GTA Aquifer Assessment 10-18 MAG

by Robert G. Bradley, P.G.
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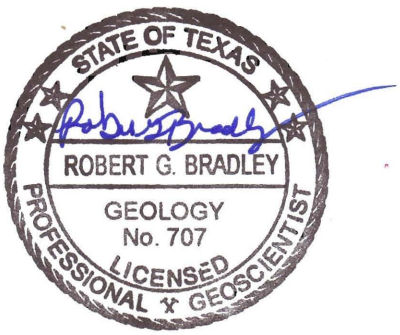

Robert G. Bradley, P.G. 707, authorized the seal appearing on this document on December 9, 2011

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EXECUTIVE SUMMARY:

The estimated modeled available groundwater from the Brazos River Alluvium Aquifer that achieves the desired future condition adopted by members of Groundwater Management Area 8 is approximately 33,169 acre-feet per year and is summarized by county, regional water planning area, and river basin as shown in Tables 1-5. The modeled available groundwater estimates for the groundwater conservation districts within Groundwater Management Area 8 for the aquifer is approximately 16,485 acre-feet per year between 2010 and 2060 and are shown in Table 5.

REQUESTOR:

Mr. Eddy Daniel of the North Texas Groundwater Conservation District acting on the behalf of Groundwater Management Area 8.

DESCRIPTION OF REQUEST:

In a letter dated August 31, 2011, Mr. Eddy Daniel provided the Texas Water Development Board (TWDB) with the desired future condition of the Brazos River Alluvium Aquifer that were adopted in a resolution, dated April 27, 2011, by the members of Groundwater Management Area 8. This resolution referenced the previously adopted desired future conditions for Brazos River Alluvium Aquifer, as described in a resolution adopted December 17, 2007 by the groundwater conservation districts in Groundwater Management Area 8.

However, following readopting the previous desired future conditions, the Groundwater Management area 8 representatives, in a resolution dated June 23, 2011, made that the portion of the Brazos River Alluvium Aquifer in Milam County non-relevant for joint planning purposes. Therefore, the current desired future conditions are:

- Maintain approximately 100 percent of the saturated thickness after 50 years in Falls County.
- Maintain approximately 82 percent of the estimated saturated thickness after 50 years in McLennan County.
- Maintain approximately 90 percent of the estimated saturated thickness after 50 years in Hill and Bosque counties.

Because the desired future conditions were identical to the previous submission, the modeled available groundwater estimates in this report are identical to the previously released "managed available groundwater" estimates that were in GTA Aquifer Assessment 07-05mag.

METHODS:

Groundwater Management Area 8, located in central Texas, includes part of the Brazos River Alluvium Aquifer (Figure 1). The desired future condition requested for the Brazos River Alluvium Aquifer was based on the desired future condition adopted by Groundwater Management Area 8. The pumping results presented here for Groundwater Management Area 8 are taken directly from GTA Aquifer Assessment 07-05mag.

PARAMETERS AND ASSUMPTIONS:

- Parameters, assumptions, volumetric calculations, and areas were obtained from GTA Aquifer Assessment 07-05mag (Bradley, 2008).

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 January 25, 2011, 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. The previous version of this report was completed prior to the readopting of the desired future conditions.

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 from the Brazos River Alluvium Aquifer in Groundwater Management Area 8 that achieves the adopted desired future condition is approximately 33,169 acre-feet per year. 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 1).

The 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. Estimated modeled available groundwater by decade for the Brazos River Alluvium Aquifer in Groundwater Management Area 8. 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
Bosque	G	Brazos	830	830	830	830	830	830
Falls	G	Brazos	16,684	16,684	16,684	16,684	16,684	16,684
Hill	G	Brazos	632	632	632	632	632	632
McLennan	G	Brazos	15,023	15,023	15,023	15,023	15,023	15,023
		Total	**33,169**	**33,169**	**33,169**	**33,169**	**33,169**	**33,169**

Table 2. Estimated modeled available groundwater for the Brazos River Alluvium Aquifer summarized by county in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Bosque	830	830	830	830	830	830
Falls	16,684	16,684	16,684	16,684	16,684	16,684
Hill	632	632	632	632	632	632
McLennan	15,023	15,023	15,023	15,023	15,023	15,023
Total	**33,169**	**33,169**	**33,169**	**33,169**	**33,169**	**33,169**

Table 3. Estimated modeled available groundwater for the Brazos River Alluvium Aquifer summarized by regional water planning area in Groundwater Management Area 8 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	33,169	33,169	33,169	33,169	33,169	33,169

Table 4. Estimated modeled available groundwater for the Brazos River Alluvium Aquifer summarized by river basin in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

