

Wilson Lake Water Quality Summary

2005-2014



Wilson Lake:

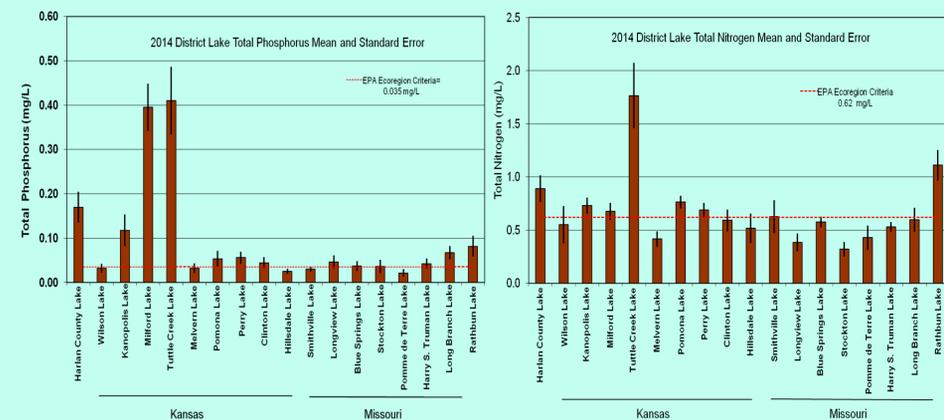
- Located at RM 130 of Saline River, 20 miles East of Russell KS
- **Watershed** = 1,917 sq miles (1,226,880 Acres)
- **Capacity:**
 - Flood Control: 530,204 Acre Feet (AF) / 20,027 surface acres (SA)
 - Multipurpose: 242,528 AF / 9,045 SA / 100 miles of shoreline
 - Avg. annual inflow (2005-2014)=56,312 AF; 2014 inflow=20,945 AF
- **Operating project purposes:** flood control, water quality, recreation, fish and wildlife
- **Water Quality** at Wilson Lake in 2014 was beneficial to operating purposes and measured parameters did not exceed KS State WQ Standards for designated uses. Seasonally adjusted TMDL limits for sulfate and chloride ions are in effect to reduce inputs into receiving waters with elevated background concentrations.

The **US Army Corps of Engineers** (USACE) Water Quality Program collects monthly water samples at Wilson Lake* from April through September. These figures present data collected between 2005-2014 from 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. USACE 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.

*Note: The term "lake" is substituted for technically correct "reservoir" throughout this document for consistency.

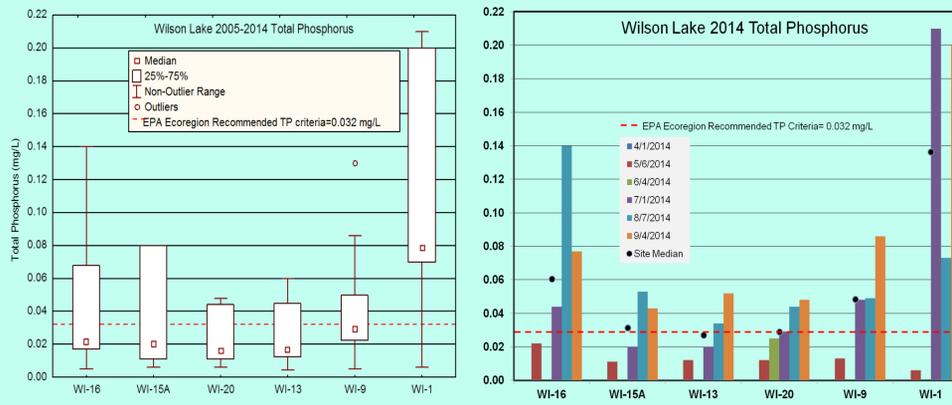
Nutrient Enrichment

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. External sources of high nutrients are minimal in the watershed. Consequently, nutrient levels are moderate and Wilson Lake ranks low among USACE Kansas City District Lakes.



