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# Strong seasonal and inter-annual fidelity in foraging areas of a mobile marine top predator, the grey seal

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## Abstract

Grey seals *Halichoerus grypus* are protected marine mammals, sharing their time between the marine and terrestrial environments. They haul out on land to rest, moult and breed, while they feed at sea. Mark-recapture studies showed they can be faithful to their haulout site over the years, but such site fidelity was less well known at sea. Nineteen grey seals were tagged with GPS/GSM tags in Brittany, France, from 2010 to 2013. The tags continuously recorded the GPS locations as well as the diving behavior of the seals for  $159 \pm 66$  days on average. The dive shape and parameters were used to infer the foraging behavior of the seals, and the spatial distributions of the foraging areas were compared between seals or between periods for the same seals thanks to the Index of Difference in Spatial Pattern (IDSP), ranging from 0 (identical space use) to 1 (completely different spatial patterns). We showed that there was very little overlap between individual foraging areas (IDSP =  $0.96 \pm 0.06$ , N=169 pair comparisons), but each individual was quite faithful to its foraging areas from one quarter of the year to another (IDSP =  $0.64 \pm 0.20$ , N=132). Two individuals were tracked on two consecutive years, and the overlap between their foraging areas for these two years was high (IDSP= 0.30 and 0.32). Our study showed a high fidelity and individual specialization of sub-adult and adult grey seals' habitat use outside the breeding season, in addition to breeding site fidelity that was already shown for these species.

**Keywords:** site fidelity : foraging behaviour, diving behaviour, marine mammals, individual specialization, telemetry

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