SOUTHEAST TEXAS GROUNDWATER CONSERVATION DISTRICT

GROUNDWATER MANAGEMENT PLAN 2012

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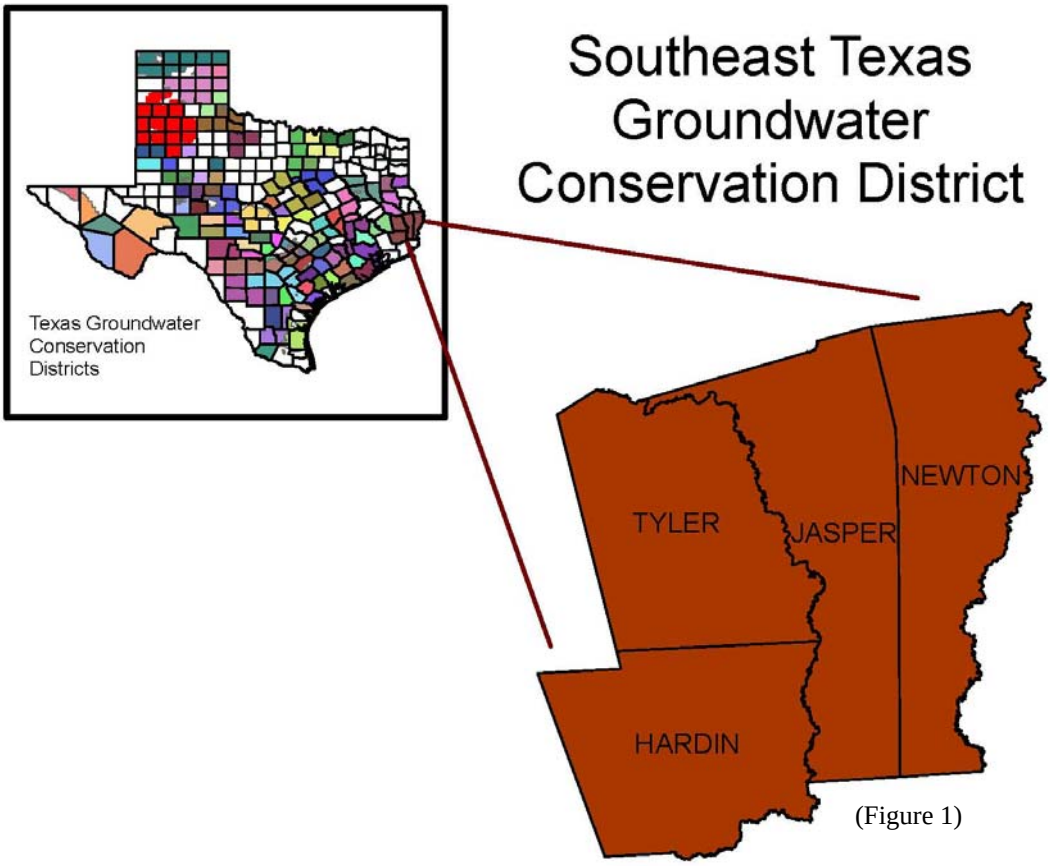
1. INTRODUCTION/PURPOSE

The Southeast Texas Groundwater Conservation District was created to conserve, preserve, protect, recharge, and prevent the waste of groundwater and to control subsidence caused by the withdrawal of groundwater within its boundaries which are coextensive with the boundaries of Jasper, Newton, Hardin and Tyler Counties, Texas as shown in *Figure 1*. As part of the process of accomplishing its purposes, the District is required to adopt a Management Plan which, after adoption, must be reviewed and approved by the Texas Water Development Board. The District is located in Groundwater Management Area 14 which covers the Upper Gulf Coast Aquifer. The District is also included in the Region I, Regional Water Planning Group.



(Figure 1)

2. DESCRIPTION OF THE DISTRICT

2.1 **Creation and Organization**. The 78th Texas Legislature, in its regular session of 2003, enacted Senate Bill 1888 which created the District in Jasper and Newton Counties, subject to approval of a confirmation election. On November 2, 2004 the voters of Jasper and Newton Counties confirmed the creation of the District. Subsequently, the Commissioners' Courts of Hardin and Tyler Counties, Texas, adopted resolutions requesting that Hardin and Tyler County be added to the District. The voters of Hardin and Tyler County confirmed the inclusion of the Counties into the District at an election held on November 8, 2005.

The District is governed by a thirteen (13) member board of directors. The Jasper County Commissioners' Court appoints two directors, one of whom represents rural water utilities and small water supply interests and one director who represents the large industrial groundwater supply interests and large municipal utilities. The Newton County Commissioners' Court appoints two directors, one of whom represents rural water utilities and small municipal water supply interests and one director who represents forestry or agricultural groundwater supply interests in the Counties. Both the Jasper City Council and the Newton City Council each appoints one director. The Hardin County Commissioners' Court appoints three directors, one representing rural water utilities and small municipal groundwater supply interests, one director representing the forestry, industrial, agricultural or landowner groundwater supply interests, and, one director representing large municipal groundwater supply interests. The Tyler County Commissioners' Court appoints three directors, one representing rural water utilities and small municipal groundwater supply interests, one director representing the forestry, industrial, agricultural or landowner groundwater supply interests, and, one director representing large municipal groundwater supply interests.

The Commissioners' Courts of Jasper, Newton, Hardin, and Tyler Counties shall jointly appoint one director to represent the forestry, agricultural, or landowner groundwater supply interest. The jointly appointed director shall serve as the presiding officer of the Board.

2.2 **Legal Authority**. The Act creating the District, Senate Bill 1888, confers upon the District all of the powers of a groundwater conservation district under Texas Water Code Chapter 36, except as limited by the Act. The District was created under Texas Constitution Article 16, Section 59 and is a governmental agency and political subdivision of the State. Senate Bill 1888 prohibits the District from imposing a tax, limits pumpage fees charged by the District to not exceed $0.01 (one cent) per thousand gallons of groundwater withdrawn for any purpose. The Act further denies the District the power of eminent domain, the power to issue bonds or other obligations that pledge revenue derived from taxation, and the power to purchase groundwater lot rights unless the rights purchased are for conservation purposes and are permanently held in trust not to be produced.

2.3 **Purpose of Management Plan**. The 75th Texas Legislature in 1997 enacted Senate Bill 1 ("SB 1") to establish a comprehensive statewide water planning process. In particular, SB 1 contained provisions that required groundwater conservation districts to prepare management plans to identify the water supply resources and water demands that will shape the decisions of each district. SB 1 designed the management plans to include management goals for each district to manage and conserve the groundwater resources within their boundaries.

In 2001, the Texas Legislature enacted Senate Bill 2 ("SB 2") to build on the planning requirements of SB 1 and to further clarify the actions necessary for districts to manage and conserve the groundwater resources of the state of Texas.

The Texas Legislature enacted significant changes to the management of groundwater resources in Texas with the passage of House Bill 1763 ("HB 1763") in 2005. HB 1763 created a long-term planning process in which groundwater conservation district (GCDs) in each Groundwater Management Area ("GMA") are required to meet and determine the Desired Future Conditions ("DFCs") for groundwater resources within their boundaries by September 1, 2010. HB 1763 also requires that GCDs share their management plans with other GCDs within their respective GMA. The Southeast Texas Groundwater Conservation District is located within GMA 14 along with the following GCDs *(see figures 2a and 2b)*:

Bluebonnet Groundwater Conservation District;
Brazoria County Groundwater Conservation District;
Brazos Valley Groundwater Conservation District;
Lone Star Groundwater Conservation District; and
Lower Trinity Groundwater Conservation District

TEXAS GROUNDWATER MANAGEMENT ARES

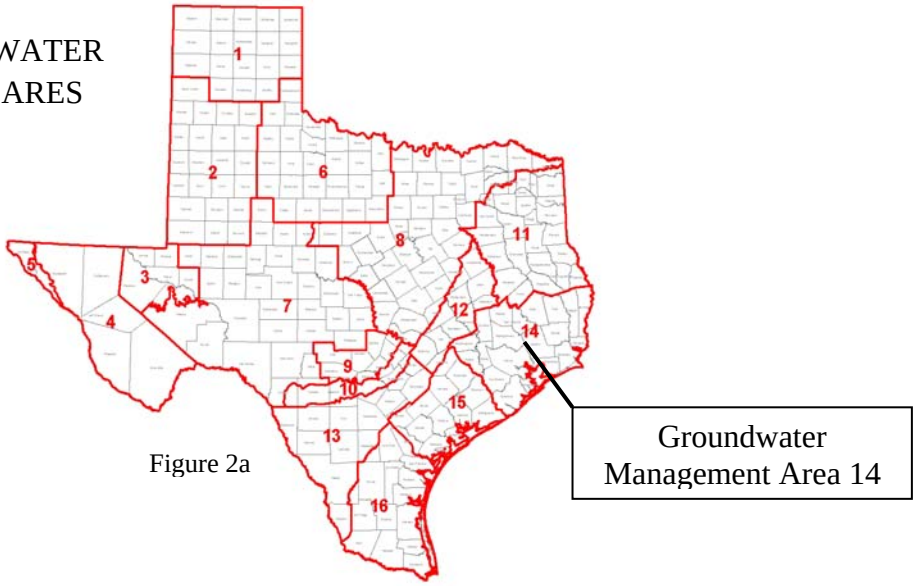


Figure 2a

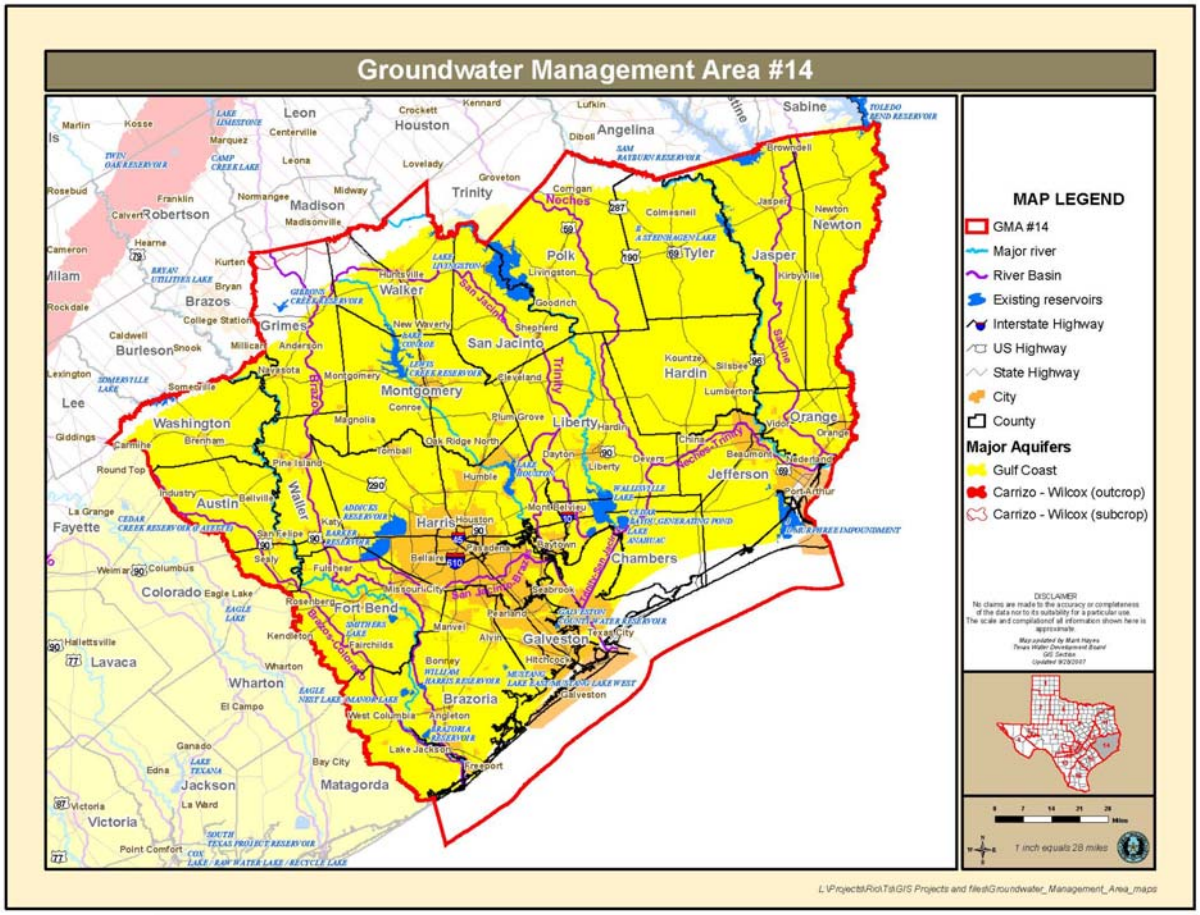


Figure 2b

The Southeast Texas Groundwater Conservation District's Management Plan satisfies the requirements of SB 1, SB 2, HB 1763, the statutory requirements of Chapter 36 of the Texas Water Code, and the administrative requirements of the Texas Water Development Board's rules.

