From traits to life history strategies: deconstructing fish community composition in European Seas

Laurene Pecuchet*, Martin Lindegren, Manuel Hidalgo, Jon Solmundsson, Marina Delgado, Heino Fock and Mark Payne#

Abstract

Selecting an appropriate set of biological traits to use when characterizing communities can be challenging: traits are often correlated and therefore contain similar information. In this study we investigated whether summarizing traits into life history strategies (LHS) could be an efficient way of simplifying the analysis of communities' composition. Moreover, we studied whether the LHS follow specific spatial patterns that can be related to the abiotic environment. Using an extensive set of scientific bottom trawl surveys conducted in the Northeast Atlantic, we obtained the species composition of the fish communities on a ¼ degree grid. We complemented this data with species-specific information on six life history traits. We found that three LHS, corresponding to the "Equilibrium-Periodic-Opportunistic" model of Winemiller and Rose (1992), sufficiently summarized the information contained in the traits. These three strategies demonstrate marked spatial patterns, with Equilibrium and Opportunistic species dominating at high and low latitudes, respectively. The environmental variables explained up to 70% of the LHS spatial variability. Notably, sea surface temperature and its seasonality were important predictors and had strong and opposite patterns for the Equilibrium and Opportunistic strategies. Due to their tight coupling to the environment we argue that LHS can be a suitable tool to monitor community changes in response to natural and anthropogenic stressors, including climate change.

*corresponding author: laupe@aqua.dtu.dk, Centre for Ocean Life, National Institute of Aquatic Resources (DTU-Aqua), Technical University of Denmark, Charlottenlund Castle, DK-2920 Charlottenlund, Denmark