Fish community size-resolved model (FCSRM)

Model type: FCSRM represents an ecosystem including fish populations resolved by species and body size, fishing mortality, and zooplankton as a food source. All life stages of fish are modelled at a consistent level of detail. This is a simple theoretical model that has no spatial structure and predicts the types of fish communities that might coexist. It allows assessment of high-level questions related, for example, to the response of ecosystems to fishing pressure and the ecological indicators that are needed to underpin policy and management.

Existing Models for UK shelf seas:
A variant of the FCSRM with a specific parameterisation to represent the North Sea fish community has been recently calibrated and validated[1]. The predicted catches and spawning stock biomass from the calibrated model correlated strongly to observed values and the validation showed significant positive correlation between modelled and observed species' size distributions.

Existing uses:
- Understanding how and why ecosystems respond to fishing pressure.
- Understand the mechanism generating complex non-linear stock-recruitment relations for fish.
- Assessment sensitivity and specificity of size-based ecological indicators to fishing.

Potential new uses:
- Evaluate ecosystem response to fishing and resulting management trade-offs.
- After further calibration and validation, address management questions related to a specific ecosystem and fishery including the likelihood of meeting management targets.

Key modelling issues:
- As for all food-web models, structural instability of food webs demands that the FCSRM represents a compromise between faithful representations of state and faithful representations of dynamics.
- Compared with conventional stock-assessment models, the representation of adult life stages is simple.

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[1] Houle et al. (2012). Canadian Journal of Fisheries and Aquatic Sciences, 69, 1065—1079.
Blanchard et al. (20114). Journal of Applied Ecology 51, 612–622