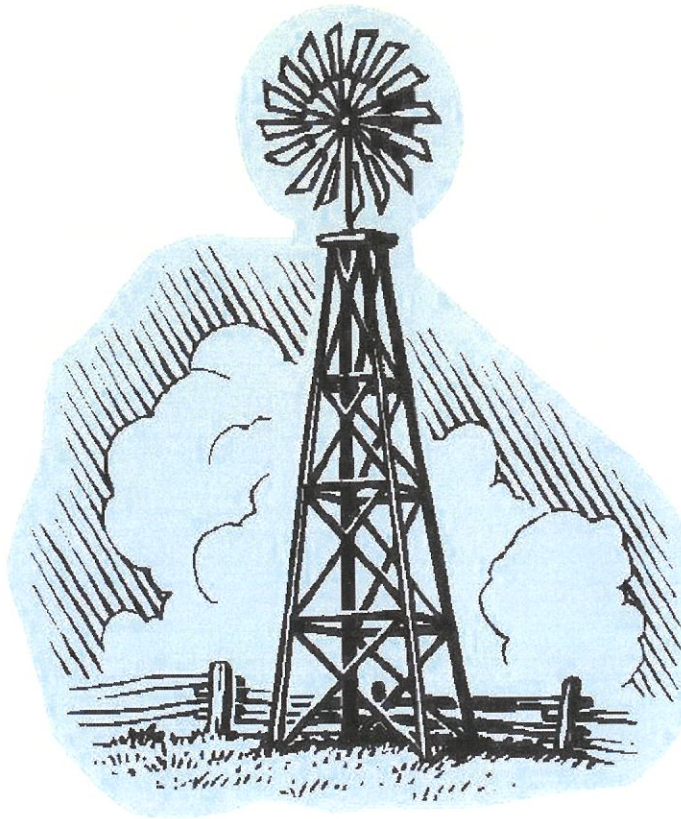


Coastal Plains Groundwater Conservation District Groundwater Management Plan



CPGCD Board Adoption: 10-30-03

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Coastal Plains Groundwater Conservation District

Groundwater Management Plan

November 2014, Amended November ____ 2025

I. District Mission

The Coastal Plains Groundwater Conservation District (the District) is committed to manage and protect the groundwater resources of the District. The District is committed to maintaining a sustainable, adequate, reliable, cost effective and high quality source of groundwater to promote the vitality, economy and environment of the District. The District will work with and for the citizens of the District and cooperate with other local, regional and state agencies involved in the study and management of groundwater resources. The District will take no action without a full consideration of the groundwater needs of the citizens of the District and due consideration of private property rights.

II. Purpose of Management Plan

Chapter 36 of the Texas Water Code establishes the actions necessary for groundwater conservation districts to manage and conserve the groundwater resources of the State of Texas. Chapter 36 (TWC) requires 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.

The administrative requirements of the Chapter 36, Texas Water Code, provisions for groundwater management plan development are specified in 31 Texas Administrative Code, Chapter 356 of the Texas Water Development Board Rules. This plan fulfills all requirements for groundwater management plans in Chapter 36, Texas Water Code, and administrative rules of the Texas Water Development Board.

III. Time Period of Management Plan

This plan shall be in effect for a period of five years from the date of approval by TWDB, unless a new or amended management plan is adopted by the District Board of Directors and approved by TWDB. This plan will be reviewed within five years as required by Sec. 36.1072(e), Texas Water Code. The District will consider the necessity to amend the plan and re-adopt the plan with or without amendments as required by Sec. 36.1072(e), Texas Water Code.

IV. Coastal Plains Groundwater Conservation District

The District was created in 2001 by the 77th Texas Legislature enacting HB 1038. This act is recorded in Chapter 1294 of the Acts of the 77th Texas Legislature, and codified as Chapter 8831, Special District Local Laws Code. The District was confirmed by local election held in Matagorda County on November 6, 2001 with 68.7 percent of the voters in favor of the District.

The District is located in Matagorda County, Texas. The District boundaries are the same as the area and extent of Matagorda County. The District is bounded by Jackson, Calhoun, Brazoria and Wharton Counties. As of the plan date, groundwater conservation districts (GCDs) exist in all counties bounding the district. The GCDs neighboring the District are: Brazoria County GCD (Brazoria), Calhoun County GCD (Calhoun County), Coastal Bend GCD (Wharton), and Texana GCD (Jackson) (see Figure 1).

The District is located in Groundwater Management Area (GMA) 15. Chapter 36, Texas Water Code, authorizes the District to co-ordinate its management of groundwater with other GCDs in GMA 15. The other confirmed GCDs that are located in GMA 15 are: Fayette County GCD (Fayette), Pecan Valley GCD (DeWitt), Texana GCD (Jackson), Calhoun County GCD (Calhoun County), Coastal Bend GCD (Wharton), Colorado County GCD (Colorado), Victoria County GCD (Victoria), Evergreen UWCD (Karnes), Goliad County GCD (Goliad), Refugio County GCD (Refugio), Aransas County GCD, Corpus Christi ASR CD, and Bee GCD (Bee). (See Figure 2).

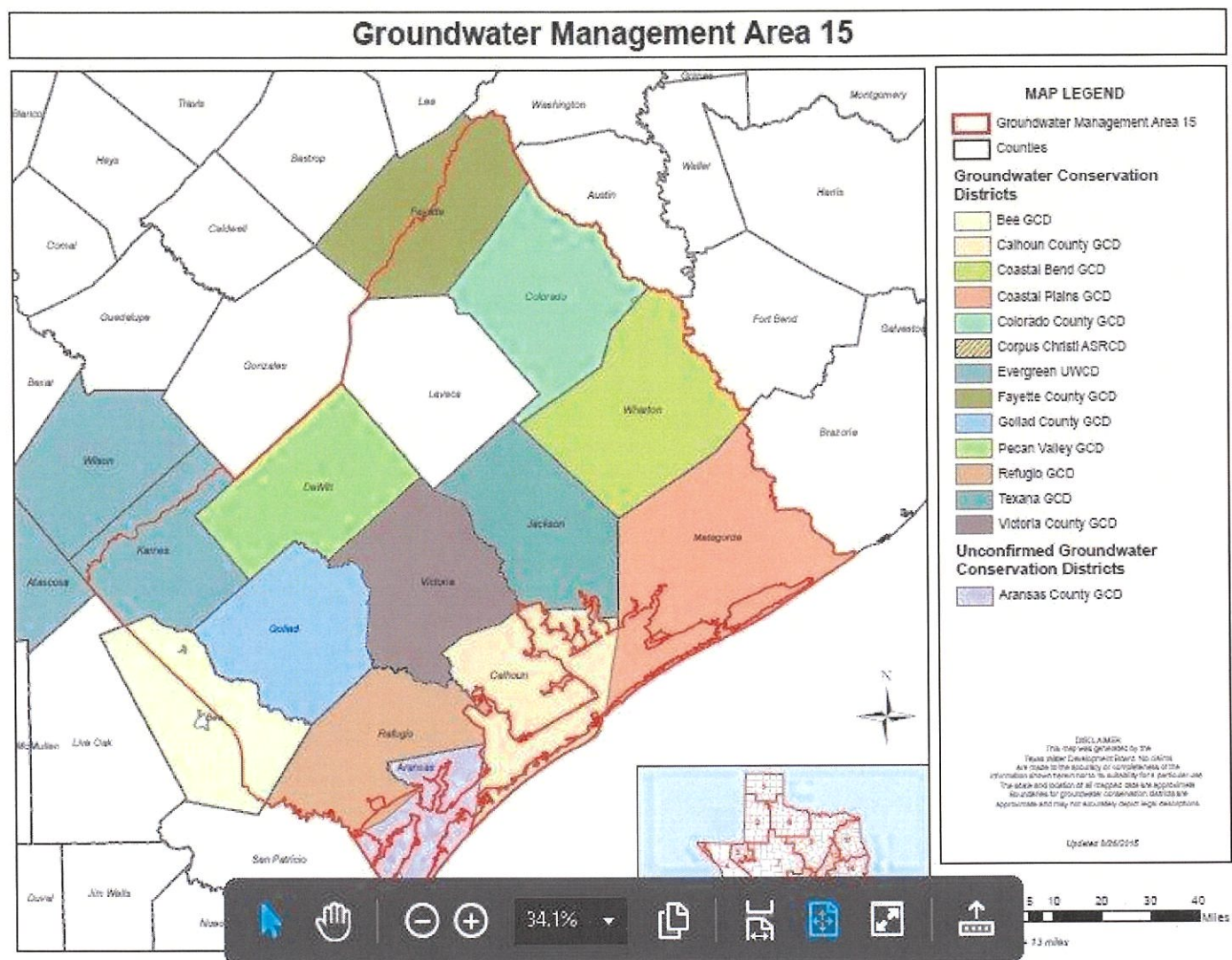


Figure 1. Neighboring Districts to Coastal Plains Groundwater Conservation District

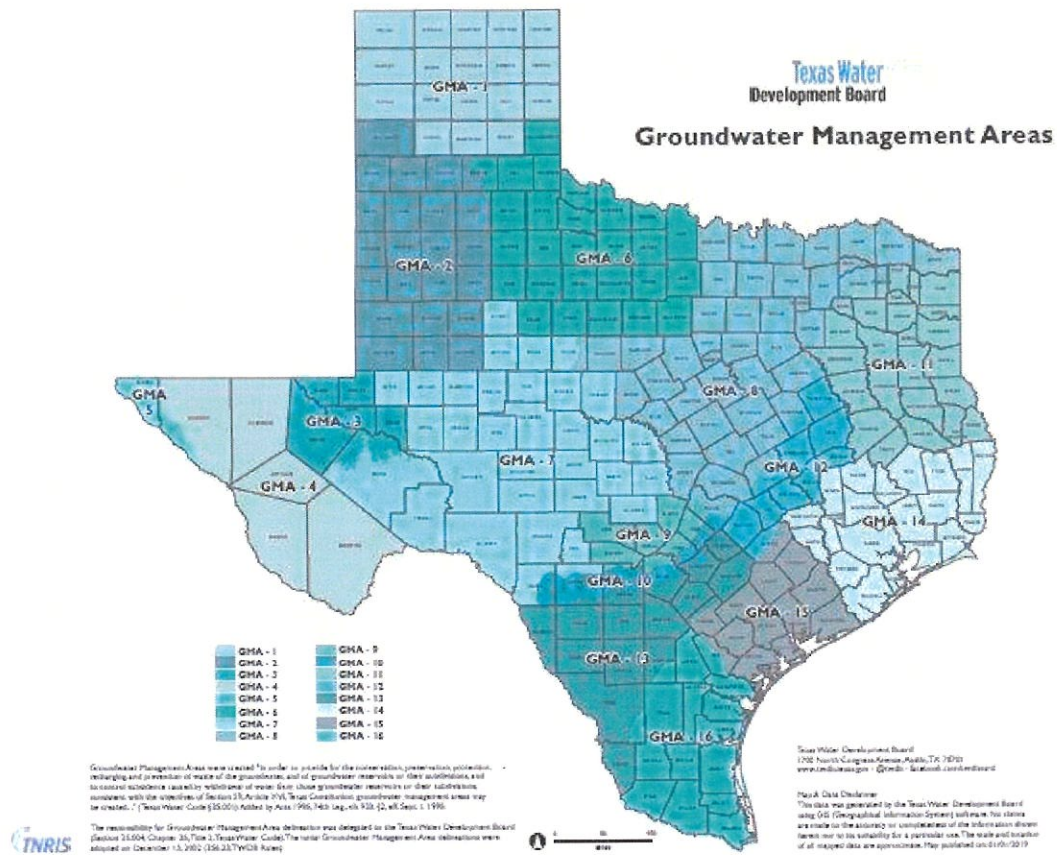


Figure 2. Groundwater Management Areas in Texas

The District Board of Directors is composed of seven members elected to staggered four-year terms. Four directors are elected from county precincts and three directors are elected at-large. The Board of Directors holds regular meetings at the District offices on the fourth floor of the County of Matagorda Office Building at 2200 Seventh Street in Bay City, Texas. Meetings of the Board of Directors are public meetings and held in accordance with requirements of the Texas Open Meetings Act and Chapter 36, Texas Water Code. The Board of Directors meetings are announced on the District website www.coastalplainsgcd.com along with other items of interest posted by the District.

V. Authority of the District

The District derives its authority to manage groundwater within the District by virtue of the powers granted and authorized in the District's enabling act, Chapter 8831, Special District Local Laws Code. (Appendix A). The District, acting under authority of the enabling legislation, assumes all the rights and responsibilities of a groundwater conservation district specified in Chapter 36, Texas Water Code. Upon adoption of the District rules by the Board of Directors in a public meeting, the authority to manage the use of groundwater in the District will be governed at all times by the due process specified in the District rules. (Appendix B).

VI. Geological Formations and Aquifers

All groundwater pumped in Matagorda County originates from the Gulf Coast Aquifer System. The Gulf Coast Aquifer System is a major aquifer paralleling the Gulf of Mexico coastline from the Louisiana border to the border of Mexico (George and others, 2011). The Gulf Coast Aquifer System is comprised of, from shallowest to deepest, the Chicot Aquifer, the Evangeline Aquifer, the Burkeville Confining Unit, and the Jasper Aquifer, with parts of the Catahoula Formation acting as the Catahoula Confining System.

The most recent studies funded by the TWDB that delineate the structure and stratigraphy of the Gulf Coast Aquifer System are by Young and others (2010; 2012). These studies subdivided the aquifer units into geological formations based on chronostratigraphic correlations. Figure 3 shows the relationships between geological formations and aquifers as defined by Young and others (2010, 2012) and study of the Catahoula Aquifer (LGB Guyton and INTERA, 2013). Figure 4 is a vertical cross-section through the Gulf Coast Aquifer System that crosses through Matagorda County.

ERA	Epoch		Est. Age (M.Y)	Geologic Unit	Hydrogeologic Unit
Cenozoic	Pleistocene		0.7	Beaumont	CHICOT AQUIFER
			1.6	Lissie	
	Pliocene		3.8	Willis	
			11.2	Upper Goliad	EVANGELINE AQUIFER
	Miocene	Late	14.5	Lower Goliad	
			17.8	Upper Lagarto	BURKEVILLE
		Middle		Middle Lagarto	
				Lower Lagarto	JASPER AQUIFER
		Early	24.2	Oakville	
	Oligocene		32	Frio	CATAHOULA
			34	Vicksburg	

Figure 3. Geologic and Hydrologic Units of the Gulf Coast aquifer System in Matagorda County, Modified from (based on Young and others (2010; 2012) and LGB Guyton and INTERA (2012)).

