EFFECT OF A SMALL-SCALE FISHING CLOSURE AREA ON THE DEMERSAL COMMUNITY IN THE NW MEDITERRANEAN SEA

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Abstract

The study was conducted in the NW Mediterranean where Rosas' fishermen association has closed during two years one of their fishing grounds. We compared the community structure between the closed fishing ground, and an adjacent area where fishing was permitted in order to explore the effects of the closed area on the community assemblage. Preliminary results indicate that density of most representative taxonomic groups is significantly higher into the closed zone than in the surrounding fishing area. Additionally, the multidimensional scaling analysis showed two well-defined assemblages corresponding to the fishing allowed and the closed zone. The results suggest that fishing closure is an appropriate measure to habitat protection.

Keywords: Density, North-Western Mediterranean, Restoration, Continental shelf

Closed areas have become important elements of fishery management programs for their capacity to protect marine resources and ecosystems [1]. Numerous studies on rocky littoral areas have documented benefits from protection measures, particularly in terms of density and biomass of exploited species [2]. We investigate the effects on the community structure of a fishing closed area in a muddy fishing ground located in the Roses Gulf (NW Mediterranean Sea).

The closing fishing area has a surface of 70 km^2 and was located at 140 m depth in the NW Mediterranean. This closed zone was protected against fishing during two years (from February 2014 to March 2016). Monthly, four trawls were conducted on board fishing vessels; two inside the closed area (C) and two in a neighbour zone where fishing was allowed (F). All hauls (n=43) were conducted at the same bathymetric range (120-140m) and using the same net characteristics (OTMs, squared 40mm size mesh). On board, all commercial species were identified, counted and measured whereas the discard was analysed in the laboratory. All data were normalized to an area of 1 km2 using vessel speed and average horizontal opening of the gear. Non-metric multidimensional scaling (MDS) was performed to the standardized species abundance matrix (fourth root transformation, Bray-Curtis similarity index, PRIMER software) [3]. The SIMPER analysis was used to determine the contribution of the different species to the average dissimilarity between samples [3].

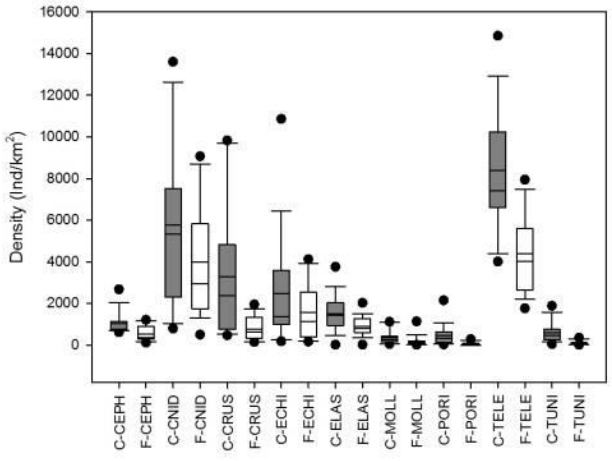

Fig. 1. Boxplot diagram related to density values (ind/km2) of the principal taxonomic groups in the closed fishing area (C: in grey) and the fishing area (F: in white)

Teleost fishes (C = 180.247 ind/km^2; F = 86.939 ind/km^2) were the most abundant taxonomic group in both zones followed by Cnidarians (C = 111.097 ind/km^2; F = 83.839 ind/km^2), Crustaceans (C = 62.948 ind/km^2; F = 14.810 ind/km^2) and Echinoderms (C = 166.715 ind/km^2; F = 29.904 ind/km^2). The boxplot results showed marked density differences between the closed zone and the fishing zone (Fig. 1). All taxonomic groups showed significant higher densities (Wilcox-Test; $p<0.05$) in the closed zone (Fig. 1).

The MDS showed two well-defined assemblages corresponding to the fishing allowed and the closed zone (Fig. 2). The hermit crab *Pagurus prideauxi* and their associated anemone *Adamsia carcinopados*, together with the crinoid *Leptometra phalangium* and the gurnard *Lepidotrigla cavillone* were the species that contributed more to the dissimilarity between both zones, showing higher densities inside the closed fishing zone. However, a minimum of 14 species were required to account for more than 20% of the dissimilarity.

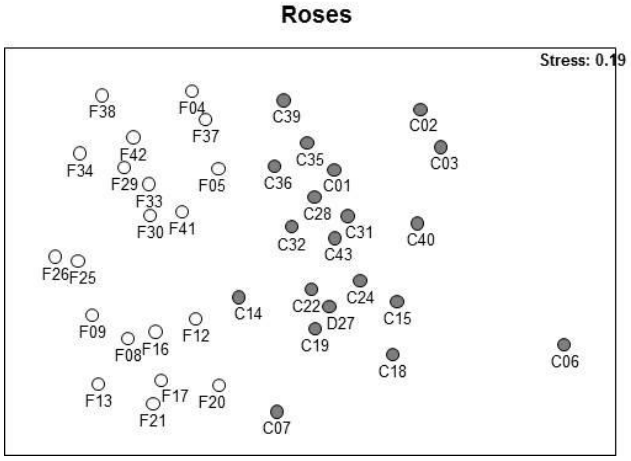

Fig. 2. Non-parametric multidimensional scaling analysis (MDS) of all hauls from the closed fishing area (C: in grey) and the fishing area (F: in white)

The present study suggest that the fishing closures measures have positive effects in the community. Furthermore, a longer closure period would allow the growth and built of more structured systems.

References

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