2.4 <u>Rules and Regulations</u>. After public notice and a public hearing, the District adopted its substantive rules which became effective July 1, 2005 (amended October 2009, July 2010, and April 2012). The District also adopted Rules for Hearing which became effective July 1, 2005. A copy of the District Rules and Rules for Hearing can be found at the District's website at: http://www.setgcd.org.

3. GROUNDWATER RESOURCES OF THE DISTRICT TECHNICAL INFORMATION AS REQUIRED BY TEXAS ADMINISTRATIVE CODE

The Texas Gulf Coast Aquifer area includes the Gulf Coast, Yegua-Jackson, and the Brazos River Alluvium aquifers. Only the Chicot, Evangeline, Burkeville Confined, Jasper, and the Yegua-Jackson Aquifers are present within the District. The boundaries of these aquifers have been defined by the Texas Water Development Board (TWDB). See the TWDB GAM Run 11-019 attached as Appendix B.

3.1 Modeled Available Groundwater. The Texas Water Code defines modeled available groundwater 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 Texas Water Code §36.108.

The joint planning process set forth in Texas Water Code §36.108 must be collectively conducted by all groundwater conservation districts within the same GMA. The District is a member of GMA 14. GMA 14 adopted DFCs for the following aquifers on August 25, 2010:

Gulf Coast Aquifer;
Carrizo Sand Aquifer;
Queen City Aquifer,
Sparta Aquifer,
Yegua-Jackson Aquifer, and
Relative River Alluviums within the GMA

The adopted DFCs were then forwarded to the TWDB for development of the Modeled Available Groundwater ("MAG") calculations. On November 18, 2011 the TWDB issued GAM Run 10-038 MAG, attached as Appendix C. A summary of the Desired Future Conditions and Modeled Available Groundwater, relative to the Southeast Texas Groundwater Conservation District, are summarized in *Tables 1 - 4*.

DESIRED FUTURE CONDITION AND MODELED AVAILABLE GROUNDWATER FOR THE SOUTHEAST TEXAS GROUNDWATER CONSERVATION DISTRICT

AQUIFER	HARDIN COUNTY	
	Desired Future Conditions Average Drawdown in 2060 - feet	Modeled Available Groundwater (AF/yr) 2060
Chicot	17	1,263
Evangeline	27	33,696
Burkeville	23	0
Jasper	37	0
Yegua-Jackson	*	0
TOTAL		34,959

Table 1

AQUIFER	JASPER COUNTY	
	Desired Future Conditions Average Drawdown in 2060 - feet	Modeled Available Groundwater (AF/yr) 2060
Chicot	10	10,835
Evangeline	23	40,755
Burkeville	24	1
Jasper	21	15,903
Yegua-Jackson	*	0
TOTAL		67,494

Table 2

AQUIFER	NEWTON COUNTY	
	Desired Future Conditions Average Drawdown in 2060 - feet	Modeled Available Groundwater (AF/yr) 2060
Chicot	9	501
Evangeline	20	21,288
Burkeville	22	0
Jasper	18	12,350
Yegua-Jackson	*	0
TOTAL		34,139

Table 3

AQUIFER	TYLER COUNTY	
	Desired Future Conditions Average Drawdown in 2060 - feet	Modeled Available Groundwater (AF/yr) 2060
Chicot	3	0
Evangeline	16	20,592
Burkeville	19	1
Jasper	33	17,563
Yegua-Jackson	*	0
TOTAL		38,156

Table 4

*The Yegua-Jackson Aquifer is declared non-relevant within the Southeast Texas Groundwater Conservation District.

3.2 **Amount of Groundwater Being Used within the District on an Annual Basis**. Please refer to Appendix A.

3.3 **Annual Amount of Recharge from Precipitation to the Groundwater Resources within the District**. Please refer to Appendix B.

3.4 **Annual Volume of Water that Discharges from the Aquifer to Springs and Surface Water Bodies**. Please refer to Appendix B.

3.5 **Estimate of the Annual Volume of Flow into the District, out of the District, and Between Aquifers in the District**. Please refer to Appendix B.

3.6 **Projected Surface Water Supply within the District**. Please refer to Appendix A.

3.7 **Projected Total Demand for Water within the District**. Please refer to Appendix A.

3.8 **Water Supply Needs**. Please refer to Appendix A.

3.9 **Water Management Strategies**. Please refer to Appendix A.

4. MANAGEMENT GOALS, PERFORMANCE STANDARDS, MANAGEMENT OBJECTIVES, AND METHODOLOGY

Each year, an Annual Report will be created by the general manager and staff of the District and be provided to the members of the Board. The Annual Report will cover the activities of the District including information on the District's performance in regards to achieving the District's management plan goals and objectives. The Annual Report will be delivered to the Board within one hundred and eighty (180) days following the completion of the

District's fiscal year. A copy of the Annual Report will be kept on file and be made available for public inspection at the District's office upon adoption of the report by the Board.

4.1 Providing the Most Efficient Use of Groundwater:

4.1.1. Objective - Each year, the District will require all new exempt or non-exempt wells that are constructed within the boundaries of the District to be registered or permitted with the District in accordance with the District's Rules.

4.1.2 Performance Standard - The number of exempt and non-exempt wells registered or permitted by the District for the year will be incorporated into the District's Annual Report.

4.2 Controlling and Preventing the Waste of Groundwater in the District

4.2.1 Objectives - Each year, the District will make an evaluation of the District Rules to determine whether any amendments are recommended to decrease the amount of waste of groundwater within the District.

4.2.2 Performance Standard - The District will include a discussion of the annual evaluation of the District Rules and the determination of whether any amendments to the rules are recommended to prevent the waste of groundwater in the District's Annual Report.

4.2.3 Objective - Each year, the District will provide information to the public on eliminating and reducing wasteful practices in the use of groundwater by posting an article on groundwater waste reduction on the District's website.

4.2.4 Performance Standard - Each year, a copy of the information provided in the groundwater waste reduction article posted on the District's website will be included in the District's Annual Report.

4.3 Controlling and Preventing Subsidence.

4.3.1 Objective - At this time, there are no known occurrences of subsidence within the District. The District proactively strives to prevent subsidence from occurring by applying its Rules, meeting the goals of its Management Plan, as well as participating in joint planning efforts in both GMA 14 and the Region I Water Planning Group. By continuing all of the above mentioned efforts and actively planning for the responsible use of its groundwater resources, the prevention of subsidence is inherent in the overall management of the District.

4.3.2 Performance Standard – Any reported subsidence shall be included in the District's Annual Report.

4.4 Addressing Conjunctive Surface Water Management Issues.

4.4.1 Objective - The District will coordinate conjunctive surface water issues with the Angelina and Neches River Authority (ANRA), Lower Neches Valley Authority (LNVA), and the Sabine River Authority (SRA) through the East Texas Regional Water Planning Group, Region I, by inviting the officials from the Planning Group to attend a District meeting at least once a year.

4.4.2 Performance Standard. - A copy of the letters to the surface water providers, as well as evidence that the letters have been sent, either via U.S. Postal Service (registered/return receipt) or e-mail will be included in the District's Annual Report.

4.5 Natural Resource Issues Affecting the Use and Availability of Groundwater or Affected by the Use of Groundwater.

This Management Goal is not applicable to the District.

4.6 Addressing Drought Conditions.

4.6.1 Objectives - The District will post an article, at least annually, regarding drought conditions in the District on the District's website.

4.6.2 Performance Standard - A copy of the article or articles posted on the District's website regarding drought conditions will be included in the District's Annual Report.

4.7 Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control.

Conservation is the only practice which is practicable in the District. The District does not consider recharge enhancement, precipitation enhancement, or brush control to be either necessary or practical at this time. Rainwater harvesting is not necessary due to the very high rainfall rate in the District. Therefore, these four goals are not applicable.

4.7.1 Objective - The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in Jasper, Newton, Hardin and Tyler Counties.

4.7.2 Performance Standard - A copy of the article submitted by the District for publication to a newspaper of general circulation in Jasper, Newton, Hardin and Tyler Counties regarding water conservation will be included in the District's Annual Report.

4.7.3 Objective - The District will publish and mail, at least once annually, an informative flier on water conservation and related issues, to groundwater use permit holders. A copy of the flier(s) shall also be made available on the District's website.

4.7.4 Performance Standard – A copy of the flier(s), on water conservation and related issues, along with the mailing list of the permit holders it was provided to shall be included in the District's Annual Report

4.8 Addressing in a Quantitative Manner the Desired Future Conditions

4.8.1 Objective - The District will monitor groundwater conditions within the District by measuring the static water levels in at least fifteen (15) monitor wells annually.

4.8.2 Performance Standard – The recorded static water levels of the fifteen (15) monitor wells will be included in the District's Annual Report.

5. ACTIONS, PROCEDURE, PREFORMANCE, AND AVOIDANCE FOR IMPLIMENTATION OF MANAGEMENT PLAN

The District will implement the goals and provisions of this Management Plan as a guideline in its decision-making. The District will ensure that its planning efforts, operations, and activities will be consistent with the provisions of this plan.

The District has adopted rules in accordance with Chapter 36 of the Texas Water Code, and all rules will be followed and enforced. The District Rules are available at http://www.setgcd.org/rules.html. The District may amend the District Rules as necessary to comply with changes to Chapter 36 of the Texas Water Code, a revised Management Plan and to ensure the best management of groundwater within the District according to present aquifer conditions. The development and enforcement of the District Rules will be based on best scientific and technical evidence available to the District.

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

APPENDIX A

Estimated Historical Water Use and 2012 State Water Plan Datasets:

By Stephen Allen
Texas Water Development Board
Groundwater Resources Division
Groundwater Technical Assistance Section
(512) 462-7317
August 3, 2012

Estimated Historical Water Use And 2012 State Water Plan Datasets:

Southeast Texas Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Resources Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
August 3, 2012

GROUNDWATER MANAGEMENT PLAN DATA:

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

http://www.twdb.texas.gov/groundwater/docs/GCD/GMPchecklist0911.pdf

The five reports included in part 1 are:

1. Estimated Historical Water Use (checklist Item 2)

   from the TWDB Historical Water Use Survey (WUS)

2. Projected Surface Water Supplies (checklist Item 6)
3. Projected Water Demands (checklist Item 7)
4. Projected Water Supply Needs (checklist Item 8)
5. Projected Water Management Strategies (checklist Item 9)

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

Part 2 of the 2-part package is the groundwater availability model (GAM) report. The District should have received this report from the Groundwater Availability Modeling Section. Questions about the GAM can be directed to Dr. Shirley Wade, shirley.wade@twdb.texas.gov, or (512) 463-0749 (to contact the Administrative Assistant).

DISCLAIMER:

The data presented in this report represents the most updated Historical Water Use and 2012 State Water Planning data available as of 8/3/2012. Although it does not happen frequently, neither of these datasets are static and are subject to change pending the availability of more accurate data (Historical Water Use data) or an amendment to the 2012 State Water Plan (2012 State Water Planning data). District personnel must review these datasets and correct any discrepancies in order to ensure approval of their groundwater management plan.

