

ARTIFICIAL REEF FISH ASSEMBLAGE COMPARED WITH THAT OF NATURAL AREAS IN PALMA BAY (BALEARIC ISLANDS, WESTERN MEDITERRANEAN)

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Summary

The fish assemblage present in a production block artificial reef moored 30 m deep in Palma Bay, is studied and compared with that of two natural areas with similar environmental features. The results show differences in both areas and that the aggregation effects can not prove the production effects, as well as the need for a real fishing management to prevent the risk of overfishing the whole area by fishing the reef area.

Key words: Artificial Reefs, Balearic Islands, Western Mediterranean

Introduction

As part of the evaluation of the effects of the artificial reefs moored in Palma Bay (1) the fish assemblage of the reef compared with that of natural areas has been studied. The reef is situated between Cap Enderrocat and Cap de Regana (29° 26.59' N, 2° 43.00' E), located on degraded *Posidonia oceanica* beds and sand bottom. The work has been carried out in the reef area, as well as in two natural areas (39° 27.46' N; 02° 28.23' E and 39° 34.60' N; 02° 18.40' E). with similar environmental factors.

The data were collected by scuba diving visual census (2). In order to evaluate spatial variation in each area, 18 replicates per area have been taken, distributed in three sites, with a total of 54 replicates per year, in the months of June of 1999 and 2000. In the control areas the transect method was used. (3, 4, 5) and in the artificial reef that method has been adapted (2). The descriptive indexes were calculated with the Primer Program and analysed by Anovas (6). A pot-hoc test (Tuckey) has been performed to show possible differences between sites in each zone.

Because of the different sampling area, and in order to compare the abundance of common species between areas, both data sets (artificial reef and natural areas) have been referred to a normalised area of 10 m² and analysed by Anovas. The density of categories and ten vulnerable species common to the three areas has been studied with Anovas.

The fish size distribution of ten vulnerable species was made by grouping the specimens in three size classes: large, medium and small, according to the common maximum size for each species (7). The collected data have been analysed with Kolmogorov-Smirnov test. The statistical tests have been made with SPSS and Statistica programs.

The species present, total abundance and density of the different spatial categories (8), as well of ten vulnerable species, specific richness, diversity, evenness and specimen size distribution of the assemblage has been taken into account.

Results

The number of species present has always been lower in the reef (25-26) than in the control areas (32-37), with 18 species present in both areas and no species only present in the artificial reef.

In the reef the total abundance increased in the year 2000 in comparison to 1999. In relation to the abundance of the different spatial categories, only the species belonging to categories 5 and 6 showed significant differences. In both cases the density was higher in the reef and in the year 2000 increased in the reef area as well as in the natural ones.

The diversity, measured by Shannon diversity index, was also lower in the reef area than in the control ones.

The density of the following ten vulnerable species, common to the reef and the control areas were studied separately: *Diplodus vulgaris*, *D. puntazzo*, *D. sargus*, *Sciaena umbra*, *Spondyllosoma cantharus*, *Epinephelus costae*, *E. marginatus*, *Labrus merula*; *L. viridis* and *Muraena helena*. The only species showing differences between the reef and the control areas were: *D. puntazzo* and *E. marginatus*, being in higher density on the reef in both study years.

In both years the size were smaller on the reef than in the natural areas. This could be due to the difference in the fishing gear used in each area. No juvenile recruits were observed.

Both abundance and indexes, in 1999 and in 2000, present spatial differences in the reef area but there was not temporal variability, while the natural areas do not show spatial variability but time variability.

We believe the artificial reefs are effective in very damaged, homogenous seabed areas. Nevertheless in such a man-influenced area as Palma Bay, the number and variety of factors make it difficult to understand the cause-effect relationship.

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