OSMOSE Model
English Channel case study

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BELMONT FORUM
NORTH WESTERN WATERS ADVISORY COUNCIL
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OSMOSE

Object-oriented Simulator of Marine Ecosystems

www.osmose-model.org

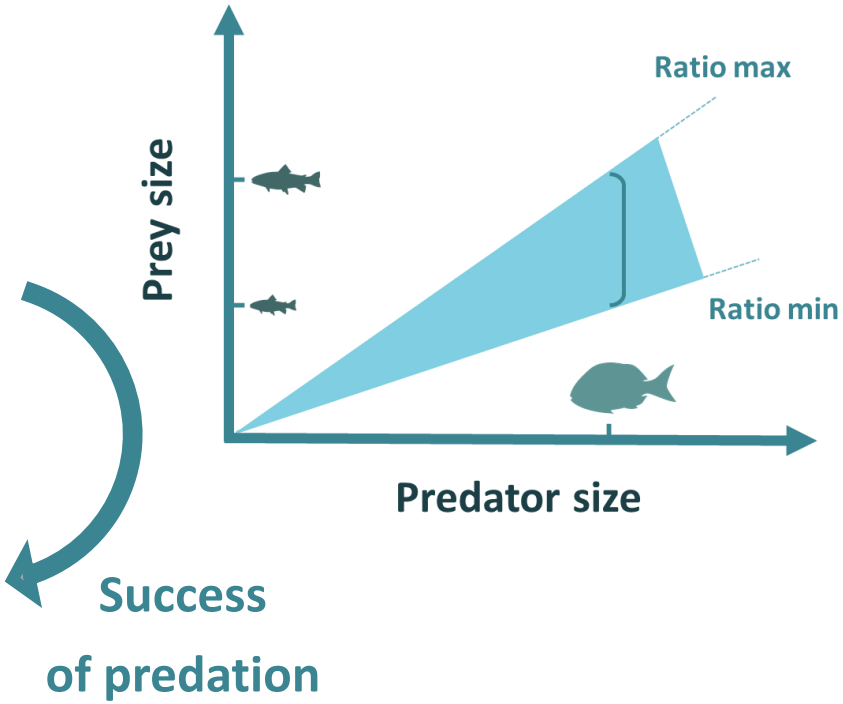
Main assumptions

- Multispecies
- Individual based model

Opportunistic predation :

- Size selection
- Spatio-temporal co-occurrence

- Growth
- Mortality
- Reproduction
- …



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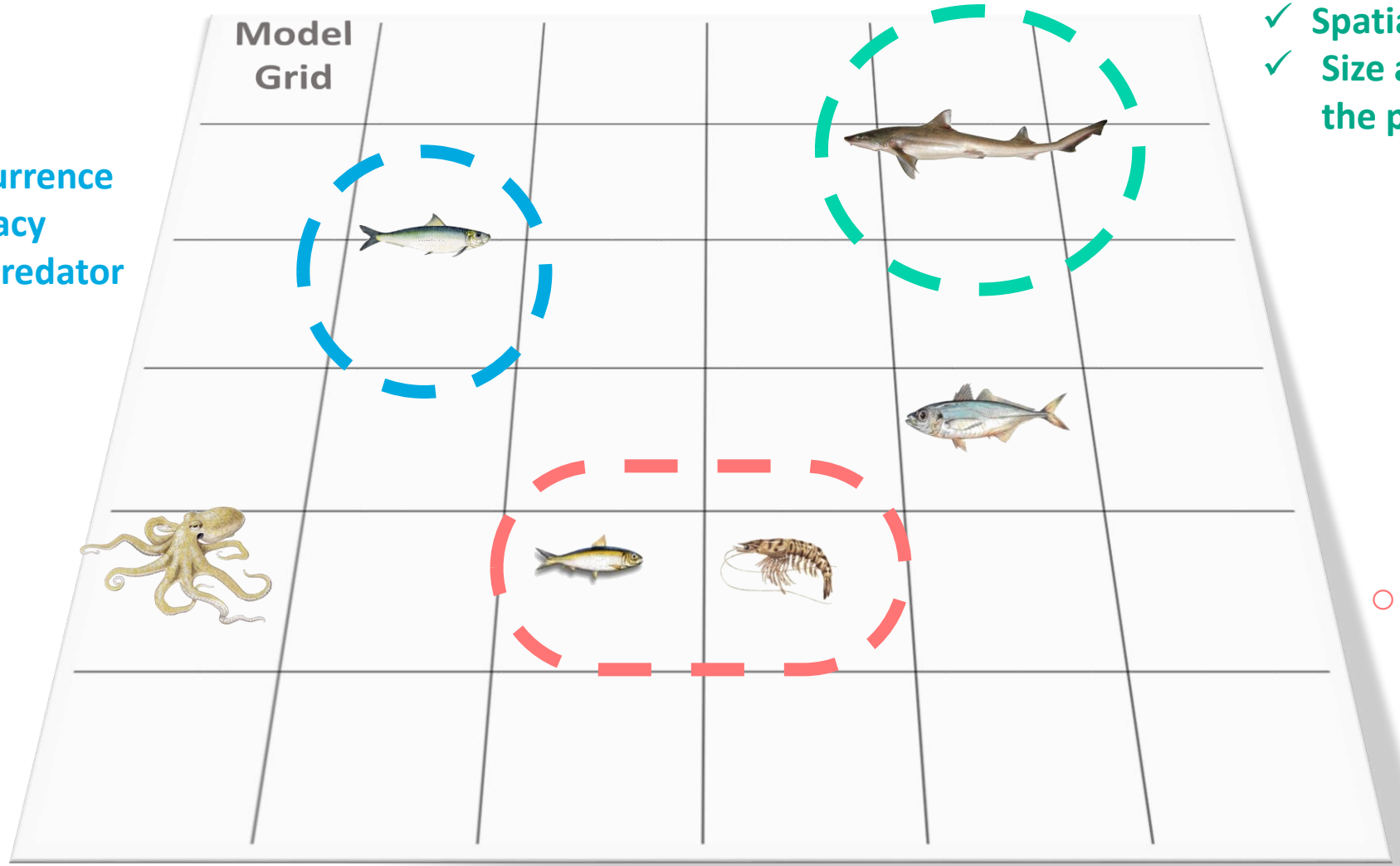
- ✓ Spatial co-occurrence
- ○ No size adequacy between the predator and its prey



- ✓ Spatial co-occurrence
- ✓ Size adequacy between the predator and its prey

- ○ No spatial co-occurence

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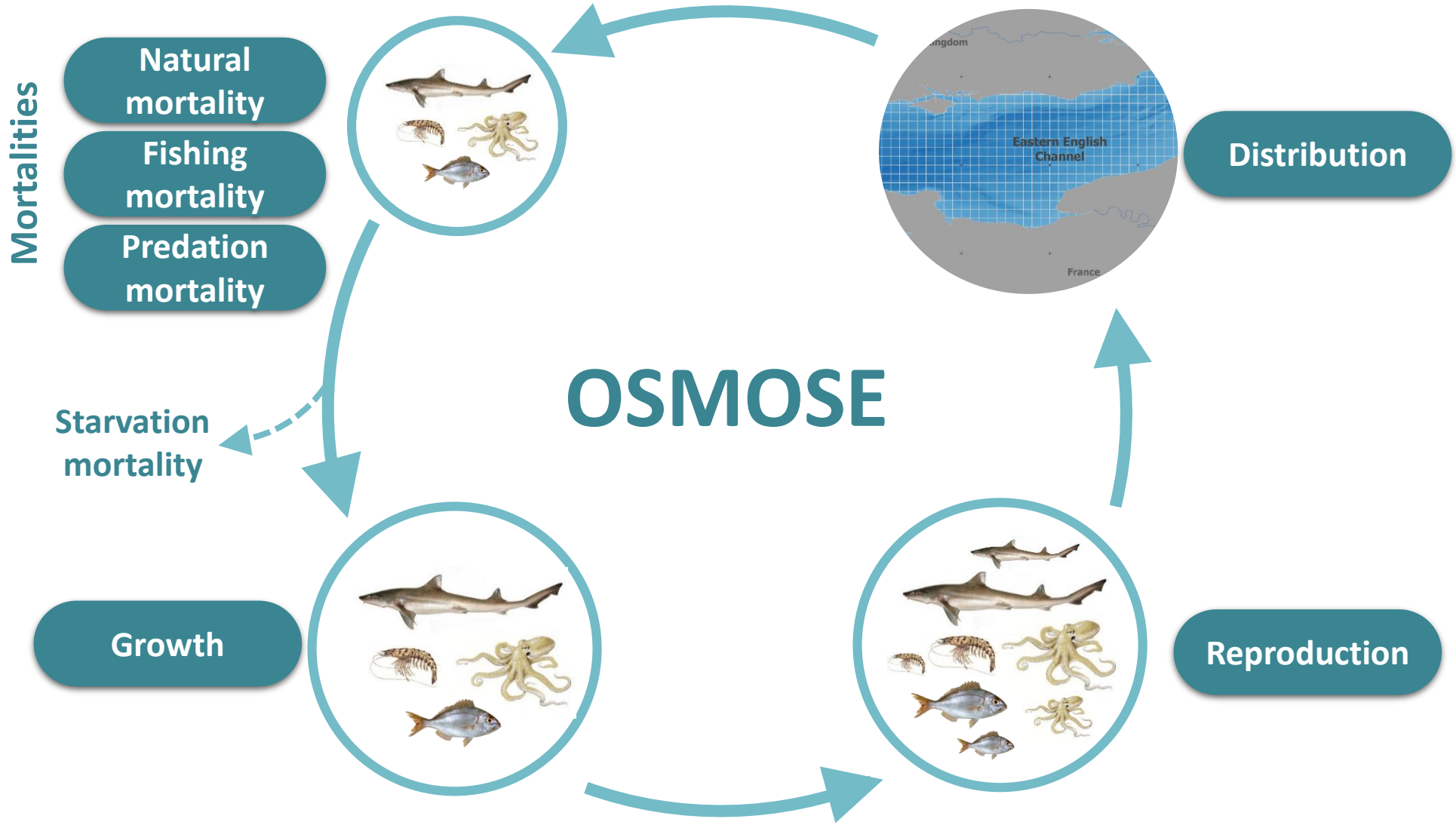

