[1]Environment and Sustainability Institute, University of Exeter, Penryn TR10 9FE, UK

[2]BirdLife International, The David Attenborough Building, Pembroke Street, Cambridge CB2 3QZ, UK

[3]Centre d'Etudes Biologique de Chizé, UMR 7372 - Centre National d'Études Spatiales & Université de La Rochelle, Villiers-en-Bois 79360, France

[4]Centre National d'Études Spatiales, Toulouse 31400, France

[5]Institut de Recherche pour le Développement - UMR MARBEC, Station Ifremer de Sète, Sète 34203, France

[6]MaREI, the SFI Research Centre for Energy, Climate and Marine, University College Cork, Ringaskiddy P43 C573, Ireland

[7]Centre for Ecology and Conservation, University of Exeter, Penryn TR10 9FE, UK

[8]Environmental Biology, College for Life and Environmental Sciences, University of Exeter, Exeter EX4 4PS, UK

[9]School of Biological Sciences, University of Aberdeen, King's College, Aberdeen AB24 3FX, UK

[10]RSPB Centre for Conservation Science, North Scotland Regional Office, Beechwood Park, Inverness IV2 3BW, UK

[11]Sea Mammal Research Unit, Scottish Oceans Institute, University of St Andrews, St Andrews KY16 8LB, UK

[12]School of Biology, University of Leeds, Leeds LS2 9JT, UK

[13]Remote Sensing Group, Plymouth Marine Laboratory, Plymouth PL1 3DH, UK

[14]RSPB Ramsey Island, St Davids SA62 6PY, UK

[15]The Welsh Wildlife Centre, The Wildlife Trust of South and West Wales, Cardigan SA43 2TB, UK

[16]NERC National Environmental Isotope Facility, Scottish Universities Environmental Research Centre, East Kilbride G75 0QF, UK

[17]School of Environmental Sciences, University of Liverpool, Liverpool L69 3GP, UK

[18]School of Science and Engineering, University of the Sunshine Coast, Maroochydore, Queensland 4556, Australia

[19]Faculty of Life and Environmental Sciences, School of Social Sciences, University of Iceland, 102 Reykjavík, Iceland

[20]University of Glasgow, Institute of Biodiversity, Animal Health and Comparative Medicine, Graham Kerr Building, Glasgow G12 8QQ, UK

[21]The Lyell Centre, Heriot-Watt University, Edinburgh EH14 4AP, UK

Table S1. Biometric measurements for chick-rearing northern gannets *Morus bassanus* at Grassholm, UK, measured in 2006 and 2008–17. There were no sex differences in bill length or wing length, although females were 6.8% (193g) heavier than males.

	Female		Male		Linear Model			
	Mean ± SD	n	Mean ± SD	n	Adj. r^2	F	df	p
Bill length (mm)	98.3 ± 2.9	190	98.2 ± 2.9	210	-0.002	0.043	1, 398	0.835
Wing chord (cm)	49.3 ± 0.9	180	49.3 ± 0.9	203	-0.003	0.004	1, 381	0.948
Mass (g)	3032 ± 259	192	2839 ± 208	217	0.143	69.14	1, 407	<0.001

Table S2. Mean foraging trip metrics ± standard error derived from GPS loggers deployed on Grassholm, UK, for 634 foraging trips from 297 northern gannets *Morus bassanus*. Home range is derived from 95% utilisation distributions calculated using kernel density estimation.

