

## 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, global warming and fishing. We conducted meta-analyses on marine mammals sampled in the North Sea to test the potential antropogenic impact on feeding behaviour of grey seals, harbour seals and harbour porpoises. Data included  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values measured in blood cells and muscles from the three species. SIBER, an isotopic niche quantification approach, is used to highlight potential dietary similarity and thus competition between marine mammal species. Harbour seals sampled in Germany showed the highest  $\delta^{15}\text{N}$  values, reflecting a trophic position at the top of the food web, alongside grey seals. In contrast, harbour porpoises sampled from Germany displayed the lowest trophic position. The ellipse overlapping between German harbour and grey seals was very important, showing similarity in, and therefore potential competition for, food sources. On the other hand, the harbour seal and the harbour porpoise of Germany displayed extended ellipse size compared to the grey seal. This may be due to a more diverse diet and, perhaps, a more opportunistic foraging behaviour than grey seals. Surprisingly, another group of grey seals sampled at Isle of May, Scotland displayed lower  $\delta^{15}\text{N}$  values and a very small ellipse size compared to grey seals from Germany, presumably being even more selective in their prey choice. Nevertheless, comparing the trophic position of the groups of grey seals requires caution as the isotopic baseline differed between the two sampling areas. This study allowed the determination of the competition, the spatial variations and the trophic niches of marine mammals in the North Sea and will, at the end, evaluate the effects of the changes in the North Sea on the ecology of marine mammals.

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