

Stockton Lake Water Quality Summary

2005-2012

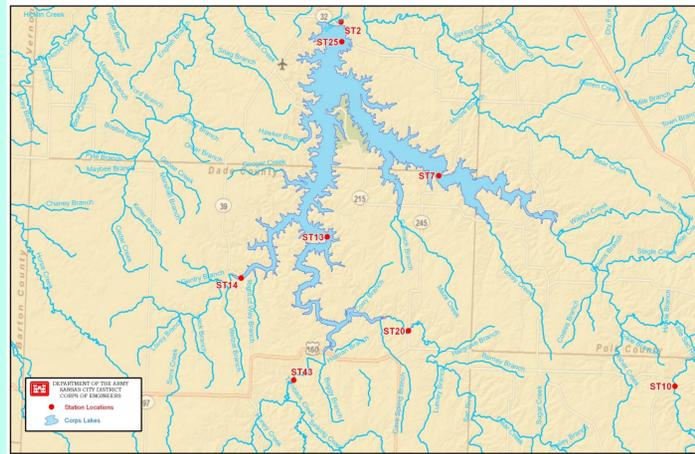
The **US Army Corps of Engineers (USACE)** Water Quality Program collects monthly water samples at Stockton Lake and inflows from April through September. These figures present data collected between 2005-2012 from three lake sites (#7, #13, #25), four inflows (#10, #14, #20, and #43), and the outflow (#2) below the dam. Thirty-four chemical, physical and biological parameters are measured to evaluate water quality. USACE uses this data to describe conditions and changes from the inflow streams, within the main lake, and outflow focusing on eutrophication, nutrients, sediment, herbicides, metals, and contaminants.

Stockton Lake

- Built on Sac River reaching full pool in 1971.
- **Watershed** = 1,160 square miles/ 742,400 Surface Acres (SA)
- **Capacity:**
 - Flood Control: 776,066 Acre-feet (AF) / 38,281 SA
 - Multipurpose: 874,887 AF / 24,632 SA / 298 miles of shoreline
 - Avg. annual inflow (2003-2012)= 875,202 AF; 2012 inflow=391,062 AF
- **Operating project purposes:** flood control, hydroelectric power, water quality, recreation, fish and wildlife, and water supply.
- **Water Quality** in Stockton Lake in 2012 was beneficial to operating purposes listed above and did not exceed MO State WQ Standards for designated uses. Fecal bacteria contributions in the Little Sac River have been limited by Mo. State TMDL regulations since 2006 to reduce impairments impacting whole body contact.

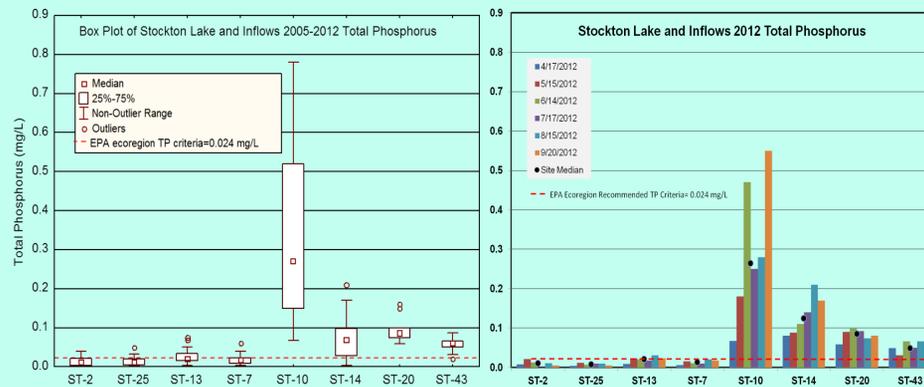
Nutrient Enrichment

Nutrients (i.e. phosphorus and nitrogen) are essential for aquatic life and are the primary factor driving fish and aquatic plant growth rates and productivity. Excess nutrients from urban, agricultural or natural sources increases the natural aging or eutrophication process in lakes. This can alter plant and aquatic life in lakes and water bodies, cause algal blooms, create low dissolved oxygen affecting fish survival, and lead to taste and odor issues in drinking water. In 2012, Stockton Lake was below the District Lake average for total phosphorus (0.06 mg/L) and total nitrogen (0.74 mg/L) measured at the site nearest the dam. Average total phosphorus at the dam was below the EPA ecoregion recommended criteria (0.024 mg/L) and at the low end of mesotrophic range of biological productivity. Mesotrophic lakes are characterized by moderate levels of nutrients and clear water (i.e. secchi measurement 2-4 meters) which provide good growing conditions for aquatic plants and algae which benefit the aquatic food chain including sportfish. Standard error bars in the graphs below illustrate the variation in nutrient sample results from each site in 2012.



