio County through a confirmation election held on November 6, 2001 ratified the DISTRICT. The boundaries of the District are conterminous with those of Refugio County, Texas. The DISTRICT was formed to protect, conserve, and prevent waste of the groundwater resources beneath the area of Refugio 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 Management Plan, and the District Rules.

Directors

The Refugio Groundwater Conservation District Board of Directors consists of five members. These five directors are elected by the voters of Refugio County and serve a four-year term. The DISTRICT observes the same four precincts as the Refugio County Commissioners' with one at-large position. Director terms 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 management plan, provide for the permitting of certain water wells, and implement programs to achieve statutory requirements. The DISTRICT has rule-making authority to implement its policies and procedures to manage the groundwater resources of Refugio County.

Location and Extent

The boundaries of the DISTRICT are the same as Refugio County. This area encompasses approximately 770 square miles. The District is bounded by Victoria County, Calhoun County, Aransas County, San Patricio County, Bee County, and Goliad County.

GROUNDWATER RESOURCES OF REFUGIO COUNTY

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

Table 1: Geologic Formations in Refugio County (after Baker, 1979, pg 8)

Era	Period	Epoch	Stratigraphic Unit	Hydrogeologic Unit
Cenozoic	Quaternary	Holocene/Pleistocene	Alluvium Beaumont/Lissie	Chicot
		Pliocene	Willis	
	Tertiary	Miocene	Upper Goliad	Evangeline
			Lower Goliad	
			Upper Lagarto	Burkeville Confining Unit
			Lower Lagarto	Jasper
			Oakville	

The Gulf Coast aquifer is conceptualized to comprise of four distinct aquifers: Chicot, Evangeline, Burkeville confining unit and the Jasper aquifer (Baker, 1979). These aquifers are included within the Central Gulf Coast Groundwater Availability Model developed by the Texas Water Development Board (Chowdhury and Mace, 2004). The Chicot and the Evangeline aquifers are used the most within the Refugio Groundwater Conservation District. The Chicot aquifer outcrops across the entire county while the Evangeline formation is under confined conditions.. The thickness of the Chicot aquifer ranges from about 150 feet in the western portion of Refugio County to nearly 1,000 feet in the eastern portion of Refugio County. The thickness of the Evangeline aquifer varies from approximately 1,000 feet in the western portion of Refugio County to over 1,500 feet in the eastern portion of Refugio County. The Chicot 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 aquifer generally deteriorates along the coast.

STATEMENT OF GUIDING PRINCIPLES

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

CRITERIA FOR PLAN APPROVAL

Planning Horizon

The time period for this plan is 10 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 management plan with or without amendments as required by §36.1072(e) of the Texas Water Code.

This 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 Refugio County region for coordination purposes are included in Appendix E.

Refugio Groundwater Conservation District Board of Director Resolution Adopting Management Plan

A copy of the DISTRICT's resolution 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 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 required by the 79th Legislature with the passage of House Bill 1763 into law.

The DISTRICT is located in Groundwater Management Area 15. The groundwater conservation districts of Groundwater Management Area 15 completed the first-round of joint planning process to determine the desired future condition of the aquifers within the groundwater management area.

District representatives of Groundwater Management Area 15 adopted, by resolution, the desired future condition for Gulf Coast Aquifer within Groundwater Management Area 15 on July 14, 2010. The desired future condition is stated as follows:

"An average drawdown of the Gulf Coast Aquifer within the GMA 15 boundary of 12 feet relative to year 1999 starting conditions in accordance with Table 7 of GAM Run 10-008 Addendum."

The Texas Water Development Board reported the modeled available groundwater for Groundwater Management Area 15 based on the desired future condition in GAM Run 10-028 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 5 of the GAM Run 10-028 MAG report is as follows:

Year					
2010	2020	2030	2040	2050	2060
29,328 AFY	29,328 AFY	29,328 AFY	29,328 AFY	29,328 AFY	29,328 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)

Please refer to Appendix A.

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)

Please refer to Appendix B.

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)

Please refer to Appendix B.

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)

Please refer to Appendix B.

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)

Please refer to Appendix A.

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)

Please refer to Appendix A.

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

Please refer to Appendix A.

DETAILS ON THE DISTRICT MANAGEMENT OF GROUNDWATER

The Texas Legislature established that groundwater conservation districts are the preferred method of groundwater management in TWC §36.0015. The DISTRICT will manage the use of groundwater within Refugio 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 Refugio County as practicably as possible as established in the plan. In consideration of the economic and cultural activities occurring within Refugio 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 Refugio 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 DISTRICT's enabling legislation.

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 Section 36.001 of the Texas Water Code.

An observation well network will be established and maintained by the DISTRICT in order to monitor changing water levels and water quality of groundwater supplies within Refugio County. When a monitoring well network has been established, the DISTRICT will make a regular assessment of water supply and groundwater storage conditions, water quality conditions and will report those conditions to the Refugio Groundwater Conservation Board of Directors and to the public. The DISTRICT may undertake, as necessary, investigations of the groundwater resources within Refugio County and will make the results of investigations available to the public. The DISTRICT will co-operate with investigations of the groundwater resources of Refugio 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 Refugio County; or
2. Each geographic area overlying an aquifer or subdivision of an aquifer located in

whole or in part within Refugio County.

For the purpose of managing the use of groundwater within Refugio County, the DISTRICT may define sustainable use as the use of an amount of groundwater in Refugio 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 Refugio 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 Refugio 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 Refugio 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 DISTRICT's management plan; and
3. Are reasonably necessary to protect historic use.

The DISTRICT may adopt rules to regulate groundwater withdrawals by means of spacing and/or 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 DISTRICT enabling Legislation, 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 Refugio 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 DISTRICT's enabling legislation. The exercise of said discretion by the Refugio Groundwater Conservation District Board of Directors shall not be construed as limiting

the power of the Refugio Groundwater Conservation District Board of Directors.

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 guidepost for determining the direction or priority for all DISTRICT 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.

Rules adopted by the DISTRICT for the permitting of wells and the use of groundwater 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 DISTRICT's rules are available at the following website addresses:
www.rgcd.org or www.refugiogcd.org.

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 Refugio Groundwater Conservation Board of Directors regarding the DISTRICT's performance in achieving management goals and objectives for the fiscal year. The report will be presented within 120 days following the completion of the DISTRICT's fiscal year. The DISTRICT will maintain the report on file for public inspection at the District's offices upon adoption at a meeting of the Refugio Groundwater Conservation 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 water well registration program for tracking well information for wells within Refugio County.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the changes related to water well registration including the number of non-grandfathered and grandfathered wells registered.

Objective: Develop and maintain a water well permitting program for processing and tracking all permits authorizing groundwater production.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the changes related to water well permitting including the number of new applications and the disposition of the applications.

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

Objective: Develop and maintain a water well inspection program for non-exempt wells.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the findings of the inspection activities including information regarding the number of wells that require improvement to control or prevent waste of groundwater.

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 has occurred in Refugio 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 subsidence develop.

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 at least one South Central Texas Regional Water Planning Group (Region L) meeting per year.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the representatives of the DISTRICT, dates, and the number of meetings of the South Central Texas Regional Water Planning Group attended.

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 water quality monitoring program.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the monitoring activities including the number of wells monitored and the year-to-year change of water quality.

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

Objective: Collect and review drought condition information related to Refugio County and the surrounding region of Texas.