Basin	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Brazos	33,169	33,169	33,169	33,169	33,169	33,169

Table 5. Estimated modeled available groundwater for the Brazos River Alluvium Aquifer summarized by groundwater conservation district in Groundwater Management Area 8 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Middle Trinity GCD	830	830	830	830	830	830
Prairielands GCD	632	632	632	632	632	632
Southern Trinity GCD	15,023	15,023	15,023	15,023	15,023	15,023
Total (excluding non-district areas)	**16,485**	**16,485**	**16,485**	**16,485**	**16,485**	**16,485**
No district	16,684	16,684	16,684	16,684	16,684	16,684
Total (including non-district areas)	**33,169**	**33,169**	**33,169**	**33,169**	**33,169**	**33,169**

LIMITATIONS:

The water budget used by Bradley (2008) 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., 2008, GTA Aquifer Assessment 07-05mag: Texas Water Development Board, GTA Aquifer Assessment Report, 8 p.

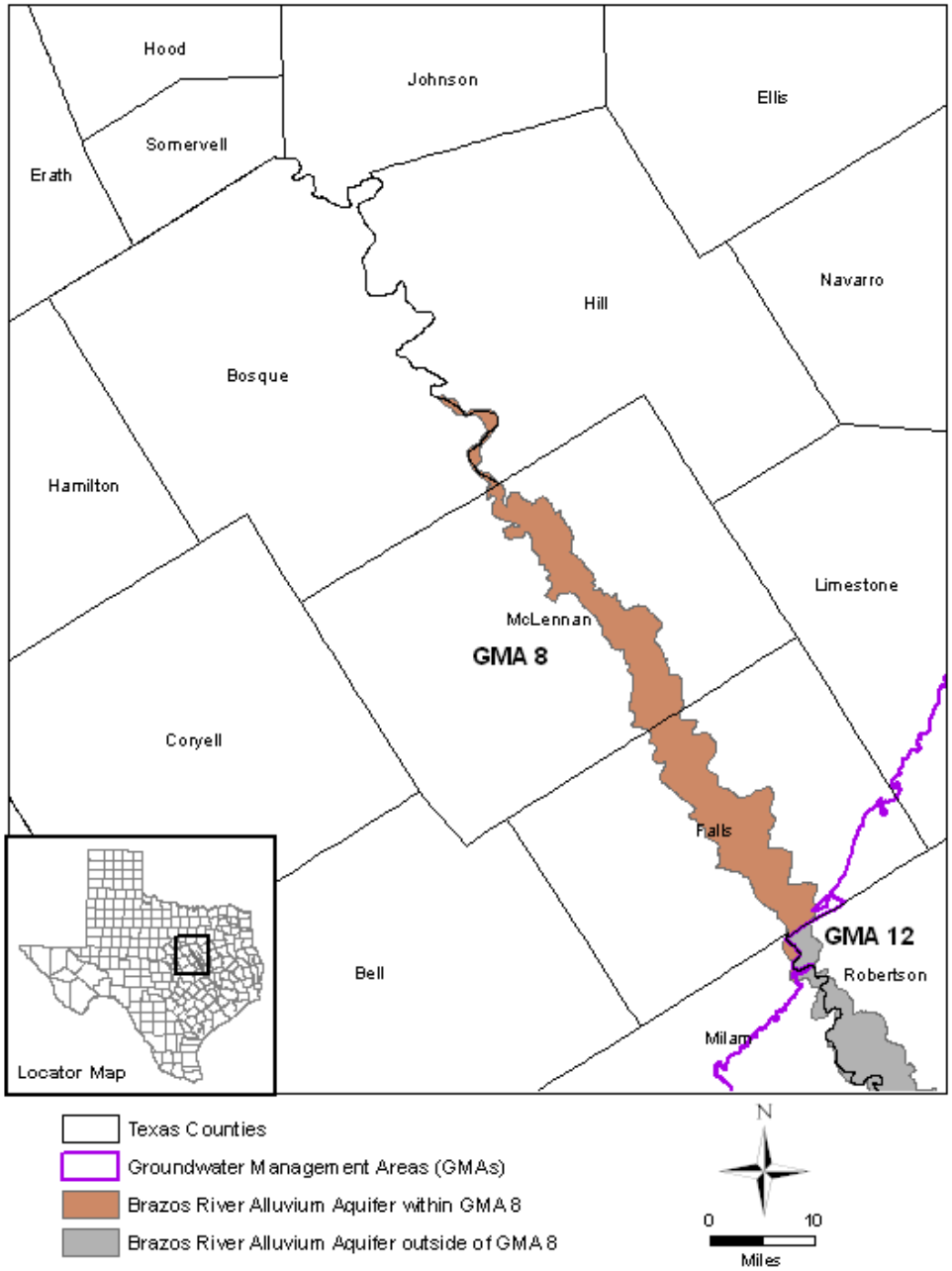

Figure 1. Map showing the area covered by the Brazos River Alluvium Aquifer in Groundwater Management Area 8.

