

Category: Water Quality

Indicator: Groundwater Quality: Trends in Water Quality Parameters

Methodology

Trend in Water Quality Parameters is an indicator of change in water quality of Texas aquifers over time. It is measured by analyzing annual average groundwater conditions in Texas' nine major aquifers at the county level. We analyzed three parameters for this indicator, nitrate, total dissolved solids and chloride, for the period from 1988 until present. This period was selected for analysis because water quality measurement was standardized by Texas Water Development Board (TWDB) in 1988, so data collected since this period will be more consistent and should help to reduce bias introduced by different sampling methods.

The TWDB groundwater database was the primary source of water quality data used in this study. Water quality information was gathered from more than 10,000 wells consisting of over 25,000 individual measurements from the nine major aquifers in Texas (Table 1).

Table 1. Number of wells and samples used in analysis of Trends in Water Quality Parameters.

Major Aquifer	Chloride		Nitrate		TDS	
	# Wells Sampled	# Samples	# Wells Sampled	# Samples	# Wells Sampled	# Samples
Carrizo-Wilcox	1216	2500	1196	2453	1199	2451
Edwards (BFZ)	667	3758	635	2193	628	3464
Edwards-Trinity Plateau	1075	1838	1079	1825	1054	1804
Gulf Coast	1909	4309	1742	3543	1763	3583
Hueco-Mesilla Bolson	310	1726	305	1683	309	1722
Ogallala	2910	7037	2909	7030	2742	6390
Pecos Valley	240	462	238	454	238	457
Seymour	219	370	217	366	219	369
Trinity	1596	2715	1496	2529	1521	2548
Total	10142	24715	9817	22076	9673	22788

We calculated county-level annual averages of all available measurements of the three water quality parameters from each aquifer in the county. We then analyzed these averages for any trend using a Mann-Kendall univariate trend test. This test is a non-parametric test that determines whether a time series of data exhibits an increasing or decreasing trend and reports a level of significance. We considered the test significant with a p-value of less than 0.05. We used the Mann-Kendal results to determine if each county has an increasing, decreasing, or no trend in the annual averages for nitrate, TDS and chloride.

Maps at the well, county and aquifer level are included in the map viewer. The county-level map shows the results of the trend analysis, displaying each county as increasing, decreasing, or no trend. The aquifer level maps shows the percent of counties with increasing trends (i.e.,

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Methodology

worsening water quality) for each parameter. The well map shows which wells were used in this analysis.

Data Sources

Texas Water Development Board. Groundwater Database. Accessed March 25, 2014.
<http://www.twdb.texas.gov/groundwater/data/gwdb rpt.asp>