POPULATION DYNAMICS OF *MERLUCCIUS MERLUCCIUS* EXPLOITED BY TWO DIFFERENT TRAWL-NETS IN THE NORTHERN TYRRHENIAN SEA

Bruno REALE[1], Mario SBRANA[2], Stefano DE RANIERI[1]

[1] Centro Interuniversitario di Biologia Marina, Livorno, Italy
[2] Dipartimento di Scienze dellí Ambiente e del Territorio, Università di Pisa, Italy

An intense activity of trawl fishery is taking place at present in the Northern Thyrrhenian Sea. A survey has been undertaken to evaluate the conditions of exploitation of hake, *Merluccius merluccius*, using Porto Santo Stefano as sample port. In 1992 and 1993, the hake landings amounted to 460 and 344 tons respectively, that is 34% and 28% of all commercial species landings.

The local fishery uses two kinds of trawl-nets: the Italian traditional net (19 boats with 42% of hake catches in the 1992 and 13 boats with 38% catches in the 1993) and the so called "french" net (1992, 20 boats with 58% catches and 1993, 18 boats with 62% catches). The boats equipped with french net (vertical opening up to 10 m) have an engine power (538+/-148 Hp) stronger than those of the boats using the traditional net (380+/-106 Hp, about 1 m vertical opening) (SARTOR & DE RANIERI, 1994). In both types of gears, the streched mesh size is 36 mm long.

Length frequency distributions have been calculated for four different commercial categories of the landing carried to the local fish market (VIVA & DE RANIERI, 1994), measuring the total lengths of 5474 (1992) and 6608 (1993) specimens and expanding it appropriately to the total amount of the monthly landing of the species. The growth parameters (Loo = 92.98 cm, K = 0.119) have been calculated by analysing the length frequency distributions of the 1992 landing, by the ELEFAN program (GAYANILO *et al.*, 1988), t0 = -0.05 by indirect method, M = 0.226 by empiric Pauly's method, Fterm = 0.1 experimentally and the parameters of the weight-length relationship from the measured samples (1992, a = 0.00376 and b = 3.177; 1993, a = 0.00390 and b = 3.159). With the by length arranged data (2 cm step), the virtual population has been calculated by the Length Cohort Analysis (POPE, 1972) and the yield per recruit has been analysed using the VIT program (LLEONART & SALAT, 1992).

No particular differences appear between the size classes of the two years (Fig. 1). The length frequency distributions of the landing of both gears are principally constituted by size classes smaller than the first sexual maturity ones (27 cm males, 46.5 cm females). Specimens from 7 to 108 cm of total length with an average size of 16.9 and 15.3 cm for the french net, 15.1 and 14.3 cm for the traditional net have been sampled respectively in 1992 and 1993.

Even going over the total fishing mortality vectors and the two different nets one, substantial differences between the two years cannot be observed (Fig. 2). We can notice higher values for the traditional net about the length classes between 12 and 23 cm; 13 and 41 for the french net. The turnover is high (in the 1992 116%, in the 1993 132%). Comparing the yields per recruit (Fig. 3) we can observe that the values of the different effort levels referring to the french net are always higher than the traditional net ones. In 1993, such values are slightly lower than the previous years. The average lengths of the catches, the fishing mortality vectors and the maximum sustainable yields show a different impact of the two gears on the population owing to the technical caracteristics of the nets (vertical opening, selectivity) and to the work depth (maximum 150 m for the french net). Through the obtained results, we can assume an hake overexploitation rate for both the gears, which needs a drastic reduction of the fishing effort. That is not economically realistic at present, therefore it would be advisable studying a change of the fishing strategy.

The above described situation refers only to the population exploited by trawl and does not take into consideration the effect of the other gears. At the moment, a survey is being carried out to evaluate the impact of the gill-nets on the hake stock.
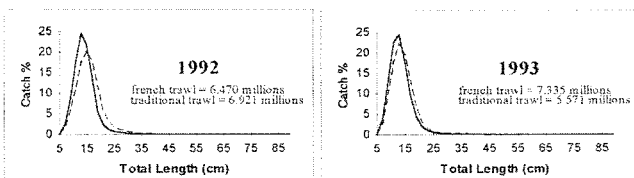

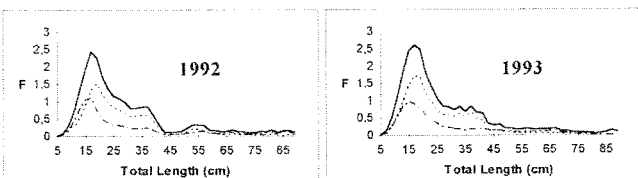Fig. 1 - Catches in number % for gear _____ traditional trawl _ _ _ _ french trawl

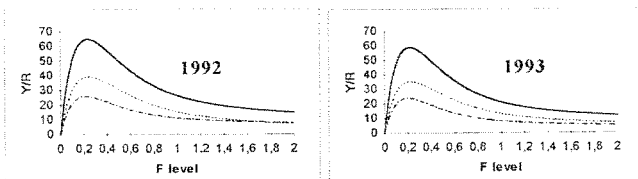Fig. 2 - Fishery mortalities _____ total _ _ _ _ traditional trawl _ _ _ french trawl

Fig. 3 - Yield per recruit (g) _____ total _ _ _ _ traditional trawl _ _ _ french trawl

REFERENCES

GAYANILO F.C., *et al.* 1988. ICLARM, Manila Philippines. Software 2 : 65 pp.
LLEONART J. & SALAT J. 1992. *Inf. Téc. Sci. Mar.*, 168- 169 : 116 pp.
POPE J. G. 1972. Int. Commn. *Northwest Atl. Fish. Res. Bull.*, 9 : 65-74.
SARTOR P. & DE RANIERI S. 1994. *Biol. Mar. Medit.*, 1 (1) : 311-312.
VIVA C. & DE RANIERI S. - 1994. *Biol. Mar. Medit.*, 1 (1) : 321-322.