

**Analysis of the fluctuations observed on the landings of
the trawling fleet of the Balearic Islands**

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A research project on hake (*Merluccius merluccius* L.) and red mullet (*Mullus surmuletus* L.) fisheries has been carried out in Balearic Islands since 1977 and on red shrimp (*Aristeus antennatus* R.) since 1991.

Series of commercial landings ⁽¹⁾ (Fig. 1: hake, red mullet and red shrimp) for the period 1940-1991 are also available. These have been studied by ASTUDILLO and CADDY (1986), putting in evidence the fact that fluctuations in the annual landings exists.

Furthermore the dynamic of the population of hake in the period 1980-1986 has been analyzed by means of a virtual population analysis (OLIVER, 1990).

Considering these informations, we can observe in first place a negative correlation between the hake and red mullet series of annual landings, presenting an approximate period of 12 and 15 years respectively. The red shrimp landings also present a periodicity, but with a shorter interval of a 6-8 year period, observed by other authors (TOBAR and SARDA, 1987). (Fig. 1).

The fishing grounds have extended progressively during the period considered between (1940-1991), from the coastal fisheries towards the continental shelf, where red mullet can be considered as the target species, through deeper fishing grounds, where the target species might be the hake, and finally reaching the deeper slope fishing grounds where the red shrimp is captured.

The results of VPA show a delay of one year, in its fluctuation, of yields (Y), in relation to the ones of recruitment (R), may be caused by the incorporation of the recruits, belonging to age class I, born the year before.

That way the maximum recruitment (age class 0) observed in 1983 is followed by a maximum yield in 1984. (Fig. 2).

In the same way a decreasing fishing mortality (F) can be observed until 1983, possibly due to the progressive lack of interest of the fleet towards the hake, due to the missing catches. This could lead us to think that in certain periods the efforts could be directed in an alternative and major way towards one or another species, depending on the level of catches obtained at that moment. In any case, as it has been shown by other authors (ASTUDILLO and CADDY, 1986), the periodical fluctuations of the landings would be independent of the fishing efforts.

At the same time there is a relative stability of the Spawning Stock Biomass (SSB) observed, anyhow sensible, with a major imbalance towards the fluctuations of the recruitment. This stable minimum level of SSB make the occasional appearance of the rich recruitments possible, which allow the maintainment of the fisheries.

⁽¹⁾ Source of data: Anuarios de Pesca (Estadística Pesca Oficial) 1940-1969, I.E.O. data 1970-1990.

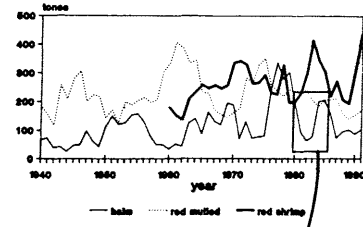


Fig.1 Landings 1940 - 1991
Balearic Islands

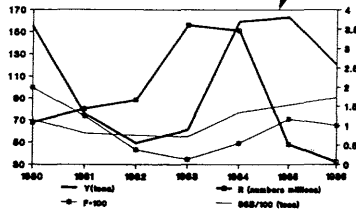


Fig.2 VPA Hake Results.

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