

ICES/PICES 6ZPS 2016/S4

What does standard plankton monitoring miss? Using meta-barcoding and an epibenthic sledge to reveal the hidden diversity of the shelf sea zooplankton.

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Traditional monitoring of shelf sea zooplankton is based on vertically hauled plankton nets, with microscope-based identification of the catch. This might provide an incomplete picture of the true diversity of the assemblage, due to the presence of small/rare/cryptic taxa, difficulties of identification (e.g. of larvae or meroplankton), and some of the taxa residing close to the seabed. To address this we studied the zooplankton at the L4 time series site (54 m depth) in the Western English Channel using both traditional microscopy and metabarcoding. This allowed a comparison between the morphologically- and metagenetically-derived Operational Taxonomic Units (OTUs) assigned to major eukaryotic taxa. In addition metabarcoding was used to analyse the catch from both vertical nets and epibenthic sledge over a seasonal cycle to determine if there is any taxa routinely missed by our sampling methods. The metabarcoding revealed a previously hidden taxonomic richness, especially for Copepoda and hard-to-identify meroplankton such as Bivalvia, Gastropoda and Polychaeta. It also revealed rare species and parasites missed by the microscope enumeration. Metabarcoding of the epibenthic plankton compared with traditional WP2 nets further increased the total species richness. Traditional sampling and analysis methods thus give only a partial picture of the plankton and our study shows that metabarcoding is a powerful tool for elucidating the true diversity and species richness of zooplankton communities. However, morphological analysis, capable of quantification of life stages and gender, still has some advantages over metabarcoding and the promises and pitfalls of both techniques will be discussed.

Key Words: metabarcoding, diversity, morphological analysis, Western Channel Observatory

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