

## **Report for 2001NJ1102B: The effects of water quality and habitat modification on benthic macroinvertebrates in urban forested wetlands in northeastern New Jersey**

- Conference Proceedings:
  - Hamilton, R. IV, P. S. Kourtev, and J. G. Ehrenfeld. 2001. Effects of water quality and habitat modification on benthic macroinvertebrates in urban forested wetlands in northeastern New Jersey. [Abstract] Association of Southeastern Biologists, Annual Meeting, New Orleans, Louisiana.

Report Follows:

## **Robert Hamilton IV**

### **Part II**

#### **Project Information:**

The primary objective of this study was to analyze benthic macroinvertebrate community structure and selected water quality and geomorphology parameters within wetland streams in highly urbanized watersheds to define a reference condition. It is already known that urbanized habitats are more impacted by anthropogenic stressors than nonurban ones. They have less abundance and diversity of benthic organisms, altered geomorphology, hydrology, and disturbance regimes, and a predominance of a few land use/land cover classes (e.g. industrial, residential, commercial). Since biodiversity is a commonly used surrogate for habitat quality these depauperate systems are classified as such and no further analysis is conducted. However, there appears to be high variability in the previously mentioned watershed characteristics that needs to be quantified. Once this information is quantified, and a “least impacted” reference condition is defined, it could be useful in management and conservation uses. Some uses include restoration of degraded areas, making decisions on preserved area sizes, and locations, limiting deleterious land use actions, and predicting which unimpacted areas may become at risk.

#### **Methodology**

Two preliminary studies were conducted during the fall of 2000 and 2001. The Y2000 study focused primarily on higher order streams reaches located in three different counties, where the Y2001 study focused on headwater regions all within two miles of Morristown, NJ. In the Y2000 study, seven wetlands streams along an urban to suburban gradient in urbanized northern New Jersey. The first study was used primarily to verify collection techniques of both benthic macroinvertebrates and water quality data. Benthic macroinvertebrates were collected using modified EPA multihabitat rapid bioassessment techniques. Benthic macroinvertebrates were subsampled and identified to family taxonomic level. They were also classified into functional feeding groups and water tolerance values. Water quality parameters, such as pH, dissolved oxygen, redox potential, and others, were measured using commercially available YSI and Orion probes. These respective data groups were analyzed using univariate and multivariate statistical methods. The Y2001 study used similar methods, but focused on four sites within one watershed (Whippany River).

## Principal Findings and Significance

In the Y2000 study, the seven sites showed a clear separation along a gradient of physical and chemical parameters, including pH, redox potential, dissolved oxygen, and substrate composition. The benthic communities were dominated by detritivorous crustaceans (amphipods and isopods) and slightly to moderately pollution tolerant taxa. While the physical and chemical parameters showed a clear separation, the benthic communities did not, but generally showed more diversity in less urbanized, less densely populated, and less degraded areas. The Y2001 study showed that sites in close physical proximity to each other within the same watershed could have widely differing physical and chemical conditions and benthic macroinvertebrate communities. The results from both studies suggest that in order to characterize sites in urbanized areas and establish a reference system, studies should be conducted that use multiple and quantitative techniques (as opposed to unreplicated, rapid techniques) that sample physical, chemical, and biological parameters. In addition, due to past and present land use practices in adjacent municipalities, there could be high heterogeneity with respect to the aforementioned parameters within the same site class groupings.

## References:

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