Supplementary Information

Appendix S1. Samples collected from the alpine zone of Nelson Lakes (NLNP), Mt Aspiring (MANP) and Fiordland (FNP) National Parks. Square brackets in NLNP column show number of samples collected in winter at that site. Total column show total number of samples used in mixing models.

Prey Item	Tissue	NLNP	MANP	FNP	Total	Species
Alpine fruit	fruit	10	18	5	33	*Pentachondra pumila*, *Podocarpus nivalis, Coprosma cheesemanii*, *Astelia linearis*, *Gaultheria depressa*
Beech	seed	2	2	4	8	*Lophozonia menziesii*, *Fuscospora cliffortioides*
Grasshopper	muscle	14	5	0	19	*Sigaus* spp
Ground birds	feather	5	0	9	14	*Branta canadensis*, *Porphyrio hochstetteri*, *Apteryx australis*, *Gallirallus australis*
Hare	muscle	0	4	0	4	*Lepus europaeus*
Invertebrate other	whole	2	2	3	7	*Celatoblatta* spp., *Coleoptera*
Mouse	muscle	9 [5]	5	10	23	*Mus musculus*
Passerines	blood	23 [17]	18	28	69	*Zosterops lateralis*, *Anthus novaeseelandiae*, *Petroica macrocephala*, *Anthornis melanura*, *Prunella modularis*, *Carduelis flammea*, *Acanthisitta chloris*, *Gerygone igata*, *Turdus philomelos*, *Fringilla coelebs*
Ship rat	collagen	0	2	2	4	*Rattus rattus*
Skink	whole	4	2	0	6	Unknown
Tussock	seed	0	4	11	15	*Chionochloa pallens*, *Chionochloa crassiuscula*
Wētā	muscle	4	5	16	25	*Deinacrida tibiospina*, *Hemiandrus maculifrons*, *H. focalis*, *H. fiordensis*, *H. nitaweta.*
Total		**54**	**63**	**88**	**233**	

Appendix S2. Results of beta regressions to examine factors affecting the proportion of mammals in the diet of individual stoats caught in the alpine zone of three National Parks. Each beta regression is then ranked using AIC. ΔAIC shows the difference between the model and the lowest ranging (preferred) model in the set.
(1) Mammal 'Site Model': betareg(Mammal ~ Age + Sex + Elevation + Site + Sex:Age + Age:Site+ Elevation:Site data = dat)
(2) Mammal 'Rat Model': betareg(Mammal~ Age + Sex + Elevation + RatC100TN + Sex:Age + Age:RatC100TN+ Elevation:RatC100TN, data = dat)
(3) Mammal 'Stoat Model': betareg(Mammal ~ Age + Sex + Elevation + StoatC100TN + Sex:Age + Age:StoatC100TN+ Elevation:StoatC100TN, data = dat)

Factor	Df	Pr(>Chisq)	Chisq	Significance
Mammal 'Site Model' (ΔAIC Site: 2.19)				
Age	1	0.0055	0.9409	
Sex	1	0.8324	0.3616	
Elevation	1	2.083	0.1489	
Site	2	174.2368	< 2e−16	***
Age:Sex	1	0.8373	0.3602	
Age:Site	2	1.7055	0.4263	
AltAboveTL:Site	2	0.3824	0.826	
Mammal 'Rat Model' (ΔAIC Rat: 0.00)				
Age	1	0.0349	0.8518	
Sex	1	0.5807	0.4461	
Elevation	1	2.4991	0.1139	
RatC100TN	1	164.4405	< 2e−16	***
Age:Sex	1	0.3454	0.5567	
Age:RatC100TN	1	0.004	0.9496	
AltAboveTL:RatC100TN	1	0.1413	0.707	
Mammal 'Stoat Model' (ΔAIC Stoat: 64.21)				
Age	1	0.8927	0.34474	
Sex	1	0.8656	0.35217	
Elevation	1	0.4322	0.5109	
StoatC100TN	1	4.3228	0.03761	*
Age:Sex	1	0.0204	0.8863	
Age:StoatC100TN	1	0.0085	0.92673	
AltAboveTL:StoatC100TN	1	0.3644	0.54608	

