

THE EFFECT OF A FISHING BAN ON A HAKE NURSERY GROUND IN THE ROSES GULF (NW MEDITERRANEAN)

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Abstract

A hake nursery area has been closed during two years by the Roses fishermen association (NW Mediterranean Sea) in order to protect the recruitment of hake in the area. The aim of this study is to evaluate the effectiveness of this measure. Hake landings displayed marked fluctuations in the last 15 years although effort decreased. First results regarding the measure of closing the hake nursery area indicate that abundance and biomass of recruits were higher in the closed zone than in the surrounding fishing area, suggesting that this measure could contribute to protect significantly the hake recruitment.

Keywords: Recruitment, North-Western Mediterranean, Monitoring, Continental shelf, Fisheries

European hake (*Merluccius merluccius*) is one of the most important commercial species in the Mediterranean area and similarly to other main fishing target species in this area, it is overexploited [1]. The protection of nursery grounds in the North Mediterranean Sea has been defined as an important measure to improve fisheries management [2].

Our study area is located in the northern Catalan coast, in the Roses Gulf (NW Mediterranean). Hake is caught mainly by otter trawl fleet (90% of landings) while the small-scale catches are low. Aiming at the protection of the recruitment of hake, the fishermen association of Roses harbor defined an area of 70 km² on the shelf, at 120-140 meters depth, which corresponds to a hake nursery ground, and a fishing ban was implemented from February 2014 to march 2016. In order to evaluate the effect of this measure a monitoring pilot project was conducted from March 2015 to March 2016. Monthly, four experimental fishing trawls, of 1 hour duration, were done, two in the closed area (C) and two outside this protected area in a neighboring fishing ground (F) at similar depth range. Swept area was calculated based on the haul initial and final positions, vessel speed and average horizontal opening of the gear. The net characteristics (OTMs, squared 40mm size mesh) were the same in all hauls (n=39). Data on hake abundance, biomass and length frequency distributions were obtained.

Annual landings and effort data of the Roses trawl fleet from 2000 to 2014 were taken from fishery statistics compiled by Fisheries Department of the Catalan Autonomous Government. Bottom trawl annual hake landings showed marked fluctuations between 130 and 323 tons without either increasing or decreasing trend, while fishing effort, expressed in fishing days, decreased gradually during this period (Fig. 1).

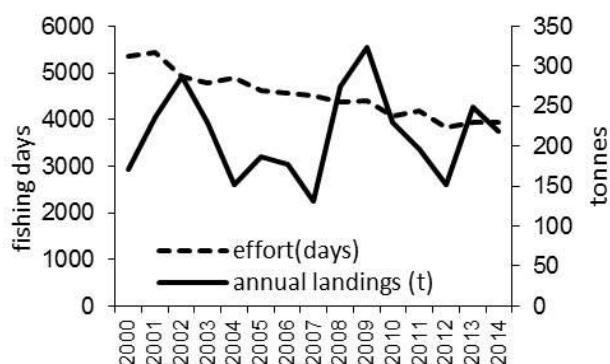


Fig. 1. Bottom trawl hake annual landings (t) at the Roses harbor and trawl fishing effort (fishing days) from 2000 to 2014

Concerning the monitoring of hake in the closed (C) and fished (F) areas, despite total abundance and biomass were higher in the closed area (C: 1171 ind/km², 79 kg/km²; F: 764 ind/km², 55.6 kg/km²), these differences were not significant (Wilcoxon test: W = 5535, p-value = 0.98). In contrast, the abundance and biomass of hake recruits (<20 cm total length TL individuals) showed a marked

difference between closed and fished area, being the values in the closed area significantly higher (Wilcoxon test: W = 295, p-value = 0.35) and near twice those in the fished zone (C: 560 ind/km², 11.5 kg/km²; F: 301 ind/km², 6.2 kg/km²).

Length frequency distribution (Fig. 2) showed similar mean and modal lengths (TL) in the closed and fished zones (C: mean length = 18.4 cm, modal length = 14 cm; F: mean length = 19.9 cm, modal length = 14 cm). Nevertheless, in the closed area we found larger abundances of smaller and larger individuals. Recruits represented 66% of the total individuals in the closed zone, and 51% in the fished area. The abundance of largest adult hakes (>35 cm TL) was slightly higher in the closed area (C: 1.8% and F: 1.3%).

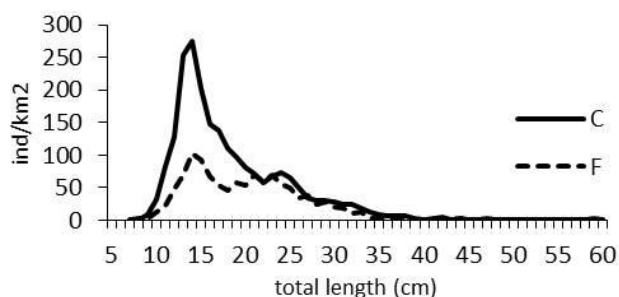


Fig. 2. Hake length frequency distribution. C: closed area; F: fished area

These preliminary results suggest that hake population respond favorably to the nursery protection measure adopted by the Roses fishermen association, enhancing the recruitment of this valuable species. Thus, the closure of this area could be an effective tool for hake management as it could act as a refuge for the recruits of this overexploited species.

References

- 1 - Vasiliakopoulos, P., Maravelias, C.D., Tserpes, G. 2014. The Alarming Decline of Mediterranean Fish Stocks. *Curr.Biol.*, 24: 1643-1648.
- 2 - Colloca, F., Garofalo, G., Bitetto, I., Faccini, M.T., Grati, F., Martiradonna, et al. 2015. The Seascape of Demersal Fish Nursery Areas in the North Mediterranean Sea, a First Step Towards the Implementation of Spatial Planning for Trawl Fisheries. *PLoS One*, 10(3): e0119590.