MESOZOOPLANKTON AND FISH LARVAE ABUNDANCE; CORRELATION BETWEEN ENVIRONMENTAL PARAMETERS, MESOZOOPLANKTON, FISH EGGS AND LARVAE

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Abstract
This study, carried out in an important Greek fishing area, presents correlations between mesozooplankton, fish eggs and larvae on the one hand and temperature, salinity, depth and coastal distance on the other hand. In addition, it presents the distribution of fish larvae predators (mesozooplankton) and fish larvae prey (mesozooplankton) in relation to fish larvae.

Keywords: Ichthyoplankton, Zooplankton , Aegean Sea

Introduction
The abundance and diversity of mesozooplankton is extremely important for planktivorous fish and fish larvae. Studies investigating the relationship between zooplankton, fish larvae and eggs, as well as environmental parameters allow more precise assessment of fish stocks.

Materials and methods
Mesozooplankton samples were collected by horizontal hauls to a maximum depth of 5m, using a sampler type Bongo net, with 250 mm mesh size, at 14 stations in the Kimi area (North Aegean Sea), on 11-13 March 2011. The area is defined by the following coordinates: N.38.4-38.8, E.24.0-24.5. Environmental parameters were recorded using CTD. Salinity and temperature refer to surface values. The material was studied at the Department of Zoology-Marine Biology, University of Athens. The mesozooplankton was divided into 2 groups: Fish Larvae predators and Fish Larvae prey. [Fish Larvae predators: Polychaetes larvae, Mysids, holoplanktonic *Decapods* and larvae, Chaetognaths, Meduses, Siphonophores, holoplanktonic Mollusk, Amphipods, Tunicates. Fish Larvae prey: *Globigerina sp*., Gastropods larvae, Polychaetes early larvae, Oligochaetes larvae, Ostracods, Copepods, Copepods nauplius and eggs, Appendicularians, Echinoderms larvae, Phoronids larvae, Tornaria larvae, Cladocerans, Euphausids larvae (Omori & Ikeda, 1984). Fish egg and larvae data was derived from a previous study carried out in the same area (Siapatis & Kontoyiannis, 2012). The statistical analysis was performed using Stat Graphics and Surfer software.

Tab. 1. Distribution and abundance of fish larvae's prey, fish eggs, fish larvae and total zooplankton depending either on diet relationship or on environmental factors. (F.L= Fish Larvae, sal= salinity, temp=temperature)

Dependent variable	Independent parameter	P-value	R^2 (adjusted for d.f.)	Regression equation
F. L. Prey	F.L. Predators, fish larvae	0,0000	91,25%	F.L. Prey = 214,089 + 3,51546*F.L. Predators + 112,537*fish larvae
Total Zooplankton	temp, depth	0,0396	34,34%	Total zooplankton = 10011,8 - 668,176*temp + 0,146577*depth
Fish larvae	temp,	0,0318	27,37%	Fish larvae = 226,211 - 15,0907*temp
Fish eggs	temp, depth, sal, coast distance	0,0057	66,84%	fish eggs = 1437,24 + 10,1079*temp - 40,6496*sal - 0,000134238*coast distance - 0,0299689*depth

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Results and Discussion
The relationship between the abundance and distribution of fish larvae, total mesozooplankton and fish eggs and the environmental parameters considered is statistically significant ($p<0.05$) (Table 1). For fish eggs in particular, the model based on these parameters is at least accurate ($p<0.01$) and is considered to interpret the distribution of abundance at 84% of the sampling stations (Figure 1 A). The fish larvae pray and predators seem not to be correlated with the abundance of fish larvae (Figure1. B, C, D). However, it provides a strong indication that the fish spawning areas may be associated mainly with the environmental parameters (Table 1). The main spawning species in this area was sardine (*Sardina pilchardus)*.This species spawning at cold water, low salinity and coastal areas(Figure 1 A,B, C). Our results are in accordance with the bibliography (Somarakis *et al.2006)*

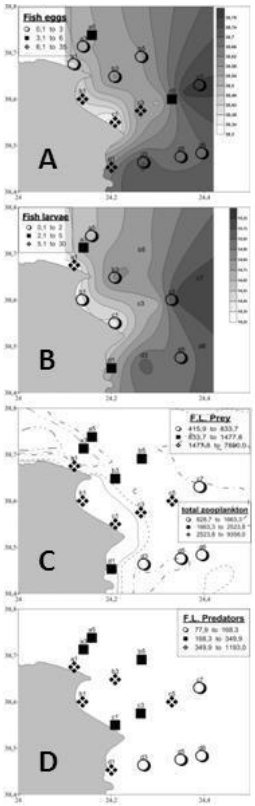

Fig. 1. Abundance & distribution of: (A) fish eggs & salinity, (B) fish larvae & temperature, (C) total mesozooplankton, fish larvae prey & depth & (D) fish larvae predators.

References
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