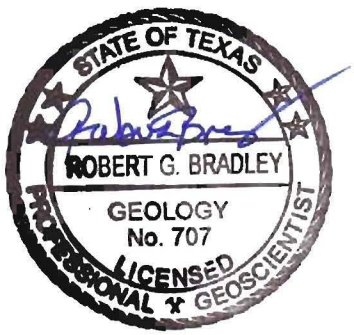
GTA Aquifer Assessment 10-09 MAG

by Robert G. Bradley, P.G.
Texas Water Development Board
Groundwater Technical Assistance Section
(512) 936-0870



Robert G. Bradley, P.G. 707, authorized the seal appearing on this document on November 18, 2011.

This page is intentionally blank.

EXECUTIVE SUMMARY:

The estimated modeled available groundwater from the Capitan Reef Complex Aquifer that achieves the desired future condition adopted by members of Groundwater Management Area 7 is approximately 9,761 acre-feet per year and is summarized by county, regional water planning area, and river basin as shown in Table 1. The estimated modeled available groundwater for the Middle Pecos Groundwater Conservation District in Groundwater Management Area 7 for the aquifer is approximately 9,761 acre feet per year between 2010 and 2060 and is shown in Table 2. The modeled available groundwater estimates were extracted from Williams 2010, which Groundwater Management Area 7 used as the basis for developing a desired future condition.

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 Capitan Reef Complex Aquifer adopted by the members of Groundwater Management Area 7. The desired future condition for the Capitan Reef Complex Aquifer, as described in Resolution No. 07-29-10-6 and adopted July 29, 2010 by the groundwater conservation districts in Groundwater Management Area 7 is described below:

> *Desired Future Conditions for the Capitan Reef [Complex] Aquifer located within GMA 7 through the year 2060:*
>
> 1. *total net decline in water levels within the Middle Pecos GCD at the end of the fifty-year period shall not exceed fifteen (15) feet below water levels in the unconfined portion of the aquifer in the year 20I0;*
> 2. *and total net decline in water levels at the end of the fifty-year period shall not exceed two hundred (200) feet below water levels in the confined portion of the aquifer in the year 2010; and*
> 3. *the aquifer is not relevant for joint planning purposes outside the boundaries of the Middle Pecos GCD.*

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 West Texas, includes the Capitan Reef Complex Aquifer (Figure 1). The Middle Pecos Groundwater Conservation District hired a consultant to compile district specific information on the aquifer for the establishment of desired future conditions within the district (Williams, 2010). This information was evaluated and verified, and it was incorporated within the final modeled available groundwater numbers issued in this report. The extent of the aquifer in Groundwater Management Area 3 is shown in Figure 2.

PARAMETERS AND ASSUMPTIONS:

- “Managed available groundwater” estimates from Williams (2010) were used in this report as modeled available groundwater volumes, because exempt use was not factored into the calculations.

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 5, 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.

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 Capitan Reef Complex Aquifer in Groundwater Management Area 7 that achieves the adopted desired future condition is approximately 9,761 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 is shown in Table 2.

Table 1. Estimated modeled available groundwater by decade for the Capitan Reef Complex Aquifer in Groundwater Management Area 7. Results are in acre-feet per year and are shown by county, regional water planning area, and river basin.

County	Regional Water Planning Area	River Basin	Year					
			2010	2020	2030	2040	2050	2060
Pecos	F	Rio Grande	9,761	9,761	9,761	9,761	9,761	9,761

Table 2. Estimates of modeled available groundwater for the Capitan Reef Complex Aquifer by groundwater conservation District 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 Pecos Groundwater Conservation District	9,761	9,761	9,761	9,761	9,761	9,761

LIMITATIONS:

The water budget this analysis (Williams 2010) is the same method used by TWDB staff, which 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:

Williams, C.R., 2010, Desired Future Condition of the Capitan Reef Aquifer in GMA-7: memorandum to Paul Weatherby, General Manager, Middle Pecos Groundwater Conservation District, 5 p.