All of the District's registered wells are located in either the Chicot Aquifer or the Evangeline Aquifer. As shown in Figure 4, these two aquifers comprise the majority of the upper 2,000 feet of the Gulf Coast Aquifer System in Matagorda County. These two aquifers are described below.

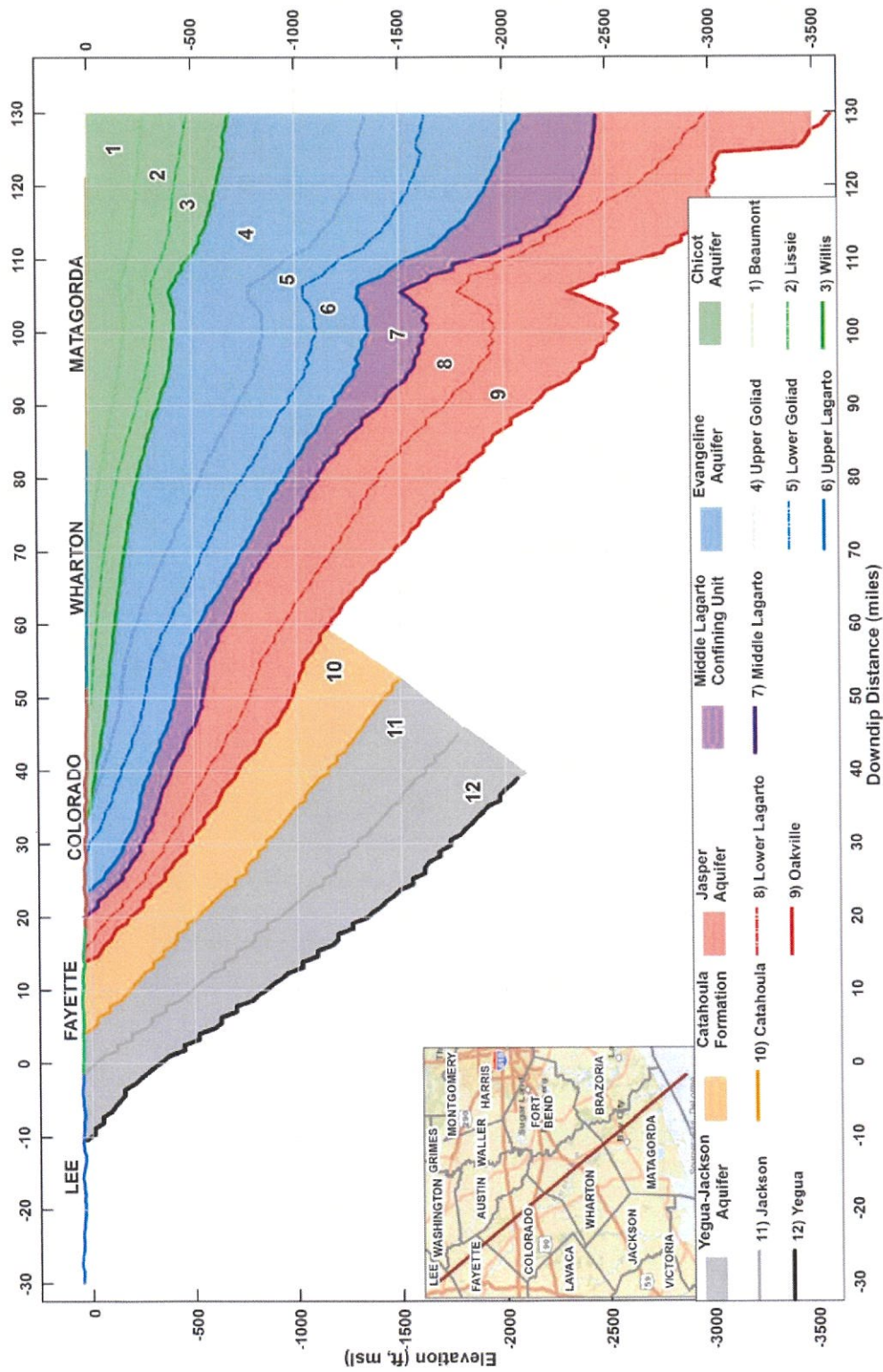


Figure 4. Vertical Cross-Section of the Geological Units through the middle of Matagorda County (Steve Young, Intera)

Chicot Aquifer - The Chicot Aquifer includes, from the shallowest to deepest, the Beaumont and Lissie Formations of Pleistocene Epoch and the Pliocene Epoch Willis Formation. The Beaumont outcrop covers a large part of the lower coastal plain except where cut by modern river valleys or covered by Holocene wind-blown sand in south Texas. The Beaumont is often composed of clay-rich sediments transected by sandy fluvial and deltaic-distributary channels. Much of the original depositional morphology of Beaumont fluvial, deltaic, and marginal-marine systems, such as abandoned channels and relict beach ridges, can be seen at the surface in aerial photographs. At outcrop the Lissie is composed of fine-grained sand and sandy clay and unconformably overlies and onlaps the Willis (Morton and Galloway, 1991). The Lissie is dominated by nonmarine depositional systems in the onshore part across most of the Texas Gulf Coast, although some shore-zone facies occur in Matagorda County as well as other coastal counties. At outcrop, the Willis is composed of gravelly coarse sand in several upward-fining successions that are interpreted as incised valley fills overlain by transgressive deposits (Morton and Galloway, 1991). Near the modern shoreline and offshore, Willis deltaic and marine systems record four cyclic depositional episodes bounded by transgressive shales (Galloway and others, 2000). Willis fluvial systems include dip-oriented sand-rich channel-fill facies and sand-poor interchannel areas, which grade toward the coast into shore-parallel deltaic and shore-zone sands and interdeltic muddy bay deposits. Individual Willis sands vary widely in thickness from about 20 to 200 feet and are separated by muds of similar thickness (Knox and others, 2006).

Evangeline Aquifer - The Evangeline Aquifer includes the upper Goliad Formation of earliest Pliocene Epoch and late Miocene Epoch, the lower Goliad Formation of middle Miocene Epoch, and the upper unit of the Lagarto Formation (a member of the Fleming Group) of middle Miocene Epoch. The Goliad Formation in Matagorda County was formed as part of the Eagle Lake Extrabasinal fluvial system. In this system the Goliad fluvial depositional systems consist of channel-fill and interchannel deposits (Young and others, 2012). Channel belts typically are 10 to 20 miles wide with about 50% sands and the interchannel deposits having less than 20 percent sand. The Upper Lagarto is comprised of deposits from the Fleming Group. The Fleming Group comprises several large fluvial systems that grade downdip into equally large delta and shore-zone systems (Rainwater, 1964; Doyle, 1979; Spradlin, 1980; DuBar, 1983; Galloway and others, 1982, 1991). In Matagorda, the Fleming sands tend to be aligned parallel to the shoreline and to have sand contents between 10 and 40 percent (Young and others, 2012).

Burkeville - The Burkeville Confining Unit is represented by the middle unit of the Lagarto Formation of middle and early Miocene Epoch, which is the chronostratigraphic layer with the most widespread clayey interval between the Evangeline and Jasper Aquifers.

Jasper Aquifer - Jasper Aquifer includes the lower Lagarto unit of early Miocene Epoch, the early Miocene Oakville sandstone member of the Fleming Group, and the sandy intervals of the Oligocene Epoch Catahoula Formation.

VII. Geography of the District

The District is located within the Gulf Coastal Plains region of Texas. The Matagorda County topography ranges from very flat coastal marshes to very gently rolling hills. There is a very

gentle seaward slope of approximately 2 feet per mile. The drainage of Matagorda County streams were determined by the initial slope of the land. There are three major drainages in the county: Tres Palacios Creek in the west, the Colorado River in the center, and Caney Creek in the east. The valley of the Colorado River has steep walls and smaller streams exhibit the V-shaped cross profile of streams in the youthful stage. The very poorly drained coastal marshes have sinuous tidal channels and shallow round lakes. The Colorado River delta, meander belts in the stream valleys, coastal marshes, barrier islands, wash-over fans, and abandoned river valleys are other notable features.

Piercement type salt domes affect the topography of the county. At Old Gulf a subsurface salt dome caused a topographic high about 40 feet above the surrounding land surface. Sulfur associated with the salt dome was mined intensively and the area is now a topographic low. At Clemville the slight surface expression of another salt dome has been reduced by the removal of oil and gas. (Hammond, 1969)

VIII. Management of Groundwater Supplies

The District will evaluate and monitor groundwater conditions and regulate production consistent with this plan and the District Rules (Appendix B). An electronic version of these Rules can be found at <https://coastalplainsgcd.com/regulatory-info/> Production will be regulated as needed to conserve groundwater, and protect groundwater users, in a manner not to unnecessarily and adversely limit production or impact the economic viability of the public, landowners and private groundwater users and achieve the Desired Future Conditions. In consideration of the importance of groundwater to the economy and culture of the District, the District will identify and engage in activities and practices that will permit groundwater production and, as appropriate, protect the aquifer and groundwater in accordance with this Management Plan and the District's Rules. A monitoring well network will be maintained to monitor aquifer conditions within the District. The District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions as appropriate in public meetings of the Board or public announcements. The District will undertake investigations, and co-operate with third-party investigations, of the groundwater resources within the District, and the results of the investigations will be made available to the public upon being presented at a meeting of the Board.

The District will amend the current rules to implement this plan to regulate groundwater withdrawals by means of well spacing and production limits as appropriate to implement this Plan. In making a determination to grant a permit or limit groundwater withdrawals, the District will consider the available evidence and, as appropriate and applicable, weigh the public benefit against the individual needs and hardship.

To accomplish the purposes of Texas Water Code Chapter 36, and to achieve the stated purposes and goals of the District, including managing the sustainability of the aquifers and preventing significant, sustained water-level declines within the aquifers, the District shall manage total groundwater production on a long-term basis to achieve the applicable desired future condition. The District may establish production limits on new regular permits or existing permits. All permits are issued subject to any future production limits adopted by the District.

The factors that the District may consider in making a determination to grant a drilling and operating or operating permit or limit groundwater withdrawals will include:

1. The purpose of the rules of the District;
2. The equitable distribution of the resource;
3. The economic hardship resulting from grant or denial of a permit, or the terms prescribed by the permit;
4. This Management Plan and Desired Future Conditions of the District as adopted in Joint Planning under Sec. 36.108, Texas Water Code; and
5. The potential effect the permit may have on the aquifer, and groundwater users.

The transport of groundwater out of the District will be regulated by the District according to the Rules of the District.

As allowed under §36.116(b), Texas Water Code, in promulgating rules, the district may preserve historic or existing use to the maximum extent practicable. If production limitations are necessary, historic user permits and regular permits will be required to reduce permits based on aquifer levels. The Board will determine if permit limits are necessary, and will consider:

1. the modeled available groundwater determined by the Executive Administrator;
2. the Executive Administrator's estimate of the current and projected amount of groundwater produced under exemptions granted by District Rules (Appendix B) and §36.117, Texas Water Code;
3. the amount of groundwater authorized under permits previously issued by the District;
4. a reasonable estimate of the amount of groundwater that is actually produced under permits issued by the District; and
5. yearly precipitation and production patterns.

Permit limitations will be triggered if average aquifer levels decline below the Desired Future Condition. The first permit limitations will be triggered when aquifer levels drop at least one foot below the Desired Future Condition level; the second permit limitations will be triggered when aquifer levels drop at least two feet below the Desired Future Condition level; the third permit limitations will be triggered when aquifer levels drop at least four feet below the Desired Future Condition level. The percentage reduction will be based on hydrogeologic calculations of that amount of production that must be reduced to restore aquifer levels above the Desired Future Condition level. The exact amount of percentage reduction for each type of permit will be established by rule.

The District will employ reasonable and necessary technical resources at its disposal to evaluate the groundwater resources available within the District and to determine the effectiveness of regulatory or conservation measures. A public or private user may appeal to the Board for discretion in enforcement of the provisions of the water supply deficit contingency plan on grounds of adverse economic hardship or unique local conditions. The exercise of discretion by the Board shall not be construed as limiting the power of the Board.

IX. Desired Future Conditions

Per §36.001, Texas Water Code, "Desired future condition" means a quantitative description, adopted in accordance with Section 36.108, Texas Water Code, of the desired condition of the groundwater resources in a management area at one or more specified future times. To establish a Desired Future Condition, the District shall participate in the joint planning process in GMA 15 as defined per §36.108, Texas Water Code, including establishment of Desired Future Conditions (DFCs) for management areas within the District.

Based on the GMA 15 joint planning resolution dated October 14, 2021, the member Districts agreed to adopt the following Desired Future Condition:

“The Desired Future Condition for the counties in the groundwater management area (gma-specific DFC) shall not exceed an average drawdown of 13 feet for the Gulf Coast Aquifer System at December 2080. Desired Future Conditions for each county within the groundwater management area (county-specific DFCs) shall not exceed the values specified in Table 6 at December 2080.” (Desired Future Condition Explanatory Report for Groundwater Management Area 15, 2021)(Keester and others 2021)

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

Figure 5. . Table 6 from Desired Future Condition Explanatory Report for Groundwater Management Area 15, 2021)(Keester and others 2021) For the purpose of joint planning in GMA 15, the District considers the Burkeville Formation and Jasper Aquifer as non-relevant aquifers. Thus, the District will not have a DFC for the Burkeville and the Jasper Aquifer. For the Chicot and the Evangeline Aquifers, the District will manage groundwater supplies to achieve a DFC of not more than 11 ft of average drawdown in the Chicot and Evangeline Aquifers over the period from January 2000 to December 2080. To manage the Chicot and Evangeline Aquifers so that 11 ft DFC will not be violated, the District will adopt rules to regulate groundwater withdrawals by means of well spacing and production limits as appropriate. If the Board finds it is necessary to reduce the maximum allowable production or the permitted production within the District or for any management zone to accomplish the desired future conditions, preserve and conserve groundwater or protect groundwater users within the District or a management zone, the Board shall establish a schedule for reducing the maximum allowable production or permitted production for the District or a management zone.