Performance Standard: Each year, the District will summarize within the annual report the drought condition information collected and reviewed.

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 Refugio County.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the activities directly related to conservation, rainwater harvesting or brush control including participation in scientific investigations and studies, educational materials developed and delivered to local schools, cooperative educational contributions and grants, public speaking events and presentations, community event participation, and educational publications.

Recharge enhancement and precipitation enhancement are deemed to be

not appropriate or cost-effective programs for the DISTRICT at this time because there are no existing recharge enhancement or precipitation enhancement programs operating in nearby counties in which the DISTRICT could participate and share costs. The costs of operating a single-county recharge enhancement or precipitation enhancement program are prohibitive and would require the DISTRICT to increase taxes. Therefore, these goals are not 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 water level monitoring program.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the water level monitoring activities including the number of wells monitored and the year-to-year change of water level.

Objective: Analyze water level monitoring information to evaluate water level trends and determine the degree to which the DISTRICT is complying with the desired future conditions of Gulf Coast Aquifer in Refugio County.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the water level trends and the conclusions regarding the DISTRICT's compliance with the desired future condition of the Gulf Coast Aquifer in Refugio County.

List of Appendices

Appendix A. Estimated Historical Water Use and 2012 State Water Plan Datasets provided by Texas Water Development Board

Appendix B. Groundwater Availability Model Run 13-008 provided by Texas Water Development Board

Appendix C. Groundwater Availability Model Run 10-028 MAG

Appendix D. Public Notices Regarding Hearings Related to Plan Adoption

Appendix E. Letters Coordinating with Regional Surface Water Management Entities

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

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

Appendix H. Refugio Groundwater Conservation District Contact Information

Appendix A. Estimated Historical Water Use and 2012 State Water Plan Datasets provided by Texas Water Development Board

Estimated Historical Water Use And 2012 State Water Plan Datasets:

Refugio Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Resources Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
March 31, 2014

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:

http://www.twdb.texas.gov/groundwater/docs/GCD/GMPChecklist0113.pdf

The five reports included in part 1 are:

1. Estimated Historical Water 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)

   reports 2-5 are from the 2012 Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report. 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 2012 SWP data available as of 3/31/2014. Although it does not happen frequently, neither of these datasets are static so they are subject to change pending the availability of more accurate WUS data or an amendment to the 2012 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:

http://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/

The 2012 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) or Rima Petrossian (rima.petrossian@twdb.texas.gov or 512-936-2420).

Estimated Historical Water Use

TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2012. TWDB staff anticipates the calculation and posting of these estimates at a later date.

REFUGIO COUNTY

All values are in acre-fee/year

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2011	GW	1,339	0	30	0	2,189	490	4,048
	SW	0	0	3	0	0	55	58
2010	GW	1,137	0	42	0	561	504	2,244
	SW	0	0	4	0	0	56	60
2009	GW	1,232	0	53	0	156	565	2,006
	SW	0	0	5	0	0	63	68
2008	GW	1,106	0	62	0	1,164	536	2,868
	SW	0	0	7	0	0	60	67
2007	GW	1,094	0	0	0	439	502	2,035
	SW	0	0	0	0	0	55	55
2006	GW	1,112	0	0	0	911	592	2,615
	SW	0	0	0	0	0	66	66
2005	GW	1,108	0	0	0	588	668	2,364
	SW	0	0	0	0	0	74	74
2004	GW	1,036	0	0	0	527	62	1,625
	SW	0	0	0	0	0	600	600
2003	GW	1,014	0	0	0	621	60	1,695
	SW	0	0	0	0	0	585	585
2002	GW	1,116	0	0	0	1,019	63	2,198
	SW	0	0	0	0	0	613	613
2001	GW	1,138	0	0	0	850	55	2,043
	SW	0	0	0	0	0	535	535
2000	GW	1,199	0	0	0	850	62	2,111
	SW	0	0	0	0	0	561	561

Projected Surface Water Supplies
TWDB 2012 State Water Plan Data

REFUGIO COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
L	LIVESTOCK	SAN ANTONIO	LIVESTOCK LOCAL SUPPLY	13	13	13	13	13	13
L	LIVESTOCK	SAN ANTONIO-NUECES	LIVESTOCK LOCAL SUPPLY	299	299	299	299	299	299
	Sum of Projected Surface Water Supplies (acre-feet/year)			**312**	**312**	**312**	**312**	**312**	**312**

Projected Water Demands
TWDB 2012 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.

REFUGIO COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	LIVESTOCK	SAN ANTONIO	25	25	25	25	25	25
L	COUNTY-OTHER	SAN ANTONIO	7	6	6	5	5	5
L	IRRIGATION	SAN ANTONIO-NUECES	69	69	69	69	69	69
L	REFUGIO	SAN ANTONIO-NUECES	645	709	723	763	787	777
L	WOODSBORO	SAN ANTONIO-NUECES	283	291	289	292	295	293
L	MINING	SAN ANTONIO-NUECES	7	8	8	8	8	8
L	LIVESTOCK	SAN ANTONIO-NUECES	598	598	598	598	598	598
L	COUNTY-OTHER	SAN ANTONIO-NUECES	314	281	264	239	225	227
	Sum of Projected Water Demands (acre-feet/year)		**1,948**	**1,987**	**1,982**	**1,999**	**2,012**	**2,002**

Projected Water Supply Needs
TWDB 2012 State Water Plan Data

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

REFUGIO COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	COUNTY-OTHER	SAN ANTONIO	3	4	4	5	5	5
L	COUNTY-OTHER	SAN ANTONIO-NUECES	129	162	179	204	218	216
L	IRRIGATION	SAN ANTONIO-NUECES	0	0	0	0	0	0
L	LIVESTOCK	SAN ANTONIO	0	0	0	0	0	0
L	LIVESTOCK	SAN ANTONIO-NUECES	0	0	0	0	0	0
L	MINING	SAN ANTONIO-NUECES	1	0	0	0	0	0
L	REFUGIO	SAN ANTONIO-NUECES	792	728	714	674	650	660
L	WOODSBORO	SAN ANTONIO-NUECES	391	383	385	382	379	381
	Sum of Projected Water Supply Needs (acre-feet/year)		**0**	**0**	**0**	**0**	**0**	**0**

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

REFUGIO COUNTY

WUG, Basin (RWPG)

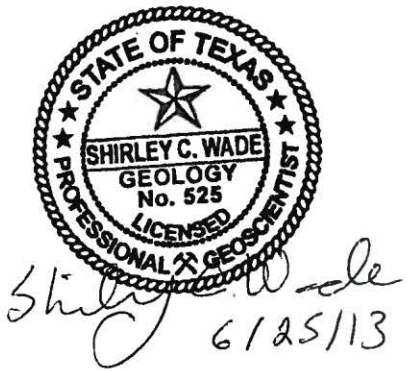
All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
REFUGIO, SAN ANTONIO-NUECES (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [REFUGIO]	44	94	100	114	130	144
WOODSBORO, SAN ANTONIO-NUECES (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [REFUGIO]	5	6	7	8	14	20
Sum of Projected Water Management Strategies (acre-feet/year)		**49**	**100**	**107**	**122**	**144**	**164**

Appendix B. Groundwater Availability Model Run 13-008 provided by Texas Water Development Board

GAM RUN 13-008: REFUGIO GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Shirley Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 936-0883
June 25, 2013



The seal appearing on this document was authorized by Shirley Wade, P.G. 525, on June 25, 2013.

