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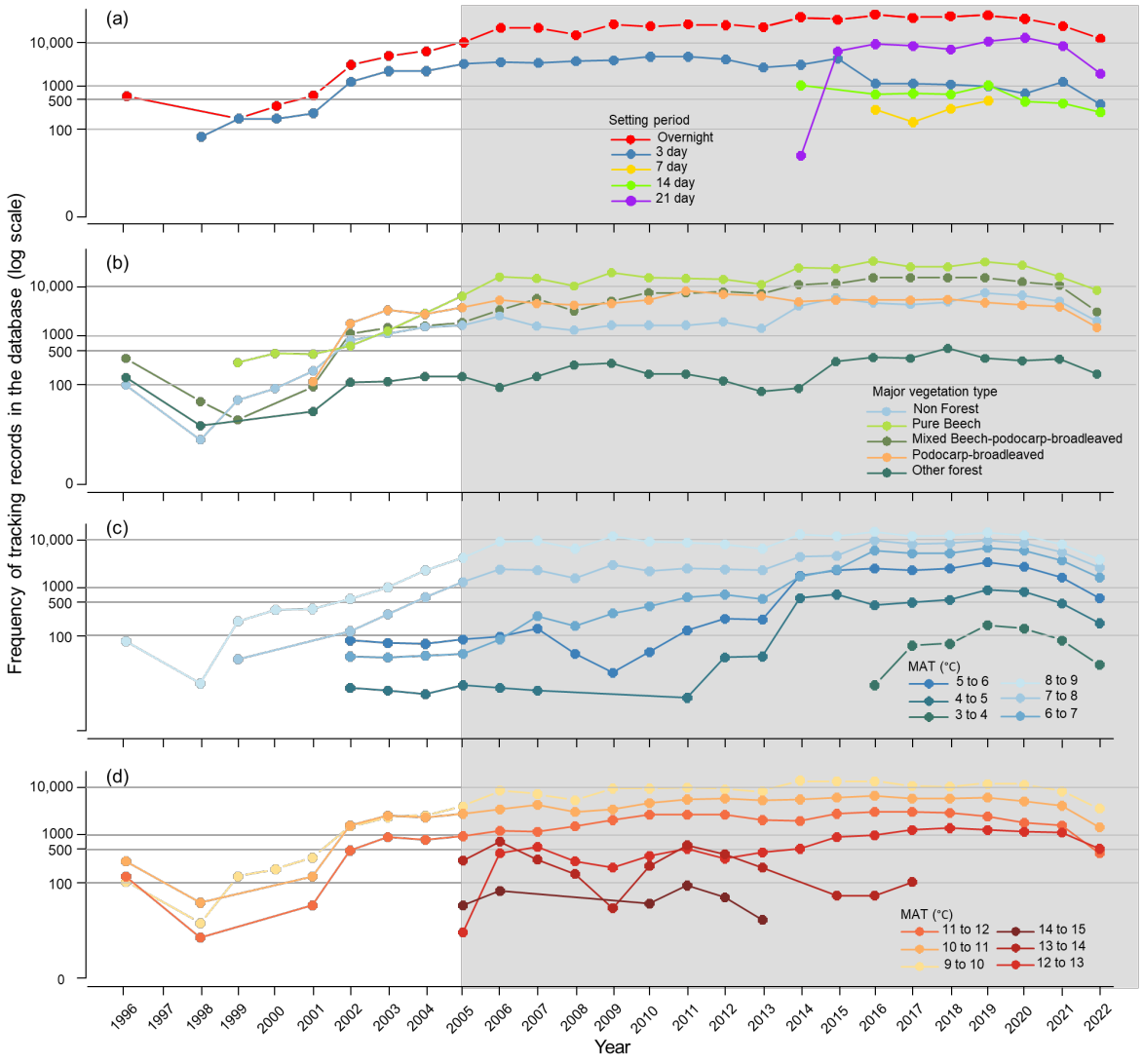
Supplementary material

Appendix S1. Timeline showing the annual frequency of tracking records in the database.

Timeline showing the annual frequency of tracking records in the database by (a) setting period, (b) major forest type (derived from Ecosat Forests, see Appendix S2); and (c,d) one degree band of long-term mean annual temperature (MAT) sourced from McCarthy et al. (2021). The grey background box indicates the temporal range of our predictions of ship rat and mouse tracking rates.



References

McCarthy JK, Leathwick JR, Roudier P, Barringer JR, Etherington TR, Morgan FJ, Odgers NP, Price RH, Wiser SK, Richardson SJ 2021. New Zealand Environmental Data Stack (NZEnvDS): a standardised collection of spatial layers for environmental modelling and site characterisation. New Zealand Journal of Ecology 45(2): 3440. https://dx.doi.org/10.20417/nzjecol.45.31

Shepherd JD, Ausseil A-G, Dymond JR 2005. Ecosat Forests: a 1:750,000 scale map of indigenous forest classes in New Zealand. Lincoln, Manaaki Whenua Press.

Supplementary material, Walker et al. Temporal and spatial patterns in rodent and mustelid tracking rates across New Zealand conservation land between 2005 and 2022.

Appendix S2. Assignment of Ecosat Forests classes to major vegetation types in this study.

In Appendix S2, Ecosat Forests is the spatial layer of Shepherd et al. (2005)

Ecosat vegetation type number	Ecosat Forests class name	Assigned major vegetation type
1	Subalpine scrub	Non forest
2	Coastal forest	Other forest
3	Kauri forest	Podocarp-broadleaved
4	Podocarp forest	Podocarp-broadleaved
5	Podocarp-broadleaved forest	Podocarp-broadleaved
6	Beech forest	Pure Beech
7	Broadleaved forest	Podocarp-broadleaved
8	Podocarp-broadleaved / Beech forest	Mixed beech-podocarp-broadleaved
9	Beech / Broadleaved forest	Mixed beech-podocarp-broadleaved
10	Beech / Podocarp-broadleaved forest	Mixed beech-podocarp-broadleaved
12	Unspecified Indigenous forest	Other forest
14	Other	Non forest

References

Shepherd JD, Ausseil A-G, Dymond JR 2005. Ecosat Forests: a 1:750,000 scale map of indigenous forest classes in New Zealand. Lincoln, Manaaki Whenua Press.

