

TEXT S1.

MATERIALS AND METHODS

Stable isotope analysis

Assessing sex differences. To assess sex differences in isotopic values of carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) from blood samples of masked boobies (MB) during non-breeding sampling events, we used the Mann-Whitney test. The dataset comprised 40 samples (females, $n = 19$; males, $n = 21$) (Table S2), representing five fewer samples than the original dataset due to individuals for which sex could not be determined in the field.

Sensitivity tests for repeated individuals over sampling events. For this analysis, only one randomly selected sample per individual was retained, while individuals without ring identification were kept unchanged. Isotopic differences among sampling events were then re-evaluated using Kruskal–Wallis tests followed by Dunn's post-hoc comparisons.

RESULTS

Sensitivity tests for repeated individuals over sampling events. The reduced dataset comprised 127 samples (15 fewer than the main dataset) and differed in sample size for April 2017 (22 vs. 30 samples in the main dataset), April 2018 (29 vs. 34), September 2018 (14 vs. 15), and April 2022 (20 vs. 21). Results were qualitatively consistent with those obtained using the full dataset, with same significant differences among sampling events detected by Kruskal–Wallis tests for both $\delta^{13}\text{C}$ (Kruskal–Wallis, $\chi^2 = 99.94$, $df = 6$, $p < 0.001$) and $\delta^{15}\text{N}$ ($\chi^2 = 93.15$, $df = 6$, $p < 0.001$), as well as for pairwise comparisons between sampling events (Table S1).

Table S1. Results from post-hoc Dunn's test for multiple comparisons applied on a reduced dataset of carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) isotopic values from blood of masked booby (*Sula dactylatra*), in which repeated samples were removed by randomly retaining a single observation per ringed individual. Significant results are shown in bold

Sampling event		$\delta^{13}\text{C}$ (‰)		$\delta^{15}\text{N}$ (‰)	
1	vs. 2	z	P _{adj}	z	P _{adj}
Apr/2017	Apr/2018	4.35	<0.001	−1.80	0.360
Apr/2017	Apr/2019	0.47	1.000	−3.35	0.011
Apr/2017	Apr/2022	8.69	<0.001	−3.43	0.008
Apr/2017	Sep/2015	5.43	<0.001	−5.89	<0.001
Apr/2017	Sep/2016	5.16	<0.001	−7.65	<0.001
Apr/2017	Sep/2018	4.19	<0.001	−5.77	<0.001
Apr/2018	Apr/2019	−3.09	0.018	−2.02	0.351
Apr/2018	Apr/2022	5.01	<0.001	−1.90	0.346
Apr/2018	Sep/2015	2.54	0.089	−4.82	<0.001
Apr/2018	Sep/2016	1.16	1.000	−6.35	<0.001
Apr/2018	Sep/2018	0.62	1.000	−4.49	<0.001
Apr/2019	Apr/2022	6.90	<0.001	0.38	1.000
Apr/2019	Sep/2015	4.55	<0.001	−2.70	0.069
Apr/2019	Sep/2016	3.87	0.001	−3.08	0.023
Apr/2019	Sep/2018	3.21	0.013	−1.96	0.351
Apr/2022	Sep/2015	−1.06	1.000	−3.28	0.012
Apr/2022	Sep/2016	−3.66	0.003	−4.03	0.001
Apr/2022	Sep/2018	−3.60	0.004	−2.61	0.081
Sep/2015	Sep/2016	−1.66	0.580	0.31	0.756
Sep/2015	Sep/2018	−1.83	0.471	1.04	1.000
Sep/2016	Sep/2018	−0.37	0.715	0.98	0.985

Table S2. Results of post-hoc Dunn's test for multiple comparisons of carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) isotopic values from blood samples of masked booby (MB, *Sula dactylatra*), and red-footed booby (RFB, *S. sula*), sampled during sampling events (month/year) in the Fernando de Noronha archipelago, Brazil. Values correspond to the z-score and Holm-adjusted p-value (p_{adj}). Niche position (NP, Euclidean distances between centroids of each sampling event), and Mean Distance to Centroid (MDC) differences were considered significant when greater than expected under a null distribution generated by residual permutation procedure ($p < 0.05$). Posterior Probability (PP) indicates the probability (0 to 1) that the Bayesian standard ellipse area (SEAb) of sampling event 1 is smaller than that of sampling event 2. Significant results are shown in bold