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GAM RUN 13-008: REFUGIO GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Shirley Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 936-0883
June 25, 2013

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h), 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. Information derived from groundwater availability models that shall be included in the groundwater management plan includes:

- the annual amount of recharge from precipitation to the groundwater resources within the district, if any;
- 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
- the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

This report—Part 2 of a two-part package of information from the TWDB to Refugio Groundwater Conservation District management—fulfills the requirements noted above. Part 1 of the 2-part package is the Historical Water Use/State Water Plan data report. The District should have received, or will receive, this data report from the TWDB Groundwater Technical Assistance Section. Questions about the data report can be directed to Mr. Stephen Allen, Stephen.Allen@twdb.texas.gov, (512) 463-7317. The groundwater management plan for the Refugio Groundwater Conservation District should be adopted by the district on or before December 25, 2013 and submitted to the executive administrator of the TWDB on or before January 24, 2014. The current management plan for the Refugio Groundwater Conservation District expires on March 25, 2014.

This report discusses the method, assumptions, and results from model runs using the groundwater availability model for the central portion of the Gulf Coast Aquifer. This model run replaces the results of GAM Run 08-39. GAM Run 13-008 meets current standards set after the release of GAM Run 08-39. Table 1 summarizes the groundwater availability model data required by the statute, and Figure 1 shows the area of the model from which the values in the table was extracted. If after reviewing the figure, Refugio Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the Texas Water Development Board immediately. The TWDB has also approved, for planning purposes, alternative models that can have water budget information extracted for the district. These alternative models include the Groundwater Management Area 16 alternative model and the fully penetrating alternative model for the central portion of the Gulf Coast Aquifer. Please contact the author of this report if a comparison report using either of these models is desired.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the groundwater availability model for the central portion of the Gulf Coast Aquifer was run for this analysis. Refugio Groundwater Conservation District Water budgets for 1981 through 1999 were extracted 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, net inter-aquifer flow (upper), and net inter-aquifer flow (lower) for the portions of the aquifers located within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Gulf Coast Aquifer

- Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer was used 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 section of the Gulf Coast Aquifer assumes partially penetrating wells in the Evangeline Aquifer due to a lack of data for aquifer properties in the lower section of the aquifer.
- This groundwater availability model includes four layers, which generally correspond to (from top to bottom):

1. the Chicot Aquifer,
2. the Evangeline Aquifer,
3. the Burkeville Confining Unit, and
4. the Jasper Aquifer including parts of the Catahoula Formation.

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 model results for the aquifers located within the district and averaged over the duration of the calibration and verification portion of the model runs in the district, as shown in Table 1. The components of the modified budget shown in Table 1 include:

- 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.
- Surface water outflow—The total water discharging from the aquifer (outflow) to surface water features such as streams, reservoirs, and drains (springs).
- Flow into and out of district—The lateral flow within the aquifer between the district and adjacent counties.
- Flow between aquifers—The net vertical flow between aquifers or confining units. This flow is controlled by the relative water levels in each aquifer or confining unit and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs. “Inflow” to an aquifer from an overlying or underlying aquifer will always equal the “Outflow” from the other aquifer.

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 (Figure 1).

TABLE 1: SUMMARIZED INFORMATION FOR THE GULF COAST AQUIFER THAT IS NEEDED FOR REFUGIO GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT. THESE FLOWS MAY INCLUDE BRACKISH WATERS.

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer	13,072
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	40,891[1)]
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer	19,159
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer	15,103
Estimated net annual volume of flow between each aquifer in the district	Not Applicable	Not Applicable

[1)] discharge amount includes 5,020 acre-feet per year of water leaving the district to bays.

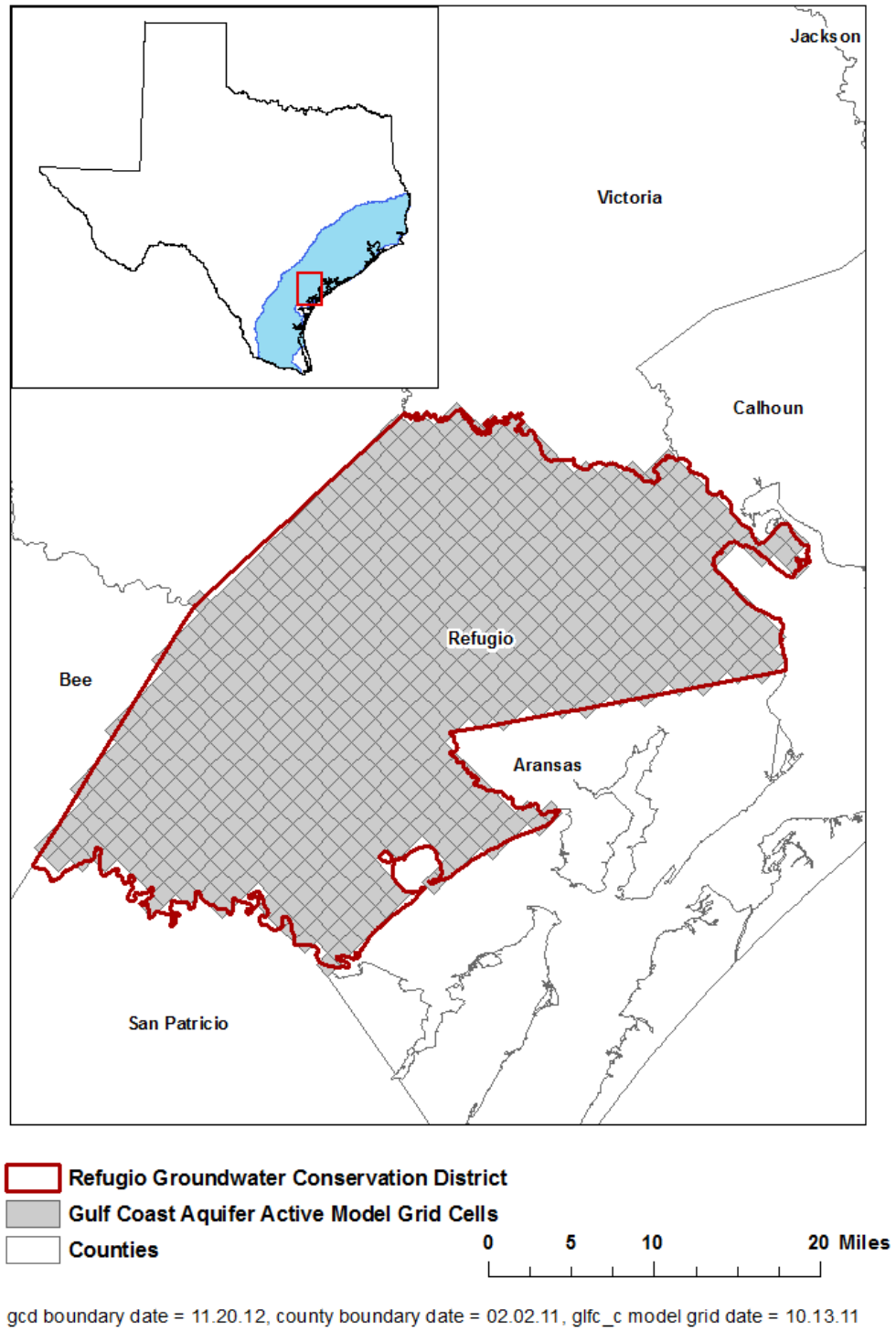


FIGURE 1: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PORTION OF THE GULF COAST AQUIFER FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE GULF COAST AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

LIMITATIONS

The groundwater model(s) used in completing this analysis is the best available scientific tool that can be used to meet the stated objective(s). 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 interaction with streams are specific to particular historic time periods.

