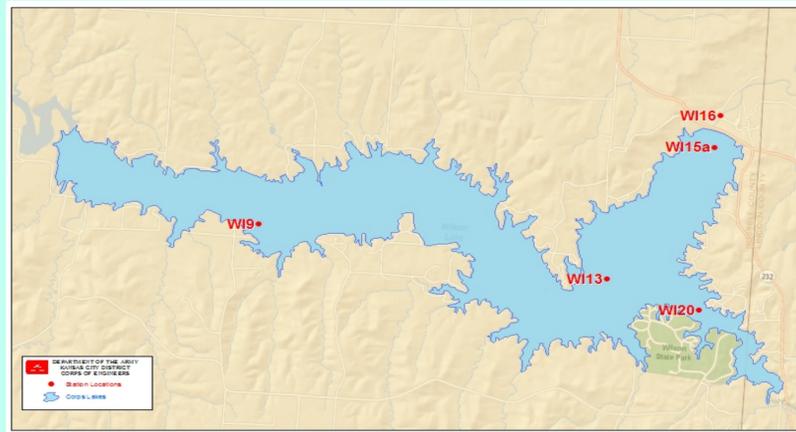


Wilson Lake Water Quality Summary

2010-2019

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 2010-2019 from four lake sites (WI-15a, WI-9, WI-13, WI-20) and the outflow (WI-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.

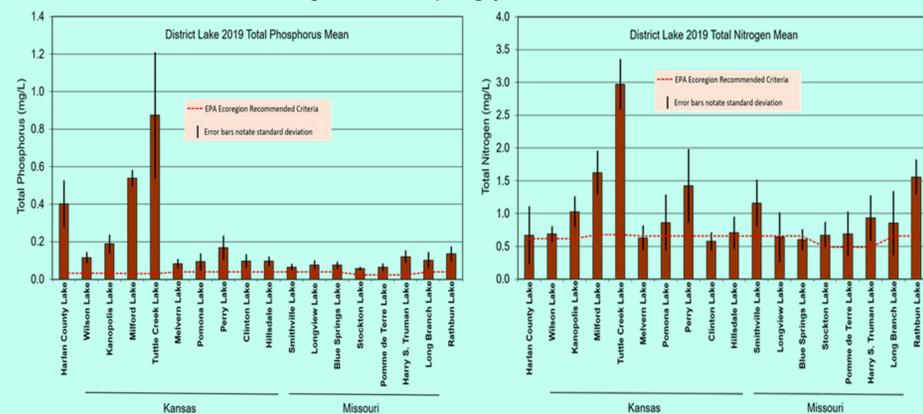


Wilson Lake:

- 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 (2010-2019)= 113,722 AF; 2019 inflow= 416,170 AF
- **Operating project purposes:** flood control, water quality, recreation, fish and wildlife
- **Water Quality (WQ)** at Wilson Lake in 2019 was beneficial to operating purposes and measured parameters did not exceed Kansas State WQ Standards for designated uses. Seasonally adjusted total maximum daily load (TMDL) limits for sulfate and chloride ions are in effect to reduce inputs into receiving waters with elevated background concentrations.

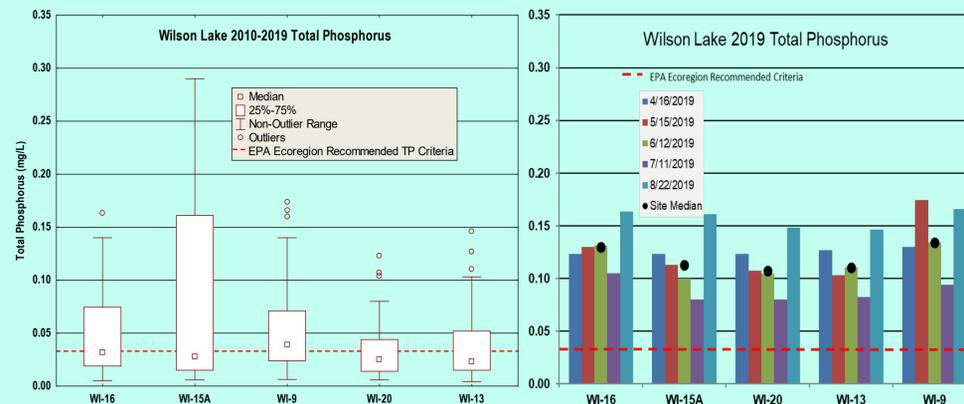
Nutrient Enrichment

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 and non-point source inputs are minimal in the watershed. Consequently, nutrient levels are moderate and Wilson Lake ranks low among USACE Kansas City District Lakes. Error bars in the graphs below illustrate the variation observed in monthly sample results from each site during 2019 sampling year.



