Appendix 1

This appendix presents results using the taxonomic classification system followed by the IUCN, including the family of Sarothruridae as part of the rail family. However, results presented in this paper consider the Sarothruridae as distinct from the rail family (since BOW/IOU committees and Clements *et al.*, 2022 recognize that Sarothruridae are not rails) and were therefore excluded from the datasets.

Table X1 Range of parameters tried in all combinations to estimate the model performing the best and the optimum number of boosted regression trees.

	n	Learning rate	Tree complexity	Bag fraction	Step size	n.minobsinnode in predictions
Part 1 - Extinction	67	0.001, 0.005, 0.01	1, 2, 3	.5, .6, .7, .8, .9	50	10
Part 2 - Vulnerability						
Global scale	139	0.001, 0.005, 0.01	1, 2, 3, 4, 5	.5, .6, .7, .8, .9	50	10
Island scale	41	0.0005, 0.001, 0.005, 0.01	1, 2, 3	.7, .8, .9	20	6
Part 3 – Habitat loss						
Global scale	139	0.001, 0.005, 0.01	1, 2, 3, 4, 5	.5, .6, .7, .8, .9	50	10
Island scale	41	0.0005, 0.001, 0.005, 0.01	1, 2, 3	.7, .8, .9	20	6
Part 3 – Over-hunting						
Global scale	139	0.001, 0.005, 0.01	1, 2, 3, 4, 5	.5, .6, .7, .8, .9	50	10
Island scale	41	0.0005, 0.001, 0.005, 0.01	1, 2, 3	.7, .8, .9	20	6
Part 3 – Introduced species						
Global scale	139	0.001, 0.005, 0.01	1, 2, 3, 4, 5	.5, .6, .7, .8, .9	50	10
Island scale	41	0.0005, 0.001, 0.005, 0.01	1, 2, 3	.7, .8, .9	20	6

Table X2 Optimum parameters and model performance for the boosted regression trees. Note that results presented for Part 2 (islands) have a reduced number of predictors after an initial model selection.

Model	Learning rate	Tree complexity	Bag fraction	Optimal n.trees	Deviance	Sensitivity	Specificity	TSS
Part 1 – Extinction risk								
Island scale	0.01	2	0.5	1400	1.00	0.90	0.56	0.46
Part 2 - Vulnerability								
Global scale	0.005	5	0.5	1250	0.83	0.98	0.68	0.66
Island scale	0.01	2	0.9	2650	1.23	0.75	1	0.75
Part 3 – Habitat loss								
Global scale	0.01	5	0.8	850	1.25	0.93	0.28	0.21
Island scale	0.001	3	0.9	1670	1.36	0.90	0.80	0.70
Part 3 – Over-hunting								
Global scale	0.01	1	0.8	900	0.75	0.97	0.5	0.47
Island scale	0.01	2	0.8	590	1.24	0.92	0.69	0.61
Part 3 – Introduced sp.								
Global scale	0.005	2	0.6	450	0.70	0.95	0.59	0.54
Island scale	0.005	2	0.7	430	1.14	0.74	0.82	0.56