Appendix S3. Predictor variables included in our boosted regression tree models of rat, mouse and mustelid tracks, and of sampling frequency.

In Appendix S3 the range of values represented is shown in parentheses in column 1 along with units of measurement. The type of variable (column 2) is either binary factor, factor, numeric or integer, and the number of classes in multilevel factors is also shown where relevant. Sources of information are identified in column 3.

Predictor variable	Variable type	Source or reference	Rat track model	Mouse tracks	Mustelid tracks	Sampling frequency
Timing						
Rodent year (1 October to 30 September)	Factor (1996 to 2022)	Tracking database	+	+	+	
Season	Factor (4 classes: Spring, Summer, Autumn, Winter)	Tracking database	+	+	+	
Setting period	Factor (5 classes: 1,3,7,14 or 21 days)	Tracking database	+	+	+	
Environment[1]						
July ground frost (3.0 to 30.4 °C)	Numeric	McCarthy et al. (2021)	+	+	+	+
Mean annual temperature[2] (2.9 to 14.4 °C)	Numeric	McCarthy et al. (2021)	+	+	+	+

[1] All climate layers sourced from McCarthy et al. (2021) were originally derived from the Land Environments of New Zealand (LENZ; Leathwick et al. 2003) or from additional climate layers developed by Landcare Research for that product (cited as Landcare Research, unpublished data, 2003) or other projects (cited as Landcare Research, unpublished data, 2013 and 2015). Each climate layer is an interpolated mathematical surface (thin-plate spline) fitted using information about the climate, location and elevation of a number of meteorological stations. Temperature and rainfall data estimates used to derive the environmental data layers were collected at meteorological stations over the period from 1950 to 1980, while data describing humidity and solar radiation consisted of averages of all data collected up until 1980.

[2] Over the period from 1950 to 1980. Note that between 1972 and 2022 there was a median increase in average annual temperature of 0.19°C per decade (Statistics New Zealand 2023).

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Predictor variable	Variable type	Source or reference	Rat track model	Mouse tracks	Mustelid tracks	Sampling frequency
Mean annual rainfall (749 to 8,332 mm)	Numeric	McCarthy et al. (2021)	+	+	+	+
Rainfall to potential evapotranspiration ratio (20 to 279)	Numeric	McCarthy et al. (2021)	+	+	+	+
Annual Penman moisture deficit (0 to 410 mm)	Numeric	McCarthy et al. (2021)	+	+	+	+
October vapour pressure deficit (0 to 48 kPa)	Numeric	McCarthy et al. (2021)	+	+	+	+
Beech stems per hectare[3] (0 to 330)	Numeric	Landcare Research, unpublished data, 2015 (100 m)	+	+	+	+
Ecosat forests class	Factor (12 classes[4])	Shepherd et al. (2005)				+
Land element	Factor (10 classes[5])	Landcare Research, unpublished data, 2013 (100 m)	+	+	+	+
Elevation (0 to 1,832 m asl)	Numeric	McCarthy et al. (2021)				+
Mean annual solar radiation (11.7 to 15.5 MJ/m^2/day)	Numeric	Landcare Research, unpublished data (2003)				+
Management						

[3] Stems >30cm dbh per hectare, where dbh = diameter of tree at breast height, predicted by a BRT model which used data from the LUCAS (the New Zealand Land-Use and Carbon Analysis System) natural forest plots (MFE 2010).

[4] The typology is derived from canopy spectral characteristics: 1. Subalpine scrub, 2. Coastal forest, 3. Kauri forest, 4. Podocarp forest, 5. Podocarp-broadleaved forest, 6. Beech forest, 7. Broadleaved forest, 8. Podocarp-broadleaved / Beech forest, 9. Beech / Broadleaved forest, 10. Beech / Podocarp-broadleaved forest, 12. Unspecified indigenous forest, 14. Other.

[5] Based on classification of landform elements from a digital elevation model (J. Barringer, Manaaki Whenua – Landcare Research, unpublished data, 2013): 1. Ridge, 2. Shoulder, 3. Valley, 4. Footslope, 5. Backslope, 6. Channel, 7. Hollow, 8. Spur, 9. Terrace, 10. Plateau.

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Predictor variable	Variable type	Source or reference	Rat track model	Mouse tracks	Mustelid tracks	Sampling frequency
Days since last 1080 operation (0 to 2554)	Numeric	DOC management database	+	+	+	
Number of previous 1080 operations	Numeric	DOC management database	+	+	+	
Rodents tracked						
Ship rats tracked	Binary factor (0/1)	Tracking database		+	+	
Mice tracked	Binary factor (0/1)	Tracking database			+	

References

Leathwick J, Morgan F, Wilson G, Rutledge D, McLeod M, Johnson K 2003. Land environments of New Zealand: a technical guide. Wellington, Ministry for the Environment. 237 p.

McCarthy JK, Leathwick JR, Roudier P, Barringer JR, Etherington TR, Morgan FJ, Odgers NP, Price RH, Wiser SK, Richardson SJ. New Zealand Environmental Data Stack (NZEnvDS): a standardised collection of spatial layers for environmental modelling and site characterisation. New Zealand Journal of Ecology 45(2): 3440. https://dx.doi.org/10.20417/nzjecol.45.31

MfE (Ministry for the Environment) 2010. Measuring carbon emissions from land-use change and forestry: the New Zealand land-use and carbon analysis system, INFO 527. Wellington, Ministry for the Environment.

