

# GAM Run 10-038 MAG

by **Mohammad Masud Hassan, P.E.**

Texas Water Development Board  
Groundwater Availability Modeling Section  
(512) 463-3337  
December 29, 2010

This document is released for the purpose of interim review under the authority of Mohammad Masud Hassan, P.E. 95699 on December 29, 2010.

*This page is intentionally left blank*

**EXECUTIVE SUMMARY:**

The estimated total pumping from the Gulf Coast Aquifer that achieves 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 summarized by county, regional water planning area, and river basin as shown in Table 2. The estimated managed available groundwater, the amount available for permitting, for the groundwater conservation districts within Groundwater Management Area 14 is reported for each of the units of the Gulf Coast Aquifer (Chicot Aquifer, Evangeline Aquifer, Burkeville Confining Unit, and, Jasper Aquifer) as shown in tables 22 through 25. The pumping estimates were extracted from Groundwater Availability Modeling Run 10-023, Scenario 3, which Groundwater Management Area 14 used as the basis for developing their desired future conditions.

**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 managed available groundwater for each groundwater conservation district within 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), managed 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.

### **Determining Managed Available Groundwater**

As defined in Chapter 36 of the Texas Water Code, “managed available groundwater” is the amount of water that may be permitted. The pumping output from groundwater availability models, however, represents the total amount of pumping from the aquifer. The total pumping includes uses of water both subject to permitting and exempt from permitting. Examples of exempt uses include domestic, livestock, and oil and gas exploration. Each district may also exempt additional uses as defined by its rules or enabling legislation.

Since exempt uses are not available for permitting, it is necessary to account for them when determining managed available groundwater. To do this, the Texas Water Development Board developed a standardized method for estimating exempt use for domestic and livestock purposes based on projected changes in population and the distribution of domestic and livestock wells in the area.

Note that this exempt use methodology applies to the Gulf Coast Aquifer as a whole. The estimated exempt use was divided into each of the aquifer units (the Chicot, Evangeline, and Jasper units) based on the proportion of the area of each unit that outcrops (is exposed at land surface) in each groundwater conservation district. The Burkeville Confining Unit was not considered to have significant exempt use. The exempt pumping in areas where the Burkeville outcrops was, therefore, assigned to the next lower unit which is Jasper aquifer.

Because other exempt uses can vary significantly from district to district, and there is much higher uncertainty associated with estimating use due to oil and gas exploration, the Texas Water Development Board estimates of exempt pumping are limited to domestic and livestock uses. If a district believes it has a more appropriate estimate of exempt pumping, they may submit it, along with a description of how it was developed, to the Texas Water Development Board for consideration. In the exempt pumping estimates shown below, updated exempt use has already been submitted by Lone Star Groundwater Conservation District and divided among each of the units as described above. Once established, the estimates of exempt pumping are subtracted from the total pumping output from the groundwater availability model to yield the estimated managed available groundwater for permitting purposes.

### **RESULTS:**

The estimated total pumping from the Gulf Coast Aquifer in Groundwater Management Area 14 that achieves the above desired future conditions declines from approximately 978,000 acre-feet

per year in 2010 to 844,000 acre-feet per year in 2060. This pumping 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 total pumping estimates for the four units of the Gulf Coast Aquifer are 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 total pumping both excluding and including areas outside of a groundwater conservation district is shown. Tables 19 through 21 contain the estimates of exempt pumping for each unit (except the Burkeville Confining Unit) of the Gulf Coast Aquifer by groundwater conservation district. The managed available groundwater for the groundwater conservation districts, the difference between the total pumping in the districts (tables 15 through 18, excluding areas outside of a district) and the estimated exempt use (tables 19 through 21) is shown in tables 22 through 25. Note that, if the estimated exempt pumping amount is higher than the total estimated pumping in a groundwater conservation district, the managed available groundwater was considered to be zero for that district.

