

## Migratory routes and stopover sites of the Lesser Black-backed Gull: Where to go if your options are endless?

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Long-distance migration has evolved in many genera of birds to cope with spatio-temporal fluctuations in the environment (1). This allows them to complete their annual cycle under favourable conditions, for example by taking advantage of seasonal peaks in food availability (2). Within species, populations have typically well-defined migration routes, stopover sites and wintering areas (3). However, in individuals may still differ in their choice of wintering areas in relation to age, size or sex, which is referred to as differential migration (4).

Lesser Black-backed Gulls (*Larus fuscus*) show pronounced individual variation in migration strategies with some birds wintering as close as Northern France or Southern England, while others migrate as far south as Senegal (5–7). In addition, Lesser Black-backed Gulls have in the past century progressively adapted to anthropogenic food sources, taking advantage of new feeding opportunities in agricultural and urban habitats, next to their historic marine habitat (8). Hence, their options to select winter and stopover sites are nowadays almost endless.

In this study we used 5 years of GPS tracking data of adult Lesser Black-backed Gulls breeding in the southern bight of the North Sea to investigate the movements and temporal dynamics in habitat selection outside the breeding season. We did not find differences in migration routes and wintering areas between sexes. However, males and females differed significantly in their timing and use of stopover sites. Differential migration hence occurred during autumn migration. It took females on average 15 days longer to reach their wintering sites than males. During autumn migration, females made more extensive use of stopover sites, in particular in North France and the UK where they almost exclusively foraged in agricultural areas. Males, in contrast, did not significantly alter their diet during autumn migration. This shift in habitat use and protracted autumn migration coincided with the timing of moult, which overlaps with chick rearing and migration in the Lesser Black-backed Gull. Our results suggest that this overlap between energy-demanding activities may cause females to perform a more prolonged autumn migration and select different foraging habitats during autumn migration.

### References

- 1 Berthold, *Bird migration: a general survey* (Oxford University Press, Oxford, 2001).
- 2 Alerstam *et al.* Long-distance migration: evolution and determinants. *Oikos*. **103**, 247–260 (2003).
- 3 Newton, *The migration ecology of birds* (Elsevier, London, 2007).
- 4 Ketterson and Nolan, in *Current Ornithology*, R. F. Johnston, Ed. (Plenum Press, New York, 1983), pp. 357–402.
- 5 Bosman *et al.*, Effects of body size on sex-related migration vary between two closely related gull species with similar size dimorphism. *Ibis* **154**, 52–60 (2012).
- 6 Shamoun-Baranes *et al.*, Short distance migrants travel as far as long distance migrants in lesser black-backed gulls *Larus fuscus*. *J. Avian Biol.* **48**, 49–57 (2017).
- 7 Klaassen *et al.*, Migration strategy of a flight generalist, the Lesser Black-backed Gull *Larus fuscus*. *Behav. Ecol.* **23**, 58–68 (2012).
- 8 Camphuysen *et al.*, Sexually distinct foraging strategies in an omnivorous seabird. *Mar. Biol.* **162**, 1417–1428 (2015).

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