Shepherd JD, Ausseil A-G, Dymond JR 2005. Ecosat Forests: a 1:750,000 scale map of indigenous forest classes in New Zealand. Manaaki Whenua Press, Lincoln.

Statistics New Zealand 2023. https://www.stats.govt.nz/indicators/temperature (accessed 13 September 2024).

Appendix S4. Model statistics for our six BRT models of rodent tracks in three major forest types, and the relative influence of predictor variables.

In Appendix S4, the rows show (a) cross validation correlation coefficient (cvCC) and cross-validated area under the ROC curve (cvAUC), and (b) the relative influence (RI) of predictor variables. RI is the number of times a variable is selected for splitting, weighted by the squared improvement to the model as a result of each split, averaged over all trees and scaled to sum to 100 (Elith et al. 2008).

	Ship rats			**Mice**		
	Pure Beech	Mixed beech-podocarp-broadleaved	Podocarp-broadleaved	Pure Beech	Mixed beech-podocarp-broadleaved	Podocarp-broadleaved
(a) Model parameters						
Final number of trees	8400	5800	5850	9750	5950	3450
cvCC	0.64 ± 0.00	0.66 ± 0.00	0.69 ± 0.00	0.70 ± 0.00	0.65 ± 0.00	0.59 ± 0.00
cvAUC	0.91 ± 0.00	0.90 ± 0.00	0.90 ± 0.00	0.92 ± 0.00	0.91 ± 0.00	0.90 ± 0.00
(c) Relative influence of predictor variables						
Time						
Rodent year	27.7	24.5	29.9	37.8	33.7	31.0
Season	3.5	3.3	3.5	8.0	6.0	3.8
Setting period	3.9	2.4	2.3	2.4	2.1	2.8
Environment						
July ground frost	7.5	7.3	8.6	6.5	5.8	7.0
Mean annual temperature	8.9	11.7	4.9	3.2	5.0	4.1
Mean annual rainfall	10.0	12.5	10.4	8.4	10.4	15.4
Rainfall:potential evapotranspiration ratio	5.7	8.1	7.9	3.6	4.0	4.1
Annual Penman moisture deficit	2.1	2.3	2.5	2.1	6.8	2.0
October vapour pressure deficit	5.8	3.5	3.3	4.8	3.4	2.9

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	Ship rats			Mice		
	Pure Beech	Mixed beech-podocarp-broadleaved	Podocarp-broadleaved	Pure Beech	Mixed beech-podocarp-broadleaved	Podocarp-broadleaved
Nothofagus stem density	7.0	4.2	2.8	4.2	4.8	2.4
Ecosat forest class		1.1	1.2		0.7	0.9
Landscape element	5.0	6.5	7.0	3.3	6.0	7.1
Management						
Days since last 1080 operation	11.3	11.2	14.1	13.1	9.3	13.9
Total number of 1080 operations	1.7	1.4	1.5	2.1	1.4	1.8
Rodents tracked						
Rats tracked				0.4	0.6	0.8

References

Elith J, Leathwick JR, Hastie T 2008. A working guide to boosted regression trees. Journal of Animal Ecology 77: 802–813.

Appendix S5. Partial dependence plots for the most influential variables in our 3 BRT models of **ship rat** tracks in three major forest types.

In Appendix S5 the three major forest types (pure beech, mixed beech-podocarp-broadleaved, and podocarp-broadleaved) are derived from Ecosat Forests (see Appendix S2). The vertical axes are on the logit scale and are centred to have zero mean over the data distribution. Tick marks at the inside top of subplots show the distribution of tracking tunnel sites across that variable, in deciles.

