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Diet tracing in anchovy and sardine: a multi-proxy approach to understand trophic interactions in the NW Mediterranean pelagic ecosystem

Authors: Eneko Bachiller¹, Joan Gimenez¹, Marta Albo-Puigserver¹, Elena Lloret¹, Jose Maria Bellido², Maria Grazia Pennino², Antonio Esteban², Neus Marí-Mena³, Belén Carro³, Marta Coll¹.

Abstract

1Institut de Ciències del Mar (ICM-CSIC), Barcelona, Spain. **2**Instituto Español de Oceanografía, Centro Oceanográfico de Murcia, San Pedro del Pinatar, Spain. **3**AllGenetics & Biology SL. ESB70306840. Edificio CICA. Campus de Elviña s/n. E-15008 A Coruña. Spain.

Keywords: sardine, anchovy, stomach contents, stable isotopes, DNA-metabarcoding, prey diversity, diet overlap.

After several years of low abundance and landings for Mediterranean anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*), with the subsequent lowered fishing effort, the recovery of such species is still uncertain. Despite anchovy being less affected, in recent years declines in biomass have been reported for both species in the Northern area of the Western Mediterranean, showing also lower condition factor than in previous decades. In this context, understanding key ecological processes such as the potential trophic interactions between anchovy and sardine sharing the niche is of especial interest. The combination of visual characterization and DNA-metabarcoding analyses in stomach contents of anchovy and sardine suggests a latitudinal trend in the study area (Spain and France), with a higher feeding success in the Southern areas of GSA06 (Spain). Although the taxonomic resolution changes with the method, both species show a Calanoid-based diet composition, with higher abundances of relatively larger prey (e.g. Euphausiids) in the South. Stable isotope analyses of nitrogen ($\delta^{15}\text{N}$) and carbon ($\delta^{13}\text{C}$) show anchovy feeding in higher trophic levels than sardine, highlighting that anchovy may use the active predation on large prey more often. Combining methods offer new insights in feeding ecology and results can be used to improve multispecies models in the area, addressing either underestimation (e.g. in gelatinous prey such as salps) or identification problems (i.e. reaching the species level) in certain prey, often found in conventional analyses.

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Contact author:

Eneko Bachiller, Institut de Ciències del Mar (ICM-CSIC), Barcelona, Spain.

ebachiller@mail.com

¹Institut de Ciències del Mar (ICM-CSIC), Barcelona, Spain. ²Instituto Español de Oceanografía, Centro Oceanográfico de Murcia, San Pedro del Pinatar, Spain. ³AllGenetics & Biology SL. ESB70306840. Edificio CICA. Campus de Elviña s/n. E-15008 A Coruña. Spain.

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