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 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.

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.

Ridgeway, Cynthia K., 2008, GAM Run 08-39: Texas Water Development Board, GAM Run 08-39 Report, 4 p., http://www.twdb.texas.gov/groundwater/docs/GAMruns/GR08-39.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.

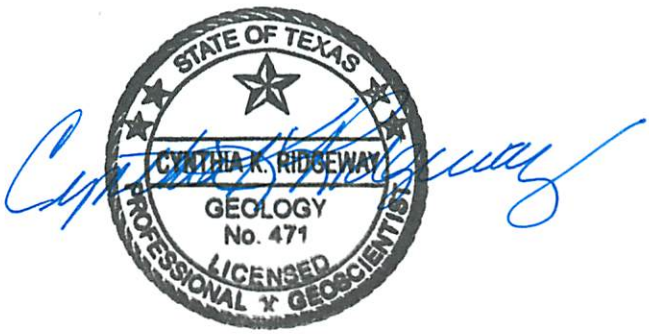
Appendix C. Groundwater Availability Model Run 10-028 MAG

GAM Run 10-028 MAG

by Melissa E. Hill, Ph.D., P.G. and Wade Oliver

Edited and finalized by Shirley Wade to reflect statutory changes effective September 1, 2011

Texas Water Development Board
Groundwater Availability Modeling Section
(512) 936-0883
November 18, 2011



Cynthia K. Ridgeway, the Manager of the Groundwater Availability Modeling Section and Interim Director of the Groundwater Resources Division, is responsible for oversight of work performed by employees under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G. 471 on November 18, 2011.

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EXECUTIVE SUMMARY:

The modeled available groundwater for the Gulf Coast Aquifer as a result of the desired future conditions adopted by the members of Groundwater Management Area 15 is approximately 488,000 acre-feet per year. This is shown divided by county, regional water planning area, and river basin in Table 1 for use in the regional water planning process. Modeled available groundwater is summarized by county, regional water planning area, river basin, and groundwater conservation district in tables 2 through 5. The estimates were extracted from the simulation documented in Table 7 of Groundwater Availability Model Run 10-008 Addendum, which meets the desired future conditions adopted by Groundwater Management Area 15.

REQUESTOR:

Mr. Neil Hudgins of the Coastal Bend Groundwater Conservation District on behalf of Groundwater Management Area 15

DESCRIPTION OF REQUEST:

In a letter dated July 15th, 2010 and received July 30th, 2010, Mr. Neil Hudgins provided the Texas Water Development Board (TWDB) with the desired future condition (DFC) of the Gulf Coast Aquifer for Groundwater Management Area 15. The desired future condition for the Gulf Coast Aquifer, as described in Resolution 2010-01 and adopted July 14, 2010 by the groundwater conservation districts (GCDs) within Groundwater Management Area 15, are described below:

> *An average drawdown of the Gulf Coast Aquifer within the* [Groundwater Management Area] *15 boundary of 12 feet relative to year 1999 starting conditions in accordance with Table 7* of [Groundwater Availability Model] *Run 10-008 Addendum.*

In response to receiving the adopted future condition, the Texas Water Development Board estimated the modeled available groundwater for each groundwater conservation district within Groundwater Management Area 15.

METHODS:

Groundwater Management Area 15 lies within the domain of the groundwater availability model for the central portion of the Gulf Coast Aquifer in Texas. The location of Groundwater Management Area 15, the Gulf Coast Aquifer, and the groundwater availability model cells that represent the aquifer are shown in Figure 1. The Gulf Coast Aquifer System is comprised of the Chicot, Evangeline, and Jasper aquifers. The Burkeville Confining Unit lies between the Evangeline and Jasper aquifers (Waterstone Engineering Inc. and others, 2003).
The previously completed Groundwater Availability Model (GAM) Run 10-008 (Hutchison, 2010), its addendum GAM Run 10-008 Addendum (Wade, 2010), GAM Run 09-010 (Anaya, 2010), GAM Run 08-56 (Anaya, 2009), GAM Run 07-43 (Donnelly, 2008b), and GAM Run 07-42 (Donnelly, 2008a) document the model results reviewed by members of Groundwater Management Area 15 when developing the desired future condition. The results presented in this

report are based on the model simulation shown as the "12 foot scenario" shown in Table 7 of GAM Run 10-008 Addendum (Wade, 2010).

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the model run using the groundwater availability model for the central portion of the Gulf Coast Aquifer are described below:

- Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer was used for this analysis. See Chowdhury and others (2004) and Waterstone Engineering Inc. and others (2003) for assumptions and limitations of the groundwater availability model.
- The model includes four layers representing: the Chicot Aquifer and shallow surface alluvial deposits (layer 1), the Evangeline Aquifer (layer 2), the Burkeville Confining Unit (layer 3), and the Jasper Aquifer including portions of the Catahoula Formation (layer 4) as described in Waterstone Engineering Inc. and others (2003).
- The mean absolute error (a measure of the difference between simulated and measured water levels during model calibration) in the entire model for 1999 is 26 feet, which is 4.8 percent of the hydraulic head drop across the model area (Chowdhury and others, 2004).
- The recharge, evapotranspiration, and streamflows for the model run represent average conditions between 1981 and 1999 in the historical-calibration period of the model (Chowdhury and others, 2004).
- See Wade (2010) for a full description of the methods, assumptions, and results of the groundwater availability model run.

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code, "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. This is distinct from "managed available groundwater," shown in the draft version of this report dated November 10, 2010, which was a permitting value and accounted for the estimated use of the aquifer exempt from permitting. This change was made to reflect changes in statute by the 82nd Texas Legislature, effective September 1, 2011.

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. The estimated amount of pumping exempt from permitting, which the

Texas Water Development Board is now required to develop after soliciting input from applicable groundwater conservation districts, will be provided in a separate report

RESULTS:

The modeled available groundwater for the Gulf Coast Aquifer in Groundwater Management Area 15 consistent with the desired future conditions is approximately 488,000 acre-feet per year. This has been divided by county, regional water planning area, and river basin for each decade between 2010 and 2060 for use in the regional water planning process (Table 1).

The modeled available groundwater is also summarized by county (Table 2), regional water planning area (Table 3), river basin (Table 4), and groundwater conservation district (Table 5). Note that some small differences exist between the results shown in Table 2 of this report and Table 7 of Wade (2010) due to a re-assignment of grid cells to be more consistent with previous and known interpretations of political boundaries. The most significant of these adjustments is in Fayette County, where 339 acre-feet per year of pumping from the Gulf Coast Aquifer was previously reported as existing in Groundwater Management Area 12 (Wade, 2010). Since the groundwater management area boundary was originally delineated along the Gulf Coast Aquifer boundary in this area, this pumping is now associated with Groundwater Management Area 15.

In Table 5, the modeled available groundwater among all districts has been calculated both excluding and including areas outside the jurisdiction of a groundwater conservation district. Though a small portion of Corpus Christi Aquifer Storage and Recovery Conservation District falls within Groundwater Management Area 15, results are not shown for this area below because no model cells representing the Gulf Coast Aquifer fall within the district.