#### **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.
- 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: Estimated total annual pumping 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
<b>Total</b>			<b>977,816</b>	<b>913,948</b>	<b>843,660</b>	<b>843,666</b>	<b>843,820</b>	<b>844,244</b>

Table 3: Estimated total annual pumping 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
<b>Total</b>	<b>278,392</b>	<b>270,556</b>	<b>244,844</b>	<b>245,943</b>	<b>247,502</b>	<b>247,706</b>

Table 4: Estimated total annual pumping 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
<b>Total</b>	<b>539,477</b>	<b>499,126</b>	<b>455,328</b>	<b>454,957</b>	<b>454,156</b>	<b>454,428</b>

Table 5: Estimated total annual pumping 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
<b>Total</b>	<b>4,148</b>	<b>2,342</b>	<b>2,269</b>	<b>1,894</b>	<b>1,899</b>	<b>1,899</b>

Table 6: Estimated total annual pumping 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
<b>Total</b>	<b>155,799</b>	<b>141,924</b>	<b>141,219</b>	<b>140,872</b>	<b>140,263</b>	<b>140,211</b>

Table 7: Estimated total annual pumping 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
<b>Total</b>	<b>278,392</b>	<b>270,556</b>	<b>244,844</b>	<b>245,943</b>	<b>247,502</b>	<b>247,706</b>

Table 8: Estimated total pumping 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
<b>Total</b>	<b>539,477</b>	<b>499,126</b>	<b>455,328</b>	<b>454,957</b>	<b>454,156</b>	<b>454,428</b>

Table 9: Estimated total pumping 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
<b>Total</b>	<b>4,148</b>	<b>2,342</b>	<b>2,269</b>	<b>1,894</b>	<b>1,899</b>	<b>1,899</b>

Table 10: Estimated total pumping 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
<b>Total</b>	<b>155,799</b>	<b>141,924</b>	<b>141,219</b>	<b>140,872</b>	<b>140,263</b>	<b>140,211</b>

Table 11: Estimated total pumping 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
<b>Total</b>	<b>278,392</b>	<b>270,556</b>	<b>244,844</b>	<b>245,943</b>	<b>247,502</b>	<b>247,706</b>

Table 12: Estimated total pumping 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
<b>Total</b>	<b>539,477</b>	<b>499,126</b>	<b>455,328</b>	<b>454,957</b>	<b>454,156</b>	<b>454,428</b>

Table 13: Estimated total pumping 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
<b>Total</b>	<b>4,148</b>	<b>2,342</b>	<b>2,269</b>	<b>1,894</b>	<b>1,899</b>	<b>1,899</b>

Table 14: Estimated total pumping 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
<b>Total</b>	<b>155,799</b>	<b>141,924</b>	<b>141,219</b>	<b>140,872</b>	<b>140,263</b>	<b>140,211</b>

Table 15: Estimated total pumping 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
<b>Total (groundwater conservation districts)</b>	<b>63,806</b>	<b>64,046</b>	<b>64,046</b>	<b>64,046</b>	<b>64,046</b>	<b>64,046</b>
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
<b>Total (all areas)</b>	<b>278,392</b>	<b>270,556</b>	<b>244,844</b>	<b>245,943</b>	<b>247,502</b>	<b>247,706</b>

Table 16: Estimated total pumping for the 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
<b>Total (groundwater conservation districts)</b>	<b>240,515</b>	<b>239,427</b>	<b>239,427</b>	<b>239,427</b>	<b>239,427</b>	<b>239,427</b>
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
<b>Total (all areas)</b>	<b>539,477</b>	<b>499,126</b>	<b>455,328</b>	<b>454,957</b>	<b>454,156</b>	<b>454,428</b>

Table 17: Estimated total pumping 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
<b>Total (groundwater conservation districts)</b>	<b>3,445</b>	<b>1,645</b>	<b>1,645</b>	<b>1,645</b>	<b>1,645</b>	<b>1,645</b>
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
<b>Total (all areas)</b>	<b>4,148</b>	<b>2,342</b>	<b>2,269</b>	<b>1,894</b>	<b>1,899</b>	<b>1,899</b>

Table 18: Estimated total pumping 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
<b>Total (groundwater conservation districts)</b>	<b>145,554</b>	<b>131,679</b>	<b>130,978</b>	<b>130,632</b>	<b>130,022</b>	<b>129,970</b>
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
<b>Total (all areas)</b>	<b>155,799</b>	<b>141,924</b>	<b>141,219</b>	<b>140,872</b>	<b>140,263</b>	<b>140,211</b>

