Comments to: Hydrogeology of Val Verde County with emphasis on the Devils River Watershed and San Felipe Springs

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1) The cretaceous-age carbonate Edwards-Trinity Aquifer is dominated by karstic preferential flow paths (i.e., conduits) aligned with major and minor tributaries. These preferential flow features appear to be restricted to within 120-150 ft of ground surface.

2) The upper reaches of the major watersheds in Val Verde County (i.e., lower Pecos River, Devils River, Sycamore Creek) are hydraulically separate. The lowest reaches of these watersheds, where the aquifers are confined or semi-confined, may be in hydraulic communication. The result is that most of these watersheds act separately hydraulically. For example, pumping in the upper reach of one watershed will not draw water from adjoining watersheds.

3) Each of the three watersheds should be assigned a separate drought trigger. Again, this is because pumping from the upper reach of one watershed will not draw water from adjoining watersheds. Triggers could be in terms of river flow or groundwater elevation, which are correlated. Complications are encountered when pumping from the lower reach of any of the watersheds. This is because: (1) Pumping from near Amistad Reservoir will extract surface water from the Reservoir and limit the amount of groundwater pulled from the watershed. (2) Pumping from regions where the aquifers are confined or semi-confined can result in extraction from adjoining watersheds.

4) The extents and boundaries of the springshed for San Felipe Springs and the watershed for Sycamore Creek are not fully defined. Additional work is needed to define these watersheds and to better define the hydraulic relationship among the lower Devils River, San Felipe Springs capture area, Sycamore Creek watershed, Amistad Reservoir, and Rio Grande. These

hydraulic relationships are complicated by the facts that the lower reaches of the aquifers may be confined or semi-confined and the close proximity of a surface-water boundary condition in Amistad Reservoir and the Rio Grande. One important limiting factor is that the discharge from either San Felipe Springs and in Sycamore Creek is limited due to the relatively modest sizes of their respective capture areas.

5) The upper reaches of all watershed aquifers, particularly the Devils River watershed, are relatively thin and unconfined. [Note the Edwards portion of the Edwards-Trinity Aquifer is treated hydraulically separately.] Detailed coupled surface-water/groundwater modeling has shown that relatively modest pumping in the upper reach of the Devils Rivers (i.e., 4,000-6,000 acre-ft/yr) has resulted in the cessation of live water between Pecan Springs and Beaver Lake, a distance of about 10 miles. It should be noted that the time during which this live water was lost (i.e., post 1960) corresponds with a period of increased spring and stream flow in the Edwards Plateau due to improved land management practices. The acute sensitivity of live flow to pumping is due to the fact that the permeable portion of the aquifer is relatively thin and that surface-water flow in the river and groundwater flow in the conduits are intricately linked with topography.

Woody plant encroachment paradox: Rivers rebound as degraded grasslands convert to woodlands

Wilcox, B. P., and Y. Huang (2010), Woody plant encroachment paradox: Rivers rebound as degraded grasslands convert to woodlands, Geophys. Res. Lett., 37, L07402.

Abstract

The related phenomena of degradation and woody plant encroachment have transformed huge tracts of rangelands. Woody encroachment is assumed to reduce groundwater recharge and streamflow. We analyzed the long-term (85 years) trends of four major river basins in the Edwards Plateau region of Texas. This region, in which springs are abundant because of the karst geology, has undergone degradation and woody encroachment. We found that, contrary to widespread perceptions, streamflows have not

been declining. The contribution of baseflow has doubled—even though woody cover has expanded and rainfall amounts have remained constant. We attribute this increase in springflow to a landscape recovery that has taken place concurrently with woody expansion—a recovery brought about by lower grazing pressure. Our results indicate that for drylands where the geology supports springs, it is degradation and not woody encroachment that leads to regional-scale declines in groundwater recharge and streamflows.

References:

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