SUPPLEMENTARY FILE 1

Table S1. Linear model fitting results for each stable isotopic measurement ($\delta^{13}C$ and $\delta^{15}N$, separately) using species, temporal groups and the presence/absence of seabirds as explanatory variables. SE = standard error.

$\delta^{13}C$ ~ Species + Temporal group + Seabird presence

	Estimate	SE	t value	*p*-value
Intercept	-23.81	0.52	-45.53	<0.01
Species	-1.18	0.23	-5.10	<0.01
Temporal group:Historical	-0.04	0.53	-0.07	0.94
Temporal group:Post-translocation	0.25	0.22	1.15	0.25
Seabird presence	0.37	0.45	0.82	0.41

$\delta^{15}N$ ~ Species + Temporal group + Seabird presence

	Estimate	SE	t value	*p*-value
Intercept	11.23	2.41	4.66	<0.01
Species	-4.75	1.06	-4.47	<0.01
Temporal group:Historical	-3.08	2.44	-1.26	0.21
Temporal group: Post-translocation	-0.83	1.00	-0.83	0.41
Seabird presence	5.46	2.08	2.62	0.01

Table S2. Linear model fitting results for each stable isotopic measurement ($\delta^{13}C$ and $\delta^{15}N$, separately) using species and temporal groups as explanatory variables considering only the set of individuals influenced by guano presence (i.e., individuals from islands). SE = standard error.

$\delta^{13}C$ ~ Species + Temporal group

	Estimate	SE	t value	*p*-value
Intercept	-23.40	0.21	-113.24	<0.01
Species	-1.24	0.21	-5.83	<0.01
Temporal group	0.17	0.20	0.86	0.40

$\delta^{15}N$ ~ Species + Temporal group

	Estimate	SE	t value	*p*-value
Intercept	16.90	0.65	26.00	<0.01
Species	-5.04	0.67	-7.52	<0.01
Temporal group	-1.19	0.64	-1.88	0.07

Table S3. Linear model fitting results for $\delta^{15}N$ values using species and seabirds' abundance (low, medium and high) as explanatory variables considering only the set of individuals influenced by guano presence (i.e., individuals from islands). SE = standard error.

$\delta^{15}N$ ~ Species + Seabirds' abundance

	Estimate	SE	t value	*p*-value
Intercept	16.39	0.58	28.47	<0.01
Seabirds' abundance:Low	-1.31	1.09	-1.20	0.24
Seabirds' abundance:Medium	-0.63	1.21	-0.52	0.61
Species	-4.23	1.09	-3.89	<0.01

Figure S1. Sampling locations of North Island saddlebacks (upper panel; red) and South Island saddlebacks (lower panel; blue) in Aotearoa New Zealand.

