

Texana Groundwater Conservation District Management Plan

Texana Groundwater Conservation District Board of Directors Management Plan Revision Adoption:	May 17, 2018
Texas Water Development Board Administrative Management Plan Revision Approval:	June 13, 2016
Texana Groundwater Conservation District Management Plan Adoption of Modeled Available Groundwater Amendment	

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DISTRICT MISSION

The mission of the Texana 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 Jackson County for the benefit of Jackson 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 codified as Chapter 8857, Special District and Local Laws Code. The citizens of Jackson County through a confirmation election held on November 6, 2001 ratified the DISTRICT. The DISTRICT was formed to protect, conserve, and prevent waste of the groundwater resources beneath the area of Jackson 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 Texana Groundwater Conservation District Board of Directors consists of seven members. These directors are elected by the voters of Jackson County and serve a four-year term. The DISTRICT observes the same four precincts as the Jackson County Commissioners' with three at-large positions. 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 Jackson County.

Location and Extent

The boundaries of the DISTRICT are conterminous with those of Jackson County, Texas. This area encompasses approximately 829.25 square miles. The District is bounded by Calhoun County, Colorado County, Lavaca County, Matagorda County, Victoria County, and Wharton County.

GROUNDWATER RESOURCES OF JACKSON COUNTY

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

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

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

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 and the Evangeline Aquifers are utilized the most within Jackson County. The Chicot Aquifer outcrops across the entire county. The thickness of the Chicot Aquifer ranges up to approximately 1,000 feet in Jackson County. The thickness of the Evangeline Aquifer ranges from 1,000 feet to 1,600 feet in Jackson 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 Jackson 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 Jackson 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 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 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 Jackson County region for coordination purposes are included in Appendix E.

Texana 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. District representatives of Groundwater Management Area 15 adopted, by resolution, the desired future condition for Gulf Coast Aquifer within Groundwater Management Area 15 on April 29, 2016. The administrator of Groundwater Management Area 15 submitted the adopted desired future conditions and explanatory report for Groundwater Management Area 15 on June 23, 2016 to Texas Water Development Board. The Texas Water Development Board designated the Groundwater Management Area 15 Explanatory Report administratively complete on October 20, 2016. The Texas Water Development Board provided the Modeled Available Groundwater estimates for Groundwater Management Area 15 to district representatives on March 22, 2017.

The desired future condition for the entire area is stated as follows:

"Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 13 feet in December 2069 from estimated year 2000 conditions."

The desired future condition for Jackson County is stated as follows: *"Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 15 feet in December 2069 from estimated year 2000 conditions."*

The Texas Water Development Board reported the modeled available groundwater for Groundwater Management Area 15 based on the desired future condition in GAM Run 16-025 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 1 of the GAM Run 16-025 MAG report is as follows:

Year					
2020	2030	2040	2050	2060	2069
76,787 AFY	90,482 AFY	90,482 AFY	90,482 AFY	90,482 AFY	90,482 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 Jackson 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 Jackson County as practicably as possible as established in the plan. In consideration of the economic and cultural activities occurring within Jackson 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 Jackson 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 Jackson 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 Texana Groundwater Conservation District Board of Directors and to the public. The DISTRICT may undertake, as necessary, investigations of the groundwater resources within Jackson County and will make the results of investigations available to the public. The DISTRICT will cooperate with investigations of the groundwater resources of Jackson 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 Jackson County; or
2. Each geographic area overlying an aquifer or subdivision of an aquifer located in whole or in part within Jackson County.

For the purpose of managing the use of groundwater within Jackson County, the DISTRICT may define sustainable use as the use of an amount of groundwater in Jackson 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 Jackson 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 Jackson 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 Jackson 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 Jackson 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 Texana Groundwater Conservation District Board of Directors shall not be construed as limiting the power of the Texana 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 address: www.texanagcd.org/policiesrules.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 Texana 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 Texana 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 Jackson 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 Jackson 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 Lavaca Regional Water Planning Group (Region P) 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 Lavaca 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 Jackson 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 Jackson 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 Jackson 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 Jackson 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 14-012 provided by Texas Water Development Board
- Appendix C.** Groundwater Availability Model Run 16-025 MAG
- Appendix D.** Public Notices Regarding Hearings Related to Plan Adoption
- Appendix E.** Letters Coordinating with Regional Surface Water Management Entities
- Appendix F.** Texana Groundwater Conservation District Board of Director Resolution Adopting Management Plan
- Appendix G.** Minutes of Texana Groundwater Conservation District Board of Director Meeting related to the public hearings for and adoption of the Management Plan
- Appendix H.** Texana Groundwater Conservation District Contact Information

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

Appendix B. Groundwater Availability Model Run 14-012 provided by Texas Water Development Board

Appendix C. Groundwater Availability Model Run 16-025 MAG

Appendix D. Public Notices Regarding Hearings Related to Plan Adoption

Appendix E. Letters Coordinating with Regional Surface Water Management Entities

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

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

Appendix H. Texana Groundwater Conservation District Contact Information

Estimated Historical Water Use And 2012 State Water Plan Datasets:

Texana 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
April 8, 2015

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 4/8/2015. 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 2013. TWDB staff anticipates the calculation and posting of these estimates at a later date.