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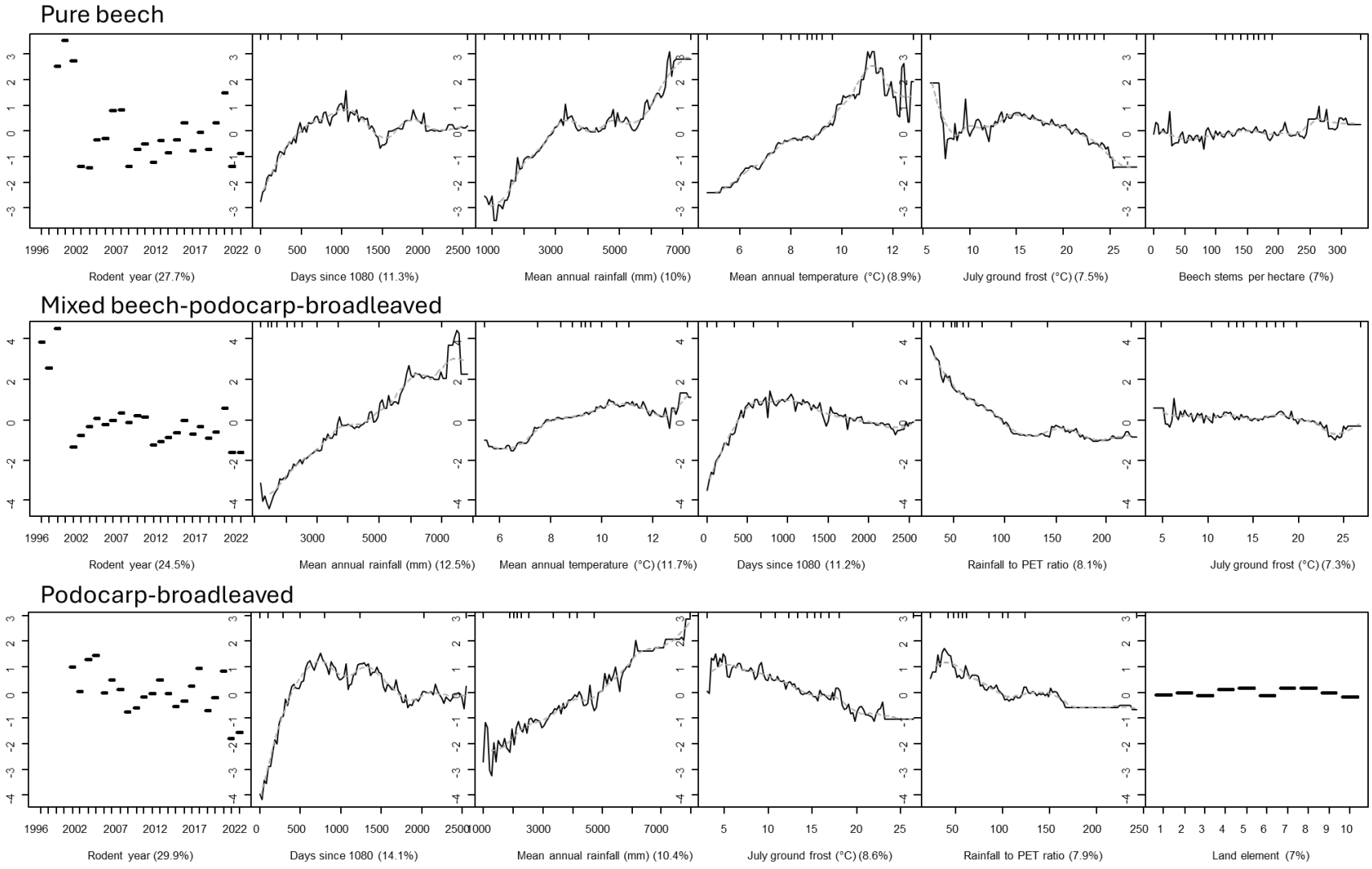
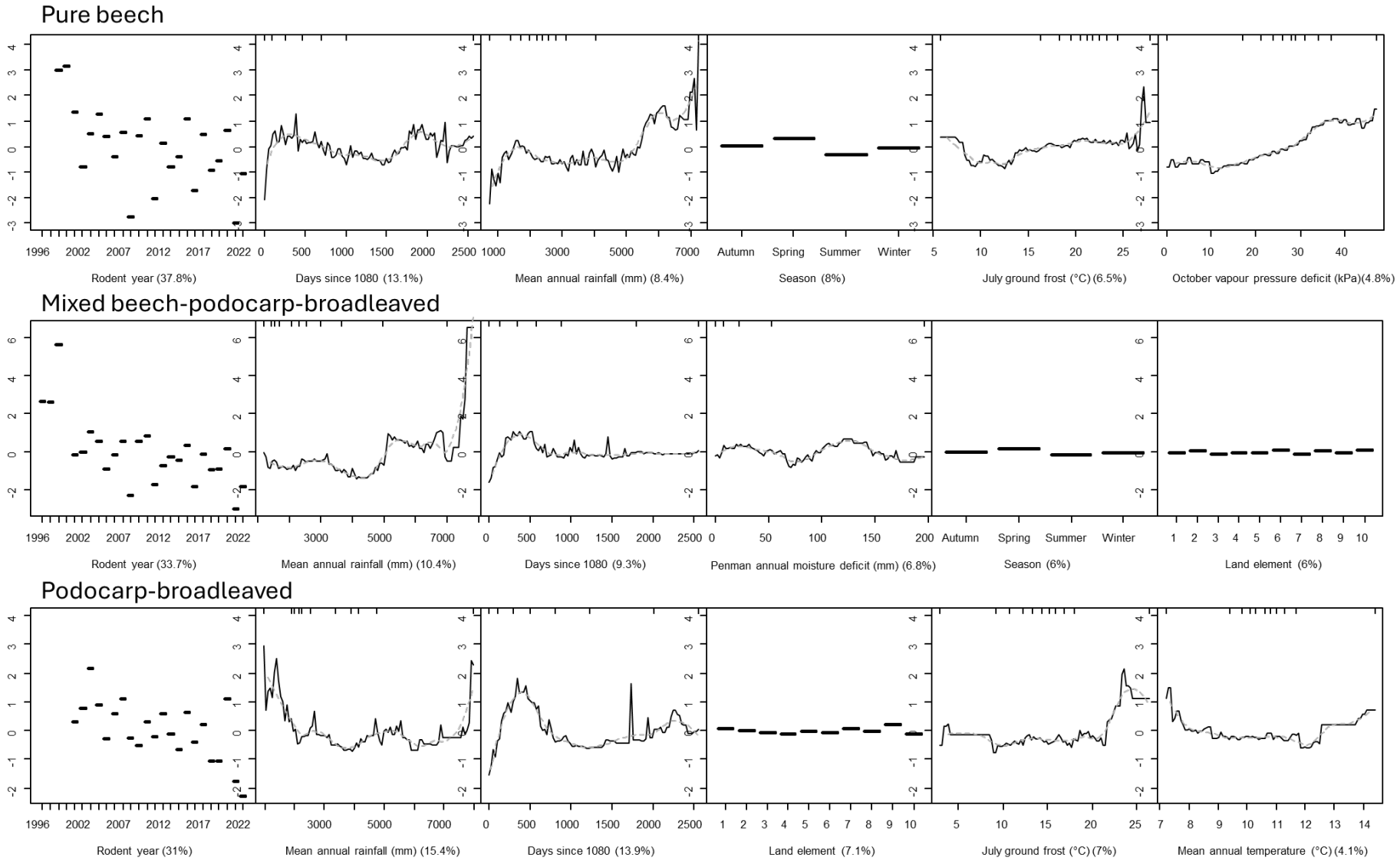


Appendix S6. Partial dependence plots for the most influential variables in our 3 BRT models of **mouse** tracks in three major forest types.

