Preliminary results of the effects of different levels of trawl fishing activity on benthos and sediment from fishing grounds in European waters (Irish Sea, Adriatic Sea, and Catalan Sea)

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Introduction

This study gives the opportunity to analyse the effects of different fishing regimens, low and high fishing intensity, and high intensities possibly change benthic communities for considerable time scales. Although numerous studies have shown relationships between fishing intensity and community structure in experimental approaches (Giske et al., 2000; Kaiser et al. 2000; Kaiser de Groot, 2000), it has been difficult to associate observed changes in benthic communities with fishing effort on real fishing grounds. This study gives the opportunity to analyse the effects of different fishing regimens, low and high fishing effort, on benthic ecosystems. Preliminary results are presented focusing the attention on the epibenthic fauna and sediments.

Study areas and Methodology

The north eastern Irish Sea study area is a muddy fishing ground between 30 and 50 m depth. Within this area, four sites with high level of fishing effort (considered as disturbed sites) and four sites with a very low level of disturbance (considered as undisturbed sites) have been defined. A seasonal trend in fishing activity can also be defined. Samples from high effort period, in May 2003, and low effort period, in January 2004, have been studied.

The three otter trawl fishing grounds were surveyed obtaining samples of epibenthos and sediments. Epifauna was surveyed using a 2 m beam trawl in Irish Sea, and a similar dredge in Adriatic and Catalan Sea. The codend was of 10 mm mesh size three hauls standardised to 15 trawling were performed in each site. Total number and biomass for each species, as well as Shannon’s diversity index (H’), were recorded. Surficial sediments for particle size analysis were collected using a van Veen grab or a box-corer. A two-way ANOVA test was conducted to evaluate the differences between high and low level of fishing effort, and between disturbed and undisturbed areas.

Results and Discussion

In the Irish Sea, undisturbed sites present higher epifaunal abundances, although these differences were not significant. On the contrary, in Catalan and Adriatic Sea, epibenthic organisms were significantly more abundant in disturbed sites during high fishing activity. The analysis from the Irish Sea data showed significant results only during low fishing activity between disturbed and undisturbed sites, with higher biomass in undisturbed sites. Epibenthic biomass in the Catalan Sea was higher during low fishing effort period, and also in the undisturbed sites compared to the disturbed ones, although differences were more significant both during effort level and site. On the contrary in Adriatic Sea biomass was higher in the period of high fishing intensity, however these differences were not significant.

In all three areas Shannon’ diversity indices showed decreasing trends during high fishing effort periods. Low diversity values were found in high fishing effort season, while during low fishing activity and in undisturbed sites diversity tended to be higher. However further analysis of the correlation between fishing effort and epifauna diversity is required.

Average grain size (described as average mud content in the Irish Sea, and mean phi values in Catalan and Adriatic Seas) is significantly different between disturbed and undisturbed sites in the three areas studied, showing different trends. In the Irish Sea, and Adriatic Sea we find finer particles in highly fished areas, while in the Catalan Sea average grain size is smaller in undisturbed areas.

Further information from low and high fishing activities in each study area will be analysed. The results expected from this investigation are to elucidate the potential effectiveness of using different fishing effort strategies on variability and changes on benthic communities and sediment.