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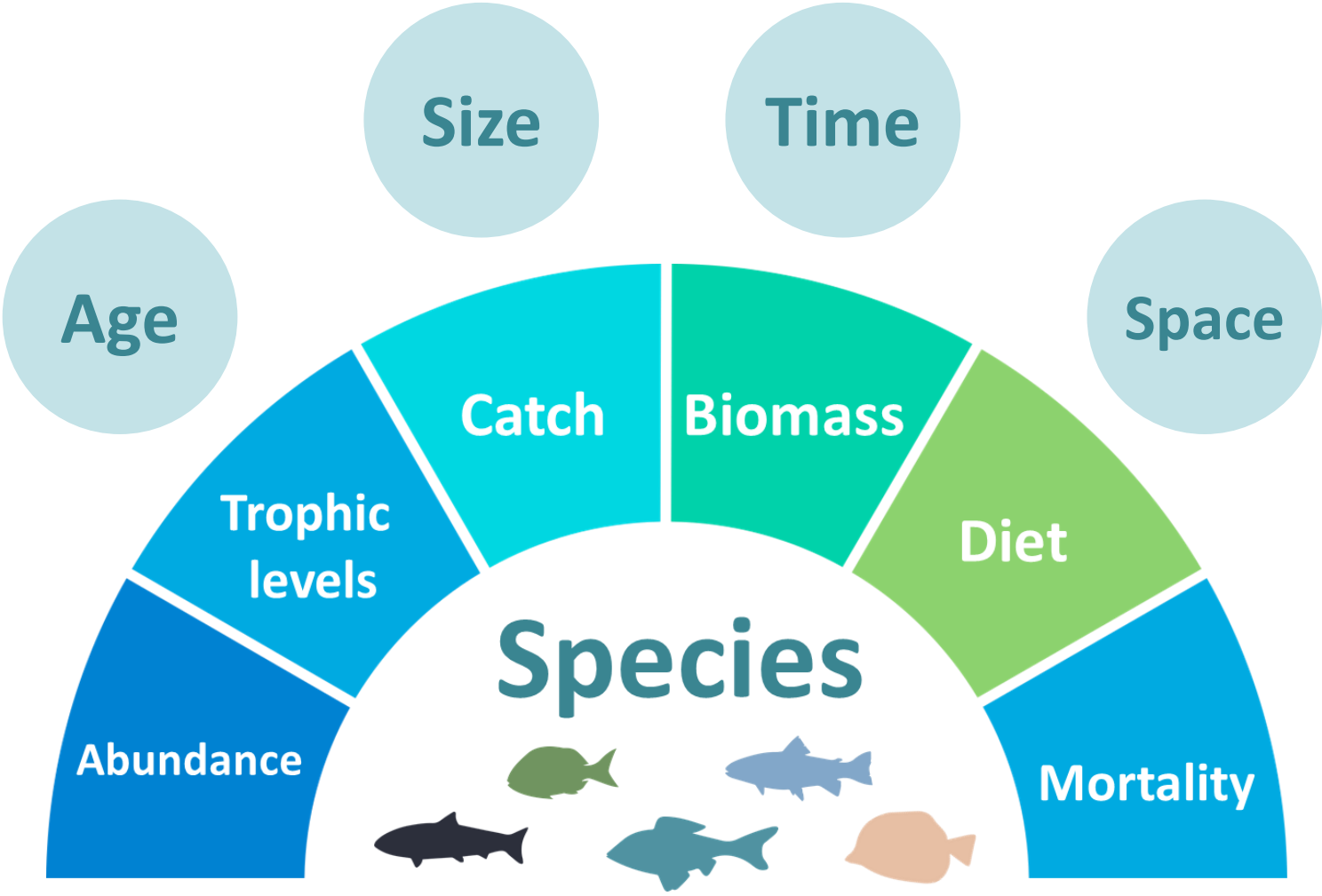
Outputs



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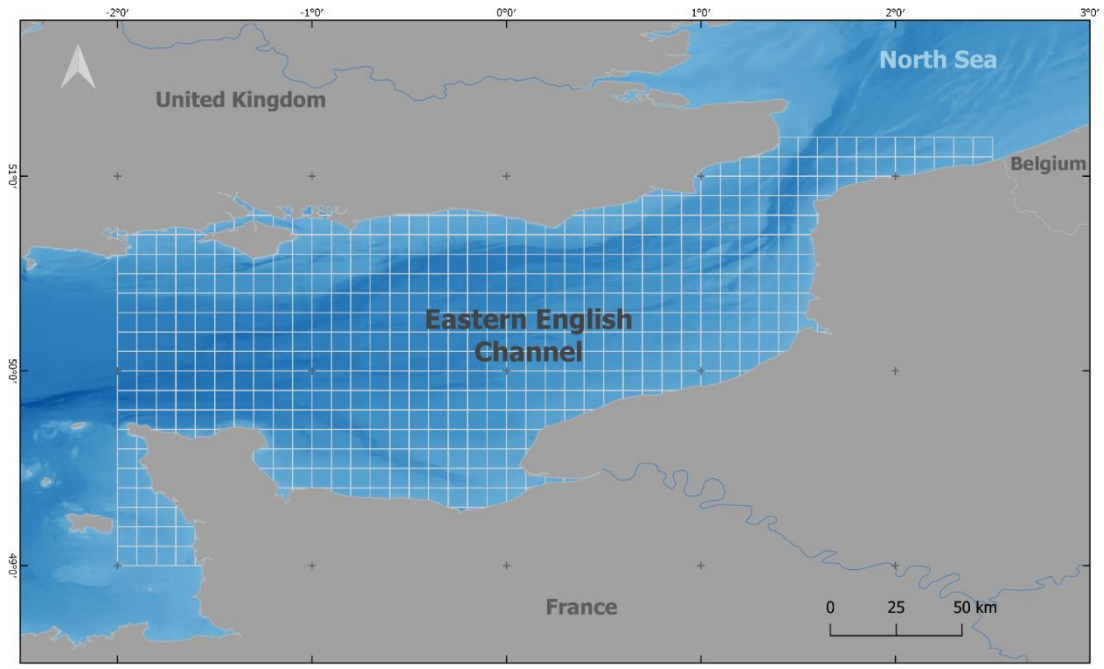

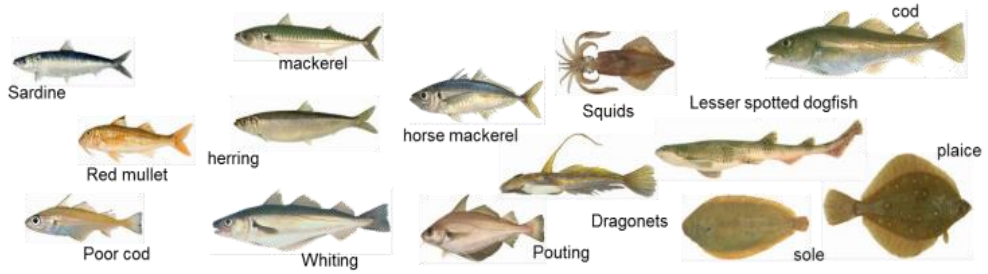

- **14 Species** (~90% of landings)
- **5 Planktonic groups** (ECO-MARS-3D)
- **5 Benthic groups** (structured by size)

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Contents lists available at ScienceDirect

Ecological Modelling

journal homepage: www.elsevier.com/locate/ecolmodel

Emergence of negative trophic level-size relationships from a size-based, individual-based multispecies fish model

Morgane Travers-Trolet[a,b,*], Franck Coppin[a], Pierre Cresson[a], Philippe Cugier[c], Ricardo Oliveros-Ramos[b], Philippe Verley[d]