LIMITATIONS:

The groundwater model used in developing estimates of modeled available groundwater is the best available scientific tool that can be used to estimate the pumping that will achieve the desired future conditions. Although the groundwater model used in this analysis is the best available scientific tool for this purpose, it, like all models, has limitations. 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 develop estimates of modeled available groundwater is the need to make assumptions about the location in the aquifer where future pumping will occur. As actual pumping changes in the future, it will be necessary to evaluate the amount of that pumping as well as its location in the context of the assumptions associated with

this analysis. Evaluating the amount and location of future pumping is as important as evaluating the changes in groundwater levels, spring flows, and other metrics that describe the condition of the groundwater resources in the area that relate to the adopted desired future condition(s).

Given these limitations, users of this information are cautioned that the modeled available groundwater numbers should not be considered a definitive, permanent description of the amount of groundwater that can be pumped to meet the adopted desired future condition. 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 future groundwater pumping as well as whether or not they are achieving their desired future conditions. Because of the limitations of the model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine the modeled available groundwater numbers given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future.

REFERENCES:

Anaya, R., 2009, GAM Run 08-56: Texas Water Development Board GAM Run 08-56 Report, 63 p.

Anaya, R., 2010, GAM Run 09-010: Texas Water Development Board GAM Run 09-10 Report, 30 p.

Chowdhury, A.H., Wade, S., Mace, R.E., and Ridgeway, C., 2004, Groundwater availability model of the Central Gulf Coast Aquifer System: numerical simulations through 1999 Model Report, Texas Water Development Board, 108 p.

Donnelly, A.C., 2008a, GAM Run 07-42: Texas Water Development Board GAM Run 07-42 Report, 51 p.

Donnelly, A.C., 2008b, GAM Run 07-43: Texas Water Development Board GAM Run 07-43 Report, 51 p.

Hutchison, W.R., 2010, GAM Run 10-008: Texas Water Development Board GAM Run 10-008 Report, 9 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.

Wade, S.C., 2010, GAM Run 10-008 Addendum: Texas Water Development Board GAM Run 10-008 Addendum Report, 8 p.

Waterstone Engineering, Inc., and Parsons, Inc., 2003, Groundwater availability of the central Gulf Coast Aquifer: numerical simulations to 2050 Central Gulf Coast, Texas-Final Report: contract report to the Texas Water Development Board, variously p.

Table 1. Modeled available groundwater for the Gulf Coast Aquifer in Groundwater Management Area 15. Results are in acre-feet per year and are summarized by county, regional water planning area, and river basin.

County	Regional Water Planning Area	Basin	Year					
			2010	2020	2030	2040	2050	2060
Aransas	N	San Antonio-Nueces	1,862	1,862	1,862	1,862	1,862	1,862
Bee	N	Nueces	30	30	30	30	30	30
		San Antonio-Nueces	9,484	9,484	9,460	9,460	9,408	9,408
Calhoun	L	Colorado-Lavaca	361	361	361	361	361	361
		Guadalupe	17	17	17	17	17	17
		Lavaca	2	2	2	2	2	2
		Lavaca-Guadalupe	2,574	2,574	2,574	2,574	2,574	2,574
		San Antonio-Nueces	41	41	41	41	41	41
Colorado	K	Brazos-Colorado	10,464	10,464	10,464	10,464	10,464	10,464
		Colorado	16,058	16,058	16,058	16,058	16,058	16,058
		Lavaca	22,431	22,431	22,431	22,431	22,431	22,431
Dewitt	L	Guadalupe	10,613	10,548	10,548	10,548	10,548	10,548
		Lavaca	2,932	2,932	2,926	2,915	2,912	2,912
		Lavaca-Guadalupe	417	417	417	417	417	417
		San Antonio	739	739	739	739	739	739
Fayette	K	Brazos	17	17	17	17	17	17
		Colorado	6,254	6,123	5,961	5,956	5,952	5,924
		Lavaca	2,933	2,933	2,927	2,922	2,917	2,915
Goliad	L	Guadalupe	4,417	4,417	4,417	4,417	4,417	4,417
		San Antonio	6,121	6,121	6,121	6,121	6,121	6,121
		San Antonio-Nueces	1,161	1,161	1,161	1,161	1,161	1,161
Jackson	P	Colorado-Lavaca	23,615	23,615	23,615	23,615	23,615	23,615
		Lavaca	41,927	41,927	41,927	41,927	41,927	41,927
		Lavaca-Guadalupe	10,844	10,844	10,844	10,844	10,844	10,844
Karnes	L	Guadalupe	12	12	12	12	12	12
		Nueces	78	78	78	78	78	78
		San Antonio	3,069	3,061	3,056	3,052	3,048	2,944
		San Antonio-Nueces	84	84	84	84	84	82
Lavaca	P	Guadalupe	41	41	41	41	41	41
		Lavaca	19,944	19,944	19,944	19,944	19,937	19,932
		Lavaca-Guadalupe	400	400	400	400	400	400
Matagorda	K	Brazos-Colorado	23,055	23,055	23,055	23,055	23,055	23,055
		Colorado	4,179	4,179	4,179	4,179	4,179	4,179
		Colorado-Lavaca	18,662	18,662	18,662	18,662	18,662	18,662
Refugio	L	San Antonio	1,522	1,522	1,522	1,522	1,522	1,522
		San Antonio-Nueces	27,806	27,806	27,806	27,806	27,806	27,806

Table 1. Continued.

County	Regional Water Planning Area	Basin	Year					
			2010	2020	2030	2040	2050	2060
Victoria	L	Guadalupe	14,617	14,617	14,617	14,617	14,617	14,617
		Lavaca	217	217	217	217	217	217
		Lavaca-Guadalupe	19,924	19,924	19,924	19,924	19,924	19,924
		San Antonio	936	936	936	936	936	936
Wharton	K	Brazos-Colorado	34,020	34,020	34,020	34,020	34,020	34,020
		Colorado	31,406	31,406	31,406	31,406	31,406	31,406
		Colorado-Lavaca	11,624	11,624	11,624	11,624	11,624	11,624
		Lavaca	1,690	1,690	1,690	1,690	1,690	1,690
	P	Colorado	441	441	441	441	441	441
		Colorado-Lavaca	11,549	11,549	11,549	11,549	11,549	11,549
		Lavaca	87,763	87,763	87,763	87,763	87,763	87,763
Total			**488,353**	**488,149**	**487,946**	**487,921**	**487,846**	**487,705**

Table 2. Modeled available groundwater for the Gulf Coast Aquifer summarized by county in Groundwater Management Area 15. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Aransas	1,862	1,862	1,862	1,862	1,862	1,862
Bee	9,514	9,514	9,490	9,490	9,438	9,438
Calhoun	2,995	2,995	2,995	2,995	2,995	2,995
Colorado	48,953	48,953	48,953	48,953	48,953	48,953
Dewitt	14,701	14,636	14,630	14,619	14,616	14,616
Fayette	9,204	9,073	8,905	8,895	8,886	8,856
Goliad	11,699	11,699	11,699	11,699	11,699	11,699
Jackson	76,386	76,386	76,386	76,386	76,386	76,386
Karnes	3,243	3,235	3,230	3,226	3,222	3,116
Lavaca	20,385	20,385	20,385	20,385	20,378	20,373
Matagorda	45,896	45,896	45,896	45,896	45,896	45,896
Refugio	29,328	29,328	29,328	29,328	29,328	29,328
Victoria	35,694	35,694	35,694	35,694	35,694	35,694
Wharton	178,493	178,493	178,493	178,493	178,493	178,493
Total	**488,353**	**488,149**	**487,946**	**487,921**	**487,846**	**487,705**

Table 3. Modeled available groundwater for the Gulf Coast Aquifer summarized by regional water planning area in Groundwater Management Area 15. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
K	182,793	182,662	182,494	182,484	182,475	182,445
L	97,660	97,587	97,576	97,561	97,554	97,448
N	11,376	11,376	11,352	11,352	11,300	11,300
P	196,524	196,524	196,524	196,524	196,517	196,512
Total	**488,353**	**488,149**	**487,946**	**487,921**	**487,846**	**487,705**

Table 4. Modeled available groundwater for the Gulf Coast Aquifer summarized by river basin in Groundwater Management Area 15. Results are in acre-feet per year.

Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	17	17	17	17	17	17
Brazos-Colorado	67,539	67,539	67,539	67,539	67,539	67,539
Colorado	58,338	58,207	58,045	58,040	58,036	58,008
Colorado-Lavaca	65,811	65,811	65,811	65,811	65,811	65,811
Guadalupe	29,717	29,652	29,652	29,652	29,652	29,652
Lavaca	179,839	179,839	179,827	179,811	179,796	179,789
Lavaca-Guadalupe	34,159	34,159	34,159	34,159	34,159	34,159
Nueces	108	108	108	108	108	108
San Antonio	12,387	12,379	12,374	12,370	12,366	12,262
San Antonio-Nueces	40,438	40,438	40,414	40,414	40,362	40,360
Total	**488,353**	**488,149**	**487,946**	**487,921**	**487,846**	**487,705**

Table 5. Modeled available groundwater for the Gulf Coast Aquifer summarized by groundwater conservation district (GCD) in Groundwater Management Area 15. Results are in acre-feet per year. UWCD refers to Underground Water Conservation District.

Goundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Bee GCD	9,504	9,504	9,480	9,480	9,428	9,428
Calhoun County GCD*	2,995	2,995	2,995	2,995	2,995	2,995
Coastal Bend GCD	178,493	178,493	178,493	178,493	178,493	178,493
Coastal Plains GCD	45,896	45,896	45,896	45,896	45,896	45,896
Colorado County GCD	48,953	48,953	48,953	48,953	48,953	48,953
Evergreen UWCD	3,243	3,235	3,230	3,226	3,222	3,116
Fayette County GCD	9,204	9,073	8,905	8,895	8,886	8,856
Goliad County GCD	11,699	11,699	11,699	11,699	11,699	11,699
Lavaca County GCD*	20,385	20,385	20,385	20,385	20,378	20,373
Pecan Valley GCD	14,701	14,636	14,630	14,619	14,616	14,616
Refugio GCD	29,328	29,328	29,328	29,328	29,328	29,328
Texana GCD	76,386	76,386	76,386	76,386	76,386	76,386
Victoria County GCD	35,694	35,694	35,694	35,694	35,694	35,694
Total (excluding non-district areas)	**483,486**	**483,282**	**483,079**	**483,054**	**482,979**	**482,838**
No District	1,872	1,872	1,872	1,872	1,872	1,872
Total (including non-district areas)	**488,353**	**488,149**	**487,946**	**487,921**	**487,846**	**487,705**

*Lavaca County and Calhoun County GCDs are pending confirmation as of the date of this report

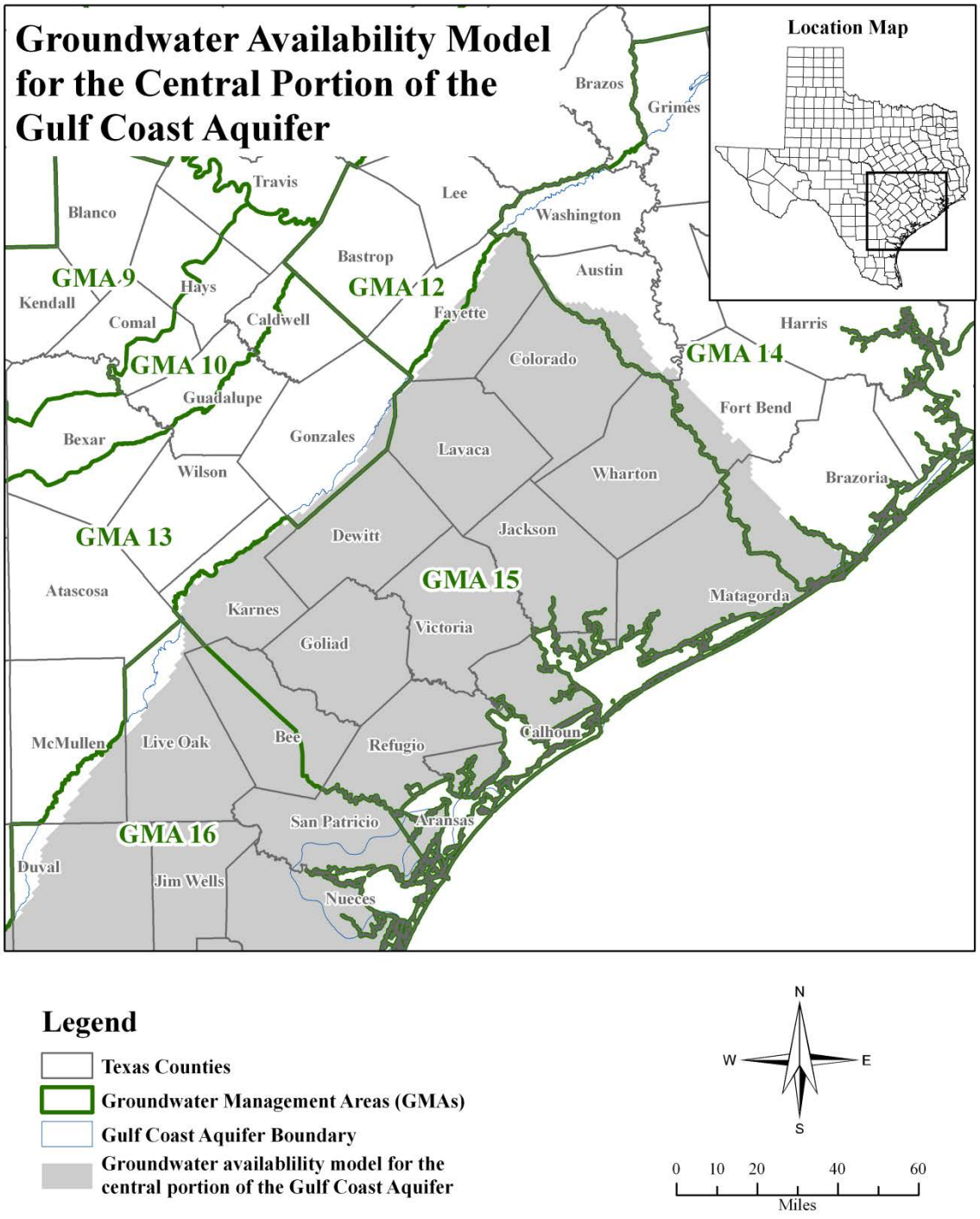

Figure 1. Map showing the areas covered by the groundwater availability model for the central portion of the Gulf Coast Aquifer in Groundwater Management Area 15.

