Future MARES

Final Project Meeting

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The path of the righteous

Economic and spatial response of North Sea demersal fisheries to climate change

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DATA BASE

Vessels:

Medium-sized (15-40m) vessels

Gears:

Demersal trawls and seines

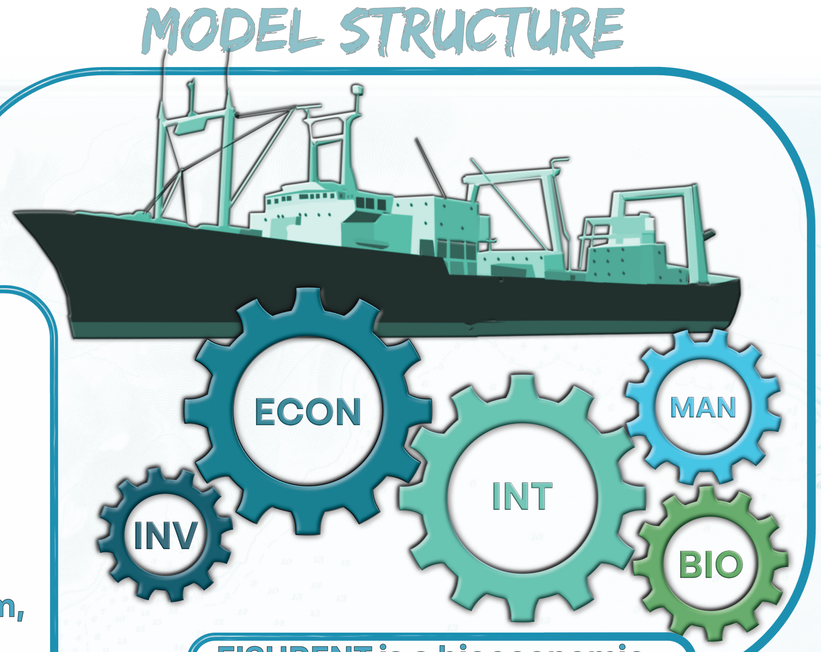
Countries:

Norway, United Kingdom, Germany

Target species:

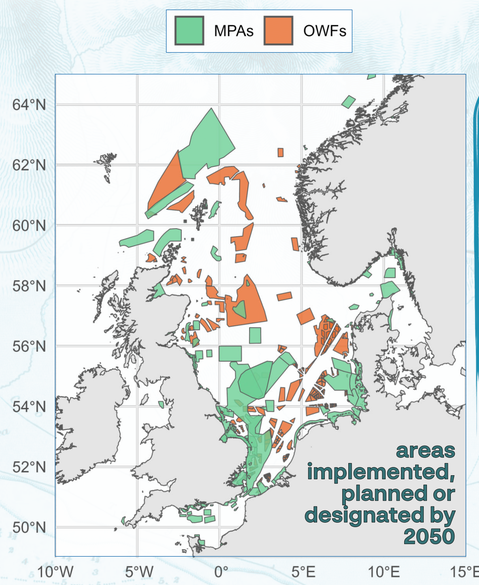
cod (*Gadus morhua*), saithe (*Pollachius virens*), haddock (*Melanogrammus aeglefinus*)

MODEL STRUCTURE

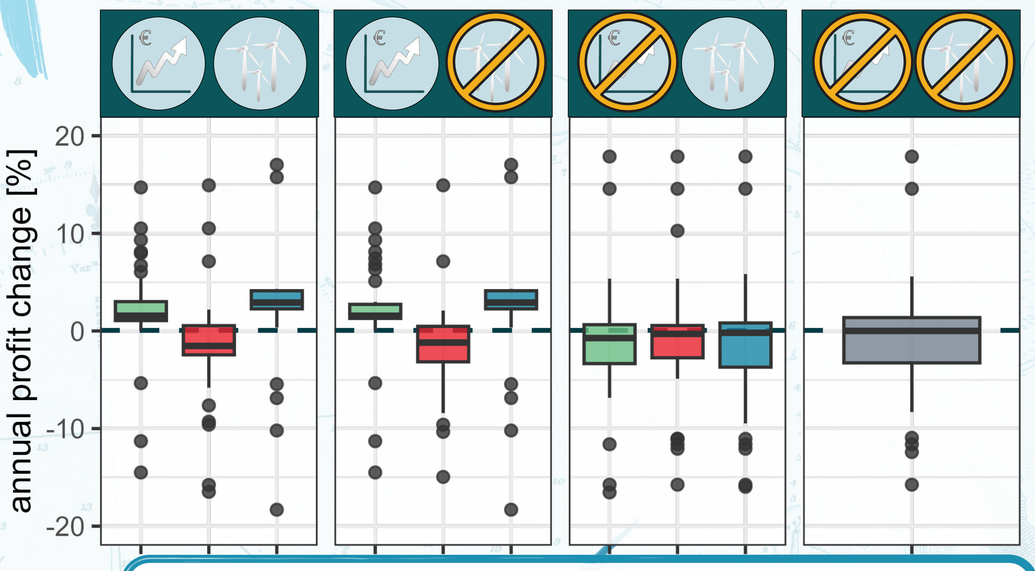


FISHRENT is a bioeconomic simulation and optimization model consisting of five modules: INVestment, ECONomy, INTerface, MANagement, and BIOlogy.