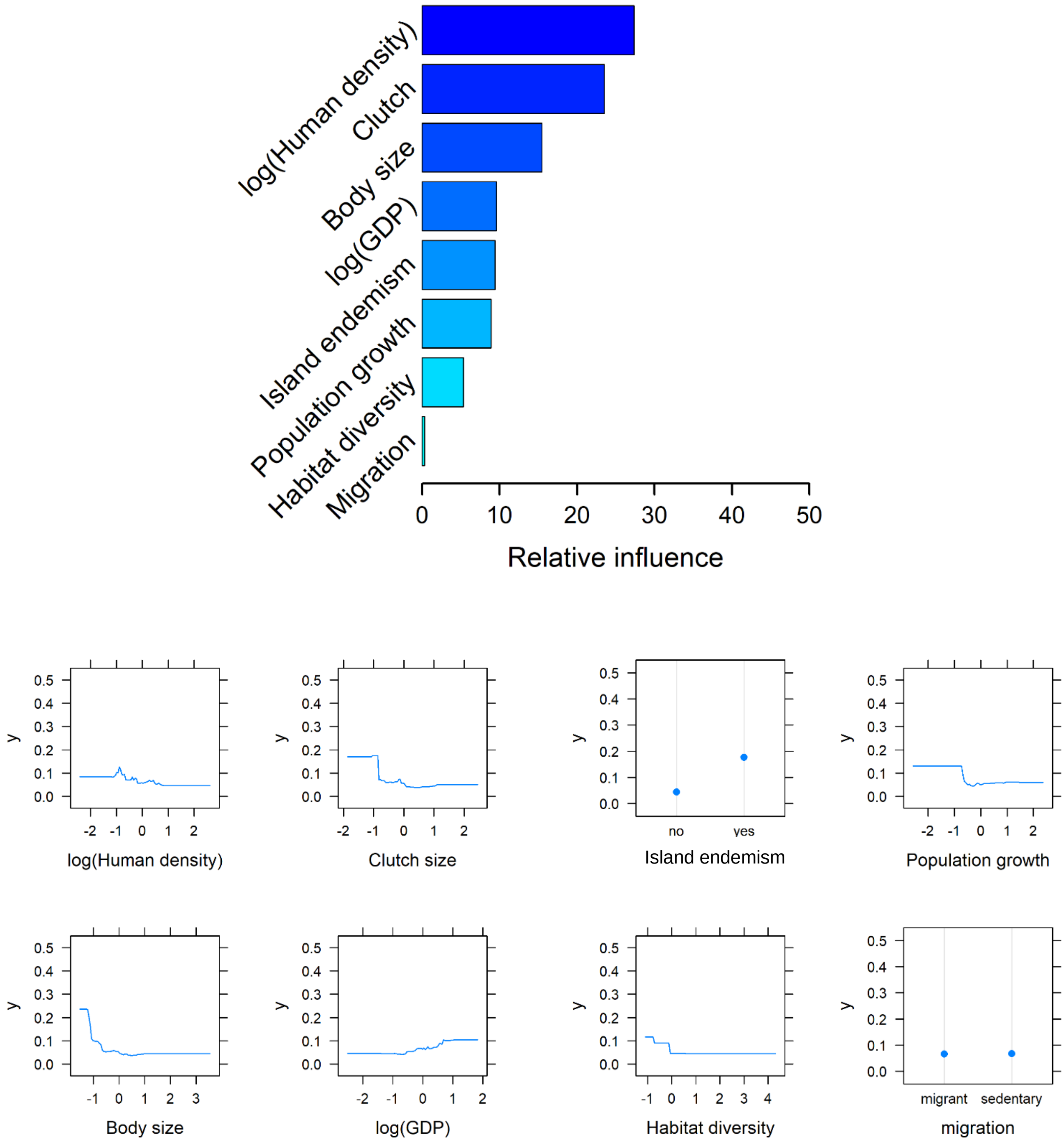

Fig. X1. Global vulnerability: the relative influence (top) and partial dependence plots (bottom) of predictor variables for the boosted regression tree model on rails' global vulnerability. Y is the probability of being threatened. The dataset includes the family of Sarothruridae as part of the rail family.

