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Moving Genetic Biomonitoring from a Concept to a Tool

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Abstract

Molecular genetic techniques such as DNA barcoding and environmental DNA have been proposed as tools for aquatic biomonitoring for nearly a decade, but have yet to break through into widespread acceptance. The potential benefits of these molecular methods, such as quicker, cheaper, more detailed measures of biodiversity, remain on the horizon, yet end users and decision makers continue to hesitate to move away from traditional techniques. This lack of adoption of molecular genetic environmental methods suggests a continued disconnect between the researchers advancing them and the managers that stand to benefit from them. Without addressing this disconnect, the likelihood of adopting molecular genetic tools into environmental monitoring is slim. Here, we outline three areas for development of molecular genetic methods from concepts to tools for environmental managers: 1) creating consensus between genetic researchers in laboratory protocols and data standards; 2) addressing questions of reproducibility and standardized data analyses; 3) outlining how molecular genetics align and differ from standard techniques but also create opportunities beyond traditional tools. We would argue that movement in these three topics for researchers will foster improved relationships with implementers of these genetic environmental tools.