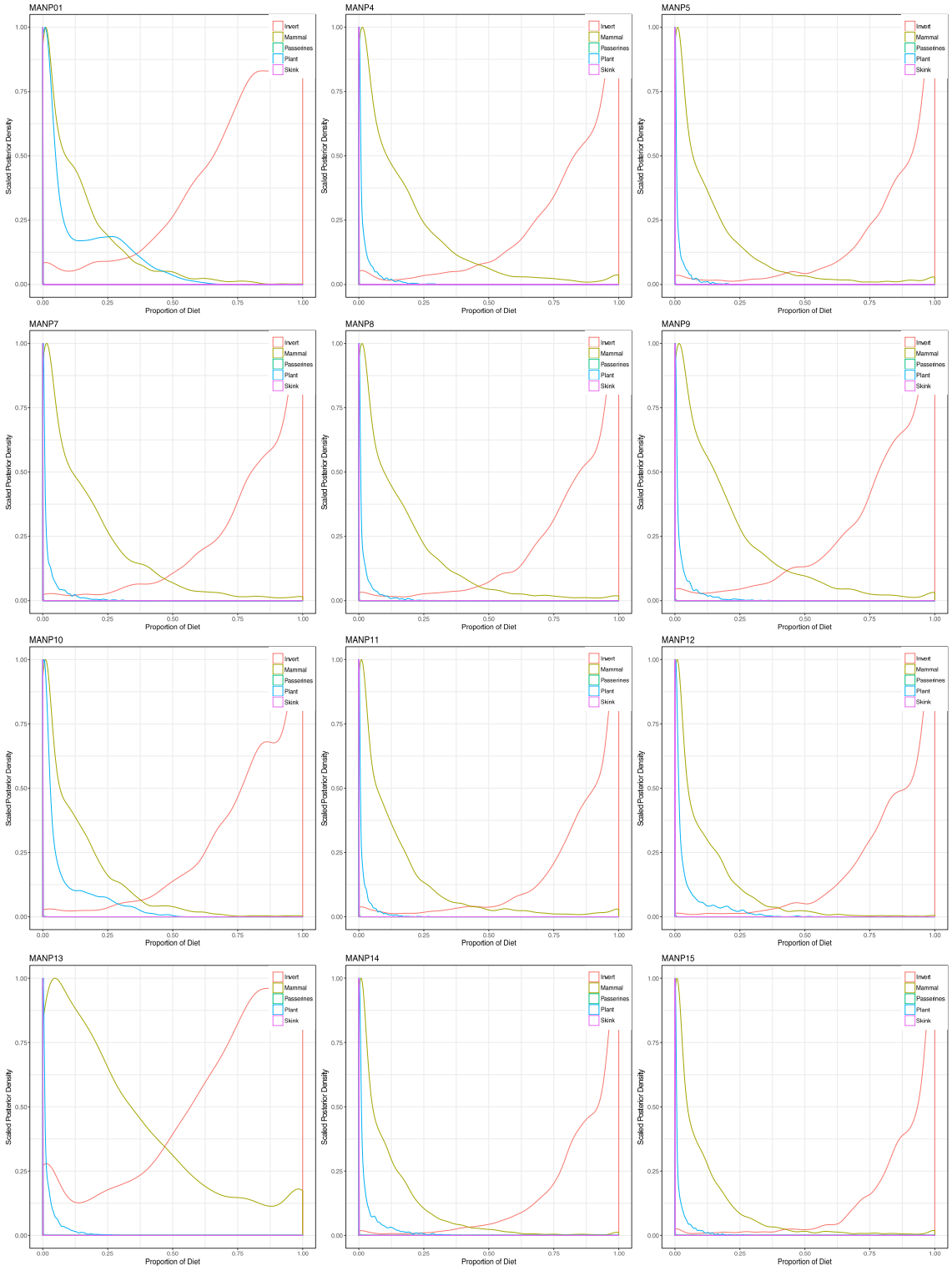
Appendix S3. Results of beta regressions to examine factors affecting the proportion of invertebrates in the diet of individual stoats caught in the alpine zone of three National Parks. Each beta regression is then ranked using AIC. ΔAIC shows the difference between the model and the lowest ranging (preferred) model in the set.
(1) Invertebrate 'Site Model': betareg(Invert ~ Age + Sex + Elevation + Site + Sex:Age + Age:Site + Elevation:Site, data = dat)
(2) Invertebrate 'Rat Model': betareg(Invert~ Age + Sex + Elevation + RatC100TN + Sex:Age + Age:RatC100TN + Elevation:RatC100TN, data = dat)
(3) Invertebrate 'Stoat Model': betareg(Invert~ Age + Sex + Elevation + StoatC100TN + Sex:Age + Age:StoatC100TN + Elevation:StoatC100TN, data = dat)