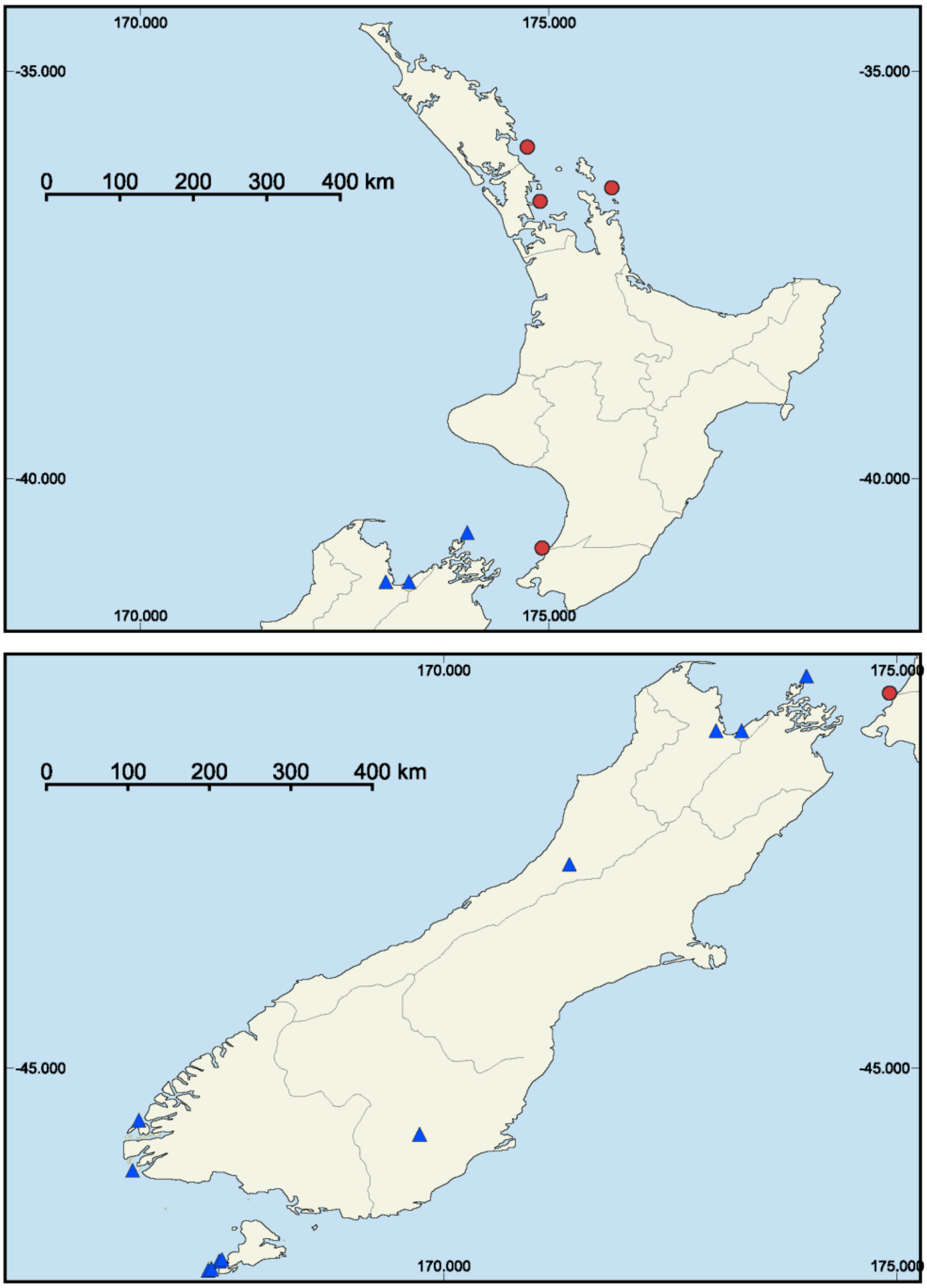


Figure S2. Mean and standard error of **(a)** $\delta^{13}C$ and **(b)** $\delta^{15}N$ values of North Island (NI; circle) and South Island (SI; triangle) saddleback species collected only in localities where seabirds were present (i.e., islands). Considering that only individuals of the 'bottleneck' and 'post-translocation' groups were from islands, we did not include 'historical' saddlebacks.

