Drought Trigger Methodology for a Karst Aquifer System: Barton Springs Segment of the Edwards Aquifer, Central Texas

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The Barton Springs segment of the Edwards Aquifer is a vital resource for water supply, endangered species habitat, and recreation. Previous studies have shown that with unmanaged pumping, current pumping rates and a recurrence of drought-of-record conditions could cause flow from Barton Springs to cease for brief periods, and up to 20% of the water-supply wells could go dry. A drought trigger methodology (DTM) was devised to improve declarations of drought and to implement mandated conservation measures by ground-water users. These conservation measures are the primary means of protecting water levels and spring flow.

Three criteria were established as the basis for developing a DTM: 1) that a drought stage declaration be triggered in sufficient time to achieve benefits of conservation measures; 2) that it will be representative of aquifer-wide conditions; and 3) that it be simple to implement. Principal components of the hydrologic cycle (recharge, storage, and discharge) were evaluated along with historical data such as rainfall, stream flow, water levels, and spring flow.

The DTM that was developed uses flow from Barton Springs and water levels in the Lovelady monitor well to determine drought status of the aquifer. Water levels in the well are indicative of the amount of water in storage. The muted response to major recharge events suggests that the well is not well connected to the conduit system. Flow from Barton Springs responds quickly to minor and major recharge events. By using both the Lovelady well and flow from Barton Springs to signal a drought, it is likely that a serious drought can be recognized early enough that conservation measures can be implemented and continue long enough to minimize the impact of low water levels in wells on water supplies and to maintain adequate flow at Barton Springs that will be protective of the endangered species at the springs.