

PRELIMINARY ANALYSIS OF THE HABITAT CHARACTERISTICS OF ANCHOVY AND SARDINE IN THE AEGEAN SEA IN RELATION TO FISH SIZE

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Abstract

The present work examines the size specific distribution of anchovy and sardine in the Aegean Sea (Eastern Mediterranean basin) during early summer. Data from pelagic trawl hauls, multivariate methods, certain satellite environmental data and area topographic characteristics were used in order to identify the parameters that could discriminate the spatial distribution of the juveniles and the adults of both species
Keywords : Aegean Sea, Eastern Mediterranean, Pelagic.

Introduction

Considering the general lack of information on the size related distribution of small pelagic fish in the Eastern Mediterranean basin, we examined the spatial changes in the length frequency distribution of anchovy and sardine populations, in the main fishing grounds of Aegean Sea, during June. Catch data from pelagic hauls were used and multivariate methods were applied separately for anchovy and sardine, in order to examine the classification of the pelagic trawl hauls in respect to fish size. Furthermore, certain satellite environmental data and area topographic characteristics were used to identify the parameters that could discriminate the resulting size-related groups.

Materials and methods

Data on catches from 132 pelagic hauls of 6 research surveys (1998-2006) on board the R/PHILIA carried out in Aegean Sea during June, were analyzed in order to explore the spatial changes in the size distribution of anchovy (data from 99 hauls) and sardine (data from 78 hauls). Mean total length and fish abundance per hour and 0.5 cm length class were estimated for each haul. This weighted length frequency distribution was analyzed with the non metric Multi Dimensional Scaling (MDS) using a Bray-Curtis similarity matrix, in order to identify haul groups based on fish size.

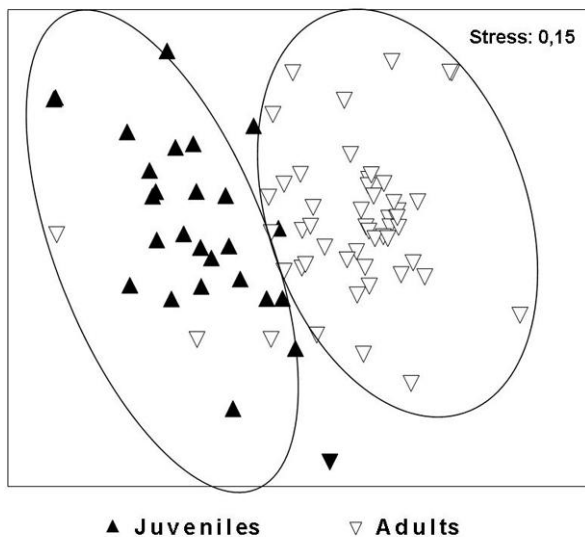


Fig. 1. MDS results for sardine. Juveniles: hauls with mean length of the catch <110mm; Adults: hauls with mean length of the catch >110mm.

In order to determine if the groups defined by the MDS could be distinguished in terms of certain environmental characteristics a stepwise backward Discriminant Function analysis (DFA) was applied. The F-statistic was used to test the significance of the group centroid differences [1]. Satellite and topographic data were used. The satellite data (mean weekly values of sea surface temperature-SST in °C, chlorophyll-a CHLA in mg/m³, sea surface salinity-SSS, sea level anomaly-SLA in cm, photosynthetic active radiation-PAR in Ein/m²/day) were estimated by GIS techniques [2]. Regarding topographic data, the study area was divided

into 6 sub areas and the Enclosure Index (EI) as well as the size of each sub-area (in Km²) were estimated as described in [3], in order to take into account the peculiar topography of the Aegean Sea that is consisted of variable sized, open as well as semi-enclosed areas.

Tab. 1. DFA results for anchovy and sardine. EI: Enclosure index, SST: Sea surface temperature, CHLA: Chlorophyll-a, PAR: photosynthetic active radiation, SLA: sea level anomaly.

	Variables	Wilks' λ	p-value	Correct assignments
Anchovy	EI	0.83	0.000	81.82%
	SST			
	CHLA			
Sardine	SLA	0.83	0.009	73.08%
	CHLA			
	SST			
	PAR			

Results and Discussion

The MDS analysis showed that hauls characterized by mean length less than 110 mm for both species were mainly grouped together indicating groups of juveniles and adult individuals (Fig.1). This length is close to the size of first maturity for both anchovy and sardine in the Aegean Sea [4]. Table 1 shows the results of the DFA analysis on the environmental-variables used. The differences between the two groups were in all cases highly significant as shown by the Wilks' statistic and its correspondent F-statistic. The high percentages of correct assignments of hauls to the groups (>73%) indicated satisfactory discrimination between adults and juveniles (Table 1). DFA revealed that the parameters, mostly responsible for the spatial separation of the juveniles and the adults were EI, SST and CHLA regarding anchovy and SST, CHLA, PAR and SLA regarding sardine (Table 1). These preliminary results indicate that juveniles and adults of both anchovy and sardine are spatially separated which seems to be related to certain environmental parameters. The use of data from additional areas and years will further highlight the habitat characteristics of juveniles and adults. This information could be coupled with GIS techniques for mapping the potential habitat of juveniles and adults.

References

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