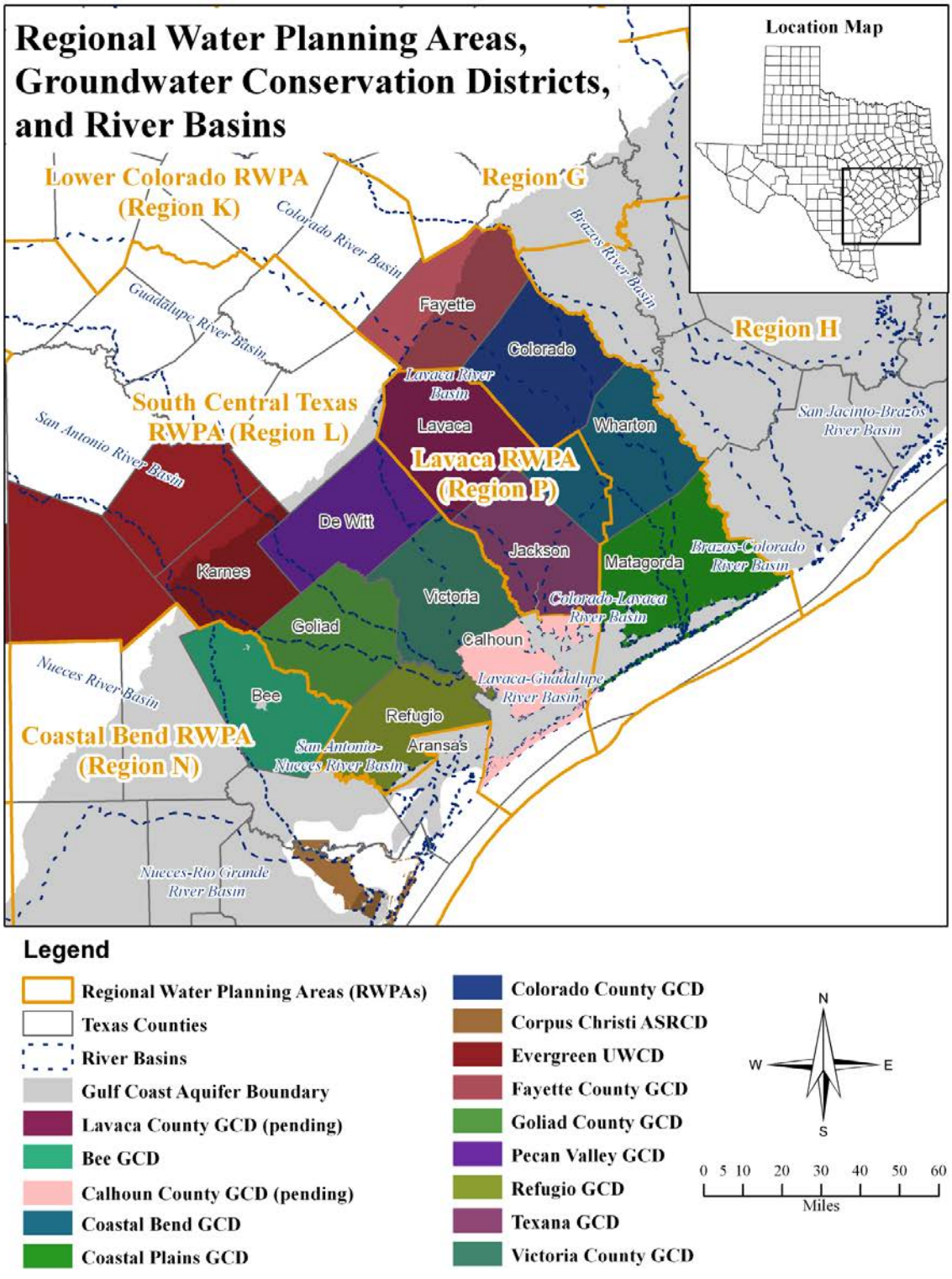

Figure 2. Map showing regional water planning areas, counties, river basins, and groundwater conservation districts (GCD) in and neighboring Groundwater Management Area 15.

Appendix D. Public Notices Regarding Hearings Related to Plan Adoption

Public Hearing Notice

Pursuant to Chapter 36, Texas Water Code, the Refugio County Groundwater Conservation District will conduct a public hearing on the 2014 Refugio County Groundwater Conservation District Management Plan – Proposed at 6:00 P.M. on Monday, June 30, 2014 at the Refugio County Courthouse, 808 Commerce Street, Refugio, Texas 78377. The hearing is conducted to receive comments and suggestions from the public concerning the proposed management plan.

The proposed management plan was developed using the district's best available data and addressed 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 proposed management plan (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 proposed management plan may be reviewed or copied at the District's office at 604 Commerce Street, Refugio, Texas 78377. Questions or comments should be directed to Tim Andruss, General Manager at Refugio Groundwater Conservation District, 604 Commerce Street, Refugio, Texas 78377 or 361-526-1483.

Certificate of Posting

The above Notice of Meeting was posted June 13, 2014 at a place convenient to the public on a bulletin board in the Refugio County Courthouse at Refugio, Texas.

WITNESS MY HAND AND SEAL of office on above date.

Ida Ramirez, Clerk County Court
Refugio County, Texas
By JoAnna Perez Deputy
JoAnna Perez

6/12/14 Refugio County GCD Public hearing Mgt plan

AFFIDAVIT of PUBLICATION

THE STATE OF TEXAS
COUNTY OF BEE

JUN 16 2014

Before me, the undersigned authority, on this day personally appeared F.C. Latcham, III Publisher of The Refugio County Press, a newspaper having general circulation in Refugio County, Texas, who being by me duly sworn, deposes and says that the foregoing attached notice was published in said newspaper on the following date(s),
to wit: June 12, 2014.

F.C. Latcham III
F.C. Latcham, III, Publisher

Sworn to and subscribed before me by F.C. Latcham, III this the 12 day of June, 2014 A.D. to certify which witness my hand and official seal.

Mary Virginia Massey
Mary Virginia Massey, Notary Public
in and for the State of Texas

MARY VIRGINIA MASSEY
My Commission Expires
November 2, 2016

6/12/14 Refugio County GCD Public hearing Mgt plan

AFFIDAVIT of PUBLICATION

THE STATE OF TEXAS
COUNTY OF BEE

JUN 16 2014

Before me, the undersigned authority, on this day personally appeared F.C. Latcham, III Publisher of The Refugio County Press, a newspaper having general circulation in Refugio County, Texas, who being by me duly sworn, deposes and says that the foregoing attached notice was published in said newspaper on the following date(s),
to wit: June 12, 2014.

F.C. Latcham III
F.C. Latcham, III, Publisher

Sworn to and subscribed before me by F.C. Latcham, III this the 12 day of June, 2014 A.D. to certify which witness my hand and official seal.

Mary Virginia Massey
Mary Virginia Massey, Notary Public
in and for the State of Texas

MARY VIRGINIA MASSEY
My Commission Expires
November 2, 2016

Public Hearing Notice

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A copy of the proposed management plan may be reviewed or copied at the District's office at 604 Commerce Street, Refugio, Texas 78377. Questions or comments should be directed to Tim Andruss, General Manager at Refugio Groundwater Conservation District, 604 Commerce Street, Refugio, Texas 78377 or 361-526-1483.

