Oil & Gas Water Use in Texas: Update to the 2011 Mining Water Use Report

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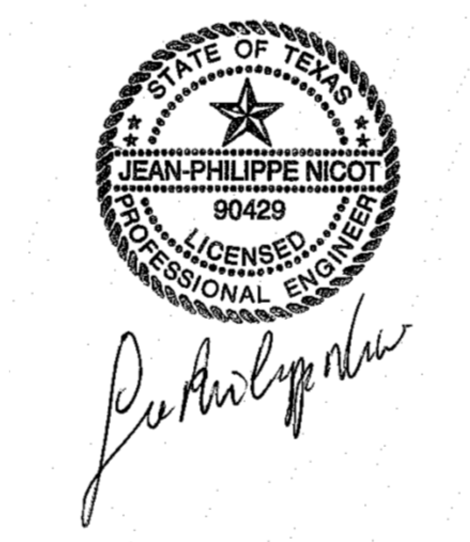

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Executive Summary

In Spring 2012, we undertook an update of the hydraulic fracturing sections of the TWDB-sponsored report titled “Current and Projected Water Use in the Texas Mining and Oil and Gas Industry” that we published in June 2011 (Nicot et al., 2011). The 2011 report provided estimated county-level water use in the oil and gas industry in 2008 and projections to 2060. This 2012 update was prompted by two main events: (1) a major shift of the oil and gas industry from gas to oil production, displacing production centers across the state and impacting county-level amounts; (2) rapid development of technological advances, resulting in more common reuse and in the ability to use more brackish water. The timely update was enabled by a faster than anticipated development, translating into abundant statistical data sets from which to derive projections, and by an increased willingness of the industry to participate in providing detailed information about water use in its operations. This document follows the same methodology as the 2011 report but differs from it in two ways. Our current update clearly distinguishes between water use and water consumption. The 2011 report does not include reuse from neighboring hydraulic fracturing jobs, recycling from other industry operations or other treatment plants, and use of brackish water. Our update also presents three scenarios: high, low, and most likely water use and consumption with a focus on water consumption. This update has been reviewed by the TWDB and should supersede oil and gas industry projections from the 2011 report.

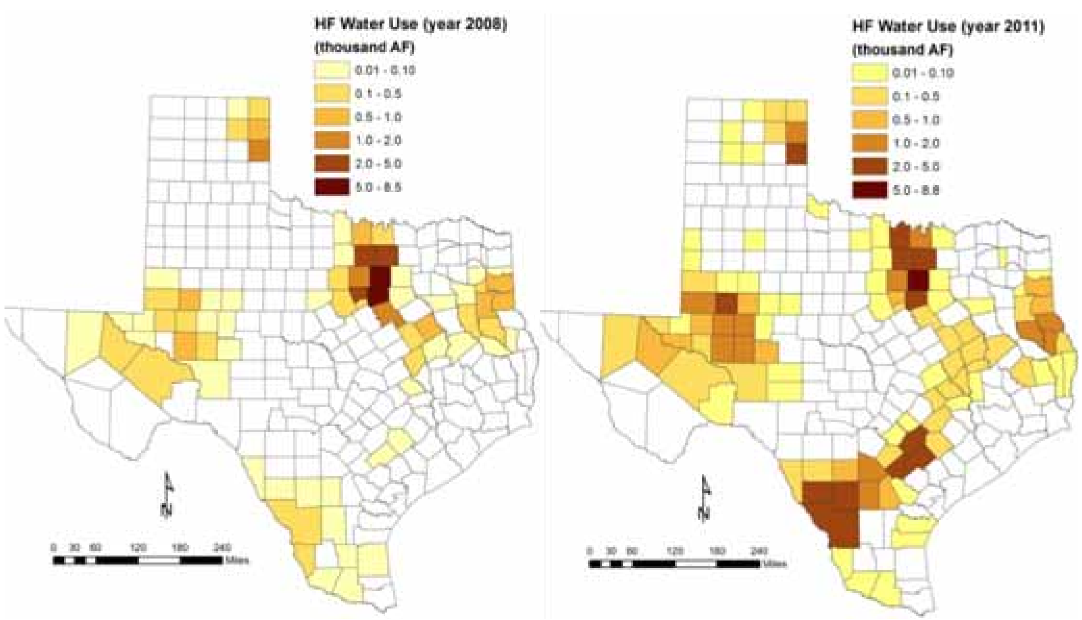

Figure ES1. Spatial distribution of hydraulic fracturing water use in 2008 (~36,000 AF) and 2011 (~81,500 AF).

Overall we find that, if the total water use for hydraulic fracturing has increased from 36,000 AF in 2008 to ~81,500 AF in 2011 (Figure ES1), the amount of recycling/reuse and the use of brackish water have also increased (~17,000 AF in 2011, or 21%). Hydraulic fracturing has expanded to the southern and western, drier parts of the state and, by necessity, the industry has had to adapt to those new conditions. Collected information tends to suggest that the industry has been decreasing its fresh-water consumption despite the increase in water use. Total water use information is relatively easy to access (through the private database vendor IHS), but true consumption is harder to gauge.

