

Appendix 2

This appendix presents initial results using logistic regression models that were run before BRTs were preferred to support the datasets' complexity. They used the taxonomic classification system followed by the IUCN, including the family of Sarothruridae as part of the rail family (but see Appendix 1).

Abbreviations:

Variables (see Table 1 for more details): **Life-history traits:** size: body size; island: island endemism; migration: migratory behaviour (migrant/sedentary); clutch: clutch size; island.sz: island size; no.mammal: absence of native mammalian predators ('predator naivety'); habitat div: habitat diversity (number of habitat types used); artificial: known to exploit artificial man-modified habitats.

Socio-economic traits: density: human density; pop growth: human population growth.

Statistics: TSS: True Skill Statistic; w : AIC weight.

Part 1: Past extinction risk

Table Y1. Extinction risk: Results from logistic regression models on extinction risk for island rails, with a smaller sample size ($n=56$). Effect size is judged using a Wald test (Z-value), and with standard errors. Showing models for which $\Delta AIC < 2$. Models including both 'flightless' and 'island size' were ignored due to overfitting.

Model	Predictors	Coefficient \pm SE	Z-value	AUC	TSS	w	ΔAIC
Model 1	flightless	18.92 \pm 2258.02	0.01	0.83	0.36	0.37	0
	naive	1.45 \pm 0.83	1.75				
Model 2	flightless	19.21 \pm 2292.76	0.01	0.76	0.00	0.22	1.03
Model 3	flightless	19.10 \pm 2236.15	0.01	0.87	0.29	0.18	1.43
	naive	1.47 \pm 0.85	1.74				
	body size	-0.32 \pm 0.35	-0.92				
Null model						0	15.79

Table Y2. Extinction risk: Results from logistic regression models on extinction risk for island rails, with a larger sample size ($n=67$). Effect size is judged using a Wald test (Z-value), and with standard errors. Predictors associated with the response variable are in bold.

Model	Predictors	estimate \pm SE	Z-value	AUC	TSS	w	$\Delta AICc$
f(~island size + naivete)				0.83	0.42	0.96	0
	island size	-2.28 \pm 1.25	-1.83				
	naivete	1.99 \pm 0.69	2.87				
f(~island size)				0.75	0.49	0.03	7.34
	island size	-2.59 \pm 1.24	-2.09				
f(~naivete)				0.73	0.46	0.01	8.47
	naivete	2.49 \pm 0.66	3.76				
f(~1)				0.50	0.00	0.00	23.61

Table Y3. Extinction risk: Results from logistic regression models with interactions on extinction risk for island rails. Effect size is judged using a Wald test (Z-value), and with standard errors. Predictors associated with the response variable are in bold. N=56.

Model	Predictors	Coefficient \pm SE	Z-value	AUC	TSS	AIC
Model 1	size	1.94e-09 \pm 3.44e+03	0.00	0.82	0.24	53.17
	flightless	1.93e+01 \pm 2.46e+03	0.01			
	size*flightless	-3.08e-01 \pm 3.44e+03	0.00			
Model 2	size	-0.70 \pm 0.54	-1.29	0.74	0.31	60.39
	naive	2.23 \pm 0.86	2.58			
	size*naive	1.47 \pm 0.89	1.65			
Null model						64.98

Part 2: Contemporary vulnerability (IUCN status)

Globally

Table Y4. Global vulnerability: Results from logistic regression models, including biological and socio-economic predictors (n=139). Effect size is judged using a Wald test (Z value), and with standard errors. Predictors associated with the response variable are in bold.

Model	predictor	estimate \pm SE	Z-value	AUC	TSS	df	Δ AICc	w
f(~density + island + size + pop growth)				0.85	0.36	5	0.00	0.17
	density	-1.05 \pm 0.64	-1.64					
	island	2.96 \pm 0.62	4.80					
	size	-0.73 \pm 0.28	-2.59					
	pop growth	-1.00 \pm 0.32	-3.14					
f(~habitat div + density + island + size + pop growth)				0.86	0.42	6	1.16	0.10
	habitat diversity	-0.29 \pm 0.30	-0.97					
	density	-1.00 \pm 0.65	-1.53					
	island	2.96 \pm 0.62	4.75					
	size	-0.70 \pm 0.28	-2.48					
	pop growth	-0.97 \pm 0.33	-2.97					
f(~GDP + density + island + size + pop growth)				0.85	0.36	6	1.34	0.09
	GDP	0.26 \pm 0.29	0.92					
	density	-0.99 \pm 0.63	-1.56					
	island	3.04 \pm 0.63	4.83					
	size	-0.83 \pm 0.31	-2.69					
	pop growth	-0.84 \pm 0.35	-2.39					
f(~1)						1	36.10	0.00

