Blanco River streamflow losses to the Trinity and Edwards aquifers in the reach from the City of Blanco to San Marcos, Texas

Raymond Slade, Jr.
Certified Professional Hydrologist

During the past about 100 years, the U.S Geological Survey has been conducting streamflow gain/loss studies in Texas. These studies document the streamflow gains and losses between streambeds and underlying aquifers. Seven such studies have been conducted for the Blanco River in the reach from 10 miles upstream from Wimberley to near San Marcos, Texas (table 1 below).

Data in the table are presented as follows:

Column no.	Data or information therein	Column no.	Data or information therein
4th	The reach identification	8th	Number of streamflow measurements on Blanco River
5th	Date of study	9th	Name of aquifer under stream reach
6th	Streambed reach length (mi.)	10th	Total loss (-) or gain (+) in flow from Blanco River to aquifer

Data documenting the streamflow gain or loss for many subreaches also exist for each of the seven reach studies. The number of subreaches for each study is equal to the data vaue in column 8 minus 1. For example, for the first study listed below, the flow gain or loss is documented for 5 subreaches within the reach. The flow gain or loss values for each subreach are presented in table 4 of the report listed at the bottom of this page.

For 5 of the 7 studies, the data below reveal the reaches to be loosing flow. The losses range from 2.65 ft^3/s (1.7 million gallons per day) to 13.9 ft^3/s (9.0 million gallons per day). The other 2 studies reveal gaining-flow reaches. However, for these 2 studies, records reveal they were conducted shortly after runoff producing storms. It is likely that increased groundwater levels during these two periods caused the streamflow gains. Additionally, for the 1963 study, 6 of the 19 subreaches had flow losses--these subreach lengths range from 0.1 to 5.3 miles in length. Finally, for the June 12, 1924 study, one of the 2 subreaches had flow losses--this subreach lost 15 cubic feet per second to the underlying aquifer within the 8-mile length of the subreach.

In conclusion, groundwater levels in the area have been substantially reduced since the last flow study in 1963. Therefore, it is likely that more subreaches are loosing flow to the aquifer and the current flow losses are great than documented in these studies.

Table 1. Characteristics of flow gain-loss studies in Texas—Continued

Stream-flow study no.	Major river basin	Stream name	Reach identification	Date of study	Reach length (river mi)	Total no. of measure-ment sites	No. of measure-ment sites on main channel	Major aquifer outcrop(s) intersected by reach	Total gain or loss (-) in reach (ft^3/s)	Gain or loss per mile of reach (ft^3/s-mi)	Reference for data
97	Guadalupe	Blanco R	10 mi upstream of Wimberley to northeast of San Marcos	3/15–16/1955	33.3	7	6	Edwards, Trinity	–10.3	–.309	TBWE (1960)
98	Guadalupe	Blanco R	9 mi below Blanco to Wimberley (08171000)	2/25–3/4/1963	27.1	28	20	Trinity	25.9	.956	USGS (1964)
99	Guadalupe	Blanco R	above Halifax Cr to near Kyle	7/22/1924	4.2	3	3	Edwards	–13.1	–3.119	TBWE (1960)
100	Guadalupe	Blanco R	upstream from Little Blanco R to northeast of San Marcos	1/24–28/1955	49.6	33	30	Edwards, Trinity	–2.65	–.053	TBWE (1960)
101	Guadalupe	Blanco R	Wimberley (08171000) to Kyle (08171300)	7/10–14/1957	16.2	8	7	Edwards, Trinity	–13.9	–.858	TBWE (1960)
102	Guadalupe	Blanco R	Wimberley to near Kyle	6/12/1924	19.4	3	3	Edwards, Trinity	14.0	.722	TBWE (1960)
103	Guadalupe	Blanco R	Wimberley to near Kyle	7/15–16/1924	19.4	4	4	Edwards, Trinity	–12.8	–.66	TBWE (1960)

Table from Slade, R.M., Jr., Bentley, T., and Michaud, D., 2002, Results of streamflow gain-loss studies in Texas, with emphasis on gains from and losses to major and minor aquifers: U.S. Geological Survey Open-File Report 02-068, DC-ROM.
http://pubs.usgs.gov/of/2002/ofr02-068/