Table 19: Estimates of exempt use for the Chicot Aquifer in Groundwater Management Area 14 by groundwater conservation district (GCD) for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Source	Year					
		2010	2020	2030	2040	2050	2060
Bluebonnet GCD	T	2,701	3,296	3,886	4,471	5,150	5,931
Brazoria County GCD	T	8,536	9,633	10,793	11,860	12,994	14,181
Brazos Valley GCD	T	0	0	0	0	0	0
Lone Star GCD	D	4,788	6,356	7,923	9,490	11,058	12,625
Lower Trinity GCD	T	537	620	686	730	759	779
Southeast Texas GCD	T	2,197	2,377	2,466	2,535	2,593	2,653
<b>Total (groundwater conservation districts)</b>		<b>18,759</b>	<b>22,281</b>	<b>25,754</b>	<b>29,087</b>	<b>32,554</b>	<b>36,170</b>

Note: T = Estimated exempt use by TWDB, D=Estimated exempt use by the District, redistributed to the layer by the TWDB

Table 20: Estimates of exempt use for the Evangeline Aquifer in Groundwater Management Area 14 by groundwater conservation district (GCD) for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Source	Year					
		2010	2020	2030	2040	2050	2060
Bluebonnet GCD	T	1,235	1,431	1,598	1,734	1,867	2,023
Brazoria County GCD	T	0	0	0	0	0	0
Brazos Valley GCD	T	0	0	0	0	0	0
Lone Star GCD	D	1,222	1,621	2,021	2,421	2,821	3,221
Lower Trinity GCD	T	489	572	639	686	722	753
Southeast Texas GCD	T	533	590	623	640	644	649
<b>Total (groundwater conservation districts)</b>		<b>3,479</b>	<b>4,215</b>	<b>4,882</b>	<b>5,481</b>	<b>6,054</b>	<b>6,645</b>

Note: T = Estimated exempt use by TWDB, D=Estimated exempt use by the District, redistributed to the layer by the TWDB

Table 21: Estimates of exempt use for the Jasper Aquifer in Groundwater Management Area 14 by groundwater conservation district (GCD) for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Source	Year					
		2010	2020	2030	2040	2050	2060
Bluebonnet GCD	T	1,020	1,111	1,166	1,175	1,189	1,202
Brazoria County GCD	T	0	0	0	0	0	0
Brazos Valley GCD	T	17	15	13	11	9	9
Lone Star GCD	D	580	770	960	1,150	1,340	1,530
Lower Trinity GCD	T	1,562	1,838	2,059	2,215	2,343	2,456
Southeast Texas GCD	T	1,377	1,506	1,579	1,615	1,626	1,638
<b>Total (groundwater conservation districts)</b>		<b>4,555</b>	<b>5,240</b>	<b>5,777</b>	<b>6,166</b>	<b>6,507</b>	<b>6,835</b>

Note: T = Estimated exempt use by TWDB, D=Estimated exempt use by the District, redistributed to the layer by the TWDB

Table 22: Estimated managed 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 <sup>1</sup>	0	0	0	0	0	0
Brazoria County GCD	39,589	38,492	37,332	36,265	35,131	33,944
Brazos Valley GCD	0	0	0	0	0	0
Lone Star GCD <sup>1</sup>	0	0	0	0	0	0
Lower Trinity GCD <sup>1</sup>	0	0	0	0	0	0
Southeast Texas GCD	10,402	10,222	10,133	10,064	10,006	9,946
<b>Total</b>	<b>49,991</b>	<b>48,714</b>	<b>47,465</b>	<b>46,329</b>	<b>45,137</b>	<b>43,890</b>

Note 1) The estimated exempt use in these areas exceeds the total pumping estimated to achieve the desired future conditions. The managed available groundwater, therefore, has been set to zero for these areas.

Table 23: Estimated managed available groundwater for the 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	64,808	64,612	64,445	64,309	64,176	64,020
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	38,159	36,672	36,272	35,872	35,472	35,072
Lower Trinity GCD	16,000	15,917	15,850	15,803	15,767	15,736
Southeast Texas GCD	115,798	115,741	115,708	115,691	115,687	115,682
<b>Total</b>	<b>237,036</b>	<b>235,212</b>	<b>234,545</b>	<b>233,946</b>	<b>233,373</b>	<b>232,782</b>

Table 24: Estimated managed 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
<b>Total</b>	<b>3,445</b>	<b>1,645</b>	<b>1,645</b>	<b>1,645</b>	<b>1,645</b>	<b>1,645</b>