	Female					Male				
Year	n trips	n birds	Foraging range (km)	Trip duration (hours)	Home range (km^2)	n trips	n birds	Foraging range (km)	Trip duration (hours)	Home range (km^2)
2006	12	10	189 ± 30	33.9 ± 5.3	46,786	17	13	78 ± 10	18.4 ± 3.7	21,011
2010	26	6	160 ± 17	26.9 ± 3.3	66,064	60	16	146 ± 14	22.9 ± 1.8	75,269
2011	88	20	116 ± 9	23.7 ± 2.7	65,298	115	25	104 ± 5	18.5 ± 1.4	52,993
2012	21	20	148 ± 14	27.4 ± 2.9	47,596	26	20	115 ± 11	20.9 ± 2.1	38,021
2013	45	27	134 ± 9	21.5 ± 1.7	36,529	31	20	115 ± 11	19.6 ± 2.2	36,300
2014	26	22	147 ± 13	20.2 ± 2.2	34,419	24	19	96 ± 8	15.4 ± 1.7	30,029
2015	10	7	101 ± 13	17.6 ± 21	18,664	31	20	93 ± 6	18.7 ± 1.7	26,130
2016	27	17	81 ± 11	18.9 ± 3.4	28,063	40	21	67 ± 6	16.0 ± 1.9	20,151
2017	17	11	139 ± 12	36.8 ± 4.4	41,594	18	10	136 ± 12	39 ± 6.3	40,878
All	272	138	129 ± 5	24.2 ± 1.2	88,883	362	159	107 ± 4	20.1 ± 0.8	68,800

Table S3. Linear Mixed Model estimates ± standard error for foraging trip range and duration for northern gannets *Morus bassanus* in relation to sex, year and mass (kg), with bird ID fitted as a random intercept. Estimates are from the model with the lowest AICc (see Table 1), given on the Box-Cox transformed scale.

	Range (km)	SE	Duration (h)	SE
Intercept – 2006, Female	6.314	0.783	3.021	0.285
Sex – Male	-1.892	0.931	-0.150	0.039
Year – 2010	0.313	0.235	-0.023	0.120
Year – 2011	-0.022	0.231	-0.134	0.117
Year – 2012	0.175	0.248	-0.021	0.127
Year – 2013	0.131	0.241	-0.102	0.123
Year – 2014	0.168	0.258	-0.172	0.131
Year – 2015	-0.090	0.252	-0.147	0.128
Year – 2016	-0.536	0.238	-0.261	0.121
Year – 2017	0.223	0.255	0.175	0.130
Mass (kg)	-0.756	0.236	-0.272	0.081
Sex:Mass	0.533	0.312	-	-

Table S4. Linear Mixed Model statistics to explain gannet foraging trip range and duration as a function of sex, year and mass, with individual fitted as a random intercept.

Response	Explanatory variables	X^2	npar	p
Range	Sex	15.099	1	< 0.001
	Year	52.573	8	< 0.001
	Mass	8.021	1	0.005
	Sex:Mass	2.890	1	0.089
Duration	Sex	14.198	1	< 0.001
	Year	38.721	8	< 0.001
	Mass	11.160	1	< 0.001

Table S5. Estimated overlap (Bhattacharyya's affinity, BA) in male and female northern gannet *Morus bassanus* utilisation distributions (UD) randomly subsampled to the sample size of 2006 (29 trips). P is the proportion of simulation BAs that did not exceed the observed BA. The mean BA was slightly lower for random samples of 29 trips for 2010–17 (0.678 compared to 0.794), but the segregation was not significantly different from the null distribution.

Year	Random sample no.	100% UD	
		BA	P
2010	1	0.598	0.934
	2	0.598	0.653
	3	0.528	0.186
2011	1	0.639	0.558
	2	0.729	0.785
	3	0.545	0.405
2012	1	0.745	0.414
	2	0.677	0.610
	3	0.746	0.802
2013	1	0.603	0.135
	2	0.624	0.070
	3	0.711	0.345
2014	1	0.660	0.053
	2	0.719	0.150
	3	0.642	0.151
2015	1	0.704	0.209
	2	0.808	0.710
	3	0.770	0.782
2016	1	0.863	0.723
	2	0.716	0.635
	3	0.740	0.397
2017	1	0.579	0.084
	2	0.691	0.558
	3	0.603	0.077

Table S6. Outputs from habitat selection models for male and female northern gannets *Morus bassanus* for the sex:habitat interaction from a binomial GLM for each year fitted with a residual autocovariate smoother to account for spatial autocorrelation (*p<0.05, **p<0.01, ***p<0.001). This models the probability of locations being classed as a foraging location rather than a pseudo-absence in response to four habitat variables: sea surface temperature (°C), chlorophyll-a concentration, thermal fronts (composite of strength, proximity and persistence) and fishing activity (number of Vessel Monitoring System records travelling at fishing speed).

