

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

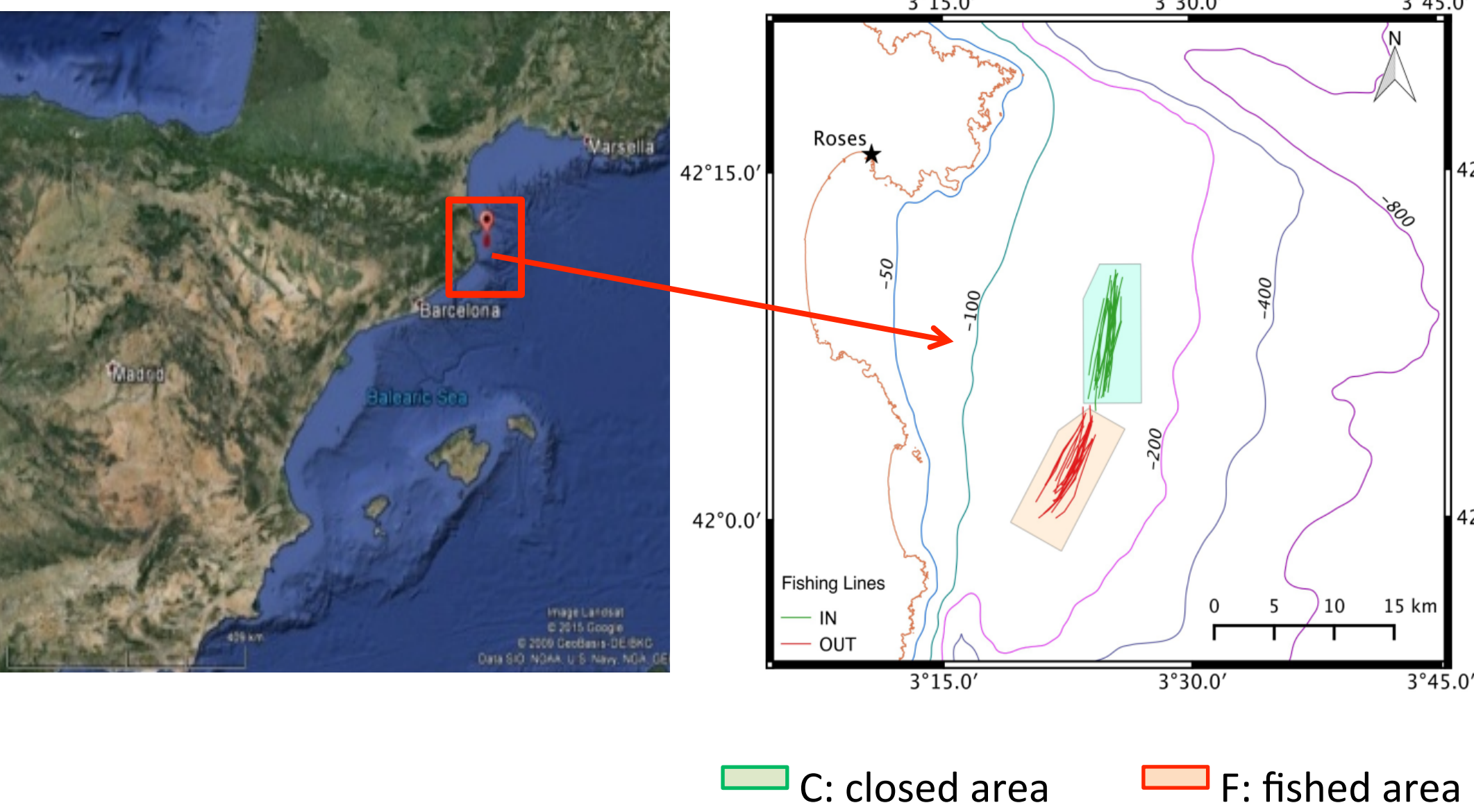
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Abstract: This study was conducted in the NW Mediterranean where the **fishermen association of Roses** has closed during two years one of their fishing grounds. We compared the community structure between the closed fishing ground, and an adjacent area where fishing was allowed in order to explore the effects of a closed area on the epibenthic community. Results indicate that density of most representative taxonomic groups (i.e. teleost fishes, cnidarians, crustaceans and echinoderms) is significantly higher in the closed zone than in the surrounding fishing area. Additionally, multidimensional scaling analysis showed two well-defined assemblages corresponding to the samples where fishing was allowed and the closed zone. These results indicate that fishing closure is an appropriate measure to protect the epibenthic community.