The Historical Water Use dataset can be verified at this web address:

http://www.twdb.texas.gov/wrpi/wus/summary.asp

The 2012 State Water Planning dataset can be verified by contacting Wendy Barron (wendy.barron@twdb.texas.gov or 512-936-0886).

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317) or Rima Petrossian (rima.petrossian@twdb.texas.gov or 512-936-2420).

Estimated Historical Water Use

TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water use estimates are currently unavailable for 2005, 2009 and 2010.
TWDB staff anticipates the calculation and posting of such estimates during the first half of 2012.

HARDIN COUNTY

All values are in acre-feet/year

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	GW	3,598	1,917	0	5,770	75	15	11,375
	SW	0	0	0	0	0	105	105
1980	GW	5,582	255	0	5,000	39	28	10,904
	SW	0	0	0	0	0	42	42
1984	GW	5,178	80	0	1,141	1,077	48	7,524
	SW	0	0	0	0	0	72	72
1985	GW	5,383	1,502	0	1,400	13	48	8,346
	SW	0	0	0	0	5,895	72	5,967
1986	GW	5,006	799	0	1,600	11	8	7,424
	SW	0	0	0	0	5,580	79	5,659
1987	GW	4,834	265	0	1,600	31	55	6,785
	SW	0	0	0	0	5,231	82	5,313
1988	GW	4,360	105	0	2,000	28	15	6,508
	SW	0	0	0	0	5,617	142	5,759
1989	GW	4,888	100	0	1,922	28	13	6,951
	SW	0	0	0	0	5,233	125	5,358
1990	GW	4,798	106	0	2,200	28	13	7,145
	SW	0	0	0	0	5,233	123	5,356
1991	GW	4,936	82	0	2,200	28	14	7,260
	SW	0	0	0	0	8,793	127	8,920
1992	GW	5,006	86	0	2,200	23	9	7,324
	SW	0	0	0	0	8,794	81	8,875
1993	GW	5,217	105	0	1,587	22	11	6,942
	SW	0	9	0	0	8,717	96	8,822
1994	GW	5,505	90	0	1,813	21	11	7,440
	SW	0	0	0	0	8,717	96	8,813
1995	GW	5,606	83	0	1,296	9	12	7,006
	SW	0	0	0	0	6,221	111	6,332
1996	GW	6,025	83	0	267	9	12	6,396
	SW	0	0	0	0	6,221	111	6,332
1997	GW	5,807	102	0	267	11	11	6,198
	SW	0	0	0	0	6,221	96	6,317

Estimated Historical Water Use

TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water use estimates are currently unavailable for 2005, 2009 and 2010.
TWDB staff anticipates the calculation and posting of such estimates during the first half of 2012.

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1998	GW	6,040	87	0	3,467	7	15	9,616
	SW	0	0	0	0	6,221	137	6,358
1999	GW	5,909	117	0	2,933	7	18	8,984
	SW	0	0	0	0	6,221	163	6,384
2000	GW	5,825	119	0	3,502	7	15	9,468
	SW	0	0	0	0	6,221	140	6,361
2001	GW	5,656	111	0	1,223	11	16	7,017
	SW	0	0	0	0	6,211	141	6,352
2002	GW	5,851	114	0	1,210	9	14	7,198
	SW	0	0	0	0	5,227	119	5,346
2003	GW	7,995	117	0	148	9	15	8,284
	SW	0	0	0	164	5,227	135	5,526
2004	GW	5,940	199	0	136	9	16	6,300
	SW	0	0	0	171	5,227	136	5,534
2006	GW	5,557	137	0	789	3	40	6,526
	SW	0	0	0	189	0	120	309
2007	GW	5,467	91	0	1,769	0	40	7,367
	SW	0	0	0	169	0	120	289
2008	GW	5,756	55	0	2,245	0	44	8,100
	SW	0	0	0	184	0	133	317
2009	GW	5,684	42	0	866	23	41	6,656
	SW	0	2	0	192	3	124	321

JASPER COUNTY

All values are in acre-feet/year

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	GW	3,623	48,422	0	0	19	62	52,126
	SW	0	12,400	0	40	0	365	12,805
1980	GW	5,270	46,010	0	75	0	116	51,471
	SW	0	12,960	0	94	0	143	13,197
1984	GW	4,808	46,179	0	50	0	125	51,162
	SW	0	11,265	0	122	4	188	11,579
1985	GW	4,611	46,681	0	58	0	118	51,468

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water use estimates are currently unavailable for 2005, 2009 and 2010.
TWDB staff anticipates the calculation and posting of such estimates during the first half of 2012.

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1985	SW	0	9,367	0	142	4	177	9,690
1986	GW	4,308	47,764	0	58	0	118	52,248
	SW	0	10,118	0	142	4	177	10,441
1987	GW	4,509	40,329	0	58	0	138	45,034
	SW	0	14,435	0	142	4	208	14,789
1988	GW	4,501	42,016	0	58	0	149	46,724
	SW	0	16,173	0	142	4	225	16,544
1989	GW	4,301	46,418	0	0	0	134	50,853
	SW	0	13,828	0	105	2	202	14,137
1990	GW	4,589	44,764	0	0	0	133	49,486
	SW	0	12,828	0	150	2	200	13,180
1991	GW	4,303	45,336	0	0	4	136	49,779
	SW	0	11,460	0	150	0	204	11,814
1992	GW	4,344	49,638	0	0	4	105	54,091
	SW	0	12,422	0	150	0	157	12,729
1993	GW	4,546	51,410	0	0	4	99	56,059
	SW	0	12,046	0	99	0	148	12,293
1994	GW	4,685	48,703	0	0	4	115	53,507
	SW	0	9,588	0	105	0	173	9,866
1995	GW	4,608	46,835	0	0	4	130	51,577
	SW	0	10,806	0	105	0	193	11,104
1996	GW	4,755	44,169	0	0	4	115	49,043
	SW	0	11,271	0	105	0	174	11,550
1997	GW	4,648	48,302	0	0	4	117	53,071
	SW	0	10,781	0	105	0	175	11,061
1998	GW	5,160	44,236	0	0	4	102	49,502
	SW	0	12,237	0	105	0	153	12,495
1999	GW	5,192	45,727	0	0	4	110	51,033
	SW	0	9,895	0	105	0	165	10,165
2000	GW	5,110	47,009	0	0	4	127	52,250
	SW	0	11,874	0	0	0	190	12,064
2001	GW	3,456	47,170	0	0	2	64	50,692
	SW	0	12,298	0	0	0	239	12,537
2002	GW	3,431	47,807	0	0	2	75	51,315

Estimated Historical Water Use

TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water use estimates are currently unavailable for 2005, 2009 and 2010.
TWDB staff anticipates the calculation and posting of such estimates during the first half of 2012.

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
2002	SW	0	14,054	0	0	0	281	14,335
2003	GW	3,415	45,939	0	0	2	68	49,424
	SW	0	3,565	0	0	0	253	3,818
2004	GW	3,745	34,372	0	0	2	68	38,187
	SW	0	14,266	0	0	0	254	14,520
2006	GW	4,976	45,739	0	36	0	189	50,940
	SW	0	9,826	0	0	0	284	10,110
2007	GW	5,186	44,467	0	30	0	194	49,877
	SW	0	8,419	0	0	0	291	8,710
2008	GW	4,332	42,682	0	30	0	120	47,164
	SW	0	7,981	0	0	0	180	8,161
2009	GW	5,061	46,806	0	0	0	417	52,284
	SW	0	0	0	0	0	181	181

NEWTON COUNTY

All values are in acre-feet/year

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	GW	1,528	1,202	0	763	14	18	3,525
	SW	0	0	0	4	0	150	154
1980	GW	1,654	306	0	850	0	40	2,850
	SW	0	0	0	377	0	61	438
1984	GW	1,594	306	0	881	0	54	2,835
	SW	0	0	0	294	34	82	410
1985	GW	1,716	420	0	663	0	41	2,840
	SW	0	0	0	221	34	62	317
1986	GW	1,671	423	0	750	7	34	2,885
	SW	0	0	0	250	35	51	336
1987	GW	1,531	111	0	875	6	34	2,557
	SW	0	0	0	292	28	51	371
1988	GW	1,541	125	0	447	7	40	2,160
	SW	0	0	0	149	31	60	240
1989	GW	1,580	116	0	1,650	6	39	3,391
	SW	0	0	0	550	27	59	636

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water use estimates are currently unavailable for 2005, 2009 and 2010.
TWDB staff anticipates the calculation and posting of such estimates during the first half of 2012.

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1990	GW	1,677	114	0	1,650	6	39	3,486
	SW	0	0	0	550	27	58	635
1991	GW	1,606	109	0	1,787	6	40	3,548
	SW	0	0	0	596	28	60	684
1992	GW	1,774	110	0	1,787	6	33	3,710
	SW	0	0	0	596	28	49	673
1993	GW	1,723	117	0	1,513	6	33	3,392
	SW	0	0	0	504	28	49	581
1994	GW	1,649	117	0	1,650	6	33	3,455
	SW	0	234	0	550	28	49	861
1995	GW	1,689	117	0	1,179	6	40	3,031
	SW	0	234	0	393	28	60	715
1996	GW	1,817	117	0	1,081	6	33	3,054
	SW	0	234	0	360	28	49	671
1997	GW	1,824	121	0	1,081	6	40	3,072
	SW	0	235	0	360	28	60	683
1998	GW	1,747	317	0	1,081	6	38	3,189
	SW	0	235	0	360	28	58	681
1999	GW	1,728	316	0	1,081	6	46	3,177
	SW	0	235	0	360	28	70	693
2000	GW	1,854	315	0	275	6	44	2,494
	SW	0	236	0	92	28	66	422
2001	GW	1,832	127	0	275	6	44	2,284
	SW	0	246	0	92	34	66	438
2002	GW	1,815	127	0	275	6	38	2,261
	SW	0	246	0	92	34	56	428
2003	GW	1,711	124	0	310	6	51	2,202
	SW	0	241	0	23	34	76	374
2004	GW	1,916	101	0	292	6	51	2,366
	SW	0	196	0	208	34	77	515
2006	GW	1,454	38	0	264	0	49	1,805
	SW	0	0	0	111	0	90	201
2007	GW	1,470	52	0	50	0	49	1,621
	SW	0	0	0	317	0	90	407

Estimated Historical Water Use

TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water use estimates are currently unavailable for 2005, 2009 and 2010.
TWDB staff anticipates the calculation and posting of such estimates during the first half of 2012.

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
2008	GW	2,167	52	0	0	0	37	2,256
	SW	0	0	0	0	0	68	68
2009	GW	2,078	52	0	0	73	37	2,240
	SW	0	0	0	0	75	68	143

TYLER COUNTY

All values are in acre-feet/year

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	GW	1,721	373	0	0	7	27	2,128
	SW	0	25	0	9	0	195	229
1980	GW	2,243	44	0	0	0	96	2,383
	SW	0	0	0	0	0	144	144
1984	GW	2,146	13	0	4	0	156	2,319
	SW	0	0	0	18	0	234	252
1985	GW	2,340	23	0	9	0	142	2,514
	SW	0	0	0	41	0	214	255
1986	GW	2,305	41	0	9	0	115	2,470
	SW	0	0	0	41	0	173	214
1987	GW	2,141	25	0	9	0	122	2,297
	SW	0	0	0	41	0	184	225
1988	GW	1,927	21	0	9	0	132	2,089
	SW	0	0	0	41	0	198	239
1989	GW	2,001	28	0	4	0	116	2,149
	SW	0	0	0	18	0	175	193
1990	GW	2,043	32	0	3	0	115	2,193
	SW	0	0	0	15	0	172	187
1991	GW	2,171	11	0	3	0	117	2,302
	SW	0	0	0	15	0	176	191
1992	GW	2,487	18	0	3	0	70	2,578
	SW	0	0	0	15	0	105	120
1993	GW	2,463	15	0	0	0	70	2,548
	SW	0	0	0	18	0	105	123
1994	GW	2,497	18	0	0	0	97	2,612

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water use estimates are currently unavailable for 2005, 2009 and 2010.
TWDB staff anticipates the calculation and posting of such estimates during the first half of 2012.