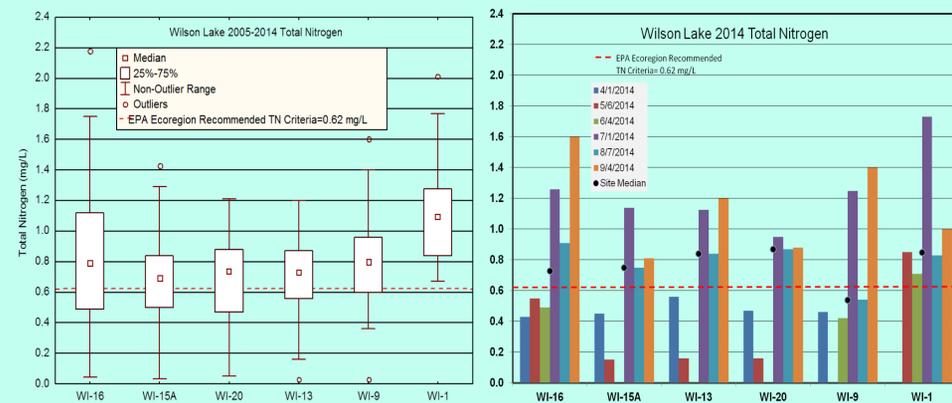
Total Phosphorus

Median total phosphorus (TP) concentrations from 2005-2014 were less than EPA Ecoregion criteria (0.032 mg/L). Drought conditions provided limited inflow and relatively low total phosphorus during spring runoff. Median TP at lake sites except WI-9 were in the range of mesotrophic class designation (TP= 0.012-0.024 mg/L) supporting moderate biological productivity including a diverse community of aquatic plants, invertebrates and fish. Like most impoundments, Wilson Lake has higher TP concentrations in the upper lake sites (WI-9) due to mobilized nutrients bound to silt particles in moving water associated with inflows. Biological uptake or conversion of nutrients and settling occurs as the water flows through the lake. This trend is evident in the decline in TP from WI-9 to WI-15a.



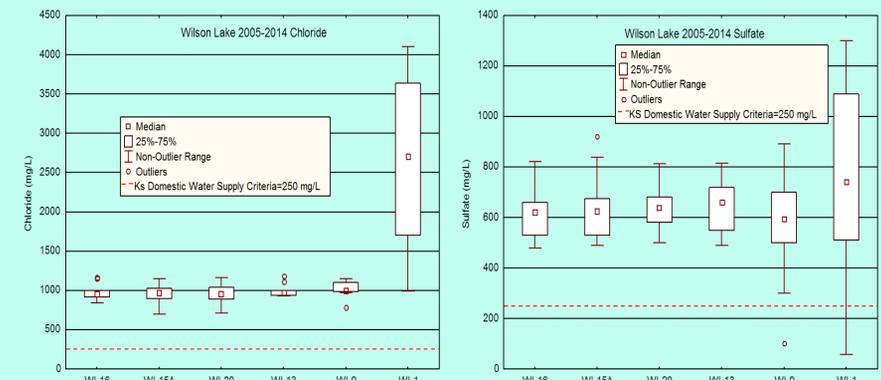
Total Nitrogen

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. Total nitrogen (TN) concentrations at all sites are near or slightly exceed proposed EPA Ecoregion recommended criteria (0.62 mg/L). Wilson Lake is ranked near the low end of District Lake TN average. Total nitrogen values were highly variable by month in 2014 due to biological uptake by phytoplankton, inflows, and other watershed influences. Median TN at all sites were similar to 10-year median values, except WI-9 was below the 25% quartile of data collected since 2005. This is likely due to high utilization/conversion of nitrite/nitrates by algae populations during the summer months.



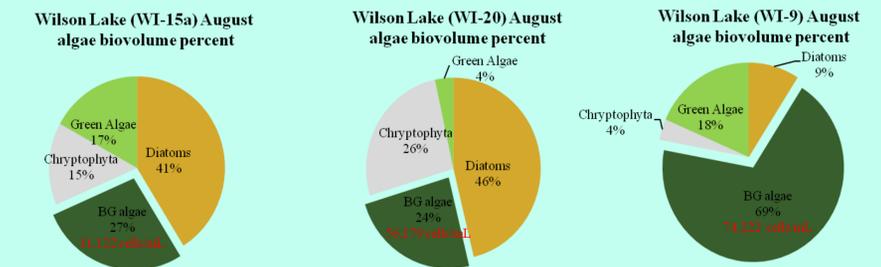
Chlorides and Sulfates

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 and the Saline River always has the highest ion concentrations. 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 Domestic Water Supply Criteria. Salinity from these ions can negatively impact freshwater fish and invertebrates, but this occurs at concentrations ten times higher than measured values from Wilson Lake.



Algae

Algae and green plants are the base of the food chain in a lake and function to convert nutrients and CO₂ via photosynthesis into biomass for all aquatic life. In Wilson Lake, the algae populations are thriving due to sunlight penetration and moderate nutrients levels. August and Sept. phytoplankton sampling indicated that late summer algae populations were dominated by diatoms near the dam and blue green algae in the upper lake. Algal cell counts were moderate with blue green cell counts ranging from 31,112 to 75,719 cells/mL at lakes sites in August and September. Blue green algae populations were dominated (93-100%) by non-toxin producing species. USACE toxin samples collected August and Sept did not detect algal toxins at a measureable (>0.15 ug/L) concentrations.



Dissolved Oxygen

Dissolved oxygen (D.O.) is an important factor in aquatic species location, growth, and ultimately survival in lakes. Wilson Lake undergoes weak stratification during summer months. Low dissolved oxygen (<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
- Chloride



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