GTA Aquifer Assessment 10-16 MAG

by Robert G. Bradley, P.G.
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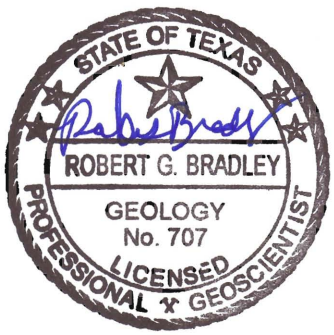

Robert G. Bradley, P.G. 707, authorized the seal appearing on this document on December 7, 2011

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EXECUTIVE SUMMARY:

The estimated modeled available groundwater from the Hickory Aquifer that achieves the desired future condition adopted by members of Groundwater Management Area 8 is approximately 2,346 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 2,297 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 Hickory 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 the Hickory Aquifer, as described in a resolution adopted May 19, 2008 by the groundwater conservation districts in Groundwater Management Area 8 is described below:

- Burnet County pumping should maintain approximately 100 percent of the saturated thickness after 50 years by using approximately 80 percent of the estimated recharge.
- Brown, Lampasas, Mills, Travis, and Williamson Counties should maintain approximately 90 percent of the available drawdown [saturated thickness] after 50 years.

The desired future condition for Burnet County adds a stipulation of using 80 percent of the estimated recharge (Williams, 2008). Because this is a volume and not a condition of the aquifer, this part of the statement was disregarded in the calculation of the modeled available groundwater (Bradley, 2009).

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 08-04mag.

METHODS:

Groundwater Management Area 8, located central Texas, includes part of the Hickory Aquifer (Figure 1). The desired future condition requested for the Hickory 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 08-04mag.

PARAMETERS AND ASSUMPTIONS:

- Parameters, assumptions, volumetric calculations, and areas were obtained from GTA Aquifer Assessment 08-04mag (Bradley, 2009).

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 Hickory Aquifer in Groundwater Management Area 8 that achieves the adopted desired future condition is approximately 2,346 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 Hickory 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
Brown	F	Colorado	12	12	12	12	12	12
Burnet	K	Colorado	2,148	2,148	2,148	2,148	2,148	2,148
		Brazos	0	0	0	0	0	0
Lampasas	G	Colorado	47	47	47	47	47	47
		Brazos	66	66	66	66	66	66
Mills	K	Colorado	35	35	35	35	35	35
		Brazos	1	1	1	1	1	1
Travis	K	Brazos	0	0	0	0	0	0
		Colorado	22	22	22	22	22	22
Williamson	G	Brazos	15	15	15	15	15	15
		Colorado	0	0	0	0	0	0
		Total	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**

Table 2. Estimated modeled available groundwater for the Hickory 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
Brown	12	12	12	12	12	12
Burnet	2,148	2,148	2,148	2,148	2,148	2,148
Lampasas	113	113	113	113	113	113
Mills	36	36	36	36	36	36
Travis	22	22	22	22	22	22
Williamson	15	15	15	15	15	15
Total	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**

Table 3. Estimated modeled available groundwater for the Hickory 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**
F	12	12	12	12	12	12
G	128	128	128	128	128	128
K	2,206	2,206	2,206	2,206	2,206	2,206
Total	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**

Table 4. Estimated modeled available groundwater for the Hickory 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	82	82	82	82	82	82
Colorado	2,264	2,264	2,264	2,264	2,264	2,264
Total	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**

Table 5. Estimated modeled available groundwater for the Hickory 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**
Central Texas GCD	2,148	2,148	2,148	2,148	2,148	2,148
Fox Crossing WD	36	36	36	36	36	36
Saratoga UWCD	113	113	113	113	113	113
Total (excluding non-district areas)	**2,297**	**2,297**	**2,297**	**2,297**	**2,297**	**2,297**
No district	49	49	49	49	49	49
Total (including non-district areas)	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**	**2,346**

LIMITATIONS:

The water budget used by Bradley (2009) 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., 2009, GTA Aquifer Assessment 08-04mag: Texas Water Development Board, GTA Aquifer Assessment Report, 11 p.