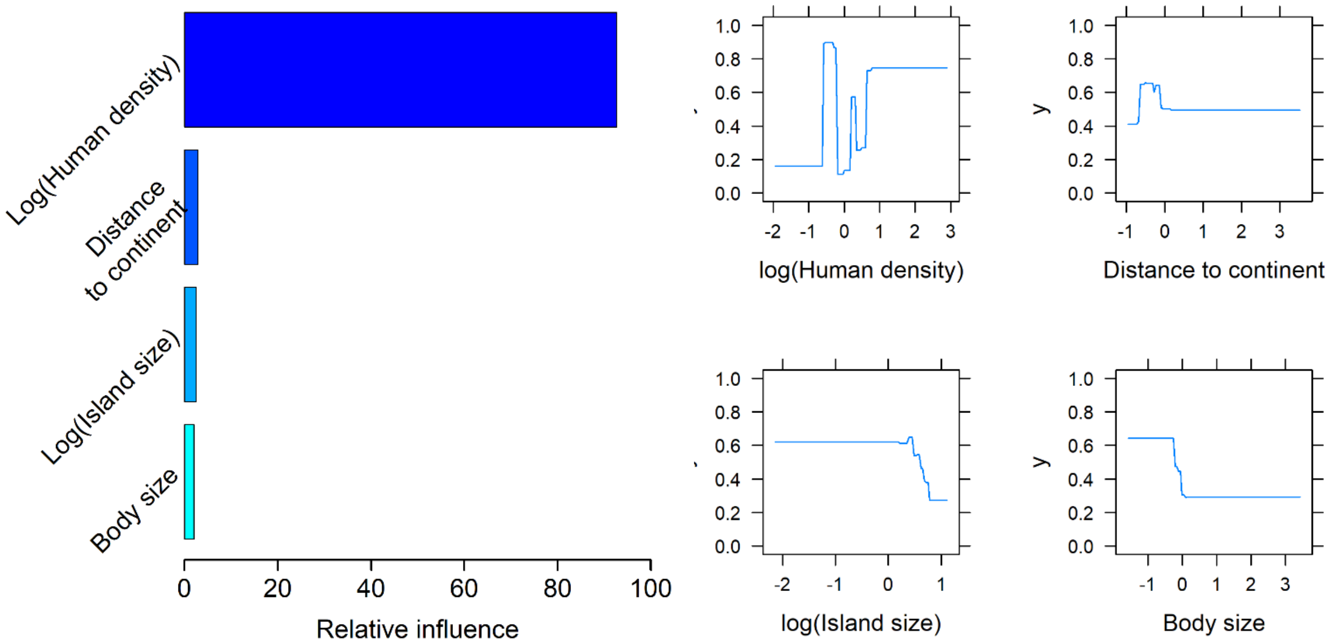

Fig. X2. Vulnerability of island endemic rails: relative influence (left) and partial dependence plots (right) of predictor variables for the boosted regression tree model on island rails' vulnerability. Y is the probability of being threatened. The dataset includes the family of Sarothruridae as part of the rail family.

On islands (i.e., excluding continental rail species), human density was the most important predictor of vulnerability (93% of relative influence in the model; Fig. X2). Rails on islands with > 70 people/km^2 had over 75% likelihood of being threatened. Such density concerned 27% of the island rails (the maximum density was of 1,201 people/km2). Other variables had < 3% relative influence in the model.

Table X3. Proportion of rail species impacted by the three main threatening processes. The dataset includes the family of Sarothruridae as part of the rail family.

	Habitat loss	Over-hunting	Introduced species
Globally	40%	17%	12%
On islands	49%	39%	54%

Globally

When examining the importance of life-history (intrinsic) traits for the vulnerability to three main anthropogenic threats (habitat loss, over-hunting, and introduced species), we found that island endemism was a common factor leading to increased vulnerability globally (Fig. X4-X6), and most especially to the threat of introduced species. Habitat loss was the threat impacting most rail species globally (Table X3), however our model had a low performance at capturing the pattern (Table X2). The higher the habitat diversity a species enjoyed, the lower its chance of being threatened by habitat loss (Fig. X5). Clutch size was the most influential parameter explaining over-hunting, accounting for over 40% of the model influence for over-hunting, but variation of the predictor's range altered the likelihood to be threatened by less than 10% (Fig. X6). Larger rails were also more likely to suffer from over-hunting (Fig. X6).

On islands

The proportion of species impacted by habitat loss, over-hunting, and introduced species was higher on islands than globally (Table X3). Body size was the most important predictor for over-hunting, with rails larger than 31 cm having up to 40% chance of being threatened due to their size (Fig. X7), yet it had little importance for introduced predators (Fig. X8). Island size was the main factor leading to increased vulnerability to habitat loss. Species living on islands between 4,469km^2 and 205,131km^2 had up to 74% chance to be threatened by habitat loss (Fig. X9; 34% of the island rails). Island size is also associated with the threat of introduced predators on islands, rails on smaller islands having a higher risk. However, naivete to predators was the predominant predictor (i.e., absence of native mammals; 44% of the rails evolved this way; Fig. X8). Overall, flightlessness had little influence on the vulnerability to any of these three threats.