JACKSON COUNTY

All values are in acre-fee/year

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2012	GW	1,947	32	4	0	48,889	534	51,406
	SW	0	458	0	0	445	288	1,191
2011	GW	2,109	28	31	0	86,894	835	89,897
	SW	0	487	4	0	442	449	1,382
2010	GW	1,713	37	43	0	42,258	793	44,844
	SW	0	432	6	0	1,500	427	2,365
2009	GW	1,852	29	43	0	45,911	681	48,516
	SW	0	431	6	0	1,699	367	2,503
2008	GW	1,746	33	42	0	35,889	670	38,380
	SW	0	451	6	0	1,334	361	2,152
2007	GW	1,626	140	0	0	33,242	757	35,765
	SW	0	461	0	0	471	409	1,341
2006	GW	1,832	167	0	0	33,396	669	36,064
	SW	0	489	0	0	0	362	851
2005	GW	1,789	166	0	0	42,893	583	45,431
	SW	0	474	0	0	0	314	788
2004	GW	1,723	122	0	0	44,599	205	46,649
	SW	0	434	0	0	621	677	1,732
2003	GW	1,793	90	0	0	33,494	210	35,587
	SW	3	494	0	0	756	689	1,942
2002	GW	1,949	34	0	0	35,251	196	37,430
	SW	0	497	0	0	0	646	1,143
2001	GW	1,875	38	0	0	39,754	202	41,869
	SW	0	477	0	0	0	667	1,144
2000	GW	1,889	43	0	0	44,236	511	46,679
	SW	0	518	0	0	120	341	979

Projected Surface Water Supplies

TWDB 2012 State Water Plan Data

JACKSON COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
P	MANUFACTURING	COLORADO-LAVACA	TEXANA LAKE/RESERVOIR	1,832	1,832	1,832	1,832	1,832	1,832
Sum of Projected Surface Water Supplies (acre-feet/year)				1,832	1,832	1,832	1,832	1,832	1,832

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.

JACKSON COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
P	COUNTY-OTHER	COLORADO-LAVACA	266	275	277	274	273	273
P	MANUFACTURING	COLORADO-LAVACA	641	668	688	706	722	768
P	MINING	COLORADO-LAVACA	25	27	28	29	30	30
P	IRRIGATION	COLORADO-LAVACA	22,066	22,066	22,066	22,066	22,066	22,066
P	LIVESTOCK	COLORADO-LAVACA	298	298	298	298	298	298
P	MANUFACTURING	LAVACA	2	2	2	3	3	3
P	MINING	LAVACA	38	40	41	43	44	45
P	IRRIGATION	LAVACA	28,645	28,645	28,645	28,645	28,645	28,645
P	LIVESTOCK	LAVACA	418	418	418	418	418	418
P	EDNA	LAVACA	816	850	861	856	855	855
P	GANADO	LAVACA	259	272	277	276	276	276
P	COUNTY-OTHER	LAVACA	478	495	498	493	491	492
P	IRRIGATION	LAVACA-GUADALUPE	9,090	9,090	9,090	9,090	9,090	9,090
P	LIVESTOCK	LAVACA-GUADALUPE	136	136	136	136	136	136
P	COUNTY-OTHER	LAVACA-GUADALUPE	59	61	61	61	60	60
P	MINING	LAVACA-GUADALUPE	63	66	69	71	74	76
Sum of Projected Water Demands (acre-feet/year)			63,300	63,409	63,455	63,465	63,481	63,531

Projected Water Supply Needs

TWDB 2012 State Water Plan Data

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

JACKSON COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
P	COUNTY-OTHER	COLORADO-LAVACA	11	2	0	3	4	4
P	COUNTY-OTHER	LAVACA	20	3	0	5	7	6
P	COUNTY-OTHER	LAVACA-GUADALUPE	2	0	0	0	1	1
P	EDNA	LAVACA	45	11	0	5	6	6
P	GANADO	LAVACA	18	5	0	1	1	1
P	IRRIGATION	COLORADO-LAVACA	-5,053	-5,053	-5,053	-5,053	-5,053	-5,053
P	IRRIGATION	LAVACA	0	0	0	0	0	0
P	IRRIGATION	LAVACA-GUADALUPE	0	0	0	0	0	0
P	LIVESTOCK	COLORADO-LAVACA	0	0	0	0	0	0
P	LIVESTOCK	LAVACA	0	0	0	0	0	0
P	LIVESTOCK	LAVACA-GUADALUPE	0	0	0	0	0	0
P	MANUFACTURING	COLORADO-LAVACA	1,191	1,164	1,144	1,126	1,110	1,064
P	MANUFACTURING	LAVACA	1	1	1	0	0	0
P	MINING	COLORADO-LAVACA	5	3	2	1	0	0
P	MINING	LAVACA	7	5	4	2	1	0
P	MINING	LAVACA-GUADALUPE	13	10	7	5	2	0
Sum of Projected Water Supply Needs (acre-feet/year)			-5,053	-5,053	-5,053	-5,053	-5,053	-5,053

Projected Water Management Strategies

TWDB 2012 State Water Plan Data

JACKSON COUNTY

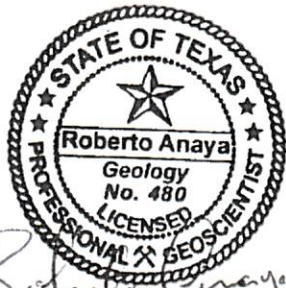
WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
IRRIGATION, COLORADO-LAVACA (P)							
CONJUNCTIVE USE OF GROUNDWATER (TEMPORARY OVERDRAFT) - JACKSON COUNTY	GULF COAST AQUIFER [JACKSON]	5,053	5,053	5,053	5,054	5,053	5,053
Sum of Projected Water Management Strategies (acre-feet/year)		5,053	5,053	5,053	5,054	5,053	5,053

GAM RUN 14-012: TEXANA GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Bernard Bahaya, E.I.T, and Roberto Anaya, P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6115
July 12, 2015



Roberto Anaya



Cynthia K. Ridgeway

Cynthia K. Ridgeway is the Manager of the Groundwater Availability Modeling Section and is responsible for oversight of work performed by Bernard Bahaya under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G. 471 on July 12, 2015.

