

MCEF Project Completion Report
Submitted to
Marine Conservation Enhancement Fund

1. Project Details

Project Name: Assessment of eDNA for monitoring fish and shrimp diversity and distribution in Hong Kong's western waters: comparison with trawling (MCEF22003)

Project Period: 01/07/2023 - 31/12/2025

Organization / Project Leader:

Hong Kong Baptist University / Dr Jianwen Qiu

2. Executive summary

This project successfully evaluated the effectiveness of environmental DNA (eDNA) metabarcoding as a modern biomonitoring tool for fish and decapod (shrimp, crab) populations in Hong Kong's sediment-rich western waters, comparing it against traditional trawling methods. The project has met all its objectives, resulting in significant scientific outputs and practical recommendations for future environmental monitoring.

Key Achievements and Findings:

A key achievement was the establishment of a critical DNA reference database, which addressed a major knowledge gap for Hong Kong's marine species. This work revealed high barcode coverage for fish (approx. 90%) but found that decapods are significantly underrepresented (approx. 40-46%). Crucially, the study identified low data quality in existing public databases, highlighting an urgent need to generate high-quality reference sequences from morphologically verified local specimens. Building on this foundational work, the project also optimized eDNA sampling protocols for the region. The research determined the most effective strategy is to use larger water volumes (at least 2L per replicate) with a specific number of replicates to maximize species detection, providing a clear, evidence-based protocol for future studies.

When directly compared with conventional methods, eDNA proved to be a more powerful tool for assessing fish diversity. It detected more than double the number of fish taxa (164 via eDNA vs. 76 via trawling) and successfully identified a high percentage (70-80%) of the species captured by trawls. However, the study also identified important limitations. In contrast to the fish results, traditional trawling was more effective at detecting decapod diversity. This critical finding underscores that eDNA is not a universal replacement for conventional methods and its efficacy varies depending on the target group.

Project Outcomes:

The project has produced significant and tangible outcomes, including two peer-reviewed publications, one accepted manuscript (including the discovery of three new sea pen species), and one submitted manuscript, with two additional papers in preparation. By providing robust empirical data, the project has successfully validated the applicability of eDNA for fish monitoring in Hong Kong and established a foundation for its integration into future biodiversity assessment programs.