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Improving Environmental DNA (eDNA) Reliability for Resource Management

Project ID – 2022_WIL_770220

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January 2025

ABSTRACT:

Environmental DNA (eDNA) is increasingly being used as a tool for fisheries management and detection of invasive species, but its newness and lack of data standards make it difficult for managers to know whether or how much to rely on eDNA findings. Because of the sensitivity of eDNA methods for detecting DNA for species of interest stringent quality controls and testing at all stages, transparent reporting of the reliability of eDNA results is essential in order to avoid potential sources of error. Data standards and reporting requirements have only recently been developed, and can be difficult to interpret for non-specialists. As a result, managers have been understandably reluctant to rely too much on eDNA detections. We developed a user-friendly, interactive decision checklist (https://form.jotform.com/GLFC_STP/edna-decision-checklist) that compiles relevant information on eDNA metadata requirements and reporting standards, as well as a step-through series of considerations for how to use eDNA for single species detection or characterizing aquatic communities. We compiled and combined information from existing data standards and guidance documents for considerations of all stages of eDNA-related projects, from initial sample collection and sampling design to assay testing, sensitivity and specificity, and final interpretation of results. Recommendations and reporting requirements from the compiled information sources were built into a simplified, web-based checklist of considerations for all stages of eDNA project planning, implementation, and interpretation, directing users to relevant source materials, recommendations and guidance for instances where specific considerations or information/reporting have not been met. As part of this, the checklist also provides users with recommended information for managers to request from eDNA labs, as well as to help them interpret the reliability of reported eDNA results to improve the value of eDNA information for resource management.