Williams, C.R, 2008, Adopted desired future conditions of minor aquifers: memorandum to Cheryl Maxwell, Groundwater Management Area 8, 12p.

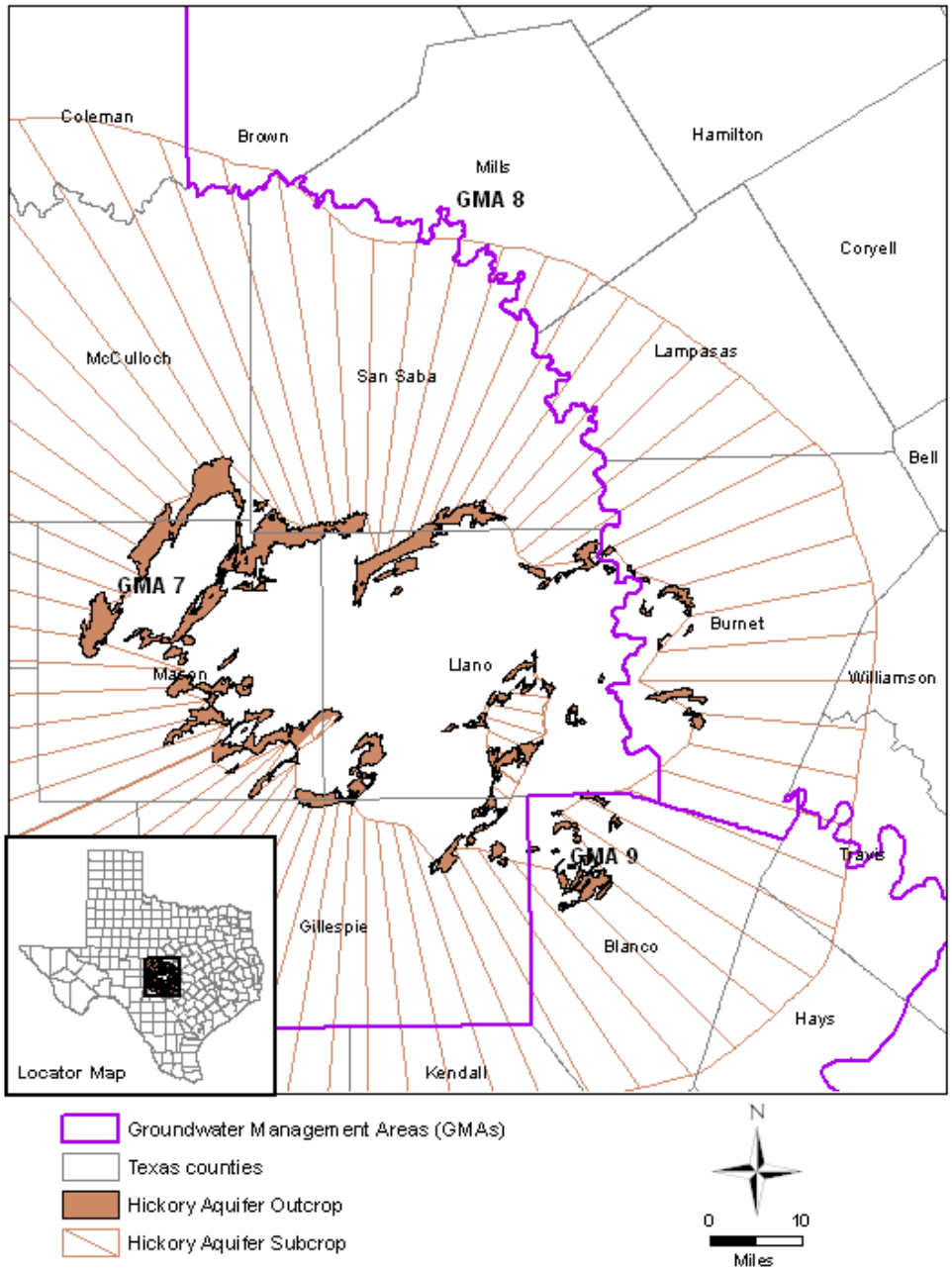

Figure 1. Map showing the area covered by the Hickory Aquifer.