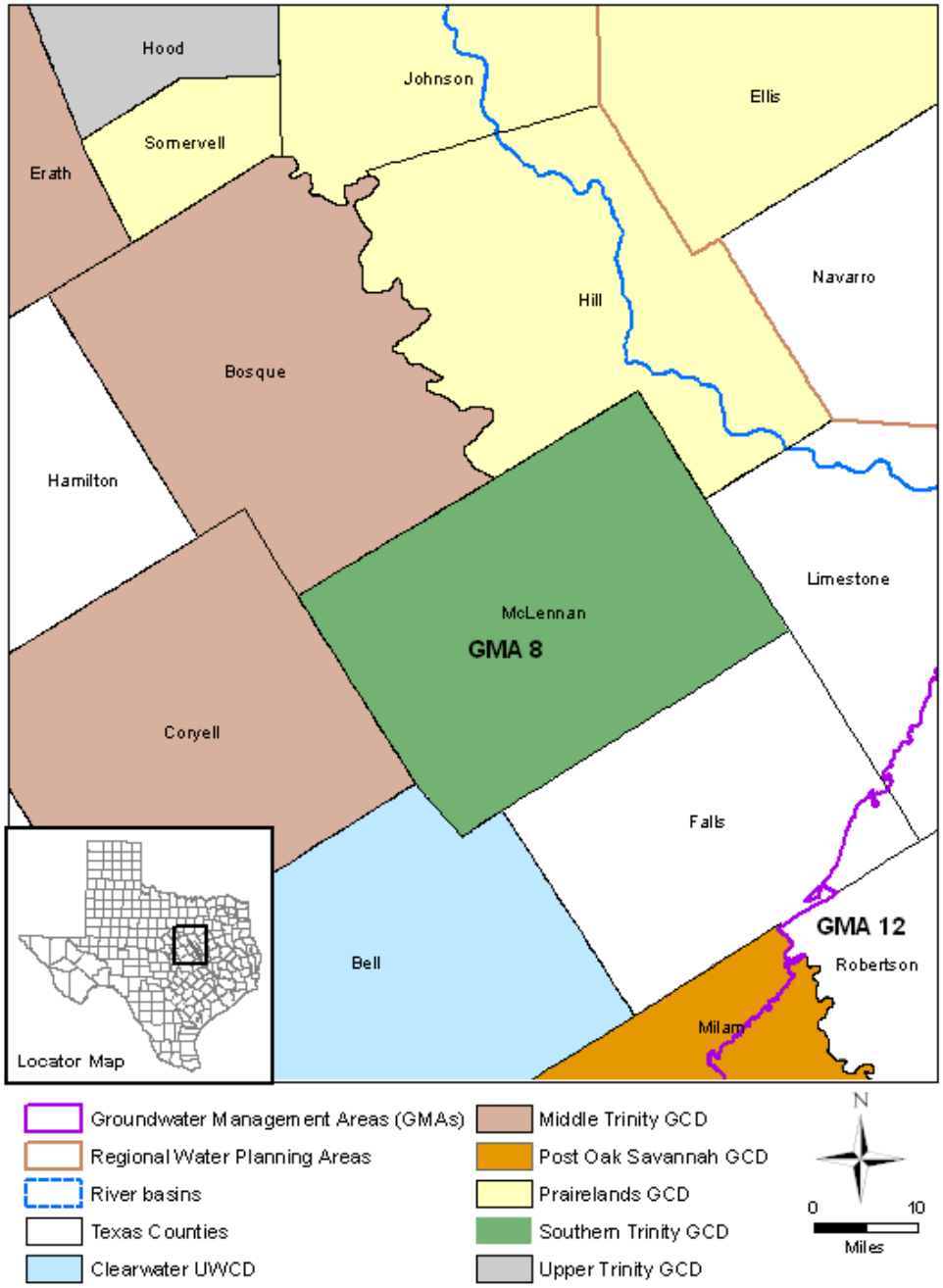

Figure 2. Map showing regional water planning areas, river basins, groundwater conservation districts and counties in and neighboring the Groundwater Management Area 8 assessment area. GCD = Groundwater Conservation District, UWCD = Underground Water Conservation District.