

A meta-analysis of isotopic compositions of North Sea marine mammals

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For over a decade, the North Sea has been undergoing significant changes due to global changes and overfishing. We conducted meta-analyses of previously published data on marine mammals sampled in the North Sea to test the competition for food sources and spatial variations. The overall objective of this study was to assess the potential trophic changes of the grey seal, the harbour seal and the harbour porpoise. Data included $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values measured in blood cells and muscles from the three species. SIBER, a trophic niche overlap quantification approach, highlighted potential competition between marine mammal species. The ellipse drawn for harbour seal data showed the highest $\delta^{15}\text{N}$ values, reflecting its trophic position at the top of the food web. But the ellipse overlapping between the harbour seal and the grey seal of Germany was very important, showing a potential strong competition for food sources may be due to the overfishing. The harbour porpoise displayed a lower trophic position and a wide range of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values compared to harbour seal and grey seal as seen from its extended ellipse size. This may be due to a more opportunistic behaviour following the decline of some fish population in the North Sea. Surprisingly a group of grey seals sampled in Scotland present a very small ellipse size, presumably more selective in their prey choice, and show the lowest $\delta^{15}\text{N}$ values. Caution should be taken before comparing the trophic position of the groups of grey seals as the baseline differed between the two sampling areas. Low nitrates concentrations, higher latitudes, colder temperatures, deeper waters and rocky soils of the Scotland's coasts of the North Sea cause a stratification phenomenon of the water column explaining the lower $\delta^{15}\text{N}$ baseline in this area and so the spatial variation between these two groups of grey seals living in the North Sea.

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