In Appendix E (GMA 15 Explanatory Report Appendices), you will find Appendix 2 – DFC Resolution 2021-01 to adopt the desired future conditions for Groundwater Management Area 15 aquifers.

District Performance in Achieving the Desired Future Condition - In 2024, the Coastal Plains GCD adopted the CPGCD DFC Achievement Policy. CPGCD developed and began monitoring a network of wells designated to monitor for DFC achievement in 2014. This network consists of 16 wells geographically spaced throughout the county with varying depths. Since this network of wells was not established until 2014, CPGCD decided to use TWDB monitor wells to establish the baseline water levels in the year 2000 and utilize those same baseline levels for CPGCD's 16 DFC monitor wells. CPGCD uses the difference between the CPGCD and TWDB measurements for 2014 to extrapolate data for the prior years. CPGCD chooses to use the average difference of TWDB/CPGCD networks from 2014-2023 of 7 feet to estimate prior years' average water level for CPGCD well network. By using this method, CPGCD established an average water level for 2000 starting conditions of 52.4 feet below land surface. If the average water levels in the CPGCD monitor wells taken in March of calendar year drop below 63.4 feet below land surface at (exceeding the DFC of an average of 11 feet of decline since 2000), CPGCD would consider action to reduce permit allocations based on CPGCD Rule Section 6.11. As of 2025, the current average water level for Matagorda County was 51.8 ft below land surface. (11.6 ft above the DFC consideration level.)

X. Modeled Available Groundwater

Modeled available groundwater is defined in §36.001, 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. Table X.1 provides the MAG values for Matagorda County as determined by GAM Run 21-020 MAG (Dowlearn, 2022) (Table 2). These MAG values are based on the DFC established by GMA 15 (Appendix B, Desired Future Condition Explanatory Report for Groundwater Management Area 15, 2021)(Keester and others 2021).

Table X.1 Modeled Available Groundwater (acre-feet/yr) for the Gulf Coast Aquifer System in Matagorda County as Determined by GAM Run 21-020 MAG (Dowlearn, 2022) (Table 2)

Year	Modeled Available Groundwater (MAG) (acre-feet/yr)
2010	38,892
2020	38,892
2030	38,892
2040	38,892
2050	38,892
2060	38,892
2069	38.892

The MAGs listed in Table X.1 were developed through the application of Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System (Chowdhury and others, 2004). This model includes four layers represent the Chicot Aquifer (layer 1), the Evangeline Aquifer (layer 2), the Burkeville Unit (layer 3), and the Jasper Aquifer including portions of the Catahoula Unit (layer 4). (Keester and other 2021) provides the description of the methods, assumptions, and results of the groundwater availability model simulations.

The District will consider the MAGs in Table X.1 along with other factors, when issuing permits. Implicit in this consideration is recognition of the TWDB disclaimer associated with MAG report (Dowlearn, 2022) that:

“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.

Because the application of the groundwater model was designed to address regional scale questions, the results are the 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.”

XI. Groundwater Monitoring

The District will maintain a monitoring well network that will be used by the District to obtain measured water levels, and will also utilize any data from wells monitored by TWDB. Groundwater monitoring will be designed to monitor changes in groundwater conditions over time. The District encourages well owners to volunteer wells to be used as part of the monitoring network. The District will accept wells into, or replace an existing well in, the monitoring network. The selection process will consider the well proximity to other monitoring wells, to permitted and exempt wells, to streams, and to geographic and political

boundaries. If no suitable well locations can be found to meet the monitoring objectives in a specific aquifer or management zone, the District may evaluate the benefits of converting an oil and gas well to a water well, drilling and installing a new well, or using modeled water levels for that area until such time as a suitable well can be obtained for monitoring.

XII. Estimate of the Amount of Groundwater Used in the District on Annual Basis

The TWDB estimated historical water use in the district, is provided in Appendix B, in the Table titled, “Estimated Historical Water Use: TWDB Historical Water Use Survey (WUS) Data.

The Coastal Plains GCD began permitting non-exempt wells in 2005. Since that time, annual water use reports were collected at the District level from each permitted user in the District at the end of each calendar year. Exempt uses (*) were calculated based on the initial well registration of a well owner. The reported data for groundwater use within the District for years 2005-2018 is shown below broken down in types of use in Table XII.2.

**Table XII.2. Coastal Plains Groundwater Conservation Total Groundwater Use Source:
CPGCD database – January 2020**

Type of Use	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Aquaculture	1203	809	2985	2660	2191	1704	2771	5056	4568	4042	2226	2453	2202	3605
Commercial/Industrial	1693	2744	3582	2567	2759	2789	2949	4063	6034	5565	4971	4623	4574	5378
Crop Rice	2241	5420	1081	2260	13660	4940	14213	4314	7506	11573	10777	5592	4536	4956
Row Crop	0	0	4	93	38	35	256	46	1540	1681	648	411	400	607
Municipal	2908	2770	3294	3907	3802	3150	4258	3411	3885	3281	3505	3214	3169	7264
Nursery/Trees	0	0	130	120	151	130	8	130	130	130	130	130	130	150
Turfgrass	11669	8279	5438	12011	14541	12905	27278	18245	16469	13091	9817	9312	9628	7863
Waterfowl	54	0	605	357	712	548	3396	2680	1523	1726	2903	2721	3189	588
Pasture/Hay	102	1275	181	130	1186	697	3410	609	1426	932	352	747	584	388
Recreational	0	0	11	14	0	0	0	0	0	0.00	0	0	0	0
*Domestic	1278	1540	1702	1704										
*Livestock	597	687	702	754	40	3	35	35						
Other	0	0	0	0	0	79	0	179						
Total Exempt Use									3779	3810	3858	3879	3903	3960
Total Groundwater (ac-ft)	21745	23523	19715	25528	39079	26978	58574	38767	46860	45831	39187	33082	32315	34759

Table continued.

Type of Use	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Aquaculture	1603	1423	1482	1823										
Commercial/Industrial	6117	6405	5903	4163										
Crop Rice	4508	4916	3701	7270										
Row Crop	232	260	301	502										
Municipal	6819	6819	7001	6700										
Nursery/Trees	150	150	150	150										
Turfgrass	6538	6825	7622	13577										
Waterfowl	961	870	723	1664										
Pasture/Hay	282	182	165	889										
Recreational	0	0	0	0										
*Domestic														
*Livestock														
Other														
Total Exempt Use	3960	3960	3960	3960										
Total Groundwater (ac-ft)	31175	31811	31009	40699										

XIII. Estimate of the Annual Recharge from Precipitation to the Groundwater Resources within the District

The average amount of groundwater recharge from precipitation was estimated using Groundwater budget studies that employed the Central Gulf Coast Aquifer Model (Chowdhury and others, 2004) and the Lower Colorado River Basin Model (Young and others, 2010). The GAM runs were carried out by the Texas Water Development Board and the results were described in the report (GAM Run 13-026, Wade, 2013) (Appendix C). The LCRB Model Runs were performed by INTERA. The annual recharge estimate represents the average recharge from 1981-1999. The average annual recharge estimates in Table 3 are 20,943 192,167 AF/yr based on the Central Gulf Coast Aquifer Model and the Lower Colorado Aquifer Model, respectively. As shown in Table XIII.1, all recharge from precipitation occurs in the Chicot formation. One of the reasons for the large difference between the recharge values is the different numerical construction between the two models. The LCRB model has significantly smaller grid spacing and model layers than does the GAM so that it can better represent the shallow flow zone (Toth, 1963, 1966, 1970). The shallow flow zone is the upper portion of a groundwater flow system that is primarily responsible for baseflow into the rivers and streams and has hydraulic head gradients, which control flow directions that largely mimic the topographic gradients.

Table XIII.1. Estimate of the Annual Recharge from Precipitation to the Groundwater Resources within the District rounded to nearest 1 acre-foot.

Aquifer	Recharge from Precipitation	
	Central Gulf Coast GAM	Lower Colorado Basin Model
Gulf Coast Aquifer System	20,943	192,167

XIV. Estimate of the Annual Volume of Water That Discharges From the Aquifer to Springs and Any Surface Water Bodies, Including Lakes, Streams, and Rivers

The surface water-groundwater exchanges between various components average over the 1981-1999 time-frame is present in Table XIV.1. The Central Gulf Coast Aquifer Model (Chowdhury and others, 2004) and the Lower Colorado River Basin Model (Young and others, 2010). The GAM runs were carried out by the Texas Water Development Board and the results were described in the report (GAM Run 13-026, Wade, 2013) (Appendix C). The LCRB Model Runs were performed by INTERA. Negative values indicate discharge out of aquifer. The results indicated that over the 1981-1999 time frame, there is a net loss of water from the Chicot Aquifer to surface water bodies. One of the reasons for the large difference between the water exchange values that the two models have very different numerical grids and construction. The LCRB model has significantly smaller grid spacing and model layers than does the GAM so that it can better represent the shallow flow zone (Toth, 1963, 1966, 1970). The shallow flow zone is the upper portion of a groundwater flow system that is primarily responsible for baseflow into the rivers and streams and has hydraulic head gradients, which control flow directions that largely mimic the topographic gradients.

Table XIV.1. Estimate of the annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers rounded to nearest 1 acre-foot.

Aquifer	Net Surface Water-Groundwater Water Exchange (AF/yr)	
	Central Gulf Coast GAM	Lower Colorado Basin Model
Gulf Coast Aquifer System	42,726	65,888

¹This total includes 560 acre-feet per year spring discharge and 33,755 acre-feet per year leakage to streams, and 8,411 acre-feet per year discharge to bays and the Gulf of Mexico. Note: negative values indicate a net loss of groundwater to surface water

XV. Estimate of Annual Volume of Flow Into and Out of the District Within Each Aquifer and Between Aquifers in the District

The lateral movement of water (inflow into and out of the district) across the district boundaries is referred to as horizontal exchanges. Water budget calculations were made by TWDB for each year during the 1980-1999 time frame over the entire Coastal Plains GCD. Vertical exchanges represent the cross-formational flows within the District boundaries among various aquifer formations. Table XV.1 shows water budget calculations based on results from the Central Gulf Coast (GAM Run 13-026, Wade, 2013) (Appendix C). Table XV.2 shows water budget calculations based on results from the Lower Colorado River Basin Model (INTERA, 2013).

Table XV.1. Estimate of annual volume of flow into and out of District rounded to nearest 1 acre-foot based on results from the Gulf Coast Central GAM

Aquifer	Lateral Flow Into the District (acre-ft/yr)	Lateral Flow Out of the District (acre-ft/yr)	Flow Between Aquifer and Overlying Geologic Unit ¹ (acre-ft/yr)
Gulf Coast Aquifer System	15,421	31,543	NA

Note: NA – not applicable

¹ positive values indicate flow into the aquifer; negative numbers indicate flow out of the aquifer

Table XV.2. Estimate of annual volume of flow between each aquifer in the District rounded to nearest 1 acre-foot based on results from the Lower Colorado River Basin Model

Aquifer	Flow Into the District (acre-ft/yr)	Flow Out of the District (acre-ft/yr)	Flow Between Aquifer and Overlying Geologic Unit ¹ (acre-ft/yr)
Gulf Coast Aquifer System	27,426	-24,894	NA

Note: Not available because the base of the model assumes no-flow conditions

¹ positive values indicate flow into the aquifer; negative numbers indicate flow out of the aquifer

XVI. Projected Surface Water Supply in the District, According to the Most Recently Adopted State Water Plan

The projected surface water supply in the district, according to the most recently adopted state water plan, is provided in Appendix B, in the Table titled, “Projected Surface Water Supplies-TWDB 2022 State Water Plan.”

XVII. Projected Total Demand For Water in the District According to the Most Recent Adopted State Water

The projected total demand for water in the district, according to the most recently adopted state water plan, is provided in Appendix B, in the Table titled, “Projected Water Demands: TWDB 2022 State Water Plan Data.”

XVIII. Water Supply Needs and Water Management Strategies Included in the Adopted State Water Plan

Section 36.1071(e)(4) of the Texas Water Code states that the district’s management plan shall ‘consider the water supply needs...included in the adopted state water plan.’

The water supply needs for the district, according to the most recently adopted state water plan, is provided in Appendix B, in the Table titled, “Projected Water Supply Needs: TWDB 2022 State Water Plan Data.” Projected water supply needs listed in the TWDB Estimated Historical Groundwater Use/2022 State Water Plan Datasets report are municipal (Bay City), Irrigation (Matagorda), and steam-electric power (Matagorda). Total needs decline from 134,502 AFY in 2020 to 110,277 AFY in 2070.

Water supply needs are the projected water demands in excess of existing water supplies for a water user group or a wholesale water provider. These are the volumes of water that result from comparing each Water User Group’s projected existing water supplies to its projected water demands.

The water management strategies for the district, according to the most recently adopted state water plan, is provided in Appendix B, in the Table titled, “Projected Water Management Strategies: TWDB 2022 State Water Plan Date.”

A projected water management strategy is a specific project or action to increase water supply or maximize existing supply to meet a specific need. Each water need identified in the previous section is required to have at least one identified water management strategy that will provide the additional water to fully serve the projected needs. Projected water Management strategies listed in the TWDB Estimated Historical Groundwater Use/2022 State Water Plan Datasets report are: 1)Drought management – demand reduction 2)Austin return flows – indirect use 3)Irrigation conservation on farm – demand reduction 4)Irrigation conservation – operations, conveyance improvements – demand reduction 5)Irrigation

conservation – real time use metering and monitoring – demand reduction 6)LCRA – interruptible water for irrigation – Highland Lakes 7)Development of new groundwater supplies – Gulf Coast Aquifer System 8)Irrigation conservation – sprinkler 9)Expansion of current groundwater supplies – Gulf Coast Aquifer System 10)Austin return flows – direct reuse 11)Municipal conservation – demand reduction 12)Blend brackish surface water in STPNOC reservoir – Gulf of Mexico 13)Downstream return flows – indirect reuse.

XIX. Actions, Procedures, Performance and Avoidance Necessary to Effectuate the Plan

The District will implement the provisions of this management plan and will utilize the objectives of the plan as a guide for District actions, operations and decision-making. The District will ensure that its planning efforts, activities and operations are consistent with the provisions of this plan.