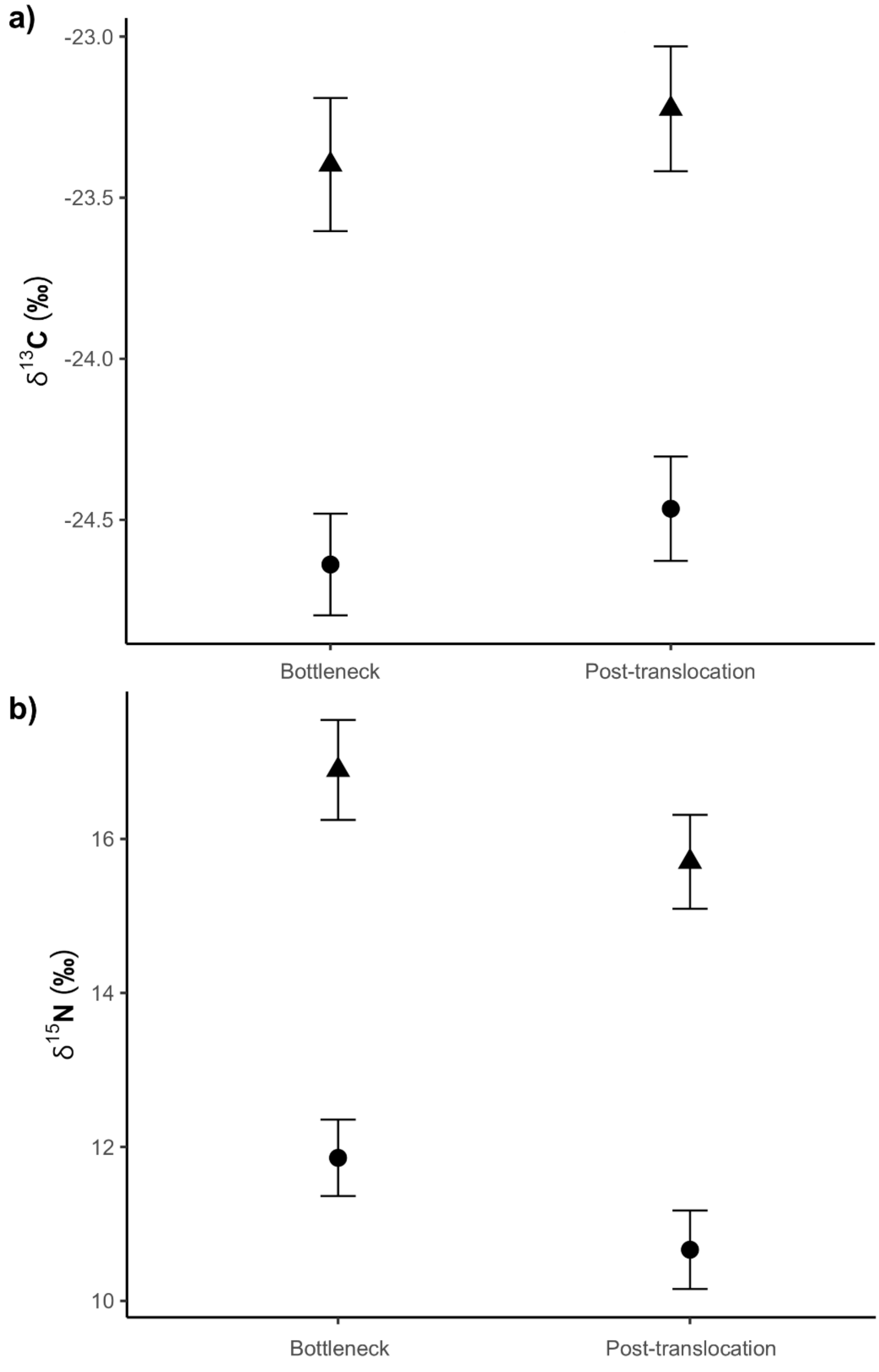


Figure S3. Mean and standard error of $\delta^{15}N$ of North Island (NI; circle) and South Island (SI; triangle) saddleback species collected in localities where seabirds were present (i.e., islands) with different abundances (low, medium and high).

