Assessing and mitigating of bottom trawling. Final BENTHIS project Report (Benthic Ecosystem Fisheries Impact Study) - DTU Orbit (24/10/2019)

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BENTHIS developed the scientific basis to quantify the impact of bottom trawling on the seafloor and the benthic ecosystem. Based on insight in how fishing gear affects the seafloor, an assessment framework was developed that provides indicators of impact and seafloor status on a continuous scale that can be applied in the context of the MSFD. The mechanistic approach allows us to set reference values of impact (status) to estimate the proportion of a region or habitat where the impact is below (status is above) the threshold. The methodology combines estimates of trawling intensity with the depth to which the fishing gear penetrates into the sea bed (penetration profile) and the sensitivity of the habitat. Habitat sensitivity is estimated from the longevity composition of the benthic community that is related to the recovery rate. The mortality imposed by trawling was shown to be related to penetration depth of the fishing gear. The framework was applied to explore which fisheries had the greatest impact and which habitats were impacted the most. Fishers concentrate their activities in only a part of their total fishing area. These core fishing grounds are characterised by a relative low status (high impact). Additional fishing in these core grounds have only a small impact. In the peripheral areas where fishing intensity is low, additional fishing will have a much larger impact. Hence, shifting trawling activities from the core fishing grounds to the peripheral areas will increase the overall impact. Shifting activities from the peripheral grounds to the core will reduce the overall impact. This asymmetry provides the possibility to reduce the impact at a minimal cost. It was shown that implementing a habitat credit management system can provide incentives to reduce fishing in peripheral areas at minimal cost. In collaboration with the fishing industry and gear manufacturers, technological innovations were studied to reduce the impact of trawling. Promising results were obtained showing that (semi-) pelagic otter doors can be applied to reduce bottom impact and at the same time reduce the fuel cost without affecting the catch rate of the target species. Replacing mechanical stimulation by tickler chains with electrical stimulation in the beam trawl fishery for sole, reduced footprint and penetration depth as well as the fuel cost. Electrical stimulation is also a promising innovation to reduce the bycatch and bottom contact in the beam trawl fishery for brown shrimps. Sea trials to replace bottom trawls with pots were inconclusive. Results suggest that creels may offer an alternative for small Nephrops fishers in the Kattegat. In waters off Greece, the catch rates were very low. Sea trials with the blue mussel fishery showed that fishers could reduce their footprint by deploying acoustic equipment to detect mussel concentrations that allow the fishers to more precisely target the mussel beds and hence reduce fishing in areas with low mussel density. A review of the various case studies carried out in BENTHIS revealed the critical success factors for implementing technological innovations to mitigate trawling impact. While economic investment theory predict that economic profitability should lead to investment in innovative gears, it appeared that many other factors play a role in the successful uptake of new technology such as social, regulatory, technological and environmental factors. For the successful development and implementation of gear innovations, collaboration between fishers, gear manufacturers, policy makers, scientist and society is important.

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