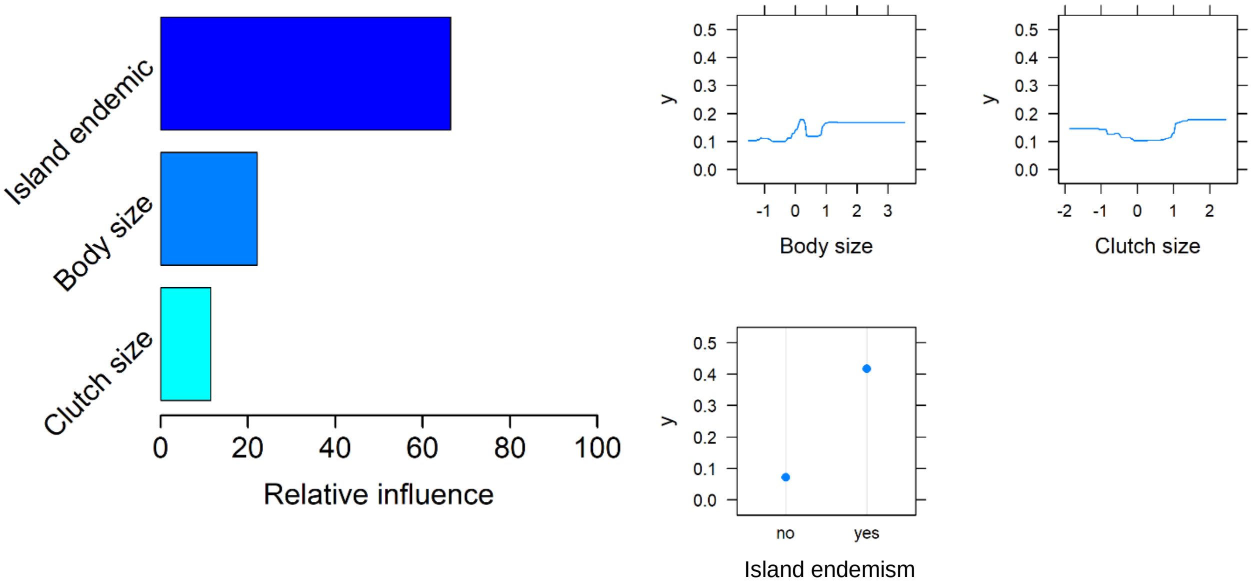

Fig. X4. Global vulnerability to introduced species: relative influence (left) and partial dependence plots (right) of predictor variables for the boosted regression tree model on rails' vulnerability to introduced species globally. Y is the probability of being threatened by introduced species. The dataset includes the family of Sarothruridae as part of the rail family.

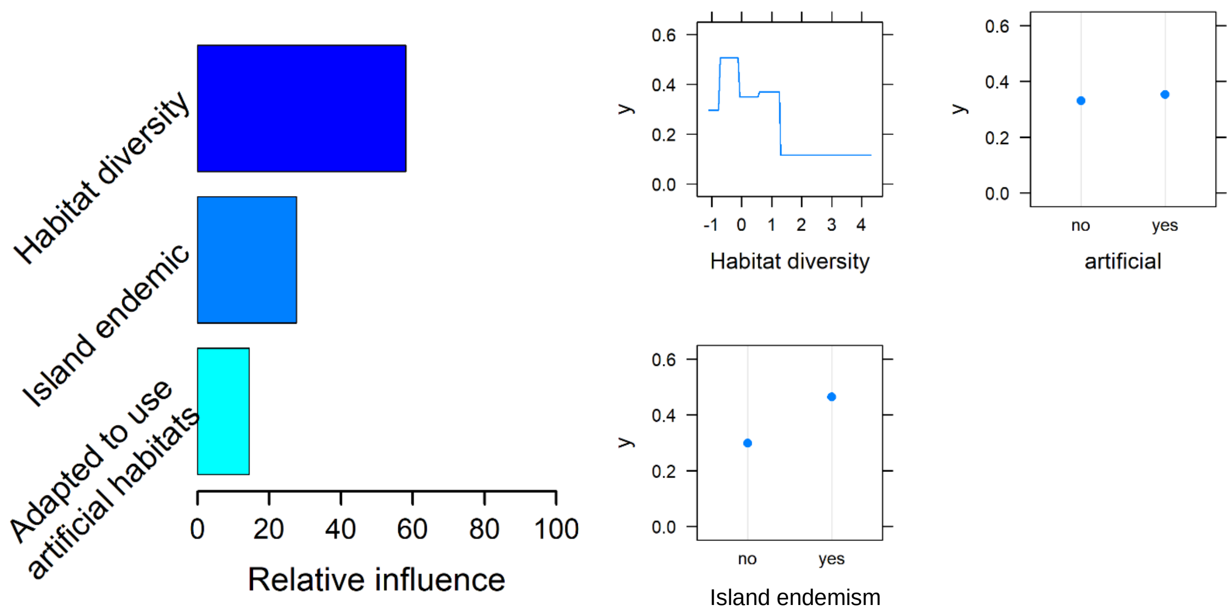

Fig. X5. Global vulnerability to habitat loss: relative influence (left) and partial dependence plots (right) of predictor variables for the boosted regression tree model on rails' vulnerability to habitat loss globally. Y is the probability of being threatened by habitat loss. The dataset includes the family of Sarothruridae as part of the rail family.