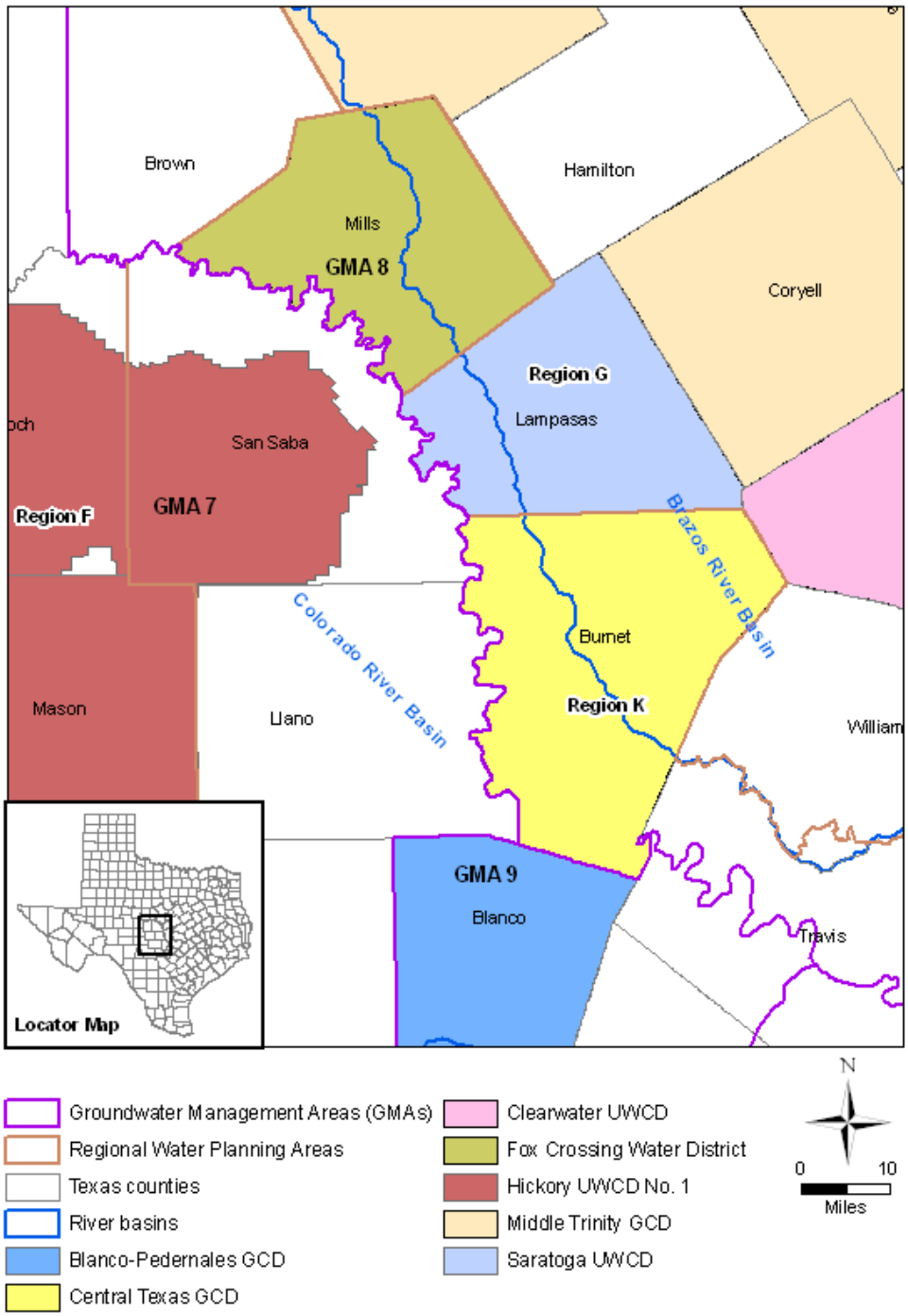

Figure 2. Map showing regional water planning areas, river basins, groundwater conservation districts and counties in and neighboring the Groundwater Management Area 8 assessment area. GCD = Groundwater Conservation District, UWCD = Underground Water Conservation District.