Table 25: Estimated managed 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	27,140	27,026	26,430	26,122	26,108	26,095
Brazoria County GCD	0	0	0	0	0	0
Brazos Valley GCD	1,172	1,174	1,176	1,178	1,180	1,180
Lone Star GCD	31,821	20,844	20,654	20,464	20,274	20,084
Lower Trinity GCD	36,227	32,925	32,704	32,501	31,763	31,598
Southeast Texas GCD	44,638	44,470	44,237	44,201	44,190	44,178
<b>Total</b>	<b>140,999</b>	<b>126,439</b>	<b>125,201</b>	<b>124,466</b>	<b>123,515</b>	<b>123,135</b>

DRAFT

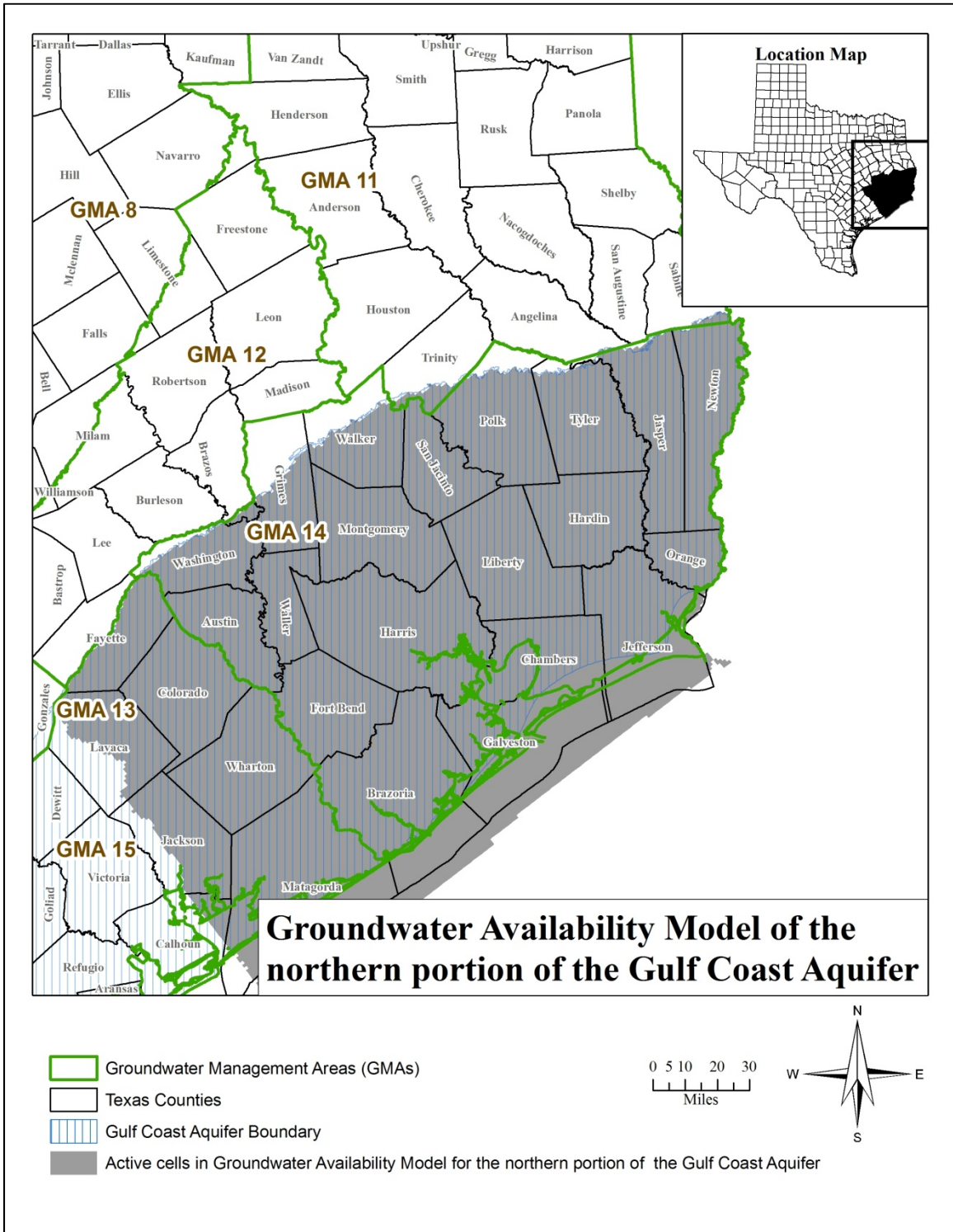


Figure 1: Map showing the areas covered by the groundwater availability model for the northern portion of the Gulf Coast Aquifer.