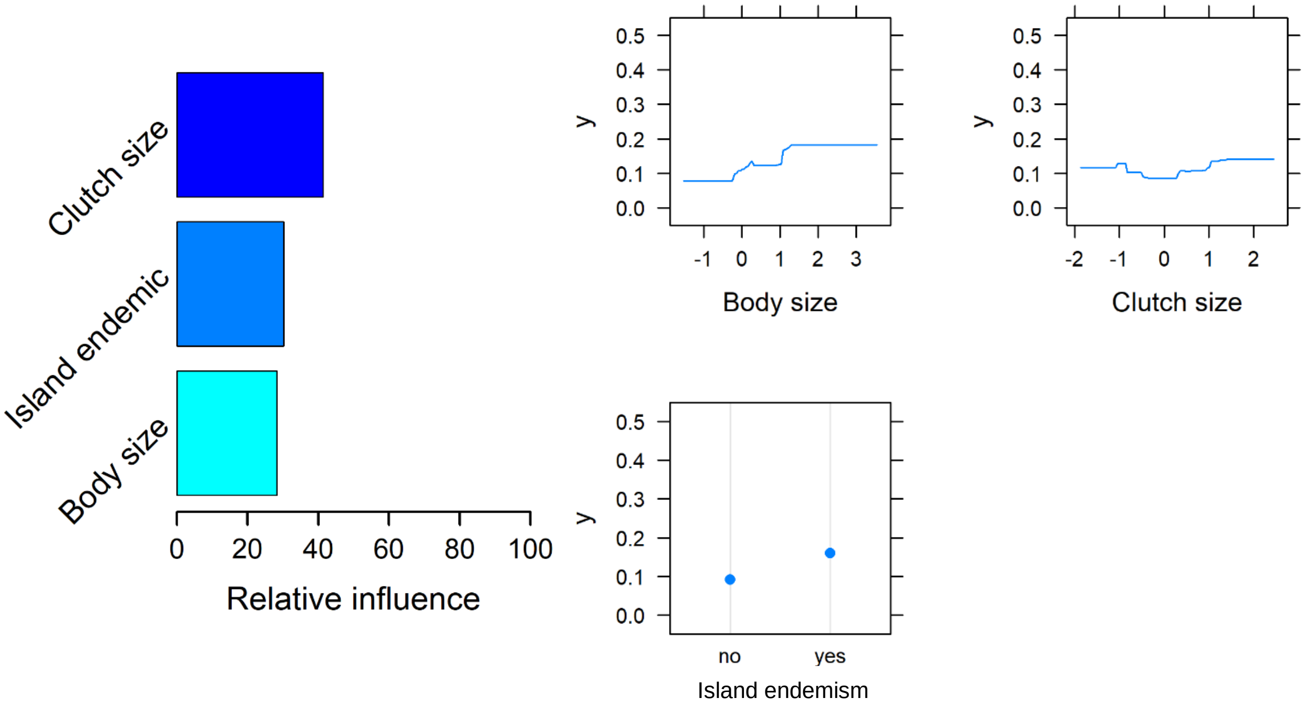

Fig. X6. Global vulnerability to over-hunting: relative influence (left) and partial dependence plots (right) of predictor variables for the boosted regression tree model on rails' vulnerability to over-hunting globally. Y is the probability of being threatened by over-hunting. The dataset includes the family of Sarothruridae as part of the rail family.

