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Preliminary results of a nutrient source study in Wilgreen Lake, Madison County, Kentucky.

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Wilgreen Lake (Madison County, Kentucky) is an eutrophic lake formed by damming Taylor Fork, part of the Silver Creek watershed. Two principal tributaries drain urban areas of the city of Richmond, agricultural land typified by cattle grazing, and a high-density residential area using septic systems. The lake is “nutrient impaired,” so it is likely that anthropogenic nutrient loading is affecting water quality. Our study aims to first characterize the physical characteristics and water quality of the lake (2006), and then determine the specific proportion of nutrient inputs (2007) to the lake with the aim of remediating any possible degradation of water quality. We anticipate using nitrogen isotopes and microbial DNA templates to identify specific nutrient sources.

Research started in May 2006 with work occurring throughout the 2006 field season with the intent of establishing a baseline for key lake parameters. We used an YSI probe to measure temperature, conductivity, oxygen concentration, and pH and assayed for total ammonia nitrogen using the sodium hypochlorite, colorimetric method. The lake was already strongly stratified in May with disoxic and anoxic water below about 4 meters. Stratification strengthened in the summer with the disoxic-oxic boundary moving upward to about 3 meters, and showing a sharper gradient between oxic and disoxic waters. Ammonium concentrations are typically zero in the oxic zone, and increase in concentration with increasing water depth in anoxic waters to about 6 ppm. We anticipate that phosphate and nitrate concentrations will mirror ammonium concentration profiles in character.

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