Appendix E. Letters Coordinating with Regional Surface Water Management Entities

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

County of Refugio
808 Commerce St
Refugio, TX 78377

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

Refugio County WCID 2
Edward Ermis
PO Box 718
Woodsboro, TX 78393

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

Hilcorp Energy
PO Box 280
537 Quintana Rd
Refugio, TX 78377

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

Refugio County Drainage District
401 Gin
Tivoli, TX 77990

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

Guadalupe-Blanco River Authority
933 E Court St
Seguin, TX 78155

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

Town of Bayside
909 1st St
Bayside, TX 78374

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

City of Woodsboro
PO Box 632
Woodsboro, TX 78393

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

Refugio County WCID 1
PO Box 397
Tivoli, TX 77990

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

City of Austwell
108 S. Gisler St
Austwell, TX 77950

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

DIRECTORS:

President:

Larry Aduddell

Vice President:

Dr. Gary Wright

Secretary:

Dallas Ford

MEMBERS:

Scott Carter

Carroll Borden

July 25, 2014

City of Refugio
609 Commerce St
Refugio, TX 78377

RE: Refugio Groundwater Conservation District Management Plan

To Whom It May Concern:

Please find enclosed a copy of the approved District Management Plan for the Refugio Groundwater Conservation District. Pursuant to Chapter 36, Texas Water Code, the District has sent a copy of the approved District Management Plan to the Texas Water Development Board for review and approval.

Regards,

Tim Andruss, General Manager

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

RESOLUTION
Resolution Number: 2014-07-21-A
Resolution Adopting the Refugio Groundwater Conservation District Management Plan

WHEREAS on June 12, 2014, a Notice of Hearing was published in the Refugio County Press newspaper regarding a public hearing on the adoption of the Refugio Groundwater Conservation District Management Plan; and

WHEREAS on June 30, 2014, the Refugio Groundwater Conservation District Board of Directors with a quorum being present, conducted a public hearing regarding the adoption of the Refugio Groundwater Conservation District Management Plan; and

WHEREAS, the Refugio 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 2014 Refugio Groundwater Conservation District Management Plan is ADOPTED as described in the Refugio Groundwater Conservation District Management Plan attached hereto and made a part hereof for all purposes and that said management plan shall be submitted by the General Manager to the Executive Administrator of the Texas Water Development Board for review and approval with all necessary documentation.

Adopted by a vote of 3 ayes and 0 nays on this 21 day of July, 2014.

Larry D Rundell
President, Refugio Groundwater Conservation District

I, the undersigned, do hereby certify that the above resolution was adopted by the Board of Directors of the Refugio Groundwater Conservation District on the 21st day of July, 2014.

Director, Refugio Groundwater Conservation District

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

REFUGIO GROUNDWATER CONSERVATION DISTRICT
Hearing Minutes for June 30, 2014

The Refugio Groundwater Conservation District Board of Directors' hearing regarding the Refugio Groundwater Conservation District Management Plan convened at the Refugio County Courthouse, 808 Commerce St., Refugio, Texas 78377 on Monday, June 30, 2014, at 6:00 PM.

The following representatives of the Refugio Groundwater Conservation District attended the hearing:

Precinct 1:	Mr. Larry Aduddell, President	Present
Precinct 2:	Mr. Carroll Borden, Director	Present
Precinct 3:	Dr. Gary Wright, Vice President	Absent
Precinct 4:	Mr. Dallas Ford, Secretary	Present
At Large:	Mr. Scott Carter	Present
General Manager:	Mr. Tim Andruss	Present
Legal Counsel:	Mr. James Allison	Present
Administrative Assistant:	Ms. Billie Sue Dunnivan	Present

Mr. Aduddell called the hearing to order at 6:01 PM.

Mr. Andruss provided a summary of the management plan revision process and major revisions within the draft management plan.

Mr. Andruss informed the Board that the District had not received comments or inquiries regarding the management plan prior to the hearing.

Mr. Aduddell opened the hearing to receive public comments regarding the draft management plan.

The following individuals provided comment: no comments provided.

With no additional public comments, Mr. Aduddell closed the public hearing at 6:13 PM.

REFUGIO GROUNDWATER CONSERVATION DISTRICT
Hearing Minutes for June 30, 2014

Prepared by:

Tim Andruss
General Manager
Refugio Groundwater Conservation District

The above and foregoing minutes were read and approved on this the

21 day of July, 20___.

ATTEST:

Director

Director

REFUGIO GROUNDWATER CONSERVATION DISTRICT
Meeting Minutes for July 21, 2014

The Refugio Groundwater Conservation District Board of Directors' Meeting convened at the Refugio County Courthouse, 808 Commerce St., Refugio, Texas 78377 on Monday, July 21, 2014, at 6:00 PM.

The following representatives of the Refugio Groundwater Conservation District attended the meeting:

Precinct 1:	Mr. Larry Aduddell, President	Present
Precinct 2:	Mr. Carroll Borden, Director	Absent
Precinct 3:	Dr. Gary Wright, Vice President	Present
Precinct 4:	Mr. Dallas Ford, Secretary	Present
At Large:	Mr. Scott Carter	Absent
General Manager:	Mr. Tim Andruss	Present
Legal Counsel:	Mr. James Allison	Present
Administrative Assistant:	Ms. Billie Sue Dunnivan	Present

Agenda Item 1: Call the meeting to order and welcome guests.

Discussion:

Mr. Aduddell called the meeting to order at 6:00 PM.

Board Action: No action taken.

Agenda Item 2: Receive public comments.

Discussion: None

Board Action: No action taken.

Agenda Item 3: Consideration of and possible action on matters related to the adoption of the proposed 2014 Management Plan of the District.

Discussion: Mr. Andruss explained that on June 30, 2014, the District conducted a public hearing regarding the Proposed 2014 Management Plan. The District did not receive comments or questions regarding the proposed plan prior to, during, or after the public hearing.

Board Action:

DR. WRIGHT moved to accept and adopt the proposed 2014 Management Plan as drafted and approve Resolution Number:

2014-07-21-A Resolution Adopting the Refugio Groundwater Conservation District Management Plan.

Mr. Ford seconded the motion. The motion passed.

Agenda Item 4: Adjourn.

Discussion: None.

Board Action:

Dr. Wright moved to adjourn at 6:07 PM.

Mr. Ford seconded the motion. The motion passed.

Prepared by:

Tim Andruss
General Manager
Refugio Groundwater Conservation District

The above and foregoing minutes were read and approved on this the 21st day of July, 2014.

ATTEST:

Director

Director

Appendix H. Refugio Groundwater Conservation District Contact Information

District Contact Information

Physical Address:
604 Commerce Street
Refugio, Texas 78377

Mailing Address:
Refugio Groundwater Conservation District
P.O. Box 116
Refugio, Texas 78377

Email Address:
admin@rgcd.org

Phone Number:
361.526.1483

FAX Number:
361-526-1294

Board of Directors:
Larry Aduddell, Precinct 1;
Dallas Ford, Precinct 4;
Carroll Borden, Precinct 2;
Gary Wright, Precinct 3;
Scott Carter, At large

Staff:
Tim Andruss, General Manager
Billie Sue Dunnivan, Administrative Assistant