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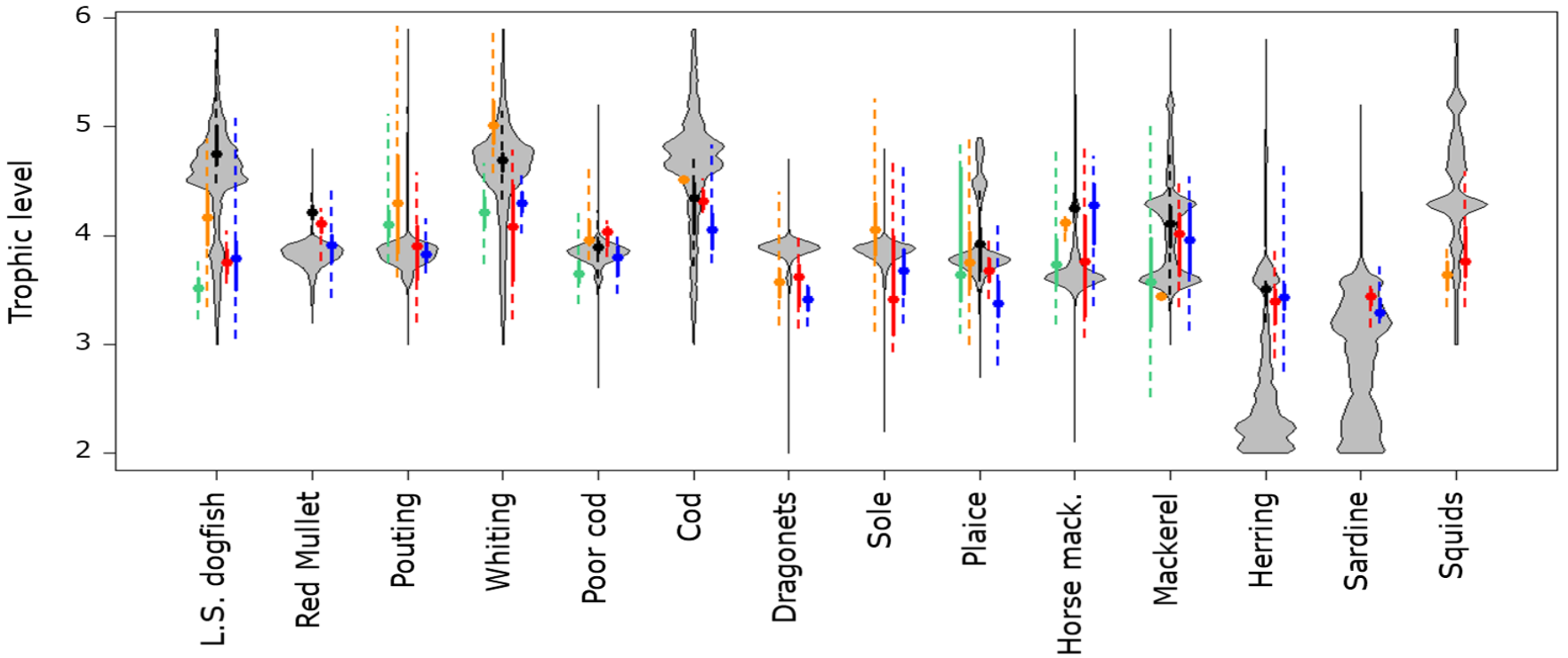
Model validation



Cresson et al. (2017)
Jennings and van der Molen (2015)

Cresson et al. (2018)
Kopp et al., (2015)

Mialet et al. (2017)
Travers (2019)

(Morgane Traves pers. comm)

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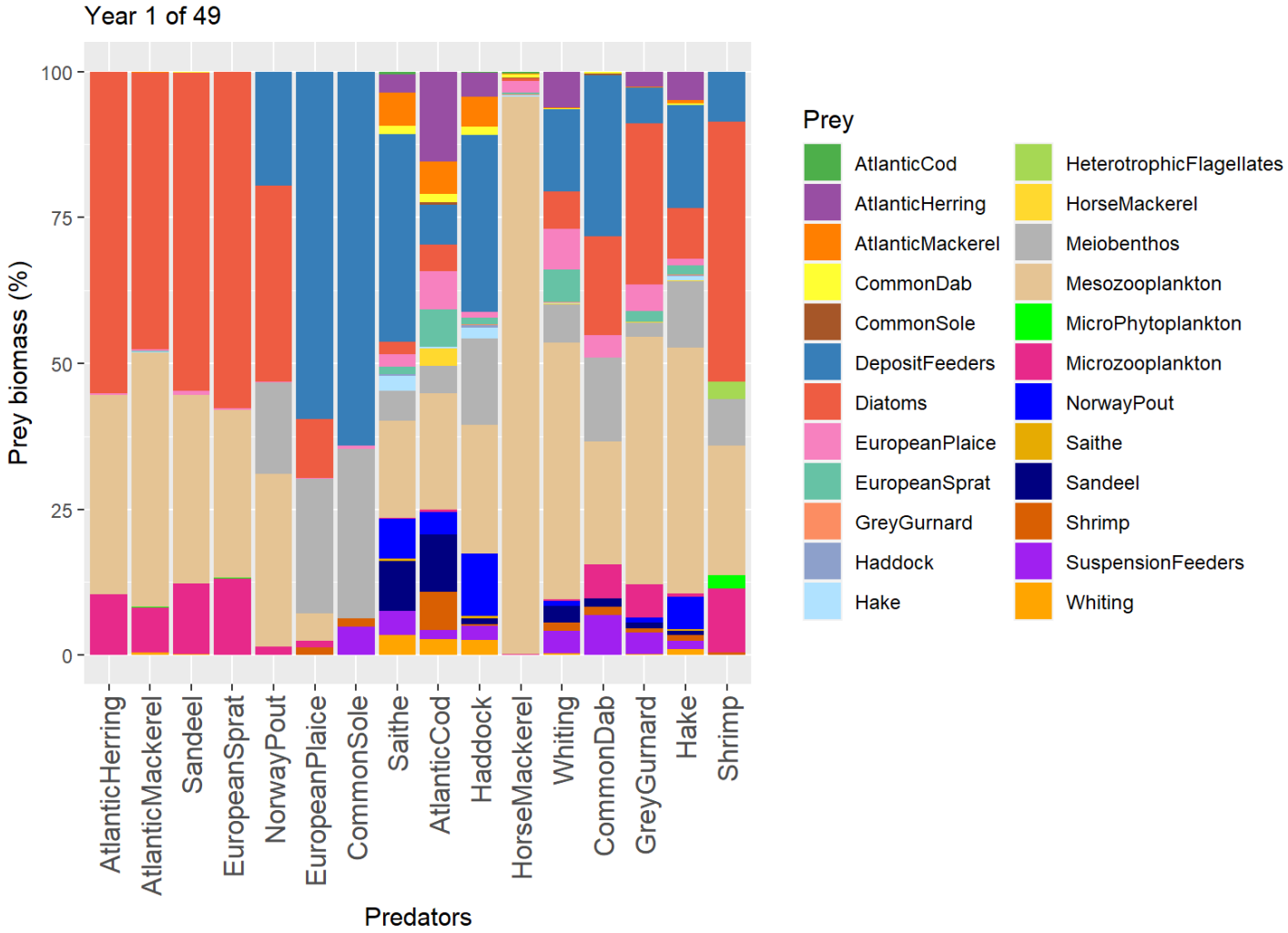
Diet composition



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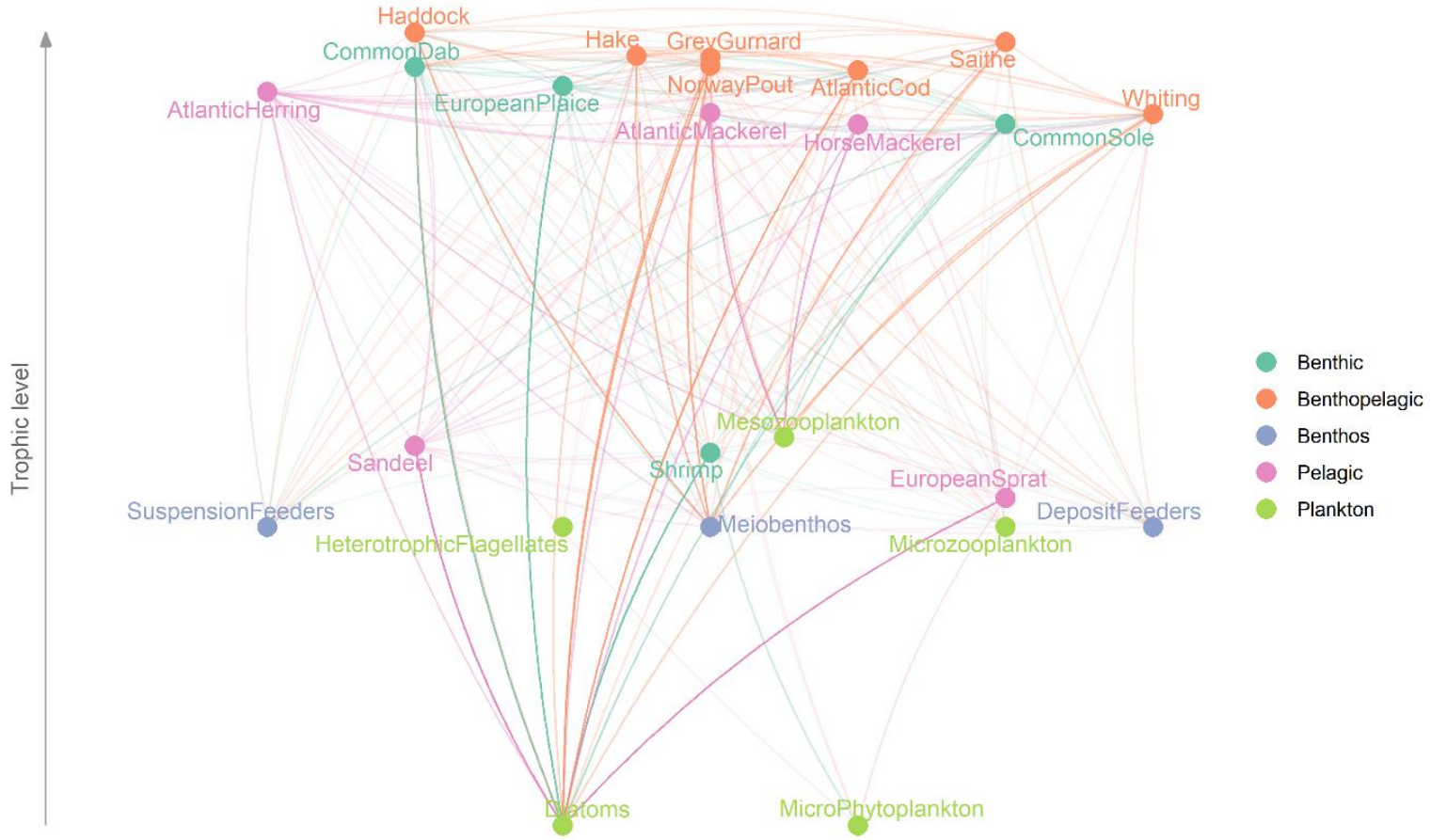
Food web



