Melvern Lake Water Quality Data

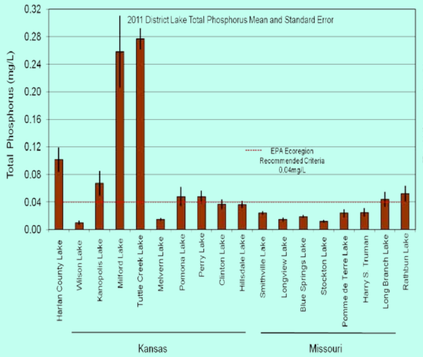
2001-2011

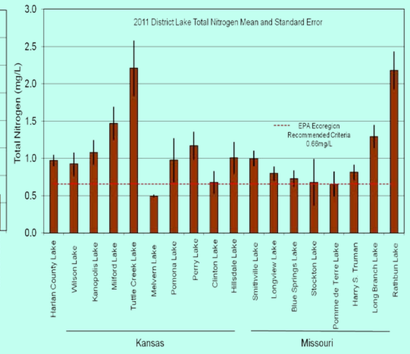
Melvern Lake

- Built on Marais des Cygnes River reaching multipurpose pool in 1975.
- Watershed = 349 square miles/ 223,360 Surface Acres (SA)
- Capacity:
  - Flood Control: 358,635 Acre-feet (AF) / 14,010 SA
  - Multipurpose: 149,630 AF / 6,951 SA / 101 miles of shoreline
  - Avg. annual inflow (1980-2011)= 158,300 AF; 2011=77,200 AF
- Operating project purposes: flood control, water quality, recreation, fish and wildlife, and water supply

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, and create low dissolved oxygen. In 2011, Melvern Lake was below average for District Lakes for average total phosphorus and total nitrogen measured at the site nearest the dam. Nutrient parameters were less than EPA Ecoregion recommended criteria which indicates most nutrients are reduced to moderate levels or mesotrophic according to Carlson Trophic Classification sampled at the dam (ME-3). Standard error bars in the graphs below illustrate the variation in sample results from each site in 2011.

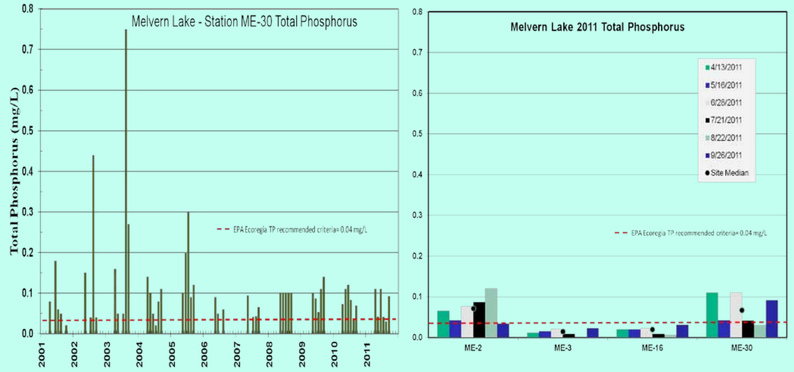




The US Army Corps of Engineers Water Quality Program collects monthly data (April – September) at Melvern Lake. These figures present data collected between 2001-2011 from 4 sites. The sites include 3 lake sites (#3, 16, 30), and the outflow (#2). Thirty-four chemical, physical and biological parameters are measured to evaluate water quality. COE 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.

