

SHORT-TERM TRENDS IN ANCHOVY AND SARDINE CATCH/DAY IN GREEK WATERS

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Abstract

Anchovy and sardine monthly catch per day from Greek waters for the period 1996-2000 were analysed in order to identify significant trends. Catches for both species were found to be declining throughout the study period, following the eutrophic north to south gradient of the Greek waters. Results are discussed in relation to exploitation patterns of the two stocks and some management proposals are suggested.

Keywords : Fisheries, Time Series, Aegean Sea, Ionian Sea.

Introduction

Anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*) comprise 30% of the total landings and 60% of the total purse seine landings, being the two most important small-sized pelagic species in Greek waters [1, 2]. Despite their importance there has never been a systematic monitoring of their catch per unit of effort. In this study we present the anchovy and sardine monthly catch/day for the period 1996-2000 in order to identify significant trends.

Materials and Methods

Since the second half of 1995, fishing effort and corresponding catch per day for a large number of species have been collected by the Institute of Marine Biological Resources (HCMR). Data have been collected on a monthly basis over a network of 21 stations throughout the Greek Seas, by local Fisheries Inspectors [1]. At each station, data were collected from a sample of vessels displaying full activity, generally covering at least 10% of trawlers and purse seiners, and 2% of artisanal boats. Collected data were stratified by vessel size (based on EU regulations). Raw data subsequently grouped into two categories with respect to vessel size: <20 m and >20 m for trawlers, <15 m for purse-seiners, and <10 m and >10 m for artisanal boats. Data were also aggregated for five fishing subareas (N., C. and S. Aegean, Cretan waters and Ionian Sea), which generally differ in terms of biological productivity (see detailed review by [2]).

sis is given in [1]. These data overcomes various important drawbacks of all other data sources available, notably that fishing effort is expressed as fishing days at sea.

Results and Discussion

During 1996-2000, the mean anchovy and sardine catch/day was significantly higher for purse seiners >15 m, operating in the North and Central Aegean Sea and Ionian Sea (anchovy: >370 kg/day, sardine: >140 kg/day) when compared to those of other gears (i.e. trawl, beach-seine, netters) and areas (i.e. South Aegean Sea and Cretan waters) where the mean catch/day was <125 kg/day for anchovy and <108 kg/day for sardine. This agrees to a large extent with the results of the analysis of the National Statistical Service of Hellas data [2]. The main factors contributing to such a geographical differentiation in mean catch/day could be the gradient in eutrophy of the Aegean Sea waters along a NNW to SSE axis [2]. The catch/day time series for anchovy displayed a downward trend ($p < 0.05$) in all three main areas (Fig. 1a-c). For sardine, declining trends were observed only in the Ionian Sea (Fig. 1d-f). The catch/day series in the North Aegean Sea did not display any trend probably because sardine's variability in this area is mainly affected by market demand. Although additional information might be required together with catch/day series the negative trends identified indicate that pelagic resources are either heavily exploited or overfished. Declining catch/day trends are regarded as strong indicators of overfishing especially in the light of the fact that fishers maintain high catch rates by fishing in "hot spots" [3]. Thus, the regulations currently enforced for small pelagics (i.e., closed seasons, limited issue of licenses, minimum legal landing sizes, mesh size regulations, banning of pelagic trawl, no allowance to fish small pelagics with bottom trawl or with electric light) are inadequate and alternative management options should be considered. For example, it has been suggested that a displacement of the existing closed season from December-March, protecting the sardine spawning stocks with no effect on anchovy, to September-November, will be beneficial to the latter, which exhibited significant declining trends, by protecting the young of the year, as well as to sardine by protecting its stocks at the onset of the spawning period [4].

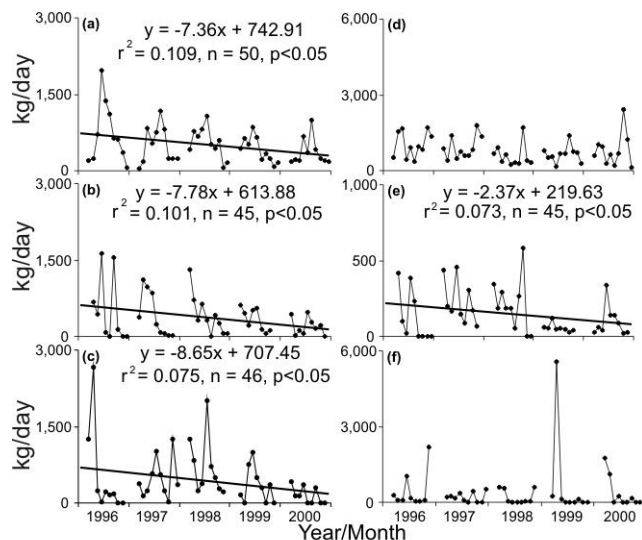


Fig. 1. Mean monthly catch per day for purse seiners >15 m in Greek waters, 1996-2000. Anchovy catches in (a) the N. Aegean; (b) C. Aegean; (c) Ionian. Sardine catches in (d) N. Aegean; (e) Ionian; (f) C. Aegean. Trend lines with slope significantly ($p < 0.05$) different from zero are also shown.

A detailed description of the available data set, data processing and analy-

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