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1994	SW	0	0	0	18	0	145	163
1995	GW	2,484	66	0	0	0	103	2,653
	SW	0	0	0	18	0	155	173
1996	GW	2,633	87	0	0	0	110	2,830
	SW	0	0	0	18	0	165	183
1997	GW	2,410	158	0	0	0	77	2,645
	SW	0	0	0	18	0	115	133
1998	GW	2,614	66	0	0	0	102	2,782
	SW	0	0	0	18	0	152	170
1999	GW	2,734	66	0	0	0	114	2,914
	SW	0	0	0	18	0	170	188
2000	GW	2,776	32	0	0	0	110	2,918
	SW	0	0	0	29	0	165	194
2001	GW	2,762	32	0	0	0	110	2,904
	SW	0	0	0	20	0	165	185
2002	GW	2,865	14	0	0	0	100	2,979
	SW	0	0	0	104	0	150	254
2003	GW	2,566	14	0	0	0	94	2,674
	SW	0	0	0	0	0	140	140
2004	GW	2,948	4	0	434	0	87	3,473
	SW	0	0	0	0	0	130	130
2006	GW	2,562	1	0	500	0	56	3,119
	SW	0	0	0	0	0	225	225
2007	GW	3,191	1	0	175	0	60	3,427
	SW	0	0	0	0	0	239	239
2008	GW	3,233	1	0	19	0	46	3,299
	SW	0	0	0	0	0	186	186
2009	GW	4,012	2	0	0	18	80	4,112
	SW	0	0	0	675	2	320	997

Projected Surface Water Supplies
TWDB 2012 State Water Plan Data

HARDIN COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
I	LIVESTOCK	NECHES	LIVESTOCK LOCAL SUPPLY	139	139	139	139	139	139
I	LIVESTOCK	TRINITY	LIVESTOCK LOCAL SUPPLY	2	2	2	2	2	2
	Sum of Projected Surface Water Supplies (acre-feet/year)			141	141	141	141	141	141

JASPER COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
I	LIVESTOCK	NECHES	LIVESTOCK LOCAL SUPPLY	115	115	115	115	115	115
I	LIVESTOCK	SABINE	LIVESTOCK LOCAL SUPPLY	75	75	75	75	75	75
I	MANUFACTURING	NECHES	NECHES RIVER RUN-OF-RIVER MANUFACTURING	12	12	12	12	12	12
I	MANUFACTURING	NECHES	NECHES RIVER RUN-OF-RIVER MANUFACTURING	604	604	604	604	604	604
I	MANUFACTURING	NECHES	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	20,189	23,571	26,084	28,281	29,928	29,991
	Sum of Projected Surface Water Supplies (acre-feet/year)			20,995	24,377	26,890	29,087	30,734	30,797

NEWTON COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
I	IRRIGATION	SABINE	SABINE RIVER RUN-OF-RIVER IRRIGATION	50	50	50	50	50	50
I	LIVESTOCK	SABINE	LIVESTOCK LOCAL SUPPLY	66	66	66	66	66	66
I	MANUFACTURING	SABINE	SABINE RIVER RUN-OF-RIVER MANUFACTURING	135	135	135	135	135	135
I	MINING	SABINE	OTHER LOCAL SUPPLY	28	28	28	28	28	28
I	STEAM ELECTRIC POWER	SABINE	SABINE RIVER RUN-OF-RIVER	14,179	14,179	14,179	14,179	14,179	14,179

Projected Surface Water Supplies
TWDB 2012 State Water Plan Data

	Sum of Projected Surface Water Supplies (acre-feet/year)			14,458	14,458	14,458	14,458	14,458	14,458

TYLER COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
I	IRRIGATION	NECHES	NECHES RIVER COMBINED RUN-OF-RIVER IRRIGATION	123	123	123	123	123	123
I	LIVESTOCK	NECHES	LIVESTOCK LOCAL SUPPLY	165	165	165	165	165	165
	Sum of Projected Surface Water Supplies (acre-feet/year)			288	288	288	288	288	288

Projected Water Demands
TWDB 2012 State Water Plan Data

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

HARDIN COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	KOUNTZE	NECHES	306	323	326	328	336	348
I	LUMBERTON	NECHES	1,430	1,515	1,544	1,573	1,615	1,673
I	SILSBEE	NECHES	1,072	1,136	1,149	1,161	1,193	1,235
I	SOUR LAKE	NECHES	176	184	183	182	186	193
I	COUNTY-OTHER	NECHES	1,834	1,943	1,964	1,984	2,037	2,109
I	MANUFACTURING	NECHES	146	165	182	200	216	233
I	MINING	NECHES	7,800	8,648	9,219	9,788	10,361	10,798
I	LIVESTOCK	NECHES	154	154	154	154	154	154
I	IRRIGATION	NECHES	3,502	3,502	3,502	3,502	3,502	3,502
I	LUMBERTON MUD	NECHES	1,929	2,073	2,125	2,179	2,245	2,325
I	NORTH HARDIN WSC	NECHES	685	716	714	720	736	762
I	WEST HARDIN WSC	NECHES	315	325	325	325	330	342
I	COUNTY-OTHER	TRINITY	19	20	20	21	21	22
I	LIVESTOCK	TRINITY	2	2	2	2	2	2
I	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	6	7	7	7	7	7
	Sum of Projected Water Demands (acre-feet/year)		19,376	20,713	21,416	22,126	22,941	23,705

JASPER COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	JASPER	NECHES	1,602	1,682	1,714	1,699	1,688	1,688
I	LIVESTOCK	NECHES	197	197	197	197	197	197
I	MINING	NECHES	2	2	2	2	2	2
I	MANUFACTURING	NECHES	64,231	67,611	70,123	72,318	73,965	74,028
I	COUNTY-OTHER	NECHES	1,834	1,895	1,906	1,868	1,850	1,850
I	MANUFACTURING	SABINE	36	38	39	41	41	41
I	JASPER COUNTY WCID #1	SABINE	324	329	325	312	306	306
I	MAURICEVILLE SUD	SABINE	100	104	104	103	103	103
I	KIRBYVILLE	SABINE	474	494	506	501	499	499
I	MINING	SABINE	2	2	2	2	2	2

Projected Water Demands
TWDB 2012 State Water Plan Data

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

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	LIVESTOCK	SABINE	120	120	120	120	120	120
I	COUNTY-OTHER	SABINE	981	1,016	1,023	1,003	994	994
	Sum of Projected Water Demands (acre-feet/year)		69,903	73,490	76,061	78,166	79,767	79,830

NEWTON COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	MINING	NECHES	6	6	6	6	6	6
I	LIVESTOCK	SABINE	110	110	110	110	110	110
I	MINING	SABINE	26	26	26	26	26	26
I	IRRIGATION	SABINE	367	367	367	367	367	367
I	NEWTON	SABINE	480	495	489	497	509	524
I	COUNTY-OTHER	SABINE	1,128	1,132	1,103	1,100	1,120	1,154
I	MANUFACTURING	SABINE	678	793	899	1,006	1,103	1,196
I	STEAM ELECTRIC POWER	SABINE	5,924	14,132	16,522	19,436	22,987	27,317
I	MAURICEVILLE SUD	SABINE	37	37	37	37	38	39
I	SOUTH NEWTON WSC	SABINE	257	259	253	253	257	265
	Sum of Projected Water Demands (acre-feet/year)		9,013	17,357	19,812	22,838	26,523	31,004

TYLER COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	WOODVILLE	NECHES	661	750	802	818	814	814
I	MANUFACTURING	NECHES	39	46	53	60	66	71
I	COLMESNEIL	NECHES	72	80	84	84	83	83
I	COUNTY-OTHER	NECHES	1,422	1,587	1,684	1,696	1,677	1,677
I	LIVESTOCK	NECHES	274	274	274	274	274	274
I	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	NECHES	7	7	8	8	8	8
I	TYLER COUNTY WSC	NECHES	575	633	665	663	652	652
I	IRRIGATION	NECHES	29	29	29	29	29	29
	Sum of Projected Water Demands (acre-feet/year)		3,079	3,406	3,599	3,632	3,603	3,608

Projected Water Supply Needs
TWDB 2012 State Water Plan Data

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

HARDIN COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	COUNTY-OTHER	NECHES	-154	-263	-284	-304	-357	-429
I	COUNTY-OTHER	TRINITY	1	0	0	-1	-1	-2
I	IRRIGATION	NECHES	-1,002	-1,002	-1,002	-1,002	-1,002	-1,002
I	KOUNTZE	NECHES	423	406	403	401	393	381
I	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	TRINITY	2	1	1	1	1	1
I	LIVESTOCK	NECHES	3	3	3	3	3	3
I	LIVESTOCK	TRINITY	0	0	0	0	0	0
I	LUMBERTON	NECHES	270	185	156	127	85	2
I	LUMBERTON MUD	NECHES	1,052	908	856	802	736	656
I	MANUFACTURING	NECHES	-27	-46	-63	-81	-97	-114
I	MINING	NECHES	-7,772	-8,620	-9,191	-9,760	-10,333	-10,770
I	NORTH HARDIN WSC	NECHES	714	683	685	679	663	637
I	SILSBEE	NECHES	536	472	459	447	415	373
I	SOUR LAKE	NECHES	590	582	583	584	580	573
I	WEST HARDIN WSC	NECHES	284	274	274	274	269	257
	Sum of Projected Water Supply Needs (acre-feet/year)		-8,955	-9,931	-10,540	-11,148	-11,790	-12,317

JASPER COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	COUNTY-OTHER	NECHES	-334	-395	-406	-368	-350	-350
I	COUNTY-OTHER	SABINE	-40	-75	-82	-62	-53	-53
I	JASPER	NECHES	2,932	2,852	2,820	2,835	2,846	2,846
I	JASPER COUNTY WCID #1	SABINE	231	226	230	243	249	249
I	KIRBYVILLE	SABINE	126	106	94	99	101	101
I	LIVESTOCK	NECHES	2	2	2	2	2	2
I	LIVESTOCK	SABINE	7	7	7	7	7	7
I	MANUFACTURING	NECHES	0	1	1	1	1	1
I	MANUFACTURING	SABINE	0	0	0	0	0	0
I	MAURICEVILLE SUD	SABINE	8	4	4	5	5	5

Projected Water Supply Needs
TWDB 2012 State Water Plan Data

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

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	MINING	NECHES	0	0	0	0	0	0
I	MINING	SABINE	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet/year)		-374	-470	-488	-430	-403	-403

NEWTON COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	COUNTY-OTHER	SABINE	250	246	275	278	258	224
I	IRRIGATION	SABINE	1,917	1,917	1,917	1,917	1,917	1,917
I	LIVESTOCK	SABINE	14	14	14	14	14	14
I	MANUFACTURING	SABINE	-149	-264	-370	-477	-574	-667
I	MAURICEVILLE SUD	SABINE	2	2	2	2	1	0
I	MINING	NECHES	2	2	2	2	2	2
I	MINING	SABINE	2	2	2	2	2	2
I	NEWTON	SABINE	206	191	197	189	177	162
I	SOUTH NEWTON WSC	SABINE	396	394	400	400	396	388
I	STEAM ELECTRIC POWER	SABINE	8,255	47	-2,343	-5,257	-8,808	-13,138
	Sum of Projected Water Supply Needs (acre-feet/year)		-149	-264	-2,713	-5,734	-9,382	-13,805

TYLER COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
I	COLMESNEIL	NECHES	299	291	287	287	288	288
I	COUNTY-OTHER	NECHES	23	-142	-239	-251	-232	-232
I	IRRIGATION	NECHES	98	98	98	98	98	98
I	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	NECHES	1	1	0	0	0	0
I	LIVESTOCK	NECHES	37	37	37	37	37	37
I	MANUFACTURING	NECHES	34	27	20	13	7	2
I	TYLER COUNTY WSC	NECHES	497	439	407	409	420	420
I	WOODVILLE	NECHES	1,260	1,171	1,119	1,103	1,107	1,107
	Sum of Projected Water Supply Needs (acre-feet/year)		0	-142	-239	-251	-232	-232