In Appendix S6 the three major forest types (pure beech, mixed beech-podocarp-broadleaved, and podocarp-broadleaved) are derived from Ecosat Forests (see Appendix S2). The vertical axes are on the logit scale and are centred to have zero mean over the data distribution. Tick marks at the inside top of subplots show the distribution of tracking tunnel sites across that variable, in deciles.

Supplementary material, Walker et al. Temporal and spatial patterns in rodent and mustelid tracking rates across New Zealand conservation land between 2005 and 2022.



Appendix S7. Parameter estimates from generalised linear mixed effects models of the unmanaged tracking rates of rodents.

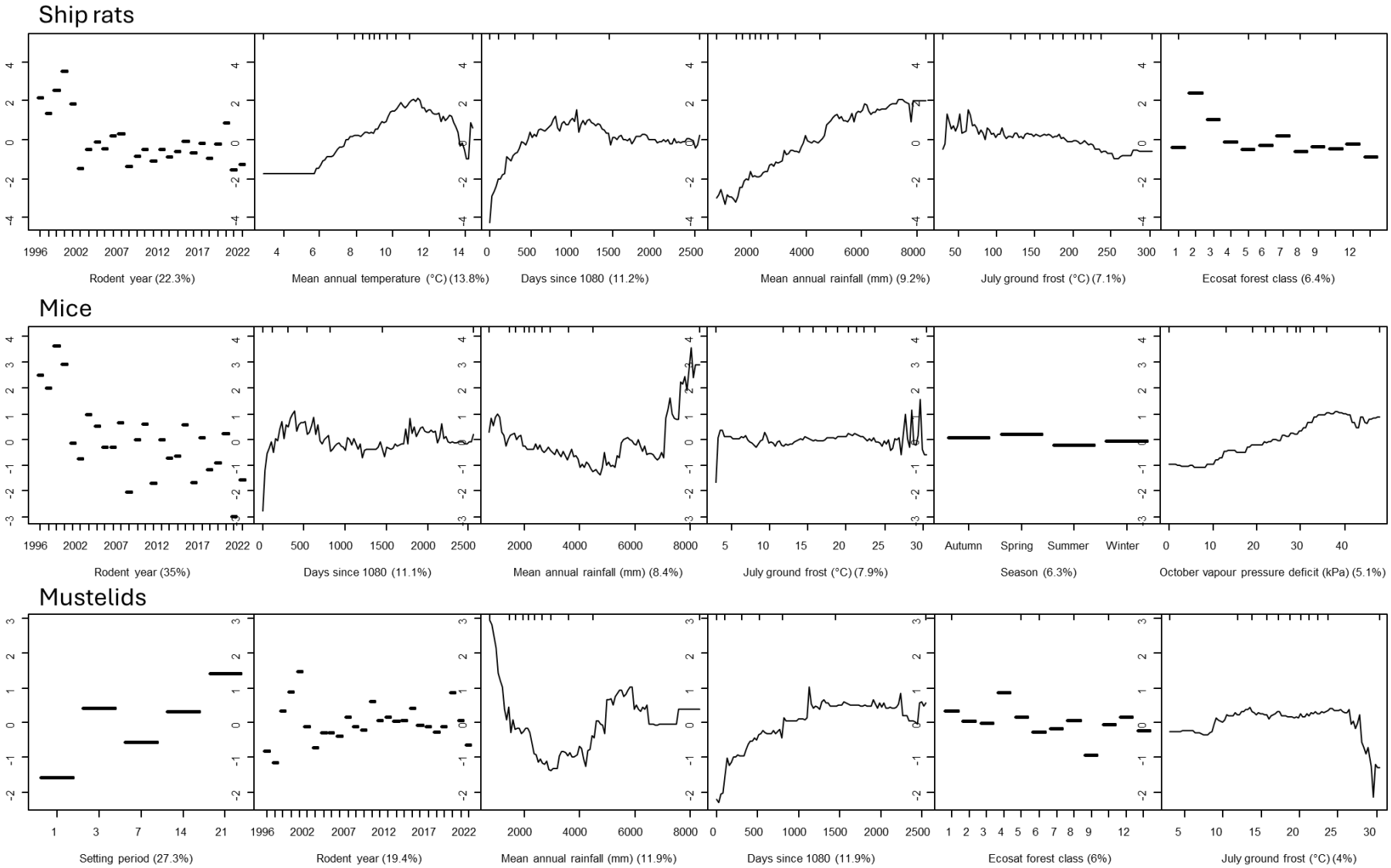
Appendix S7 shows parameter estimates [and 95% intervals] from 1000 generalised linear mixed effects models of unmanaged tracking rates of rodents, each fitted to a different draw of 500 points from within a major forest type, showing overall effects of time (across 67 seasons from spring 2005 to autumn 2022) and mean annual temperature, and their interactions. Parameter estimates are on the logit scale of the link function and predictor variables were zero-mean unit variance transformed.

	Ship rats	Mice
Pure beech forest		
Intercept	−2.14 [−2.25, −2.05]	−1.87 [−1.95, −1.8]
Mean annual temperature	0.89 [0.80, 0.99]	−0.06 [−0.15, 0.03]
Time	−0.24 [−0.28, −0.19]	−0.25 [−0.28, −0.21]
Mean annual temperature:Time	0.07 [0.01, 0.13]	−0.08 [−0.12, −0.04]
Mixed beech-podocarp-broadleaved forest		
Intercept	−0.17 [−0.25, −0.08]	−1.43 [−1.5, −1.35]
Mean annual temperature	1.08 [0.99, 1.17]	−0.26 [−0.33, −0.19]
Time	−0.31 [−0.35, −0.28]	−0.22 [−0.25, −0.19]
Mean annual temperature:Time	0.07 [0.02, 0.11]	0.14 [0.11, 0.17]
Podocarp−broadleaved forest		
Intercept	0.89 [0.81, 0.98]	−1.87 [−1.97, −1.78]
Mean annual temperature	0.44 [0.35, 0.52]	−0.27 [−0.38, −0.16]
Time	−0.21 [−0.23, −0.18]	−0.31 [−0.35, −0.28]
Mean annual temperature:Time	0.13 [0.10, 0.16]	0.16 [0.13, 0.20]

Appendix S8. Partial dependence plots for the most influential variables in our 3 full-dataset BRT models of ship rat, mouse and mustelid tracks.