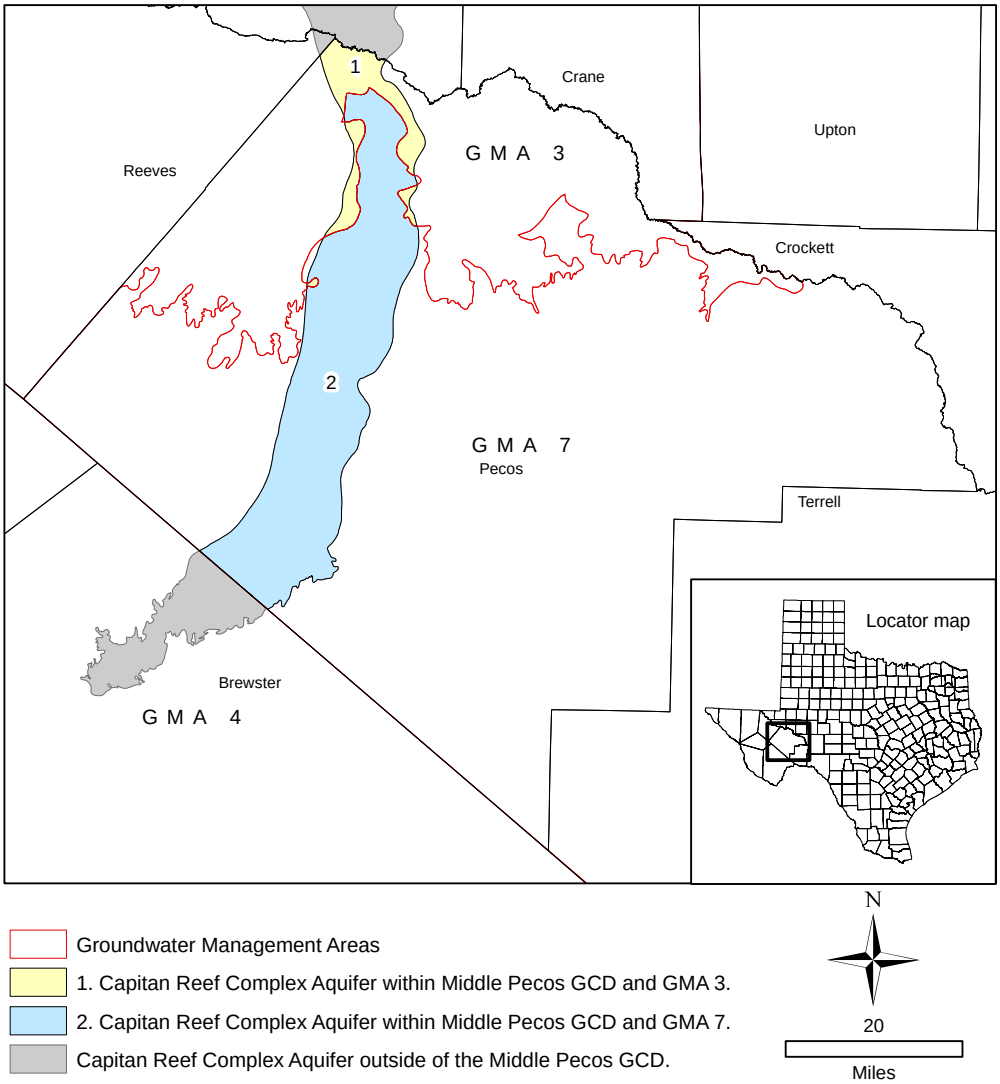


Figure 1. Map showing the area covered by the Capitan Reef Complex Aquifer in Groundwater Management Area 7. GCD = Groundwater Conservation District.

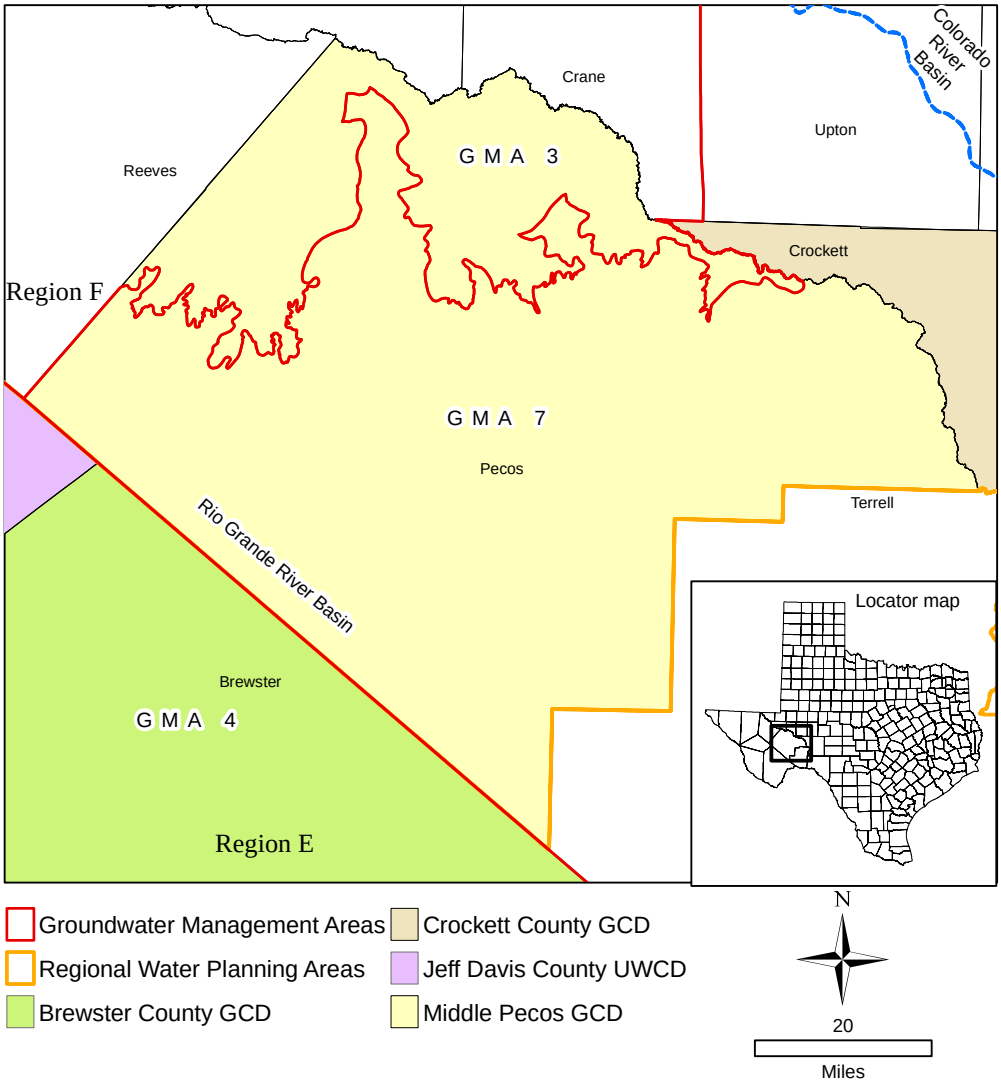


Figure 2. Map showing regional water planning areas, river basins, groundwater conservation districts, and counties in Groundwater Management Area 7. GCD = Groundwater Conservation District, UWCD = Underground Water Conservation District