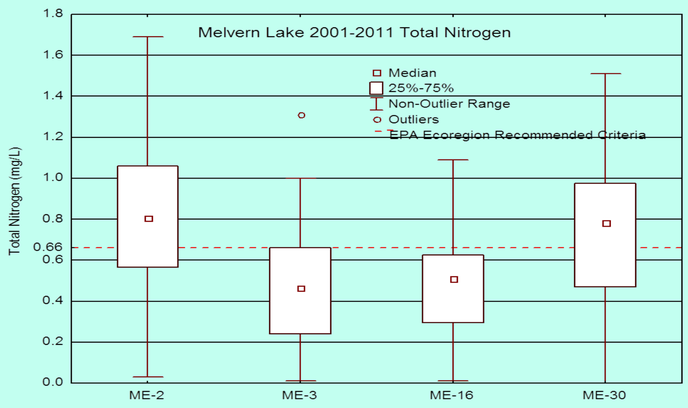
Total Phosphorus

Total phosphorus (TP) median concentrations from 2011 Melvern Lake samples were near EPA Ecoregion Recommended Criteria (0.04 mg/L). Median TP at Lake sites are in the range of moderate to high biological productivity indicative of high algae populations and rapid fish growth as described by mesotrophic classification in the lower two sites and eutrophic class designation in the upper lake. In 2011, Melvern TP concentrations were lower than long term averages and 2001-2011 trends with phosphorus concentrations. Similar to most impoundments, higher TP concentrations and a wider range of data is usually found in the upper lake sites due to influences from inflow streams and biological uptake (i.e decreasing TP) as the water moves through the lake.



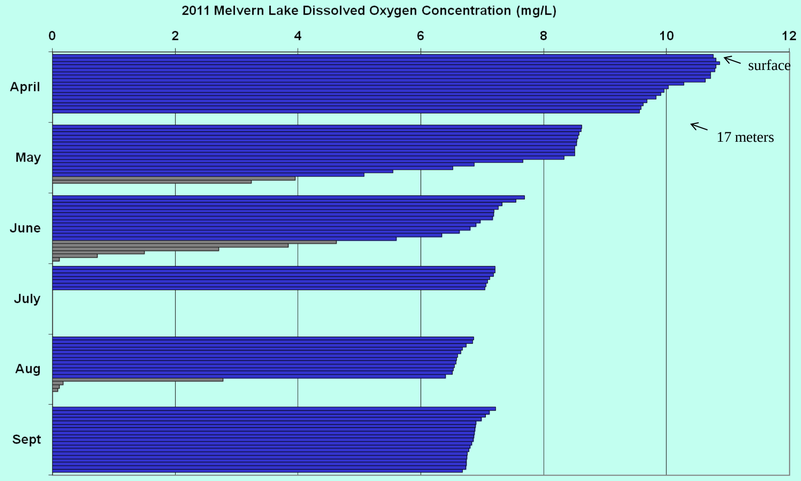
Total Nitrogen

Median TN concentrations from Melvern Lake sites from 2001-2011 were less than EPA Ecoregion recommended criteria of 0.66 mg/L at the lower lake sites and slightly above the criteria at the upper site and outflow. Total nitrogen concentrations are highly variable between sites and years and most related to inflow levels and watershed factors (i.e. soils and farming practices).



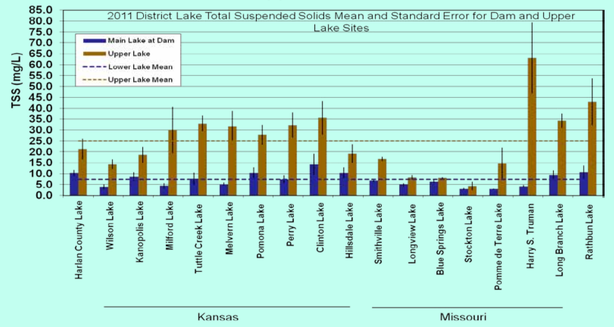
Dissolved Oxygen

Dissolved oxygen is a 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 through September. Melvern Lake typically stratifies for a short period of the summer, however adequate (5 mg/L) dissolved oxygen is typically available in the lake. In 2011, Melvern Lake was oxygenated in the top 12 meters during the worst conditions in August.



Total Suspended Solids

Total suspended solids (TSS) or filterable solids in streams and lakes is a function of watershed characteristics including soil composition, land use, weather patterns, and characteristics of inflowing streams. TSS is an indicator of erosion in watersheds, sedimentation or filling rates of downstream reservoirs, and is also closely linked to nutrient and contaminant transport through river systems. In 2011, Melvern Lake TSS values in the upper lake were above average for District lakes with 83% of TSS settled out as water moved from the upper lake to the dam.



Water Quality Concerns:

- Nutrients
- Sediment inputs

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