

{rokbox title=| Scheme of eDNA used in the FishGenome contract virtual workshop “Improving Cost-Efficiency of Fisheries Research Surveys and Fish Stocks Assessments using Next-Generation Genetic Sequencing Methods :: Image: Authors|
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Sergio Ramírez-Amaro, Marta Bassitta, Antònia Picornell, Cori Ramon, Bàrbara Terrasa, 2022. [Environmental DNA: State-of-the-art of its application for fisheries assessment in marine environments.](#)

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Abstract:Fisheries management involves a broad and complex set of tasks that are necessary to prevent overfishing and to help the recovery of overfished stock. Monitoring fishing activities based on two main sources, landings data and scientific surveys, is a challenging task. Fisheries collection data is often limited, which compromises the accuracy of the results obtained. Therefore, several emerging applications of molecular methods have the potential to provide unique understanding of ecological processes in marine environments and to build stronger empirical underpinnings for the Ecosystem-Based Fisheries Management. Environmental DNA (eDNA) is a complex mixture of genetic material shed by those organisms that inhabit a given environment, whereby DNA is extracted from an environmental sample without accessing the target organism. eDNA studies can be categorized into two main approaches, i) eDNA metabarcoding or semi-targeted (community) approaches and ii) species-specific or targeted approaches (single). Although both categories are often discussed, they differ drastically in their methodology, interpretations and accuracy. Both approaches involve a series of steps that include eDNA capture, preservation, extraction and amplification. This detection will depend on the affinity to the targeted taxa sequences and completeness and accuracy of DNA reference collection databases. The eDNA method applied in marine environments are probably the most challenging aquatic environments for applying this technique. This is because of the extreme relationship between water-volume to biomass, dynamics and the physical and chemical properties of seawater that affect dispersion, dilution and preservation. Here, we review the present application of this novel method in fishery assessment in marine environments. To date, many studies suggest that this method offers the potential to revolutionize fisheries monitoring, which will contribute to improving the range of tasks involved in fisheries management. The compelling conclusion is that the methodological steps including in eDNA surveys should be standardized and that research efforts should focus on developing appropriately validated tests to address environmental and sampling factors that

may affect eDNA detection in marine environments in order to draw reliable conclusions. This bioassessment tool can assist fisheries professionals in achieve their research, management, and conservation objectives, but not as a replacement for time-proven assessment methods.

Keywords:eDNA, fisheries, experimental design, marine environment, metabarcoding, monitoring, standardization, biodiversity.