		Habitat variable			
Year	Sex interaction	Sea surface temperature	Chlorophyll-a concentration	Thermal fronts	Fishing density
all	Estimate	**-0.203**	**0.392**	**0.139**	0.034
	p value	**<0.001*****	**<0.001*****	**0.001****	0.517
	X^2	**13**	**33**	**10**	0
2006	Estimate	**-1.602**	**1.172**	**0.698**	0.027
	p value	**<0.001*****	**<0.001*****	**0.003****	0.959
	X^2	**11.4**	**12.3**	**8.8**	0.0
2010	Estimate	**-0.578**	**-1.033**	0.074	**-0.224**
	p value	**<0.001*****	**<0.001*****	0.382	**0.007****
	X^2	**17.5**	**37.1**	0.8	**7.3**
2011	Estimate	**-0.216**	**0.903**	0.038	**0.176**
	p value	**0.037***	**<0.001*****	0.514	**0.003***
	X^2	**4.3**	**214.2**	0.4	**9.0**
2012	Estimate	**-0.899**	**-1.734**	**0.501**	0.056
	p value	**0.039***	**0.001****	**0.039***	0.792
	X^2	**4.3**	**10.8**	**4.3**	0.1
2013	Estimate	-0.509	1.057	-0.156	**0.303**
	p value	0.118	0.094	0.156	**0.048***
	X^2	2.4	2.8	2.0	**3.9**
2014	Estimate	-0.173	-0.042	**0.956**	-0.059
	p value	0.732	0.950	**<0.001*****	0.882
	X^2	0.1	0.0	**23.8**	0.0
2015	Estimate	-0.801	0.323	-0.240	0.490
	p value	0.056	0.559	0.286	0.310
	X^2	3.6	0.3	1.1	1.0
2016	Estimate	0.451	**1.760**	0.027	-0.198
	p value	0.182	**0.004****	0.911	0.567
	X^2	1.8	**8.2**	0.0	0.3

Table S7. Assessment of habitat selection models containing habitat variables, sex and sex:habitat interaction (Table S5), with an without a Residuals Auto-Correlation term. Kappa and AUC (area under the Receiver Operating Characteristic curve) are derived from a confusion matrix based on the original data. Kappa is the proportion of correct predictions in relation to random chance (maximum 1). AUC ranges from 0 to 1, where 0.5 is random, and higher values indicate better model performance. The Boyce index for assessing resource selection functions is suitable for presence-only models. It ranges from -1 to 1, where 0 indicates random and positive values show that the prediction is consistent with the presence data distribution.

		Habitat variable	
Year	Measure	With RAC	Without RAC
all	Kappa	NA	NA
	AUC (ROC)	0.990	0.629
	Boyce Index	0.931	0.586
2006	Kappa	0.948	NA
	AUC (ROC)	0.997	0.534
	Boyce Index	0.797	0.443
2010	Kappa	0.862	NA
	AUC (ROC)	0.981	0.600
	Boyce Index	0.939	0.621
2011	Kappa	0.884	NA
	AUC (ROC)	0.985	0.546
	Boyce Index	0.992	0.434
2012	Kappa	0.950	NA
	AUC (ROC)	0.996	0.548
	Boyce Index	0.819	-0.662
2013	Kappa	0.936	NA
	AUC (ROC)	0.995	0.560
	Boyce Index	0.823	0.620
2014	Kappa	0.936	NA
	AUC (ROC)	0.995	0.556
	Boyce Index	0.823	0.791
2015	Kappa	0.946	NA
	AUC (ROC)	0.996	0.567
	Boyce Index	0.814	0.495
2016	Kappa	0.947	NA
	AUC (ROC)	0.994	0.587
	Boyce Index	0.868	0.603

Table S8. Mean stable isotope values (per mil) ± standard error from northern gannet *Morus bassanus* red blood cells collected for 361 individuals on Grassholm during nine breeding seasons.