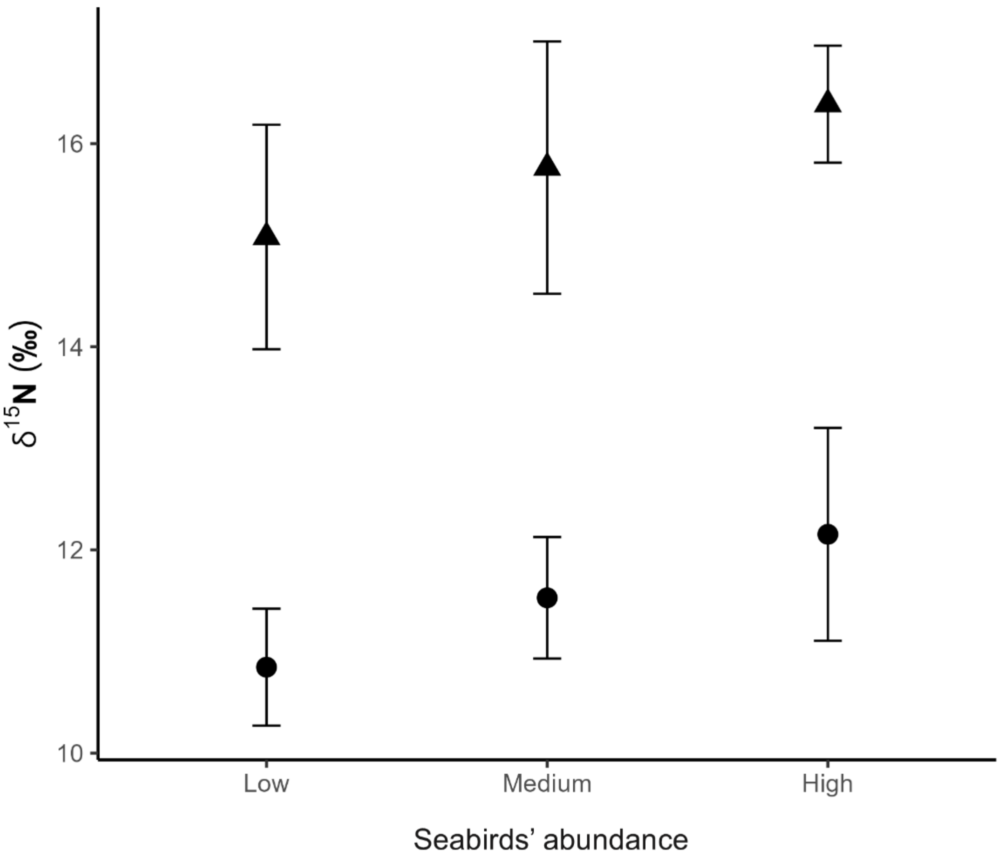
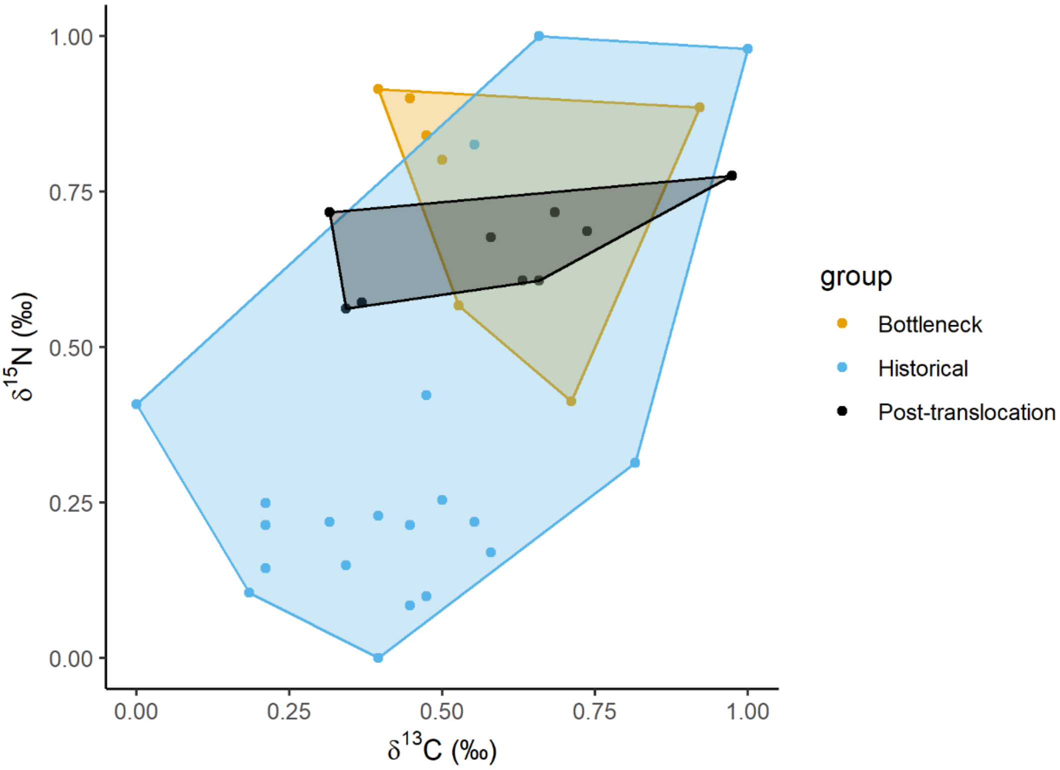


Figure S4. Isotopic niche space represented by the convex hull area (IRic) for the different temporal groups (historical, bottleneck and post-translocation) of the South Island saddleback.



Seabird guano influence

Seabird excrement, including the nitrogen from their protein-rich diets, plays a key role in fertilising and providing nutrients to terrestrial and marine environments, influencing the entire food chain (Kazama 2020; Grant et al. 2022). Terrestrial birds inhabiting islands largely occupied by seabird colonies forage on food items (e.g., fruits, invertebrates) that are influenced by guano (Hawke and Holdaway, 2005). The mean $\delta^{15}N$ values of NI and SI saddlebacks were high in localities where seabird colonies were present (Figure 2; 6 ‰ higher), further demonstrating that seabird guano alters stable isotope values of terrestrial organisms (Szpak et al. 2012) due to its influence on the area's ecosystem and food chains (Caut et al. 2012). In addition, factors like sea spray can enrich ^{15}N in coastal vegetation increasing $\delta^{15}N$ values (Zunzunegui et al. 2024), however we consider the influence of such factors to be negligible in our system, as saddlebacks depend on forest vegetation to forage rather than on coastal areas directly affected by sea spray.

The presence of seabirds in the localities where saddlebacks were collected did not significantly alter the mean $\delta^{13}C$ values of the specimens (Figure 2). The environmental influence of seabird excrement on the $\delta^{13}C$ values of invertebrates (prey items) is less evident (Hawke et al. 2013). Although studies indicate 1–2 ‰ higher $\delta^{13}C$ values in organisms living close to seabird colonies, the effect of guano can increase $\delta^{15}N$ values by as much as 5–11 ‰ (Markwell and Daugherty 2002). Our results therefore provide further evidence that seabird guano has a stronger influence on the nitrogen cycle than the carbon cycle in terrestrial ecosystems.

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