

EFFECTS OF SEASONAL CLOSURES ON BENTHIC COMMUNITIES FROM TWO MEDITERRANEAN TRAWLING GROUNDS

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Abstract

Seasonal closures in trawling grounds are generally considered a useful management tool, but there is a lack of knowledge on their benefits for benthic communities. Two trawling grounds located in the Catalan and Adriatic seas, which are regulated by a two-month fishing closure, were surveyed to monitor changes in the benthos during the trawling cessation. Results suggest that closures are too short to detect a response of benthic communities.

Keywords : Adriatic Sea, Biodiversity, Fisheries, Western Mediterranean.

Introduction

The establishment of temporal closures in trawling grounds is one of the most effective measures to reduce fishing effort. Several authors have evidenced an increase in commercial catches after the closure [1]; however, the effects on benthic communities have been poorly investigated. Numerous studies have demonstrated that commercial trawling chronically modifies benthic communities [2]. Consequently, it is necessary to implement adequate management actions to improve the effectiveness of marine ecosystems protection.

Methods

Two trawling grounds located in the Catalan and Adriatic Seas, and regulated by a two-month seasonal closure, were selected to study the response of benthic communities to this management measure. Two study sites were delimited within each fishing ground: a fished site, regularly exploited by the local trawling fleet, and an un-fished site as a reference. In order to analyse changes in the community structure, epifaunal and infaunal samples were collected at both sites during six experimental cruises performed before, during and after the fishing closure. Total abundance, biomass and diversity, based on Shannon index, were recorded, and a two-way ANOVA was developed to identify any effects of site or cruise on these variables. Multivariate analyses, based on the Bray-Curtis similarity index and subsequent MDS ordination plot, were conducted to study changes in the community structure.

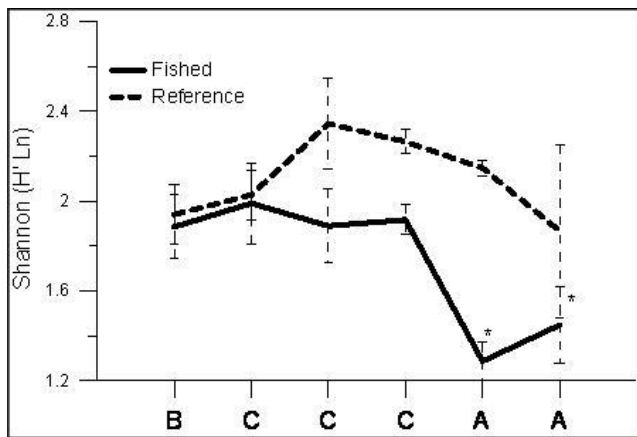


Fig. 1. Epifaunal diversity at fished and reference sites from the Catalan Sea. B, before the closure; C, during the closure; A, after the closure. * $p < 0.001$.

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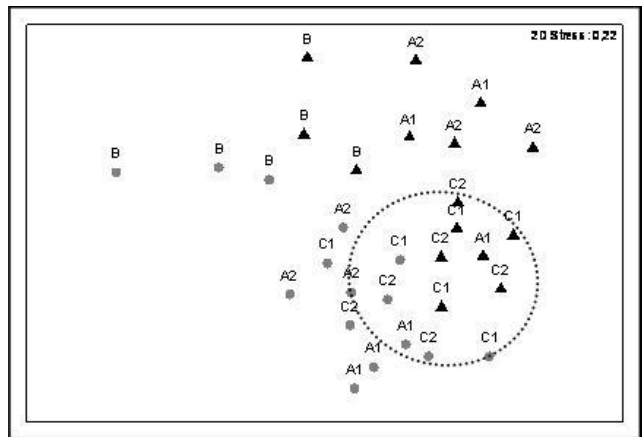


Fig. 2. MDS plot of epifaunal abundance from the Adriatic Sea. Triangles: fished site, circles: reference site. B: before closure; C1: at the beginning, and C2: at the end of the closure; A1: one month after, and A2: two months after the closure.

Results

An overall of 96 epifaunal species and 153 infaunal taxa were collected in the Catalan Sea study area, and 68 epifaunal species and 217 infaunal taxa in the Adriatic Sea sites. Variations in total abundance and biomass of infauna and epifauna did not reflect a closure effect. Epifaunal diversity significantly decreased immediately after the closure at the fished site from the Catalan Sea, when the fishing effort in the area is high (Fig 1). This pattern was not observed in the Adriatic Sea, where the fishing effort after the closure is low. Multivariate analysis of epifaunal data detected changes in the community structure during the closure in both study areas. Although this analysis differentiated samples from fished and reference sites, similarity between sites was slightly higher during the closure (Adriatic: 67% and Catalan: 66% similarity) (Fig. 2). Differences emerged when comparing the infaunal community from fished and reference sites, however no response to the closure was highlighted.

Discussion

Overall these results suggest that a two-month closure is too short to benefit benthic communities. Nevertheless, despite the brevity of this period, the epifaunal community showed a positive response suggested by the increase of similarity between the fished and un-disturbed communities during the closure. Moreover, the reduction of epifaunal diversity in the Catalan Sea fished area after the closure highlights that a high level of fishing activity has an immediate negative effect on the community.

References

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