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Supplementary material

Soil phosphorus predicts feral pig (*Sus scrofa*) occupancy, detection probability and feeding activity in a temperate montane rainforest

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Fig. S1. Photograph of the Ikawhenua Range illustrating the topographic diversity and forest cover of our mountainous study area. A 400-m elevation gradient occurs from valley bottoms to ridge crests, forming steep slopes of varying aspects. *Kunzea ericoides*, a tree species dominating previously burnt forest, is shown in the foreground, with trees of *Beilschmiedia tawa* and *Melicytus ramiflorus* dominating the unburnt forest slopes in the background. A grid of camera locations was used to representatively sample use of the study area by feral pigs. Photo credit: David M. Forsyth.

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Table S1. Pearson's correlation coefficients between the four biophysical covariates

For predictor variable abbreviations, see Table 2.

	sqrt DS	ln CN	ln P	NMDS
sqrt DS	1.00	0.17	−0.01	0.58
ln CN	0.17	1.00	−0.18	0.51
ln P	−0.01	−0.18	1.00	−0.02
NMDS	0.58	0.51	−0.02	1.00

Table S2. Summary of feral pig camera trapping data by season and year

Given are the total number of camera days, number of images, and naïve occupancy value (proportion of camera locations with at least one image containing a feral pig during a season). Piglet and feeding naïve occupancy are the proportions of camera locations where pigs were photographed that also resulted in images of piglets and of feeding behaviour, respectively. Seasons were the winters of 2010 and 2011 and the austral summers of 2010/2011 (nominally 2010) and 2011/2012 (2011).

Information	Season and year			
	Winter 2010	Summer 2010	Winter 2011	Summer 2011
Camera days	2230	2313	2447	2753
Feral pig images[a]	18	140	46	67
Feral pig naïve occupancy	0.24	0.80	0.48	0.68
Feral piglet images[a]	0	53	0	2
Feral piglet naïve occupancy, given pigs	0.00	0.70	0.00	0.12
Feral pig feeding images[a]	4	63	20	25
Feeding naïve occupancy, given pigs	0.33	0.85	0.58	0.71

[a]Independent images (see Materials and methods).

Table S3. Most supported models ($w_i \geq 0.05$) of feral pig occupancy and detection probability

For model abbreviations, see Table 2. ΔAIC is relative difference in AIC between that model and the highest-ranked model; w_i is AIC model weight; K, number of parameters in the model; $-2LL$, twice the negative log-likelihood value. Models are listed from most to least supported.

Model	ΔAIC	w_i	K	$-2LL$
Feral pig occupancy				
SEAS + ln P	0.00	0.20	25	1,070.50
SEAS + sqrt DS + ln P	1.44	0.10	26	1,069.94
SEAS + YR + ln P	1.95	0.08	26	1,070.45
SEAS + ln P + NMDS	1.96	0.08	26	1,070.46
SEAS + ln CN + ln P	1.98	0.07	26	1,070.47
SEAS + sqrt DS + ln P + NMDS	2.39	0.06	27	1,068.89
Feral pig detection probability				
PIGLET + ln P + Num Sur	0.00	0.16	24	1,069.71
PIGLET + ln P + NMDS + Num Sur	1.25	0.09	25	1,068.96
PIGLET + sqrt DS + ln P + Num Sur	1.45	0.08	25	1,069.17
SEAS + PIGLET + ln P + Num Sur	1.68	0.07	25	1,069.40
PIGLET + ln CN + ln P + Num Sur	1.96	0.06	25	1,069.68
PIGLET + YR + ln P + Num Sur	1.98	0.06	25	1,069.70
PIGLET + ln CN + ln P + NMDS + Num Sur	2.60	0.05	26	1,068.32

Table S4. Summed AIC model weights for the predictors of feral pig occupancy and detection probability

For variable abbreviations, see Table 2. w_{Σ} is summed weights; *ER* is evidence ratio.

Variable	w_{Σ}	*ER*
Feral pig occupancy		
SEAS	0.91	10.47
YR	0.31	0.46
sqrt DS	0.41	0.70
ln CN	0.29	0.42
ln P	0.94	15.35
NMDS	0.35	0.54
Feral pig detection probability[a]		
SEAS	0.32	0.48
PIGLET	0.99	88.43
YR	0.25	0.33
sqrt DS	0.33	0.49
ln CN	0.30	0.43
ln P	0.98	58.87
NMDS	0.31	0.46

[a]The variable ‘Num Sur’ was included in all these models and is not shown here.

