DEMERSAL-PELAGIC RATIO IN GREEK FISH LANDINGS (1964-2003)

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Abstract

The demersal/pelagic (D/P) ratio was assessed in different Greek fishing regions for the period 1964-2003. In eastern/southern Aegean region and in western/central Aegean and Ionian region, the D/P ratio decreased significantly ($P<0.05$) during 1964-2003. In contrast, in the northern Aegean such a trend was present only for the period 1990-2003. These trends indicate that fisheries in these regions are increasingly relying on the smaller, short-lived pelagic fishes.

Keywords : Aegean Sea, Demersal, Pelagic, Fisheries, Ionian Sea.

Introduction

The annual landings of the Greek commercial fishing fleet have been routinely recorded since 1964 by the National Statistical Service of Greece (NSSG) for 16 fishing subareas [1]. Landings data refer to the legal and reported large- and small-scale fisheries, excluding recreational or sport fishing.

The aim of the present work was to assess the demersal/pelagic ratio (D/P) in groups of fishing subareas based on their fish landings composition for the period 1982-2003. The D/P ratio is used in fisheries science as an indication of the effect of fishing on marine ecosystems [2].

Materials and methods

Non-parametric multidimensional scaling (NMDS) using the Bray-Curtis similarity measure was applied to the average (1982-2003) landings of 66 per species (or groups of species) for each Greek fishing subarea. NMDS was used to identify groups of fishing subareas having similar landings composition. Stress values <0.15 indicate a good representation of data in two dimensions [3]. Consequently, we estimated the D/P ratio, for the groups of subareas indicated by NMDS, for the period 1964-2003. Demersal and pelagic species were defined based on FishBase (www.fishbase.org).

Results and discussion

The application of NMDS revealed the existence of three groups (Figure 1): (A) the northern Aegean subareas 13 and 14, including the Pagassitikos Gulf, subarea 11; (B) the Ionian (subareas 3, 4, 5 and 6) and western/central Aegean (subareas 8, 9, 10 and 12); and (C) the eastern/southern Aegean subareas (7, 15, 16, 17 and 18). This grouping was also confirmed by cluster analysis (results not shown). The two dominant pelagic and demersal species per group are shown in Figure 1.
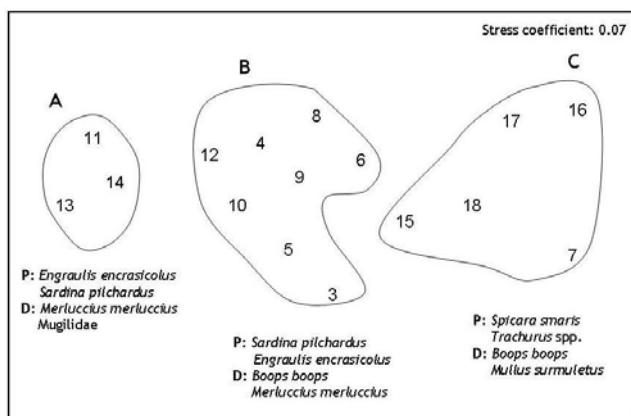

Fig. 1. NMDS of Bray-Curtis similarities from standardised mean catch data per species (1964-2003) showing the 16 Greek fishing subareas [for the location see figure 3 in (1)] assembled in three groups. The dominant pelagic (P) and demersal (D) taxa landed in each area are also shown.

The mean D/P ratio differed with group of subareas (ANOVA, $P<0.05$; A: 0.364±0.001; B: 0.848±0.004; C: 2.27±0.014), being higher for southern Aegean, thus indicating the predominance of demersal species in this region when compared to the northern Aegean the landings of which are dominated (>45%) by anchovy and sardine. The D/P ratio declined

significantly with time in the eastern/southern Aegean and in the western/central Aegean and Ionian Sea group (C and B respectively: Figure 2), a fact showing that fisheries in these areas are increasingly relying on the smaller, short-lived fishes from the lower part of marine food webs because the demersal stocks are depleted and the large pelagic ones are either declining or remain stable. Although the D/P showed no significant trend with time in the northern Aegean Sea for the entire period, it declined significantly ($P<0.05$) for the 1990-2003 period (Figure 2: bottom line, black circles).
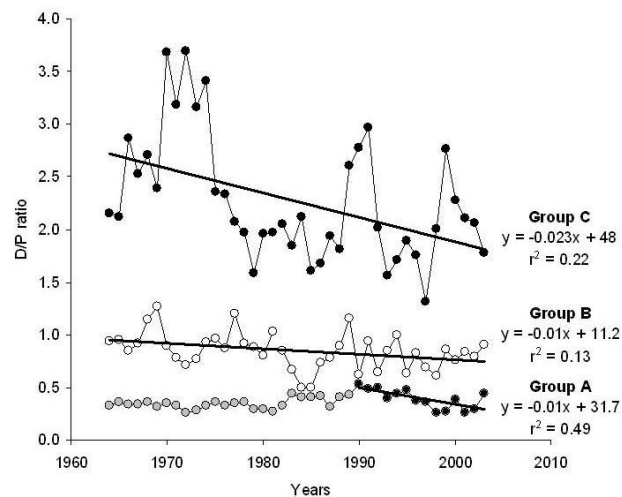

Fig. 2. The D/P ratio for Greek landings (1964-2003) in the three groups of subareas shown in figure 1. Regression for Group A refers to the 1990-2003 period.

References

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