The District will amend the current rules to implement this plan in accordance with Chapter 36 of the Texas Water Code and all rules will be followed and enforced. The development of rules will be based on the best scientific information and technical evidence available to the District.

<https://coastalplainsgcd.com/wp-content/uploads/2025/04/CPGCD-Rules.pdf>

The District will encourage cooperation and coordination in the implementation of this plan. All operations and activities will be performed in a manner that encourages the cooperation of the citizens of the District and with the appropriate water management entities at the state, regional and local level.

XX. Methodology for Tracking the District's Progress in Achieving Management Goals

The Annual Report will include an update on the District's performance in achieving the management goals contained in this plan. The general manager will present the Annual Report to the Board of Directors Within ninety (120) days following the completion of the District's Fiscal Year, beginning in the fiscal year starting on October 1, 2020. A copy of the annual audit of District financial records will be included in the Annual Report. The District will maintain a copy of the Annual Report on file for public inspection at the District offices.

XXI. Management Goals

1) Providing for the Most Efficient Use of Groundwater in the District.

1.1 Objective – Each year, the District will require 100 percent of exempt or permitted wells that are constructed within the boundaries of the District to be registered with the District in accordance with the District rules.

1.1 Performance Standard – The number of exempt and permitted wells registered by the District for the year will be incorporated into the Annual Report submitted to the Board of Directors of the District.

1.2 Objective – Each year, the District will regulate the production of groundwater by maintaining a system of permitting the use of groundwater within the boundaries of the District in accordance with the District Rules.

1.2 Performance Standard – Each year the District will accept and process applications for the permitted use of groundwater in the District in accordance with the permitting process established by District rules. The number and type of applications made for the permitted use of groundwater in the District and, the number and type of permits issued by the District will be included in the Annual Report given to the Board of Directors.

1.3 Objective –The District will conduct an investigation to evaluate the aquifers of the district and the production of groundwater within the district in preparation of establishing a monitor well network within the boundaries of the District.

1.3. Performance Standard – Each year the District will utilize the monitor well network to take samples of water quality and to conduct regular measurements of the changing water-levels in the aquifers of the District. The District will monitor the water levels in at least 8 wells monthly throughout the District. The District will also annually test the water quality in at least one well for each county precinct in Matagorda County. A progress report on the work of the District regarding monitoring the water quality and water-levels of aquifers within the District will be included in the Annual Report of the District each year.

2) Controlling and Preventing the Waste of Groundwater in the District.

2.1 Objective – Each year, the District will make an evaluation of the District Rules (Appendix B) to determine whether any amendments are recommended to decrease the amount of waste of groundwater within the District.

2.1 Performance Standard – The District will include a discussion of the annual evaluation of the District Rules (Appendix B) and the determination of whether any amendments to the rules are recommended to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.

2.2 Objective – Each year, the District will provide at least one article annually on the District's website on eliminating and reducing wasteful practices in the use of groundwater.

2.2 Performance Standard – Each year, a copy of the information provided on the District's website regarding groundwater waste reduction will be included in the District's Annual Report to be given to the District Board of Directors.

3) Controlling and Preventing Subsidence.

3.1 Objective – Each year, the District will hold a joint meeting with neighboring Groundwater Conservation Districts focused on sharing information regarding subsidence and the control and prevention of subsidence through the regulation of groundwater use.

3.1 Performance Standard – Each year, a summary of the joint meeting on subsidence issues will be included in the Annual Report submitted to the Board of Directors of the District.

3.2 Objective – Each year, the District will provide one article annually on the District's website to educate the public on the subject of subsidence.

3.2 Performance Standard – The Annual Report submitted to the Board of Directors will include a copy of the article posted on the District's website.

Note: The Coastal Plains GCD has reviewed TWDB subsidence risk report: Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with Regard to Groundwater Pumping – TWDB Contract Number 1648302062, by LRE Water.

<http://www.twdb.texas.gov/groundwater/modcls/rcsearch/subsidence/subsidence.asp>

The pages that reference the Gulf Coast Aquifer's vulnerability to subsidence are 4-33 through 4-42. Results of the assessment suggest that the confined Gulf Coast Aquifer System zones of the Jasper, Evangeline, and Chicot aquifers exhibit the highest risk for future subsidence due to pumping. The unconfined zones of these aquifers have a lower risk of subsidence due primarily to the lower clay thicknesses. The report illustrates the risk factor for the Gulf Coast Aquifer System and Matagorda County is shown to be at a medium to high risk factor with regard to pumping. CPGCD Staff will investigate all reports of possible subsidence brought to their attention.

4) Natural Resource Issues That Affect the Use and Availability of Groundwater or are affected by the Use of Groundwater.

4.1 Objective – Each year the District will inquire to the Railroad Commission of Texas asking whether any new salt water or waste disposal injection wells have been permitted by the Railroad Commission of Texas to operate within the District.

4.1 Performance Standard – Each year a copy of the letter to the Railroad Commission of Texas asking for the location of any new salt water or waste disposal wells permitted to operate within the District will be included in the Annual Report submitted to the Board of Directors of the District along with any information received from the Railroad Commission of Texas.

4.2 Objective – Each year the District will request the Railroad Commission of Texas to provide a copy of the results of integrity tests performed on salt water or waste disposal injection wells permitted by the Railroad Commission of Texas to operate within the District

4.2 Performance Standard – Each year a copy of the letter to the Railroad Commission of Texas requesting the results of the integrity testing performed on salt water or waste disposal injection wells permitted by the Railroad Commission of Texas to operate within the District will be included in the Annual Report submitted to the Board of Directors of the District along with any information received from the Railroad Commission of Texas.

5) Conjunctive Surface Water Management Issues.

5.1 Objective – Each year, the District will participate in the regional planning process by attending 50% of the Region K Regional Water Planning Group meetings to encourage the development of surface water supplies to meet the needs of water user groups in the District.

5.1 Performance Standard – The percentage of meetings attended by a District representative at the Region K Regional Water Planning Group meetings will be noted in the Annual Report presented to the District Board of Directors.

6) Addressing Drought Conditions.

6.1 Objective – Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and other related information from the National Weather Service – Climate Prediction Center website. Additional information is available from TWDB at the following website:

<http://waterdatafortexas.org/drought/>

6.1 Performance Standard – Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps and other related information will be included with copies of the quarterly briefing in the District Annual Report to the Board of Directors.

7) Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control, where appropriate and cost-effective.

Conservation

7.1 Objective – The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in the District.

7.1 Performance Standard – A copy of the article submitted by the District for publication to a newspaper of general circulation in the District regarding water conservation will be included in the Annual Report to the Board of Directors.

7.2 Objective – The District will develop or implement a pre-existing educational program for use in public or private schools located in the District to educate students on the importance of water conservation.

7.2 Performance Standard – A summary of the educational program developed or implemented by the District for use in public or private schools located in the District will be included in the Annual Report to the Board of Directors for every year this plan is active.

7.3 Objective – Each year, the District will include an informative flier on water conservation with at least one mail out to groundwater use permit holders distributed in the normal course of business for the District.

7.3 Performance Standard – The District's Annual Report will include a copy of the informative flier distributed to groundwater use permit holders regarding water conservation and the number of fliers distributed.

Recharge Enhancement

7.4 Objective – Each year, the District will provide one article relating to recharge enhancement on the District web site.

7.4 Performance Standard – Each year, the District annual report will include a copy of the information that has been provided on the District web site relating to recharge enhancement.

Precipitation Enhancement

Precipitation enhancement is not an appropriate or cost-effective program for the District at this time because there is not an existing precipitation enhancement program operating in nearby counties in which the District could participate and share costs. The cost of operating a single-county precipitation enhancement program is prohibitive and would require the District to increase taxes. Therefore, this goal is not applicable to the District at this time.

Brush Control

7.5 Objective – Each year, the District will provide one article relating to Brush Control on the District web site.

7.5 Performance Standard – Each year, the District annual report will include a copy of the information that has been provided on the District web site relating to Brush Control.

Rainwater Harvesting

7.6 Objective – Each year, the District will provide one article relating to Rainwater Harvesting on the District web site.

7.6 Performance Standard – Each year, the District annual report will include a copy of the information that has been provided on the District web site relating to Rainwater Harvesting.

8) Addressing Desired Future Conditions (DFCs)

8.1 Management Objective:

At least once every three years, the District will monitor water levels and evaluate whether the change in water levels is in conformance with the DFCs adopted by the District.

The District will estimate total annual groundwater production for each aquifer based on the water use reports, estimated exempted use, and other relevant information, and compare these production estimates to the MAGs listed in Table X.1.

8.1 Performance Standard:

1. At least once every three years, the general manager will report to the Board the measured water levels obtained from the monitoring wells within each Management Zone, the average measured drawdown for each Management Zone calculated from the measured water levels of the monitoring wells within the Management Zone, a comparison of the average measured drawdowns for each Management Zone with the DFCs for each Management Zone, and the District's progress in conforming with the DFCs.
2. At least once every three years, the general manager will report to the Board the total permitted production and the estimated total annual production for each aquifer and compare these amounts to the MAGs listed in Figure 5 for each aquifer that is declared by the district to be relevant.

XXII. References

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APPENDIX A

Enabling Act

Chapter 8831, Special District Local Laws Code

SPECIAL DISTRICT LOCAL LAWS CODE

TITLE 6. WATER AND WASTEWATER

SUBTITLE H. DISTRICTS GOVERNING GROUNDWATER

CHAPTER 8831. COASTAL PLAINS GROUNDWATER

CONSERVATION DISTRICT

SUBCHAPTER A. GENERAL PROVISIONS

Sec. 8831.001. DEFINITIONS. In this chapter:

(1) "Board" means the district's board of directors.

(2) "Director" means a board member.

(3) "District" means the Coastal Plains Groundwater Conservation District.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Sec. 8831.002. NATURE OF DISTRICT. The district is a groundwater conservation district in Matagorda County created under and essential to accomplish the purposes of Section 59, Article XVI, Texas Constitution.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Sec. 8831.003. FINDINGS OF PUBLIC USE AND BENEFIT. (a) The district is created to serve a public use and benefit.

(b) All land and other property included in the district will benefit from the works and projects accomplished by the district under the powers conferred by Section 59, Article XVI, Texas Constitution.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Sec. 8831.004. DISTRICT TERRITORY. The district's boundaries are coextensive with the boundaries of Matagorda County, Texas, unless the district's territory has been modified under:

- (1) Subchapter J, Chapter 36, Water Code; or
- (2) other law.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Sec. 8831.005. CONFLICTS OF LAW. The following provisions prevail over a conflicting or inconsistent provision of this chapter:

- (1) Sections 36.1071-36.108, Water Code;

(2) Sections 36.159-36.161, Water Code; and

(3) Subchapter I, Chapter 36, Water Code.

Added by Acts 2011, 82nd Leg., R.S., Ch. 91 (S.B. [1303](#)), Sec. 22.023, eff. September 1, 2011.

SUBCHAPTER B. BOARD OF DIRECTORS

Sec. 8831.051. COMPOSITION OF BOARD; TERMS. (a) The district is governed by a board of seven directors.

(b) Directors serve staggered four-year terms.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Sec. 8831.052. ELECTION OF DIRECTORS. (a) Three directors are elected by the voters of the entire district. One director is elected from each county commissioners precinct by the voters of that precinct. The directors elected from precincts 1-4 occupy positions 1-4, respectively, on the board. The at-large directors occupy positions 5-7, respectively, on the board.

(b) A person shall indicate on the application for a place on the ballot the position on the board for which the person is a candidate.

(c) At the first election after the county commissioners precincts are redrawn under Section 18, Article V, Texas Constitution, each director in office on the effective date of the change, or elected to a term of office beginning on or after the effective date of the change, shall serve, unless otherwise removed as provided by law, in the position to which each was elected for the entire term to which elected, even though the change in boundaries places the director's residence outside the precinct from which the director was elected.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Sec. 8831.053. ELECTION DATE. Each even-numbered year, the board shall hold an election in the district on a uniform election date provided by Section 41.001(a), Election Code, to elect the appropriate number of directors. If the board changes the election date, the district shall adjust the terms of office to conform to the new election date.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Sec. 8831.054. ELIGIBILITY. (a) To be eligible to be a

candidate for or to serve as a director at large, a person must be a registered voter of the district.

(b) To be eligible to be a candidate for or to serve as a director from a county commissioners precinct, a person must be a registered voter of that precinct, except as provided by Section 8831.052(c).

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Sec. 8831.055. BOARD VACANCY. (a) The board shall appoint a replacement to fill a vacancy in the office of director.

(b) The appointed replacement serves until the next directors' election.

(c) At that election, a person is elected to fill the position. If the position is not scheduled to be filled at the election, the person elected to fill the position serves only for the remainder of the unexpired term.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

SUBCHAPTER C. POWERS AND DUTIES

Sec. 8831.101. GROUNDWATER CONSERVATION DISTRICT POWERS AND DUTIES. Except as provided by this chapter, the district has the rights, powers, privileges, functions, and duties provided by the general law of this state, including Chapter 36, Water Code, applicable to groundwater conservation districts created under Section 59, Article XVI, Texas Constitution.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Sec. 8831.102. REGIONAL COOPERATION. To provide for uniformity across districts in addressing the need to achieve a common approach to managing the underlying aquifer and to ensure that administration of the district will be cost-effective, the district shall:

- (1) attempt to coordinate meetings with adjacent districts;
- (2) encourage sharing of personnel and resources to achieve administrative cost savings;
- (3) study a common approach for collecting and sharing appropriate data to be used in managing the aquifer;
- (4) support cooperation in the investigation of aquifer contamination; and

(5) include adjacent districts on mailing lists for district meeting announcements, newsletters, public meetings, and other scheduled events.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

SUBCHAPTER D. GENERAL FINANCIAL PROVISIONS

Sec. 8831.151. DISTRICT REVENUE AND FEES. To accomplish the regulatory goals of the district, to pay the district's maintenance and operating costs, and to pay any bonds issued by the district, the district may:

(1) impose an ad valorem tax at a rate not to exceed 2.5 cents for each \$100 of taxable value of property in the district, subject to voter approval;

(2) assess production fees as authorized by Section 36.205, Water Code;

(3) solicit and accept grants from any public or private source; and

(4) assess:

(A) an export fee on groundwater exported from the district in an amount not to exceed 150 percent of the maximum

wholesale water rate charged by the City of Houston; and

(B) other fees authorized by Chapter 36, Water Code.

