
Scenarios on the effects of environmental drivers and fishing in a Baltic Sea ecosystem

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Abstract

We describe a food web model of the Baltic Proper to understand how the fisheries and the abiotic environment in combination influence ecosystem structure and function. The model is constructed using recent ecological and fisheries data. It represents 21 functional groups, including the four most important commercial fish species in the open sea Baltic fisheries, and multiple fishing fleets categorized by vessel size and gear type. Alternative scenarios about nutrient load and climate change are modelled by a hydrodynamical-biogeochemical model, BALTSEM. The outputs of BALTSEM were used to drive abiotic environmental conditions and the production rate of phytoplankton in the food web model. The effects of these environmental scenarios on the food web were evaluated in parallel with a set of potential fisheries management strategies which were developed in a co-creation process with stakeholders. We use a set of indicators to compare the consequences of the various scenarios. These ranged from ecosystem structure indicators to indicators more directly focused on fish production as a provisioning ecosystem service. Indicators allowed comparison of the impacts of fisheries management choices on the ecosystem and to what extent those are modified by eutrophication and climate change.

Keywords: Ecopath with Ecosim, fisheries, eutrophication, simulation model, scenarios

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