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Combining stable isotope mixing models and a bioenergetics-based approach to spatialize the exploitation efficiency of juvenile demersal fish a coastal nursery

Louise DAY, Pierre CRESSON, Alexandra ENGLER, Hervé LE BRIS, Anik BRIND'AMOUR

Estuarine and coastal ecosystems are spatially-restricted habitats fulfilling a nursery function for many demersal fish species. These nursery-dependant species concentrate at the juvenile stage in these habitats, resulting in density-dependent regulation and thus limiting the growth and survival. However, the underlying mechanisms are still poorly understood and the limitation of the food supply on the juvenile fish remains a pending issue.

The Seine estuarine and coastal ecosystem (Eastern English Channel) is a nursery composed of a mosaic of habitats offering diverse food resources. Over the last decades, important anthropogenic stress significantly reduced the surface of mudflats and productive habitats. In this context, the understanding of the trophic contribution and role of each habitat is essential to understand the local trophic functioning and more generally to test the food limitation hypothesis at a finer spatial scale.

We used a recently developed bioenergetics-based approach to estimate the benthic trophic capacity of this nursery. This approach estimates the exploitation efficiency (EE), *i.e.* the part of the production consumed by the juveniles. The production model can be easily spatialized in the different habitats. However, fish mobility makes the spatialization of the consumption model, which estimates the total energy required by the fish growth, more challenging. This issue was overcome by combining the outputs of the consumption model with those of isotopic mixing models, the latter integrating isotope compositions of juveniles' prey from the different habitats. The comparison of the EE assessed will help identifying trophically-limited habitats for the juveniles' production.

Keywords: trophic capacity, juvenile fish, habitats, spatialization, stable isotopes

Contact author: *Louise Day, Ifremer, Ecologie et Modèles pour l'Halieutique, rue de l'île d'Yeu, 44311 Nantes cedex 03, France and Agrocampus Ouest, Ecology and Ecosystem Health Unit, 65 rue de Saint Brieuc, 35042 Rennes cedex, France, Email: louise.day@ifremer.fr*