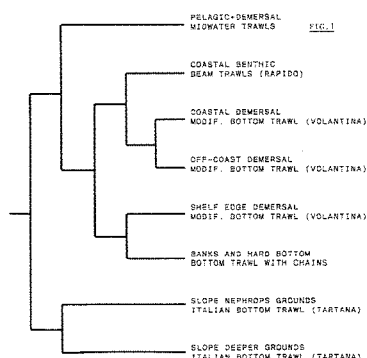
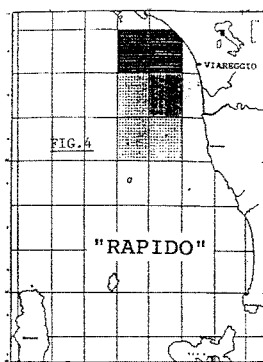
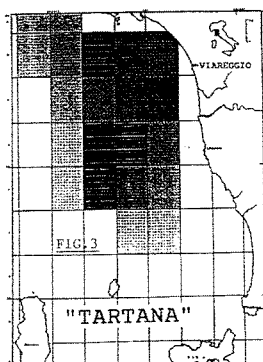
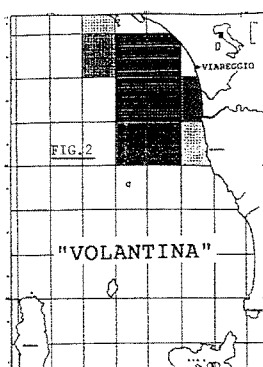


# DEFINITION OF THE GROUND FISH ASSEMBLAGES CAUGHT OFF THE TUSCANIAN COASTS FOR FISHERIES MANAGEMENT PURPOSES

A. ABELLA, F. SERENA

Consorzio Regionale di Idrobiologia e Pesca, Livorno, Italia

The demersal fisheries operating off the coasts of Viareggio, Tuscany are multispecific. Target species, fishing gears, fishing grounds change over the year. The "Italian bottom trawl net" ("tartana") is utilized in deep waters mainly for *Nephrops*, beam trawls ("rapido") in coastal waters with soles as target species, trawl nets with the groundrope with heavy chains in hard bottoms for sparids. A variant of the Italian otter trawl net ("volantina") is utilized near shore with gobies, cuttlefish, mantis shrimp, red mullet and *Eledone* spp. as target species. The midwater trawl catch includes some demersal species. Multivariate data of a catch assessment survey performed during 1992 were analyzed by arranging them in an ordered two-way table (TWINSPAN) and with the Detrended Correspondence Analysis (DECORANA). Both algorithms are included in the Cornell Ecology Programs Package, (1990). Species abundance data matrix contained information on 342 fishing trips with approximately 1200 tows and 282 species. Assemblages of co-occurring demersal fishes by fishing strategy represent seasonally invariant groupings by fishing gear and strategy and provide an accurate description of the commercially exploited species mixes. Clustering techniques can be applied to trawl-surveys data. However, the groups defined should not be consistent with those proceeding from the analysis of commercial landings. This is because trawl surveys utilize a standardized strategy and a single trawling gear. In this paper, clustering was performed with the aim to provide definitions of fisheries in particular area/gear/depth/month combinations with characteristic species mixes. Fig.1 shows the more consistent assemblages that have been derived. There is a strong agreement between the strategical goal (target species) and the corresponding assemblage designation. The clusters showed a very reduced degree of overlapping. The DCA program derived four axes in order of decreasing correspondence between the catch and species "scores". The first two axes represents a clear separation of catches determined mainly by the fishing gear. The *a priori* defined fishing strategy, based on gear, depth and target species appears accurate and effective and allows to predict the assemblages to be caught. Figs.2-4 show the geographical distribution of effort for the main groundfish fishing strategies in the area and the relative fishing pressure exercised by statistical division. Most of the smaller fishing trawlers utilize the "volantina" and are concentrated close to Viareggio. They represent approximately 60% of the total daily trips of the fleet. The importance of the single components for a certain fishing gear changes along the year. For example, *M. barbatus* landings are abundant in late Summer-Autumn, when age class 0 individuals are concentrated near the coast. The fluctuations regarding a single species (*Mullus*, *Sepia*, etc.) and areal shifting are detected with the clustering technique making subdivisions at the 5th or 6th level. During Summer, with good weather conditions, the fleet is able to go further in deeper waters and the "tartana" is more frequently used. *N. norvegicus*, *P. longirostris*, *M. poutassou*, the squids *T. eblane* and *I. coindetii*, *Lophius* spp., *L. boscii* are the main components of the "tartana" assemblage. Some fishing vessels exploit *Nephrops* grounds placed quite far from Viareggio. The beam-trawls are more utilized during Summer. *Solea* sp., *Penaeus kerathurus* and *Raja asterias* are the main components of this assemblage. During the whole year, but specially when anchovy schools are detected, part of the fleet changes strategy and utilizes the mid-water trawl net. Anchovy by-catch is mainly composed by *Sardina* sp. and other Clupeids and Mugilids, but also by demersal species as *Diplodus* spp and *M. merluccius*.



## REFERENCES

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