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Marine Ecology Progress Series

Dear Editors,

  We are submitting a research article titled “Assessing spatial patterns of within-stock connectivity provides novel insights for fisheries management” for consideration in the special issue on marine functional connectivity in MEPS. This submission suits the scope of this special issue as we incorporate environmental factors, seascape structure, dispersal and demography in our investigation of the effect of depletion events on a commercially important fish species in the North Sea. The methods and results presented here further our ecological understanding of the role of functional connectivity characteristics in driving the response to extinction-level disturbance events in a stock assessment area.

In this study, we investigated the effect of repeated commercial depletion events on sandeel populations in stock assessment area SA4 of the North Sea, using the software MerMADE, which was developed for predicting movement and dispersal evolution in aquatic environments. Using network theory analytical methods allowed us to identify key origin patches for supplying successful recruits to the system, as well as patches that are highly isolated and therefore vulnerable to disturbance. Patch size interacts with these connectivity patterns in determining the magnitude of stock-level consequences of patch depletion and possibility of recovery. The largest and most vulnerable patch in SA4 is also the target of heavy fishing pressure, indicating that there is a mismatch between the functional connectivity of the system and the way it is managed.

The novelty of this work truly lies in going beyond functional connectivity to consider its effectiveness relative to the goals of management measures that have been put in place. We challenge the operating assumption that a stock assessment area is well-mixed and the location of harvesting efforts is not important in determining the status of that stock. This has been a topic of concern and controversy for many years and we have seen examples of commercial depletion of sandeel stocks in the North Sea, indicating that investigations of this nature are not only relevant but also needed.

All authors included here have agreed to be listed and have approved the submitted version of the manuscript. Rebekka Allgayer carried out the development of the software, the running of simulations and the analysis of results. She and Peter Wright drafted the bulk of this manuscript and Justin Travis and Paul Fernandes contributed significantly to the editing process to produce the finalised version. Peter Wright and Paul Fernandes provided crucial data to carry out the work presented here.

This manuscript has not been submitted for consideration elsewhere and is an original work created by the authors included in this letter. It has not been previously submitted to any other publication outlets and we declare no conflicts of interest.

We suggest the following names for potential reviewers: Professor Michael Bode, Dr. Asbjørn Christensen, Professor Claire B. Paris-Limouzy, Dr. Scott Burgess, Dr. Stéphanie Manel, and Dr. Christophe Lett.

Yours sincerely,

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