

Trophic pathways of an expanding pelagic fish species in the Mediterranean

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Introduction Global change has been recognized as the main driver of the expansion of species outside to their native range. How **expanding species** manage trophic resources may be the most critical factor to ensure survival and reproduction and one of the most important ways to impact native communities.

Two main **trophic pathways** have been suggested to explain resource acquisition by expanding species: **(i)** they may behave aggressively over the resources exploited by natives, displacing them from their niches, or **(ii)** they may exploit niche opportunities that most native species are unable to use efficiently.

The expansion of the **Round Sardinella** (*Sardinella aurita*) as a consequence of the increase in temperature of the Mediterranean Sea provides an excellent opportunity to investigate the **trophic strategies of marine species in expansion**, as well as to quantify the **trophic impact** of this species on ecological similar native species.

Methods The study was conducted in the continental shelf of the Ebro Delta marine area (NW Mediterranean). To establish the trophic pathways of Round Sardinella and the trophic relationships with coexisting pelagic fish we analyzed $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ values. SIAR isotopic mixing models were used to determine the contribution of different prey in the diet.

Aim We examined the main **trophic pathways** of Round Sardinella and the **trophic relationships** with other ecological similar pelagic fish species in the North-Western Mediterranean Sea by analyzing their isotopic values.

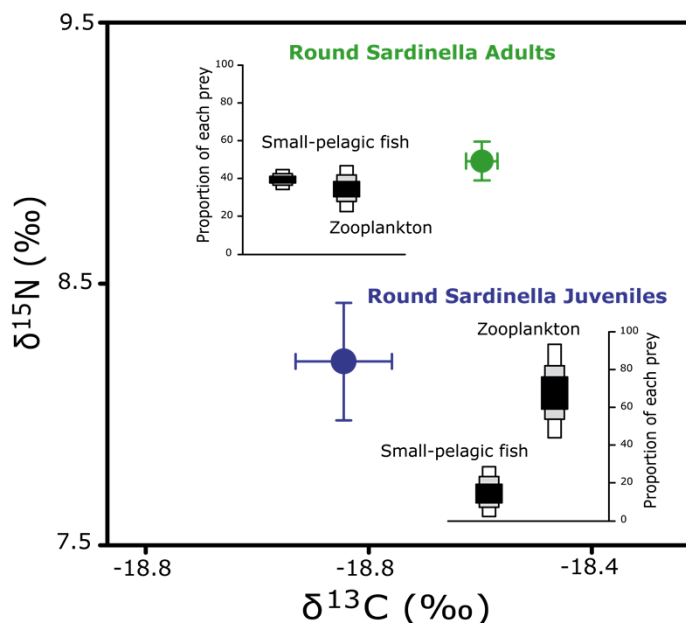


Figure 1 Stable isotopic values (mean and sd) of juvenile and adult Round Sardinella and the importance of small-pelagic fish and zooplankton in their diet based on SIAR mixing models.

Results Juvenile (immature) and adult (mature) individuals of Round Sardinella consistently occupied different **trophic niches** (see **Figure 1 and 2**).

When comparing with **ecologically-similar native species** (**Figure 2**), results show that juvenile Round Sardinella overlapped its trophic niche with small pelagic species (Sardine *Sardina pilchardus*), whereas adult individuals apparently **overlapped** their trophic niche with medium-sized pelagic species (Atlantic Horse Mackerel *Trachurus trachurus* and Atlantic Chub Mackerel *Scomber colias*).

Moreover, stable isotopic values and SIAR isotopic mixing models suggest that Round Sardinella may be acting as **predator** of small pelagic species (**Figure 1**), probably small individuals and larvae.

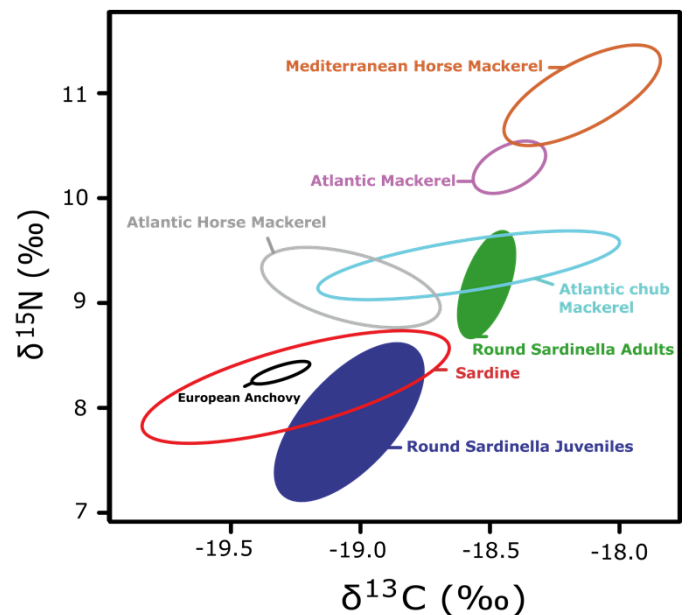


Figure 2 Trophic niche (isotopic Bayesian ellipses) of Round Sardinella and 5 coexisting pelagic species in the NW Mediterranean.

Conclusion Although preliminary, stable isotopic results indicated that the main **trophic pathway** of Round Sardinella in its expanding area is the use of resources exploited by similar native pelagic fish species. Moreover, it can be a potential predator of those species.

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