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

HARDIN COUNTY

WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
COUNTY-OTHER, NECHES (I)							
OVERDRAFT GULF COAST AQUIFER	GULF COAST AQUIFER [HARDIN]	154	306	306	306	459	459
COUNTY-OTHER, TRINITY (I)							
NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER [HARDIN]	0	0	0	1	1	2
IRRIGATION, NECHES (I)							
PURCHASE WATER FROM PROVIDER (2)	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM [RESERVOIR]	1,002	1,002	1,002	1,002	1,002	1,002
MANUFACTURING, NECHES (I)							
NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER [HARDIN]	114	114	114	114	114	114
Sum of Projected Water Management Strategies (acre-feet/year)		1,270	1,422	1,422	1,423	1,576	1,577

JASPER COUNTY

WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
COUNTY-OTHER, NECHES (I)							
OVERDRAFT GULF COAST AQUIFER	GULF COAST AQUIFER [JASPER]	550	550	550	550	550	550
COUNTY-OTHER, SABINE (I)							
NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER [JASPER]	82	82	82	82	82	82
KIRBYVILLE, SABINE (I)							
MUNICIPAL CONSERVATION	CONSERVATION [JASPER]	3	4	5	6	7	7
Sum of Projected Water Management Strategies (acre-feet/year)		635	636	637	638	639	639

Projected Water Management Strategies
TWDB 2012 State Water Plan Data

NEWTON COUNTY

WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
MANUFACTURING, SABINE (I)							
NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER [NEWTON]	400	400	400	800	800	800
STEAM ELECTRIC POWER, SABINE (I)							
PURCHASE WATER FROM PROVIDER (2)	TOLEDO BEND LAKE/RESERVOIR [RESERVOIR]	0	0	15,000	15,000	15,000	15,000
Sum of Projected Water Management Strategies (acre-feet/year)		400	400	15,400	15,800	15,800	15,800

TYLER COUNTY

WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
COUNTY-OTHER, NECHES (I)							
NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER [TYLER]	0	251	251	251	251	251
WOODVILLE, NECHES (I)							
NEW WELLS - GULF COAST AQUIFER	GULF COAST AQUIFER [TYLER]	0	300	300	300	300	300
Sum of Projected Water Management Strategies (acre-feet/year)		0	551	551	551	551	551

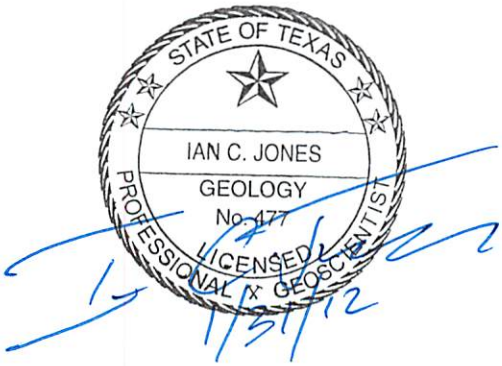
APPENDIX B

GAM Run 11-019: Southeast Texas Groundwater Conservation District Management Plan

By Ian C. Jones, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Section
(512) 462-6641
January 31, 2012

GAM Run 11-019: Southeast Texas Groundwater Conservation District Management Plan

by Ian C. Jones, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6641
January 31, 2012



The seal appearing on this document was authorized by Ian C. Jones, Ph.D., P.G. 477 on January 31, 2012.

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GAM RUN 11-019: SOUTHEAST TEXAS GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Ian C. Jones, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6641
January 31, 2012

EXECUTIVE SUMMARY:

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

The purpose of this report is to provide Part 2 of a two-part package of information to the Southeast Texas Groundwater Conservation District to incorporate in its management plan to fulfill the requirements noted above.

The groundwater management plan for Southeast Texas Groundwater Conservation District is due for approval by the Executive Administrator of the TWDB before January 8, 2013. This report discusses the methods, assumptions, and results from the model runs using the groundwater availability models for the Yegua-Jackson Aquifer and the northern part of the Gulf Coast Aquifer. Tables 1 and 2 summarize the groundwater availability model data required by the statute, and figures 1 and 2 show the area of each model from which the values in the respective tables were

extracted. This model run replaces the results of GAM Run 06-06. GAM Run 11-019 meets current standards set after GAM Run 06-06 was completed. Differences in the results of the two model runs are due to differences in the method of extracting data from the model(s) and the addition of information from the groundwater availability model for the Yegua-Jackson Aquifer. If after review of the figures, Southeast Texas Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB immediately.

METHODS:

The groundwater availability models for the Yegua-Jackson Aquifer and the northern part of the Gulf Coast Aquifer (1980 through 1999) were run for this analysis. Water budgets for each year of the transient model period were extracted and the average annual water budget values for recharge, surface water outflow, inflow to the district, outflow from the district, and net inter-aquifer flow for the portions of the aquifers located within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Yegua-Jackson Aquifer

- Version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer was used for this analysis. See Deeds and others (2010) for assumptions and limitations of the groundwater availability model for the Yegua-Jackson Aquifer.
- This groundwater availability model includes five layers, which generally correspond to (from top to bottom):
    - Parts of the Catahoula Formation, surficial alluvium units, and Yegua-Jackson outcrop,
    - Upper Jackson unit,
    - Lower Jackson unit,
    - Upper Yegua unit, and
    - Lower Yegua unit.
- Of the five layers listed above, individual water budgets for the district were determined for the combined units of the Yegua-Jackson Aquifer (Layers 2 through 5) and only the parts of layer 1

that directly overlay the outcrop portion of the Yegua-Jackson Aquifer. Data for the Catahoula Formation is included in the model results for the Gulf Coast Aquifer.

- The mean absolute error (a measure of the difference between simulated and actual water levels during model calibration) in the groundwater availability model is 31, 24, and 25 feet for the Jackson Group, Upper Yegua, and Lower Yegua, respectively, for the calibration period (1980 to 1997) (Deeds and others, 2010). These mean absolute errors are between six and ten percent of the range of measured water levels (Deeds and others, 2010).

- Groundwater in the Yegua-Jackson Aquifer ranges from fresh to brackish in composition (Deeds and others, 2010). Groundwater with total dissolved solids of less than 1,000 milligrams per liter is considered fresh and total dissolved solids of 1,000 to 10,000 milligrams per liter is considered brackish.

- Groundwater Vistas version 5 (Environmental Sciences, Inc., 2007) was used as the interface to process model output.

Gulf Coast Aquifer (northern part)

- Version 2.01 of the groundwater availability model for the northern part of the Gulf Coast Aquifer was used for this analysis. See Kasmarek and Robinson (2004) for assumptions and limitations of the groundwater availability model for the northern part of the Gulf Coast Aquifer.

- This groundwater availability model includes four layers, which generally correspond to (from top to bottom):

    - Chicot Aquifer,

    - Evangeline Aquifer,

    - Burkville confining unit, and

    - Jasper Aquifer and parts of the Catahoula Formation in direct hydrologic communication with the Jasper Aquifer.

- Water budgets for the district were determined for the Gulf Coast Aquifer (Layers 1 through 4).

- The root mean square error (a measure of the difference between simulated and actual water levels during model calibration) in the groundwater availability model is 34 feet for the Chicot Aquifer, 43 feet for the Evangeline Aquifer, and 47 feet for the Jasper Aquifer for 1977 (Kasmarek and Robinson, 2004). For the year 2000, the root mean square error is 31, 40, and 34 feet for the Chicot, Evangeline, and Jasper aquifers, respectively.

- Groundwater in the Gulf Coast Aquifer displays fresh compositions with total dissolved solids of less than 1,000 milligrams per liter (Chowdhury and others, 2006).

- Groundwater Vistas version 5 (Environmental Sciences, Inc., 2007) was used as the interface to process model output.

RESULTS:

A groundwater budget shows the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected components were extracted from the groundwater budget for the aquifers located within the district and averaged over the period 1980 through 1999, as shown in tables 1 and 2. The components of the modified budget shown in tables 1 and 2 include:

- Precipitation recharge—The areally distributed recharge originating from precipitation falling on the outcrop areas of the aquifers within the district.

- Surface water outflow—The total water discharging from the aquifer (outflow) to surface water such as streams, reservoirs, and drains (springs).

- Flow into and out of district—The lateral flow within the aquifer between the district and adjacent areas.

- Flow between aquifers—The net vertical flow between aquifers or confining units. This flow is controlled by the relative water levels in each aquifer or confining unit and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs. “Inflow” to an aquifer from an overlying or underlying aquifer will always equal the “Outflow” from the other aquifer.

The information needed for the District’s management plan is summarized in tables 1 and 2. It is important to note that sub-regional water budgets are not exact. This is due to the 1 square mile 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 (see figures 1 and 2).

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

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Yegua-Jackson Aquifer	5
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Yegua-Jackson Aquifer	152
Estimated annual volume of flow into the district within each aquifer in the district	Yegua-Jackson Aquifer	751
Estimated annual volume of flow out of the district within each aquifer in the district	Yegua-Jackson Aquifer	798
Estimated net annual volume of flow between each aquifer in the district	From Yegua-Jackson Aquifer into overlying units	33

FIGURE 1: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE YEGUA-JACKSON AQUIFER FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 2: SUMMARIZED INFORMATION FOR THE GULF COAST AQUIFER THAT IS NEEDED FOR SOUTHEAST TEXAS GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT. THESE FLOWS MAY INCLUDE FRESH AND BRACKISH WATERS.

Management Plan requirement	*Aquifer*	*Results*
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer	92,886
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	22,871
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer	12,293
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer	15,669
Estimated net annual volume of flow between each aquifer in the district	Gulf Coast Aquifer	0

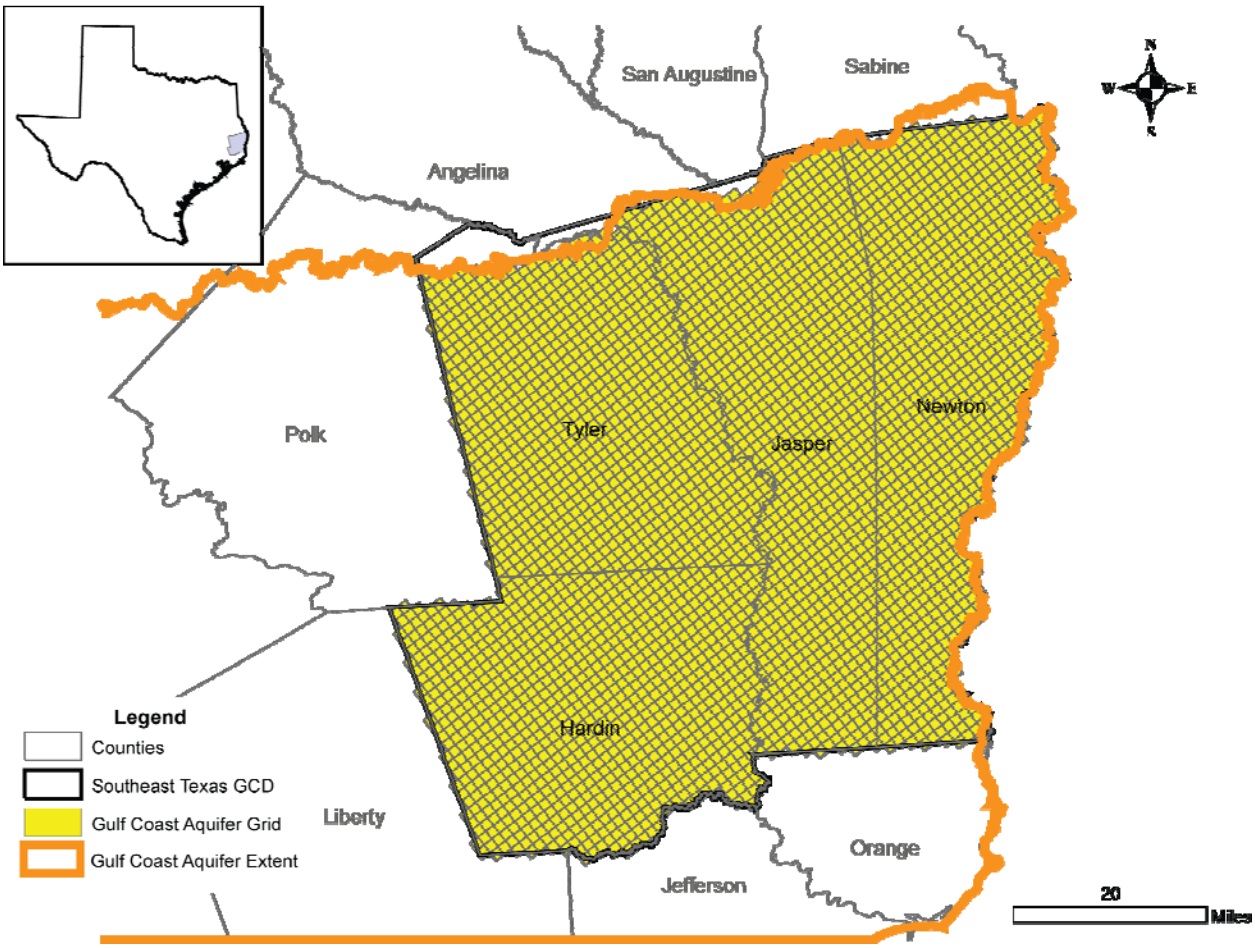


FIGURE 2: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE GULF COAST AQUIFER FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

