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Fecal microbe distribution and abundance used as a possible proxy for nutrient source identification in eutrophic Wilgreen Lake, Madison County, Kentucky

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Wilgreen Lake is a eutrophic lake that has been listed on the EPA's 303d list as nutrient impaired. Potential sources of this impairment are from humans, cattle manure and fertilizers. We suspect that the majority of nutrients originate from human sources. As a possible proxy for nutrient input, we test our hypothesis by examining fecal microbe distribution and abundance in the lake.

We took water samples at 19 sampling locations on 4 occasions. Sampling spanned 26 June to 15 August with the last 3 sampling events occurring at roughly two-week intervals. These samples were then processed using IDEXX methods, which count total coliform and *Escherichia coli* colonies. For sampling localities with microbial abundance that exceeded maximum sensitivity (>2419 cfu/100ml), we performed dilutions of 1:4 or 1:10.

Both total coliform and *E. coli* levels are elevated at sites adjacent to septic tank clusters. There is a gradual decline in microbial abundance distal to these populated areas and microbe levels are low in the third lake tributary that drains only cattle pasture. This strongly suggests that the source of microbial input is from septic systems; however, we cannot eliminate the possibility that fecal microbes are introduced into the lake via inflows, because of high microbial abundance in their waters. We plan on using Reverse-Transcription Polymer Chain Reaction (RT-PCR) techniques to distinguish between human and cattle sources of *Bacteroides* to potentially eliminate the inflows as a microbial source.

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