

THE BIOLOGY-ECOLOGY OF A DEMERSAL FISH IN A HIGHLY EUTROPHIC LAGOON OF NORTHEASTERN MEDITERRANEAN

V. Vassilopoulou*, E. Caragitsou and C. Papaconstantinou
National Centre for Marine Research, Hellinikon, Athens, Greece

Abstract

Data on the biology and ecology of the red mullet in a major gulf of western Greece, submitted to high organic enrichment, are provided. The red mullet stock in the study area comprised relatively small specimens, which appeared to perform an ontogenetic movement to the neighbouring Ionian Sea, at the onset of their sexual maturity. Reduced feeding intensity and growth of the specimens in the study area are also discussed.

Keywords : Teleostei, growth, diet, eutrophication

The Amvrakikos Gulf, is a nearly enclosed water body, with a maximum depth of 65 m, in which two rivers discharge relatively large quantities of fertilizers and pesticides used in the intensively cultivated surrounding plains. Moreover, aquaculture farms located in the northern part of the gulf, as well as domestic sewage from three coastal cities, contribute to further organic enrichment. The study of various chemical, as well as biological parameters have revealed that the area should be considered as one of the most eutrophic in the Mediterranean Sea (1). Distribution of water properties in the gulf suggests that surface salinity remains very low throughout the year, resulting to strong stratification of the upper layer, low oxygen values near the bottom and to the formation of laminated sediments at deeper areas and at bottoms of the inner part. The above are possibly connected, at least to a certain extent, with the decline of demersal fish catches in the Amvrakikos in recent years.

The red mullet (*Mullus barbatus*), along with the common sole (*Solea solea*) and the marine shrimp (*Penaeus kerathurus*) constitute the three commercially most important species of the Amvrakikos. The present study provides data on the biology/ecology of the red mullet, in order to shed some light on the status of the stock in the gulf, and clarify certain trends that appear to the respective fishery.

Samples were collected from 13 stations, using a 17 mm trammel net, during five seasonal cruises conducted in the Amvrakikos. The fork length (FL in mm), body weight (W in grams), sex and gonadal maturity were recorded for each specimen, while the otoliths (sagittae) and stomach were extracted and preserved for studying respectively the age and feeding habits of the species in the Amvrakikos.

In all, 1518 red mullet were caught, the 73.8% of which had a size belonging to the 120-140 mm length interval (Fig. 1a). The dominant age groups of the stock were one and two years, while larger (three-year old) specimens were rarely encountered (Fig. 1b). Mean length-at age appeared to be smaller than in other Greek areas (2), suggesting possibly a reduced growth rate for the species in the gulf. Growth in weight was allometric, implying the existence of thinner specimens for their length. The study of the gonadal maturity of the fish revealed that in May, when red mullet spawn in Mediterranean waters (2), very few specimens with mature gonads were collected in the gulf. The latter could be associated to the fact that the red mullet stock in the Amvrakikos comprised relatively small, sexually immature specimens. In the striped mullet (*M. surmuletus*) the existence of an ontogenetic movement to deeper waters appeared to be triggered by first maturity (3). If this is also the case for red mullet, it appears possible to hypothesize that laminated sediments in deeper areas of the gulf prevent the dwelling of living organisms there, causing possibly the migration to the Ionian sea, where the species appears to reproduce, according at least to the results of an ichthyoplankton survey study (1). Moreover, the feeding intensity of red mullet in the Amvrakikos appeared to be reduced, particularly in the inner part of the gulf and during the winter-spring period. The latter coincides with the period of increased river flow, which seemed to be critical for the benthos of the area (1). The observed reduced feeding intensity might result to reduced growth of the specimens, and was also mentioned for the cod in the gulf of St. Lawrence (4), and was correlated with existing hypoxic conditions. In the framework of the present study, it was impossible to isolate hypoxia effects, as well as those of interacting factors in this highly eutrophic area.

Our data show that the Amvrakikos red mullet stock consists of relatively young, sexually immature fish, and although trawl fishing is prohibited in the gulf, this stock is fully vulnerable to coastal fisheries. Moreover, further study is needed, in order to evaluate the observed trends regarding reduced feeding intensity and consequent growth per-

formance, as responses to the prevailing conditions in the gulf. In fact, a thorough investigation on the Amvrakikos current fishery potential should be conducted.

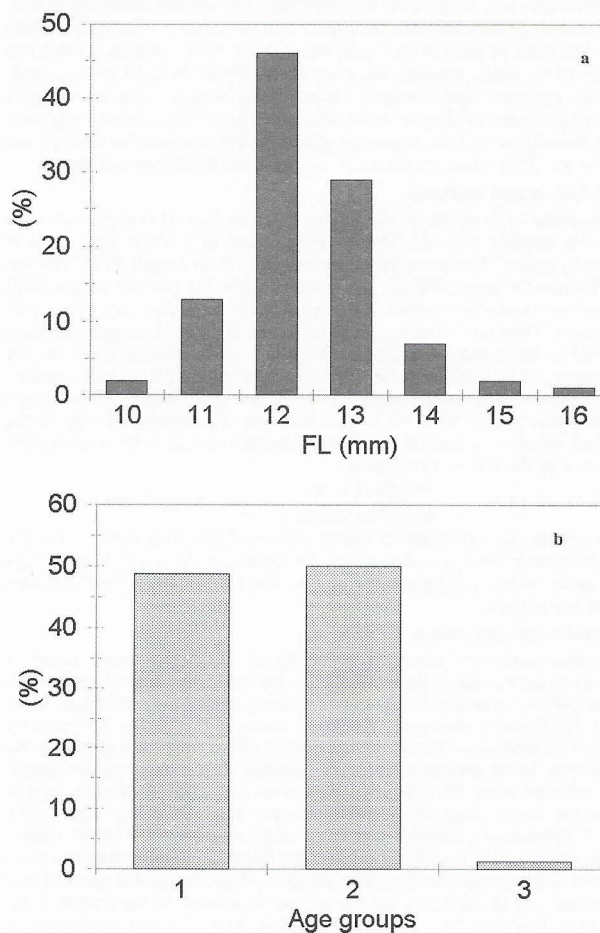


Figure 1. Length (a) and age (b) frequency distribution of the red mullet in the Amvrakikos Gulf.

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