LIMITATIONS

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

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

A key assumption used in the groundwater model to evaluate historic groundwater flow conditions concerns 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 groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations related to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, groundwater conservation districts should work with the TWDB to refine this analysis in the future as additional data are available concerning how the aquifer responds to the actual amount and location of pumping over time. Historic precipitation patterns—the basis for the spatial distribution of recharge—also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

Chowdhury, A.H., Boghici, R., and Hopkins, J., , Hydrochemistry, Salinity Distribution, and Trace Constituents: Implications for Salinity Sources, Geochemical Evolution, and Flow Systems Characterization, Gulf Coast Aquifer, Texas: In: Mace, R.E., Davidson, S.C., Angle, E.S., and Mullican, W.F. (eds.), Aquifers of the Gulf Coast of Texas: Texas Water Development Board Report 365, p. 81-128, http://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R365/ch05-GC_Chemistry.pdf.

Deeds, N.E., Yan, T., Singh, A., Jones, T.L., Kelley, V.A., Knox, P.R., Young, S.C., 2010, Groundwater Availability model for the Yegua-Jackson Aquifer: Prepared for the Texas Water Development Board, 582 p., http://www.twdb.texas.gov/gam/ygjk/Yegua-Jackson_GAM_Final.pdf.

Environmental Simulations, Inc., 2007, Guide to Using Groundwater Vistas Version 5, 381 p.

Kasmarek, M.C., and Robinson, J.L., 2004, Hydrogeology and Simulation of Groundwater Flow and Land-Surface Subsidence in the Northern Part of the Gulf Coast Aquifer System, Texas: United States Geological Survey Scientific investigations Report 2004-5102, 111 p., http://www.twdb.texas.gov/gam/glfc_n/glfc_n.asp.

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.

APPENDIX C

GAM Run 10-038 MAG:

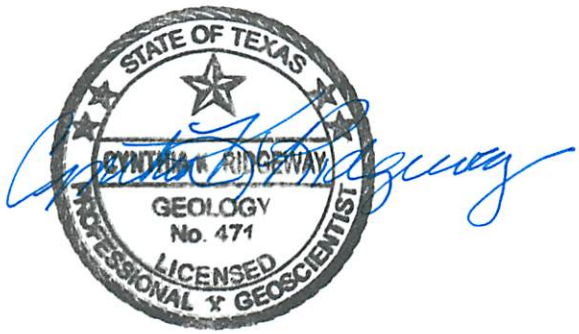
By Mohammad Masud Hassan, P.E.
Edited and finalized by Shirley Wade
Texas Water Development Board
Groundwater Availability Modeling Section
(512) 462-6641
November 18, 2011

GAM Run 10-038 MAG

By Mohammad Masud Hassan, P.E.

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

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



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

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EXECUTIVE SUMMARY:

The modeled available groundwater for the Gulf Coast Aquifer as a result of the desired future conditions adopted by the members of Groundwater Management Area 14 declines from approximately 978,000 acre-feet per year to 844,000 acre-feet per year between 2010 and 2060. This is shown divided by county, regional water planning area, and river basin in Table 2 for use in the regional water planning process. Modeled available groundwater is summarized by county, regional water planning area, river basin, and groundwater conservation district for each unit of the Gulf Coast Aquifer in tables 3 through 18. The estimates were extracted from Groundwater Availability Modeling Run 10-023, Scenario 3, which meets the desired future conditions adopted by Groundwater Management Area 14.

REQUESTOR:

Mr. Lloyd Behm of the Bluebonnet Groundwater Conservation District on behalf of Groundwater Management Area 14

DESCRIPTION OF REQUEST:

In a letter dated August 25, 2010, Mr. Lloyd Behm provided the Texas Water Development Board (TWDB) with the desired future conditions of the Gulf Coast Aquifer adopted by the members of Groundwater Management Area 14. As shown in Resolution No. 2010-01, the desired future conditions for the Gulf Coast Aquifer within Groundwater Management Area 14 were stated as average water-level declines (drawdowns) over a specified time period. The average drawdowns (in feet) specified as desired future conditions for Groundwater Management Area 14 are shown in Table 1.

Table 1: Desired future conditions (average drawdown in feet) for the Gulf Coast Aquifer in Groundwater Management Area 14. Negative values indicate a water level rise.

County	**Austin**	**Brazoria**	**Brazos**	**Chambers**	**Grimes**	**Hardin**	**Jasper**	**Jefferson**	**Liberty**
Duration (years)	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**
	Base year 2008								
Chicot Aquifer	17	45	-	43	0	17	10	25	32
Evangeline Aquifer	10	40	-	36	5	27	23	26	37
Burkeville Confining Unit	11	-	-	-	10	23	24	-	28
Jasper Aquifer	20	-	7	-	28	37	21	-	64

Table 1: Continued.

County	Montgomery		Newtown	Orange	Polk	San Jacinto	Tyler	Walker	Waller	Washington
Duration (years)	**8**	**44**	**52**	**52**	**52**	**52**	**52**	**52**	**52**	**52**
	Base year 2008	**Base year 2016**	**Base year 2008**							
Chicot Aquifer	3	6	9	14	4	5	3	-	7	-
Evangeline Aquifer	13	25	20	19	4	7	16	10	8	1
Burkeville Confining Unit	10	23	22	-	20	18	19	5	9	17
Jasper Aquifer	61	-38	18	-	41	72	33	33	25	20

In response to receiving the adopted desired future conditions, the Texas Water Development Board has estimated the modeled available groundwater in Groundwater Management Area 14. Since the desired future conditions were divided by unit within the Gulf Coast Aquifer (Chicot Aquifer, Evangeline Aquifer, Burkeville Confining Unit, and Jasper Aquifer), modeled available groundwater is presented separately for each unit.

METHODS:

The Texas Water Development Board previously completed several predictive groundwater availability model simulations of the Gulf Coast Aquifer to assist the members of Groundwater Management Area 14 in developing desired future conditions. The location of Groundwater Management Area 14, the Gulf Coast Aquifer, and the groundwater availability model cells that represent the aquifer are shown in Figure 1. As described in Resolution No. 2010-01, the management area considered Scenario 3 of GAM Run 10-023 when developing desired future conditions for the Gulf Coast Aquifer (Oliver, 2010). Since each of the above desired future conditions is met in Scenario 3 of GAM Run 10-023, the estimated pumping for Groundwater Management Area 14 presented here was taken directly from that simulation. The pumping was then divided by county, regional water planning area, river basin, and groundwater conservation district (Figure 2).

PARAMETERS AND ASSUMPTIONS:

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

- The results presented in this report are based on Scenario 3 in GAM Run 10-023 (Oliver, 2010). See GAM Run 10-023 for a full description of the methods, assumptions, and results for the groundwater availability model run.

- We used version 2.01 of the groundwater availability model for the northern portion of the Gulf Coast Aquifer. See Kasmarek and Robinson (2004) and Kasmarek and others (2005) for assumptions and limitations of the model.

- The model includes four layers representing the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the

Jasper Aquifer, which includes the more transmissive portions of the Catahoula Formation (Layer 4).

- Cells were assigned to individual counties, river basins, regional water planning areas, and groundwater conservation districts as shown in the August 12, 2010 version of the file that associates the model grid with political and natural boundaries for the Gulf Coast Aquifer.

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code, "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. This is distinct from "managed available groundwater," shown in the draft version of this report dated December 29, 2010, which was a permitting value and accounted for the estimated use of the aquifer exempt from permitting. This change was made to reflect changes in statute by the 82nd Texas Legislature, effective September 1, 2011.

Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits. The estimated amount of pumping exempt from permitting, which the Texas Water Development Board is now required to develop after soliciting input from applicable groundwater conservation districts, will be provided in a separate report.

RESULTS:

The modeled available groundwater for the Gulf Coast Aquifer in Groundwater Management Area 14 as a result of the desired future conditions declines from approximately 978,000 acre-feet per year in 2010 to 844,000 acre-feet per year in 2060. This has been divided by county, regional water planning area, and river basin for each decade between 2010 and 2060 for use in the regional water planning process (Table 2).

The modeled available groundwater for the four units of the Gulf Coast Aquifer is also summarized by county (tables 3 through 6), regional water planning area (tables 7 through 10), river basin (tables 11 through 14), and groundwater conservation district (tables 15 through 18). In tables 15 through 18, the modeled available groundwater both excluding and including areas outside of a groundwater conservation district is shown.

LIMITATIONS:

The groundwater model used in developing estimates of modeled available groundwater is the best available scientific tool that can be used to estimate the pumping that will achieve the desired future conditions. Although the groundwater model used in this analysis is the best available scientific tool for this purpose, it, like all models, has limitations. In reviewing the use of models in environmental regulatory decision-making, the National Research Council (2007) noted:

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

A key aspect of using the groundwater model to develop estimates of modeled available groundwater is the need to make assumptions about the location in the aquifer where future pumping will occur. As actual pumping changes in the future, it will be necessary to evaluate the amount of that pumping as well as its location in the context of the assumptions associated with this analysis. Evaluating the amount and location of future pumping is as important as evaluating the changes in groundwater levels, spring flows, and other metrics that describe the condition of the groundwater resources in the area that relate to the adopted desired future condition(s).

Given these limitations, users of this information are cautioned that the modeled available groundwater numbers should not be considered a definitive, permanent description of the amount of groundwater that can be pumped to meet the adopted desired future condition. Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor future groundwater pumping as well as whether or not they are achieving their desired future conditions. Because of the limitations of the model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine the modeled available groundwater numbers given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future.

REFERENCES:

Oliver, W., 2010, GAM Run 10-023: Texas Water Development Board, GAM Run 10-023 Report, 32 p.

Kasmarek, M.C., and Robinson, J.L., 2004, Hydrogeology and simulation of groundwater flow and land-surface subsidence in the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2004-5102, 111 p.

Kasmarek, M.C., Reece, B.D., and Houston, N.A., 2005, Evaluation of groundwater flow and land-surface subsidence caused by hypothetical withdrawals in the northern part of the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2005-5024, 70 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.

Texas Water Development Board, 2007, Water for Texas – 2007-Volumes I-III; Texas Water Development Board Document No. GP-8-1, 392 p.

Table 2: Modeled available groundwater for the Gulf Coast Aquifer in Groundwater Management Area 14. Results are in acre-feet per year and are divided by county, regional water planning area, and river basin.