Added by Acts 2009, 81st Leg., R.S., Ch. 1139 (H.B. [2619](#)), Sec. 1.05, eff. April 1, 2011.

Amended by:

Acts 2015, 84th Leg., R.S., Ch. 529 (H.B. [1421](#)), Sec. 1, eff. June 16, 2015.

APPENDIX B
Estimated Historical Water Use and 2022 State
Water Plan Datasets

TWDB Estimated Historical Groundwater Use and 2022 State Water Plan Datasets

Coastal Plains Groundwater Conservation District

Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Department
stephen.allen@twdb.texas.gov
(512) 463-7317
September 9, 2025

GROUNDWATER MANAGEMENT PLAN DATA

This set of water data tables (part one of a two-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 table addresses a specific numbered requirement in the Texas Water Development Board's groundwater management plan review checklist. The checklist can be found at this web address:

https://www.twdb.texas.gov/groundwater/docs/GCD/GCD_Mgmt_Plan_Checklist_2025.pdf

The five tables included in part one of this data package are:

TWDB Historical Water Use Survey (WUS)

- Estimated Historical Water Use (checklist item 2)

State Water Plan (SWP)

- Projected Surface Water Supplies (checklist item 6),
- Projected Water Demands (checklist item 7),
- Projected Water Supply Needs (checklist item 8),
- Projected Water Management Strategies (checklist item 9)

Part two of the two-part package is the groundwater availability model (GAM) run report for the district (checklist items 3 through 5). The district should have received, or will receive, this report from the TWDB Groundwater Modeling Department. Questions about the GAM can be directed to the Groundwater Modeling Team at gam@twdb.texas.gov

DISCLAIMER:

Data presented in these tables are the most up to date WUS and SWP data available as of 9/9/2025. Although it does not happen often, these data are subject to change pending the availability of more accurate WUS data or an amendment to the 2022 SWP. District personnel should review the data table values and correct any discrepancies to ensure approval of their groundwater management plan.

The WUS data can be verified at this web address:

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

The 2022 SWP data can be verified by contacting WRPdatarequests@twdb.texas.gov

The values presented in the data tables are county based. In cases where groundwater conservation districts cover only a portion of one or more counties the data values are modified with an apportioning multiplier to create new values that more accurately represent conditions within district boundaries. The multiplier used in the following formula is a land area ratio: (data value * (land area of district in county / land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide water user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district and eliminated when they are located outside (we offer districts the opportunity to review this determination).

The county values in two of the SWP tables (Projected Water Supply Needs and Projected Water Management Strategies) are not apportioned because district-specific values are not required to be presented in the groundwater management plan. However, a district is required to “consider” the county values in these two tables by drafting a short summary of the needs and strategies values in the groundwater management plan.

In the WUS table every category of water use (including municipal) is apportioned. Staff determined that breaking down the annual municipal values into individual WUGs was too complex.

TWDB recognizes that the apportioning formula used is not ideal but it is the best available process with respect to time and staffing constraints. If a district believes it has data that are more accurate, they can add those data to the plan with an explanation of how the data were derived. Apportioning percentages that the TWDB used are listed above each applicable table.

For additional questions regarding this data, please contact GWMPlans@twdb.texas.gov

Estimated Historical Water Use

TWDB Historical Water Use Survey (WUS) Data

MATAGORDA COUNTY

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2022	GW	5,309	1,957	0	1,079	25,818	585	34,748
	SW	0	10,313	0	9,955	44,333	332	64,933
2021	GW	4,914	2,175	0	1,329	27,576	601	36,595
	SW	0	9,165	0	79,715	44,579	480	133,939
2020	GW	4,960	2,490	0	1,301	28,088	622	37,461
	SW	0	11,736	0	12,795	59,557	561	84,649
2019	GW	4,086	1,930	0	1,106	27,675	773	35,570
	SW	0	11,394	0	24,028	62,629	746	98,797
2018	GW	3,884	2,520	0	1,106	31,686	803	39,999
	SW	0	8,780	0	45,172	73,263	676	127,891
2017	GW	4,269	2,684	1	1,160	30,065	599	38,778
	SW	0	9,119	0	55,908	58,814	810	124,651
2016	GW	4,480	2,379	0	1,294	22,228	639	31,020
	SW	0	9,339	0	15,421	85,142	830	110,732
2015	GW	4,421	2,534	1	1,099	35,943	631	44,629
	SW	0	2,419	0	66,355	7,308	827	76,909
2014	GW	5,187	1,331	0	1,057	32,955	678	41,208
	SW	0	2,573	0	35,994	4,167	366	43,100
2013	GW	5,942	1,185	7	1,114	33,069	643	41,960
	SW	0	2,781	2	44,018	25,234	347	72,382

Projected Surface Water Supplies

TWDB 2022 State Water Plan Data

MATAGORDA COUNTY				100% (multiplier)			All values are in acre-feet		
RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
K	Irrigation, Matagorda	Brazos-Colorado	Brazos-Colorado Run-of-River	4,000	4,000	4,000	4,000	4,000	4,000
K	Irrigation, Matagorda	Brazos-Colorado	Colorado Run-of-River	16,657	16,657	16,657	16,657	16,657	16,657
K	Irrigation, Matagorda	Colorado	Colorado Run-of-River	1,209	1,209	1,209	1,209	1,209	1,209
K	Irrigation, Matagorda	Colorado-Lavaca	Colorado Run-of-River	17,500	17,500	17,500	17,500	17,500	17,500
K	Irrigation, Matagorda	Colorado-Lavaca	Colorado-Lavaca Run-of-River	4,000	4,000	4,000	4,000	4,000	4,000
K	Livestock, Matagorda	Brazos-Colorado	Brazos-Colorado Livestock Local Supply	329	329	329	329	329	329
K	Livestock, Matagorda	Colorado-Lavaca	Colorado-Lavaca Livestock Local Supply	215	215	215	215	215	215
K	Manufacturing, Matagorda	Colorado	Colorado Run-of-River	13,803	13,803	13,803	13,803	13,803	13,803
K	Manufacturing, Matagorda	Colorado	Highland Lakes Lake/Reservoir System	3,152	3,152	3,152	3,152	3,152	3,152
K	Steam-Electric Power, Matagorda	Colorado	STPNOC Lake/Reservoir	66,260	66,260	66,260	66,260	66,260	66,260
Sum of Projected Surface Water Supplies (acre-feet)				127,125	127,125	127,125	127,125	127,125	127,125

Projected Water Demands

TWDB 2022 State Water Plan Data

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

MATAGORDA COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
K	Bay City	Brazos-Colorado	2,910	2,963	2,979	3,025	3,068	3,104
K	Bay City	Colorado	6	6	6	6	6	6
K	Caney Creek MUD of Matagorda County	Brazos-Colorado	252	255	255	258	261	264
K	Corix Utilities Texas Inc	Brazos-Colorado	6	6	6	6	6	6
K	Corix Utilities Texas Inc	Colorado	1	1	1	1	1	1
K	County-Other, Matagorda	Brazos-Colorado	449	451	448	450	456	461
K	County-Other, Matagorda	Colorado	95	96	95	96	97	98
K	County-Other, Matagorda	Colorado-Lavaca	492	493	491	492	499	505
K	Irrigation, Matagorda	Brazos-Colorado	92,589	90,098	87,675	85,316	83,021	80,788
K	Irrigation, Matagorda	Colorado	1,719	1,672	1,627	1,584	1,541	1,500
K	Irrigation, Matagorda	Colorado-Lavaca	97,280	94,664	92,117	89,639	87,228	84,881
K	Livestock, Matagorda	Brazos-Colorado	475	475	475	475	475	475
K	Livestock, Matagorda	Colorado	94	94	94	94	94	94
K	Livestock, Matagorda	Colorado-Lavaca	506	506	506	506	506	506
K	Manufacturing, Matagorda	Colorado	4,199	4,916	4,916	4,916	4,916	4,916
K	Markham MUD	Colorado-Lavaca	97	96	96	96	98	99
K	Matagorda County WCID 6	Brazos-Colorado	113	113	112	113	115	116
K	Matagorda Waste Disposal & WSC	Brazos-Colorado	51	52	52	53	54	55
K	Matagorda Waste Disposal & WSC	Colorado	76	78	79	80	81	82
K	Mining, Matagorda	Brazos-Colorado	53	56	42	30	19	12
K	Mining, Matagorda	Colorado	8	8	6	5	3	2
K	Mining, Matagorda	Colorado-Lavaca	35	36	27	20	13	8
K	Palacios	Colorado-Lavaca	615	623	624	629	638	645
K	Steam-Electric Power, Matagorda	Colorado	80,536	80,536	80,536	80,536	80,536	80,536
Sum of Projected Water Demands (acre-feet)			282,657	278,294	273,265	268,426	263,732	259,160

Projected Water Supply Needs

TWDB 2022 State Water Plan Data

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

MATAGORDA COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
K	Bay City	Brazos-Colorado	-4	-57	-73	-119	-162	-198
K	Bay City	Colorado	0	0	0	0	0	0
K	Caney Creek MUD of Matagorda County	Brazos-Colorado	974	971	971	968	965	962
K	Corix Utilities Texas Inc	Brazos-Colorado	64	64	64	64	64	64
K	Corix Utilities Texas Inc	Colorado	13	13	13	13	13	13
K	County-Other, Matagorda	Brazos-Colorado	95	93	96	94	88	83
K	County-Other, Matagorda	Colorado	79	78	79	78	77	76
K	County-Other, Matagorda	Colorado-Lavaca	82	81	83	82	75	69
K	Irrigation, Matagorda	Brazos-Colorado	-61,932	-59,441	-57,018	-54,659	-52,364	-50,131
K	Irrigation, Matagorda	Colorado	-510	-463	-418	-375	-332	-291
K	Irrigation, Matagorda	Colorado-Lavaca	-60,780	-58,164	-55,617	-53,139	-50,728	-48,381
K	Livestock, Matagorda	Brazos-Colorado	134	134	134	134	134	134
K	Livestock, Matagorda	Colorado	0	0	0	0	0	0
K	Livestock, Matagorda	Colorado-Lavaca	8	8	8	8	8	8
K	Manufacturing, Matagorda	Colorado	14,332	13,615	13,615	13,615	13,615	13,615
K	Markham MUD	Colorado-Lavaca	19	20	20	20	18	17
K	Matagorda County WCID 6	Brazos-Colorado	3	3	4	3	1	0
K	Matagorda Waste Disposal & WSC	Brazos-Colorado	4	3	3	2	1	0
K	Matagorda Waste Disposal & WSC	Colorado	254	252	251	250	249	248
K	Mining, Matagorda	Brazos-Colorado	3	0	14	26	37	44
K	Mining, Matagorda	Colorado	0	0	2	3	5	6
K	Mining, Matagorda	Colorado-Lavaca	1	0	9	16	23	28
K	Palacios	Colorado-Lavaca	449	441	440	435	426	419
K	Steam-Electric Power, Matagorda	Colorado	-11,276	-11,276	-11,276	-11,276	-11,276	-11,276
Sum of Projected Water Supply Needs (acre-feet)			-134,502	-129,401	-124,402	-119,568	-114,862	-110,277

Projected Water Management Strategies

TWDB 2022 State Water Plan Data

MATAGORDA COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
Bay City, Brazos-Colorado (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	582	593	596	605	614	621
Expansion of Current Groundwater Supplies - Gulf Coast Aquifer	Gulf Coast Aquifer System [Matagorda]	0	75	75	75	75	75
		582	668	671	680	689	696
Bay City, Colorado (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	1	1	1	1	1	1
		1	1	1	1	1	1
Caney Creek MUD of Matagorda County, Brazos-Colorado (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	26	19	13	13	13	13
		26	19	13	13	13	13
Corix Utilities Texas Inc, Brazos-Colorado (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	1	1	1	1	1	1
		1	1	1	1	1	1
County-Other, Matagorda, Brazos-Colorado (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	22	23	22	23	23	23
		22	23	22	23	23	23
County-Other, Matagorda, Colorado (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	5	5	5	5	5	5
		5	5	5	5	5	5
County-Other, Matagorda, Colorado-Lavaca (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	25	25	25	25	25	25
		25	25	25	25	25	25
Irrigation, Matagorda, Brazos-Colorado (K)							
Austin Return Flows	Indirect Reuse [Travis]	4,169	4,184	4,204	4,230	4,262	4,302
Drought Management	DEMAND REDUCTION [Matagorda]	4,262	4,147	4,036	3,927	3,822	3,719
Irrigation Conservation - On Farm - Matagorda County	DEMAND REDUCTION [Matagorda]	2,536	3,043	3,550	4,058	4,565	5,072
Irrigation Conservation - Operations Conveyance Improvements - Matagorda County	DEMAND REDUCTION [Matagorda]	1,471	3,351	5,232	7,112	8,992	10,872

Estimated Historical Water Use and 2022 State Water Plan Dataset:

Coastal Plains Groundwater Conservation District

September 9, 2025

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Irrigation Conservation - Real-Time Use Metering and Monitoring - Matagorda County	DEMAND REDUCTION [Matagorda]	2,541	2,472	2,406	2,341	2,278	2,217
Irrigation Conservation - Sprinkler - Matagorda County	DEMAND REDUCTION [Matagorda]	113	565	1,129	1,412	1,412	1,412
LCRA - Interruptible Water for Agriculture (LCRA WMP Amendments)	Highland Lakes Lake/Reservoir System [Reservoir]	12,412	4,456	2,526	0	0	0
		27,504	22,218	23,083	23,080	25,331	27,594

Irrigation, Matagorda, Colorado (K)

Austin Return Flows	Indirect Reuse [Travis]	34	33	31	29	27	25
Development of New Groundwater Supplies - Gulf Coast Aquifer	Gulf Coast Aquifer System [Matagorda]	510	510	510	510	510	510
Drought Management	DEMAND REDUCTION [Matagorda]	35	34	33	32	31	31
Irrigation Conservation - On Farm - Matagorda County	DEMAND REDUCTION [Matagorda]	21	25	29	33	38	42
Irrigation Conservation - Operations Conveyance Improvements - Matagorda County	DEMAND REDUCTION [Matagorda]	12	28	43	59	74	90
Irrigation Conservation - Real-Time Use Metering and Monitoring - Matagorda County	DEMAND REDUCTION [Matagorda]	21	20	20	19	19	18
Irrigation Conservation - Sprinkler - Matagorda County	DEMAND REDUCTION [Matagorda]	1	5	9	12	12	12
LCRA - Interruptible Water for Agriculture (LCRA WMP Amendments)	Highland Lakes Lake/Reservoir System [Reservoir]	102	37	21	0	0	0
		736	692	696	694	711	728

