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# Effect of depth gradients on fish trophic relationships in the English Channel

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## Abstract

Few studies have documented large-scale variations of trophic relationships along environmental gradients, especially in marine ecosystems, despite this topic being recognized as critical for food-web functioning understanding. Recent theoretical work demonstrated the importance of benthic-pelagic coupling in shaping the structure and functioning of marine trophic webs.

The present study investigated how depth affects the trophic interactions in the English Channel fish community, from the shallow eastern part to deeper waters westwards. C and N stable-isotope ratios of 16 fish species were used as proxies of organic matter sources fueling fishes' food web and trophic position, respectively, to produce two main indicators.

First, Bayesian isotopic mixing models were used to determine the relative contribution of benthic and pelagic primary production to fishes' food webs. Relative importance of benthic sources was higher at shallower stations for all species, demonstrating the strengthening of benthic-pelagic coupling as depth reduces, even for pelagic species. We also assessed the variation of the relationship between trophic level and body length with depth, since pelagic trophic webs are considered more size-structured than benthic. At the assemblage level (all species pooled), the slope of the relationship increased with depth, consistently with the benthic-pelagic decoupling with increasing depth. These results confirm that environmental gradients do alter trophic interactions and food-web structure and that they should be considered when assessing community functioning.

**Keywords:** English channel, trophic networks, stable isotopes, benthic, pelagic coupling, fish

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