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Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6115
July 12, 2015

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. 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 the Texana Groundwater Conservation District—fulfills the requirements noted above. Part 1 of the two-part package is the Estimated Historical Water Use/State Water Plan data report. The District 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 Texana Groundwater Conservation District should be adopted by the district on or before November 27, 2015 and submitted to the executive administrator of the TWDB on or before December 27, 2015. The current management plan for the Texana Groundwater Conservation District expires on February 25, 2016.

This report discusses the methods, assumptions, and results from a model run using the groundwater availability model for the central portion of the Gulf Coast Aquifer System (Chowdhury and others, 2004 and Waterstone and Parsons, 2003). This model run replaces the results of GAM Run 08-82 (Oliver, 2009). GAM Run 14-012 meets current standards set after the release of GAM Run 08-82. 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 the table were extracted. If after review of the figure, the Texana 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 for the Gulf Coast (Central) Aquifer System (Chowdhury and others, 2004 and Waterstone and Parsons, 2003), was run for this analysis. Texana Groundwater Conservation District water budgets were extracted for the historical model period (1981 through 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, net inter-aquifer flow (upper), and net inter-aquifer flow (lower) for the portion of the aquifer located within the district is summarized in this report.

PARAMETERS AND ASSUMPTIONS:

- Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System was used for this analysis. See Chowdhury and others (2004) and Waterstone and Parsons (2003) for assumptions and limitations of the groundwater availability model.
- 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 (Layer 4). The down-dip boundary of the model is based on contours of 10,000 parts per million of total dissolved solids (Waterstone and Parsons, 2003). Consequently, the model includes zones of brackish groundwater.
- The model for the central portion of the Gulf Coast Aquifer System assumes that wells screened in the Evangeline Aquifer do not penetrate the full thickness of the aquifer near the Gulf of Mexico. This means the areas where wells are drilled into the Evangeline Aquifer are represented using data from the shallow portions of the aquifer, such as the outcrop or just below the Chicot Aquifer closer to the Gulf of Mexico. Lower portions of the aquifer near the Gulf of Mexico are not accessible with existing wells so deeper wells will be needed to understand the aquifer properties over the entire thickness of the aquifer.
- 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 model results for the aquifer located within the district and averaged over the duration of the calibration and verification portion of the model run in the district, as shown in table 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.
- Surface water outflow—The total water discharging from the aquifer (outflow) to surface water features such as streams, reservoirs, 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 the aquifer and adjacent 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.

It is important to note that 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 TEXANA GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

<i>Management Plan requirement</i>	<i>Aquifer or confining unit</i>	<i>Results</i>
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	10,942
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, rivers, wetlands, bays, and estuaries	Gulf Coast Aquifer System	16,605
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	38,915
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	19,812
Estimated net annual volume of flow between each aquifer in the district	From Gulf Coast Aquifer System to Underlying Units	Not Applicable*

*Not applicable because flow leaving the Gulf Coast Aquifer System to the underlying brackish portion of the Yegua-Jackson Aquifer is not known. The model also assumes a no flow barrier at the base of the Gulf Coast Aquifer System.

