

# Wilson Lake Water Quality Data 2001-2011



## Wilson Lake:

- Located at RM 130 of Saline River, 20 miles East of Russell KS
- Watershed = 1,917 sq miles (1,226,880 Acres)
- Capacity:
  - Flood Control: 530,204 Acre Feet (AF) / 20,027 surface acres (SA)
  - Multipurpose: 242,528 AF / 9,045 SA/ 100 miles of shoreline
  - Avg. annual inflow (1980-2011)=105-100 AF; 2011 inflow=50,300 AF
- Operating project purposes: flood control, water quality, recreation, fish and wildlife

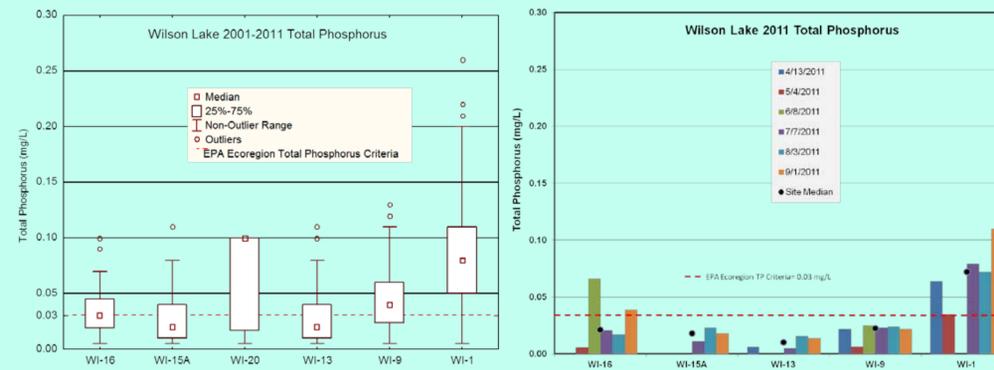
The **US Army Corps of Engineers** (COE) Water Quality Program collects monthly water samples (April –September) at Wilson Lake. These figures present data collected between 2001-2011 from up to 6 sites. The sites include inflow (#1), four lake sites (#15a, 9, 13, 20), and the outflow (#16). Thirty-four chemical, physical and biological parameters are measured to evaluate water quality. COE use this data to describe conditions and changes from the inflows through the lake and outflow focusing on eutrophication, nutrients, sediment, herbicides, metals, and contaminants.

## Nutrient Enrichment

Nutrients (i.e. phosphorus and nitrogen) are essential for aquatic life and are the primary factor driving fish and aquatic plant growth rates and biological productivity. Excess nutrients from urban, agricultural or natural sources increases the natural aging or eutrophication process in lakes. Wilson Lake ranks low in among District Lakes for nutrient concentrations measured at the dam. Standard error bars in the graphs below illustrate the variation in sample results from each site in 2011.

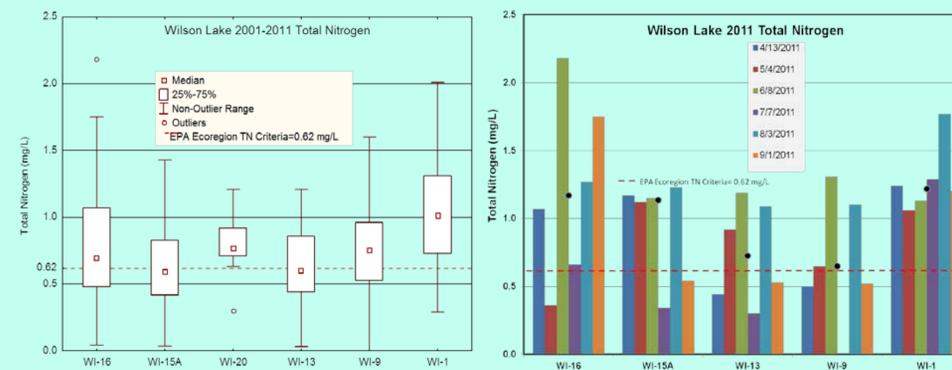
## Total Phosphorus

Median total phosphorus (TP) concentrations from 2011 Wilson Lake samples were less than EPA Ecoregion Criteria (0.032 mg/L) except at the inflow site on the Saline River (WI1). Median TP at lake sites are in the range of moderate biological productivity as indicated by mesotrophic class designation. Like most impoundments, Wilson Lake had higher TP concentrations and a wider range of data in the upper lake sites and inflows due to mobilized nutrients bound to silt particles in moving water associated with inflows and biological uptake or decline of TP as the water moves through the lake as illustrated by the decline in TP from WI-1 to WI-15a. Site WI-20 is located in the marina cove and was only sampled in 2008 and 2009. A few high TP concentrations and small sample size led to skewed data represented in the 2001-2011 figure below for WI-20.



