
Interactions between habitat use, isotopic niche variation and overlap among fish species in a temperate semi-enclosed sea

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Abstract

Recent advances on stable isotope metrics allowed characterizing population trophic niche width and overlap through the concept of "isotopic niche". Although these metrics have provided ecologists with new statistical tools to compare isotopic niches, it is still unclear how habitat use and feeding strategy influence niche width and the subsequent probability of overlap. We analyzed the effect of depth on niche width (Bayesian standard ellipse areas, SEAc) and overlap of the 10 main commercial fish species from the English Channel belonging to diverse functional groups: pelagic piscivorous (e.g., Atlantic mackerel), demersal piscivorous (e.g., European seabass), benthic feeders (e.g., Small-spotted catshark) and endobenthic feeders (e.g., Common sole). Overall, Atlantic mackerel was the species with the widest niche (SEAc = 3.36) while Whiting had the narrowest niche (SEAc = 0.62). Depth influenced niche width, for example, mackerel fish collected below 10m depth had smaller SEAc (2.24) than individuals collected between 10-20m depth (3.23). Consequently, the probability of Atlantic mackerel's niche overlap with another species' isotopic niche was highly variable ranging from 14% to 90% depending on the second species considered and sampling depth. A mixing model showed that depth (used as a proxy of habitat variation) greatly influenced resource use and was particularly important for pelagic species feeding mostly on suprabenthic prey in shallow waters (20m). Our results highlight the importance of accounting for feeding strategy and habitat when comparing isotopic niches across species at the population level.

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