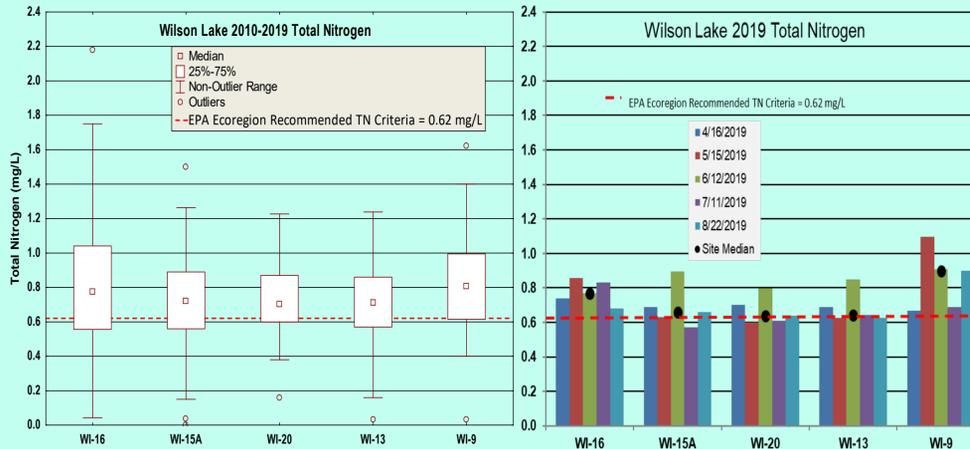
Total Phosphorus

Phosphorus is an important plant nutrient which tends to feed toxic cyanobacteria growth when in excess. Median total phosphorus (TP) concentrations in 2019 were up to four times the 10-year median data collected from 2010-2019. Inflows in 2019 were proportionally four times the 10-year average for respective sample sites. The large inflows and high water resulted in phosphorus concentrations that exceeded EPA Ecoregion Recommended Criteria (0.032 mg/L). Like most impoundments, Wilson Lake typically has higher TP concentrations in the upper lake sites due to mobilized nutrients bound to silt particles in moving water associated with inflows. This was not apparent in 2019 as high water and frequent floods maintained high TP concentrations at all lake sample sites.



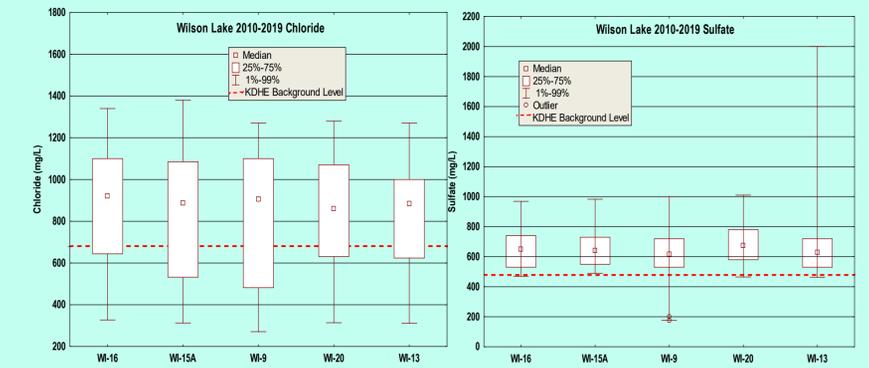
Total Nitrogen

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 EPA Ecoregion recommended criteria (0.62 mg/L). Wilson Lake is ranked near the low end of District Lake TN average. Wilson Lake 2019 median TN at all sites were similar (i.e. between 25% and 75% quartiles) to 10-year median values. Nutrient concentrations and ratios of nutrients in Wilson Lake are beneficial for primary production, which provides optimum growth for fish and invertebrates in the reservoir environment.



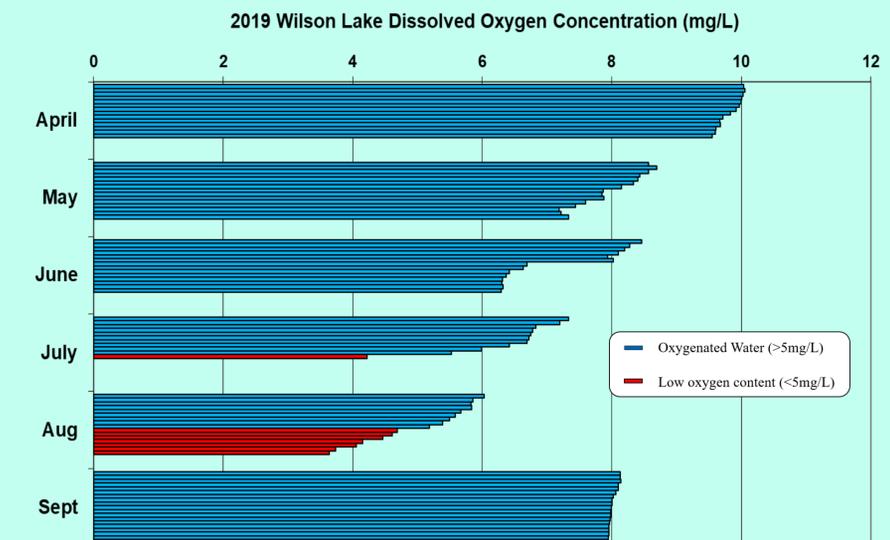
Chlorides and Sulfates

Chloride and sulfate ions are naturally occurring additions to Wilson Lake. Ions dissolve in groundwater and inflow streams from bedrock and soils. Concentrations of both compounds follow the same general trend in Wilson Lake. The Saline River always has the highest concentrations of these compounds which decrease in the lake. Periods of high flow and high water decrease measured concentrations due to dilution. During drought, both ions are more concentrated in a smaller volume of water. Both ions typically exceed the Kansas Department of Health and Environment established TMDL targets and were higher than background level 2010-2019 due to weather. Salinity is a combination of salts, including chloride, in water. Recreational users taste salinity in Wilson Lake, which ranges from 1.5 to 3.0 parts per thousand compared to sea water at 35 parts per thousand. 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.



Dissolved Oxygen

Dissolved oxygen (D.O.) is an important factor in aquatic species location, growth, and ultimately survival in lakes. The graph below shows dissolved oxygen measured in the water column in one-meter intervals (e.g. each row in each month represents one meter of depth) from April-September. Wilson Lake experiences weak stratification occasionally during summer months. Low dissolved oxygen (<5 mg/L) has not been a concern due to the large volume of oxygenated water in most years. Wind mixing and good water quality in 2019 provided ideal oxygen levels growing conditions in the top nine meters for aquatic life including cool water fisheries.



Water Quality Concerns:

- Nutrients
- Sulfate
- Chloride



US Army Corps of Engineers
Environmental Resources Section
Kansas City, MO