The updated hydraulic fracturing projections at the state level do not show a major departure from and are essentially consistent with the previous report but have a more subdued peak and a longer tail (Figure ES2). This is due to the increased likelihood that the industry has hydraulically fractured more formations that can be placed into the tight oil and gas category. The annual peak water use previously estimated at 145,000 AF in the early 2020's is now thought to be a broad peak plateauing at ~125,000 AF/yr during the 2020's. However, fresh water consumption is estimated to stay at the general level of ~70,000 AF/yr and to decrease in future decades. Adding other oil and gas industry water uses, such as waterflooding and drilling, brings projected maximum water use up to ~180,000 AF/yr during the 2020-2030 decade with a much lower consumption which brings the total mining water use to a maximum of ~340,000 AF/yr around the year 2030. These values remain small compared to the state water use (Figure ES3). In 2010, hydraulic fracturing water use represented about 0.5% of the water use in the state. However, the hydraulic fracturing water use is unevenly distributed across the state and may represent locally a higher fraction of the total water use.

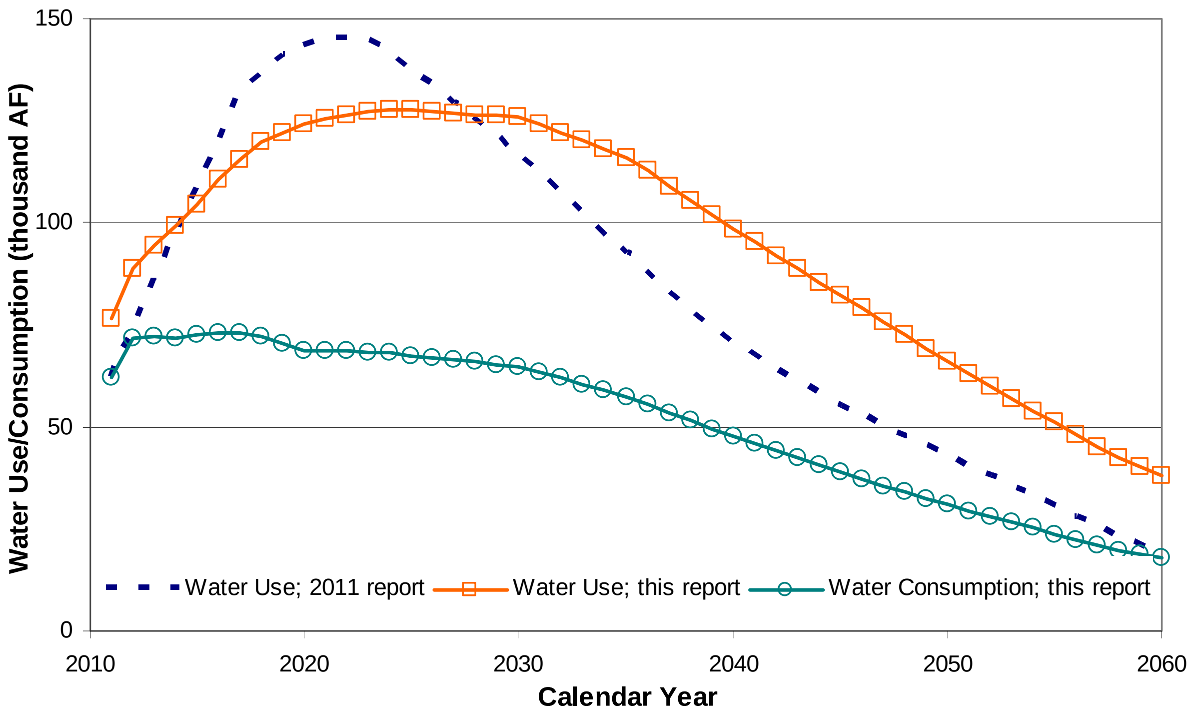

Figure ES2. State-level projections to 2060 of hydraulic fracturing water use and fresh-water consumption and comparison to earlier water projections.

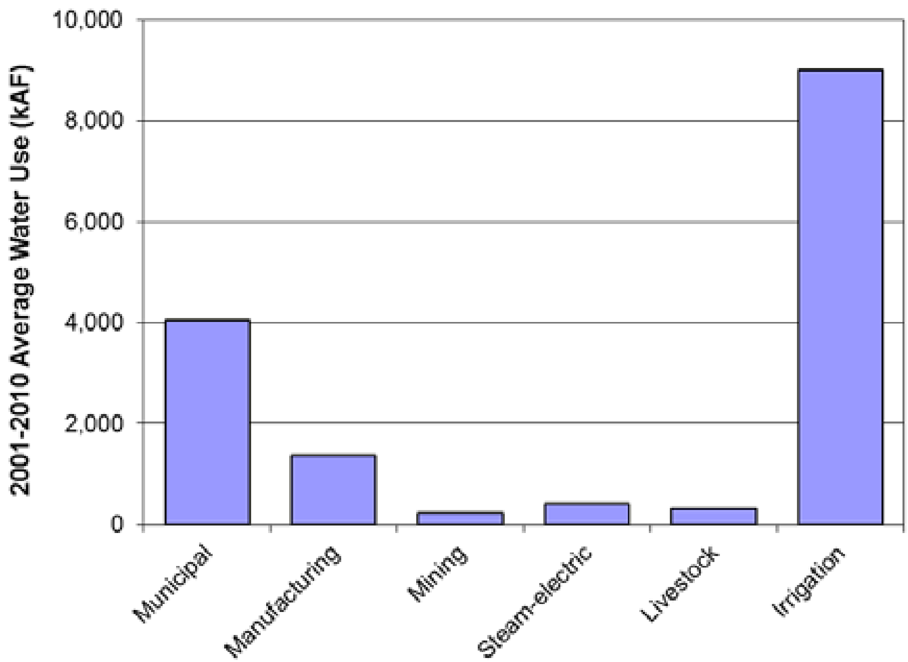

Figure ES3. Average state level water use (all categories) in 2001-2010.