Analyzing Daily Variability in *E. coli* Concentrations in an Urban Stream

Caroline Tuttle1, Julianna Crumlish2, Michael Canty2, Thomas J. Glose2, and Christopher S. Lowry2

1 Department of Environmental Studies, Skidmore College, Saratoga Springs, NY 2 Department of Geology University at Buffalo, Buffalo, NY

**Introduction**

A critical issue in urban streams is increased levels of *E. coli* due to anthropogenic sources. In the city of Buffalo, NY, these sources are due to an aging waste water infrastructure, which has a combined storm water and sewer system. One creek that is heavily impacted by increased *E. coli* due to combined-sewer overflows is Scajaquada Creek. In 1921, as development in the city increased, Scajaquada Creek was diverted underground. The creek now flows in a tunnel under Buffalo for four miles and then emerges again in Forest Lawn Cemetery. In this experiment, our goal was to determine the sources of *E. coli*, and mechanisms which might account for variability in *E. coli* within Forest Lawn Cemetery. Potential variability in these concentrations were thought to have come from photo degradation and dilution. These potential drivers were investigated over a 24 hour sampling period at locations with variable contributions of sun light and tributary sources of water.

**Methodology**

Water samples were collected in Forest Lawn Cemetery along a 2-mile stretch of Scajaquada Creek, with background sampling conducted over four month period (May – Aug 2015). Fine scale sampling was taken every two hours over a 24 hour period. Escherichia coli (*E.coli*) water samples were taken in five different locations along the stream. After the samples were taken, ColiArt was added to the samples, and the samples were placed in a Quanti-Trap for quantification of *E.coli* and fecal coliforms (ISO standard 9308-2:2012). Samples were incubated for 24 hours at 35°C. After 24 hours samples were placed under a florescent light; the cells that glowed were considered to have *E.coli*.

**Results**

**External Sources of Water Entering Stream**

Diel concentrations within Scajaquada Creek were thought to have come from photo degradation and dilution. *E. coli* concentrations in the main channel. These results may partially explain the lower levels of *E. coli* further down the stream. Results from the 24 hour sampling show small diel fluctuation in *E. coli* concentrations only at the downstream sampling locations (D and E).

**Spatial Distribution of *E. coli***

Average levels of *E. coli* decrease moving downstream from the outlet of the culvert, indicating the source of *E. coli* is likely coming from inside the culvert. Levels of *E. coli* in tributary pipes and drains entering Scajaquada Creek were found to have lower concentrations, indicating that the water from these openings may dilute the *E. coli* concentrations in the main channel. These results may partially explain the lower levels of *E. coli* further down the stream. Results from the 24 hour sampling show small diel fluctuation in *E. coli* concentrations only at the downstream sampling locations. These diel trends support the idea of limited photo degradation, which resulted in a change of 800 MPN/100ml change in concentrations at the lower site (Site E). This photo degradation is superimposed on the dilution signal resulting in the observed reduction in *E. coli* along the stream reach.

**Conclusions**

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**References**

ColiArt Quant-tray and presence/absence methods for total coliforms and Escherichia Coli- Appendix C3- Ohio Water Microbiology Laboratory (data collection sheet form).