

SEASONAL SPECIES ASSEMBLAGES IN AN ARTIFICIAL REEF IN NORTH AEGEAN SEA (GREECE)

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Abstract

The seasonal changes in fish assemblages in the artificial reef (AR) in Fanari, (North Aegean, Greece) were studied in January, June and October 2002. Species of the families Labridae, Sparidae, Serranidae and Centranchidae were responsible for dissimilarities between January and June and the same species together with Mullidae for dissimilarities between June and October.

Keywords : *Artificial Reefs, Aegean Sea.*

The main objective of the study is to determine the seasonal fish assemblages in the artificial reef (AR) after four years of establishment. The fishing gear used was bottom trawl (cod-end mesh size 10 mm) and samplings were carried out in January, June and October 2002 over a net of 11 stations. Data were analysed using multivariate analysis and groupings were based on species densities with percentage higher than 0.3% of the total monthly catch. Cluster analysis was performed with PRIMER [3] using data transformed with the Bray - Curtis similarity index (between stations) [4]. The determination of the differentiation between seasons and of the species responsible for the calculated differences were based on ANOSIM and SIMPER [3].

Cluster analysis indicated that the stations were grouped per season (Fig. 1). The average station similarity, calculated using ANOSIM, was 68.11% in January, 79.35% in June and 76.06% in October.

SIMPER, showed that the species responsible for the grouping of the January stations were: *Symphodus cinereus*, *Scorpaena notata*, *Octopus vulgaris*, *Serranus cabrilla*, *Scorpaena porcus*, *Sepia officinalis*, *Delentosteus quadrimaculatus*, *Eledone moschata* and *Trigloporus lastoviza* (total contribution 70.47%); for the June stations: *S. cinereus*, *Serranus hepatus*, *Coris julis*, *S. cabrilla*, *S. notata*, *Diplodus annularis*, *S. porcus*, *Diplodus vulgaris*, *Symphodus rostratus*, *O. vulgaris*, *Symphodus mediterraneus* (total contribution 70.71%); and for the October stations: *S. cabrilla*, *S. cinereus*, *D. annularis*, *C. julis*, *O. vulgaris*, *S. notata*, *Mullus barbatus*, *Mullus surmuletus*, *S. hepatus*, *Spicara smaris*, *S. porcus*, *Sarpa salpa*, *Boops boops*, *Scyllarus arctus*, *D. vulgaris*, *S. rostratus*, *Syngnathus acus*, *Symphodus ocellatus* (total contribution 71%).

Statistical analysis indicated that the seasons differed among them (ANOSIM, R global >0.91 , $p <0.001$). In the per pair comparisons of months, the R values were higher than 0.93 in every case. The main environmental factor most probably responsible for the presence of different assemblages was temperature, which was 14 °C in January, 18 °C in June and 22 °C in October.

Comparison of the January and June samplings showed an average dissimilarity of 45.5% with 14 species contributing 70.44% to the differentiation. The highest abundances were recorded in June. The species *C. julis*, *S. cinereus* and *S. rostratus* differentiated the two seasons by 22.83%, *D. annularis*, *D. vulgaris* and *Pagrus pagrus* by 15.64%, *S. hepatus*, *S. cabrilla*, *S. scriba* by 14.87% and *Spicara maena* and *S. smaris* by 6.56%. The June and October samplings showed an average dissimilarity of 36.8% with species *M. surmuletus*, *S. salpa*, *M. barbatus*, *S. hepatus*, *Blennius ocellaris*, *B. boops*, *Spondyliosoma cantharus*, *Dentex dentex*, *C. julis*, *S. ocellatus*, *S. smaris*, *S. cinereus*, *Gobius niger*, *D. annularis*, *S. scriba*, *S. arctus*, *Pagellus erythrinus*, *S. mediterraneus* and *Diplodus sargus* being responsible for 70.47% of the differentiation.

D. vulgaris was one of the most abundant species in the AR during the whole year. Stomach content studies have shown the importance of polychaetes in the diet of this species that are generally found on the substratum of ARs [5]. The species *C. julis*, *G. niger*, *B. ocellaris*, the species of the genus *Symphodus* and the species of the family Serranidae, assembled near the AR in June for reproduction (which takes place in spring, summer), while *D. quadrimaculatus* in January (reproduction takes place

in early spring) [1]. The presence of *P. pagrus*, *M. surmuletus*, *S. salpa* and *M. barbatus* increased in October and this could be due to the recruitment of the species that takes place during summer [1]. Furthermore, young individuals of *P. erythrinus*, *O. vulgaris* and *D. dentex* were found in all sampling periods. It is believed that they use the AR as a nursery area [1, 6].

In conclusion, each season was characterized by certain species that inhabit or visit the AR for spawning or feeding reasons. Young individuals were present inside the AR during the whole year and sexually mature individuals of most species assembled in the protected area during their reproductive period. So the reef can be considered as spawning and nursery ground.

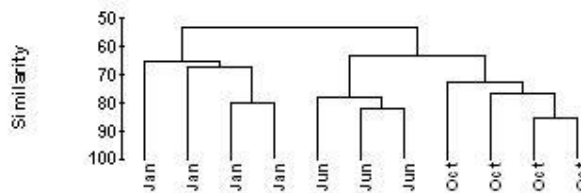


Fig. 1. Dendrogram of similarities for 11 stations (cluster analysis, group-average linkage) sampled during January, June and October 2002.

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