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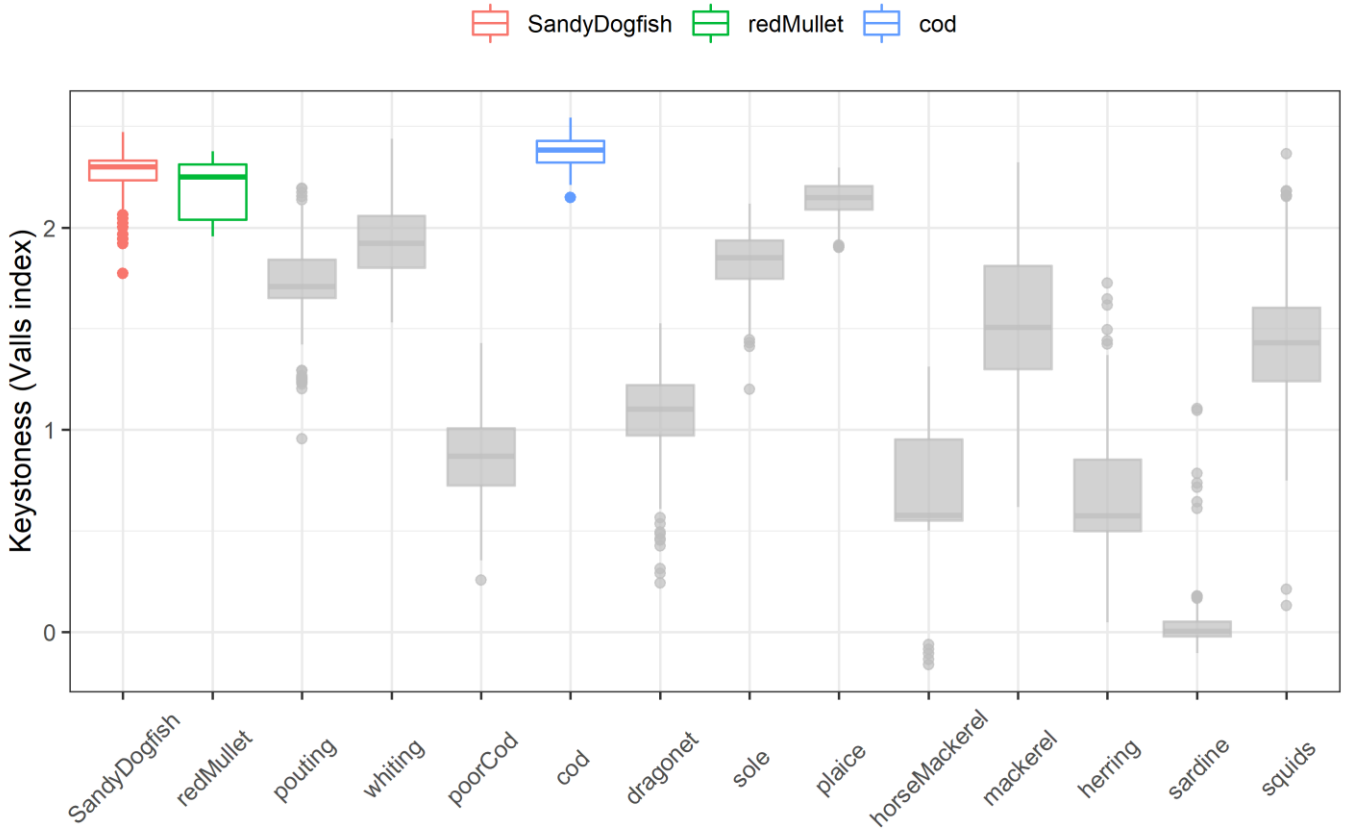
Ecological Network Indicators



Keystone index

Identifies the species with low biomass that have a disproportional effect on the ecosystem

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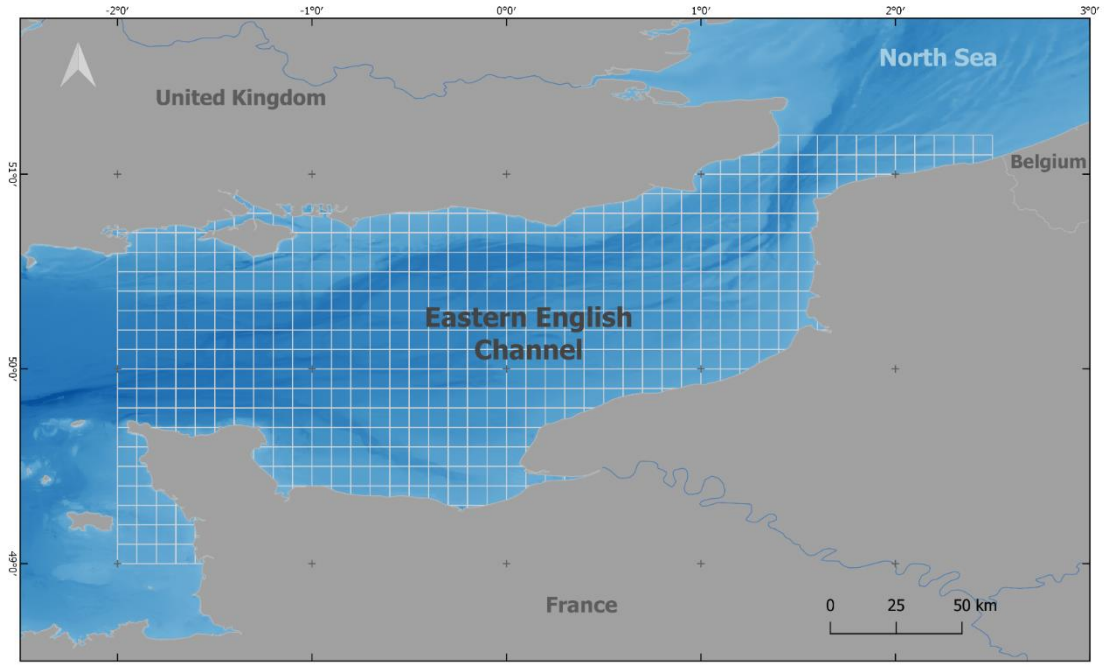

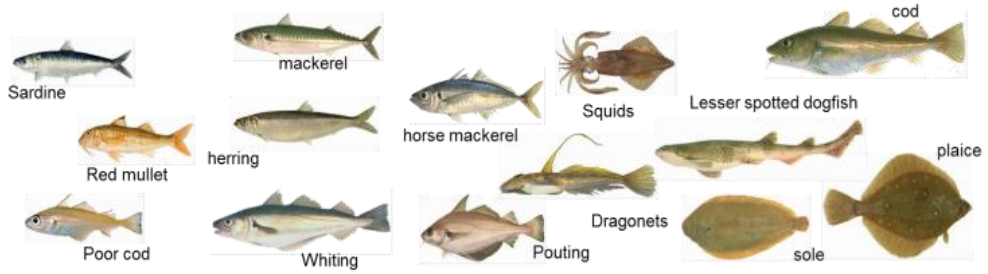

- **14 Species**
- **5 Planktonic groups** (ECO-MARS-3D)
- **5 Benthic groups** (structured by size)

Simulation of RCP regional scenarios (RCP 4.5 and RCP 8.5) using the model POLCOMS-ERSEM