Table Y5. Global vulnerability: Results from logistic regression models, excluding socio-economic predictors (n=139). Effect size is judged using a Wald test (Z value), and with standard errors. Predictors associated with the response variable are in bold.

Model	predictor	estimate ± SE	Z-value	AUC	TSS	df	ΔAICc	w
f(~habitat div + island + size)				0.82	0.36	4	0.00	0.35
	habitat diversity	-0.54 ± 0.29	-1.89					
	island	2.31 ± 0.49	4.75					
	size	-0.49 ± 0.26	-1.84					
f(~habitat div + island + size + migration)				0.83	0.36	5	1.65	0.15
	habitat diversity	-0.53 ± 0.29	-1.84					
	island	2.11 ± 0.55	3.80					
	size	-0.48 ± 0.26	-1.83					
	migration	0.48 ± 0.68	0.70					
f(~habitat div + island)				0.8	0.29	3	1.70	0.15
	habitat diversity	-0.56 ± 0.28	-1.98					
	island	2.11 ± 0.46	4.63					
f(~island + size)				0.82	0.33	3	1.85	0.14
	island	2.35 ± 0.48	4.87					
	size	-0.52 ± 0.27	-1.95					
f(~island)				0.74	0.47	2	4.07	0.05
	island	2.12 ± 0.45	4.73					
f(~1)				0.50	0.00	1	26.36	0.00

Table S7. Global vulnerability: Results from logistic regression models, including clutch size. Sample size is reduced (n=106). Effect size is judged using a Wald test (Z value), and with standard errors. Predictors associated with the response variable are in bold.

Model	predictor	estimate ± SE	Z-value	AUC	TSS	df	ΔAICc	w
f(~ clutch + island)				0.83	0.54	3	0.00	0.54
	clutch	-0.63 ± 0.42	-1.49					
	island	2.54 ± 0.68	3.75					
f(~clutch)				0.78	-0.01	2	13.42	0.00
	clutch	-1.27 ± 0.40	-3.19					
f(~ 1)				0.50	0.00	1	25.57	0.00

On islands

Table Y6. Global vulnerability for island rails: Results on logistic regression models (n=41). Effect size is judged using a Wald test (Z value), and with standard errors. Predictors associated with the response variable are in bold.

Model	predictor	estimate ± SE	Z-value	AUC	TSS	df	ΔAICc	w
f(~island size)				0.64	0.07	2	0	0.11
	island size	-0.74 ± 0.39	-1.90					
f(~density + island size)				0.74	0.31	3	0.54	0.08
	density	4.2e-03 ± 4.8e-03	0.87					
	island size	-0.70 ± 0.39	-1.78					
f(~island size + size)				0.73	0.25	3	1.36	0.05
	island size	-0.68 ± 0.39	-1.72					
	body size	0.34 ± 0.35	0.96					
f(~distance + island size)				0.69	0.20	3	1.63	0.05
	distance	-0.32 ± 0.40	-0.82					
	island size	-0.93 ± 0.46	-2.01					
f(~density)				0.70	0.01	2	1.96	0.05
	density	4.2e-03 ± 4.5e-03	0.94					
f(~1)				0.50	0.00	1	2.07	0.04

Part 3: Contemporary vulnerability (impact from threats)

Table Y7. Vulnerability to introduced predators: Results on logistic regression models (n=106 globally and n=41 on islands). Effect size is judged using a Wald test (Z value), and with standard errors. Predictors associated with the response variable are in bold.