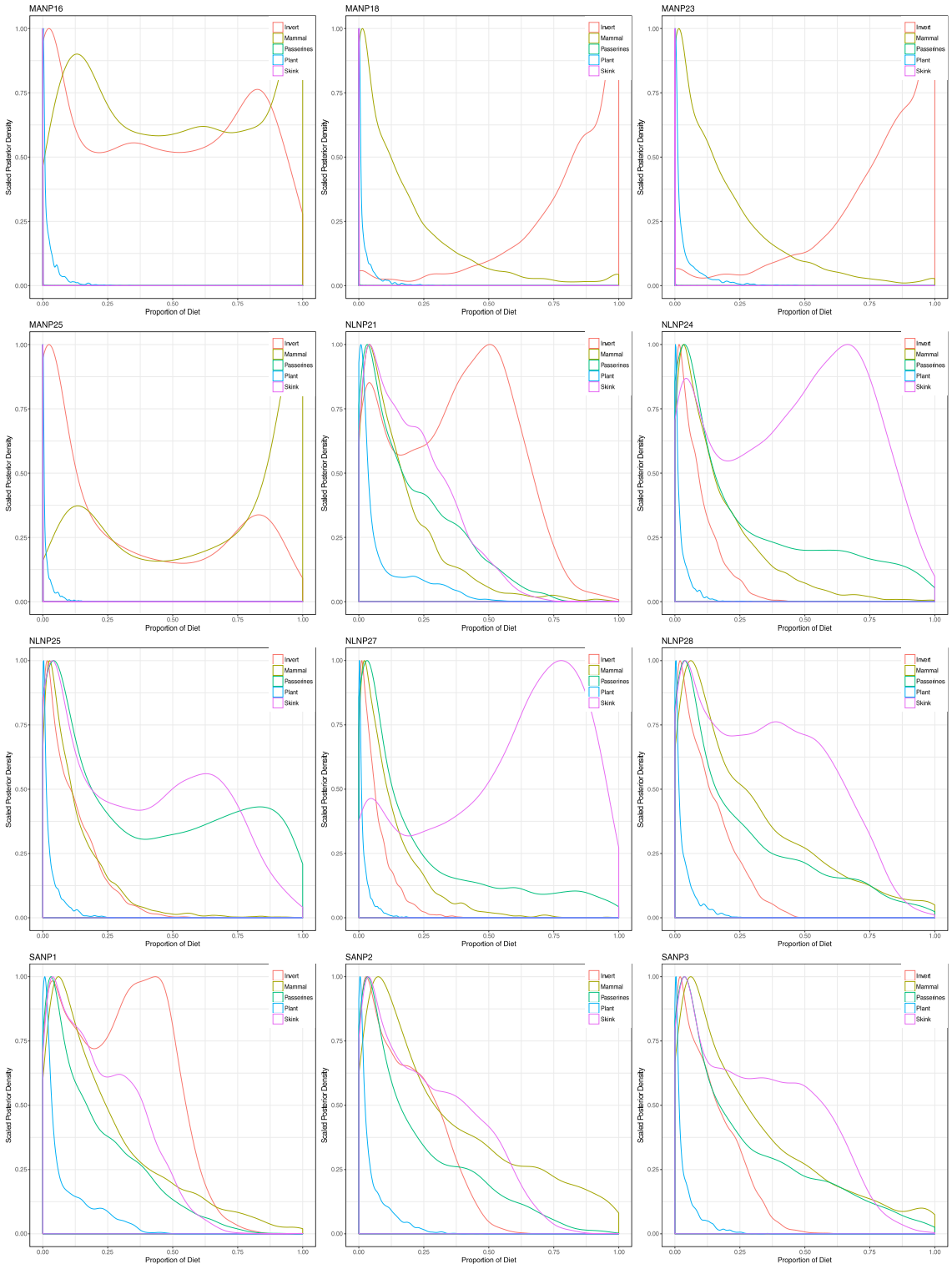
Factor	Df	Chisq	Pr(>Chisq)	Significance
Invertebrate 'Site Model' (ΔAIC Site: 0.00)				
Age	1	0.006	0.934	
Sex	1	1.514	0.219	
Elevation	1	0.225	0.635	
Site	2	203.211	< 2e−16	***
Age:Sex	1	0.535	0.464	
Age:Site	2	0.400	0.819	
AltAboveTL:Site	2	1.046	0.593	
Invertebrate 'Rat Model' (ΔAIC Rat: 67.81)				
Age	1	0.109	0.742	
Sex	1	0.249	0.618	
Elevation	1	1.282	0.258	
RatC100TN	1	7.439	0.007	**
Age:Sex	1	2.423	0.120	
Age:RatC100TN	1	0.118	0.736	
AltAboveTL:RatC100TN	1	0.116	0.734	
Invertebrate 'Stoat Model' (ΔAIC Stoat: 60.72)				
Age	1	0.976	0.323	
Sex	1	1.249	0.264	
Elevation	1	1.176	0.278	
StoatC100TN	1	16.158	5.83e−05	***
Age:Sex	1	0.005	0.943	
Age:StoatC100TN	1	0.010	0.922	
AltAboveTL:StoatC100TN	1	0.051	0.822	

