

RELATIONSHIP BETWEEN TEMPERATURE AND FISHERIES: THE CASE OF *PAGELLUS ACARNE* IN THE NW MEDITERRANEAN

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Abstract

Sea Surface Temperature (SST) and landings series of axillary seabream, *Pagellus acarne*, were analysed in order to establish the possible effect of temperature on the abundance of this species. Both series, with a two year lag, showed a similar pattern suggesting a relationship between Mediterranean sea warming and increasing *P. acarne* landings.

Keywords : *Temperature, Western Mediterranean, Teleostei, Fisheries.*

Introduction

A warming trend in Mediterranean waters has been reported during the last decades, both at surface, as well as in deep waters [1, 2]. It could be assumed that these changes would mainly affect those species of warm-water origin that spawn in summer. In addition, temperature increase would affect gonad maturation, as well as survival and growth of planktonic eggs and larvae. In this regard, there is evidence in the study area that these changes affect the abundance and distribution of some pelagic fish species [3]. Axillary seabream, *Pagellus acarne*, is a subtropical species distributed in the Eastern Atlantic (Bay of Biscay to Senegal) and the Mediterranean Sea. The spawning period in the Mediterranean extends from July to October and eggs and larvae are planktonic. This species is fished mainly by bottom trawl and artisanal fleets in coastal waters down to 200 m depth, as by-catch species [4]. Landings are mainly made up of individuals belonging to age classes 1+ (mainly 2 years old); individuals smaller than 15 cm are discarded.

In the present study, temperature and landings series were analysed in order to establish the possible effect of temperature on the abundance of axillary seabream in the Catalan coast (NW Mediterranean).

Material and Methods

Data on *Pagellus acarne* annual landings (1988 to 2004) were recorded along the Catalan Coast (NW Mediterranean: 40.5°N - 42.4°N). Considering the latitudinal pattern of temperature in the area, with higher temperatures south of Barcelona, landings were analysed separately: North area (from Barcelona to the French border; 42.4°N - 41.4°N) and South area (southwards Barcelona to the Ebre Delta; 41.3°N - 40.5°N). Linear regression was used for the analysis.

Sea Surface Temperature (SST) data (1982 - 2004) were obtained from COADS data base [5] (1° square centre 40.5°N 1.5°E). For comparison with landings data, summer temperatures (July to September), which correspond to the spawning and planktonic life of *P. acarne*, were used. Taking into account the age composition of the landings, a two years lag was considered between both series.

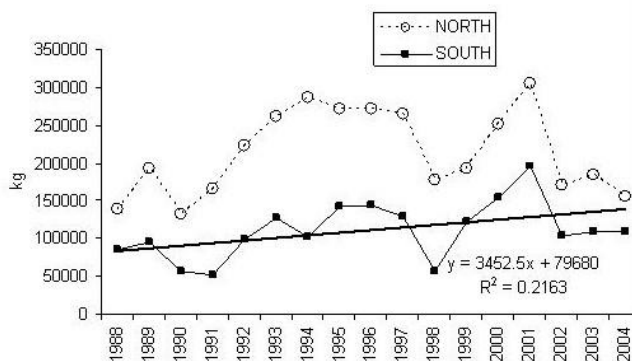


Fig. 1. *Pagellus acarne* annual landings (1988-2004) in the southern (-) and northern (-o-) Catalan coast (significant increasing trend in the South area, $p < 0.05$).

Results and Discussion

Landings showed an increasing trend (Fig. 1). Both series were highly correlated ($r = 0.77$), but the increasing trend was only significant in the South area ($p < 0.05$). Therefore, the relationship between SST and land-

ings was analyzed in the southern area. Both series exhibited a similar pattern (Fig. 2). Thus, years with high landings corresponded to high temperature values two years before, and conversely, low landings were related with low temperatures. These results highlight a clear relationship between sea warming and increasing *P. acarne* landings. Considering that *P. acarne* is not a target species, the influence of environmental factors on their reproductive biology could be stronger than in other species more subjected to fishing pressure.

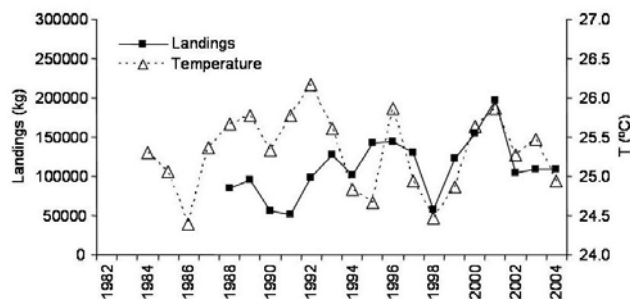


Fig. 2. *P. acarne* annual landings in year (t) (solid line) from the southern area and summer SST in year (t-2) (dashed line).

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References

- 1 - Salat J. and Pascual J., 2002. The oceanographic and meteorological station at l'Estartit (NW Mediterranean). Tracking long-term hydrological change in the Mediterranean Sea. *CIEM Workshop Ser.*, 16: 29-32.
- 2 - Bethoux J.P. and Gentili B., 1996. The Mediterranean Sea, coastal and deep-sea signatures of climatic and environmental changes. *J. Mar. Syst.*, 7: 383-394.
- 3 - Sabatés A., Martín P., Lloret J. and Raya V., 2006. Sea warming and fish distribution: the case of the small pelagic fish, *Sardinella aurita*, in the western Mediterranean. *Global Change Biol.*, 12: 2209-2219.
- 4 - Sanchez P., Demestre M. and Martín P., 2004. Characterization of the discards generated by bottom trawling in the Northwestern Mediterranean. *Fish. Res.*, 67: 71-80.
- 5 - Woodruff S.D., Diaz H.F., Elms J.D. and Worley S.J., 1998. COADS Release 2 data and metadata enhancements for improvements of marine surface flux fields. *Phys. Chem. Earth*, 23: 517-526.