In Appendix S8 the vertical axes are on the logit scale and are centred to have zero mean over the data distribution. Tick marks at the inside top of subplots show the distribution of tracking tunnel sites across that variable, in deciles.

Supplementary material, Walker et al. Temporal and spatial patterns in rodent and mustelid tracking rates across New Zealand conservation land between 2005 and 2022.



Appendix S9. Medians and median lowest and highest quarterly tracking rates in classification groups of rodent and mustelid dynamics.

In Appendix S9 the cells show the overall medians, and (in square parentheses) the median lowest and highest quarterly tracking rates of rodents and mustelids across the points in classification groups. The six classification groups of rodent dynamics (RA to RF) and the six classification groups of mustelid dynamics (MA to MF) were derived from k-means clustering of the deciles of tracking rates predicted from our 'full dataset' BRT models across the quarterly time series at each of the *n* points on our 500-m prediction grid.

Classification group of rodent dynamics	**Ship rat tracking rate (overnight) 2005 to 2022**	**Mouse tracking rate (overnight) 2005 to 2022**	**Mustelid tracking rate (21-day) 2014 to 2022**
RA (*n* = 52,547)	0.01 [0.00, 0.12]	0.04 [0.00, 0.57]	0.07 [0.01, 0.37]
RB (*n* = 46,393)	0.02 [0.00, 0.24]	0.16 [0.01, 0.86]	0.08 [0.02, 0.40]
RC (*n* = 52,641)	0.10 [0.02, 0.61]	0.05 [0.00, 0.49]	0.12 [0.03, 0.43]
RD (*n* = 30,724)	0.18 [0.03, 0.80]	0.11 [0.01, 0.76]	0.10 [0.02, 0.35]
RE (*n* = 49,698)	0.33 [0.08, 0.81]	0.04 [0.00, 0.28]	0.07 [0.02, 0.24]
RF (*n* = 30,232)	0.59 [0.17, 0.93]	0.04 [0.00, 0.23]	0.04 [0.01, 0.14]
Classification group of mustelid dynamics	**Ship rat tracking rate (overnight) 2014 to 2022**	**Mouse tracking rate (overnight) 2014 to 2022**	**Mustelid tracking rate (21-day) 2014 to 2022**
MA (*n* = 87,533)	0.20 [0.05, 0.57]	0.05 [0.01, 0.34]	0.02 [0.01, 0.11]
MB (*n* = 64,581)	0.13 [0.03, 0.53]	0.05 [0.01, 0.39]	0.07 [0.02, 0.28]
MC (*n* = 51,315)	0.09 [0.02, 0.51]	0.05 [0.00, 0.41]	0.13 [0.03, 0.48]
MD (*n* = 32,980)	0.06 [0.01, 0.45]	0.05 [0.00, 0.42]	0.21 [0.05, 0.65]
ME (*n* = 18,629)	0.05 [0.01, 0.35]	0.05 [0.00, 0.40]	0.35 [0.07, 0.79]
MF (*n* = 7,197)	0.03 [0.01, 0.23]	0.04 [0.00, 0.31]	0.55 [0.14, 0.91]

Appendix S10. Environmental characteristics of classification groups of rodent and mustelid dynamics.

In Appendix S10 the cells show the medians [and lower and upper 95% confidence intervals] of environmental characteristics of the six classification groups of rodent dynamics (RA to RF) and the six classification groups of mustelid dynamics (MA to MF). The classification groups were derived from k-means clustering of the deciles of tracking rates predicted from our 'full dataset' BRT models across the quarterly time series at each of the n points on our 500-m prediction grid. Environmental variables were sourced from McCarthy et al. (2021).

	Elevation (m a.s.l)	Mean annual temperature (°C)	Mean annual rainfall (mm)	October vapour pressure deficit (kPa)	Rainfall:potential evapotranspiration ratio	Annual penman moisture (mm)	July ground frost (°C)	*Nothofagus* stem density
Rodent classification group								
RA	1000 [101, 1505]	6.5 [4.4, 9.9]	3424 [1189, 5991]	14 [0, 36]	108 [35, 190]	0 [0, 79]	20.7 [9.7, 26.5]	32 [4, 214]
RB	742 [69, 1482]	7.7 [4, 10.2]	2399 [1165, 5213]	25 [4, 42]	72 [33, 156]	0 [0, 148]	20.6 [9.8, 26.5]	114 [3, 269]
RC	570 [27, 1198]	9.1 [6.5, 11.6]	2669 [1319, 5853]	23 [5, 38]	73 [33, 172]	0 [0, 84]	17.5 [8.8, 23.7]	69 [3, 196]
RD	575 [79, 977]	9.2 [7.5, 11.8]	2094 [1262, 5682]	27 [11, 45]	56 [32, 164]	0 [0, 186]	19.5 [9.8, 23.8]	96 [3, 189]
RE	414 [26, 1015]	10.6 [8.2, 13]	2190 [1519, 5415]	28 [15, 38]	50 [33, 148]	0 [0, 74]	13.6 [6.9, 20.0]	13 [3, 121]
RF	377 [53, 851]	11.4 [9, 13.6]	2091 [1525, 4141]	30 [21, 46]	45 [33, 110]	0 [0, 162]	11.6 [4.9, 17.5]	11 [3, 80]
Mustelid classification group								
RA	569 [44, 1430]	10.0 [45, 132]	1980 [1295, 5197]	29 [3, 43]	45 [32, 163]	0 [0, 158]	14.7 [69, 252]	13 [3, 138]
RB	663 [59, 1420]	9.0 [47, 124]	2377 [1238, 5346]	26 [3, 40]	60 [34, 164]	0 [0, 102]	17.5 [81, 257]	38 [3, 204]
RC	625 [49, 1380.15]	8.7 [50, 114]	2740 [1256, 5516]	23 [2, 37]	75 [35.85, 168]	0 [0, 84]	18.8 [87, 258]	97 [3, 216]
RD	572 [35, 1357]	8.6 [51, 112]	2612 [1263, 5940]	22 [0, 35]	77 [37, 181]	0 [0, 72]	18.5 [82, 259]	112 [3, 231]
RE	535 [33, 1233]	8.5 [57, 111]	4274 [1272, 6119]	19 [0, 33]	112 [40, 190]	0 [0, 54]	17.5 [85, 249.3]	119 [3, 241]
RF	614 [24, 1094]	8.0 [60, 111]	4901 [1087, 6201]	13 [0, 33]	136 [33, 197]	0 [0, 78.1]	16.9 [93, 233]	140 [3, 225]