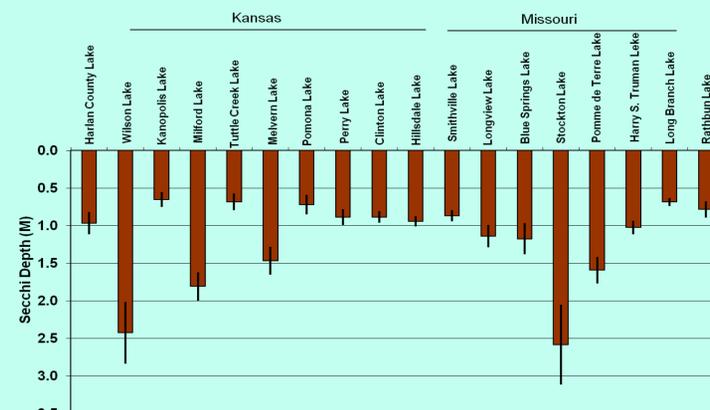
Total Phosphorus

Stockton Lake total phosphorus (TP) median concentrations from 2005-2012 were lower than EPA ecoregion recommended criteria (0.02 mg/L) at lake sites. Similar to most impoundments, higher TP concentrations and a wider range of data is usually found in the upper lake sites and inflows due to mobilized nutrients bound to silt particles in moving water in inflows and biological uptake or decline of TP and settling as the water moves through the lake to the dam. Total phosphorus measured in Stockton Lake and inflows in 2012 were similar to long-term trends. The Little Sac River (St 10) contributed 2-5 times more phosphorus than the other three inflow streams sampled.



Secchi Depth

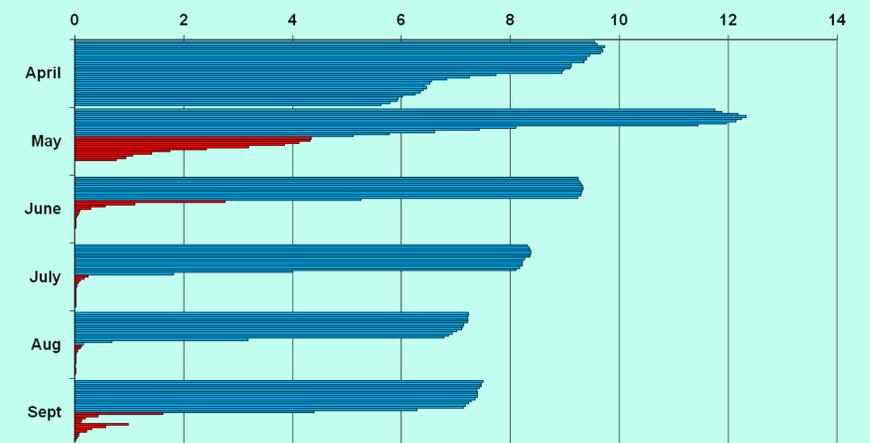
Secchi depth is a measure of water transparency or visibility in lakes. Organic (i.e. planktonic algae) and inorganic (i.e. suspended sediment) turbidity reduces transparency. Total phosphorus and TSS are inversely related to transparency as seen in Stockton and all District Lakes. Lakes with the least nutrients and turbidity have high secchi measurements and sunlight penetration.



Dissolved Oxygen

Dissolved oxygen (D.O.) is an important factor in aquatic species location, growth, and ultimately survival in lakes. Some lakes undergo a process called stratification or develop layers based on temperature and oxygen. This process begins in late spring, remains throughout the summer, and the layers mix (de-stratifies or 'turns over') in the fall. The figure 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 through September at the dam (ST 25). Stockton Lake stratifies during the summer, however adequate (5 mg/L) dissolved oxygen is typically available in the lake. In 2012, Stockton Lake was oxygenated in the top 13 meters during the worst conditions in July.

2012 Stockton Lake Dissolved Oxygen Concentration (mg/L)



Total Suspended Solids

Total suspended solids (TSS) or filterable solids in streams and lakes are a function of watershed characteristics including soil composition, land use, weather patterns, and characteristics of inflowing streams. Stockton Lake TSS values were the lowest of all District lakes with very low concentrations in both lower and upper lake sites with 3% of TSS settled out as water moved from the upper lake to the dam. Low inflow TSS and the long distance from inflows to the dam benefit water quality at Stockton Lake.

