



Conference Abstract

Transect sampling promotes higher detection rates compared to discrete sampling for environmental DNA applications

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Abstract

The use of environmental DNA (eDNA) to monitor species in aquatic environments has rapidly increased over the past decade. eDNA has consistently outperformed other methods of detection, yet eDNA relies on an indirect measure to estimate the real distribution of a species. Therefore, understanding the environmental factors that disperse eDNA is of major importance. Here we modeled the use of transect sampling for eDNA studies and also model the impact of river advection on detection radius and the expected probability of detection. Our model suggests that transect sampling: 1) increases the detection probability for both rare and common species, thus reducing the frequency of false negatives, 2) diminishes the standard deviation of the detection probability, which in most cases means higher reproducibility of eDNA studies, 3) better estimates systemwide trends of fish population distinguishing zones of multiple fishes from zones where few fishes are present, and 4) diminishes the effects of eddies and river velocity on the detection probability and detection radius. We propose the use of transect sampling as an alternative method of eDNA sampling with benefits that surpass the disadvantages of not being able to pinpoint the exact fish location. Our model also suggests that even short transects (less than 100 m) can yield considerable benefits compared to point sampling.

Keywords

eDNA; efficiency; data-analysis; transect sampling; detection rate

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