Key words: *community assemblage, density, closed fishing area, management*

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

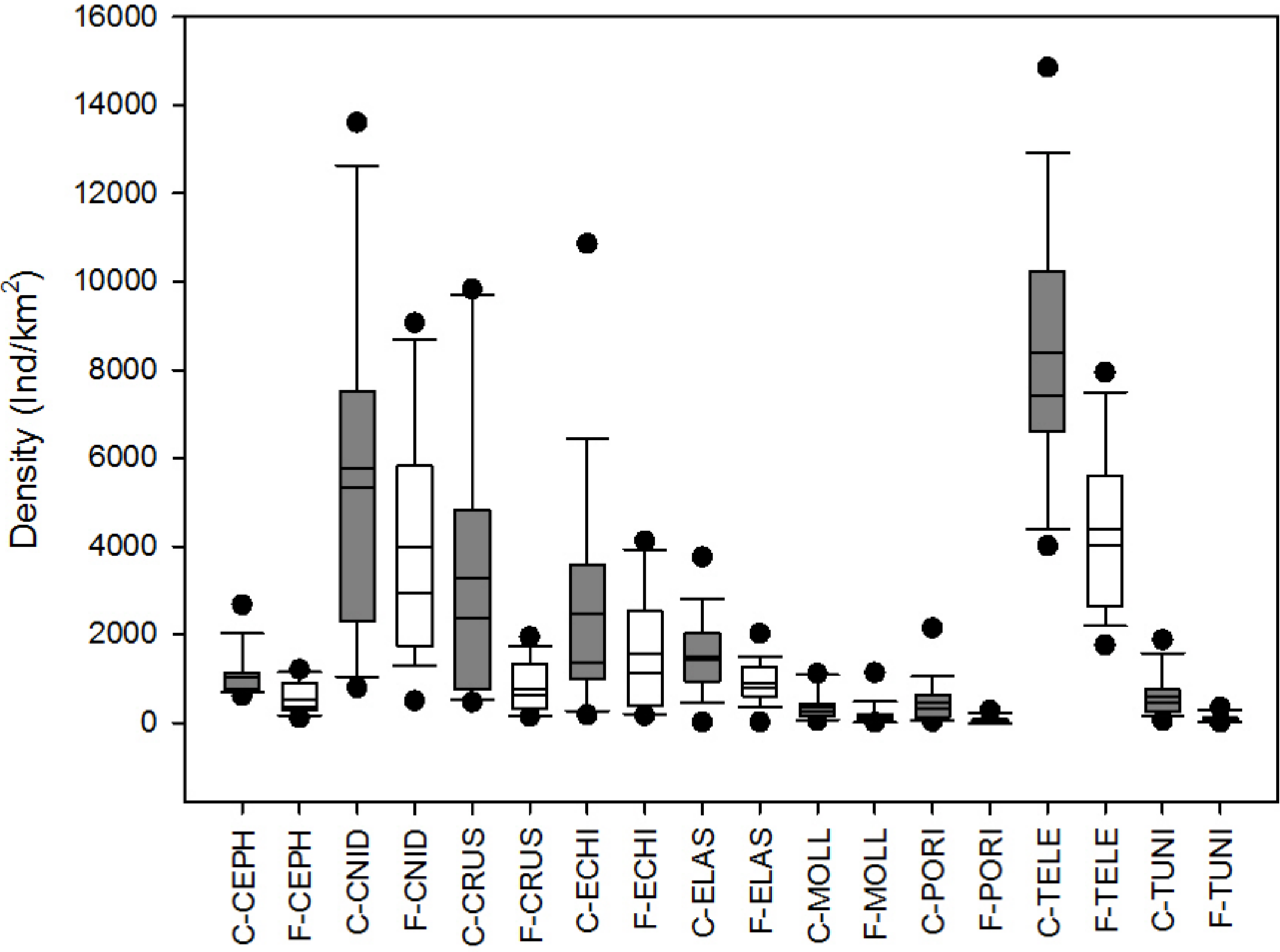
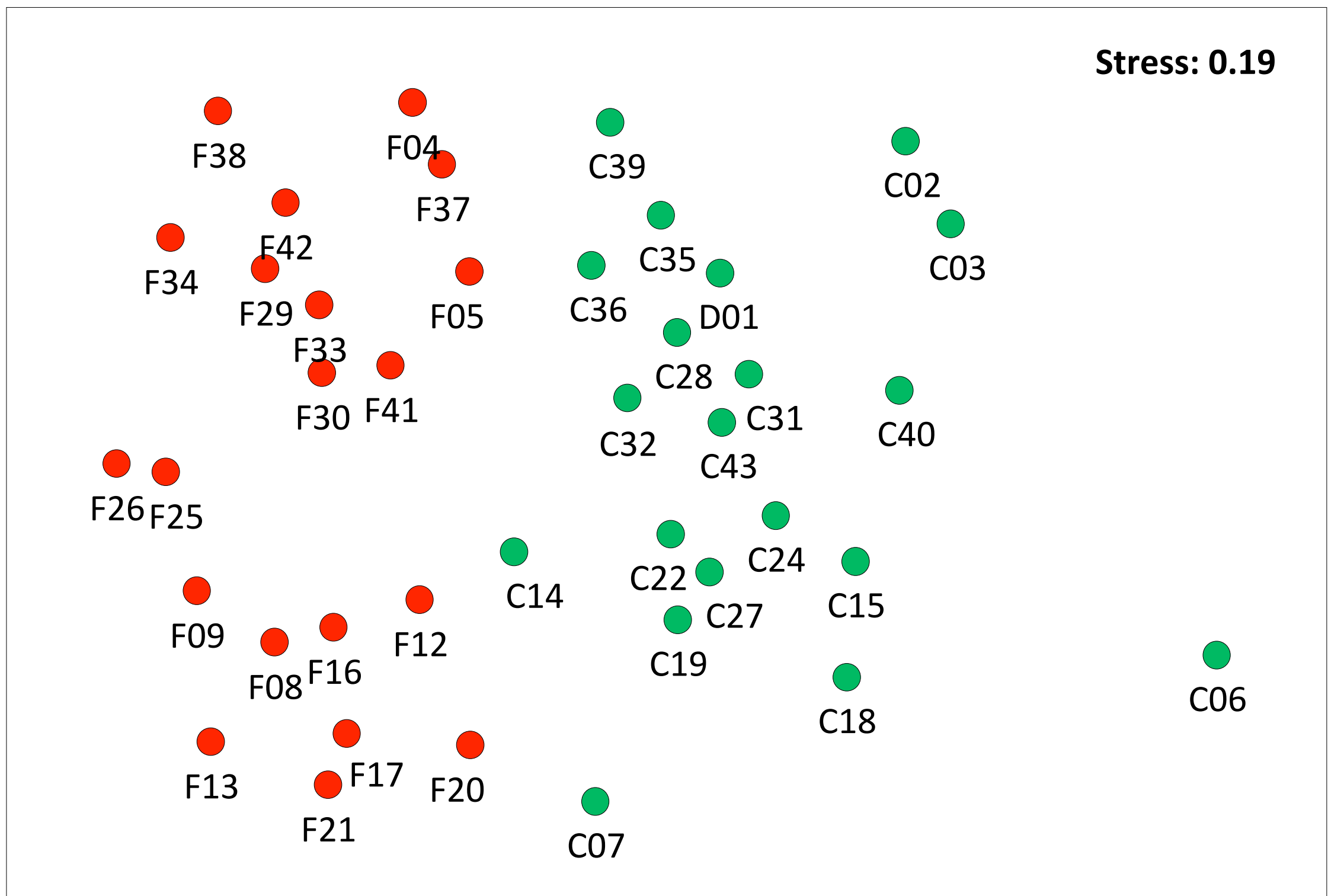


