GTA Aquifer Assessment 10-10 MAG

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David Thorkildsen, P.G. 705 authorized the seal appearing on this document on November 1, 2011.

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EXECUTIVE SUMMARY:

The modeled available groundwater for the Ellenburger-San Saba Aquifer as a result of the desired future condition adopted by members of Groundwater Management Area 7 is approximately 29,429 acre-feet per year. This is divided by county, regional water planning area, and river basin in Table 1 for use in the regional water planning process. Modeled available groundwater is summarized by county, regional water planning area, river basin, and groundwater conservation district in tables 2 through 5. The pumping estimates were extracted from GTA Aquifer Assessments 08-08 and 10-04, which Groundwater Management Area 7 used as the basis for developing a desired future condition stating that "total net decline in water levels within the Hickory UWCD No. 1, Hill Country UWCD, Kimble County GCD and Menard County UWD at the end of the fifty-year period shall not exceed five (5) feet below 2010 water levels in the aquifer" and finding that "the Ellenburger-San Saba aquifer is not relevant for planning purposes in all other areas of Groundwater Management Area 7".

REQUESTOR:

Mr. Allan Lange of the Lipan-Kickapoo Water Conservation District acting on behalf of the member groundwater conservation districts of Groundwater Management Area 7.

DESCRIPTION OF REQUEST:

In a letter received August 16, 2010, Mr. Allan Lange provided the Texas Water Development Board (TWDB) with the desired future condition of the Ellenburger-San Saba Aquifer adopted by the members of Groundwater Management Area 7. The desired future condition for the Ellenburger-San Saba Aquifer, as described in Resolution No. 07-29-10-2 and adopted July 29, 2010 by the groundwater conservation districts in Groundwater Management Area 7 is described below:

1) *total net decline in water levels within the Hickory UWCD No. 1, Hill Country UWCD, Kimble County GCD and Menard County UWD at the end of the fifty-year period shall not exceed five (5) feet below 2010 water levels in the aquifer;*
2) *the Ellenburger-San Saba aquifer is not relevant for joint planning purposes in all other areas of GMA 7.*

In response to receiving the adopted desired future condition, TWDB has estimated the modeled available groundwater that achieves the above desired future condition for Groundwater Management Area 7.

METHODS:

Groundwater Management Area 7, located in the Edwards Plateau area of Texas, includes part of the Ellenburger-San Saba Aquifer (Figure 1). At the request of Groundwater Management Area 7 the TWDB previously analyzed several water level decline scenarios for the Ellenburger-San Saba Aquifer, documented in GTA Aquifer Assessment 08-08 and GTA Aquifer Assessment 10-04. One of the scenarios of GTA Aquifer Assessment 08-08 included the desired future condition of 5 feet of water level decline. After reviewing the assessment Hill Country UWCD and Menard County UWD supplied additional water-level and water use data that were incorporated into GTA Aquifer Assessment 10-04. The pumping results presented here for Groundwater Management Area 7 are taken directly from GTA Aquifer Assessment 10-04 for Hill Country UWCD and Menard County UWD and directly from GTA Aquifer Assessment 08-08 for Hickory UWCD No. 1 and Kimble County GCD and are divided by county, regional water planning area, river basin, and groundwater conservation district. These areas are shown in Figure 2.

PARAMETERS AND ASSUMPTIONS:

- Parameters, assumptions, volumetric calculations, and areas were obtained from GTA Aquifer Assessment 08-08 (Thorkildsen and Backhouse, 2010).
- Additional water-level and water use data provide by Hill Country UWCD and Menard County UWD were evaluated in GTA Aquifer Assessment 10-04 (Bradley, 2010).
- Water-level declines of 5 feet were estimated to be uniform across the 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 November 9, 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 estimated modeled available groundwater for the Ellenburger-San Saba Aquifer in Groundwater Management Area 7 consistent with the adopted desired future condition is approximately 29,429 acre-feet per year. Table 1 shows the modeled available groundwater by decade divided by county, regional water planning area, and river basin for use in the regional water planning process.

Modeled available groundwater estimates are also summarized by county, regional water planning area, river basin, and groundwater conservation district and are shown in tables 2, 3, 4, and 5, respectively.