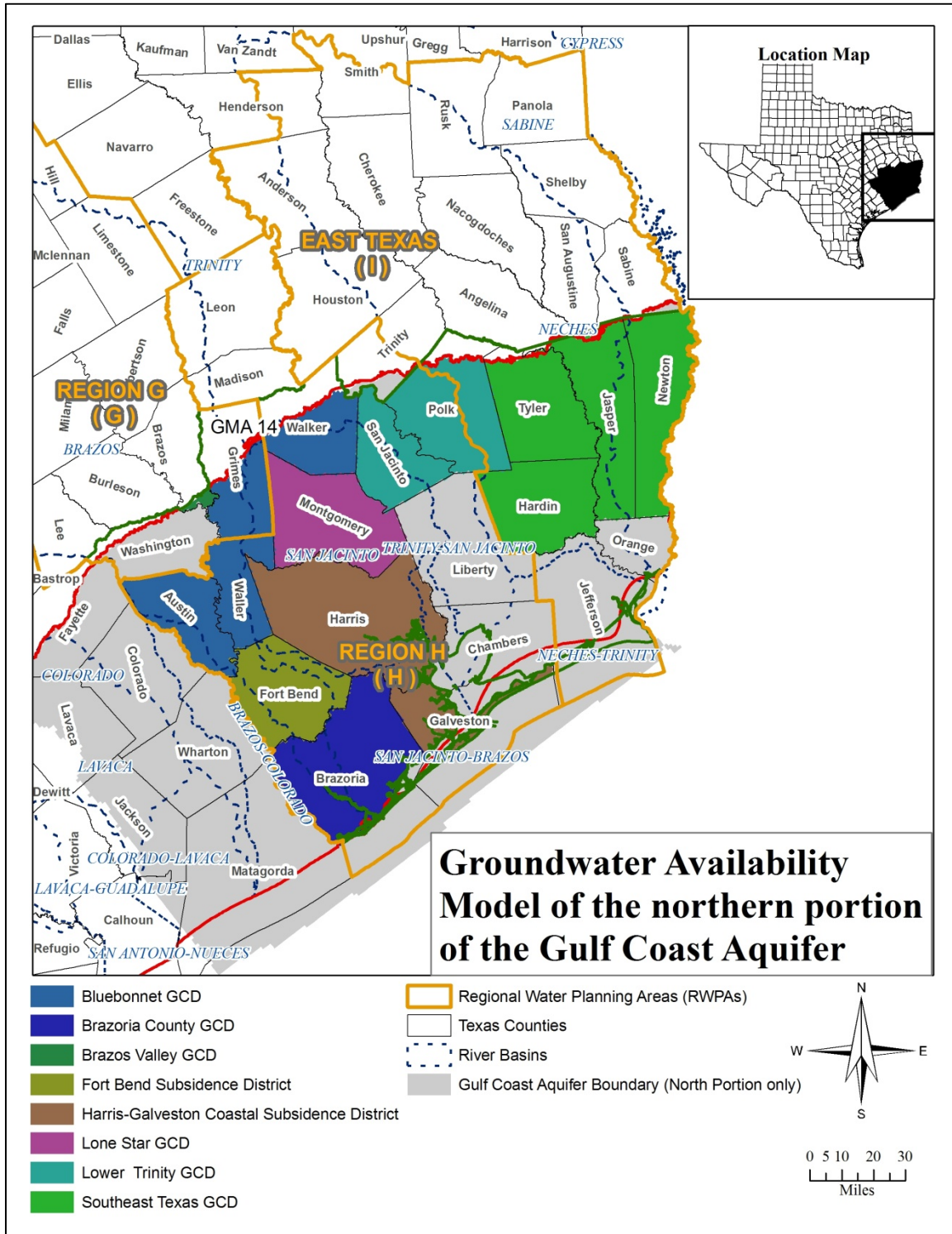


Figure 2: Map showing regional water planning areas (RWPAs), groundwater conservation districts (GCDs), subsidence districts, counties, and river basins in Groundwater Management Area 14.