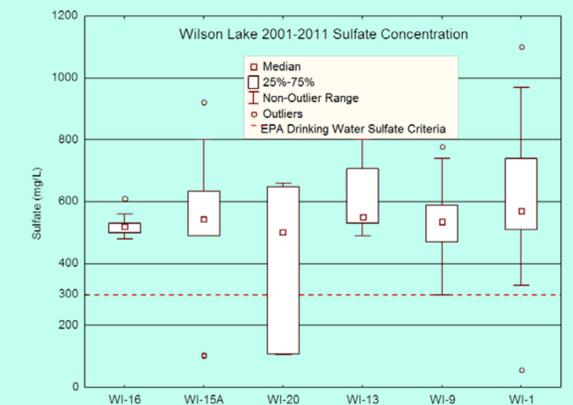
## Total Nitrogen

Nitrogen is an essential nutrient to aquatic life. However, excessive concentrations result in algal blooms, low DO levels, taste and odor issues in drinking water, and even fish kills. Wilson Lake has some of the lowest surface TN concentrations of the KC District Lakes. Total nitrogen concentrations at all sites routinely exceed proposed EPA nutrient criteria (0.62 mg/L). The highest concentrations are typically measured from upper lake at the inflow site. Annual variability within sites is very common and dependent upon rainfall with more inflow resulting in increased sediment runoff and TN.



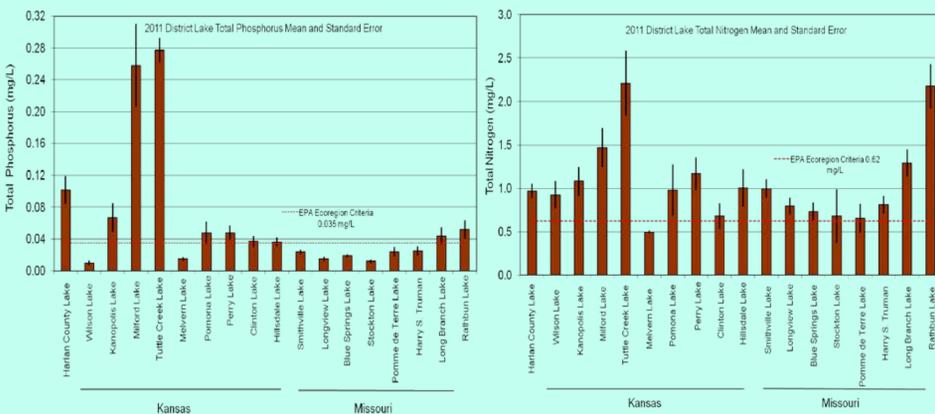
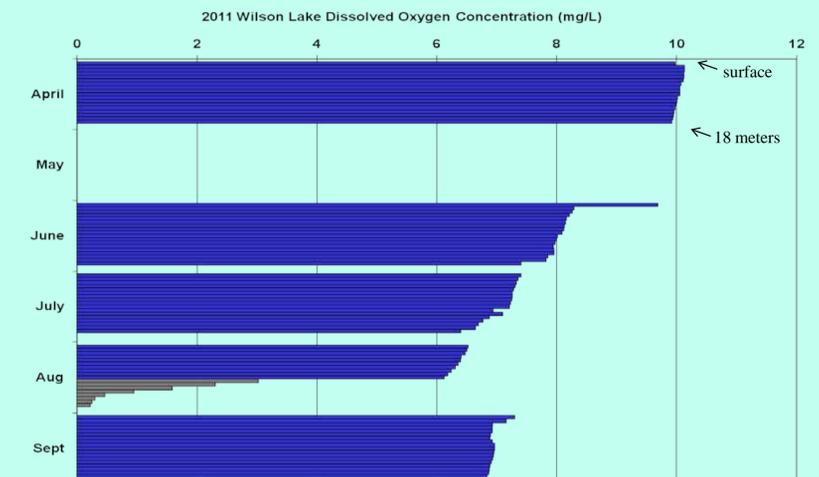
## Chlorides and Sulfates

Chloride and sulfate ions are naturally occurring additions to Wilson Lake. Ions dissolve in groundwater and inflow streams from bedrock and soils. Both compounds follow the same general trend in Wilson Lake. Periods of high flow and high water decrease measured concentrations due to dilution. During drought, the compounds are more concentrated in a smaller volume of water. Both ions typically exceed the Kansas Department of Health and Environment established TMDL targets and EPA drinking water standards. Salinity increases from these ions can negatively impact freshwater fish and invertebrates, but this occurs at concentrations ten times higher than measured values from Wilson Lake.



## Dissolved Oxygen

Dissolved oxygen (DO) is an important factor in aquatic species location, growth, and ultimately survival in lakes. The figure below shows dissolved oxygen measured in the water column at one-meter intervals (e.g. each row in each month represents one meter of depth) from April-September at the dam (WI-15A). Wilson Lake undergoes weak stratification during summer months. Low dissolved oxygen (i.e. less than 5 mg/L) is not a concern due to the large volume of oxygenated water. The west to east orientation of Wilson Lake in relation to strong prevailing winds and good water quality keep oxygen levels high and provide optimum conditions for aquatic life including cool water fisheries.



## Water Quality Concerns:

- Nutrients
- Sulfate



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