Table S5. Most supported models ($w_i \geq 0.05$) of feral piglet occupancy and detection probability (given that feral pigs were detected in a survey)

For model abbreviations, see Table 2. ΔAIC is relative difference in AIC between that model and the highest-ranked model; w_i is AIC model weight; K, number of parameters in the model; $-2LL$, twice the negative log-likelihood value. Models are listed from most to least supported.

Model	ΔAIC	w_i	K	$-2LL$
Feral piglet occupancy				
YR + ln CN	0.00	0.09	26	1,069.58
ln CN	0.14	0.08	25	1,071.73
YR + sqrt DS	0.18	0.08	26	1,069.76
NMDS	0.47	0.07	25	1,072.06
YR	1.03	0.05	25	1,072.61
YR + sqrt DS + ln P	1.06	0.05	27	1,068.65
Feral piglet detection probability				
YR + ln P + Num Sur	0.00	0.26	26	1,071.35
YR + ln P + NMDS + Num Sur	2.00	0.09	27	1,071.35
YR + sqrt DS + ln CN + ln P + NMDS + Num Sur	2.69	0.07	29	1,068.04
YR + sqrt DS + ln CN + ln P + Num Sur	2.72	0.07	28	1,070.07
YR + ln CN + ln P + Num Sur	3.24	0.05	27	1,072.60
ln CN + ln P + Num Sur	3.26	0.05	26	1,074.62
YR + sqrt DS + ln P + Num Sur	3.40	0.05	27	1,072.75

Table S6. Summed AIC model weights for the predictors of feral piglet occupancy and detection probability (given that feral pigs were detected in a survey)

For variable abbreviations, see Table 2. w_{Σ} is summed weights; *ER* is evidence ratio.

Variable	w_{Σ}	*ER*
Feral piglet occupancy		
YR	0.53	1.14
sqrt DS	0.39	0.64
ln CN	0.48	0.92
ln P	0.30	0.43
NMDS	0.40	0.66
Feral piglet detection probability[a]		
YR	0.79	3.71
sqrt DS	0.38	0.60
ln CN	0.45	0.83
ln P	0.81	4.29
NMDS	0.32	0.48

[a]The variable 'Num Sur' was included in all models and is not shown here.

Table S7. Most supported models ($w_i \geq 0.05$) of feral pig feeding occupancy and detection probability

For model abbreviations, see Table 2. ΔAIC is relative difference in AIC between that model and the highest-ranked model; w_i is AIC model weight; K, number of parameters in the model; $-2LL$, twice the negative log-likelihood value. Models are listed from most to least supported.

Model	ΔAIC	w_i	K	$-2LL$
Feral pig feeding occupancy				
SEAS	0.00	0.12	10	571.78
SEAS + YR	0.20	0.11	11	569.98
SEAS + YR + sqrt DS	1.26	0.07	12	569.04
SEAS + sqrt DS	1.54	0.06	11	571.32
SEAS + NMDS	1.84	0.05	11	571.62
SEAS + YR + NMDS	1.89	0.05	12	569.67
SEAS + ln P	2.00	0.05	11	571.78
SEAS + ln CN	2.00	0.05	11	571.78
SEAS + YR + ln CN	2.02	0.05	12	569.80
Feral pig feeding detection probability				
YR + ln P + Num Sur	0.00	0.16	11	570.44
YR + ln P + NMDS + Num Sur	0.02	0.16	12	568.46
YR + ln CN + ln P + Num Sur	1.06	0.10	12	569.50
YR + sqrt DS + ln P + Num Sur	1.53	0.08	12	569.97
YR + sqrt DS + ln P + NMDS + Num Sur	1.67	0.07	13	568.11
YR + ln CN + ln P + NMDS + Num Sur	1.91	0.06	13	568.35
SEAS + YR + ln P + NMDS + Num Sur	1.92	0.06	13	568.36
SEAS + YR + ln P + Num Sur	2.00	0.06	12	570.44

Table S8. Summed AIC model weights for predictors of feral pig feeding occupancy and detection probability

For variable abbreviations, see Table 2. w_{Σ} is summed weights; *ER* is evidence ratio.

Variable	w_{Σ}	*ER*
Feral piglet occupancy		
SEAS	0.97	27.84
YR	0.50	1.01
sqrt DS	0.35	0.54
ln CN	0.28	0.39
ln P	0.27	0.38
NMDS	0.29	0.41
Feral piglet detection probability[a]		
SEAS	0.28	0.38
YR	0.99	112.07
sqrt DS	0.31	0.44
ln CN	0.33	0.48
ln P	0.97	31.88
NMDS	0.47	0.88

[a]The variable 'Num Sur' was included in all models and is not shown here.