Table 1. Modeled available groundwater by decade for the Ellenburger-San Saba Aquifer in Groundwater Management Area 7. Results are in acre-feet per year and are divided by county, regional water planning area, and river basin.

County	Regional Water Planning Area	Basin	Year					
			2010	2020	2030	2040	2050	2060
Concho	F	Colorado	0	0	0	0	0	0
Gillespie	K	Colorado	6,270	6,270	6,270	6,270	6,270	6,270
		Guadalupe	1	1	1	1	1	1
Kimble	F	Colorado	304	304	304	304	304	304
Mason	F	Colorado	5,801	5,801	5,801	5,801	5,801	5,801
McCulloch	F	Colorado	5,369	5,369	5,369	5,369	5,369	5,369
Menard	F	Colorado	791	791	791	791	791	791
San Saba	K	Colorado	10,893	10,893	10,893	10,893	10,893	10,893
Total			**29,429**	**29,429**	**29,429**	**29,429**	**29,429**	**29,429**

Table 2. Modeled available groundwater for the Ellenburger-San Saba Aquifer summarized by county in Groundwater Management Area 7 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Concho	0	0	0	0	0	0
Gillespie	6,271	6,271	6,271	6,271	6,271	6,271
Kimble	304	304	304	304	304	304
Mason	5,801	5,801	5,801	5,801	5,801	5,801
McCulloch	5,369	5,369	5,369	5,369	5,369	5,369
Menard	791	791	791	791	791	791
San Saba	10,893	10,893	10,893	10,893	10,893	10,893
Total	**29,429**	**29,429**	**29,429**	**29,429**	**29,429**	**29,429**

Table 3. Modeled available groundwater for the Ellenburger-San Saba Aquifer summarized by regional water planning area in Groundwater Management Area 7 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**
F	12,265	12,265	12,265	12,265	12,265	12,265
K	17,164	17,164	17,164	17,164	17,164	17,164
Total	**29,429**	**29,429**	**29,429**	**29,429**	**29,429**	**29,429**

Table 4. Modeled available groundwater for the Ellenburger-San Saba Aquifer summarized by river basin in Groundwater Management Area 7 for each decade between 2010 and 2060. Results are in acre-feet per year.

Basin	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Colorado	29,428	29,428	29,428	29,428	29,428	29,428
Guadalupe	1	1	1	1	1	1
Total	**29,429**	**29,429**	**29,429**	**29,429**	**29,429**	**29,429**

Table 5. Modeled available groundwater for the Ellenburger-San Saba Aquifer summarized by groundwater conservation district in Groundwater Management Area 7 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Hickory UWCD No. 1	22,315	22,315	22,315	22,315	22,315	22,315
Hill Country UWCD	6,271	6,271	6,271	6,271	6,271	6,271
Kimble County GCD	100	100	100	100	100	100
Menard County UWD	743	743	743	743	743	743
Total	**29,429**	**29,429**	**29,429**	**29,429**	**29,429**	**29,429**

GCD = Groundwater Conservation District UWD = Underground Water District

UWCD = Underground Water Conservation District

LIMITATIONS:

The water budget in this analysis was determined to be the best method to calculate estimates of modeled available groundwater, however this method has limitations and should be replaced with better tools, including groundwater models and additional data that are not currently available, whenever possible.

This analysis assumes homogeneous and isotropic aquifers; however, aquifer conditions may not be uniform. The analysis further assumes that precipitation is the only source of aquifer recharge, that lateral inflow to the aquifer is equal to lateral outflow from the aquifer, and that future pumping will not alter this balance. In addition, certain assumptions have been made regarding future precipitation, recharge, and streamflow in developing modeled available groundwater estimates. These assumptions need to be considered and compared to actual future data when evaluating achievement of the desired future condition.

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. 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 and water levels to know if they are achieving their desired future conditions. Because of the limitations and assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to

refine these 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:

Bradley, R. G., 2010, GTA Aquifer Assessment 10-04: Texas Water Development Board, GTA Aquifer Assessment Report 10-04 Report, 5 p.