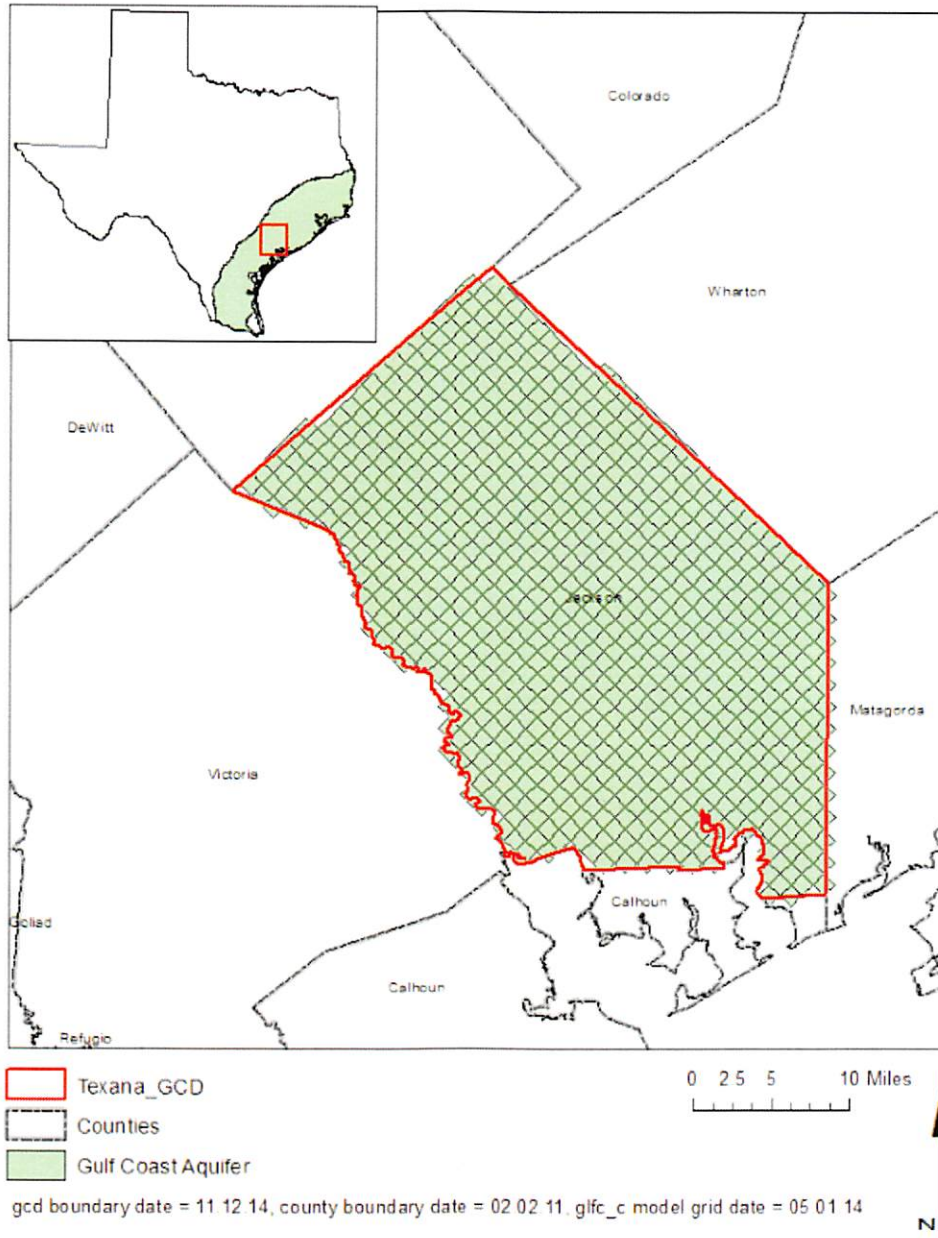


FIGURE 1 AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PORTION OF THE GULF COAST AQUIFER SYSTEM FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE GULF COAST AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).

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 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.

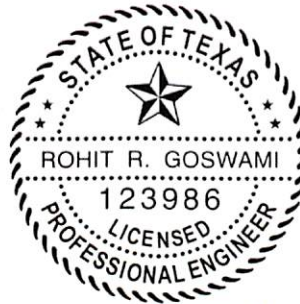
It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine 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.

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GAM RUN 16-025 MAG: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15

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March 22, 2017



Rohit Goswami
3/22/2017

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GAM RUN 16-025 MAG: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15

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Groundwater Division
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March 22, 2017

EXECUTIVE SUMMARY:

The modeled available groundwater for Groundwater Management Area 15 for the Gulf Coast Aquifer System is summarized by decade for the groundwater conservation districts (Table 1) and for use in the regional water planning process (Table 2). The modeled available groundwater estimates range from approximately 515,000 acre-feet per year in 2020 to approximately 518,000 acre-feet per year in 2069 (Table 1). The estimates were extracted from results of a model run using the groundwater availability model for the central part of the Gulf Coast Aquifer System (version 1.01). The model run files, which meet the desired future conditions adopted by district representatives of Groundwater Management Area 15, were submitted to the Texas Water Development Board (TWDB) on June 28, 2016, as part of the Desired Future Conditions Explanatory Report for Groundwater Management Area 15. The explanatory report and other materials submitted to the Texas Water Development Board (TWDB) were determined to be administratively complete on October 20, 2016.

REQUESTOR:

Mr. Tim Andruss, chair of Groundwater Management Area 15.

DESCRIPTION OF REQUEST:

In a letter dated June 23, 2016, Mr. Tim Andruss provided the TWDB with the desired future conditions of the Gulf Coast Aquifer System adopted by the groundwater conservation districts in Groundwater Management Area 15. The Gulf Coast Aquifer System includes the Chicot Aquifer, Evangeline Aquifer, Burkeville Confining Unit and the Jasper Aquifer (including parts of the Catahoula Formation). TWDB staff worked with INTERA Incorporated, the consultant for Groundwater Management Area 15, in reviewing

model files associated with the desired future conditions. We received clarification from INTERA Incorporated, on behalf of Groundwater Management Area 15, on September 18, 2016, concerning assumptions on variances of average drawdown values per county to model results, which was ± 3.5 feet for nearly all areas within the Groundwater Management Area 15. The exception is Goliad County which has a variance in drawdown of ± 5 feet. The desired future conditions for the Gulf Coast Aquifer System, as described in Resolution No. 2016-01 and adopted April 29, 2016, by the groundwater conservation districts within Groundwater Management Area 15, are described below:

Groundwater Management Area 15 [all counties]

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 13 feet in December 2069 from estimated year 2000 conditions.

Aransas County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 0 feet in December 2069 from estimated year 2000 conditions.

Bee County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 7 feet in December 2069 from estimated year 2000 conditions.

Calhoun County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 5 feet in December 2069 from estimated year 2000 conditions.

Colorado County

Drawdown shall not exceed an average of 17 feet in Chicot and Evangeline Aquifers and 23 feet in the Jasper Aquifer in December 2069 from estimated year 2000 conditions.

DeWitt County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 17 feet in December 2069 from estimated year 2000 conditions.

Fayette County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 16 feet in December 2069 from estimated year 2000 conditions.

Goliad County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 10 feet in December 2069 from estimated year 2000 conditions.

Jackson County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 15 feet in December 2069 from estimated year 2000 conditions.

Karnes County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 22 feet in December 2069 from estimated year 2000 conditions.

Lavaca County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 18 feet in December 2069 from estimated year 2000 conditions.

Matagorda County

Drawdown shall not exceed an average of 11 feet in Chicot and Evangeline Aquifers in December 2069 from estimated year 2000 conditions.

Refugio County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 5 feet in December 2069 from estimated year 2000 conditions.

Victoria County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 5 feet in December 2069 from estimated year 2000 conditions.

Wharton County

Drawdown shall not exceed an average of 15 feet in Chicot and Evangeline Aquifers in December 2069 from estimated year 2000 conditions.

Based on the adopted desired future conditions, TWDB has estimated the modeled available groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 15.

METHODS:

The groundwater availability model for the central part of the Gulf Coast Aquifer System (Figure 1) was run using the model files submitted with the explanatory report (GMA 15 and others, 2016). Model-calculated water levels were extracted for the year 2000 and the end of the year 2069, and drawdown was calculated as the difference between water levels at the beginning of 2000 and water levels at the end of 2069. Drawdown averages were calculated for each county by aquifer and for the entire Groundwater Management Area 15 by aquifer. As specified in the explanatory report (GMA 15 and others, 2016), drawdown for cells which became dry during the simulation (water level dropped below the base of the cell) were excluded from the averaging. The calculated drawdown averages were compared with the desired future conditions to verify that the pumping scenario achieved the desired future conditions within one foot.

