GAM run 04-22

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Groundwater Availability Modeling Section
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REQUESTOR:

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DESCRIPTION OF REQUEST:

Determine the groundwater volume in storage for the Blaine aquifer in Childress, Collingsworth, Hall, and Wheeler counties and for the Seymour aquifer in Childress, Collingsworth, and Hall counties for the years 2000 to 2060 on a decadal basis using the Groundwater Availability Model (GAM) for the Seymour aquifer (Ewing, and others, 2004).

METHODS:

To address the request, we ran the GAM for the Seymour aquifer using average annual recharge for the period through 2060 and predictive pumpage based on new demands that the Panhandle Regional Water Planning Group plans to include in their 2006 regional water plan. We saved water-level values for the Blaine and the Seymour aquifers for the end of each decade and imported them into ArcView. Some water levels (less than 10 percent of the active cells) exceeded the land surface. We adjusted these water levels to land surface and calculated the saturated thicknesses of the aquifers. We then multiplied the saturated thickness by the appropriate area and specific yield to calculate groundwater volumes.

PARAMETERS AND ASSUMPTIONS:

- See Ewing and others (2004) for assumptions and limitations of the GAM. Root mean squared error for this model ranges from 9.7 feet to 27.5 feet for the Seymour aquifer and is 26.4 feet for the Blaine aquifer (Ewing and others, 2004). This error will have more of an effect on model results where the aquifer is thin.
- We used a specific yield of 0.05 for the Blaine aquifer and 0.15 for the Seymour aquifer.
- Recharge represents average conditions for the predictive period.

RESULTS:

The volume of groundwater from the Seymour and Blaine aquifers in the counties are listed in Table 1. Note that the GAM run may include less pumpage than initially assigned because, according to the GAM, the Seymour aquifer cannot support the pumpage and begins to go dry. In the GAM, once a part of the model goes dry, it stays dry, and the pumping is "shut off." This can result in water levels rising in nearby areas once the pumping in the area is stopped (Table 1). This also results in less pumping in the model because the pumping has been stopped in these areas. In reality, the aquifer will probably not go dry because pumping will become uneconomical before the aquifer goes dry in any particular area. However, the GAM is suggesting that these areas may experience water supply problems sometime in the next 50 years.

REFERENCES:

Ewing, J. E., Jones, T. L., Pickens, J. F., Chastain-Howley, A., Dean, K. E., Spear, and A. A., 2004, Groundwater availability model for the Seymour aquifer: final report prepared for the Texas Water Development Board by INTERA Inc., 432 p.

Table 1. Volume of groundwater in the Blaine and Seymour aquifers for counties in the Panhandle Regional Water Planning Area based on the GAM for the Seymour aquifer.

Blaine aquifer **Groundwater volumes in acre-feet**

County	2000	2010	2020	2030	2040	2050	2060
Childress	4,900,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000
Collingsworth	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
Hall	800,000	800,000	800,000	800,000	800,000	800,000	800,000
Wheeler	2,600,000	2,600,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000

Seymour aquifer **Groundwater volumes in acre-feet**

County	2000	2010	2020	2030	2040	2050	2060
Childress	130,000	130,000	130,000	140,000	140,000	140,000	140,000
Collingsworth	520,000	480,000	460,000	450,000	450,000	460,000	470,000
Hall	210,000	200,000	180,000	180,000	180,000	190,000	190,000

- values are rounded to two significant figures