

The impact of mobile bottom fishing on organic carbon in seabed sediments

An collaborative experimental study

Why was this study conducted ?

- Seabed sediments are one of the largest stores of organic carbon, with the oceans playing an important role in atmospheric CO₂ concentrations.
- Recent scientific papers have raised concern over the potential impacts of mobile bottom fishing gears on sediment carbon, suggesting that bottom fishing leads to a remineralisation (conversion back to CO₂ and other components) of this organic carbon, and therefore reducing net uptake of CO₂ from the atmosphere.
- Scientific studies on how bottom fishing effects seabed carbon have varying results on if it has a negative, positive or neutral effect, and so more data and studies are needed.

How was the study conducted?

- In April 2023 we sampled the amount of organic carbon in the Trevoise box off southwest England (closed to fishing for three months before the study) before and after the sediment was fished by a beam trawler in one location, and a scallop dredger in another location. 46 cores were analysed down to 5 cm depth in 1 cm intervals.
- We also took samples of the water behind the fishing vessel while they towed their gear to see if we could detect organic carbon being released into the water and to see if that carbon was being remineralised by biological processes by observing nutrient levels.



Example of the sediment sampled which was predominately sandy gravel the study area and region.

What did we find?

- We did not find evidence of a significant decrease organic carbon in the sediment with increasing passes of the scallop dredges and beam trawls. We only found small amounts of organic carbon (average of 0.13 %) in the sandy gravelly seabed at the depths which can be impacted by bottom towed fishing gear.
- We saw that the fishing gear is likely resuspending material into the water column, but there was no clear signals that more organic carbon was being remineralised in the water column as a result

What do these results mean?

- The coarse sediments in this study, which are typical of the region, likely have a naturally high turnover of organic carbon in the surface sediment layers beyond the sediment depth reached by towed fishing gear.
- Our results indicate that though the fishing gear does dig into the sediment and likely resuspends material, it is unlikely to be significantly and immediately reducing the amount of organic carbon being stored in deeper layers of sediment. However, this study did not investigate the longer term effects of bottom fishing on seabed carbon.

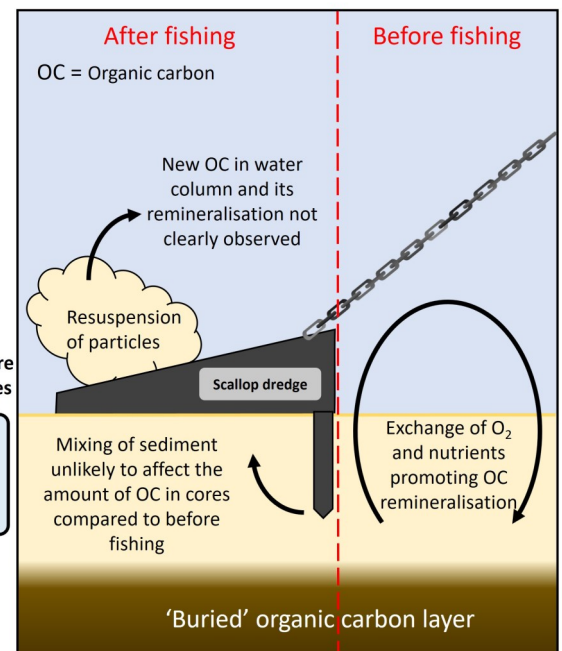
Who conducted the research ?

This work was led by Bangor University in collaboration with Imperial college London, Western Fish Producers Organisation and the South Western Fish Producer Organisation with input from CEFAS. The work was funded by DEFRA through FISP (Fisheries Industry Science Partnerships scheme). For more information contact Prof. Jan Hiddink at j.hiddink@bangor.ac.uk.

Summary papers on this topic:

Tiano, Justin, et al. "Global meta-analysis of demersal fishing impacts on organic carbon and associated biogeochemistry." *Fish and Fisheries* (2024).

Epstein, Graham, et al. "The impact of mobile demersal fishing on carbon storage in seabed sediments." *Global Change Biology* 28.9 (2022): 2875-2894.



Schematic of what we suggest our results show about how bottom gear interacts with seabed carbon in our study area (not to scale). The schematic shows a scallop dredge , however beam trawls have a shallower penetration depth.