Thorkildsen, D. and Backhouse, S., 2010, GTA Aquifer Assessment 08-08: Texas Water Development Board, GTA Aquifer Assessment 08-08 Report, 13 p.

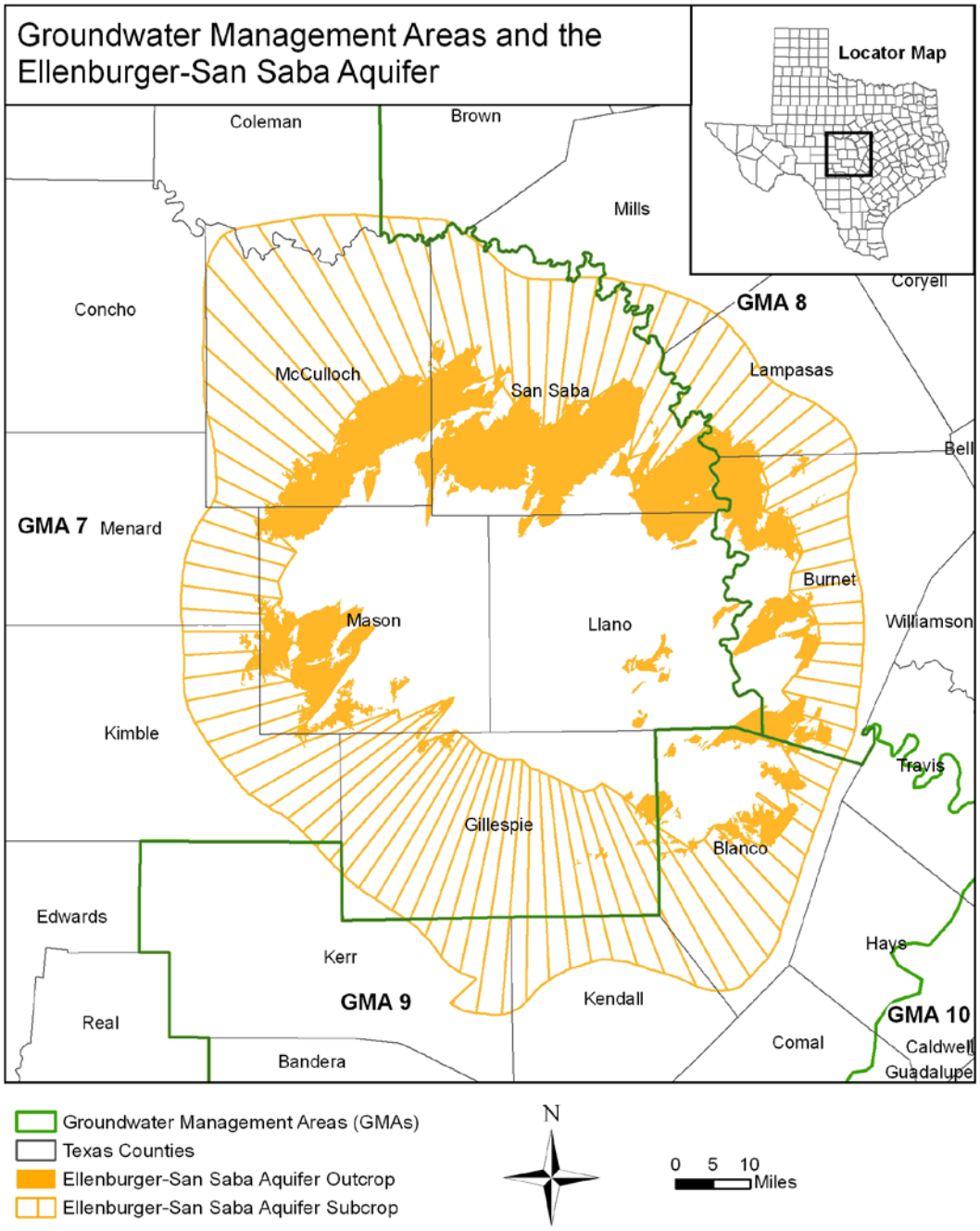

Figure 1. Map showing the area covered by the Ellenburger-San Saba Aquifer.

