GAM run 05-35

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Groundwater Availability Modeling Section
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September 12, 2005

REQUESTOR:

Mr. William E. West, Jr. on behalf of the Guadalupe-Blanco River Authority.

DESCRIPTION OF REQUEST:

What are the potential effects of increased pumping from the Trinity (Hill Country) aquifer on flow in the Guadalupe River?

METHODS:

To address the request, we extracted water-budget data from the groundwater availability model (GAM) for the Trinity (Hill Country) aquifer (Mace and others, 2000). In the Trinity (Hill Country) aquifer GAM, rivers are simulated by drains. Discharge to drain cells represents baseflow from the aquifer to the river. We calculated baseflow to the Guadalupe River by creating a zone that included the Guadalupe River. We extracted the discharge to the zoned drain cells that simulate the Guadalupe River from the predictive results of the Trinity (Hill Country) aquifer GAM under average and drought-of-record recharge conditions.

PARAMETERS AND ASSUMPTIONS:

Baseflow rates derived from the Trinity (Hill Country) GAM were obtained from water-budget output files from the model. The model stress periods simulate groundwater flow for the periods 1975-1976 (steady-state), 1996 and 1997 (transient), and 2000 through 2050 (predictive). We ran two simulations, (1) average recharge throughout the 2000 through 2050 predictive period and (2) average recharge during the period 2000 through 2043 followed by a drought-of-record (DOR) through 2050. The drought-of-record recharge conditions simulated by this model are based on the 1950 through 1956 drought that affected the model area. Pumpage for the predictive simulation is based on data from the 2001 regional water plans.

RESULTS:

The following results were obtained from the Trinity (Hill Country) aquifer GAM runs with and without a drought-of-record (Table 1, Figure 1).

Table 1. Calculated baseflow to the Guadalupe River from the Trinity (Hill Country) aquifer. DOR indicates simulation including 2044 through 2050 drought-of-record.

Year	Baseflow (acre-feet per year)
2000	46,500
2010	45,100
2020	44,100
2030	42,700
2040	41,400
2050	40,200
2050 DOR	18,700

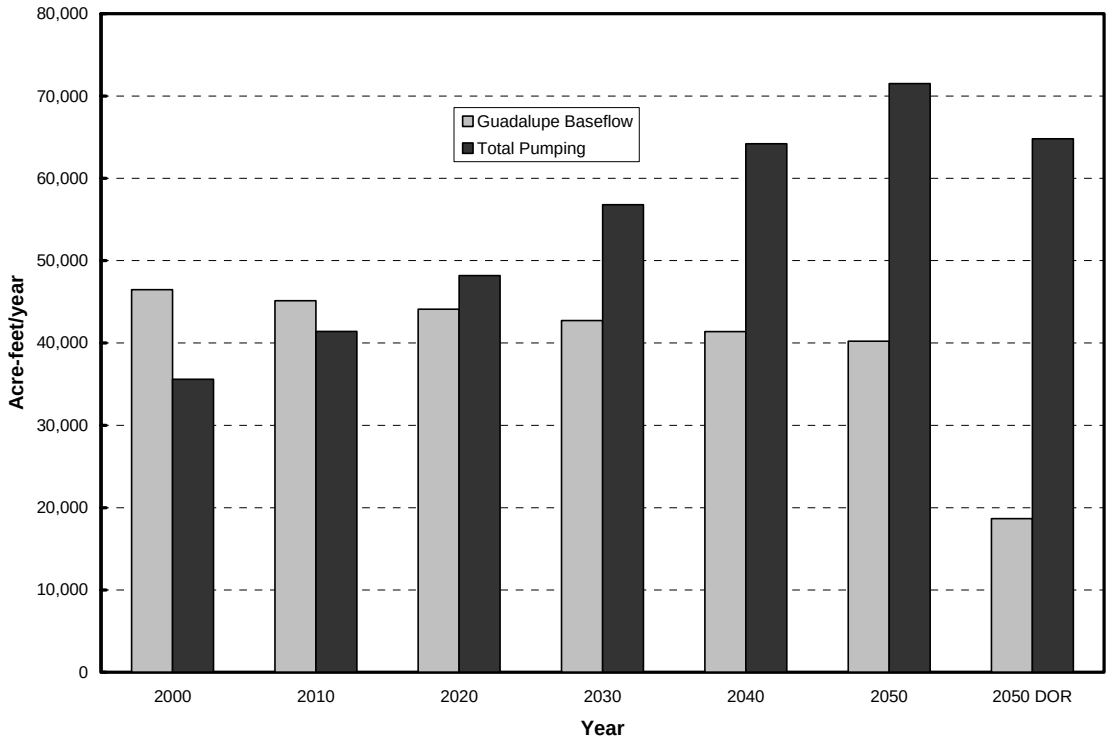

Figure 1. Simulated baseflow to the Guadalupe River and projected total pumping from the Trinity (Hill Country) aquifer for the years 2000, 2010, 2020, 2030, 2040, and 2050 for simulations with and without a drought-of-record. DOR indicates a simulation including a 2044 through 2050 drought-of-record.

Model results indicate a decline in baseflow to the Guadalupe River from the Trinity (Hill Country) aquifer from about 46,000 acre-feet per year to 40,200 acre-feet per year, in response to rising pumping. Adding a drought-of-record at the end of the model run reduces baseflow in 2050 to about 18,700 acre-feet per year. These model results indicate that based on current pumping projections through 2050, the Guadalupe River will continue to receive baseflow from the Trinity (Hill Country) aquifer, even during 1950s drought-of-record conditions.

REFERENCES:

Mace, R. E., Chowdhury, A. H., Anaya, R., and Way, S.-C., 2000, Groundwater availability of the Trinity aquifer, Hill Country area, Texas: Numerical simulations through 2050: Texas Water Development Board Report 353, 117 p.

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