The 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 are presented by county and groundwater conservation district, subtotaled by groundwater conservation district, and then summed by Groundwater Management Area 15 (Figure 2 and Table 1). Annual pumping rates are also presented by county, river basin, and regional water planning area within Groundwater Management Area 15 (Figure 2 and Table 2).

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. 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 groundwater availability are described below:

- Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System was used for this analysis. See Chowdhury and others (2004) and Waterstone and others (2003) for assumptions and limitations of the model.
- The model has four layers which represent 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).
- The model was run with MODFLOW-96 (Harbaugh and others, 1996).
- Drawdown averages and modeled available groundwater values are based on the extent of the model area rather than official aquifer boundaries (Figures 1 and 2).
- Drawdown for cells with water levels below the base elevation of the cell ("dry" cells) were excluded from the averaging per emails exchanged with INTERA, Inc. dated October 21, 2015.
- Estimates of modeled available groundwater from the model simulation were rounded to whole numbers.
- A model drawdown tolerance of up to 5 feet was assumed for Goliad County and up to 3.5 feet for the rest of Groundwater Management Area 15 when comparing desired future conditions (average drawdown values per county) to model drawdown results.
- Average drawdown by county may include some model cells that represent portions of surface water such as bays, reservoirs, and the Gulf of Mexico.

RESULTS:

The modeled available groundwater for the Gulf Coast Aquifer System that achieves the desired future conditions adopted by Groundwater Management Area 15 increases from approximately 515,000 acre-feet per year in 2020 to approximately 518,000 acre-feet per year in 2069 (Table 1). The modeled available groundwater is summarized by groundwater conservation district and county (Table 1). The modeled available groundwater has also been summarized by county, river basin, and regional water planning area for use in the regional water planning process (Table 2). Small differences of values between table summaries are due to rounding.

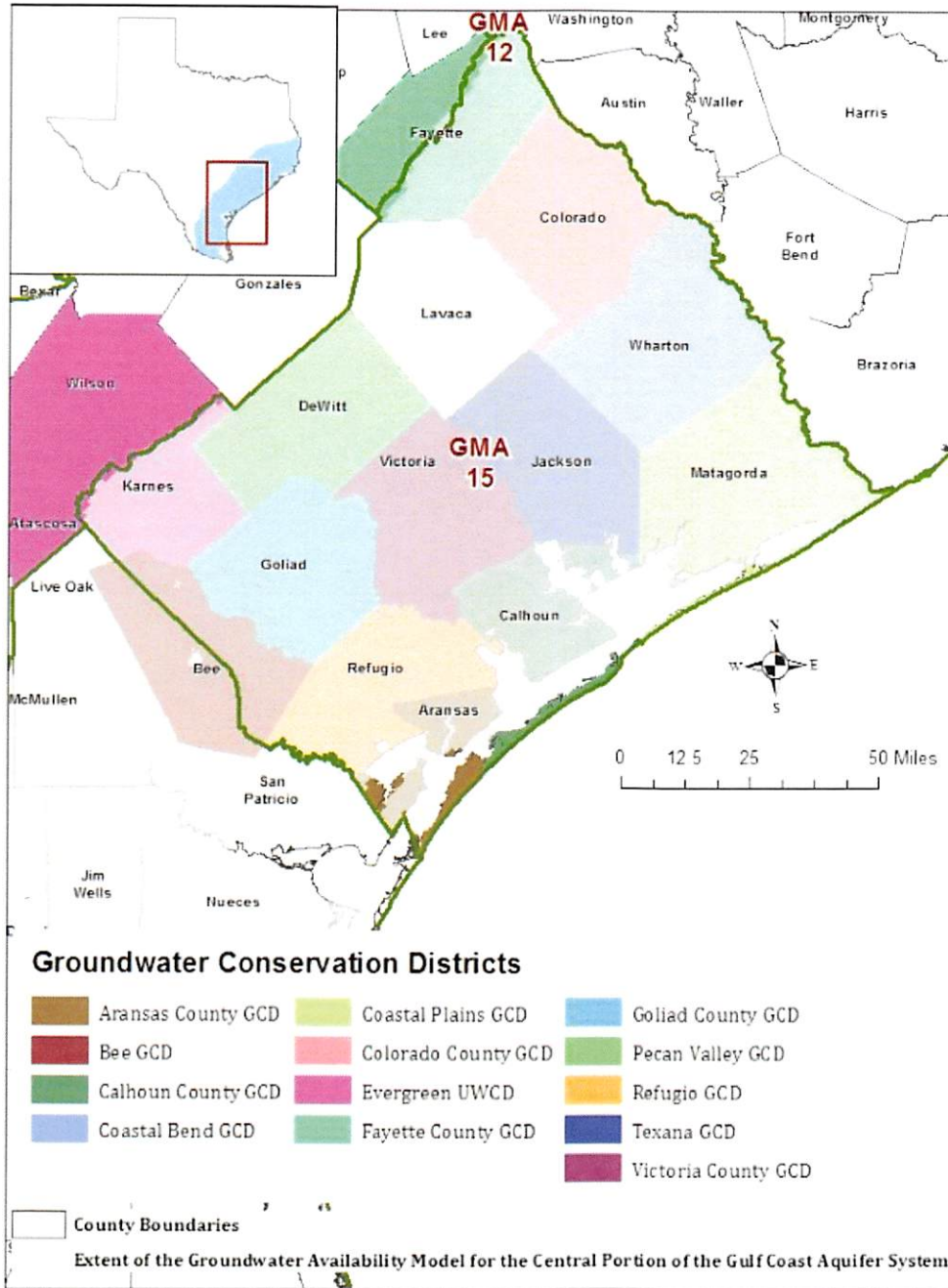


FIGURE 1. MAP SHOWING GROUNDWATER CONSERVATION DISTRICTS (GCDs) AND COUNTIES IN GROUNDWATER MANAGEMENT AREA 15 OVERLAIN ON THE EXTENT OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PORTION OF THE GULF COAST AQUIFER SYSTEM.

