

## HAS THE PROMISE OF DNA BARCODING BEEN ACHIEVED? A CRITICAL LOOK AT THE APPLICATION OF EDNA BARCODING TO BIOMONITORING

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Biological monitoring programs aim to assess the health of waters and determine the direct impact anthropogenic activities are having on the ecosystems. There is a need for the development of accurate and reproducible methods that can assess biodiversity rapidly and in a cost-effective manner. A system for tracking water quality changes brought on by such things as climate change, invasive species, nutrients, or pollution is imperative as these disturbances are occurring more often and in more places. A highly touted new strategy for evaluating biodiversity is the application of high throughput next generation sequencing to environmental DNA (eDNA), whereby the sequence of one or more specific genes can be used to distinguish between a wide range of species. This comprehensive view of an ecosystem can shed light on the health of an ecosystem by revealing the presence/absence of microbes to macroinvertebrates in a sample. In collaboration with Ohio EPA (OEPA) we aim to validate, in a field context, the efficacy of eDNA sequencing using multiple barcodes (eDNA barcoding) to identify species, and compare the species found by this method against those identified through standard morphological-based methods. Our results show little overlap between the 115 macroinvertebrate species identified by OEPA and the eDNA method, with only 15 species shared between samples. However, the eDNA barcoding approach identified a larger number of taxa that were not identified by OEPA taxonomist, demonstrating a potential underestimation of biodiversity and information relevant to water quality within this ecosystem. In addition, eDNA data is explored to identify microbes of interest to human and potentially indicative of ecosystem health. However, the question remains: Is the eDNA barcoding method, which can identify more taxa with less effort than current methodologies, a viable new tool for determining ecosystem health?

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