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The role of environment on body condition of deep-sea fishes in the western Mediterranean

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Despite the long Mediterranean tradition in fishery investigations, studies on the influence of the environment on the population dynamics of exploited species are scarce, especially for deep-sea fishes. The aim of this contribution is to assess the link between body condition of nekto-benthic fishes and environmental features in two areas of the western Mediterranean, located in the Balearic (BsB) and the Algerian (AsB) sub-basins, with 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 epi-benthic communities; (ii) and a research 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. Depths in the survey ranged from 200 to 1000 m. Differences in community structure, fish condition of 15 exploited deep-sea fish species (*Helicolenus dactylopterus*, *Lepidorhombus boscii*, *Lepidorhombus whiffiagonis*, *Lophius budegassa*, *Merluccius merluccius*, *Micromesistius poutassou*, *Raja clavata*, *Scyliorhinus canicula*, *Trigla lyra*, *Etmopterus spinax*, *Galeus melastomus*, *Lepidion lepidion*, *Mora moro*, *Nezumia aequalis* and *Phycis blennoïdes*) and environmental parameters were compared between areas and seasons, by means of uni- and multi-variant analysis and Generalized Linear Models. To estimate fish condition Fulton's and relative condition indices, as well as standardized residuals from the weight-length relationship, were used. Results showed a better fish condition in the BsB during summer, despite differences among the three indices used. The spatial and temporal differences in fish condition are discussed in the context of the main environmental variables characterizing both study areas, which include data on the oceanography (temperature, salinity, potential density, dissolved oxygen and fluorescence) as well as potential preys for the nekto-benthic fish assemblages (meso-zooplankton, meso-pelagic, supra- and epi-benthic 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 fishes 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.

Keywords : Fish condition, Environment, Trophic coupling