

Science for Environment Policy

Seafloor trawling's ecological impacts revealed by simple sampling system

Trawling's impacts on marine ecosystems can be assessed using simple metrics which characterise easy-to-obtain samples of fish, new research suggests. The Portuguese study shows that groups of fish become dominated by fewer species as fishing intensity increases, while their total biomass declines. Moreover, in the most fished areas there were other noteworthy changes, such as substantial reductions in the proportion of sharks and rays.

Bottom trawling, a form of fishing which involves dragging nets along the seafloor, can have devastating effects on [marine life](#). The heavy equipment used to hold the net open can damage habitats, changing the structure and function of these sensitive environments.

The EU's Marine Strategy Framework Directive¹ was established to protect Europe's marine environment, addressing all human activities that have an impact on the marine environment while supporting the sustainable use of the goods and services it provides. It places ecosystems at the centre of management decisions and requires Member States to implement measures to achieve or maintain 'good environmental status' by 2020.

This study looked at how groups of fish can be used to indicate the ecological impacts of bottom trawling. The researchers undertook 30-minute trawls at 97 sites of soft-bottomed habitat along the Portuguese coast between 2006 and 2010. They then characterised the groups of fish they caught using 24 metrics which may be useful as indicators of environmental status as defined by the Directive. These included total biomass and the proportion of different types of species found in each sample haul.

They also estimated the trawling intensity, or fishing pressure, along the coast, and considered its impact on the metrics. Trawling intensity was measured using information from the Vessel Monitoring System, which tracks fishing boats larger than 15 metres in European waters.

Out of the 24 metrics, total biomass and dominance (i.e. the number of species that made up 90% of the total biomass) were the most sensitive to fishing pressure. As trawling increased the total biomass fell, and the group was more likely to be dominated by fewer species.

The other three metrics strongly affected by trawling were: the proportion of sedentary fish (those with limited movement and well-defined home ranges), fish with low a low capacity to recover from environmental disturbance and cartilaginous fish, such as sharks and rays. Low proportions of these fish in each sample indicated higher fishing pressure. The authors of the study note that such loss of diversity weakens ecosystems, and makes them more vulnerable to changes in the environment.

The researchers identified three critical thresholds, depending on the metric being assessed. Changes in the fish groups detected above these thresholds can provide an early warning of changes to the functioning of marine ecosystems. Biomass declined quickly from a low threshold of fishing intensity, sedentary fish were negatively affected at medium levels of intensity and at high levels species with low resilience were significantly affected.

These indicators were developed to assess the effects of trawling activity off the Portuguese coast. However, similar indicators could be developed for ecosystem-based management in other regions, the researchers say.



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Structural and functional trends indicate fishing pressure on marine fish assemblages. *Journal of Applied Ecology*. DOI:10.1111/1365-2664.12235.

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1. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0056:EN:NOT>