County	Regional Water Planning Area	River Basin	Year					
			2010	2020	2030	2040	2050	2060
Austin	H	Brazos	6,585	6,585	6,585	6,585	6,585	6,585
		Brazos-Colorado	15,608	15,608	15,608	15,608	15,608	15,608
		Colorado	121	121	121	121	121	121
Brazoria	H	Brazos	6,658	6,658	6,658	6,658	6,658	6,658
		Brazos-Colorado	11,648	11,648	11,648	11,648	11,648	11,648
		San Jacinto-Brazos	32,090	32,090	32,090	32,090	32,090	32,090
Brazos	G	Brazos	1,189	1,189	1,189	1,189	1,189	1,189
Chambers	H	Neches-Trinity	9,527	9,527	9,527	9,527	9,527	9,527
		San Jacinto-Brazos	0	0	0	0	0	0
		Trinity	10,112	10,112	10,112	10,112	10,112	10,112
		Trinity-San Jacinto	2,068	2,068	2,068	2,068	2,068	2,068
Fort Bend	H	Brazos	60,217	52,923	43,673	43,189	42,862	42,953
		Brazos-Colorado	20,633	22,023	18,095	17,715	17,043	17,077
		San Jacinto	9,723	9,524	9,043	8,809	8,642	8,650
		San Jacinto-Brazos	23,356	24,235	21,266	22,457	23,765	23,810
Galveston	H	Neches-Trinity	0	0	0	0	0	0
		San Jacinto-Brazos	4,774	5,257	5,867	5,841	5,814	5,815
		Trinity-San Jacinto	0	0	0	0	0	0
Grimes	G	Brazos	10,889	10,889	10,889	10,889	10,889	10,889
		San Jacinto	2,197	2,197	2,197	2,197	2,197	2,197
		Trinity	764	764	223			
Hardin	I	Neches	34,821	34,821	34,821	34,821	34,821	34,821
		Trinity	138	138	138	138	138	138
Harris	H	San Jacinto	293,855	249,851	197,553	197,326	196,992	197,270
		San Jacinto-Brazos	4,801	7,202	6,798	7,563	8,428	8,440
		Trinity-San Jacinto	6,894	5,893	5,026	5,141	5,259	5,266
Jasper	I	Neches	37,659	37,620	37,541	37,541	37,541	37,541
		Sabine	29,953	29,953	29,953	29,953	29,953	29,953
Jefferson	I	Neches	804	804	804	804	804	804
		Neches-Trinity	1,641	1,641	1,641	1,641	1,641	1,641
Liberty	H	Neches	5,074	5,074	5,074	5,074	5,074	5,074
		Neches-Trinity	364	364	364	364	364	364
		San Jacinto	5,852	5,852	5,852	5,852	5,852	5,852
		Trinity	22,887	22,887	22,887	22,887	22,887	22,887
		Trinity-San Jacinto	8,856	8,856	8,856	8,856	8,856	8,856

Table 2: Continued.

County	Regional Water Planning Area	River Basin	Year					
			2010	2020	2030	2040	2050	2060
Montgomery	H	San Jacinto	73,264	61,629	61,629	61,629	61,629	61,629
Newton	I	Neches	176	176	176	176	176	176
		Sabine	34,001	34,001	33,963	33,963	33,963	33,963
Orange	I	Neches	3,925	3,925	3,925	3,925	3,925	3,925
		Neches-Trinity	256	256	256	256	256	256
		Sabine	15,832	15,832	15,832	15,832	15,832	15,832
Polk	H	Trinity	21,830	21,830	21,830	21,783	21,783	21,783
		Neches	14,912	11,886	11,886	11,886	11,276	11,224
San Jacinto	H	San Jacinto	10,368	10,368	10,368	10,368	10,368	10,368
		Trinity	10,611	8,811	8,811	8,811	8,811	8,811
Tyler	I	Neches	38,199	38,199	38,156	38,156	38,156	38,156
Walker	H	San Jacinto	9,139	9,116	9,116	9,116	9,116	9,116
		Trinity	8,873	8,873	8,873	8,797	8,797	8,797
Waller	H	Brazos	14,933	14,933	14,933	14,933	14,933	14,933
		San Jacinto	26,694	26,694	26,694	26,694	26,694	26,694
Washington	G	Brazos	12,972	12,972	12,972	12,604	12,604	12,604
		Colorado	73	73	73	73	73	73
Total			**977,816**	**913,948**	**843,660**	**843,666**	**843,820**	**844,244**

Table 3: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Austin	1,300	1,300	1,300	1,300	1,300	1,300
Brazoria	48,125	48,125	48,125	48,125	48,125	48,125
Chambers	21,328	21,328	21,328	21,328	21,328	21,328
Fort Bend	83,006	75,916	61,657	61,004	60,061	60,177
Galveston	4,303	4,697	5,233	5,194	5,152	5,153
Grimes	0	0	0	0	0	0
Hardin	1,263	1,263	1,263	1,263	1,263	1,263
Harris	70,219	68,839	56,850	58,641	61,185	61,272
Jasper	10,835	10,835	10,835	10,835	10,835	10,835
Jefferson	2,345	2,345	2,345	2,345	2,345	2,345
Liberty	14,576	14,576	14,576	14,576	14,576	14,576
Montgomery	1,482	1,722	1,722	1,722	1,722	1,722
Newton	501	501	501	501	501	501
Orange	18,809	18,809	18,809	18,809	18,809	18,809
Polk	0	0	0	0	0	0
San Jacinto	0	0	0	0	0	0
Tyler	0	0	0	0	0	0
Walker	0	0	0	0	0	0
Waller	300	300	300	300	300	300
Total	**278,392**	**270,556**	**244,844**	**245,943**	**247,502**	**247,706**

Table 4: Modeled available groundwater for the Evangeline Aquifer portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Austin	20,013	20,013	20,013	20,013	20,013	20,013
Brazoria	2,271	2,271	2,271	2,271	2,271	2,271
Chambers	379	379	379	379	379	379
Fort Bend	30,923	32,789	30,420	31,166	32,251	32,313
Galveston	471	560	634	647	662	662
Grimes	3,002	3,002	3,002	3,002	3,002	3,002
Hardin	33,696	33,696	33,696	33,696	33,696	33,696
Harris	234,977	193,759	152,256	151,126	149,225	149,435
Jasper	40,755	40,755	40,755	40,755	40,755	40,755
Jefferson	100	100	100	100	100	100
Liberty	27,669	27,669	27,669	27,669	27,669	27,669
Montgomery	39,381	38,293	38,293	38,293	38,293	38,293
Newton	21,288	21,288	21,288	21,288	21,288	21,288
Orange	1,204	1,204	1,204	1,204	1,204	1,204
Polk	8,311	8,311	8,311	8,311	8,311	8,311
San Jacinto	8,178	8,178	8,178	8,178	8,178	8,178
Tyler	20,592	20,592	20,592	20,592	20,592	20,592
Walker	2,001	2,001	2,001	2,001	2,001	2,001
Waller	41,027	41,027	41,027	41,027	41,027	41,027
Washington	3,239	3,239	3,239	3,239	3,239	3,239
Total	**539,477**	**499,126**	**455,328**	**454,957**	**454,156**	**454,428**

Table 5: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Austin	0	0	0	0	0	0
Fort Bend	0	0	0	0	0	0
Grimes	0	0	0	0	0	0
Hardin	0	0	0	0	0	0
Harris	335	329	256	249	254	254
Jasper	1	1	1	1	1	1
Liberty	0	0	0	0	0	0
Montgomery	0	0	0	0	0	0
Newton	0	0	0	0	0	0
Polk	744	744	744	744	744	744
San Jacinto	2,699	899	899	899	899	899
Tyler	1	1	1	1	1	1
Walker	0	0	0	0	0	0
Waller	0	0	0	0	0	0
Washington	368	368	368	0	0	0
Total	**4,148**	**2,342**	**2,269**	**1,894**	**1,899**	**1,899**

Table 6: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Austin	1,001	1,001	1,001	1,001	1,001	1,001
Brazos	1,189	1,189	1,189	1,189	1,189	1,189
Fort Bend	0	0	0	0	0	0
Grimes	10,848	10,848	10,307	10,084	10,084	10,084
Hardin	0	0	0	0	0	0
Harris	19	19	15	14	15	15
Jasper	16,021	15,982	15,903	15,903	15,903	15,903
Liberty	788	788	788	788	788	788
Montgomery	32,401	21,614	21,614	21,614	21,614	21,614
Newton	12,388	12,388	12,350	12,350	12,350	12,350
Polk	27,687	24,661	24,661	24,614	24,004	23,952
San Jacinto	10,102	10,102	10,102	10,102	10,102	10,102
Tyler	17,606	17,606	17,563	17,563	17,563	17,563
Walker	16,011	15,988	15,988	15,912	15,912	15,912
Waller	300	300	300	300	300	300
Washington	9,438	9,438	9,438	9,438	9,438	9,438
Total	**155,799**	**141,924**	**141,219**	**140,872**	**140,263**	**140,211**

Table 7: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
G	0	0	0	0	0	0
H	244,639	236,803	211,091	212,190	213,749	213,953
I	33,753	33,753	33,753	33,753	33,753	33,753
Total	**278,392**	**270,556**	**244,844**	**245,943**	**247,502**	**247,706**

Table 8: Modeled available groundwater for the Evangeline Aquifer portion of the Gulf Coast Aquifer, summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
G	6,241	6,241	6,241	6,241	6,241	6,241
H	412,014	371,663	327,865	327,494	326,693	326,965
I	121,222	121,222	121,222	121,222	121,222	121,222
Total	**539,477**	**499,126**	**455,328**	**454,957**	**454,156**	**454,428**

Table 9: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
G	368	368	368	0	0	0
H	3,660	1,854	1,781	1,774	1,779	1,779
I	120	120	120	120	120	120
Total	**4,148**	**2,342**	**2,269**	**1,894**	**1,899**	**1,899**

Table 10: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer, summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
G	21,475	21,475	20,934	20,711	20,711	20,711
H	77,102	66,292	66,288	66,164	66,165	66,165
I	57,222	54,157	53,997	53,997	53,387	53,335
Total	**155,799**	**141,924**	**141,219**	**140,872**	**140,263**	**140,211**

Table 11: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Brazos	56,046	48,386	40,433	39,803	39,240	39,305
Brazos-Colorado	33,286	34,676	30,748	30,368	29,696	29,730
Colorado	0	0	0	0	0	0
Neches	15,293	15,293	15,293	15,293	15,293	15,293
Neches-Trinity	11,751	11,751	11,751	11,751	11,751	11,751
Sabine	19,368	19,368	19,368	19,368	19,368	19,368
San Jacinto	66,403	63,365	51,927	52,931	54,591	54,665
San Jacinto-Brazos	50,045	51,558	49,627	50,634	51,578	51,604
Trinity	17,646	17,646	17,646	17,646	17,646	17,646
Trinity-San Jacinto	8,554	8,513	8,051	8,149	8,339	8,344
Total	**278,392**	**270,556**	**244,844**	**245,943**	**247,502**	**247,706**

Table 12: Modeled available groundwater for the Evangeline Aquifer portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Brazos	36,717	37,083	35,786	35,932	36,168	36,194
Brazos-Colorado	14,527	14,527	14,527	14,527	14,527	14,527
Colorado	23	23	23	23	23	23
Neches	78,653	78,653	78,653	78,653	78,653	78,653
Neches-Trinity	37	37	37	37	37	37
Sabine	44,700	44,700	44,700	44,700	44,700	44,700
San Jacinto	317,937	275,930	234,666	233,209	231,042	231,254
San Jacinto-Brazos	14,976	17,226	16,394	17,317	18,519	18,551
Trinity	22,643	22,643	22,643	22,643	22,643	22,643
Trinity-San Jacinto	9,264	8,304	7,899	7,916	7,844	7,846
Total	**539,477**	**499,126**	**455,328**	**454,957**	**454,156**	**454,428**

Table 13: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Brazos	368	368	368	0	0	0
Brazos-Colorado	0	0	0	0	0	0
Colorado	0	0	0	0	0	0
Neches	119	119	119	119	119	119
Sabine	1	1	1	1	1	1
San Jacinto	335	329	256	249	254	254
San Jacinto-Brazos	0	0	0	0	0	0
Trinity	3,325	1,525	1,525	1,525	1,525	1,525
Trinity-San Jacinto	0	0	0	0	0	0
Total	**4,148**	**2,342**	**2,269**	**1,894**	**1,899**	**1,899**

