Stock assessments of Sprat (*Sprattus sprattus* L.) along Bulgarian Black Sea coast (1976-1990)

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The present ecological state of Black Sea and the sharp increase of sprat catches after 1976, are the two main anthropogenic factors, determining the significant variations in the sprat stocks off Bulgarian coast and in the whole western part of the basin. This stress the necessity of annual assessments of its biomass, aimed at tacing proper measures for rational exploitation.

Materials and Methods

Sprat biomass during 1976-1990 was calculated by GULLAND's variant of VPA (POPE, 1972). Relationship between catches and the mean weighed values of fishing mortality coefficient was estimated by the following equation :

(1) $\qquad Y = a.F_{2-4}.exp(-b.F_{2-4})$

where : Y - catch in thousand tons ; F_{2-4} - mean weighed value of fishing mortality coefficient for full representative age groups.

Age composition of sprat catches is after IVANONV's data (1983, 1985, 1989, 1990).

Results and Discussion

It appears from Fig. 1 that the sprat biomass variation is from 167.5 to 204.6, avarage 179.8 thousand tons during 1976-1979. At the same period the sprat catches ammounted to 7.2-13.5, avarage 10.0 thousand tons, e.g. the sprat catches comprise from 4.07% (1976) to 8.08% (1979). However, sprat biomass decreased from 140.6 (1980) to 64.3 thousand tons (1982) during the following 3 years.
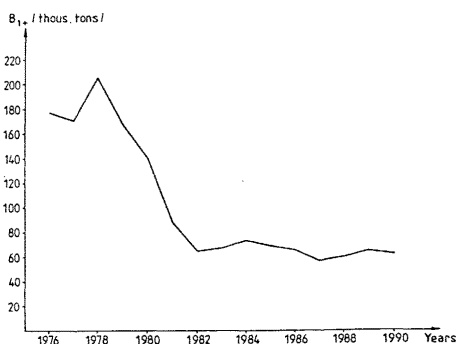

Fig. 1.- Sprat biomass (B1+.10³ tons) along Bulgarian Black Sea coast during 1976 - 1990.

After 1982 sprat biomass varies slightly from 56.8 (1987) to 73.7 (1984) thousand tons.
Largest sprat catches were recorded during 1980-1982, average 17.3 thousand tons.
For the period 1976-1985 the values of Y'msy and F'msy are 17.7 thousand tons and 0.437, respectively (Fig. 2). The last value is almost equal to this estimated by IVANOV (1984) and PRODANOV (1989)-0.435, thus differing significantly from this calculated by DOMASHENKO and YUREV (1978) - Fopt = 1.0.
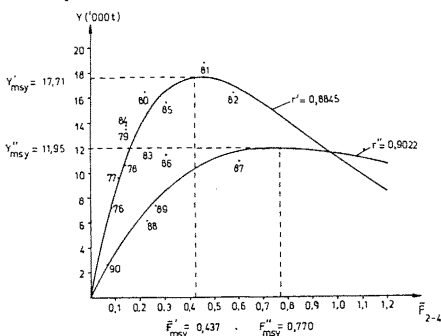

Fig .2.- Relationships between sprat catches and mean weighed values of fishing mortality coefficient during 1976 - 1985 (Y'msy; F'msy; r') and 1986 - 1990 (Y"msy; F"msy; r")

Antropogenic eutrophication of the basin after 1978 result in dramatic changes in plankton species composition, up to invasion of new species (*Mnemia mccradiy*), distinct increase in blooms both in time and space, leading to alteration in the whole food web (MONCHEVA, 1991; KONSULOV, 1991). Probably the decrease of Y"msy during 1986-1990 (see Fig. 2) can be related to *Mnemia maccradiy* expansion after 1986.

Conclusions

The present environmental state stress the necessity of preventive catch activities - in the next 2-3 years the sprat catches along Bulgarian Black Sea coast should not exceed 10.2 thousand tons (Y_{0.1} = 0.85.Y"msy; Fmsy = 0.43).

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