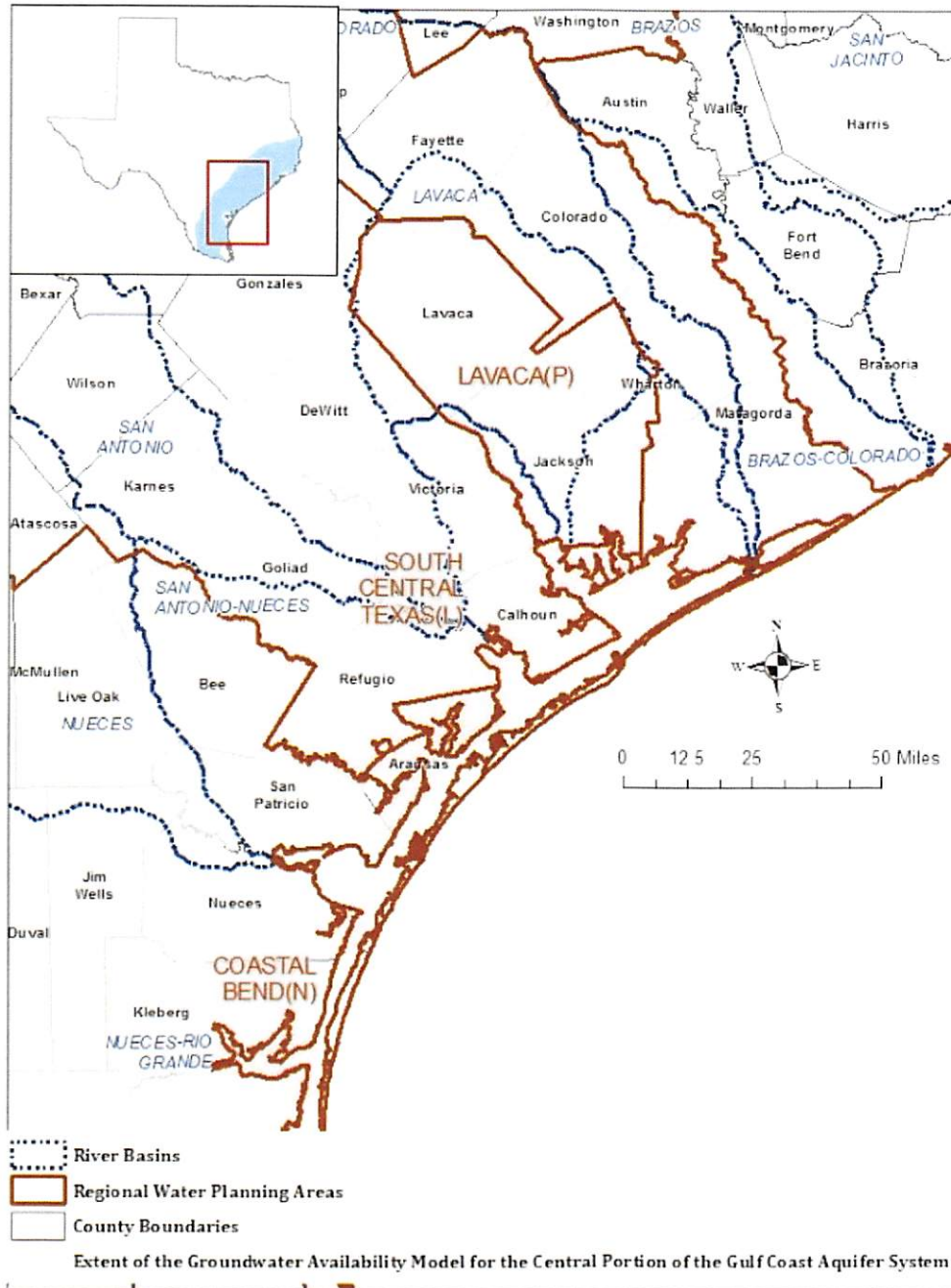


FIGURE 2. MAP SHOWING REGIONAL WATER PLANNING AREAS, GROUNDWATER CONSERVATION DISTRICTS (GCDs), COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 15 OVERLAIN ON THE EXTENT OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PORTION OF THE GULF COAST AQUIFER SYSTEM.

TABLE 1. 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 2010 AND 2069. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2069
Aransas County GCD Total	Aransas	Gulf Coast Aquifer System	1,542	1,542	1,542	1,542	1,542	1,542	1,542
Bee County GCD Total	Bee	Gulf Coast Aquifer System	9,456	9,456	9,431	9,431	9,379	9,379	9,361
Calhoun County GCD Total	Calhoun	Gulf Coast Aquifer System	2,569	7,565	7,565	7,565	7,565	7,565	7,565
Coastal Bend GCD Total	Wharton	Gulf Coast Aquifer System (Chicot and Evangeline)	181,168	181,168	181,168	181,168	181,168	181,168	181,168
Coastal Plains GCD Total	Matagorda	Gulf Coast Aquifer System (Chicot and Evangeline)	38,828	38,828	38,828	38,828	38,828	38,828	38,828
Colorado County GCD	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	79,780	74,964	74,964	72,765	72,765	71,618	71,618
Colorado County GCD	Colorado	Gulf Coast Aquifer System (Jasper)	918	918	918	918	918	918	918
Colorado County GCD Total	Colorado	Gulf Coast Aquifer System	80,698	75,882	75,882	73,683	73,683	72,536	72,536
Evergreen UWCD Total	Karnes	Gulf Coast Aquifer System	10,196	10,196	10,196	3,015	2,917	2,751	2,751
Fayette County GCD Total	Fayette	Gulf Coast Aquifer System	1,977	1,853	1,853	1,853	1,853	1,853	1,703
Goliad County GCD Total	Goliad	Gulf Coast Aquifer System	11,420	11,539	11,539	11,539	11,539	11,552	11,539

