

11-2008

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Recommended Citation

Stockwell, R.D., W.S. Borowski, 2008. Seasonal changes in a eutrophic lake, Wilgreen Lake, Madison County, Kentucky, Kentucky Academy of Sciences, Annual Meeting, November 2008.

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Seasonal changes in a eutrophic lake, Wilgreen Lake, Madison County, Kentucky

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Wilgreen Lake (Madison County, Kentucky) covers ~169 acres, formed in 1966 by damming Taylor Fork. The Wilgreen watershed drains residential developments, modified woodlands, cattle pasture, and some industrial/urban areas in the city of Richmond. The lake is deemed “nutrient impaired” by the EPA.

Our main objective is to document the seasonal changes in key lake parameters from summer stratification through fall overturn over 4 months of sampling, August through November, 2008. We collect temperature, oxygen, pH, and conductivity data from 19 stations at depth intervals of 1 meter using an YSI multi-probe. Concurrent with collecting these framework data, we take water samples, also at 1-meter intervals, and measure phosphate (PO_4^-), ammonium (NH_4^+), and nitrate (NO_3^-) concentration.

Summer stratification exerts a large control on processes occurring within the lake, as does stream inflow. August and September surface temperatures range from 25 to 26.5 degrees Celsius, considerably cooler than in 2006 and 2007. The summer thermocline was located between 6 and 7 meters. Oxygen concentrations are highest in surface layer of the lake, become disoxic below 3 to 4 meters, and are anoxic only for the bottom several meters at our deepest stations. In 2008, a much smaller volume of the lake was anoxic. We attribute these annual differences to a much cooler and wetter early summer in 2008. Much higher nutrient concentrations occur near the largest stream inputs into the lake, either from watershed runoff or from anthropogenic sources near the lakeshore such as septic systems.

Kentucky Academy of Sciences Annual Meeting, University of Kentucky, 1 November 2008.