a. Wintering grounds of greater white-fronted geese *Anser a. albifrons* in the Netherlands and northern Germany, with 65 sites (dots) where 51,037 successful families in 1,884 flocks were recorded. 21 splits (diamonds) were observed in 13 GPS tracked families. Shaded area bounds 10,635 observations of marked geese. Data were collected from 2000 - 2017. *b.* Breeding grounds (ellipse) with Kolguyev Island (dot) and rough migration route (arrow) to wintering area (rectangle).

Fig.2 Distance ~ family size

GLMM fits (lines), and mean distance of wintering sites from Kolguyev Island (symbols) per number of juveniles in a family. Data and fit for data collected $<$ 60 days after arrival are shown in red; data and fit for records $>$ 60 days after arrival are in blue. Triangles & dotted lines represent data from marked geese (dataset C), circles and solid lines family counts (dataset B).

Fig.3 Family ~ time

GLMM fits (lines) and mean number of juveniles per family on each day since goose autumn arrival pooled across years (dots). Successful families in flocks (dataset B) are shown in red, and families of marked geese (dataset C) are shown in blue. Arrows show development of size of 9 GPS tracked families that underwent splits.

Fig.4 Family size ~ predation

GLMM partial fit (lines) and mean number of juveniles per family at each unique level of pooled summer predation index (symbols) using two datasets: blue, all families of marked geese (dataset C); red, successful families cointed in flocks (dataset B); black, successful families only of marked geese (subset of C).

Fig.5 N fams ~ flock size

GAMM partial fit (line) and mean number of successful families in white-fronted goose flocks of each unique size (circles). 95% confidence interval is shaded grey.

Fig.6 N fams ~ time

GAMM partial fit (line) and mean number of successful families in white-fronted goose flocks on each winter day, pooled across all winters (circles). 95% confidence interval is shaded grey.

Fig.7 N fams ~ dist

GAMM partial fit (line) and mean number of successful families in white-fronted goose flocks at each site (circles, n = 49) as a function of its distance from the Kolguyev Island. 95% confidence interval is shaded grey.

Fig.8 Flocksize ~ distance

GLMM partial fit (line) and mean size of flocks at each site (circles, n = 111) as a function of its distance from Kolguyev Island.

Fig.9 J% ~ time

GAMM partial fit (line) and mean proportion of first-winter juveniles in white-fronted goose flocks on each winter day, pooled across all years (circles). Note that days since arrival was modelled as a smoothed covariate using thin plate splines, and 4 knots, with the smooth forced through 0. Dashed lines bound the 95% confidence interval.

Fig.10 p(split) ~ days, total flights, total distance, family size

GAMM partial fits (lines) for (a) days since arrival, (b) cumulative number of flights over winter, (c) number of juveniles, and (d) cumulative number of displacements of more than 1000 km.