- Primary production
- Growth
- Spawing period
- Distribution

PML | Plymouth Marine Laboratory

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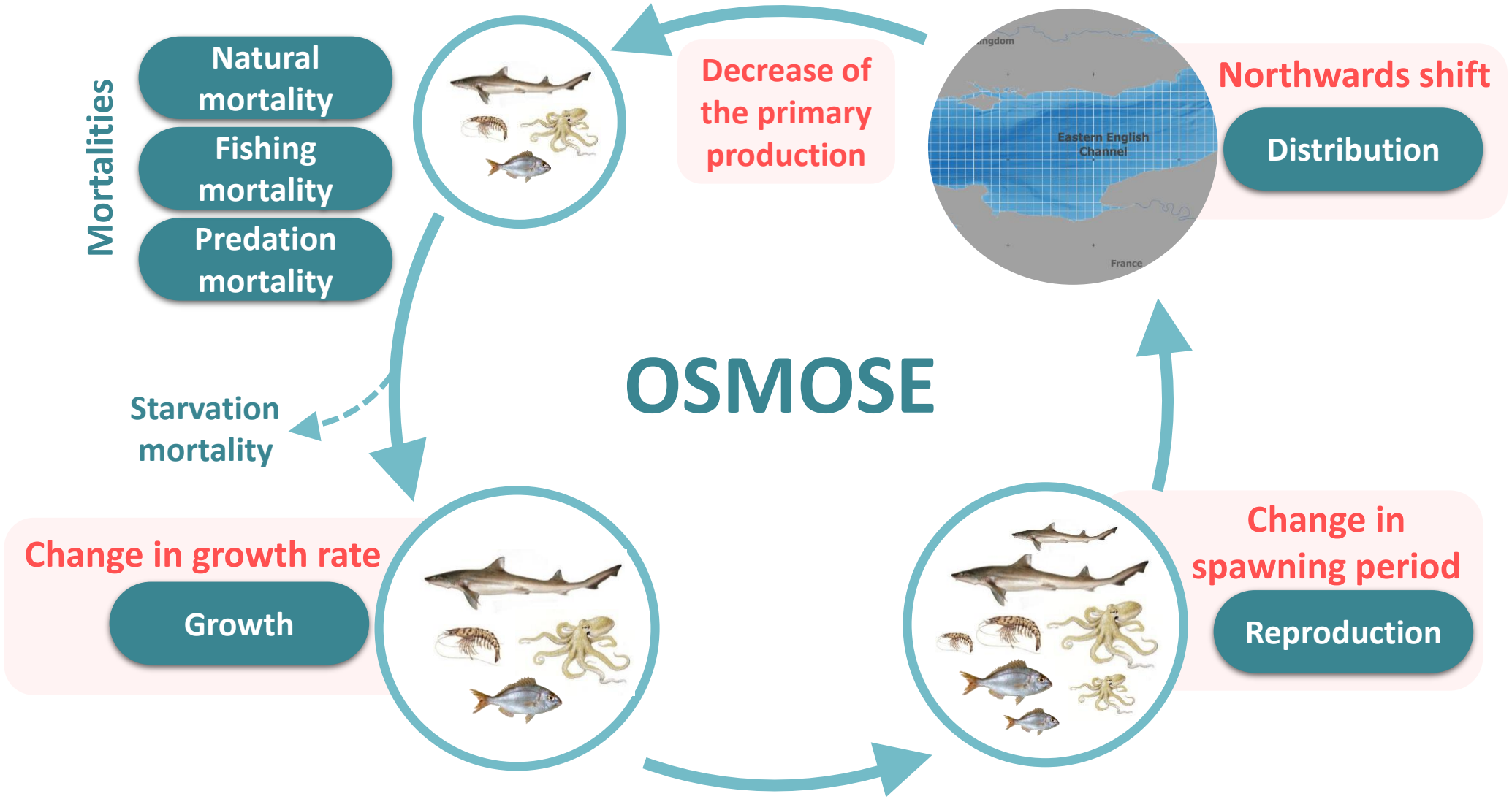

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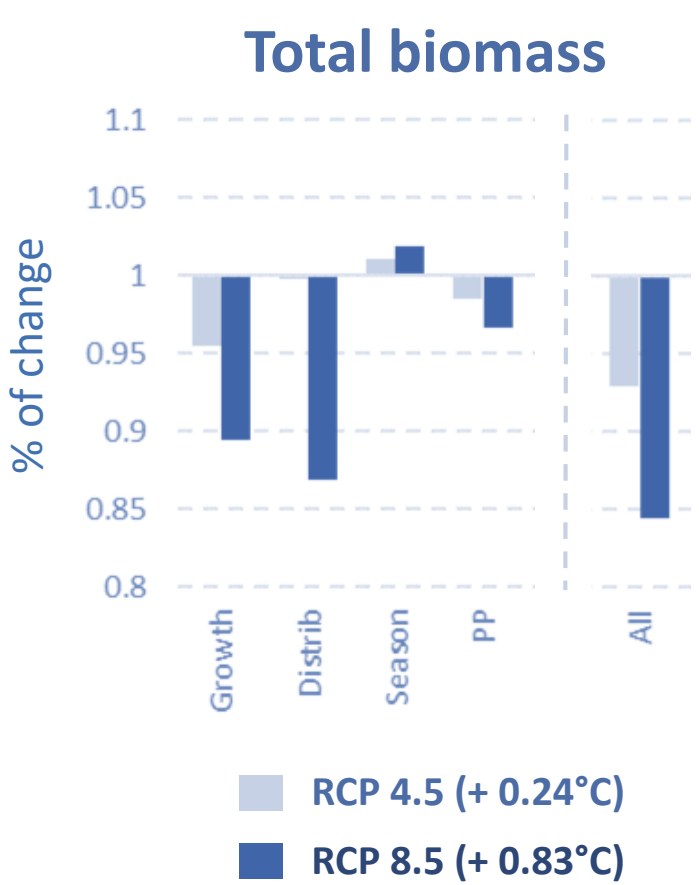
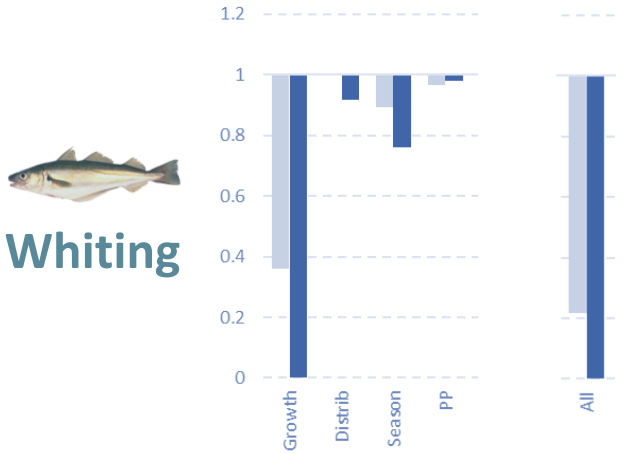
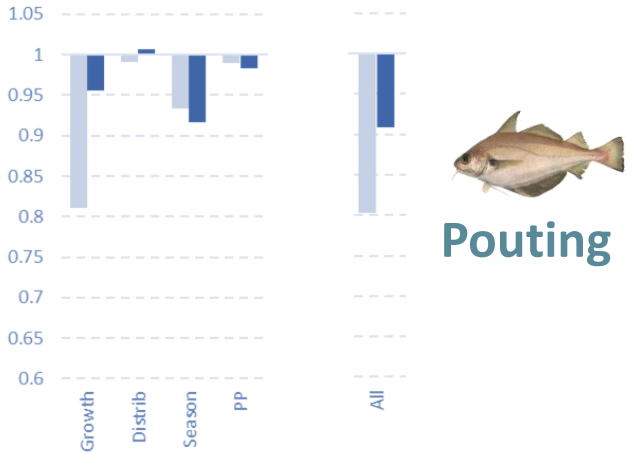
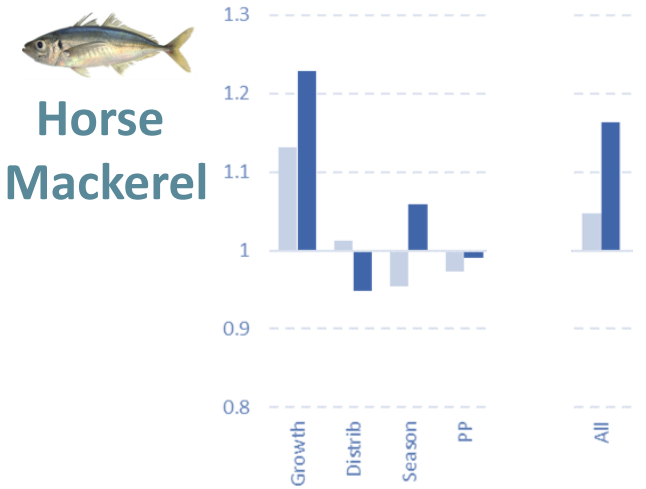
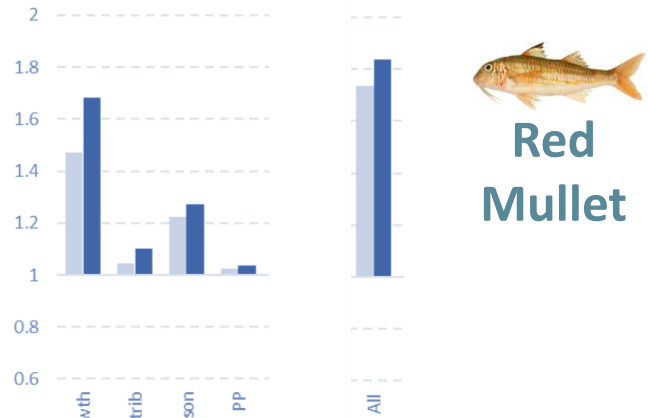
Simple and combined effects of climate change











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Climate change impacts on reference points

Evolution of reference points (F and F_{MSY}) with climate change was compared across species

frontiers in Marine Science

ORIGINAL RESEARCH
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Check for updates

The Risky Decrease of Fishing Reference Points Under Climate Change

Morgane Travers-Trolet[1], Pierre Bourdaud[2], Mathieu Genu[3], Laure Velez[4] and Youen Vermard[1]*

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(Morgane Traves pers. comm)

