

Rathbun Lake Water Quality Data

2001-2011

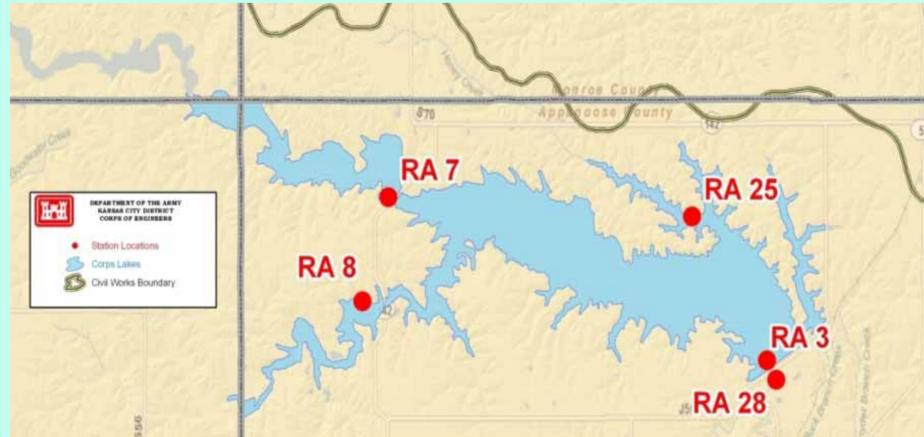
The **US Army Corps of Engineers** (COE) Water Quality Program collects monthly water samples (April – September) at Rathbun Lake while Rathbun Land Water Alliance and Iowa Dept. of Natural Resources (IDNR) work together to sample inflow streams at 14 watershed sites. This poster presents data collected between 2001-2011. The sites include four lake sites (RA3, RA7, RA8, RA25), and the outflow (RA28). 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, lake, and outflow focusing on eutrophication, nutrients, sediment, herbicides, metals, and contaminants.

Rathbun Lake

- Built on the Chariton River at river mile 142
- Filled to multi-purpose pool in 1970
- Watershed = 549 sq miles (351,360 Acres)
- Capacity:
 - Flood Control: 349,173 Acre Feet (AF)/ 22,452 surface acres (SA)
 - Multipurpose: 221,360 AF / 10,329 SA/ 155 miles of shoreline
 - Surcharge pool: 368,859 AF / 31,135 Acres
- Operating project purposes: Flood damage reduction, water supply, water quality, recreation, navigation, and fish and wildlife management.
- Avg. annual inflow = 368,100 AF
- In 2010, zebra mussels were verified in IDNR samples in the marina in the Buck Creek Arm. Changes in water quality will be recorded as the population increases possibly impacting plankton populations and water quality.

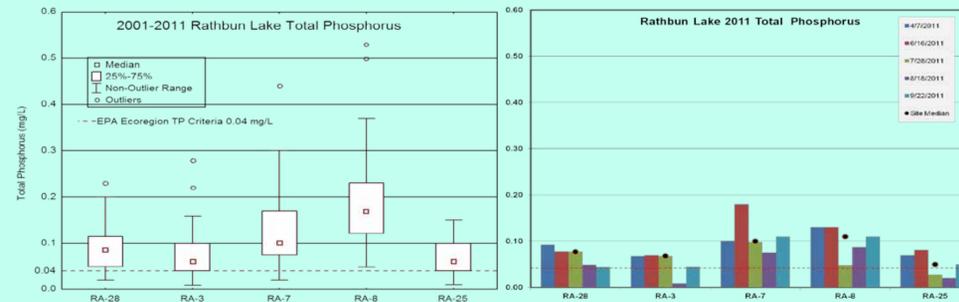
Nutrient enrichment

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 that affect fish survival, and lead to taste and odor issues in drinking water. Rathbun Lake has been added to the draft 2010 Iowa 303(d) list of impaired waters due excessive algae and turbidity. EPA and IDNR are working with water quality partners, landowners and Rathbun Land Water Alliance to focus watershed conservation efforts on priority or target areas in the watershed to reduce nutrient and sediment runoff. This approach is designed to improve water quality and reduce designated impairments at Rathbun Lake. In 2011, Rathbun Lake had second highest average total nitrogen in the District, but below District average (0.06 mg/L) for total phosphorus measured at the site nearest the dam. Both average TP and TN at Rathbun were above EPA Ecoregion recommended criteria. Standard error bars in the graphs below illustrate the variation in sample results from each site in 2011.



