



Science for Environment Policy

Pollutants released by seafloor trawling affect marine life

Commercial bottom trawling, the technique of pulling fishing gear across the seabed to catch fish and other seafood, releases pollutants trapped in the seabed, which can negatively affect local marine life and ecosystems. Recent findings from a Norwegian fjord show how mussels can take up high levels of contaminants released by trawling, with important health implications for consumers.

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Bottom trawling is a globally important economic activity that affects around 15 million km² of the world's seafloor every year. The trawling disturbs sediments on the seafloor, which absorb contaminants entering the marine environment. Following a trawl, pollutants can be re-released into the lower depths of the water. Most research in this area has been carried out in laboratories; this study of a Norwegian fjord is therefore significant in that it provides valuable insight into the effects of bottom trawling in a 'real world' setting.

The study was carried out in the south of Norway, in a fjord that has been polluted over the past 40 years with a range of chemicals from neighbouring industries. The effects of trawling were measured by placing 'semi-permeable membrane devices' (SPMDs) in the water on ropes close to the trawl sites for one month. These devices measure the amount of dissolved organic contaminants in the water.

To measure the amount of pollutants accumulated by marine organisms in the fjord, caged blue mussels (*Mytilus edulis*) were also placed on the ropes. The SPMDs and mussels were placed at different levels in the water to compare the effects of trawling: in bottom water (1.5 metres above the seabed) and in open water (19 metres above the seabed).

The results demonstrated that a single 1.8 kilometre trawl created a 3-5 million m³ cloud of sediment to a height of 15-18 metres above the seabed, which stretched over a 120-150 metre-wide range. Around nine tonnes of contaminated sediment was contained in the cloud. The total suspended matter in the plume reached around 70 times that of natural, background levels.

The bottom water samplers were almost constantly surrounded by suspended particles, owing to frequent trawling in the fjord (five trawls in the month), which leads to very slow-sinking particles and a semi-permanent plume of sediment floating just above the seabed.

The levels of pollutants were up to three times higher in mussels living in the bottom layer of water than in the open water mussels. These results suggest that the contaminants were clearly 'bioavailable', i.e. could be easily taken up by marine organisms. The researchers suggest that filter feeders, such as mussels, and benthic, seabed living species, such as prawns and flatfish, are particularly at risk.

After only one month of exposure, the mussels placed in the bottom water exceeded the EU limit for polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) in foods. PCDD/Fs are responsible for developmental and reproductive abnormalities and so their high levels in the mussels are of particular concern for public health.

The study also highlighted that the concentrations of contaminants found in the sediment were at the same level as samples that had been taken a decade before, which shows the contaminants do not degrade naturally and are not removed over time through natural processes or as a result of trawling.