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Investigating drivers of cetacean occurrence in a cross-border region, the Malin Sea, using data collected during a transnational European fishery survey

Marine top predators tend to aggregate near topographic features (coastlines, sea mounts, shelf breaks, canyon systems, sandbanks), dynamic oceanographic systems (fronts, currents) or more ephemeral phenomena (seasonal upwelling, eddies, ice-edge) where prey concentration is relatively predictable. Irish and Scottish waters include a variety of these critical features and are amongst the most important habitats for cetaceans in Europe. In Ireland, Cetaceans on the Frontier and ObSERVE surveys have shed light on habitat drivers of several offshore species but remained spatially and temporally discrete. Moreover, due to their design, transect-line surveys tend to provide lower coverage near the limits of survey blocks, therefore leaving border regions marginally sampled when surveying only national waters. So far, few studies have focused on cetaceans distribution in the region of the Malin Sea, overlapping with the Irish EEZ, UK EEZ and International waters compared to the rest of Irish and Scottish waters. Despite an apparent rich species diversity, relative cetacean abundance over the Malin shelf seems rather low in comparison with hotspots documented further north off the Hebrides, and west and south of Ireland. As the environment appears suitable for many species based on their current range and habitat preferences, it remains unclear whether this apparent low prevalence arises from a lack of published results, uneven survey coverage, or accurately portrays an ecological discontinuity between western Scotland and western Ireland habitats. Since 2016, the multi-disciplinary transnational Western European Shelf Pelagic Acoustic Survey (WESPAS) has been extensively and systematically surveying the entire region of the Malin Shelf, monitoring marine megafauna, seabird, fish stocks and zooplankton distribution while collecting in-situ measurements of oceanographic conditions. It is to date the most comprehensive and longest on-going time series for visual observations of marine mammals in the area. Here we use the WESPAS dataset to model, within a Bayesian framework, cetacean presence against selected environmental and biological variables; and investigate cetacean distribution and habitat preferences in the Malin Sea, notably in relation with the occurrence of a dynamic tidal front. Ultimately, results from this study should contribute towards informing strategic management and conservation decision making in this cross-border area.