

# NOVEL APPROACHES IN MACROINVERTEBRATE BIOMONITORING

Ely Kosnicki

Dr. Robert W. Sites, Dissertation Supervisor

## ABSTRACT

Two separate studies are presented to address aspects of freshwater macroinvertebrate biological monitoring. The first study focused on evaluation of Grass Riparian Filter Strip (GRFS) effectiveness in north central Missouri. Metrics were used to construct two assessment tools, a Benthic Index of Biotic Integrity (B-IBI) and a novel technique we call a Least Desired Index (LDI). LDI works in a reciprocal fashion to B-IBI in that the lowest scoring criteria of the metrics are set by anti-reference stream conditions, or conditions that represent an undesirable quality. B-IBI determined that the GRFS sites showed moderate improvements where the LDI showed that the GRFS sites made no improvements. The LDI was considered to be a more realistic assessment considering that the GRFS at the test sites had only been established for 2 years and the reference streams used to construct the B-IBI were most likely impaired. The second study utilized a state designated reference stream as a case study for temporally profiling the community structure. Samples of benthic macroinvertebrates and water quality were taken approximately monthly. Rare and transient taxa were classified and eliminated from further analysis. Maturity weighted abundances showed significant changes in community measures and were found to be useful in aspects of other analyses. Few metrics exhibited low variation over the annual period, and fewer were predictable, indicating that seasonal variation can have a significant impact on measurements used in biological monitoring. The RIVPACS model biologically classified three seasons. Overall, the model moderately predicted community structure, also highlighting that macroinvertebrate communities are difficult to consistently quantify.