GAM run 03-25

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Groundwater Availability Modeling Section
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REQUESTOR:

Mr. David Jeffery, Bandera County River Authority and Groundwater Conservation District

DESCRIPTION OF REQUEST:

Mr. Jeffery requested the following information from the Hill Country Trinity aquifer Groundwater Availability Model (GAM) for the Bandera County River Authority and Groundwater Conservation District (GCD):

- Recharge,
- Leakage, and
- Total storage.

METHODS:

To address the request, we:

- Queried the steady-state (1975) model for the Hill Country Trinity (Mace and others, 2001) for the water budget for each aquifer layer in Bandera County. Budget includes recharge and leakage.
- Estimated storage by calculating layer thickness for each model cell (layer top elevation minus bottom elevation), multiplying by cell area (1 mi^2) and specific yield, and summing all of the model cells within Bandera County.

PARAMETERS AND ASSUMPTIONS:

None: Data request.

RESULTS:

Recharge and Water budget

Table 1 shows the water budget in Bandera County for the Hill Country Trinity GAM. Recharge and leakage values from the model are marked in bold text in the table. Downward leakage from overlying aquifers is found in the “upper Z flow in” column.

For example, leakage from the Edwards Plateau into the upper Trinity is 500 acre-feet per year in the steady-state model.

Aquifer Storage

The total volume of storage in Bandera County for each layer in the Hill County Trinity aquifer model is shown in Table 2.

REFERENCES:

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

Table 1. Bandera County flow budget for the Hill Country Trinity aquifer model in acre-feet per year.

Aquifer	Storage	X-flow in	X-flow out	upper		lower		Wells	Recharge	Lakes	GHB	Rivers	Total		% diff
				Z flow in	Z flow out	Z flow in	Z flow out						In	Out	
Edwards plateau	200	2,500	-100	0	0	0	-500	-100	**12,200**	0	0	-14,200	15,000	-15,000	-0.02
upper Trinity	400	5,200	-13,200	**500**	0	0	-15,200	-100	**37,800**	-700	-400	-14,200	43,800	-43,800	0.01
middle Trinity	-200	10,300	-12,300	**15,200**	0	0	0	-400	**5,100**	0	-700	-17,000	30,600	-30,700	0.08
All	200	18,000	-25,600	**15,700**	0	0	-15,700	-700	**55,200**	-700	-1,100	-45,400	89,400	-89,500	0.03

Notes:

1. **Rivers** includes rivers, streams, and springs.
2. **GHB** refers to flow out of the Hill Country area to the south and east.
3. **X-flow in** refers to lateral flow into the county.
4. **X-flow out** refers to lateral flow out of the county.
5. **upper - Z-flow in** refers to flow into the layer from the layer above.
6. **upper - Z-flow out** refers to flow out of the layer into the layer above.
7. **lower - Z-flow in** refers to flow into the layer from the layer below.
8. **lower - Z-flow out** refers to flow out of the layer into the layer below.
9. **Wells** is for 1975 pumping.
10. A negative sign refers to flow out of the layer in the county.
11. A positive sign refers to flow into the layer in the county.
12. Values are rounded to the nearest 100 acre-ft.

Table 2. Total aquifer storage based on Hill Country Trinity GAM

Layer	Aquifer Storage acre-feet
Edwards plateau aquifer	125,000
upper Trinity aquifer	59,000
middle Trinity aquifer	148,000
Total	332,000

Total storage rounded to the nearest 1,000 acre-ft