COVARIATION IN MEAN ABUNDANCE OF LARVAL MYCTOPHIDS AND ZOOPLANKTON BIOVOLUMES IN THE NE AEGEAN SEA

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Abstract

Species composition and abundance of mesopelagic larvae during June 1993, 1994, 1995 and 1996 are presented in waters of the northeastern Aegean Sea (Eastern Mediterranean). Significant interannual differences were found that appeared to be associated with differences in environmental conditions. In June 1996 waters were colder, less saline and richer in zooplankton. Larvae of laternfishes were significantly more abundant in 1996.

Keywords : Ichthyoplankton, Aegean Sea

Introduction

It has been suggested that small-sized pelagics, such as anchovies, respond quickly to variations in the adult feeding environment by adjusting their egg production parameters –batch fecundity and interspawning interval (1). This can be reflected by the abundance of their spawn in the plankton.

In the present communication we present evidence that planktivorous laternfishes, which are also small-sized fishes, present increased ichthyoplankton abundance when waters are richer in zooplankton.

Materials and methods

Larval fishes were collected during four surveys carried out in 7-11 June 1993, 19-23 June 1994, 15-22 June 1995 and in 6-14 June 1996 in the NE Aegean Sea (Eastern Mediterranean). Stations were located at approximately 5 (1993 and 1995) or 10 (1994 and 1996) nautical-mile intervals on transects running parallel to lines of longitude and spaced 10 nautical miles apart (Fig. 1). In 1996, five additional offshore stations were sampled. At each station, a vertical profile of salinity and temperature was made using a Seabird 19 CTD. Ichthyoplankton sampling gear and methodology, as well as laboratory analysis of samples, are described in (2).

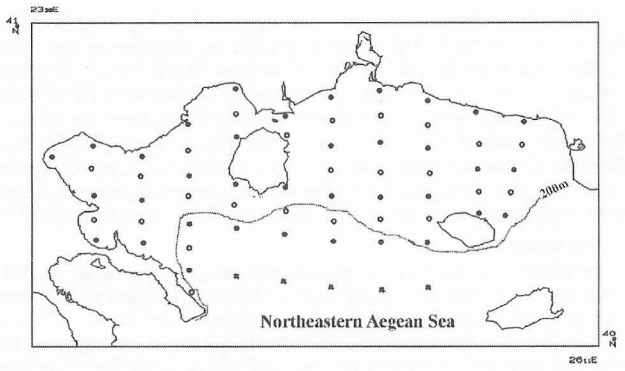

Fig.1. Map of the study area showing the location of sampling stations.
Black cycles = stations sampled during all years. Open cycles = stations sampled only in 1993 and 1995. Crosses = offshore stations sampled in 1996.

To provide a more powerful test for among years differences in the abundance of larvae, we bootstrapped 95% confidence intervals on resulting means (3). A preliminary analysis showed that interannual differences in sampling intensity and the five additional offshore stations of 1996 (see above) did not affect results.

Results and discussion

The upper water column was generally cooler and less saline in 1993 and 1996 than in 1994 and 1995 (Fig.2). Mean zooplankton displacement volume (ZDV), measured from the catch of the 0.250-mm mesh net, was higher in the "cool" years (1993 and 1996), especially in 1996 when it was almost twice as much than in the "warm" years (1994 and 1995) (Fig.2).

A total of seven species of Myctophidae were identified in the ichthyoplankton collections (Table 1). Most of them (*B. glaciale, C. maderensis, M. punctatum, H. benoiti, L. crocodilus*) were more abundant in 1996 (Table 1, Fig. 3). *M. punctatum* and *H. benoiti* had also relatively high abundance in 1993 (Fig. 3).

This pattern of interannual variation in the abundance of myctophid larvae was similar to larvae of the anchovy, which were more abundant in June 1993 and June 1996 (4). Interannual differences in the environmental conditions observed during June in the NE Aegean Sea were attributable to cold and wet winters in 1993 and 1996 (4).

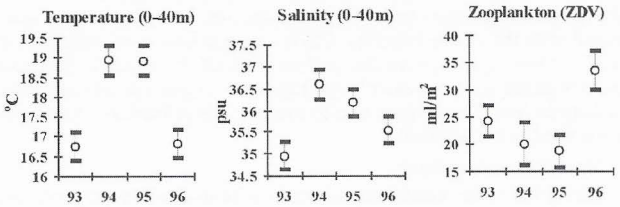

Fig. 2. Mean values and 95% confidence intervals for selected environmental parameters

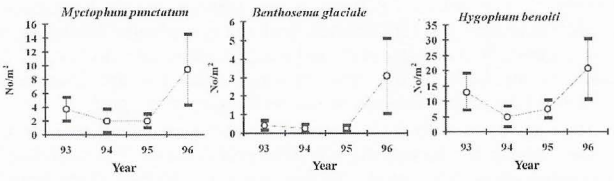

Fig. 3. Mean abundance and 95% bootstrapped confidence intervals for myctophid larval species exemplifying interannual differences.

Table 1. NE Aegean Sea. Mean abundance (larvae/m²) of myctophid larvae in June 1993, 1994, 1995 and 1996.
Asterisks denote non-overlapping 95% bootstrapped confidence intervals between 1996 and 1994-1995.

Species	1993	1994	1995	1996
Benthosema glaciale	0.42	0.19	0.24	**2.51***
Ceratoscopelus maderensis	4.00	16.77	17.42	**33.00***
Diaphus holti		0.03	0.03	
Hygophum benoiti	12.11	4.67	7.09	**19.58***
Lampanyctus crocodilus	0.17	0.75	0.36	1.65
Lobianchia dofleini	0.34	0.20	0.62	0.84
Myctophum punctatum	3.50	1.62	1.86	**8.50***

In a way similar to short-term within-year changes, interannual variability in the abundance of larval fishes in the plankton, particularly during the transitional period of spring-early summer, may reflect variability in physical processes and be particularly useful in highlighting reproductive adaptations of species to the pelagic environment (5).

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