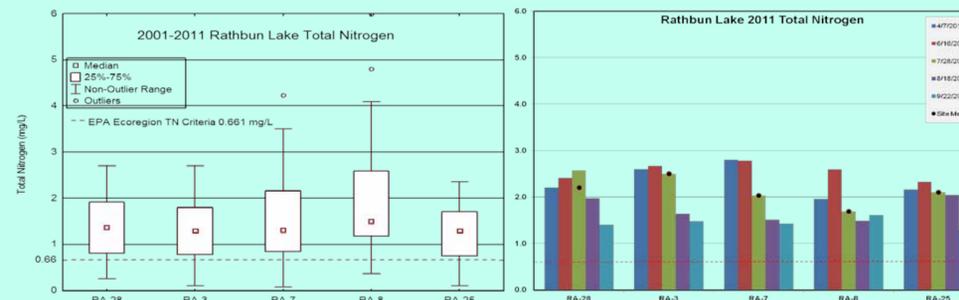
Total Phosphorus

Total phosphorus (TP) levels from all sample locations at Rathbun Lake exceed EPA nutrient criteria in 25% or more of samples taken 2001-2011. Median TP at all Rathbun Lake sites are in the range of high biological productivity leading to high algae populations and rapid fish growth. Occasional blue green algae blooms occur at Rathbun, but conditions (i.e. nitrogen:phosphorus ratio, turbidity, lake turnover rate) tend to favor beneficial green algae species over toxic blue green species. In 2011, TP monthly values were higher April-July than later months. Most 2011 Rathbun phosphorus measurements were very similar to long term trends except RA8 (South Fork Chariton Arm) had significantly lower total phosphorus levels ($P < 0.05$) than 2001-2011.



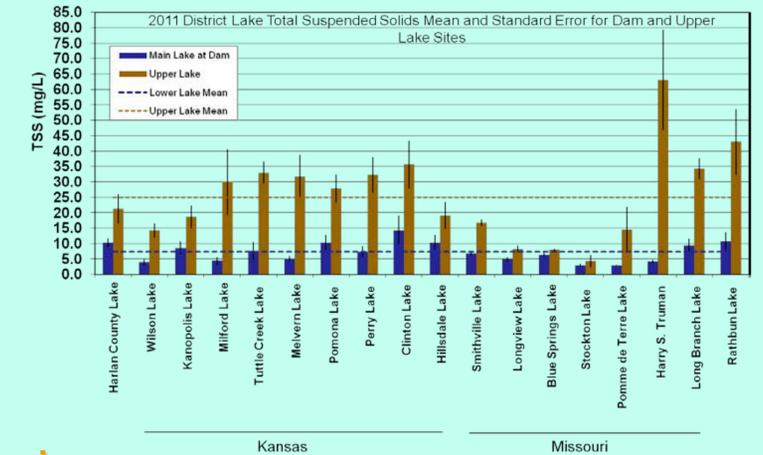
Total Nitrogen

Total nitrogen (TN) measured at Rathbun Lake in 2011 ranked high in the District. TN concentrations at all sites are frequently twice EPA Ecoregion criteria (0.66 mg/L) for the region. Average TN values in 2011 were significantly ($P < 0.05$) higher at sites RA-28, RA-3, and RA-25 than average TN from those sites measured 2001-2010. The highest concentrations of TN are typically found at RA-8 (South Fork Chariton Arm). Nitrogen concentrations are highly variable between sites and years mostly related to inflow discharge and upstream land use. Rathbun inflows in 2011 were 0.5 to 7 times higher than historic (70 years) average May-September with the exception of July.



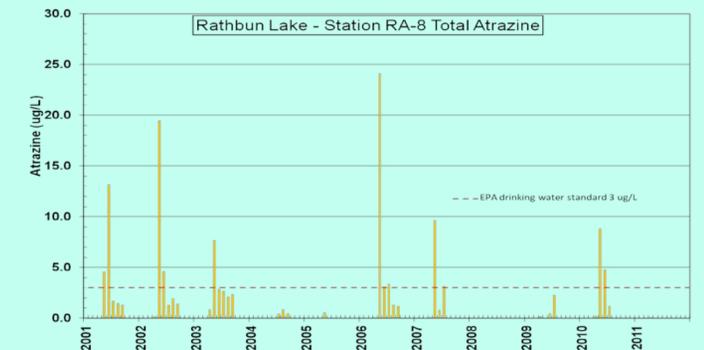
Total Suspended Solids

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, Rathbun Lake TSS values were above average for District lakes with 75% of TSS settled out as water moved from the upper lake to the dam.



Atrazine

Atrazine is a widely used and frequently detected herbicide throughout the Midwest. Rathbun Lake concentrations occasionally exceed drinking water standards (3 ug/L) during spring sampling, which coincides with application and runoff. Atrazine is dispersed throughout the water column, and must be removed for drinking water. Peak lake concentrations are typically found at RA-8 (S. Fork Chariton Arm). No lake atrazine samples were collected in 2011.



Water Quality Concerns:

- Sediment inputs
- Algae blooms
- Nutrients
- Pesticides

