

Can e-DNA help provide better represent zooplankton diversity? A comparison of net versus water sampling

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Many zooplankton species are missed or difficult to identify due to destruction caused by capturing devices or partial digestion by their predators, preservation, ambiguous characteristics and cryptic speciation. Molecular approaches can aid such identification as physical integrity is not important, as additionally material sloughed off animals can be captured (e-DNA). SAHFOS, which runs the Continuous Plankton Recorder (CPR) survey, has carried out a 1 year trial in the English Channel deploying an autonomous Water and Microplankton Sampler (WaMS) within the tailpane of the CPR device. A microscopic and molecular comparison was carried out on plankton caught on the 270µm net and in the WaMS that has an independent water inlet source. In order to verify the performance of molecular identification, taxon-specific PCR tests were performed on Cnidaria, Crustacea and Cryptophyte algae collected from CPR samples with different types/levels of preservatives, added pre- and post-CPR deployment, and from non-preserved samples. We found variation in amplification efficiency of different DNA markers on CPR samples and, upon sequencing, a broader range of taxa than the assay was designed for. The water samples provided additional taxa not captured by the CPR. Overall, sample preservation post deployment were less successful in producing a PCR product versus pre-deployment preservation and Steedmans solution (2% formaldehyde) worked almost as well as 80% ethanol preservation for the taxa tested. We also discuss how e-DNA from automated water collection systems can augment species detection and ranges for zooplankton, and the challenges of detecting zooplankton using molecular methods.

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