

The benthic-pelagic coupling enhances the body condition of deep-sea demersal species

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Studies on the relationships between environmental conditions and the nekto-benthic communities are scarce in the Mediterranean Sea, despite a long tradition in fisheries investigations. The aim of this study is to evaluate the link between body condition of demersal species and environmental features (i.e. hydrographic conditions and trophic resources) in two different nearby areas of the western Mediterranean Sea, the Balearic (BsB) and the Algerian (AsB) sub-basins, which have different geomorphological and hydrodynamic characteristics.

Two multidisciplinary surveys were carried out in December 2009 and July 2010. In each survey two vessels were used simultaneously: (i) a commercial fishing boat to sample nekto- and epibenthic communities; (ii) and an oceanographic vessel to collect hydrographic data and to sample zooplankton along the water column, as well as the meso-pelagic species of the main scattering layers, which were detected by acoustic methods. Body condition indices were calculated for individuals of 21 different demersal species (15 fishes, 3 cephalopods and 3 crustaceans), which represented approximately 71 % and 78 % of the total abundance and biomass caught, respectively. To estimate body condition Fulton's index, relative condition index and standardized residuals from the weight-length relationship, were used. Differences in community structure, body condition and environmental parameters were compared between areas and seasons, by means of uni- and multi-variant analysis and Generalized Linear Models.

Results showed a better body condition in the BsB during summer, despite differences among the three indices used. The spatial and temporal differences in body condition are discussed in the context of the main environmental variables characterizing both study areas, which include oceanographic parameters as well as potential preys of the nekto-benthic macrofaunal assemblages (meso-zooplankton, meso-pelagic, supra- and epibenthic communities). Significant variations between areas and seasons were also observed for some of these variables.

These results show the importance of the environment on the condition of deep-sea species and suggest an important trophic coupling between the benthic and the pelagic domain in the Balearic Islands, one of the most oligotrophic areas of the western Mediterranean.

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