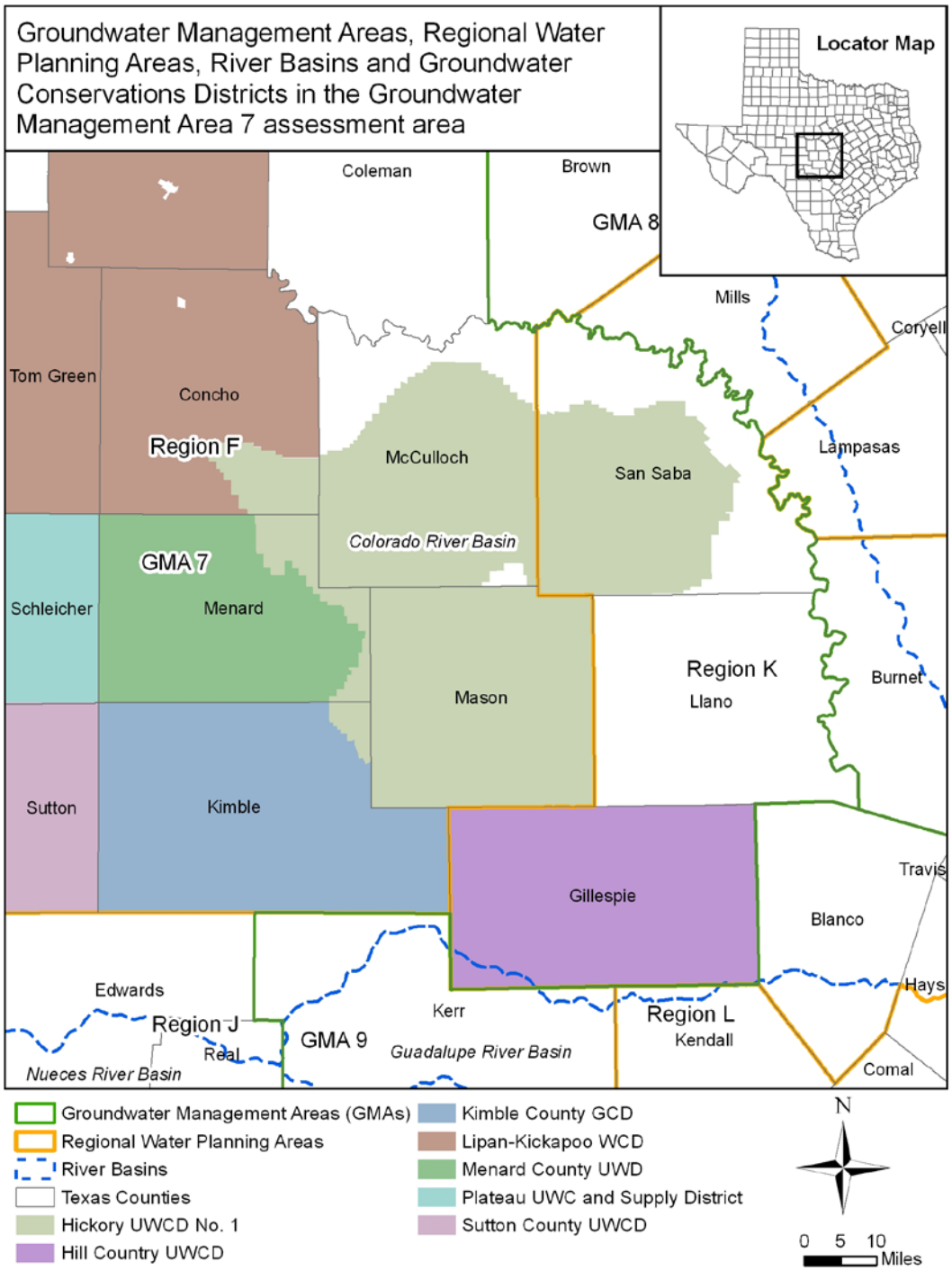

Figure 2. Map showing regional water planning areas, river basins, groundwater conservation districts and counties in and neighboring the Groundwater Management Area 7 assessment area. GCD = Groundwater Conservation District, UWCD = Underground Water Conservation District, WCD = Water Conservation District, UWD = Underground Water District