Supplementary Materials for:

Distance doesn't matter: migration strategy in a seabird has no effect on survival or reproduction

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Appendix 1. Determining winter resighting range

We separated the wintering range of lesser black-backed gulls into three geographical regions: Africa, Iberia (Spain and Portugal), and France/UK. To determine when the majority of individuals are residing within their wintering region, we began with a set of all GPS tracks from individuals tagged on Texel or IJmuiden, with coverage for more than 75% of the bird-year (start and ending June 1) and no period with missing data exceeding 45 consecutive days. If an individual had tracks from multiple years, we selected the bird-year with the fewest recording gaps. Winter region was determined based on the most southerly latitude obtained. For each date, we then determined what percentage of individuals were within their winter region. The period during which more than 95% of individuals were within their winter region began on December 31 and ended March 2 (Fig S1).

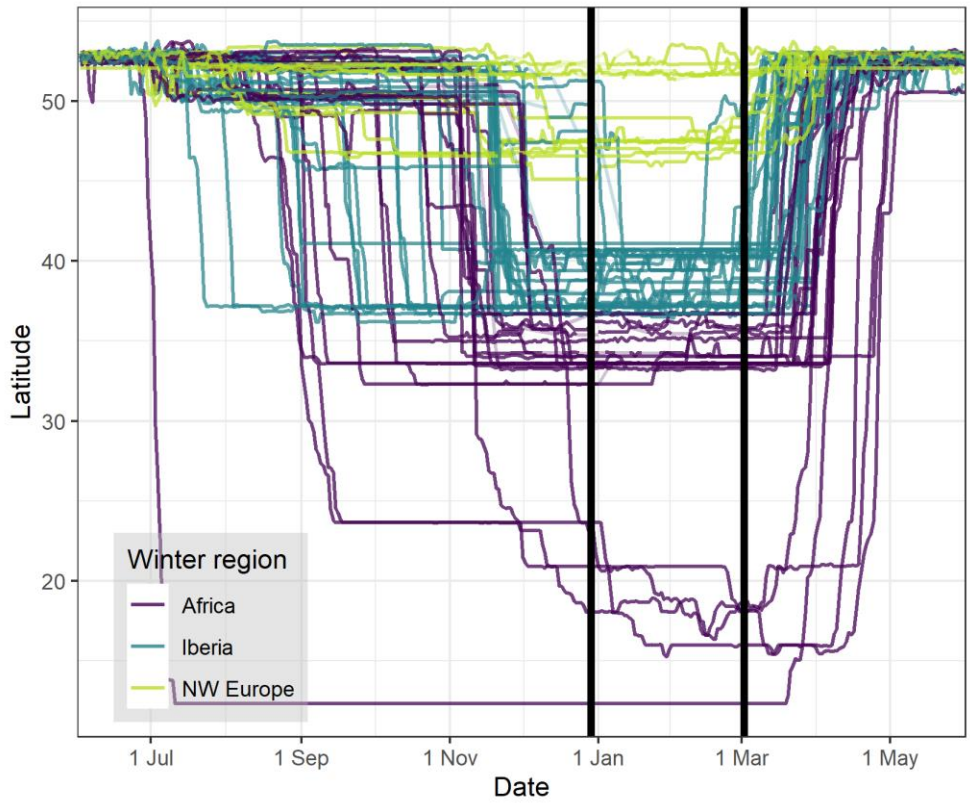

Figure S1 Latitude by date of migrating lesser black-backed gulls tracked using GPS loggers. Tracks are coloured by wintering region. Vertical black lines show the time frame where 95% of individuals were within their winter regions. Periods with no data are more transparent.

Appendix 2. Median laying dates of lesser black-backed gulls in our study colony

Table S1. Median laying dates per year of the lesser black-backed gull colony breeding on Texel, the Netherlands. These median laying dates are calculated over all eggs laid in a season. Data comes from Camphuysen et al. **in press**.

Year	Median laying date	N nests
2006	13/05/2006	57
2007	09/05/2007	79
2008	10/05/2008	92
2009	12/05/2009	108
2010	14/05/2010	74
2011	15/05/2011	87
2012	19/05/2012	90
2013	21/05/2013	84
2014	17/05/2014	88
2015	21/05/2015	93
2016	20/05/2016	84
2017	20/05/2017	90
2018	20/05/2018	62
2019	17/05/2019	88
2020	19/05/2020	82
2021	21/05/2021	65

Camphuysen, C. J., S. van Donk, J. Shamoun-Baranes, and R. Kentie. in press. The annual cycle, breeding biology and feeding ecology of the Lesser Black-backed Gull *Larus fuscus intermedius*. Ardea.