Masked booby											Red-footed booby								
Sampling events		$\delta^{13}\text{C}$ (‰)		$\delta^{15}\text{N}$ (‰)		NP		MDC		PP	$\delta^{13}\text{C}$ (‰)		$\delta^{15}\text{N}$ (‰)		NP		MDC		PP
1	vs. 2	z	p_{adj}	z	p_{adj}	dif	p	dif	p		z	p_{adj}	z	p_{adj}	dif	p	dif	p	
Apr/2017	Apr/2018	5.08	<0.001	-2.11	0.242	0.42	0.001	0.08	0.058	1.00									
Apr/2017	Apr/2019	0.62	1.000	-3.72	0.003	0.51	0.001	0.04	0.408	0.80									
Apr/2017	Apr/2022	9.34	<0.001	-3.91	0.001	1.14	0.001	0.00	0.931	0.59									
Apr/2017	Sep/2015	5.62	<0.001	-6.06	<0.001	1.37	0.001	0.21	0.002	1.00									
Apr/2017	Sep/2016	5.63	<0.001	-8.19	<0.001	1.14	0.001	0.03	0.541	0.89									
Apr/2017	Sep/2018	4.49	<0.001	-6.28	<0.001	0.95	0.001	0.04	0.491	0.92									
Apr/2018	Apr/2019	-3.16	0.016	-2.21	0.218	0.41	0.001	0.03	0.507	0.07									
Apr/2018	Apr/2022	4.99	<0.001	-2.10	0.214	0.73	0.001	0.08	0.063	0.01									
Apr/2018	Sep/2015	2.45	0.113	-4.79	<0.001	1.00	0.001	0.13	0.024	0.99									
Apr/2018	Sep/2016	1.13	1.000	-6.47	<0.001	0.84	0.001	0.05	0.258	0.05									
Apr/2018	Sep/2018	0.48	1.000	-4.69	<0.001	0.64	0.001	0.04	0.400	0.12									
Apr/2019	Apr/2022	6.76	<0.001	0.44	1.000	0.99	0.001	0.05	0.396	0.28	4.28	<0.001	0.22	1.000	0.95	0.001	0.07	0.390	0.61
Apr/2019	Sep/2015	4.44	<0.001	-2.50	0.111	0.96	0.001	0.12	0.015	1.00	4.99	<0.001	-3.13	0.009	1.28	0.001	0.16	0.054	1.00
Apr/2019	Sep/2016	3.82	0.002	-2.87	0.046	0.66	0.001	0.01	0.793	0.57	2.22	0.079	-3.52	0.003	0.73	0.001	0.13	0.076	1.00
Apr/2019	Sep/2018	3.12	0.016	-1.84	0.326	0.49	0.001	0.01	0.910	0.66	2.77	0.028	-0.92	1.000	0.51	0.001	0.14	0.094	0.99
Apr/2022	Sep/2015	-1.01	1.000	-3.13	0.021	0.72	0.001	0.21	0.004	1.00	0.36	0.716	-3.85	0.001	0.70	0.001	0.09	0.200	1.00
Apr/2022	Sep/2016	-3.52	0.005	-3.89	0.001	0.87	0.001	0.03	0.529	0.82	-3.52	0.003	-4.50	<0.001	0.88	0.001	0.06	0.337	1.00
Apr/2022	Sep/2018	-3.65	0.003	-2.58	0.099	0.78	0.001	0.04	0.466	0.88	-2.57	0.041	-1.37	0.682	0.55	0.001	0.06	0.330	1.00
Sep/2015	Sep/2016	-1.59	0.676	0.28	0.782	0.38	0.001	0.18	0.004	0.00	-4.81	<0.001	-0.08	0.939	0.72	0.001	0.03	0.584	0.19
Sep/2015	Sep/2018	-1.86	0.439	0.98	1.000	0.48	0.001	0.17	0.017	0.00	-3.53	0.003	3.36	0.005	0.77	0.001	0.03	0.613	0.12
Sep/2016	Sep/2018	-0.48	0.633	0.94	1.000	0.20	0.008	0.01	0.889	0.62	1.17	0.483	4.47	<0.001	0.42	0.001	0.00	0.969	0.32

Table S3. Sample sizes (n), mean $\pm$ standard deviation (SD) of carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) isotopic values from blood samples of female and male masked boobies (*Sula dactylatra*) from the Fernando de Noronha archipelago during the non-breeding period, separated by sampling events (month/year). Results of Mann-Whitney tests (*U*-value, *p*-value) comparing sexes for each stable isotope within each sampling event. Significant results are shown in bold.