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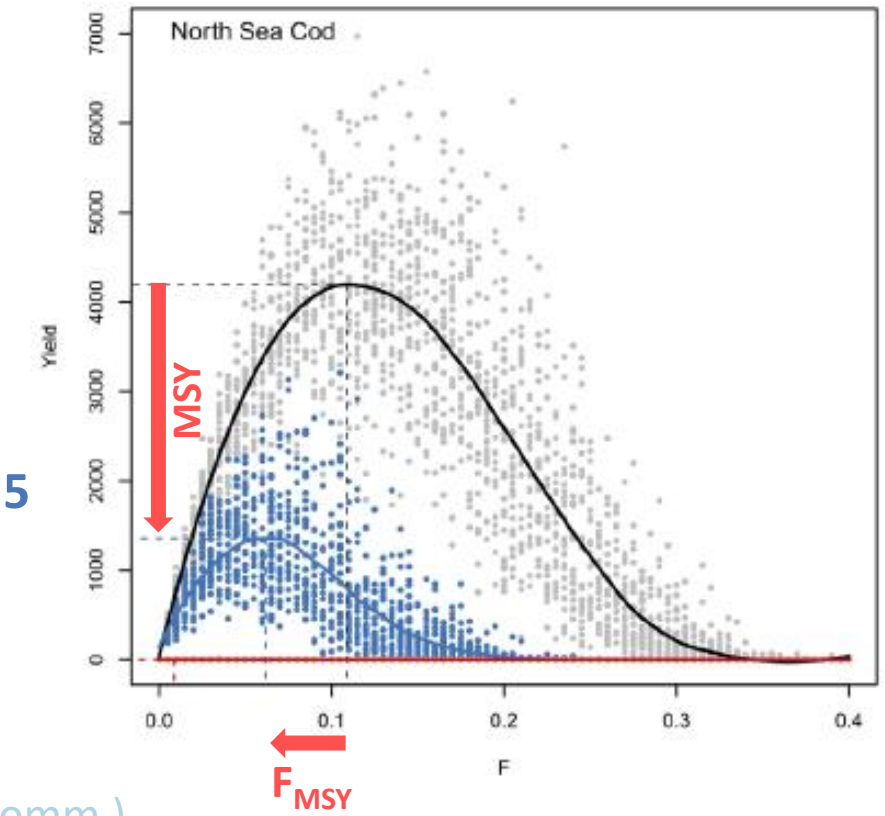
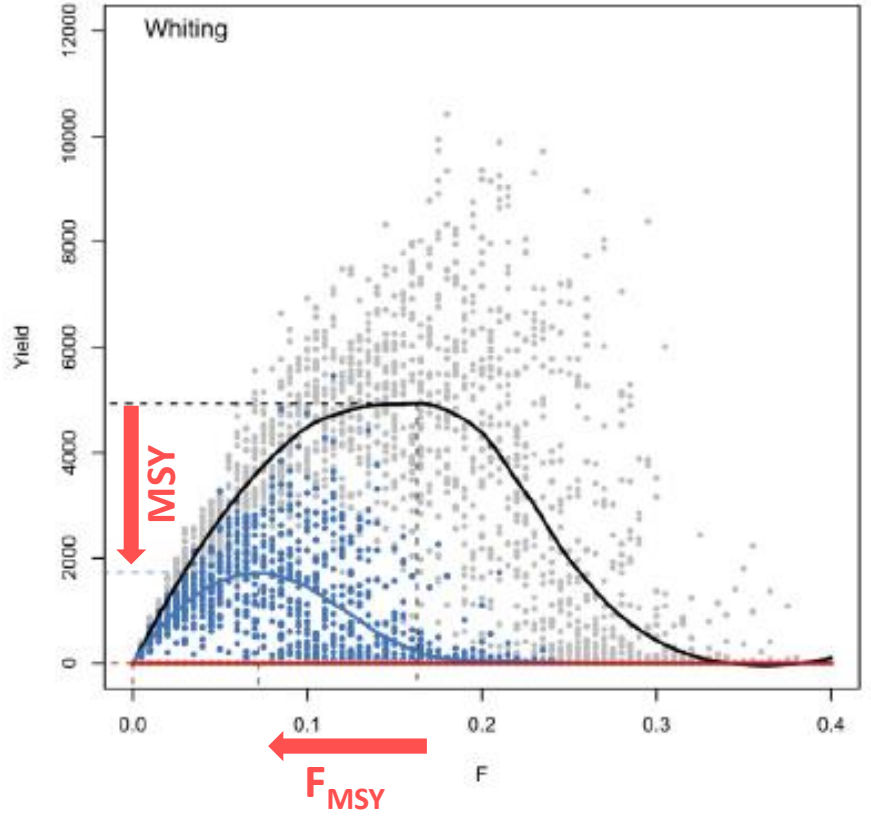
Climate change impacts on reference points

Cold-water species are likely to have both MSY and F_{MSY} declining with climate warming.

- **Historical conditions**
- **Climate change scenarios RCP 4.5**





(Morgane Traves pers. comm)

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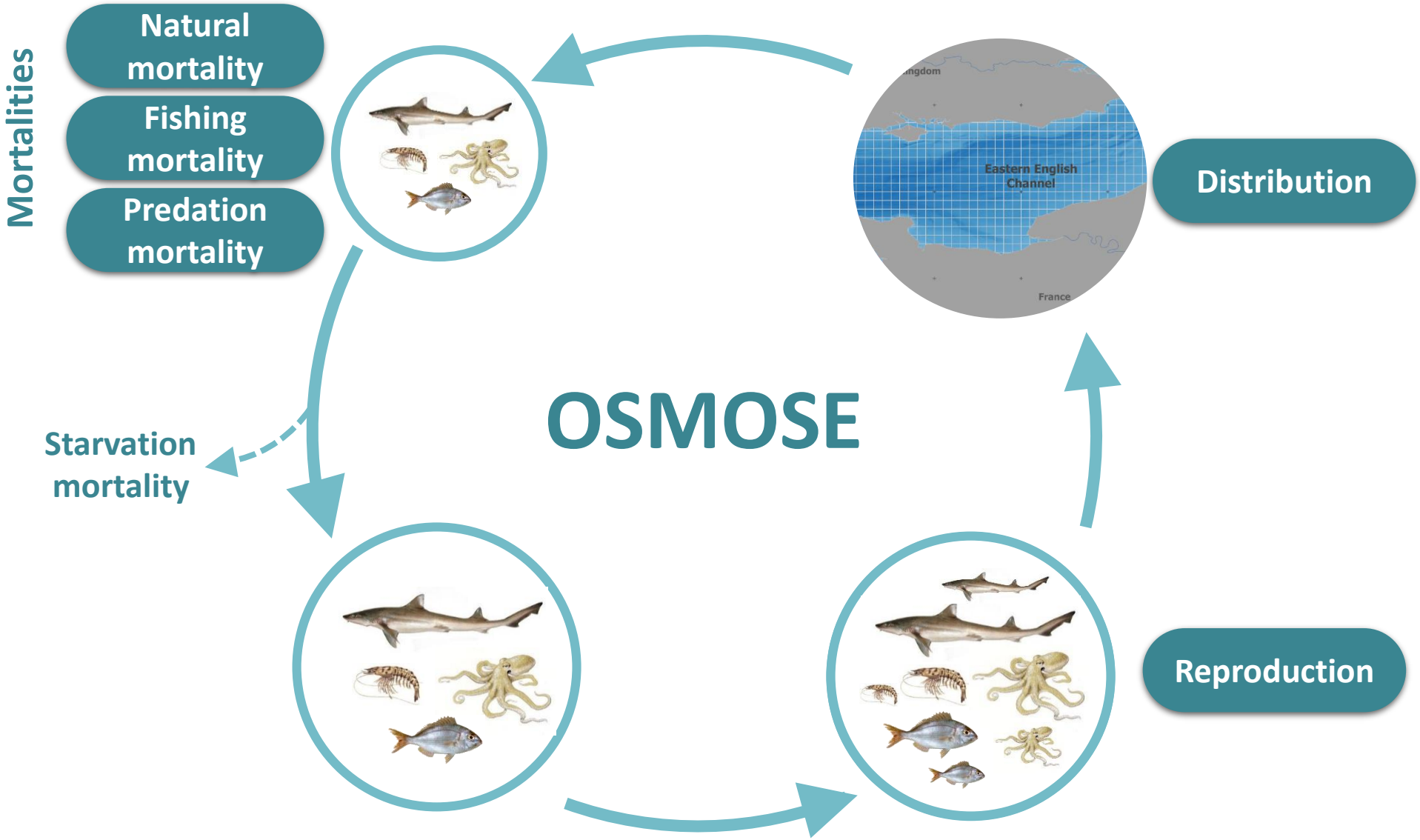