Appendix 3. Accounting for nests of which the wintering location of two partners were known

Migration distances of both parents were known for 10 % of the nests with known laying dates and hatching success, resulting in duplicated reproductive data for these nests. Including nest ID in the (G)LMM to account for pseudoreplication led to a singular fit. We therefore chose to randomly select one of the parents to model the relationship between migration distance and relative laying date or hatching success. The distance of both parents are plotted against each other in Fig S2 ($r = 0.35$, $p = 0.07$). We assessed the influence or randomly excluding one individual from each pair on model results by iterating this process 500 times (Table S2). The influence of migration distance remained insignificant across these iterations.

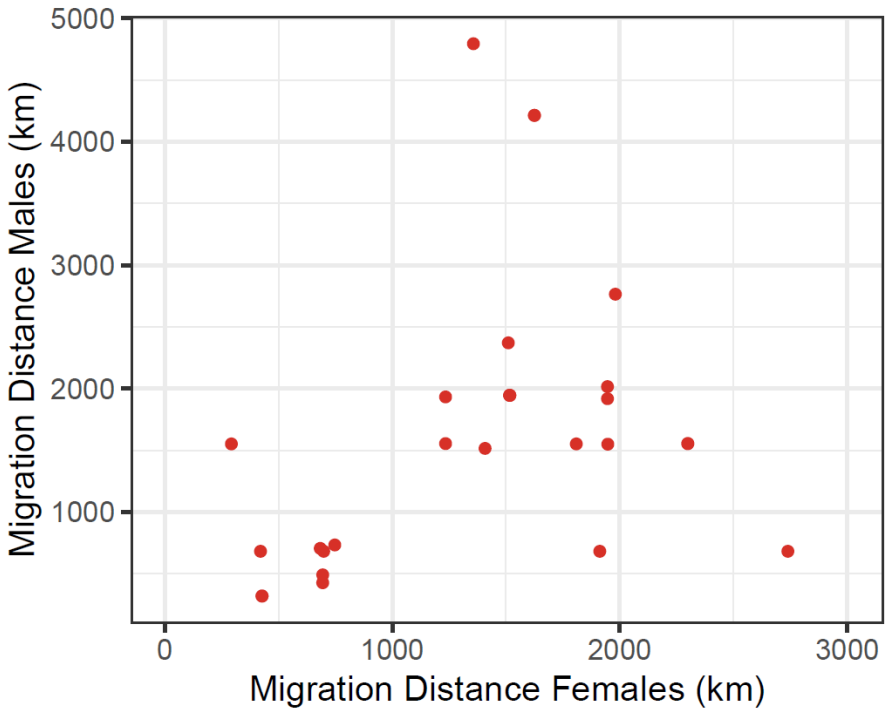

Figure S2. Distance of females and males of nests of which we knew the winter locations of both partners.

Table S2. Mean, min and max p-values and parameter estimates from 500 iterations of the models testing correlations of migration distance with relative laying date and proportion hatched, where one partner was chosen at random in nests where both partners were known.

	Relative laying date	Proportion hatched
p-value migration distance (mean, [min, max])	0.66 [0.36, 0.94]	0.67 [0.32, 1.00]
parameter estimate migration distance (mean, [sd])	0.17 [0.06]	0.06 [0.3]
p-value sex (mean, [min, max])	0.56 [0.21, 0.99]	0.18 [0.04, 0.99]*
parameter estimate sex (mean, [sd])	0.45 [0.17]	-0.30 [0.11]
p-value sex x distance (mean, [min, max])	0.90 [0.68, 1,00]	0.68 [0.24, 1.00]
parameter estimate sex x distance (mean, [sd])	-0.01 [0.12]	0.12 [0.09]
p-value laying date (mean, [min, max])		0.01 [0.005, 0.03]
Parameter estimate laying date (mean, [sd])		-0.07 [0.004]

* In three cases of the 500 iterations the p-value was below 0.05

Appendix 4. Mark-recapture survival analysis excluding GPS-tagged birds

To account for possible effects of GPS devices on lesser black-backed gulls, we have run the mark-recapture survival analysis excluding 36 tagged birds which were resighted in their wintering area. The number of individuals for the different regions were: France/UK n = 89, Iberia n = 186, Africa n = 48. The overall goodness-of-fit test was not significant (χ^2= 151.5, df = 159, p = 0.65).

