

## **Non-Conforming Metrics: Development of a Benthic Macroinvertebrate Index for the New Jersey Pinelands**

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### **ABSTRACT**

The New Jersey Department of Environmental Protection began an Ambient Biomonitoring Network (AMNET) in the early 1990's using a multimetric index to evaluate the benthic macroinvertebrate communities of freshwater streams and rivers of the State. The Department uses this data to assess whether the Aquatic Life Use goals of the Clean Water Act are being met. The index employed, known as the New Jersey Impairment Score (NJIS), was found to be problematic when applied to New Jersey Pinelands streams. The Pinelands represents a unique ecosystem due to the naturally acidic conditions found in undeveloped watersheds. As development occurs in a watershed, pH levels of Pinelands streams typically rise toward neutral. Metrics of the benthic macroinvertebrate assemblage are dependable indicators of biological integrity. Some metrics, such as EPT taxa or percent tolerant individuals, respond consistently and predictably when measured against a stressor gradient. In certain datasets, metrics can be found that respond to stress in unexpected ways. When creating an Index of Biological Integrity, biologists seek metrics with consistent, predictable, and explainable responses. Questions arise when metric responses are consistent and predictable, but are also contrary to expectations and are therefore difficult to explain. In the case of the Pinelands, increased stress (higher pH) is associated with a decreased percentage of Diptera. However, Tanytarsine midges increase with increased stress, perhaps because as filterers they can take advantage of increases in particulate matter. This non-conforming metric, Percent Diptera excluding Tanytarsini, was incorporated into the Pinelands Macroinvertebrate Index (PMI), which is being implemented by the Department as a tool for identifying biological degradation in the New Jersey Pinelands.

### **KEYWORDS**

Benthic macroinvertebrates, Pinelands, multimetric, Index of Biotic Integrity