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Understanding the ecological role of Mediterranean demersal elasmobranch mesopredators

by

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Abstract

Mesopredators occupy a central position in the food webs, foraging prey at multiple lower trophic levels. However, their function within ecosystems is still unclear, especially in terms of how their trophic roles will change under the impacts of climate change and anthropogenic pressures like overexploitation and pollution. Here, I aimed to determine specific aspects of the ecological roles of Mediterranean elasmobranch demersal mesopredators (*Mustelus* spp. and *Squalus acanthias*) by analysing their feeding habits, habitat use, and how their foraging behaviours may change under different anthropogenic stressors. By linking global trawling effort with trophic data of elasmobranchs from the genera *Mustelus* and *Squalus,* I found differences in functional foraging between the two genera, as well as differing isotopic responses under high fishing intensities. I compared the feeding habits and isotopic niche as proxy of ecological niche of a teleost (*Merluccius merluccius*) and two elasmobranchs (*Mustelus punctulatus* and *Squalus acanthias*) demersal mesopredators from the Adriatic Sea. Dietary and isotopic differences among species suggest that Adriatic *M. merluccius* and elasmobranch mesopredators are not competing for the same prey species, partly due to disparities in size ranges of the predators owing to phenotypic responses to high fishing pressure. I also related trophic biomarkers with mercury (Hg) concentrations in *Mustelus* spp. from the Mediterranean Sea. There was a relationship between Hg concentrations and $\delta^{15}N$ values in muscle suggesting repeated foraging for low trophic level and Hg-poor prey, and biomagnification of Hg at higher trophic levels. Finally, I tried a novel approach for determining if chondrichthyan cartilaginous hard tissues could potentially be used for estimating metabolic rate. Results suggested that body mass, temperature (using $\delta^{18}O$ values as proxy), and activity levels can explain some of the variation in $\delta^{13}C$ values of vertebrae and jaw tissues. Mesopredators have variable trophic roles, and these can be affected according to the impacts on their environment which highlights the need to further study how these species adapt to a fast-changing world.