

Pomme de Terre Lake Water Quality Summary

2003-2012

The **US Army Corps of Engineers (USACE)** Water Quality Program collects monthly water samples at Pomme de Terre Lake* from April through September. These figures present data collected between 2003-2012 from three lake sites (#7, 19, 24), and the outflow (#6) 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.

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

Pomme de Terre Lake

- Built on Pomme de Terre River reaching multipurpose pool in 1960.
- **Watershed** = 611 square miles/ 391,040 Surface Acres (SA)
- **Capacity:**
 - Flood Control: 406,821 Acre-feet (AF) / 15,999 SA
 - Multipurpose: 237,356 AF / 7,790 SA / 113 miles of shoreline
 - Avg. annual inflow (2003-2012)= 459,500 AF/ 2012 inflow=525,400 AF
- **Operating project purposes:** flood control, water quality, recreation, fish and wildlife
- **Water Quality** at Pomme de Terre Lake in 2012 was beneficial to operating purposes listed above and did not exceed MO State WQ Standards for designated uses. Water quality at Pomme de Terre Lake improves as nutrients, herbicides and sediments are removed by settling, dilution, and biological processes as water moves from inflow streams to the dam.

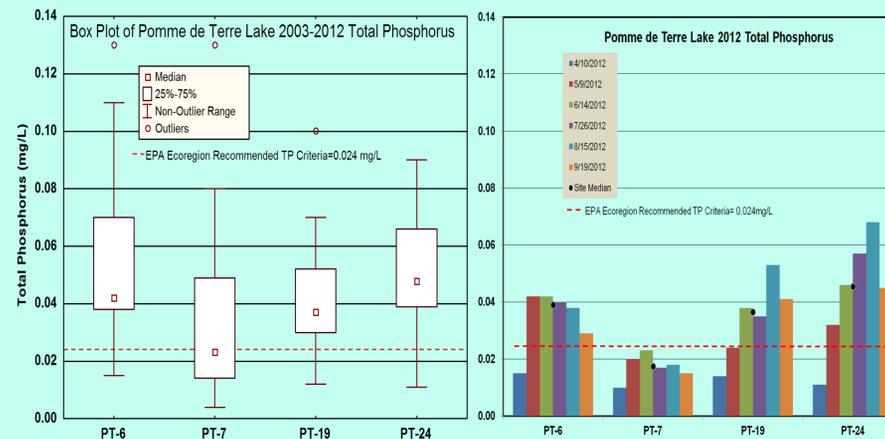
Nutrient Enrichment

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, Pomme de Terre Lake was below the District Lake total phosphorus mean (0.06 mg/L) and near the District Lake total nitrogen mean (0.74 mg/L) measured at the site nearest the dam. Total phosphorus measured at the dam was near the EPA ecoregion recommended criteria (0.024 mg/L) and at the high end or mesotrophic or moderate 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.



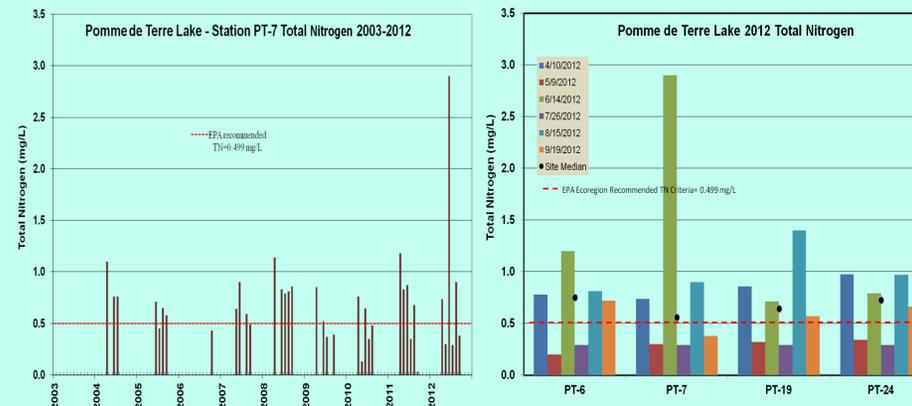
Total Phosphorus

Total phosphorus (TP) median concentrations from 2012 Pomme de Terre Lake samples were higher than EPA ecoregion recommended criteria (0.024 mg/L) at lake sites except PT-7 at the dam. TP values in 2012 were similar to long term trends (2003-2012), but an increased influence from internal loading May through August was observed at upper lake sites. This occurs as TP is released from the lake bottom due to lack of water movement through the lake and reduced spring inflows. 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.