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2069
Pecan Valley GCD Total	DeWitt	Gulf Coast Aquifer System	15,471	15,476	15,476	14,485	14,485	14,485	14,485
Refugio GCD Total	Refugio	Gulf Coast Aquifer System	5,847	5,847	5,847	5,847	5,847	5,847	5,847
Texana GCD Total	Jackson	Gulf Coast Aquifer System	76,787	90,482	90,482	90,482	90,482	90,482	90,482
Victoria County GCD Total	Victoria	Gulf Coast Aquifer System	35,640	44,974	49,970	54,966	54,966	59,963	59,963
Total (GCDs)		Gulf Coast Aquifer System	471,599	494,808	499,779	494,404	494,254	497,951	497,770
No District-County	Bee	Gulf Coast Aquifer System	10	10	10	10	10	10	10
No District-County	Lavaca	Gulf Coast Aquifer System	20,253	20,253	20,253	20,253	20,253	20,253	20,239
No district-County Total		Gulf Coast Aquifer System	20,263	20,263	20,263	20,263	20,263	20,263	20,249
Total for GMA 15		Gulf Coast Aquifer System	491,862	515,071	520,042	514,667	514,517	518,214	518,019

TABLE 2 MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Aransas	N	San Antonio- Nueces	Gulf Coast Aquifer System	1,542	1,542	1,542	1,542	1,542
Bee	N	San Antonio- Nueces	Gulf Coast Aquifer System	9,439	9,414	9,414	9,362	9,362
Bee	N	Nueces	Gulf Coast Aquifer System	27	27	27	27	27
Calhoun	L	Colorado- Lavaca	Gulf Coast Aquifer System	5,210	5,210	5,210	5,210	5,210
Calhoun	L	Guadalupe	Gulf Coast Aquifer System	18	18	18	18	18
Calhoun	L	Lavaca-Guadalupe	Gulf Coast Aquifer System	2,330	2,330	2,330	2,330	2,330
Calhoun	L	San Antonio- Nueces	Gulf Coast Aquifer System	7	7	7	7	7
Colorado	K	Brazos-Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	15,342	15,342	15,342	15,342	15,342
Colorado	K	Brazos-Colorado	Gulf Coast Aquifer System (Jasper Aquifer)	49	49	49	49	49
Colorado	K	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	20,506	20,506	20,066	20,066	20,066
Colorado	K	Colorado	Gulf Coast Aquifer System (Jasper Aquifer)	273	273	273	273	273
Colorado	K	Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	39,116	39,116	37,357	37,357	36,210
Colorado	K	Lavaca	Gulf Coast Aquifer System (Jasper Aquifer)	596	596	596	596	596
Dewitt	L	Guadalupe	Gulf Coast Aquifer System	11,358	11,358	10,470	10,470	10,470
Dewitt	L	Lavaca-Guadalupe	Gulf Coast Aquifer System	417	417	417	417	417
Dewitt	L	Lavaca	Gulf Coast Aquifer System	2,935	2,935	2,935	2,874	2,874
Dewitt	L	San Antonio	Gulf Coast Aquifer System	766	766	724	724	724

GAM Run 16-025 MAG: Modeled Available Groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 15

March 22, 2017

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County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Fayette	K	Brazos	Gulf Coast Aquifer System	2	2	2	2	2
Fayette	K	Colorado	Gulf Coast Aquifer System	989	989	989	989	989
Fayette	K	Lavaca	Gulf Coast Aquifer System	862	862	862	862	862
Goliad	L	Guadalupe	Gulf Coast Aquifer System	4,377	4,377	4,377	4,377	4,380
Goliad	L	San Antonio- Nueces	Gulf Coast Aquifer System	1,190	1,190	1,190	1,190	1,195
Goliad	L	San Antonio	Gulf Coast Aquifer System	5,972	5,972	5,972	5,972	5,977
Jackson	P	Colorado-Lavaca	Gulf Coast Aquifer System	28,025	28,025	28,025	28,025	28,025
Jackson	P	Lavaca-Guadalupe	Gulf Coast Aquifer System	12,875	12,875	12,875	12,875	12,875
Jackson	P	Lavaca	Gulf Coast Aquifer System	49,582	49,582	49,582	49,582	49,582
Karnes	L	Guadalupe	Gulf Coast Aquifer System	11	11	11	11	11
Karnes	L	Nueces	Gulf Coast Aquifer System	1,057	1,057	78	78	78
Karnes	L	San Antonio	Gulf Coast Aquifer System	9,082	9,082	2,880	2,782	2,616
Karnes	L	San Antonio-Nueces	Gulf Coast Aquifer System	46	46	46	46	46
Lavaca	P	Guadalupe	Gulf Coast Aquifer System	41	41	41	41	41
Lavaca	P	Lavaca-Guadalupe	Gulf Coast Aquifer System	401	401	401	401	401
Lavaca	P	Lavaca	Gulf Coast Aquifer System	19,811	19,811	19,811	19,811	19,811
Matagorda	K	Brazos-Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	15,282	15,282	15,282	15,282	15,282
Matagorda	K	Colorado-Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	20,329	20,329	20,329	20,329	20,329
Matagorda	K	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	3,217	3,217	3,217	3,217	3,217
Refugio	L	San Antonio- Nueces	Jasper Aquifer	5,526	5,526	5,526	5,526	5,526
Refugio	L	San Antonio	Gulf Coast Aquifer System	321	321	321	321	321
Victoria	L	Guadalupe	Gulf Coast Aquifer System	17,600	22,596	27,592	27,592	27,592
Victoria	L	Lavaca-Guadalupe	Gulf Coast Aquifer System	25,451	25,451	25,451	25,451	30,448
Victoria	L	Lavaca	Gulf Coast Aquifer System	234	234	234	234	234
Victoria	L	San Antonio	Gulf Coast Aquifer System	1,689	1,689	1,689	1,689	1,689