The conclusions from this dataset were similar to those including the GPS-tagged birds. The best supported survival model had a constant survival parameter (Table S3, Fig. S3). The 6-month survival probability was estimated as 0.91 (0.90 – 0.92 95% CI) (Table S4). The second- and third-best supported models were within 2 AICc of the top model, however 95% confidence interval of the parameters overlapped zero (distance: -0.133 – 0.321; autumn: -0.505 – 0.962) so they were therefore not considered supported. Resighting probability during summer was higher than during winter, and highest for birds marked in IJmuiden. Resighting probability during winter was lowest for birds wintering in Africa (Table S4).

Table S3. Model selection results of lesser black-backed gull survival probability (Phi), where we examined whether survival probability was influenced by season and migration distance, including different distance effects per season. Models are ordered by ΔAIC_c, where n. par. is the number of parameters, w_i is the Akaike weight, and deviance is the residual deviance. An interaction between two parameters is indicated with ×.

Model	n. par.	AICc	ΔAICc	w_i	Deviance
Phi(constant)	7	3208.495	0.000	0.390	2319.050
Phi(distance)	8	3209.847	1.351	0.199	3193.744
Phi(season)	8	3210.142	1.646	0.171	2318.673
Phi(spring × distance + autumn)	9	3210.901	2.406	0.117	3192.773
Phi(spring + autumn × distance)	9	3212.000	3.504	0.068	3193.872
Phi(spring × distance + autumn × distance)	10	3212.421	3.926	0.055	3192.265

Table S4. Parameter estimates (± standard error) and 95% confidence intervals of the most parsimonious model for 6 -month apparent survival (Phi) with resighting probability (p) of lesser black-backed gulls.

Parameter	Estimate	95% Confidence Interval
Phi (constant)	0.910 (0.007)	0.896 - 0.922
p (marked as fledgling)[a]	0.226 (0.032)	0.169 - 0.296
p (marked on Texel)	0.643 (0.026)	0.591 - 0.692
p (marked in IJmuiden)	0.880 (0.015)	0.847 - 0.907
p (FRUK)	0.458 (0.033)	0.394 - 0.523
p (IB)	0.443 (0.022)	0.3401 - 0.486
p (AFR)	0.280 (0.050)	0.195 - 0.386

[a] marked as fledgling but only entered the dataset as adult

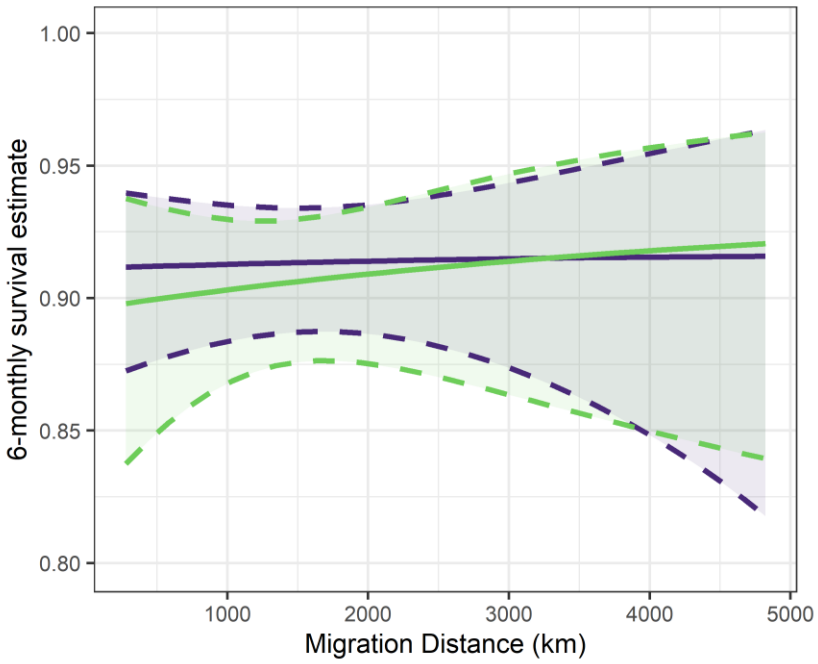

Figure S3. Model-averaged apparent survival estimates with 95% confidence intervals of lesser black-backed gulls by season (autumn = purple, spring = green) and migration distance (based on all models in Table S3).