MAPS, BORDERS, AND BOUNDARIES

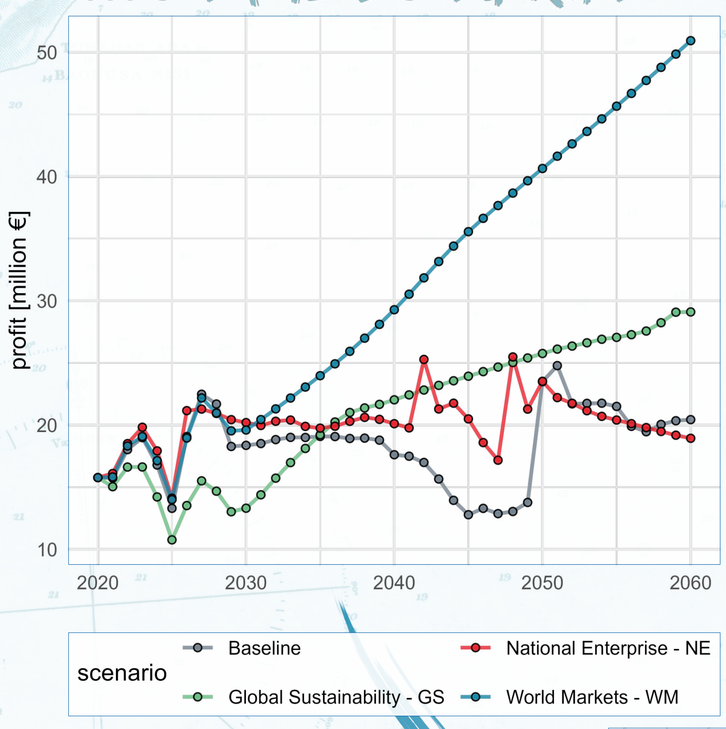


Each country bordering the North Sea pursues ambitious marine spatial planning. Former fishing grounds are already covered by marine protected areas (MPAs) and offshore wind farms (OWFs) and their share of the sea is projected to increase drastically. Fisheries will have to adjust their strategies to the unfolding competition.



A major and unexpected finding: OWF and MPA development had only a little effect on the profitability of the fleets, while economic and management projections drove considerable changes. The projections included fuel and fish prices, fuel efficiency, and harvest rates.

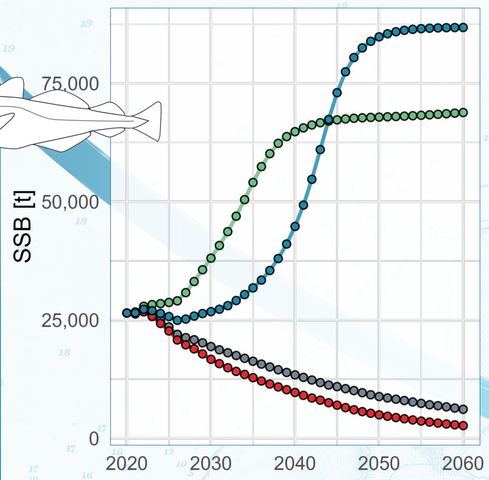
...ON THE LONG RUN



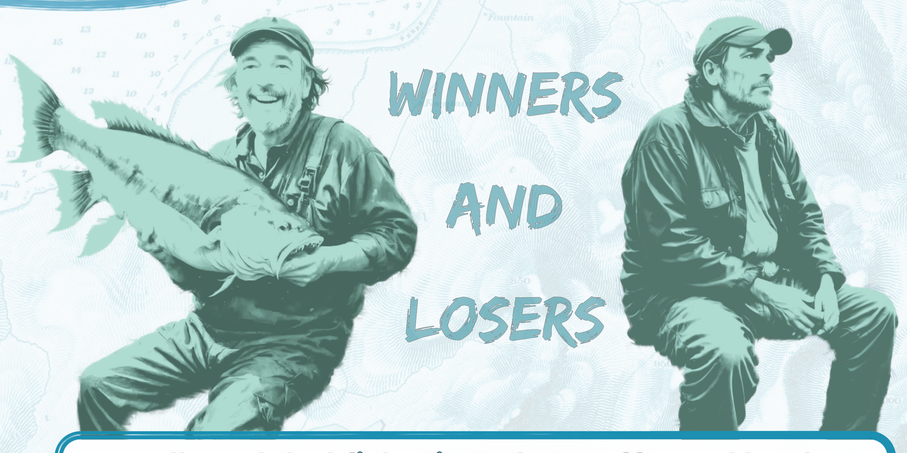
Sustainable practices always come with a cost and the profit trajectory of the GS scenario highlights that. Initially, profits were lower than in the other scenarios due to strict harvest control, but they recovered over the course of the simulation.

Unsustainable harvest rates, as they where set in NE, led to short-term profits, however, they inevitably resulted in stock declines. Cod, for example, was a continuously overfished in NE, leading to a near-collapse situation towards the end of the simulation run.

Economic pressures like price development also played a crucial role. The cod biomass in WM reached a higher level than in GS, despite a higher target harvest rate. Here, available biomass was not harvested because of economic efficiency constraints.

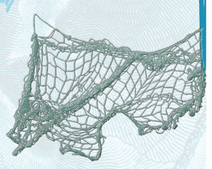


WINNERS AND LOSERS



Not all modeled fisheries where affected by the projections in the same way. Rising fuel prices forced the UK fleet to fish waters closer to their home port, reducing the distance they traveled to their key fishing areas by 39% by 2060.

This in turn benefited the other fleets, as they made use of unharvested quota and generated profits from it. The German fleet doubled their catches of saithe by the end of the simulation run. This was not only made possible by a stock recovery due to dwindling UK catches, but also by harvesting biomass made available because of the reduced travel distances of the UK fleet.



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PROFITABLE FISHERIES ARE POSSIBLE IN A FUTURE OF STRICT PROTECTION AND WIDELY IMPLEMENTED NATURE-BASED SOLUTIONS, BUT THE PATHS VARY!