Irrigation, Matagorda, Colorado-Lavaca (K)

Austin Return Flows	Indirect Reuse [Travis]	4,091	4,094	4,101	4,112	4,129	4,152
Drought Management	DEMAND REDUCTION [Matagorda]	4,183	4,070	3,961	3,854	3,750	3,650
Expansion of Current Groundwater Supplies - Gulf Coast Aquifer	Gulf Coast Aquifer System [Matagorda]	300	300	300	300	300	300
Irrigation Conservation - On Farm - Matagorda County	DEMAND REDUCTION [Matagorda]	2,489	2,987	3,484	3,982	4,480	4,978
Irrigation Conservation - Operations Conveyance Improvements - Matagorda County	DEMAND REDUCTION [Matagorda]	1,444	3,289	5,134	6,980	8,825	10,670
Irrigation Conservation - Real-Time Use Metering and Monitoring - Matagorda County	DEMAND REDUCTION [Matagorda]	2,494	2,426	2,361	2,298	2,236	2,176
Irrigation Conservation - Sprinkler - Matagorda County	DEMAND REDUCTION [Matagorda]	111	554	1,108	1,385	1,385	1,385
LCRA - Interruptible Water for Agriculture (LCRA WMP Amendments)	Highland Lakes Lake/Reservoir System [Reservoir]	12,181	4,373	2,479	0	0	0
		27,293	22,093	22,928	22,911	25,105	27,311

Markham MUD, Colorado-Lavaca (K)

Drought Management	DEMAND REDUCTION [Matagorda]	5	5	5	5	5	5
		5	5	5	5	5	5

Matagorda County WCID 6, Brazos-Colorado (K)

Drought Management	DEMAND REDUCTION [Matagorda]	6	6	6	6	6	6
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Estimated Historical Water Use and 2022 State Water Plan Dataset:

Coastal Plains Groundwater Conservation District

September 9, 2025

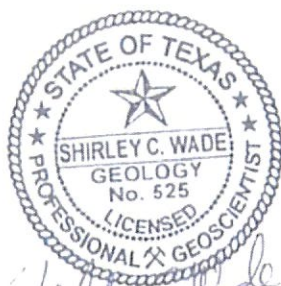
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		6	6	6	6	6	6
Matagorda Waste Disposal & WSC, Brazos-Colorado (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	9	9	9	10	10	10
Municipal Conservation - Matagorda Waste Disposal & WSC	DEMAND REDUCTION [Matagorda]	5	6	5	5	5	5
		14	15	14	15	15	15
Matagorda Waste Disposal & WSC, Colorado (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	14	14	14	14	15	15
Municipal Conservation - Matagorda Waste Disposal & WSC	DEMAND REDUCTION [Matagorda]	7	10	8	7	8	8
		21	24	22	21	23	23
Palacios, Colorado-Lavaca (K)							
Drought Management	DEMAND REDUCTION [Matagorda]	70	55	41	34	33	34
		70	55	41	34	33	34
Steam-Electric Power, Matagorda, Colorado (K)							
Austin Return Flows	Indirect Reuse [Travis]	10,696	12,076	12,030	11,984	11,937	11,891
Blend Brackish Surface Water in STPNOC Reservoir	Gulf of Mexico [Gulf of Mexico]	3,000	3,000	3,000	3,000	3,000	3,000
Downstream Return Flows	Indirect Reuse [Travis]	0	3,000	3,000	3,000	3,000	3,000
		13,696	18,076	18,030	17,984	17,937	17,891
Sum of Projected Water Management Strategies (acre-feet)		70,007	63,926	65,563	65,498	69,923	74,371

APPENDIX C
GAM Run 13-026

GAM RUN 13-026: COASTAL PLAINS GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 936-0883
September 18, 2013



Shirley C. Wade 9/18/13

The seal appearing on this document was authorized by Shirley C. Wade, P.G. 525 on September 18, 2013.

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GAM RUN 13-026: COASTAL PLAINS GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 936-0883
September 18, 2013

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 Coastal Plains Groundwater Conservation District—fulfills the requirements noted above. Part 1 of the two-part package is the 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 Coastal Plains Groundwater Conservation District should be adopted by the district on or before September 12, 2014 and submitted to the executive administrator of the TWDB on or before October 12, 2014. The current management plan for Coastal Plains Groundwater Conservation District expires on December 11, 2014.

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. This model run replaces the results of GAM Run 08-76 (Oliver, 2008). GAM Run 13-026 meets current standards set after the release of GAM Run 08-76 including use of the extent of the official aquifer boundaries within the district rather than the entire active area of the model within the district. 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, Coastal Plains 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.

Per statute, TWDB is required to provide the districts with data from the official groundwater availability models; however, the TWDB has also approved, for planning purposes, the fully penetrating alternative model for the central portion of the Gulf Coast Aquifer System. Coastal Plains Groundwater Conservation District is also included in the model area for the groundwater availability model for the northern portion of the Gulf Coast Aquifer System. Please contact the author of this report if a comparison report using one or both 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 System was run for this analysis. Coastal Plains Groundwater Conservation District water budgets were extracted for the historical model period (1980 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:

Gulf Coast Aquifer System

- 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.
- The model for the central portion of the Gulf Coast Aquifer System assumes partially penetrating wells in the Evangeline Aquifer due to a lack of data for aquifer properties in the deeper section of the aquifer.
- This groundwater availability model includes four layers, which generally represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the Jasper Aquifer including parts of the Catahoula Formation near the outcrop (Layer 4).
- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the model results for the aquifers 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, and 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.

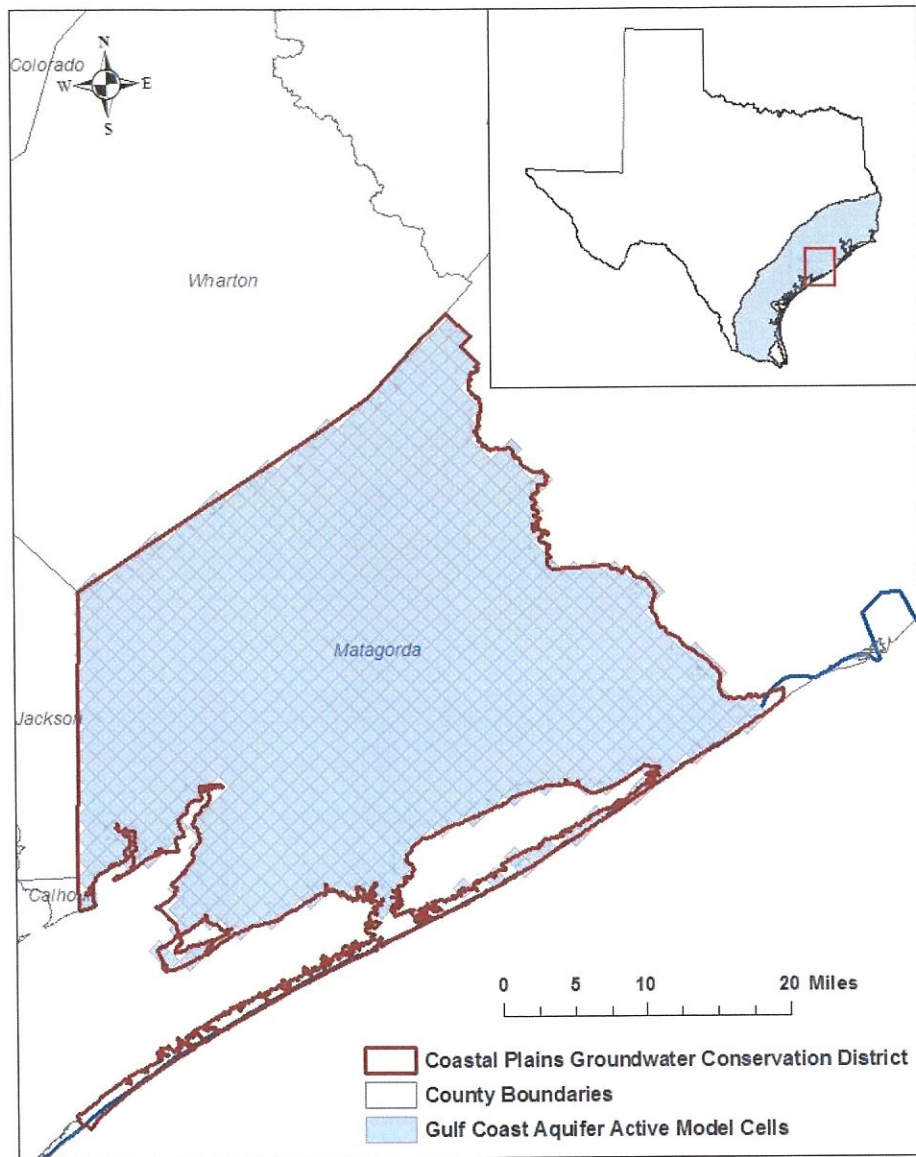
It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one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

TABLE 1: SUMMARIZED INFORMATION FOR THE GULF COAST AQUIFER SYSTEM THAT IS NEEDED FOR COASTAL PLAINS 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	20,943
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Gulf Coast Aquifer System	42,726 ¹
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	15,421
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	31,543
Estimated net annual volume of flow between each aquifer in the district	NA ²	NA ²

¹ This total includes 560 acre-feet per year spring discharge, 33,755 acre-feet per year leakage to streams, and 8,411 acre-feet per year discharge to bays and the Gulf of Mexico.

² Not available because the base of the model assumes no-flow conditions.



gcd boundary date = 08 05 13, county boundary date = 02 20 11, glfc_c model grid date = 08 20 13

FIGURE 1: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR 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.

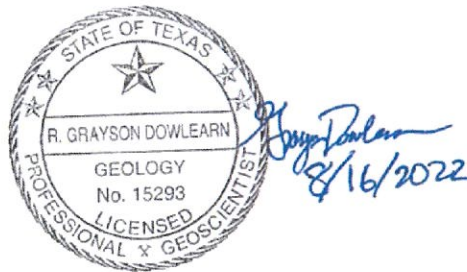
REFERENCES:

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APPENDIX D
GAM Run 21-020 MAG

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

Grayson Dowlearn, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Section
512-475-1552
August 16, 2022



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

Grayson Dowlearn, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Modeling Section
512-475-1552
August 16, 2022

EXECUTIVE SUMMARY:

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

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

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REQUESTOR:

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

DESCRIPTION OF REQUEST:

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

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

County	Aquifer	Desired future condition
Aransas	Gulf Coast Aquifer System	0
Bee	Gulf Coast Aquifer System	7
Calhoun	Gulf Coast Aquifer System	5
Colorado	Chicot and Evangeline	17
	Jasper	25
De Witt	Gulf Coast Aquifer System	17
Fayette	Gulf Coast Aquifer System	44
Goliad	Chicot	-4
	Evangeline	-2
	Burkeville	7
	Jasper	14
Jackson	Gulf Coast Aquifer System	15
Karnes	Gulf Coast Aquifer System	22
Lavaca	Gulf Coast Aquifer System	18
Matagorda	Chicot and Evangeline	11
Refugio	Gulf Coast Aquifer System	5
Victoria	Gulf Coast Aquifer System	5
Wharton	Chicot and Evangeline	15
Groundwater Management Area 15	Gulf Coast Aquifer System	13

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

METHODS:

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

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

Modeled Available Groundwater and Permitting

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

PARAMETERS AND ASSUMPTIONS:

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

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

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

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

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

RESULTS:

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

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

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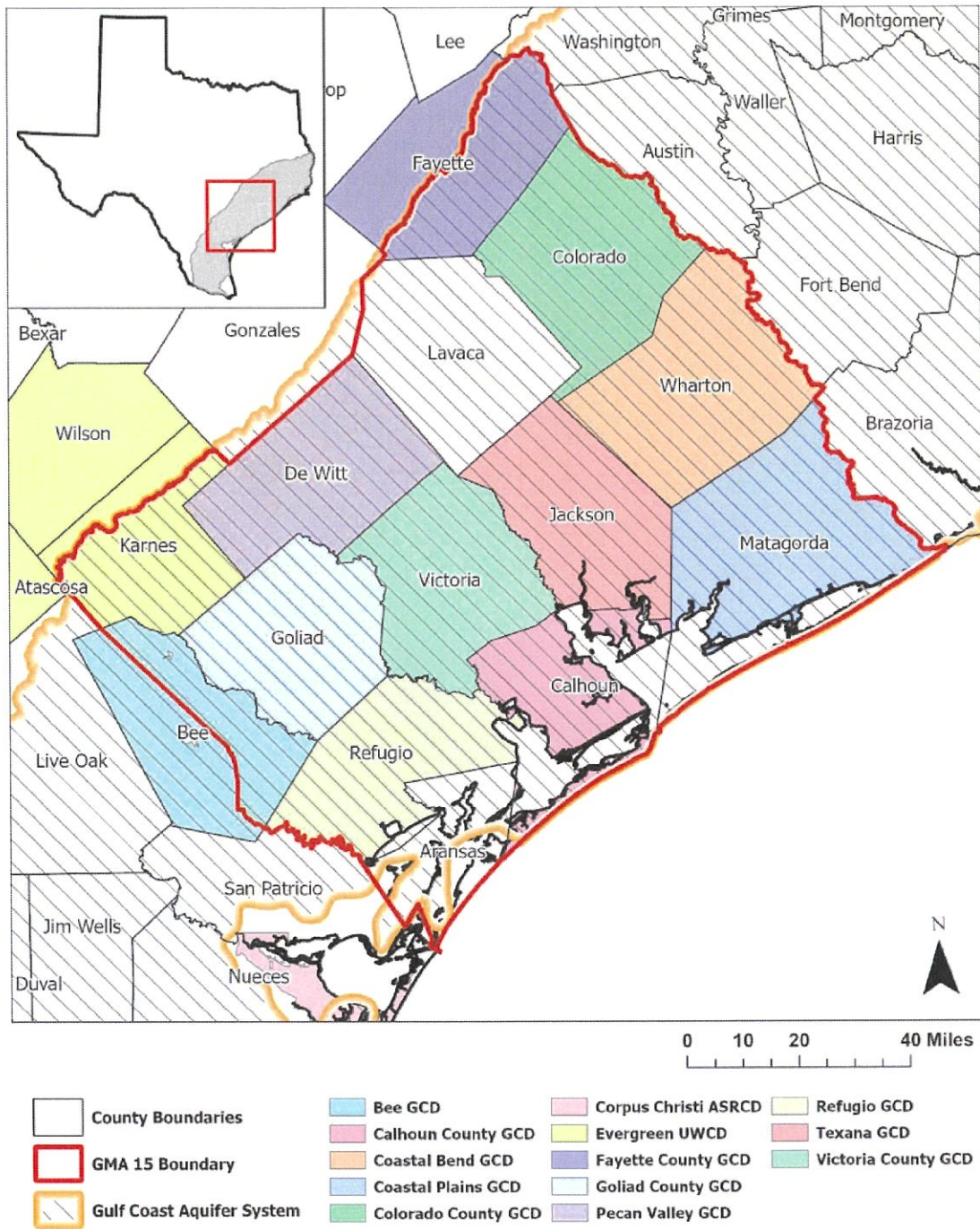