METHODOLOGY: A protection area of **50 km²** (lat. 42°11.00' / long. 3°27.00' – lat. 42°05.00' / long. 3°23.50') was implemented by fishermen initiative, at 120-140 meters depth on a hake nursery ground since February 2014. 43 experimental trawls were conducted monthly, inside and outside the closed fishing area from March 2015 to February 2016. Non-metric multidimensional scaling (MDS) was performed to the standardized species density matrix, after a fourth root transformation and employing the Bray-Curtis similarity index, using PRIMER software [3]. The similarity percentage analysis (SIMPER) was used to determine the contribution of the different species to the average dissimilarity between samples [3].

Aim: To analyse the effect of the protection measure based in a closed fishing zone on the soft bottom demersal community



RESULTS: The MDS analysis showed two well-defined assemblages corresponding to the fishing allowed (F, **O**) and the closed area (C, **G**)



The boxplot results showed marked density differences between the closed zone and the fishing zone. Teleost fishes was the most abundant taxonomic group in both zones, followed by Cnidarians, Crustaceans and Echinoderms. All taxonomic groups showed significant higher densities (Wilcox-Test; $p<0.05$) in the closed zone.

GROUPS IN (C) & OUT (F)		Average dissimilarity = 49,80			
Class	Species	C_Av. Density	F_Av. Density	Contrib%	Cum.%
Crustacea	<i>Pagurus prideaux</i>	1995,17	38,36	2,44	2,44
Anthozoa	<i>Adamsia carciniopados</i>	1535,86	14,73	2,43	4,87
Crinoidea	<i>Leptometra phalangium</i>	6290,69	279,31	1,94	6,81
Osteichthya	<i>Lepidotrigla cavillone</i>	2345,03	214,02	1,68	8,49
Anthozoa	<i>Actinia sp2</i>	759,67	63,52	1,49	9,97
Osteichthya	<i>Helicolenus dactylopterus</i>	130,53	1,74	1,43	11,41
Crustacea	<i>Parapenaeus longirostris</i>	68,86	474,03	1,43	12,84
Ascidacea	<i>Diazona violacea</i>	108,17	2,95	1,30	14,14
Crustacea	<i>Dardanus arrosor</i>	139,12	13,48	1,24	15,38
Osteichthya	<i>Argentina sphyraena</i>	381,89	44,14	1,23	16,61
Ascidacea	<i>Ascidia mentula</i>	146,87	9,56	1,18	17,79

Conclusions: The present study has documented a positive effect of the establishment of a spatial-temporal closure on a trawled fishing area, on the whole macrobenthic community, showing higher densities inside the non-fishing area for all the taxonomic groups. Furthermore, a longer closure period would allow the growth and building of more structured systems.

The **species** that contributed more to dissimilarity between areas were the hermit crab *P. prideaux* and their associate anemone (*A. carciniopados*), the crinoid *L. phalangium* and the gurnard *L. cavillone*.