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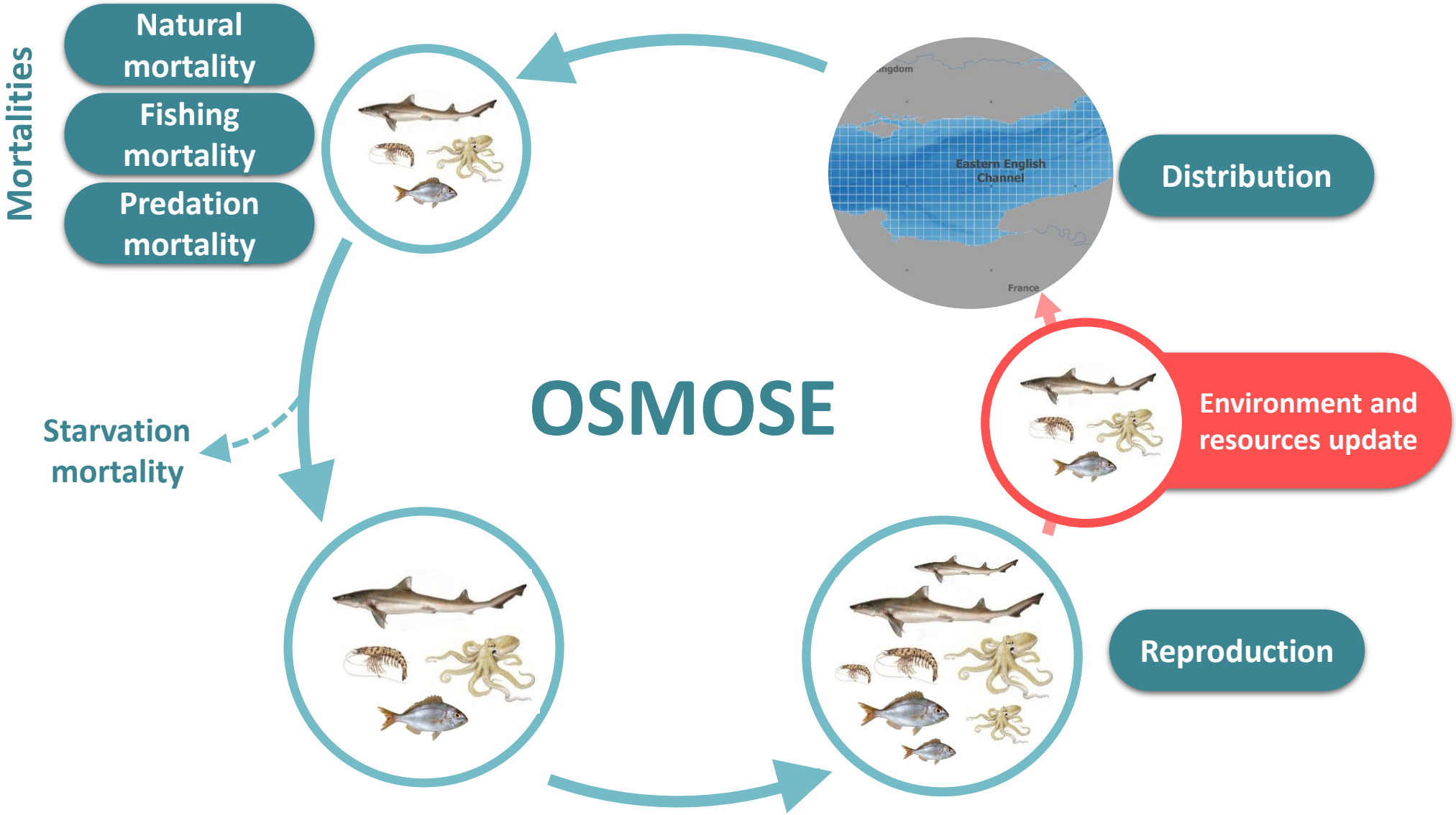

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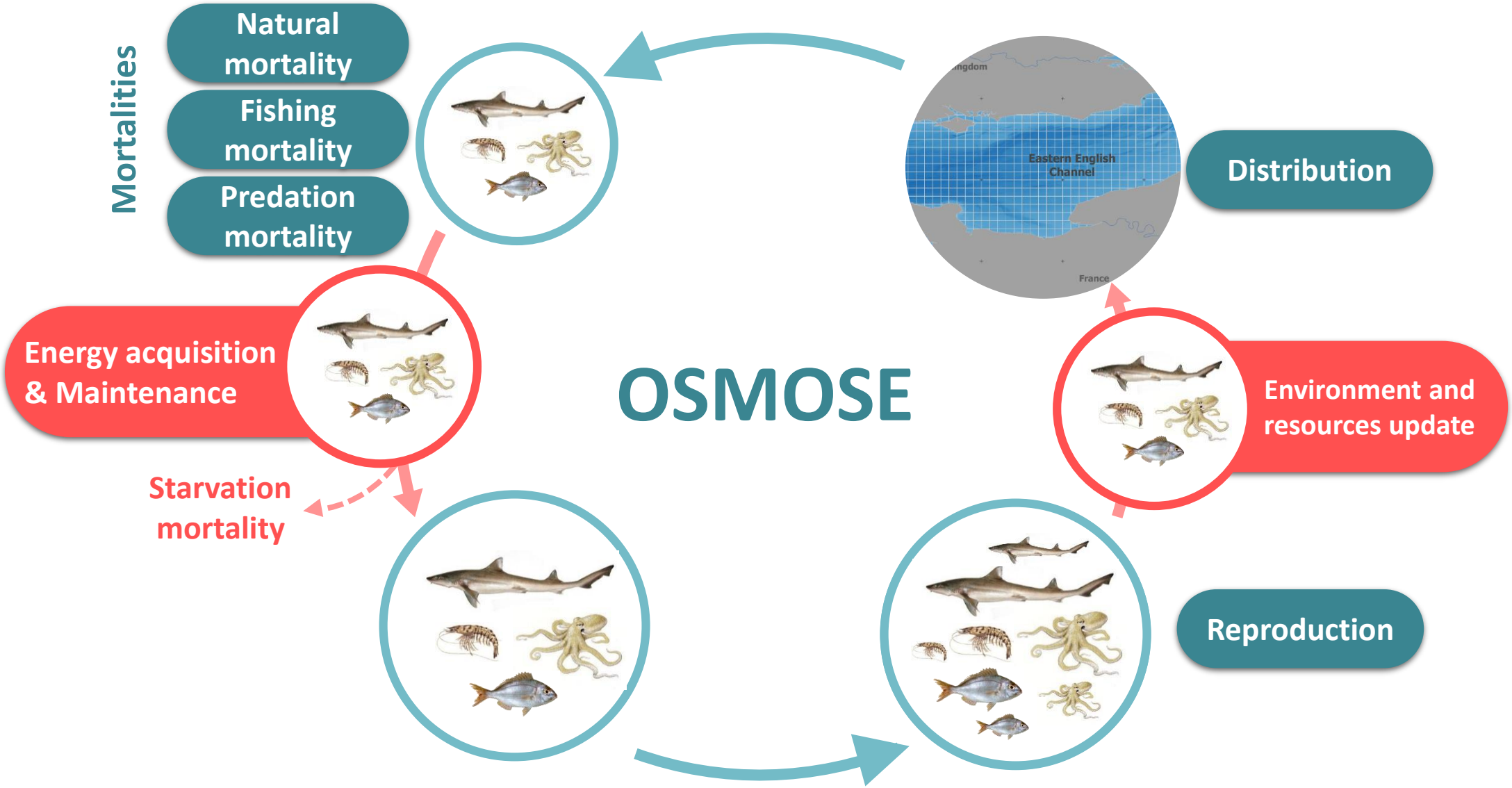

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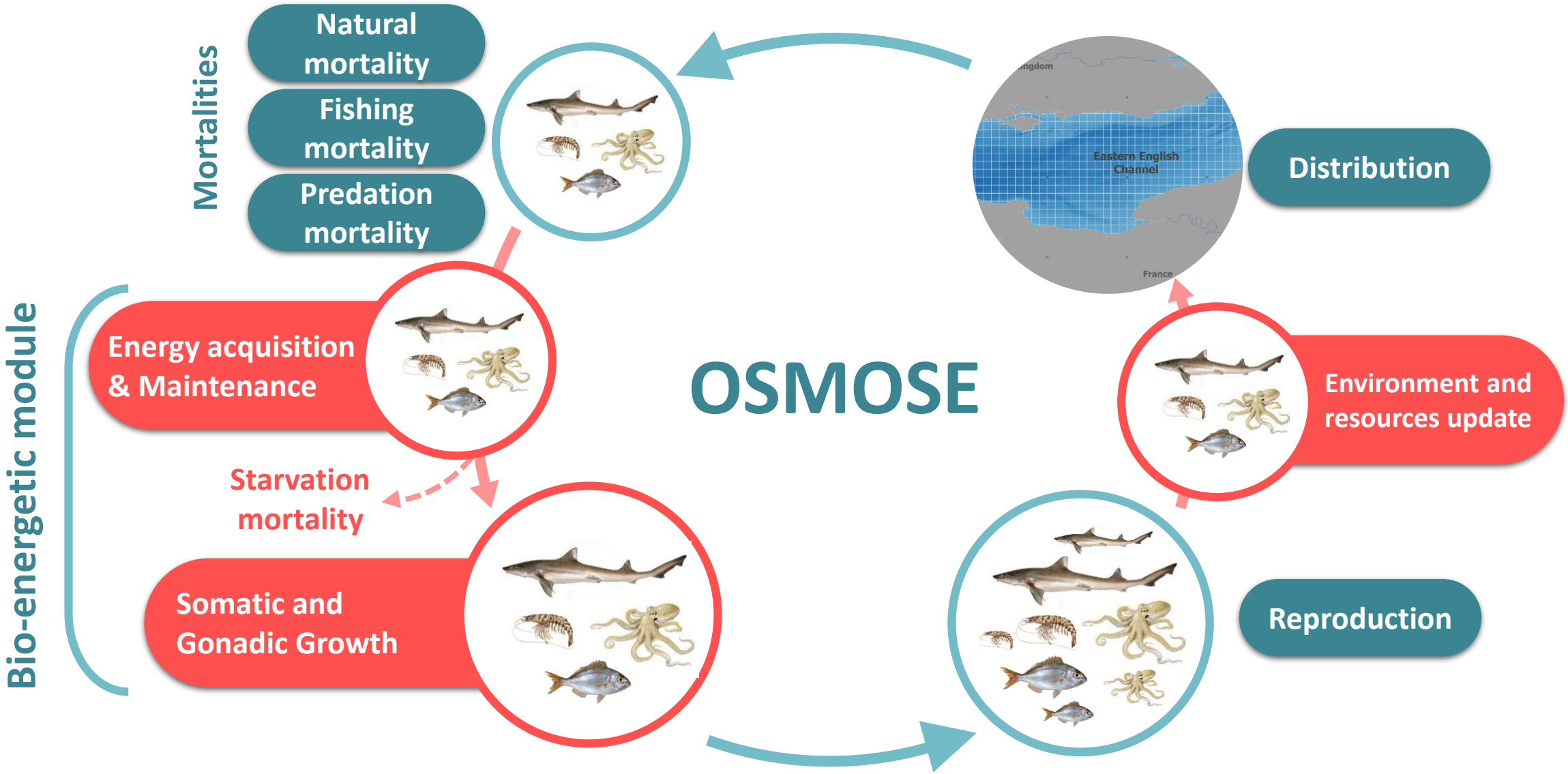

