

SMALL-SCALE FISHERIES IN CABRERA ARCHIPELAGO NATIONAL PARK (W MEDITERRANEAN): IDENTIFICATION OF FISHING MÉTIERS

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Abstract

This study identified the small-scale fixed net fishery métiers in the Cabrera Archipelago National Park. This is an important first step in this study focusing in evaluating the fisheries effects of management measures. From a data set of 113 fishing operations collected year-round, five fishing métiers were identified. The "picarel", "red mullet" and "large-scaled scorpion-fish" métiers exhibited strong seasonal, habitat and location patterns whereas "black scorpion-fish" and "star gazer" métiers were more evenly practised during the warm seasons in mixed habitats.

Key words: Marine reserves; small-scale fisheries, métiers

Introduction

Marine reserves have been widely promoted as fishery management tools that enhance local fisheries through spillover of juveniles and adults (1). A first step on the evaluation of the fisheries effects of marine reserves is the identification of métiers (fishing tactics) in the protected area. Identifying these involves acquiring knowledge of the fishing gears used and the species composition, yields and length structure of the catches as well as the seasonality and characteristics of the fishing grounds. The aim of this study was to identify fishing métiers of the small-scale fixed net fishery operating in the Cabrera Archipelago National Park (CANP) (Balearic Island, Western Mediterranean), and is part of an ongoing study evaluating the fisheries benefits of fisheries restrictions in CANP. The CANP, created in 1991, extends from the shore to 110 m depth and includes a network of five Integral reserves (IR) closed to all fishing covering 4% of the 87 Km² of marine area protected. Only small-scale fisheries are allowed in CANP and 59 boats are licensed to fish there. In spite of the recovery of most of the high-value species, mainly caught with long-lines(1), fishermen have been resistant to adapting to the new conditions, and 12 years after its creation, fixed nets are still the main gears used.

Material and methods

Data were collected from 1998 to 2001 on board artisanal vessels that fished in CANP. In each fishing operation (set) date, location, depth, habitat, net length, mesh size, fishing time, species composition of the catch and length of all the specimens captured were recorded. Métiers were identified based on ordination and classification techniques (2). We performed Principal Component Analysis to use the principal components (PC) scores as transformed variables, and Agglomerative Hierarchical Clustering (AHC) for classifying fishing operations into groups. Eight PCs that explained approximately 48% of the variance, were used as variables for HAC. For each cluster, identifying a species or group of species as typical, a new categorical variable (catch profile) was created. In a second step fishing métiers were identified by means of Multiple Correspondence Analysis (MCA) based on the following categorical variables: catch profile, fishing location, season, depth (four depth range) type of gear and mesh size. For the target species, the size structures exploited by each métiers were compared using Kolmogorov-Smirnov test.

Results and discussion

A total of 65 species were captured (4 crustaceans, 3 molluscs and 58 fishes) in the 113 sets sampled. Five cluster were identified (Table 1). The "red mullet" (35 sets) cluster, characterised by *Mullus surmuletus* and *Diplodus annularis* was the best discriminated. The "picarel" (8 sets) cluster was the only one characterised by a single species (*Spicara smaris*). The "large-scaled scorpion-fish" (10 sets) cluster encompassed species characteristics of maërl or soft substrates. The two remaining clusters "star grazer" (15 sets) and "black scorpion-fish" (41 sets), were not as well discriminated and differed in terms of both the target species and the relative proportions of soft and hard bottom species. The MCA results showed a close link between catch profiles and some of the categorical variables considered.

According to these results the artisanal fleet fishing with fixed nets in CANP involves five métiers. During winter the fleet targets *S. smaris* on soft bottom at depths from 20 to 40 m using gill nets of 36mm mesh size. This métiers is highly selective (*S. smaris* is 91% of

Table 1. Characterization of the métiers of the net small-scale fixed net fleet in the Cabrera Archipelago National Park based on categorical variables.

| Catch profile | Cluster size | Gear | Main fishing Location | Season | Main species | Depth (m) | Habitat |
|----------------------------|--------------|--|---|----------------------|---|-----------|---------------------------------|
| Red mullet | 35 | Gill net 50mm mesh size | Small Islands E. main | Autumn | <i>M. surmuletus</i> <i>D. annularis</i> | 20 - 40 | <i>Posidonia</i> edge |
| Picarel | 8 | Gill net 36mm mesh size | N. main Small Islands | Winter | <i>S. smaris</i> | 20 - 40 | Sand |
| Large-scaled scorpion-fish | 10 | Trammel net 62-100mm mesh size (inner panel) | W. main island N. small islands | Summer | <i>S. scrofa</i> <i>S. canicula</i> <i>P. elephas</i> | 30 - 80 | Maërl |
| Star gazer | 15 | Trammel net 62-80mm mesh size (inner panel) | Small islands W. main island | Spring Summer | <i>U. scaber</i> <i>P. phycis</i> <i>S. porcus</i> | 20 - 60 | Sand - Rock |
| Black scorpion-fish | 41 | Trammel net 62-80 mm mesh size (inner panel) | Small Islands E. main island W. main island | Spring Summer Autumn | <i>S. porcus</i> <i>U. scaber</i> <i>D. vulgaris</i> | 15 - 50 | Rock, sand and <i>Posidonia</i> |

the catch in number). In autumn, the fleet targets *M. surmuletus* along the edge of the *Posidonia* meadows using gill nets of 50mm mesh. This activity is restricted to the north and east areas of CANP, due to the loss of the fishing grounds located in the south and west (nowadays IR areas). In summer, some boats target *Palinurus elephas* and the bycatch species *Scorpaena scrofa*, on maërl habitats with trammel nets of 62 to 100mm mesh. Fishing takes place at greater depth, mainly in the west of the archipelago and near the limits of the IRs. The three above mentioned métiers exhibit strong seasonal, habitat and location patterns, whereas the other two métiers are more widely practised during the warm seasons all round the archipelago in mixed habitats. The catch of the later trammel net métiers contained a mixture of species and only the higher yield of species of either hard or soft bottoms, which reflects the proportion of different habitats fished and to a lesser extend the fishing depth, characterised them.

There were significant differences in the length structure of the catch of most of the species captured by two or more métiers. In general the "red mullet" and "picarel" tactic caught small specimens (lower mean, modal size and length range) than the other ones. These differences, which may be attributed to the size selectivity of the gear used in each metier and to the depth range fished, have important implications for the design of studies that aim to assess biomass export from marine reserves.

References

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