

Stochastic Multi-species model for fish stock assessment in the Celtic sea

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Abstract :

Operational implementation of the ecosystem approach to fisheries management (EAFM) relies on the ability to understand and model the technical and biological interactions between fleets, gears and species. Multi-species management advices help to address the direct and indirect effects of biological interactions (predation and food competition) on population dynamics. Currently, several multispecies and ecosystem models exist, one of them the stochastic multispecies model (SMS, developed by Lewy and Vinther in 2004) is used as basis for ICES advices in the Baltic Sea and the North Sea. This multi-species model is used to evaluate past recruitments and fish stocks status and forecast population dynamics under different fishing pressure scenarios. The Bayesian framework, on which this model is based, provides an integrated framework for data integration and prediction that accounts for multiple sources of uncertainty. In this study, we attempt to develop the first SMS model for the Celtic sea. The model includes several top predators living in the area, namely cod, hake, whiting and anglerfish, other fish species (blue whiting, horse mackerel and Norway pout) and other taxonomic groups such as Arthropoda and Mollusca. In order to estimate parameters of the model, and more especially parameters occurring in the predation process, the model requires, among others, data from stomach contents of predators. For that purpose, we use data from the EATME project, collected during the EVHOE campaigns in November 2014 and 2015. We then perform forecast simulations to estimate future stocks status with underlying uncertainties for various fishing scenarios.

Keywords : multi species stock assessment and advise, stochastic and Bayesian modeling, Celtic sea, stomach contents

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