	Model	predictor	estimate ± SE	Z value	AUC	TSS	df	ΔAICc	w
Globally	f(~island)				0.81	0.63	2	0	0.35
		island	3.07 ± 0.66	4.65					
	f(~ island + size)				0.85	0.43	3	0.31	0.30
		island	3.06 ± 0.67	4.55					
		size	0.40 ± 0.30	1.31					
	f(~clutch + island)				0.86	0.36	3	1.13	0.20
		clutch	0.38 ± 0.39	1.00					
		island	3.52 ± 0.84	4.17					
	f(~clutch + island + size)				0.87	0.37	4	1.86	0.14
		clutch	0.32 ± 0.40	0.79					
	island	3.43 ± 0.86	4.00						
	size	0.36 ± 0.31	1.17						
	f(~1)				0.50	0.00	1	23.98	0.00
On islands	f(~no.mammal)				0.76	0.52	2	0	0.21
		no.mammal	2.44 ± 0.78	3.13					
	f(~no.mammal + size)				0.8	0.47	3	0.78	0.14
		no.mammal	2.45 ± 0.80	3.05					
		size	0.56 ± 0.48	1.18					
	f(~flightless + no.mammal)				0.79	0.51	3	0.9	0.13
	flightless	1.09 ± 0.89	1.22						

	no.mammal	1.80 ± 0.92	1.97					
f(island.sz + no.mammal)				0.77	0.52	3	1.29	0.11
	island.sz	-0.48 ± 0.48	-1.00					
	no.mammal	1.87 ± 0.94	1.98					
f(~1)				0.50	0.00	1	9.92	0.00

Table Y8. Vulnerability to over-hunting: Results on logistic regression models (n=106 globally and n=41 on islands). Effect size is judged using a Wald test (Z value), and with standard errors. Predictors associated with the response variable are in bold.

	Model	predictor	estimate ± SE	Z value	AUC	TSS	df	ΔAICc	w
Globally	f(~island + size)				0.81	0.19	3	0.00	0.63
		island	1.81 ± 0.65	2.78					
		size	0.89 ± 0.31	2.89					
	f(~clutch + island + size)				0.83	0.18	4	1.48	0.30
		clutch	0.31 ± 0.37	0.83					
		island	2.15 ± 0.79	2.71					
		size	0.88 ± 0.31	2.79					
	f(~1)						1	14.58	0.00
On islands	f(~flightless + size)				0.79	0.46	3	0.00	0.27
		flightless	1.18 ± 0.72	1.65					
		size	0.93 ± 0.51	1.84					
	f(~size)				0.73	0.43	2	0.46	0.22
		size	1.08 ± 0.48	2.24					
	f(~island.sz + size)				0.76	0.46	3	0.53	0.21
		island.sz	-0.53 ± 0.36	-1.45					
		size	0.99 ± 0.49	2.04					
	f(~flightless + island.sz + size)				0.78	0.56	4	1.90	0.11
		flightless	0.86 ± 0.83	1.04					
		island.sz	-0.32 ± 0.42	-0.75					
		size	0.91 ± 0.50	1.83					
	f(~1)				0.50	0.00	1	5.39	0.02

Table Y9. Vulnerability to habitat loss: Results on logistic regression models (n=139 globally and n=41 on islands). Effect size is judged using a Wald test (Z value), and with standard errors. Predictors associated with the response variable are in bold.

	Model	predictor	estimate \pm SE	Z value	AUC	TSS	df	Δ AICc	w
Globally	f(~island)				0.58	0.00	2	0.00	0.35
		island	0.77 \pm 0.38	2.02					
	f(~habitat.div + island)				0.59	-0.01	3	1.39	0.17
		habitat div	-1.16 \pm 0.19	-0.83					
		island	0.74 \pm 0.38	1.94					
	f(~artificial + island)					0.60	0.00	3	1.98
	artificialyes	-0.12 \pm 0.36	-0.34						
	island	0.75 \pm 0.39	1.95						
	f(~1)				0.50	0.00	1	2.00	0.13
On islands	f(~island size)				0.57	0.27	2	0.00	0.26
		island size	-0.63 \pm 0.36	-1.78					
	f(~1)				0.50	0.00	1	1.31	0.13
	f(~flightless + island size)				0.61	0.13	3	1.86	0.10
		flightless	-0.55 \pm 0.80	-0.68					
	island size	-0.80 \pm 0.44	-1.81						