

TIME-SERIES ANALYSIS OF ABUNDANCE INDICES OF DEEP SEA RESOURCES IN THE STRAIT OF SICILY

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Abstract

Time-series of abundance indices of deep sea demersal resources (501-800m) derived by the MEDITS trawl survey in the Strait of Sicily (GSA 16) were analyzed by aggregated taxa (bony fish, cartilaginous fish, cephalopods and crustaceans) and species using a polynomial approach. The results showed a significant increasing trend of the cartilaginous fish and cephalopods, in terms of biomass (kg/km²) and density (n/Km²) indices, whereas temporal pattern in bony fish and crustaceans resulted not significant. *Helicolenus dactylopterus*, *Hoplostetys mediterraneus*, *Galeus melastomus*, *Nephrops norvegicus* and *Aristaeomorpha foliacea* showed significant trends in both number and weight, whereas *Aristeus antennatus*, *Etmopterus spinax* and *Chimera monstrosa* only in biomass.

Keywords: Time series, Biomass, Fisheries, Sicily Channel, Mediterranean Sea

The time series of the catch rates collected through experimental surveys are one of the most powerful tools to assess the dynamics of exploited resources and understand changes in marine communities [1]. In this study we used biomass and density data collected during the bottom trawl survey MEDITS in the South of Sicily (GSA 16) to evaluate the temporal trends in abundance of bony fish, cartilaginous fish, cephalopods and crustaceans as well as some of the main species distributed on the middle slope (501-800 m). The biomass (BI, kg/km²) and density (DI n/Km²) indices of these taxa for the period 1994-2013 were modeled to assess the temporal trend and perform a short time predictions (2 years) using a polynomial model through the Ordinary Least Squares method (OLS). All the analyses were performed in R [3]. In 2014 the MEDITS was not carried out in the depth strata (501-800 m) due to administrative issues. Trend in BI and DI of bony fish was dome shaped, ($R^2=0.21$ and 0.17 for BI and DI respectively) with a decreasing pattern since 2009 (Fig. 1). Differently, cartilaginous fish displayed an increasing trend for both indices with a six-degree polynomial trend ($R^2=0.89$; 0.83). Cephalopods showed a significant linear increasing trend for both DI and BI ($R^2=0.64$; $R^2=0.34$) but the trend of both abundance indices for the crustaceans was not significant ($R^2=0.09$; 0.12) (Fig. 1). The temporal patterns was significant trends for both DI and BI in almost all species with the exceptions of *Lepidorhombus boscii* ($R^2=0.15$; 0.25) whereas *A. antennatus*, *E. spinax* and *C. monstrosa* showed significant trend only in biomass ($R^2=0.52$; 0.33 ; 0.79) (Fig. 1). Considering the two years forecast an increase both indices BI and DI was predicted in *H. dactylopterus*, while predicted values of DI were increasing in *H. mediterraneus*, *G. melastomus*, *C. monstrosa*, *N. norvegicus* and *A. foliacea*. (Fig. 1). Our results depict a feeble recovery of the demersal community of the middle slope in the South of Sicily which is consistent with the decreased fishing capacity observed in the area during the last 10 years [4].

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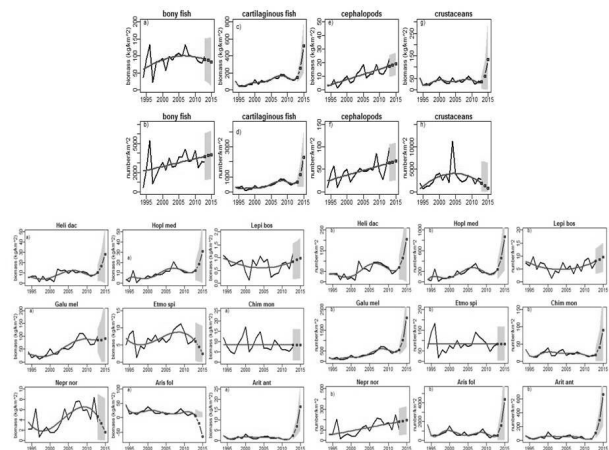


Fig. 1. Biomass and density time series trends and forecasts of aggregated taxa (bony fish, cartilaginous fish, cephalopods and crustaceans) and species in the Strait of Sicily.

References

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