Table 14: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Brazos	20,312	20,312	20,312	20,312	20,312	20,312
Brazos-Colorado	76	76	76	76	76	76
Colorado	171	171	171	171	171	171
Neches	41,505	38,440	38,318	38,318	37,708	37,656
Sabine	15,717	15,717	15,679	15,679	15,679	15,679
San Jacinto	46,417	35,607	35,603	35,602	35,603	35,603
San Jacinto-Brazos	0	0	0	0	0	0
Trinity	31,601	31,601	31,060	30,714	30,714	30,714
Trinity-San Jacinto	0	0	0	0	0	0
Total	**155,799**	**141,924**	**141,219**	**140,872**	**140,263**	**140,211**

Table 15: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	**Year**					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Bluebonnet GCD	1,600	1,600	1,600	1,600	1,600	1,600
Brazoria County GCD	48,125	48,125	48,125	48,125	48,125	48,125
Brazos Valley GCD	0	0	0	0	0	0
Lone Star GCD	1,482	1,722	1,722	1,722	1,722	1,722
Lower Trinity GCD	0	0	0	0	0	0
Southeast Texas GCD	12,599	12,599	12,599	12,599	12,599	12,599
Total (groundwater conservation districts)	**63,806**	**64,046**	**64,046**	**64,046**	**64,046**	**64,046**
Fort Bend Subsidence District	83,006	75,916	61,657	61,004	60,061	60,177
Harris-Galveston Coastal Subsidence District	74,522	73,536	62,083	63,835	66,337	66,425
No District	57,058	57,058	57,058	57,058	57,058	57,058
Total (all areas)	**278,392**	**270,556**	**244,844**	**245,943**	**247,502**	**247,706**

Table 16: Modeled available groundwater forthe Evangeline Aquifer portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	**Year**					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Bluebonnet GCD	66,043	66,043	66,043	66,043	66,043	66,043
Brazoria County GCD	2,271	2,271	2,271	2,271	2,271	2,271
Brazos Valley GCD	0	0	0	0	0	0
Lone Star GCD	39,381	38,293	38,293	38,293	38,293	38,293
Lower Trinity GCD	16,489	16,489	16,489	16,489	16,489	16,489
Southeast Texas GCD	116,331	116,331	116,331	116,331	116,331	116,331
Total (groundwater conservation districts)	**240,515**	**239,427**	**239,427**	**239,427**	**239,427**	**239,427**
Fort Bend Subsidence District	30,923	32,789	30,420	31,166	32,251	32,313
Harris-Galveston Coastal Subsidence District	235,448	194,319	152,890	151,773	149,887	150,097
No District	32,591	32,591	32,591	32,591	32,591	32,591
Total (all areas)	**539,477**	**499,126**	**455,328**	**454,957**	**454,156**	**454,428**

Table 17: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	**Year**					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Bluebonnet GCD	0	0	0	0	0	0
Brazoria County GCD	0	0	0	0	0	0
Brazos Valley GCD	0	0	0	0	0	0
Lone Star GCD	0	0	0	0	0	0
Lower Trinity GCD	3,443	1,643	1,643	1,643	1,643	1,643
Southeast Texas GCD	2	2	2	2	2	2
Total (groundwater conservation districts)	**3,445**	**1,645**	**1,645**	**1,645**	**1,645**	**1,645**
Fort Bend Subsidence District	0	0	0	0	0	0
Harris-Galveston Coastal Subsidence District	335	329	256	249	254	254
No District	368	368	368	0	0	0
Total (all areas)	**4,148**	**2,342**	**2,269**	**1,894**	**1,899**	**1,899**

Table 18: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	**Year**					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Bluebonnet GCD	28,160	28,137	27,596	27,297	27,297	27,297
Brazoria County GCD	0	0	0	0	0	0
Brazos Valley GCD	1,189	1,189	1,189	1,189	1,189	1,189
Lone Star GCD	32,401	21,614	21,614	21,614	21,614	21,614
Lower Trinity GCD	37,789	34,763	34,763	34,716	34,106	34,054
Southeast Texas GCD	46,015	45,976	45,816	45,816	45,816	45,816
Total (groundwater conservation districts)	**145,554**	**131,679**	**130,978**	**130,632**	**130,022**	**129,970**
Fort Bend Subsidence District	**0**	**0**	**0**	**0**	**0**	**0**
Harris-Galveston Coastal Subsidence District	**19**	**19**	**15**	**14**	**15**	**15**
No District	10,226	10,226	10,226	10,226	10,226	10,226
Total (all areas)	**155,799**	**141,924**	**141,219**	**140,872**	**140,263**	**140,211**

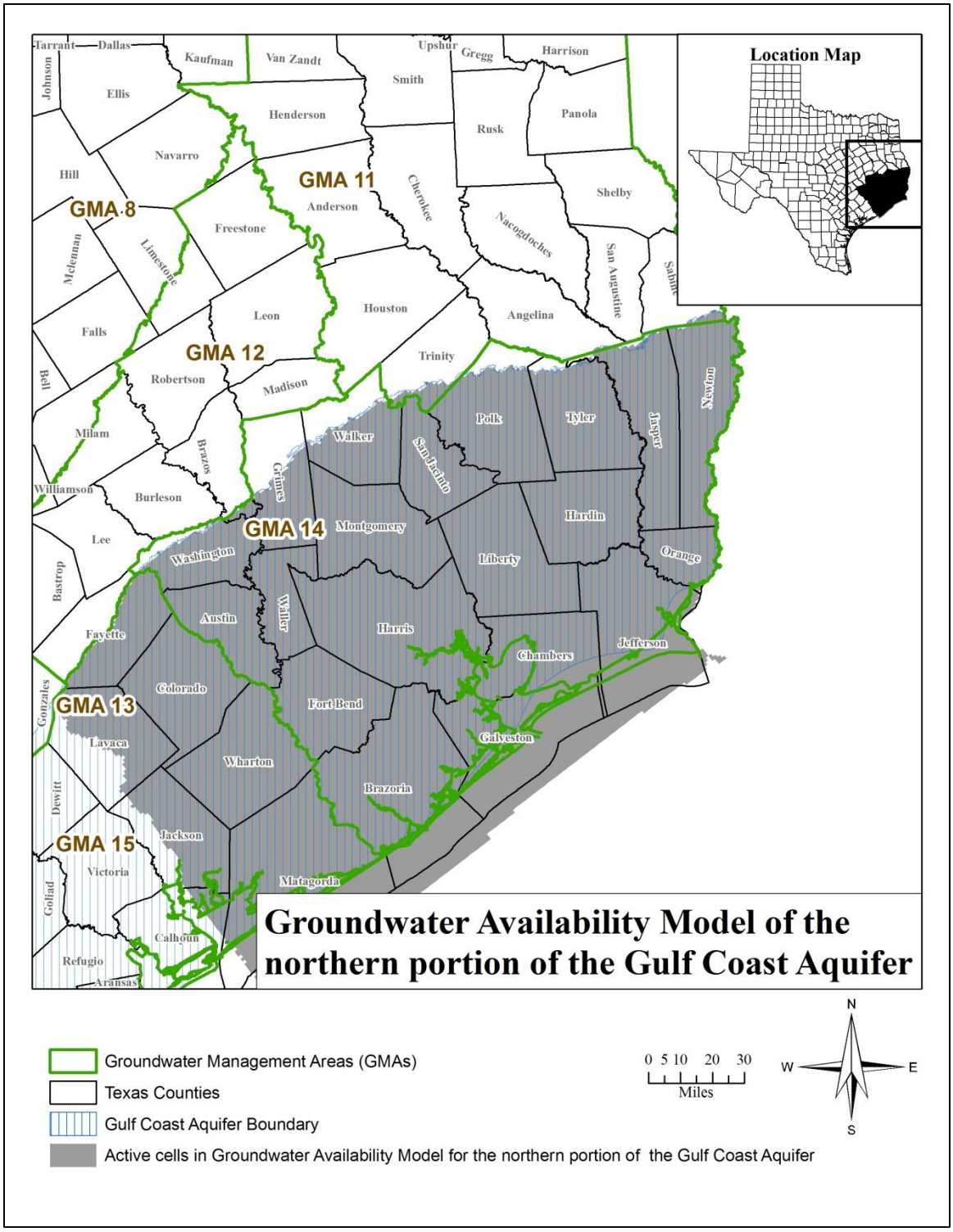

Figure 1: Map showing the areas covered by the groundwater availability model for the northern portion of the Gulf Coast Aquifer.

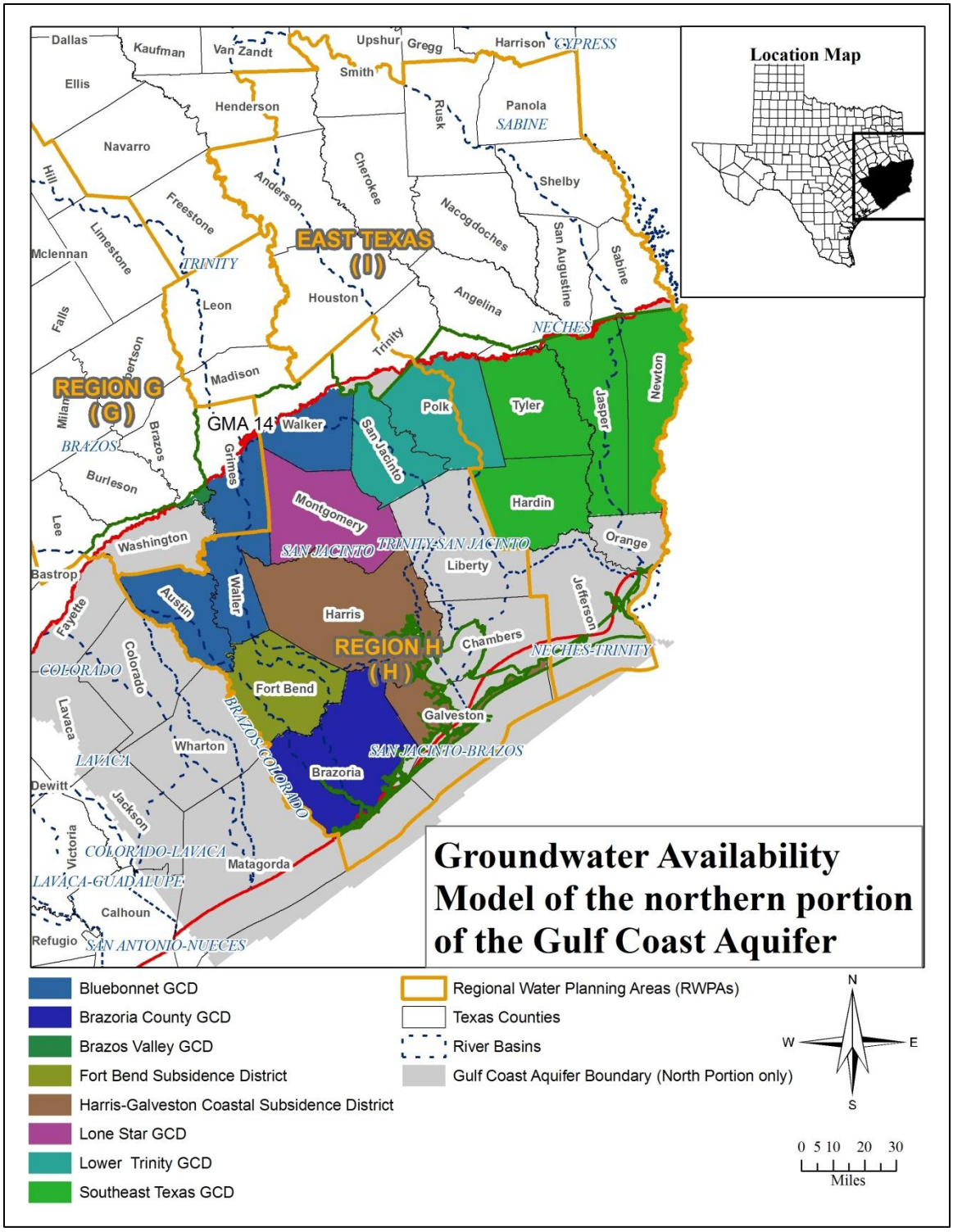

Figure 2: Map showing regional water planning areas (RWPAs), groundwater conservation districts (GCDs), subsidence districts, counties, and river basins in Groundwater Management Area 14.