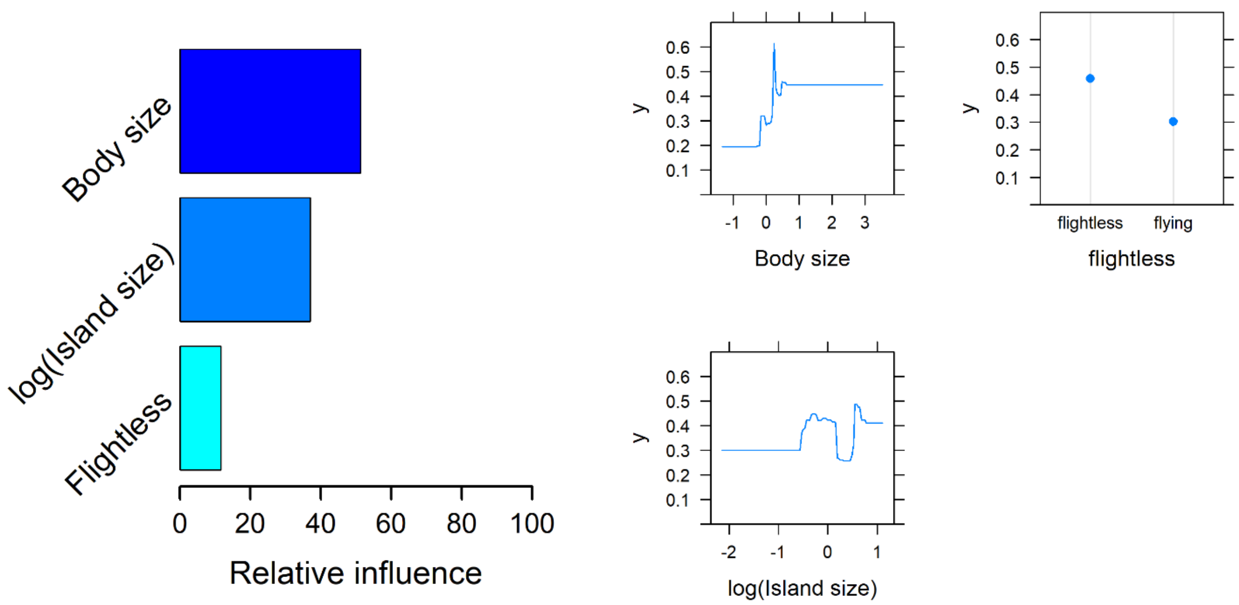

Fig. X7. Vulnerability of island endemic rails to over-hunting: relative influence (left) and partial dependence plots (right) of predictor variables for the boosted regression tree model on rails' vulnerability to over-hunting on islands. Y is the probability of being threatened by over-hunting. The dataset includes the family of Sarothruridae as part of the rail family.