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Wharton	K	Brazos-Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	50,527	50,527	50,527	50,527	50,527
Wharton	K	Colorado-Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	16,196	16,196	16,196	16,196	16,196
Wharton	P	Colorado-Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	14,091	14,091	14,091	14,091	14,091
Wharton	K	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	35,910	35,910	35,910	35,910	35,910
Wharton	P	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	873	873	873	873	873
Wharton	K	Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	579	579	579	579	579
Wharton	P	Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	62,992	62,992	62,992	62,992	62,992
GMA 15 Total			Gulf Coast Aquifer System	515,071	520,042	514,667	514,517	518,214

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, A., Wade, S., Mace, R.E., and Ridgeway, C. 2004. Groundwater Availability of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999: Texas Water Development Board, unpublished report.
- 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 Ground-Water Flow Model: U.S. Geological Survey, Open-File Report 96-485.
- 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 Engineering, Inc., and Parsons, Inc., 2003, Groundwater Availability of the Central Gulf Coast Aquifer: Numerical Simulations to 2050, Central Gulf Coast, Texas: Contract draft report submitted to Texas Water Development Board

Public Hearing Notice

Pursuant to Chapter 36, Texas Water Code, the Texana Groundwater Conservation District will conduct a public hearing on the 2018 Texana Groundwater Conservation District Management Plan - Proposed at 8:30 A.M. on Thursday, May 17, 2018 at the County Services Building, 411 N. Wells St, Edna, Texas 77957. 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 411 N. Wells St, Edna, Texas 77957. Questions or comments should be directed to Candace Whittley, General Manager at Texana Groundwater Conservation District, 411 N. Wells St, Edna, Texas 77957 or 361-781-0624.

RESOLUTION

Resolution Number: 2018-05-17-A

**Resolution Adopting the Texana Groundwater Conservation
District Management Plan**


WHEREAS on May 2, 2018, a Notice of Hearing was published in the Jackson County Herald-Tribune newspaper regarding a public hearing on the adoption of the Texana Groundwater Conservation District Management Plan; and

WHEREAS on May 17, 2018, the Texana Groundwater Conservation District Board of Directors with a quorum being present, conducted a public hearing regarding the adoption of the Texana Groundwater Conservation District Management Plan; and

WHEREAS, the Texana 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 2018 Texana Groundwater Conservation District Management Plan is **ADOPTED** as described in the Texana Groundwater Conservation District Management Plan attached hereto and mad 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 4 ayes and 0 nays on this 17th day of May 2018.


President, Texana Groundwater Conservation District

I, the undersigned, do hereby certify that the above resolution was adopted by the Board of Directors of the Texana Groundwater Conservation District on the 17th day of May 2018.


Director, Texana Groundwater Conservation District

Texana Groundwater Conservation District



6/27/2018

Jackson County Countywide Drainage District
213 County Road 325
Inez, TX 77968

RE: Management Plan

To Whom it may concern:

Please find enclosed a copy of the approved District Management Plan for the Texana 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,


Candace Whittley
General Manager

Texana Groundwater Conservation District



6/27/2018

Victoria County Groundwater Conservation District
Attn: Mr. Tim Andruss
2805 N. Navarro St. Suite 210
Victoria, Texas 77901

RE: Victoria County Groundwater Conservation District

Dear Mr. Tim Andruss,

Please find enclosed a copy of the approved District Management Plan for the Texana 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,


Candace Whittle
General Manager

Texana Groundwater Conservation District



6/27/2018

City of Laward
36 Espirita Ave,
Laward, TX 77970

RE: Management Plan

To Whom it may concern:

Please find enclosed a copy of the approved District Management Plan for the Texana 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,


Candace Whittley
General Manager

Texana Groundwater Conservation District



6/27/2018

City of Ganado
P.O. Box 264
Ganado, TX 77962

RE: Management Plan

To Whom it may concern:

Please find enclosed a copy of the approved District Management Plan for the Texana 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,


Candace Whittley
General Manager

Texana Groundwater Conservation District



6/27/2018

City of Edna
126 Main St.
Edna, TX 77957

RE: Management Plan

To Whom it may concern:

Please find enclosed a copy of the approved District Management Plan for the Texana 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,


Candace Whittley
General Manager

Texana Groundwater Conservation District



6/27/2018

Lavaca-Navidad River Authority
P.O. Box 429
Edna, TX 77957

RE: Management Plan

To Whom it may concern:

Please find enclosed a copy of the approved District Management Plan for the Texana 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,


Candace Whittley
General Manager

Texana Groundwater Conservation District



6/27/2018

Jackson County WCID 2
P.O. Box 97
Vanderbilt, TX 77991

RE: Management Plan

To Whom it may concern:

Please find enclosed a copy of the approved District Management Plan for the Texana 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,

Candace Whittley
General Manager

Texana Groundwater Conservation District



6/27/2018

Jackson County WCID 1
P.O. Box 407
Lolita, TX 77971

RE: Management Plan

To Whom it may concern:

Please find enclosed a copy of the approved District Management Plan for the Texana 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,

Candace Whittley
General Manager

Texana Groundwater Conservation District



6/27/2018

Jackson County Countywide Navigation District
P.O. Box 1212
Ganado, TX 77962

RE: Management Plan

To Whom it may concern:

Please find enclosed a copy of the approved District Management Plan for the Texana 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,


Candace Whittley
General Manager