ANALYSIS OF CATCH AND EFFORT DATA OF *LOLIGO VULGARIS* IN THE W. THRACIAN SEA (NE MEDITERRANEAN, GREECE) USING A DEPLETION MODEL

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Abstract

Loligo vulgaris is one of the most common squids in the Mediterranean. Despite the recent studies to the biology of *L.Vulgaris*, there is a great gap in the knowledge of its population size and behaviour. Catch and effort data for *L.Vulgaris* were collected daily for the fishing period October 1994 to May 1995 for trawlers and beach seiners fishing in the W.Thracian sea (NE Mediterranean, Greece). The data were analysed on a fortnightly basis using the no recruitment depletion model. Given the uncertainty of M (Natural mortality rate) values, the analysis was done at three (M) levels (0.01, 0.04, 0.08). It seems that there is no serious problem in the squid population studied but we have to note that their short life-cycle makes squid stocks very vulnerable to overfishing.

Key-words : Aegean Sea, cephalopods, fisheries, stock assessment

Introduction

European squid *(Loligo vulgaris)* is one of the most common squids along the north-eastern Atlantic and Mediterranean coasts. Within the Mediterranean, studies on *L. Vulgaris* are relatively few and these focused on biology, distribution and life history (1-7).

In the Mediterranean sea and especially along the coasts of Spain, Italy and Greece, *L. Vulgaris* is commercially important. Despite this, there is no systematic research directed on stock assessment and management. In Greece, fisheries for European squids are based on catches of beach seiners and by-catches of trawlers. Over the last decade the average annual catch of the European squid in Greek waters amounted to about 1080 tonnes, 38% of which was fished by bottom trawl, 30% by beach seine, 9% by purse seine and 23% by other gears of small scale fisheries. In the W.Thracian sea, *L. Vulgaris* is among the main target species of beach seiners. It is also fished by trawlers as a by-catch species. The average annual catch of *L. Vulgaris* in this sea over the last twenty years is 20.25 tonnes.

The aim of this presentation is to contribute to the assessment of squid fisheries in the Mediterranean using recently developed methods and help in the development of appropriate management measures.

Material and methods

Total catch for all species and effort data for *L. Vulgaris* were daily collected for the fishing period October 1994 to May 1995 for trawlers and beach seiners fishing in the W.Thracian sea (N.Aegean, Greece). The data from trawlers were collected at the fishing port of Kavala. For the beach seiners of Kavala and Thassos island, the data were collected at landing sites through personal interviews .

The catch per unit effort (CPUE) data were analysed separately, for trawlers and beach seiners on a fortnightly basis. The no recruitment depletion model was applied (8), *i.e* :

$$N_{t+1} = e^{-M} \cdot N_t - e^{-1/2.M} \cdot C_t ,$$

where N_t : population numbers at start of fishing period t (fortnight); M: natural mortality rate (per fortnight); C_t : total catch during t.

Sensitivity analysis was applied using the three available error models (Least squares, Gamma, Log transform) to find the best fit (8). Given the uncertainty of (M) values, the analysis was done at three M levels (0.01, 0.04, 0.08).

Results

There is a clear decline in *L. Vulgaris* catches from the winter to the late spring with a peak on the second half of November which is more evident for beach seiners (Fig.1).The importance of the *L. Vulgaris* catch to the total catch of each gear differs (Fig.2).

The trends of the effort and CPUE seem to follow the catches trends in both gears, generally declining from winter to the summer time (Figs 3, 4). It is interesting to note that the CPUE values of *L. Vulgaris* for the beach seiners are clearly larger from those of trawlers in October, November and the second half of January (Fig.5).

The analysis of the trawl and beach seiner data indicates that the best fit is for M= 0.010 (4). For the sake of brevity we present only the best fits and the corresponding graphs (Figs 6, 7) out of the eighteen trials at the three (M) levels.
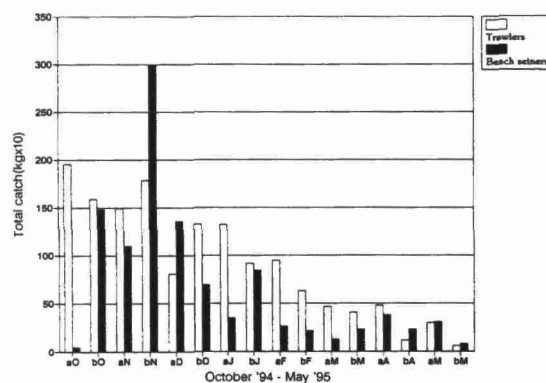

Figure 1. Total catch of *L. Vulgaris* for Trawlers and Beach seiners during the fishing period October '94 - May '95. Data presented on a fortnightly basis.
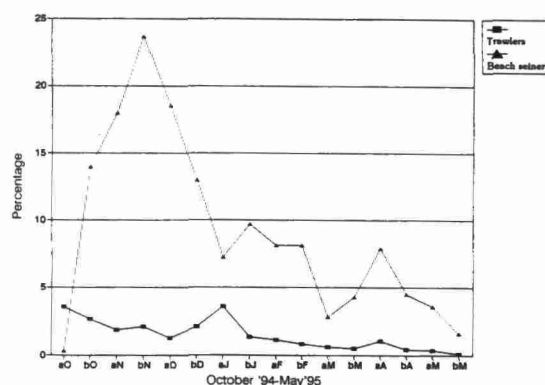

Figure 2. Percentage contribution of *L. Vulgaris* catch to the total catch of Trawlers and Beach seiners. Data presented on a fortnightly basis.
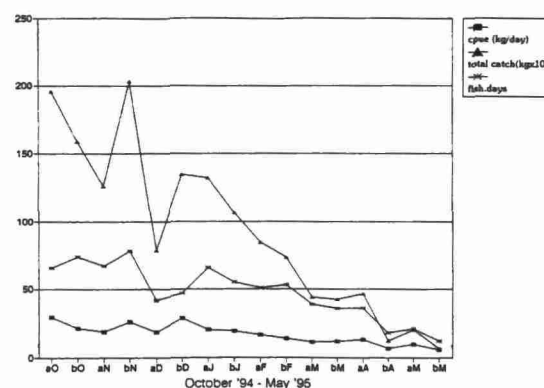

Figure 3. Total catch of *L.Vulgaris*, cpue and fishing effort for Trawlers during the fishing period October '94 - May '95. Data presented on a fortnightly basis.