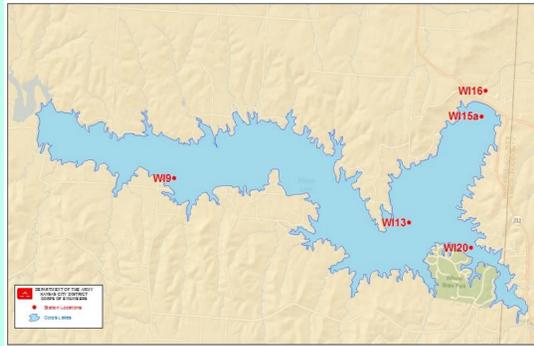


# Wilson Lake Water Quality Summary 2003-2012



## 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 (2003-2012)=59,112 AF; 2012 inflow=18,851 AF
- **Operating project purposes:** flood control, water quality, recreation, fish and wildlife
- **Water Quality** at Wilson Lake in 2012 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 2003-2012 from 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.

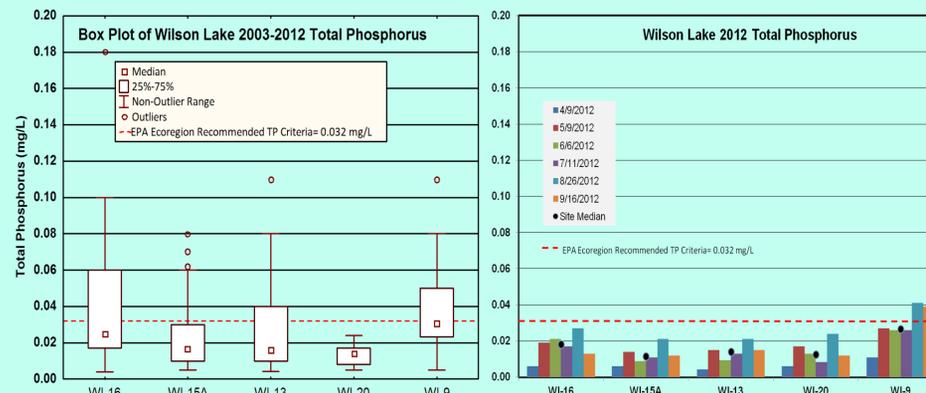
\*Note: The term "lake" is substituted for technically correct "reservoir" throughout this document for consistency.

## 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. These 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 lake averages for nutrient concentrations measured at the dam. Standard error bars in the graphs below illustrate the variation in sample results from each site in 2012.

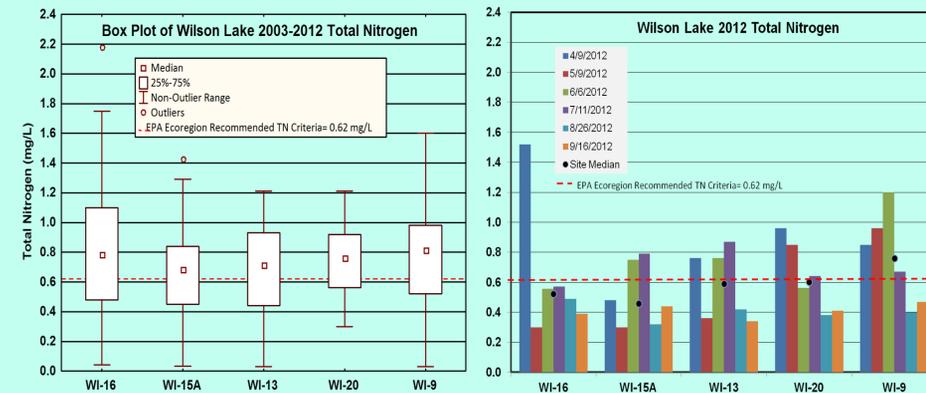
## Total Phosphorus

Median total phosphorus (TP) concentrations from 2003-2012 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 are 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 had higher TP concentrations in the upper lake sites due to mobilized nutrients bound to silt particles in moving water associated with inflows. Biological uptake or consumption 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.



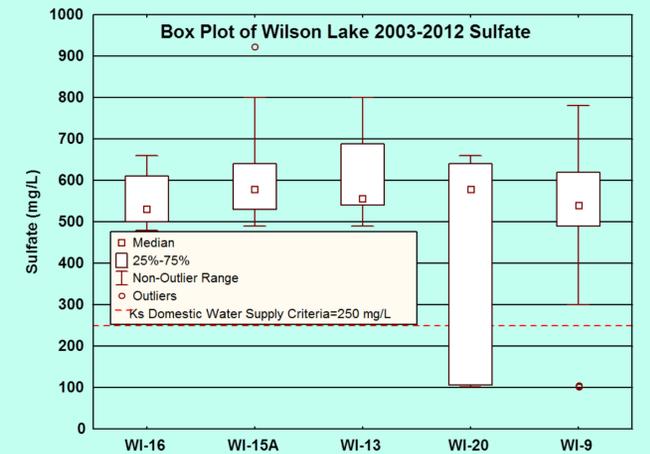
## Total Nitrogen

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. Wilson Lake has some of the lowest surface TN measured in District Lakes. Total nitrogen concentrations at all sites routinely exceed proposed EPA ecoregion recommended criteria (0.62 mg/L). Annual variability within sites is very common and dependent upon rainfall with more inflow resulting in increased sediment runoff and TN. Low inflows and limited inputs from runoff resulted in lower TN measured at all sites in 2012 compared to 10-year medians.



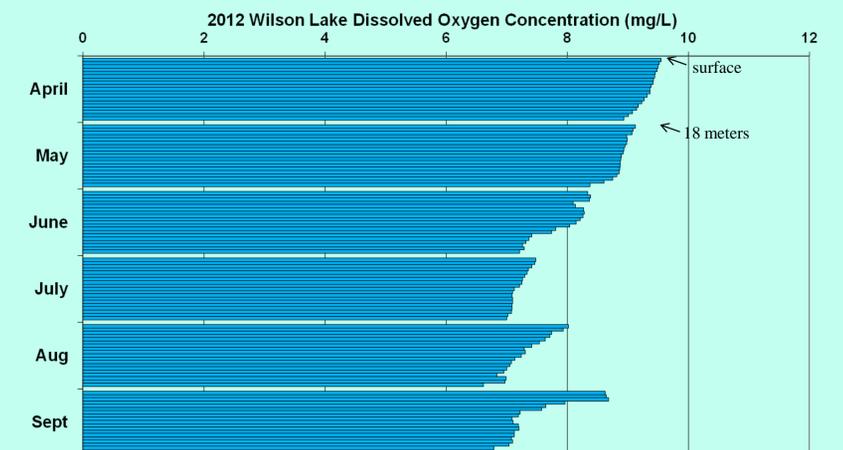
## Chlorides and Sulfates

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 conditions like 2012, 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 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 (D.O.) 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



US Army Corps of Engineers  
Environmental Resources Section  
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