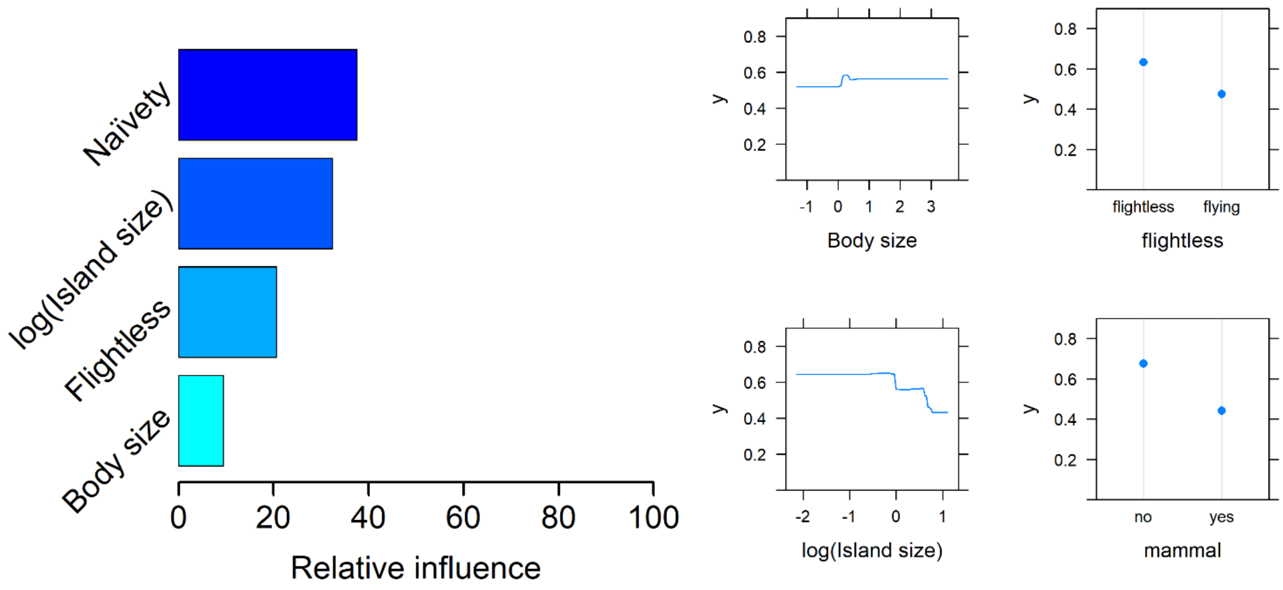

Fig. X8. Vulnerability of island endemic rails to introduced predators: relative influence (left) and partial dependence plots (right) of predictor variables for the boosted regression tree model on rails' vulnerability to introduced predators on islands. Y is the probability of being threatened by introduced predators. The dataset includes the family of Sarothruridae as part of the rail family. Mammal: the presence of native mammal species.

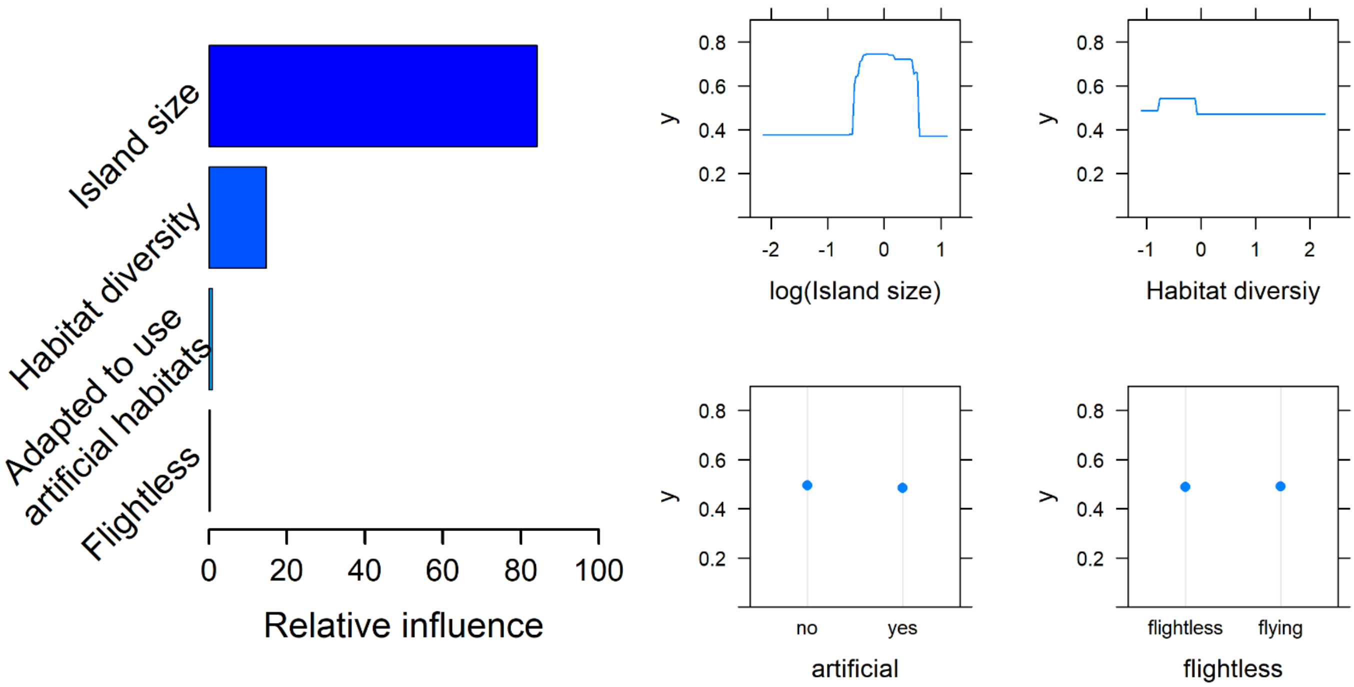

Fig. X9. Vulnerability of island endemic rails to habitat loss: relative influence (left) and partial dependence plots (right) of predictor variables for the boosted regression tree model on rails' vulnerability to habitat loss on islands. Y is the probability of being threatened by habitat loss. The dataset includes the family of Sarothruridae as part of the rail family. Artificial: species adapted to use artificial habitats, present in habitat modified by humans.