{rokbox title=|Map of the study area with species-specific populations associated to their corresponding ICES ecoregion :: Image: Authors| thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-life-history-environment-shape-small-pelagic-fish-demography-atlantic-seas-otero-et-al-2023-thumb.jpg|}images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-life-history-environment-shape-small-pelagic-fish-demography-atlantic-seas-otero-et-al-2023.jpg{/rokbox}

J. Otero and **M. Hidalgo**, 2023. **Life-history traits and environment shape small pelagic fish demography and responses to fishing and climate across European Atlantic seas.** ICES Journal of Marine Science, 2023, 0, 1–15. DOI: 10.1093/icesjms/fsad072

Abstract: Small pelagic fish (SPF) are fundamental components of marine food webs and are subject to boom and bust periods ascribed to the interactive effects of fishing and climate, which vary depending on species' demography and life-history traits and determine the signal that we observe in fisheries time series. However, it is poorly understood how the biology of SPFs and habitat structure shape their population demography and responses to fishing and climate. This study evaluates the influence of life-history traits and the environment on the demography and the response to exploitation and climate for 14 populations of SPFs occurring in the European Atlantic Seas. Using age-structured population matrix models we calculated elasticities to characterize the contribution of recruitment to population growth rate. We then evaluated the association between biological traits and environmental conditions (mean, seasonality, and predictability) with average recruitment elasticity and demography. Finally, we quantified the effects of biological traits and geography in shaping the temporal responses of each population's recruitment elasticities to demography, exploitation, and climate. For all species, population growth rate correlated positively with the elasticity to the recruitment, implying that long-term persistence is driven by the contribution of recruitment. Greater elasticity was found for populations with younger spawners, earlier maturation, and higher somatic growth rate inhabiting less predictable thermal ecosystems but with more temporally similar wind conditions. Among populations, fast growers had a stronger negative relationship between demographic structure and the importance of recruitment. At high fishing pressure, populations became increasingly dependent on recruitment though this relationship was less important for fast growers which, on average, sustained higher levels of exploitation. In turn, fast-maturing populations responded more strongly to the mean, seasonality, and predictability of the environmental conditions, especially towards eastern and southern geographically extremes. The results highlight the importance of recruitment for the population growth of SPFs and illustrate how the contribution of recruitment varies among and within populations as a function of environmental conditions and life-history traits defining an ordination of SPFs along a slow-fast continuum with implications for population dynamics and the responses to endogenous and exogenous factors.

Keywords: climate, elasticity, fishing, life-history traits, NE Atlantic, population growth, recruitment, small pelagic fish