FIGURE 1. MAP SHOWING GROUNDWATER MANAGEMENT AREA (GMA) 15, GROUNDWATER CONSERVATION DISTRICTS (GCD), COUNTIES, AND THE EXTENT OF ACTIVE MODEL CELLS. (UWCD = UNDERGROUND WATER CONSERVATION DISTRICT)

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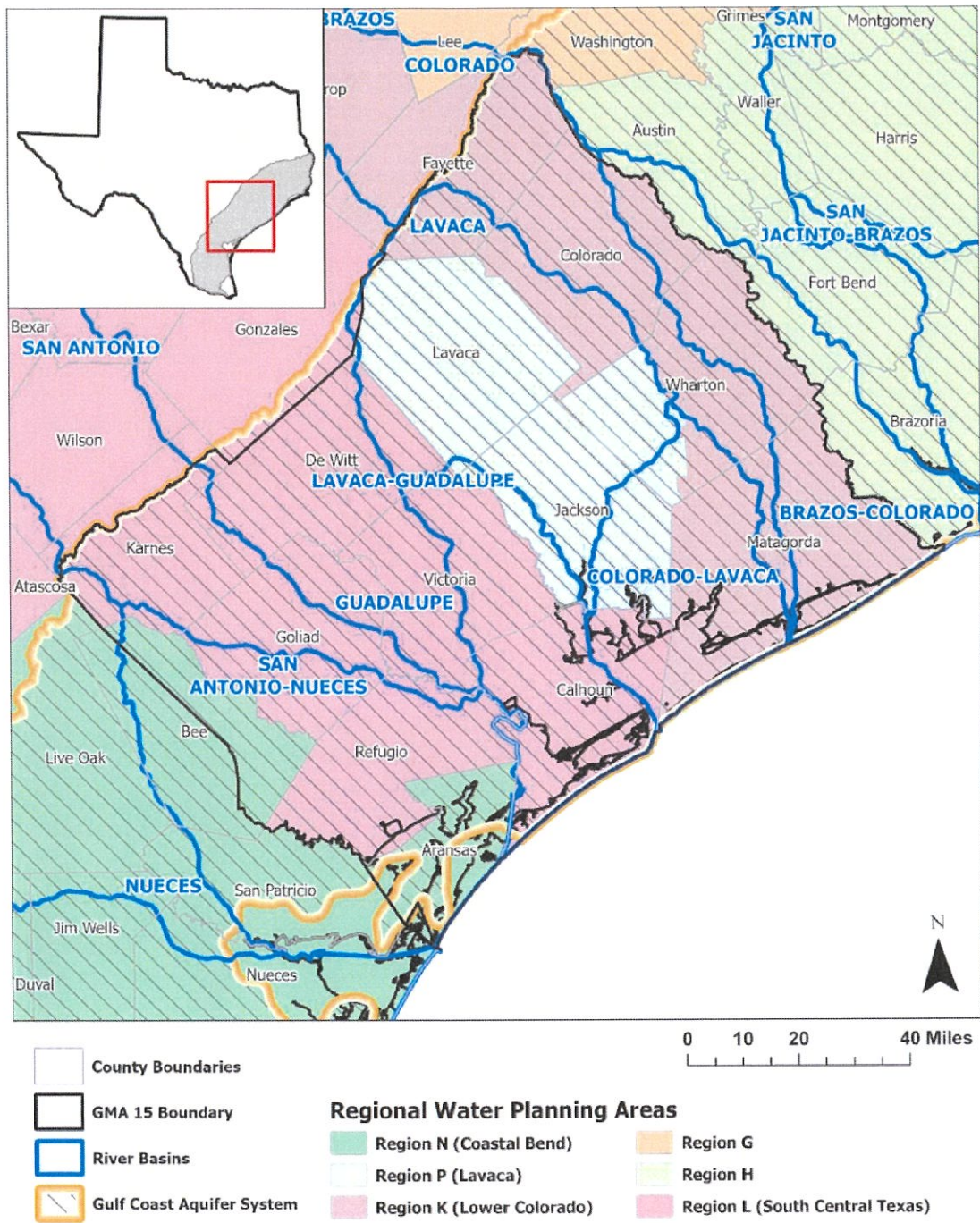


FIGURE 2. MAP SHOWING GROUNDWATER MANAGEMENT AREA (GMA) 15, REGIONAL WATER PLANNING AREAS, RIVER BASINS, COUNTIES, AND EXTENT OF ACTIVE MODEL CELLS.

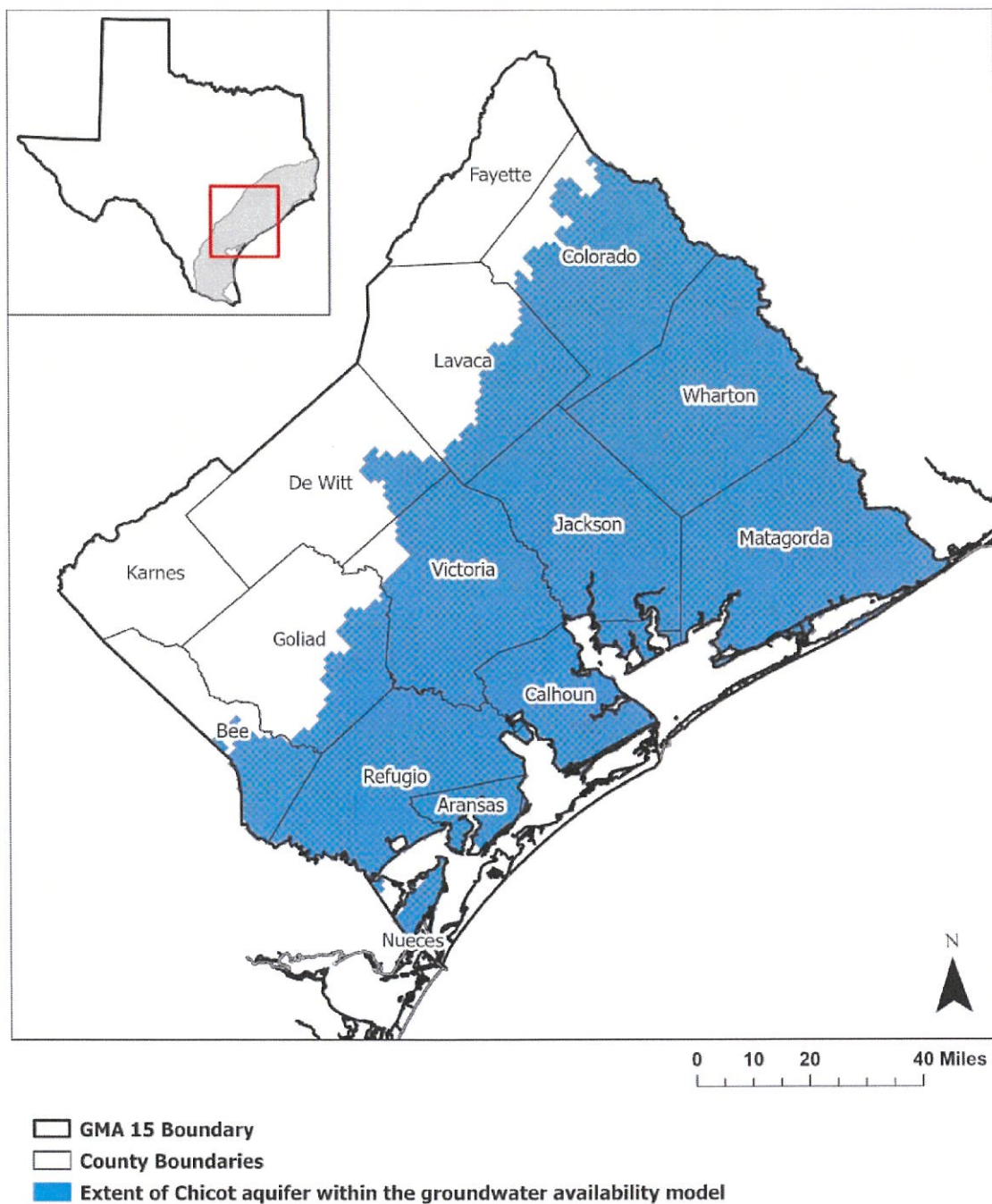


FIGURE 3. MAP SHOWING THE ACTIVE MODEL CELLS WITHIN GROUNDWATER MANAGEMENT AREA (GMA) 15 REPRESENTING THE CHICOT AQUIFER IN LAYER 1 OF THE CENTRAL GULF COAST AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL.

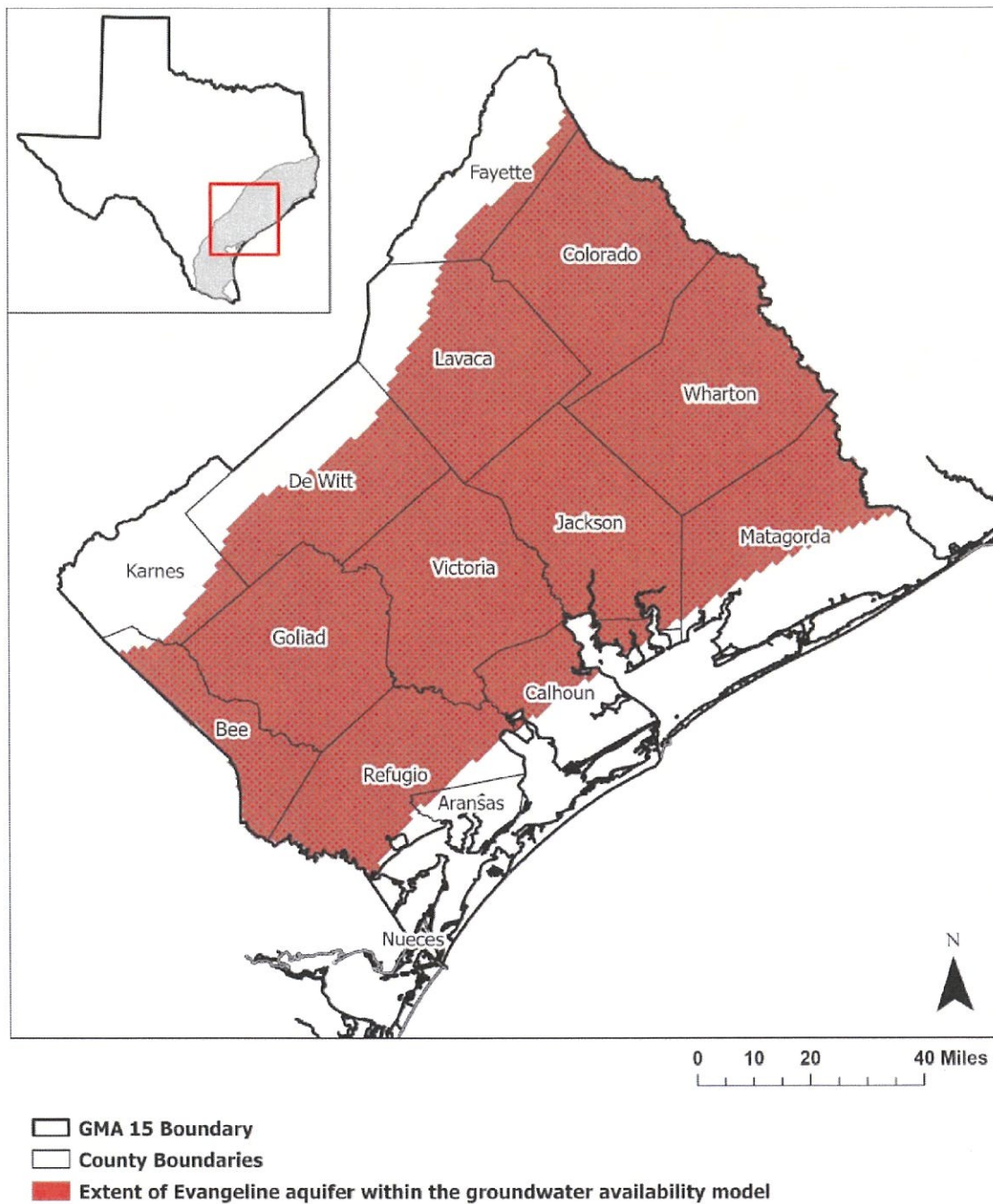


FIGURE 4. MAP SHOWING THE ACTIVE MODEL CELLS WITHIN GROUNDWATER MANAGEMENT AREA (GMA) 15 REPRESENTING THE EVANGELINE AQUIFER IN LAYER 2 OF THE CENTRAL GULF COAST AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL.