Sampling event	Females			Males			Mann-Whitney			
	$\delta^{13}\text{C}$ (‰)		$\delta^{15}\text{N}$ (‰)	$\delta^{13}\text{C}$ (‰)		$\delta^{15}\text{N}$ (‰)	$\delta^{13}\text{C}$		$\delta^{15}\text{N}$	
	n	Mean $\pm$ SD	Mean $\pm$ SD	n	Mean $\pm$ SD	Mean $\pm$ SD	<i>U</i>	<i>p</i>	<i>U</i>	<i>p</i>
Sep/2015	4	-17.34 $\pm$ 0.44	11.56 $\pm$ 0.33	3	-17.53 $\pm$ 0.51	11.44 $\pm$ 0.03	6.00	1.000	8.00	0.629
Sep/2016	11	-16.96 $\pm$ 0.10	11.40 $\pm$ 0.21	10	-17.10 $\pm$ 0.11	11.49 $\pm$ 0.19	93.00	0.008	44.50	0.481
Sep/2018	4	-16.93 $\pm$ 0.16	11.44 $\pm$ 0.04	8	-17.07 $\pm$ 0.14	11.14 $\pm$ 0.20	23.50	0.234	31.00	0.008

Table S4. Overlap of standard ellipse areas corrected for small sample sizes (SEAc) based on stable isotope values of carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) from whole blood of masked booby (MB, *Sula dactylatra*), and red-footed booby (RFB, *S. sula*), between sampling events (month/year), representing the overall proportion of shared niche space between each sampling event and the relative overlap, representing the proportion of shared niche space for each sampling event. Overlap values <30, 30–60, and >60% considered as low, moderate, and high (shown in bold), respectively

Sampling event		Masked booby			Red-footed booby		
1	2	Overlap of total area (%)	Relative overlap (%)		Overlap of total area (%)	Relative overlap (%)	
			Sampling event 1	Sampling event 2		Sampling event 1	Sampling event 2
Apr/2017	Apr/2018	15.05	42.50	18.92			
Apr/2017	Apr/2019	24.19	45.50	34.05			
Apr/2017	Apr/2022	0.00	0.00	0.00			
Apr/2017	Sep/2015	<0.01	<0.01	<0.01			
Apr/2017	Sep/2016	<0.01	<0.01	<0.01			
Apr/2017	Sep/2018	<0.01	<0.01	<0.01			
Apr/2018	Apr/2019	24.08	30.95	52.04			
Apr/2018	Apr/2022	0.00	0.00	0.00			
Apr/2018	Sep/2015	6.15	20.55	8.07			
Apr/2018	Sep/2016	7.91	11.96	18.96			
Apr/2018	Sep/2018	16.69	24.25	34.88			
Apr/2019	Apr/2022	0.00	0.00	0.00	0.00	0.00	0.00
Apr/2019	Sep/2015	9.30	44.97	10.05	0.00	0.00	0.00
Apr/2019	Sep/2016	1.69	3.43	3.24	<0.01	<0.01	<0.01
Apr/2019	Sep/2018	4.38	9.11	7.79	<0.01	<0.01	<0.01
Apr/2022	Sep/2015	4.81	29.04	5.45	2.47	18.30	2.78
Apr/2022	Sep/2016	0.00	0.00	0.00	0.00	0.00	0.00
Apr/2022	Sep/2018	0.00	0.00	0.00	0.04	0.18	0.05
Sep/2015	Sep/2016	24.76	24.76	100	5.66	8.95	13.34
Sep/2015	Sep/2018	23.35	24.10	88.27	<0.01	<0.01	<0.01
Sep/2016	Sep/2018	47.38	67.79	61.31	24.13	36.21	41.96

Table S5. Results of exploratory linear models (LM) evaluating the effects of species, sampling event (month/year) and their interaction on $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values from blood samples of masked booby (*Sula dactylatra*, MB) and red-footed booby (*S. sula*, RFB) from Fernando de Noronha Archipelago, Brazil. Term significance was assessed using Type III ANOVA tests. Pairwise comparisons among sampling events based on estimated marginal means. Significant results are shown in bold. df = degrees of freedom; SE = standard error

$\delta^{13}\text{C}$ (‰)						$\delta^{15}\text{N}$ (‰)				
Effect	df	<i>F</i>	p			df	<i>F</i>	p		
Species	1	165.42	<0.001			1	127.97	<0.001		
Sampling event	4	130.93	<0.001			4	58.94	<0.001		
Species × Sampling event	4	4.66	0.001			4	1.33	0.262		
Pairwise comparisons										
Contrast MB vs. RFB	Estimate	SE	df	<i>t</i>	p	Estimate	SE	df	<i>t</i>	p
September/2015	0.70	0.08	134	8.70	<0.001	0.54	0.10	134	5.45	<0.001
September/2016	0.36	0.48	134	7.47	<0.001	0.47	0.06	134	7.95	<0.001
September/2018	0.45	0.06	134	7.56	<0.001	0.68	0.07	134	9.29	<0.001
April/2019	0.32	0.97	134	3.23	0.002	0.53	0.12	134	4.41	<0.001
April/2022	0.27	0.08	134	4.49	0.001	0.54	0.01	134	5.66	<0.001