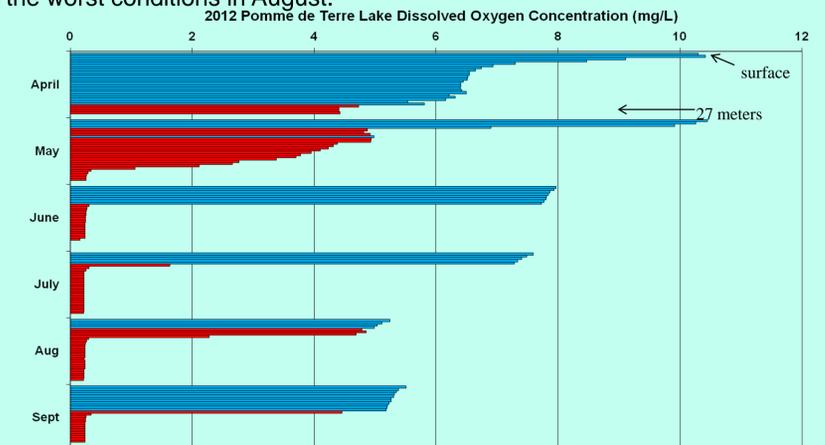
Total Nitrogen

Total nitrogen (TN) is calculated from 3 forms of nitrogen measured from Pomme de Terre Lake. Median TN concentrations at all sites are typically near EPA ecoregion criteria (0.499 mg/L). TN concentrations peak in the spring and are highly variable between sites and years related to inflows, biological activity, and upstream land use. A significant peak in TN was observed at all sites in June and attributed to organic nitrogen sources from algae cells and particulate nitrogen from runoff.



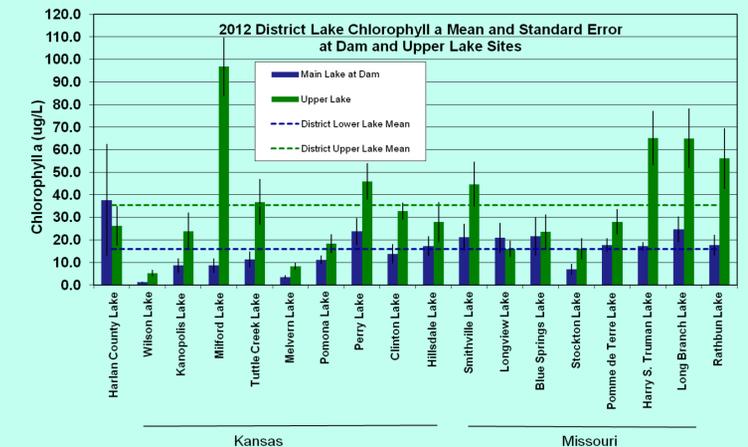
Dissolved Oxygen

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 breaks apart mixing the layers (de-stratifies or 'turns over') in the fall. The figure below illustrates 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 (PT-7). Pomme de Terre Lake stratifies during the summer, however adequate (5 mg/L) dissolved oxygen is typically available in the lake. In 2012, Pomme de Terre Lake was oxygenated in the top 5 meters during the worst conditions in August.



Algae

Algae and green plants are the base of the food chain in aquatic food webs and convert nutrients and CO₂ through photosynthesis into biomass for all aquatic life. Chlorophyll a is a measure of the active green pigment present in beneficial algae and harmful blue-green algae (cyanobacteria) active in this process. Chlorophyll a is a critical measurement as it relates nutrients like phosphorus and nitrogen to biological productivity related to algae (good and bad), aquatic invertebrate production, and fish growth. Pomme de Terre Lake typically has high levels (>20ug/L) of chlorophyll a from upper lake sites indicating nutrient enrichment. Blue-green algae is present, but algae populations in Pomme de Terre are dominated by beneficial species.



Water Quality Concerns:

- Nutrients
- Bacteria



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