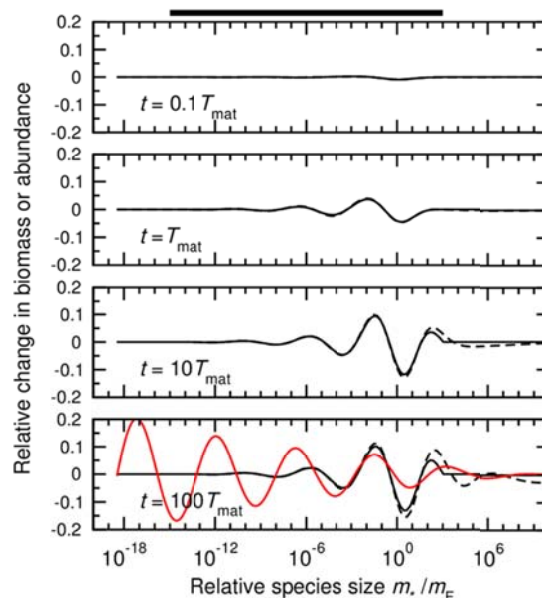


Species Size Spectrum Model (SSSM)

Model type: The modelling principles underlying the SSSM are simplicity and transparency. It describes marine food webs using a size-based approach called size-spectra, i.e. in terms of the distribution of the biomass of the entire marine food web over species in different size classes. This enables highly simplified modelling of food-web dynamics. The SSSM overcome several technical difficulties due to which previous proposals for size-spectrum models were likely to incorrectly predict dynamics responses to pressures.ⁱ The SSSM is ideally suited for quick explorations of semi-quantitative “if/when” questions as they frequently occur in the management context. Examples are questions regarding responses and responsiveness of fish-community size structure to changes in fishing mortality at different size ranges (forage fish, main commercial fish, top predators, etc). The model is easily related to several high-level MSFD indicators, and can so assist in managing marine ecosystems at the indicator level.



Existing Models for UK shelf seas:

Area Modelled	Includes					Spatial Scale	Quality (data used)
	M ¹	B ²	F ³	I ⁴	P ⁵		
Generic	Infinite					None	Generic (analytic model & solution)

1 M = mammals, 2 B = birds, 3 F = fish, 4 I = invertebrates, 5 P = primary producers

Existing uses:

- Revealed mechanisms determining magnitude and dynamics of food-web responses to pressures.

Potential new uses:

- Fast and transparent assessment of impacts of pressures and recovery potential.
- Simple prediction of indicator dynamics (e.g. size-based indicators such as LFI, Mean Maximum Length) in response to pressures.
- As a management model with an agreed role in adaptive management plans for MSFD indicators.
- Assessment of impacts of global climate change on marine higher trophic levels and seafood production.

Key modelling issues:

- Model calibration to seas surrounding the UK (will be addressed within MERP).

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ⁱ Rossberg, A. G. (2012). A complete analytic theory for structure and dynamics of populations and communities spanning wide ranges in body size. *Advances in Ecological Research*, 46, 429–522.