Appendix S11. Potential Natural Vegetation in six classification groups of rodent dynamics.

In Appendix S11 the cells show the percentage of still-forested pixels in each of six classification groups of rodent dynamics (RA to RF) which fall within the classes of the Potential Natural Vegetation of New Zealand (PNVNZ) spatial layer (LRIS 2012).

PNVNZ class	RA	RB	RC	RD	RE	RF
1. Kauri/northern broadleaved forest	0	0	0	0	1	11
2. Rimu/tawa-kamahi forest	0	0	2	2	20	31
3. Kahikatea-pukatea-tawa forest	0	0	0	0	0	0
4. Matai-kahikatea-totara forest	0	0	0	0	0	0
5. Kahikatea-matai/tawa-mahoe forest	0	0	0	0	0	0
6. Matai-totara-kahikatea-rimu/broadleaf-fuchsia forest	0	0	1	1	0	0
7. Hall's totara/broadleaf forest	0	0	1	0	1	0
8. Hall's totara/silver beech–kamahi–southern rata forest	19	9	9	3	0	0
9. Hall's totara-miro-rimu/kamahi-silver beech-sth rata forest	10	4	15	3	6	1
10. Hall's totara-miro/kamahi-southern rata-broadleaf forest	0	1	3	5	5	1
12. Rimu-miro/kamahi-red beech-hard beech forest	1	3	17	37	31	27
13. Rimu-miro/tawari-red beech-kamahi-tawa forest	0	0	1	0	6	18
14. Rimu-matai-miro-totara/kamahi forest	0	0	2	1	7	5
15. Rimu-miro-totara/kamahi forest	1	1	8	6	7	1
16. Silver beech forest	40	52	22	11	3	1
17. Red beech-silver beech forest	0	3	5	20	9	3
18. Black/mountain beech-red beech forest	4	6	7	6	1	0
19. Mountain beech forest	3	10	3	2	1	0
20. Matai-totara/black/mountain beech forest	0	0	0	1	0	1
21. Wetland	1	0	1	1	0	0
23. Dunelands	0	0	0	0	0	0
24. Scrub, tussock-grassland, and herbfield above treeline	17	7	3	1	0	0
25. Low forest, woodland and shrubland below treeline	4	4	1	0	0	0

Reference

LRIS (The Land Resource Information Systems Portal) 2012. Potential Vegetation of New Zealand. https://doi.org/10.26060/8NK5-VJ54. Accessed 31 January 2025.

Appendix S12. Potential Natural Vegetation in six classification groups of mustelid dynamics.

In Appendix S11 the cells show the percentage of still-forested pixels in each of the six classification groups of mustelid dynamics (MA to MF) which fall within classes of the potential vegetation of New Zealand (PVNZ) spatial layer (LRIS 2012).

PVNZ class	MA	MB	MC	MD	ME	MF
1. Kauri/northern broadleaved forest	7	1	0	0	0	0
2. Rimu/tawa-kamahi forest	30	8	2	1	0	0
3. Kahikatea-pukatea-tawa forest	0	0	0	0	0	0
4. Matai-kahikatea-totara forest	0	0	0	0	0	0
5. Kahikatea-matai/tawa-mahoe forest	0	0	0	0	0	0
6. Matai-totara-kahikatea-rimu/broadleaf-fuchsia forest	0	0	0	0	0	0
7. Hall's totara/broadleaf forest	1	1	0	0	0	0
8. Hall's totara/silver beech–kamahi–southern rata forest	0	4	8	8	14	24
9. Hall's totara-miro-rimu/kamahi-silver beech-sth rata forest	1	3	5	11	26	24
10. Hall's totara-miro/kamahi-southern rata-broadleaf forest	6	3	2	2	1	1
12. Rimu-miro/kamahi-red beech-hard beech forest	13	25	30	22	7	1
13. Rimu-miro/tawari-red beech-kamahi-tawa forest	12	4	1	0	0	0
14. Rimu-matai-miro-totara/kamahi forest	5	4	1	1	1	0
15. Rimu-miro-totara/kamahi forest	2	5	5	5	5	4
16. Silver beech forest	3	18	27	30	31	32
17. Red beech-silver beech forest	7	9	6	6	4	1
18. Black/mountain beech-red beech forest	5	6	3	3	2	1
19. Mountain beech forest	4	3	2	3	2	2
20. Matai-totara/black/mountain beech forest	1	1	0	0	0	0
21. Wetland	0	1	1	1	0	0
23. Dunelands	0	0	0	0	0	0
24. Scrub, tussock-grassland, and herbfield above treeline	3	4	4	5	5	9
25. Low forest, woodland and shrubland below treeline	0	1	2	3	2	1

