

Shifts in Maturity Patterns of *Solea solea*: Exploring Growth-Reproduction Trade-offs and Environmental Impacts in the Irish Sea and Eastern English Channel (2004–2022)

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Trade-offs between growth and reproduction are common in nature, as energy allocation towards reproduction competes with that towards growth. These allocations vary between species and populations, influenced by life history traits and external factors such as temperature and mortality. Common sole (*Solea solea*) is of great commercial significance for several demersal mixed fisheries from the Mediterranean to the Irish Sea. Its exploitation has increased since the 1960s with the introduction of the beam trawl. This study investigates temporal and spatial trends in the proportion of mature sole at different ages in the Irish Sea and Eastern English Channel (ICES areas 7a and 7d) from 2004 to 2022. Our research investigates how environmental and anthropogenic factors have influenced the maturity proportions of fish from 2004–2014 and compares them with those from 2014–2022. We hypothesize that: (1) the proportion of mature fish at younger ages has increased over time, indicating a shift in age-specific maturity patterns; (2) environmental changes or increased fishing mortality have contributed to these trends; and (3) Irish Sea exhibits stronger trade-offs in fish maturity compared to the English Channel, potentially due to differences in habitat characteristics or anthropogenic pressures. Otolith growth rings are used to calculate age and growth. Maturity staging is based on gonad inspection. Environmental data, including bottom temperature trends, and fishing mortality data, are integrated to assess their role in influencing maturity patterns.

Keywords

Common Sole; Growth-reproduction Trade-offs; Growth-reproduction Trade-offs; Fishing Mortality