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Relations Between Stream Chemistry, Fish Diversity, and Land Use in the Upper Little Miami Watershed

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Research + Scholarship SYMPOSIUM



Relations Between Stream Chemistry, Fish Diversity, and Land Use in the Upper Little Miami Watershed

Streams are susceptible to numerous threats to their water quality and biodiversity. In southwest Ohio a major driver of these impacts is associated with current agricultural practices and associated legacy effects. These structural and chemical impacts are known to affect biodiversity in these streams. The objective of this study was to document and examine relationships among land-use/land cover, stream chemistry, and fish diversity in the headwaters streams of the Little Miami Watershed. Three streams (Little Miami River, Massies Creek - North Fork, and Massies Creek - South Fork) were sampled in the upper headwaters as well as downstream. Air and water temperature, pH, dissolved oxygen, alkalinity, hardness and turbidity were measured in early September and late November. With the exception of temperature, the measurement of these parameters was generally consistent between sampling periods ($CV < 22$). A total of 517 fish were collected using an electroshock backpack along 75m stretches at the sites ($N = 6$). In total 25 species were identified while individual sites yielded 7 - 12 species each. Fish diversity (Simpson's Diversity, $1 - D$) at our sites ranged between 0.77 and 0.86. A significant correlation ($r = 0.918$, $p = 0.01$) was found between fish diversity and the % of developed land in these watersheds. Our landscape analysis revealed that all six watersheds had 86 - 97% agricultural land use which had a negative ($r = - 0.796$), but not statistically significant correlation ($p = 0.0581$) impact on fish diversity. This work will serve as the baseline for future study of land use impacts on fish diversity, phylogeography, and water quality.