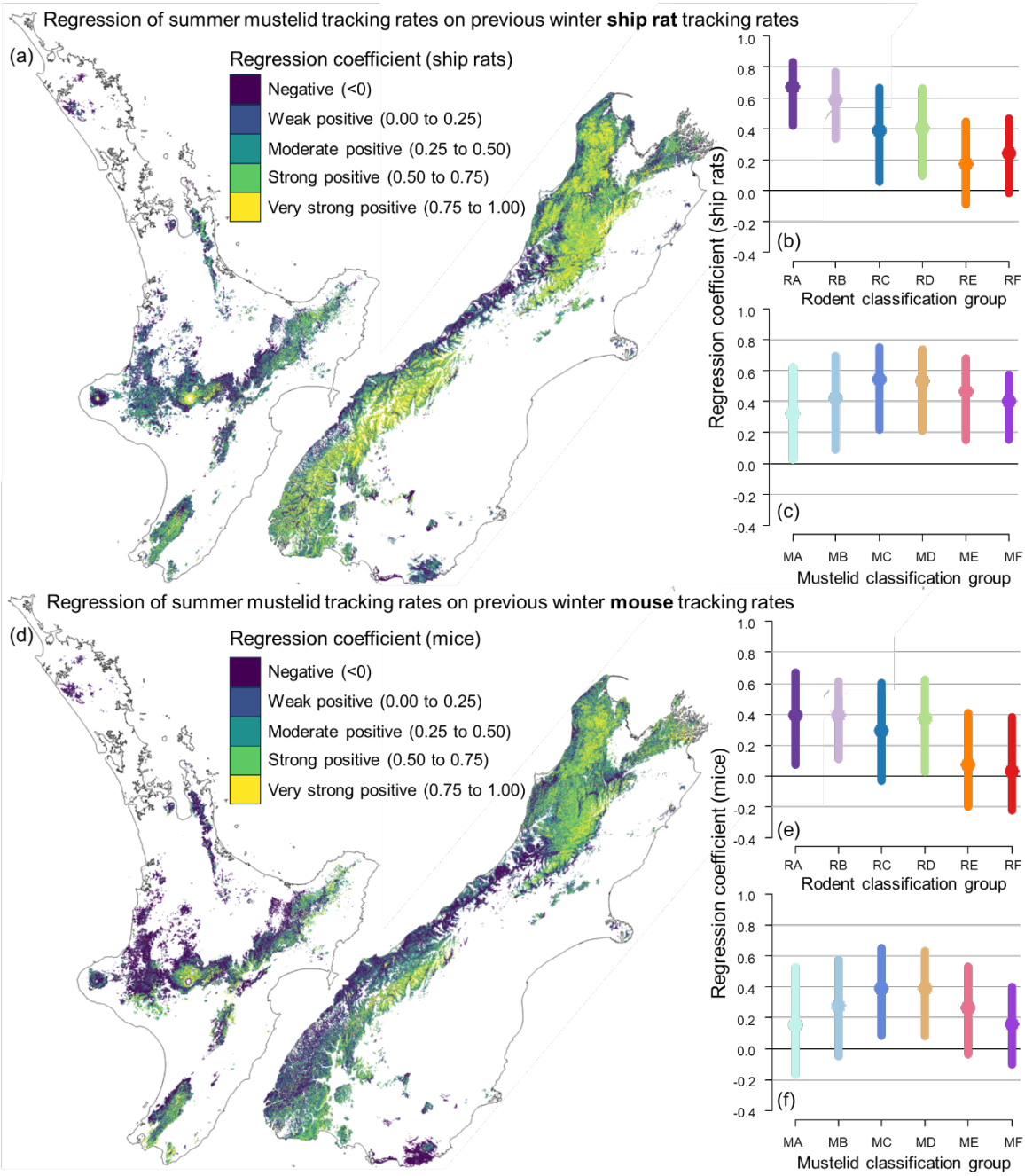
Reference

LRIS (The Land Resource Information Systems Portal) 2012. Potential Vegetation of New Zealand. https://doi.org/10.26060/8NK5-VJ54. Accessed 31 January 2025.

Supplementary material, Walker et al. Temporal and spatial patterns in rodent and mustelid tracking rates across New Zealand conservation land between 2005 and 2022.

Appendix S13. The relationship between summer mustelid tracking rates and rodent tracking rates in the previous winters.

In Appendix S13, linear regression coefficients indicate the relationship between 21-day summer mustelid tracking rates between 2015 and 2022 and the ship rat and mouse tracking rates in the previous winters, as predicted by our BRT models of mustelid and rodent tracks. Maps (a) and (d) show the spatial distribution of coefficients for ship rats and mice, respectively, and subplots b, c, e and f summarise those coefficients within six classification groups of rodent and mustelid dynamics, respectively. Points in the subplots are medians, and thick lines are interquartile range. The six rodent and six mustelid classification groups (RA to RF, and MA to MF, respectively) were derived from k-means clustering of the deciles of tracking rates predicted from our 'full dataset' BRT models across the time series at each point on our 500-m prediction grid.



Supplementary material, Walker et al. Temporal and spatial patterns in rodent and mustelid tracking rates across New Zealand conservation land between 2005 and 2022.

Appendix S14. Mean annual temperature from New Zealand's 'seven-station' temperature series to 2022 (Statistics New Zealand 2023) showing the longer-term trend from 1909 to 2022 (upper plot) and the more recent trend from 2003 to 2021 (lower plot).