Year	Female			Male		
	n	$\delta^{13}C$	$\delta^{15}N$	*n*	$\delta^{13}C$	$\delta^{15}N$
2006	16	-17.84 ± 0.06	14.62 ± 0.09	20	-16.98 ± 0.14	15.54 ± 0.14
2008	22	-18.03 ± 0.05	13.69 ± 0.08	18	-17.68 ± 0.06	14.25 ± 0.12
2009	10	-17.99 ± 0.07	14.78 ± 0.10	17	-17.59 ± 0.09	15.40 ± 0.13
2010	8	-17.88 ± 0.17	14.18 ± 0.19	14	-17.43 ± 0.13	14.51 ± 0.23
2011	21	-17.76 ± 0.10	14.53 ± 0.13	30	-17.18 ± 0.08	15.12 ± 0.10
2012	24	-17.64 ± 0.09	15.14 ± 0.12	30	-17.25 ± 0.10	15.63 ± 0.10
2013	27	-17.78 ± 0.10	14.36 ± 0.14	24	-17.59 ± 0.12	15.17 ± 0.14
2014	15	-17.47 ± 0.11	13.84 ± 0.14	11	-16.93 ± 0.10	14.49 ± 0.14
2016	25	-17.63 ± 0.10	14.46 ± 0.14	29	-16.92 ± 0.09	15.08 ± 0.09
All	168	-17.77 ± 0.03	14.41 ± 0.05	193	-17.28 ± 0.04	15.16 ± 0.05

Table S9. Linear Model estimates ± standard error for stable isotope values of $\delta^{13}C$ and $\delta^{15}N$ from northern gannet *Morus bassanus* red blood cells in relation to sex, year and mass. Estimates are from the model with the lowest AICc (see Table 3).

	$\delta^{13}C$	SE	$\delta^{15}N$	SE
Intercept – 2006, Female	-19.44	0.479	13.352	0.565
Sex – Male	2.316	0.695	1.858	0.780
Year – 2008	-0.061	0.152	-1.052	0.134
Year – 2009	-0.070	0.182	0.005	0.146
Year – 2010	0.022	0.194	-0.765	0.152
Year – 2011	0.111	0.154	-0.241	0.127
Year – 2012	0.296	0.152	0.331	0.133
Year – 2013	0.156	0.146	-0.280	0.126
Year – 2014	0.494	0.164	-0.872	0.147
Year – 2016	0.293	0.145	-0.288	0.122
Mass (g)	0.0005	0.0001	0.0004	0.0002
Sex:Mass	-0.0005	0.0002	-0.0004	0.0003
Sex:Year – 2008	-0.631	0.214	-	-
Sex:Year – 2009	-0.568	0.236	-	-
Sex:Year – 2010	-0.474	0.249	-	-
Sex:Year – 2011	-0.278	0.205	-	-
Sex:Year – 2012	-0.433	0.212	-	-
Sex:Year – 2013	-0.769	0.201	-	-
Sex:Year – 2014	-0.430	0.236	-	-
Sex:Year – 2016	-0.223	0.195	-	-

Table S10. Linear Model statistics for stable isotope values of $\delta^{13}C$ and $\delta^{15}N$ from northern gannet *Morus bassanus* red blood cells in relation to sex, year and mass.

Response	Explanatory variables	f	d. f.	p
$\delta^{13}C$	Sex	113.437	1, 323	< 0.001
	Year	9.148	8, 323	< 0.001
	Mass	6.903	1, 323	0.009
	Sex:Year	2.618	8, 314	0.009
	Sex:Mass	4.135	1, 314	0.043
$\delta^{15}N$	Sex	110.767	1, 323	< 0.001
	Year	22.383	8, 323	< 0.001
	Mass	4.251	1, 314	0.040
	Sex:Mass	2.184	1, 314	0.141