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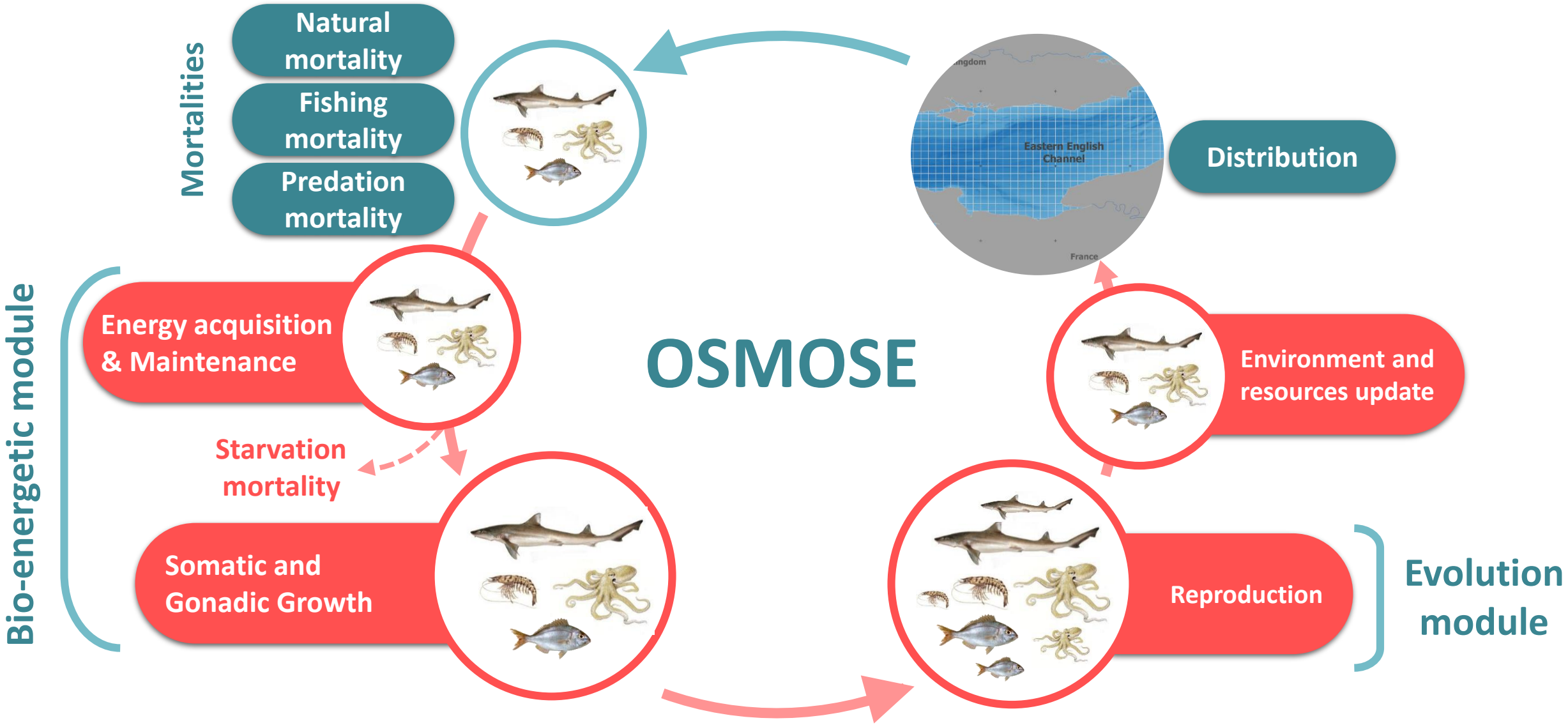

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The overall objective of SOMBEE is to build future scenarios of marine biodiversity with emphasis on the effects of fishing and climate change.

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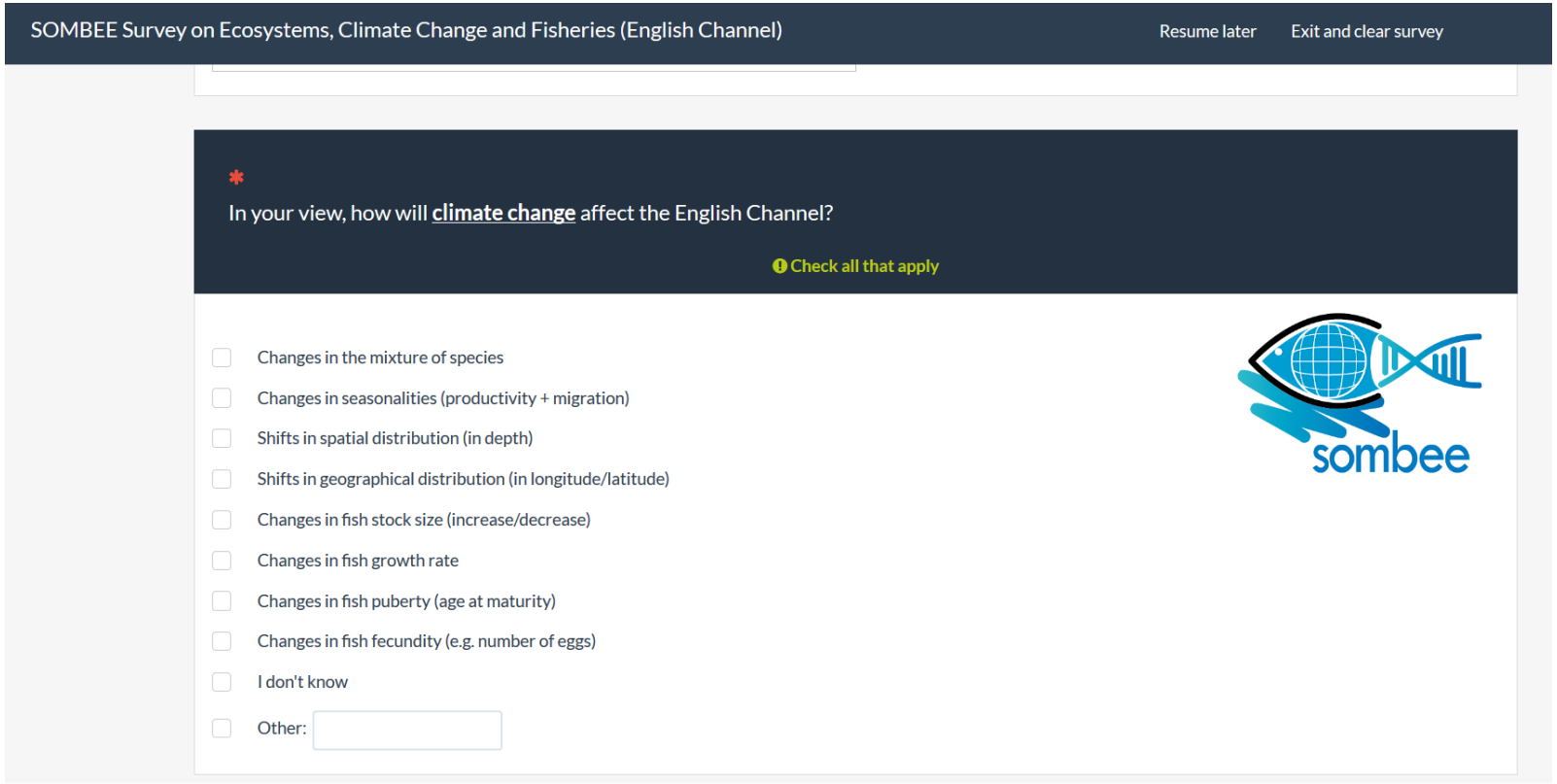
SOMBEE Survey on Ecosystems, Climate Change and Fisheries

How stakeholders perceive the effects of climate change and fisheries on fish resources ?



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