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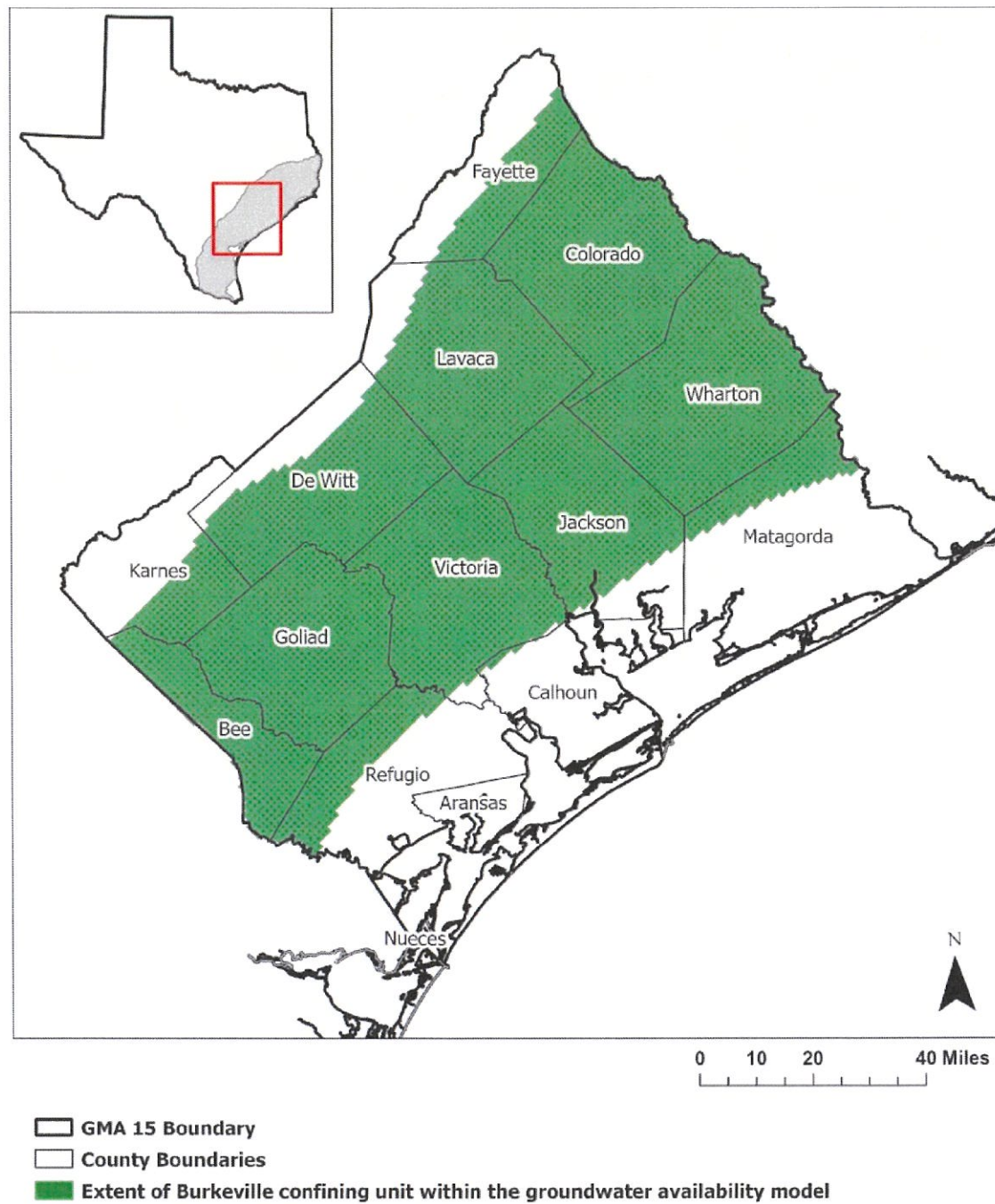


FIGURE 5. MAP SHOWING THE ACTIVE MODEL CELLS WITHIN GROUNDWATER MANAGEMENT AREA (GMA) 15 REPRESENTING THE BURKEVILLE CONFINING UNIT IN LAYER 3 OF THE CENTRAL GULF COAST AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL.

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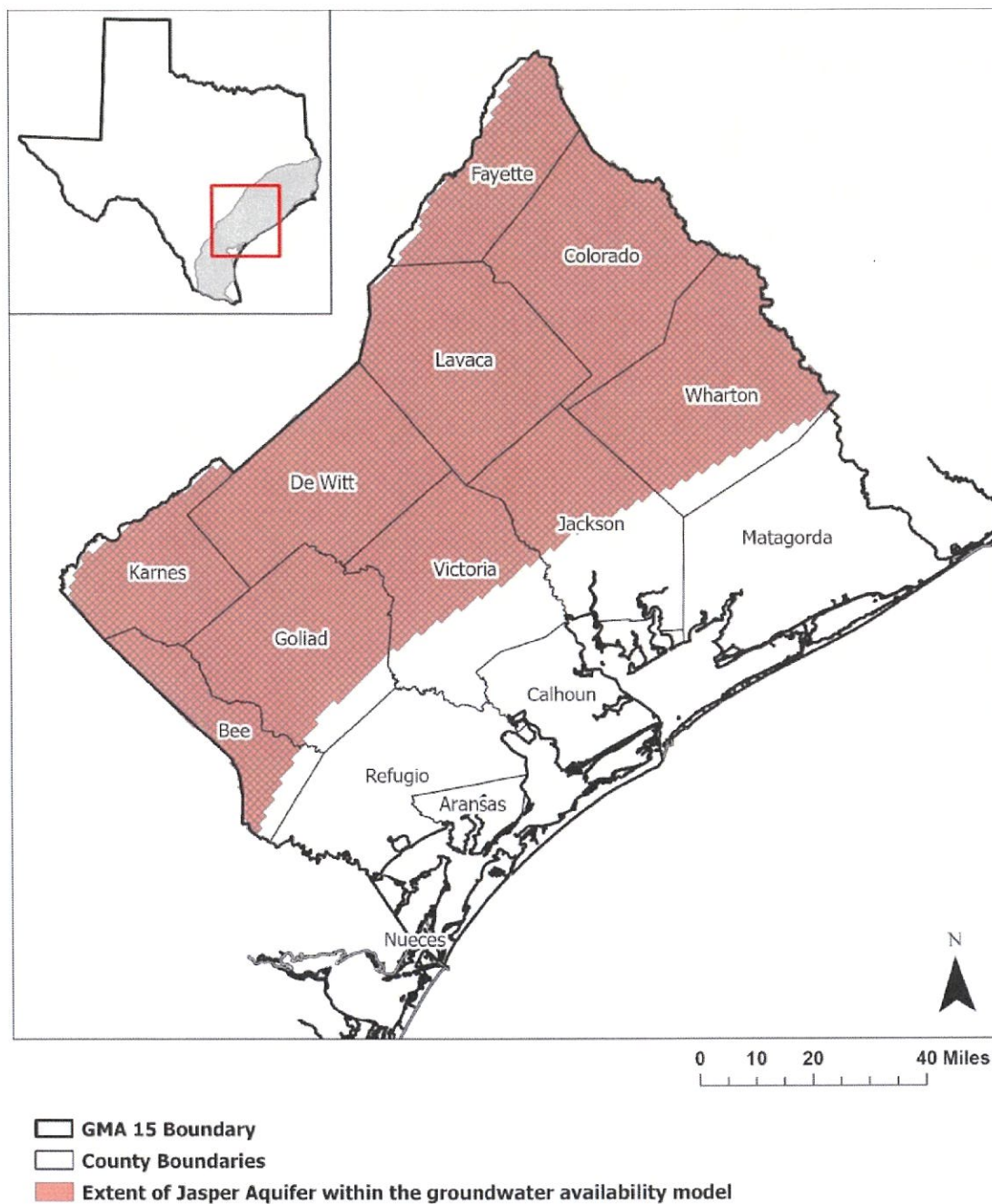


FIGURE 6. MAP SHOWING THE ACTIVE MODEL CELLS WITHIN GROUNDWATER MANAGEMENT AREA (GMA) 15 REPRESENTING THE JASPER AQUIFER AND CATAHOULA FORMATION IN DIRECT HYDROLOGIC CONNECTION WITH THE JASPER AQUIFER IN LAYER 4 OF THE CENTRAL GULF COAST AQUIFER SYSTEM GROUNDWATER AVAILABILITY MODEL.

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

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

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

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

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

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

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

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

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

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

LIMITATIONS:

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

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

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

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

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

REFERENCES:

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- Harbaugh, A. W., 2009, Zonebudget Version 3.01, A computer program for computing sub-regional water budgets for MODFLOW ground-water flow models, U.S. Geological Survey Groundwater Software.
- Harbaugh, A. W., and McDonald, M. G., 1996, User's documentation for MODFLOW-96, an update to the U.S. Geological Survey modular finite-difference groundwater-water flow model: U.S. Geological Survey Open-File Report 96-485, 56 p.
- Keester, M., Danielson, V., Donnelly, A., 2021, GMA 15 2021 Joint Planning Desired Future Conditions Explanatory Report, 1047 p.
- National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., http://www.nap.edu/catalog.php?record_id=11972.
- Texas Water Code, 2011, <http://www.statutes.legis.state.tx.us/docs/WA/pdf/WA.36.pdf>.
- Wade, S., 2010, GAM Run 10-008 Addendum: Texas Water Development Board, 8 p., <https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR10-08addendum.pdf>

APPENDIX E

GMA 15 Explanatory Report Appendices

**Appendix 2 —
Resolution to Adopt the Desired Future Conditions for Groundwater Management
Area 15 Aquifers**

**RESOLUTION TO ADOPT DESIRED FUTURE CONDITIONS
FOR GROUNDWATER MANAGEMENT AREA 15 AQUIFERS**

STATE OF TEXAS

**GROUNDWATER
MANAGEMENT AREA 15**

§
§
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§

RESOLUTION # 2021-01

WHEREAS, Texas Water Code § 36.108 requires the Groundwater Conservation Districts located whole or in part in a Groundwater Management Area ("GMA") designated by the Texas Water Development Board to adopt desired future conditions for the relevant aquifers located within the management area;

WHEREAS, the Groundwater Conservation Districts located wholly or partially within Groundwater Management Area 15 ("GMA 15"), as designated by the Texas Water Development Board, as of the date of this resolution are as follows:

Bee Groundwater Conservation District, Calhoun County Groundwater Conservation District, Coastal Bend Groundwater Conservation District, Coastal Plains Groundwater Conservation District, Colorado County Groundwater Conservation District, Corpus Christi Aquifer Storage and Recovery Conservation District, Evergreen Underground Water Conservation District, Fayette County Groundwater Conservation District, Goliad County Groundwater Conservation District, Pecan Valley Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, and Victoria County Groundwater Conservation District ;

WHEREAS, the Board Presidents or their Designated Representatives of districts in GMA 15 have met at various meetings and conducted joint planning in accordance with Chapter 36.108, Texas Water Code since April 2016 and;

WHEREAS, GMA 15, having given proper and timely notice, held an open meeting of the GMA 15 Member Districts on October 14, 2021 and;

WHEREAS, GMA 15 has solicited and considered public comment at specially called Public Meetings, including the meeting on October 14, 2021 and;

WHEREAS, the GMA 15 Member Districts received and considered technical advice regarding local aquifers, hydrology, geology, recharge characteristics, local groundwater demands and usage, population projections, ground and surface water inter-relationships, and other considerations that affect groundwater conditions and;

WHEREAS, following public discussion and due consideration of the current and future needs and conditions of the aquifers in question, the current and projected groundwater demands, and the potential effects on springs, surface water, habitat, and water-dependent species through the year 2079, GMA 15 Member Districts have analyzed drawdown estimations from numerous pumping scenarios using the Central Gulf Coast

Groundwater Availability Model and have voted on a motion made and seconded to adopt a Desired Future Condition (DFC) stated as follows:

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

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

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

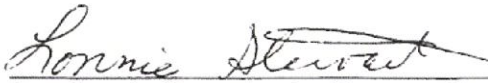
NOW THEREFORE BE IT RESOLVED, that the Groundwater Management Area 15 Member Districts do hereby document, record and confirm the Desired Future Condition stated above was adopted by the following vote:

Bee County Groundwater Conservation District: Aye
Calhoun County Groundwater Conservation District: Aye
Coastal Bend Groundwater Conservation District: Aye
Coastal Plains Groundwater Conservation District: Aye
Colorado County Groundwater Conservation District: Aye
Corpus Christi ASR Conservation District: Absent
Evergreen Underground Water Conservation District: Aye
Fayette County Groundwater Conservation District: Absent
Goliad County Groundwater Conservation District: Nay
Pecan Valley Groundwater Conservation District: Aye
Refugio Groundwater Conservation District: Aye
Texana Groundwater Conservation District: Aye
Victoria County Groundwater Conservation District: Aye

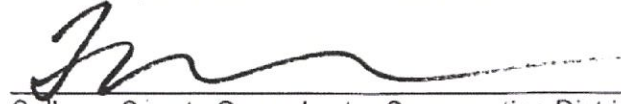
AND IT IS SO ORDERED.

PASSED AND ADOPTED on this 14th day of October 2021.

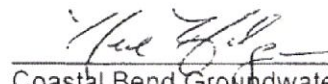
ATTEST:



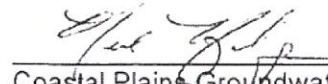
Bee County Groundwater Conservation District



Calhoun County Groundwater Conservation District



Coastal Bend Groundwater Conservation District



Coastal Plains Groundwater Conservation District



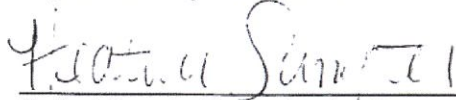
Colorado County Groundwater Conservation District

Corpus Christi Aquifer Storage and Recovery Conservation District

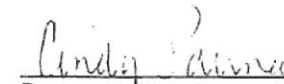


Evergreen Underground Water Conservation District

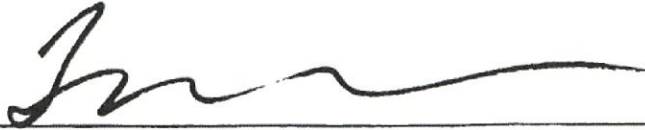
Fayette County Groundwater Conservation District



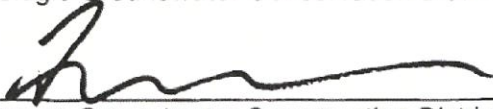
Goliad County Groundwater Conservation District



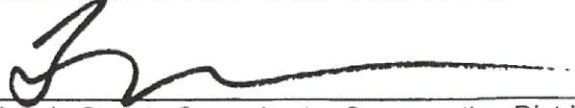
Pecan Valley Groundwater Conservation District



Refugio Groundwater Conservation District



Texana Groundwater Conservation District



Victoria County Groundwater Conservation District