



Conference Abstract

There's always a better way: The application of eDNA to effectively assess biodiversity

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Abstract

Our ecosystem monitoring methodologies focus on data collection for reporting purposes that may not serve to identify the systematic causes of ecological change. Managers need precise and timely information at appropriate scales to build ecosystem resilience.

Traditional species detection methodologies offer little information when species abundance are low, especially in large water ecosystems such as the Great Lakes. Species not found during monitoring doesn't necessarily mean that species are absent. Moreover, even if a change in the ecosystem is detected, it is often not possible to determine its cause at a spatiotemporal scale or a trophic cascade level. As a result, we often find ourselves being reactive in our mitigation measures. Before irreversible change occurs, we must be guided by a better understanding of the actual ecological landscape which Environmental DNA (eDNA) may help provide.

eDNA is a potential tool to effectively overcome traditional species survey limitations currently in use at many Parks Canada sites. As various organisms interact with the environment, DNA is expelled and accumulates in their surroundings. Such samples can be analyzed by high-throughput DNA sequencing methods for rapid measurement and monitoring of biodiversity. Access to this genetic information makes a critical contribution to the understanding of population size, species distribution, and population dynamics for species not well documented. Despite the increasing use of eDNA in conservation practice, it requires further methodological improvement for greater influence on management

decisions. The tool requires standardized protocols based on site-specific covariates and objectives.

We're working to tackle the challenge with 2 objectives: (1) to combine traditional biomonitoring knowledge and metagenomics to further develop eDNA as a reliable sampling tool for Parks Canada and (2) to support site-specific monitoring objectives for species-at-risk, invasive species, aquatic species inventories, and/or culturally significant species. The overall goal is to increase our capacity to make more informed, timely, regionally-coordinated conservation decisions through the rapid and sensitive species detection methods offered by eDNA.

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