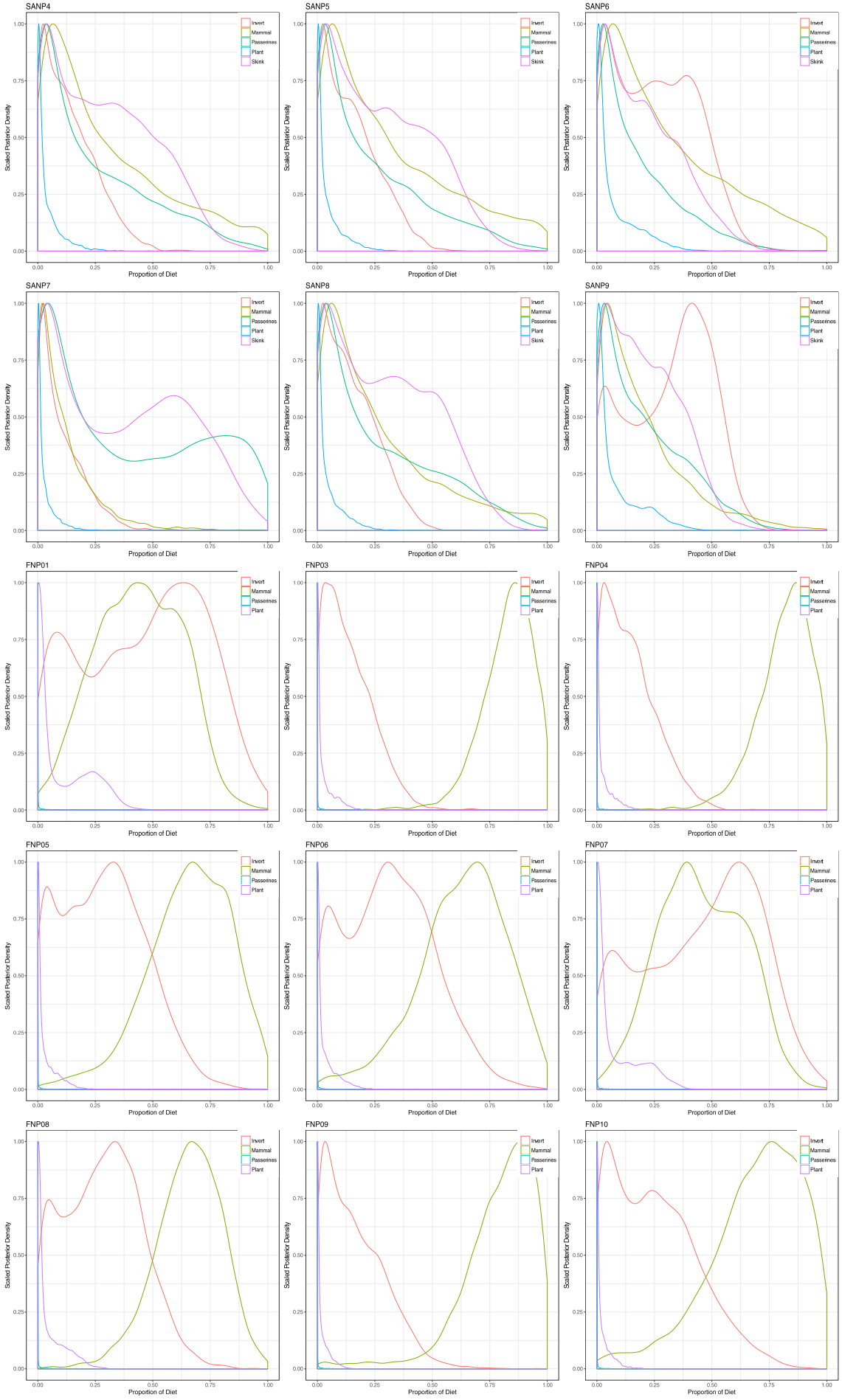
Appendix S4. Results of beta regressions to examine factors affecting the proportion of passerines in the diet of individual stoats caught in the alpine zone of three national parks. Each beta regression is then ranked using AIC. ΔAIC shows the difference between the model and the lowest ranging (preferred) model in the set.
(1) Passerine 'Site Model': betareg(Passerines ~ Age + Sex + Elevation + Site + Sex:Age + Age:Site+ Elevation:Site, data = dat)
(2) Passerine 'Rat Model': betareg(Passerines~ Age + Sex + Elevation + RatC100TN + Sex:Age + Age:RatC100TN+ Elevation:RatC100TN, data = dat)
(3) Passerine 'Stoat Model': betareg(Passerines~ Age + Sex + Elevation + StoatC100TN + Sex:Age + Age:StoatC100TN+ Elevation:StoatC100TN, data = dat)

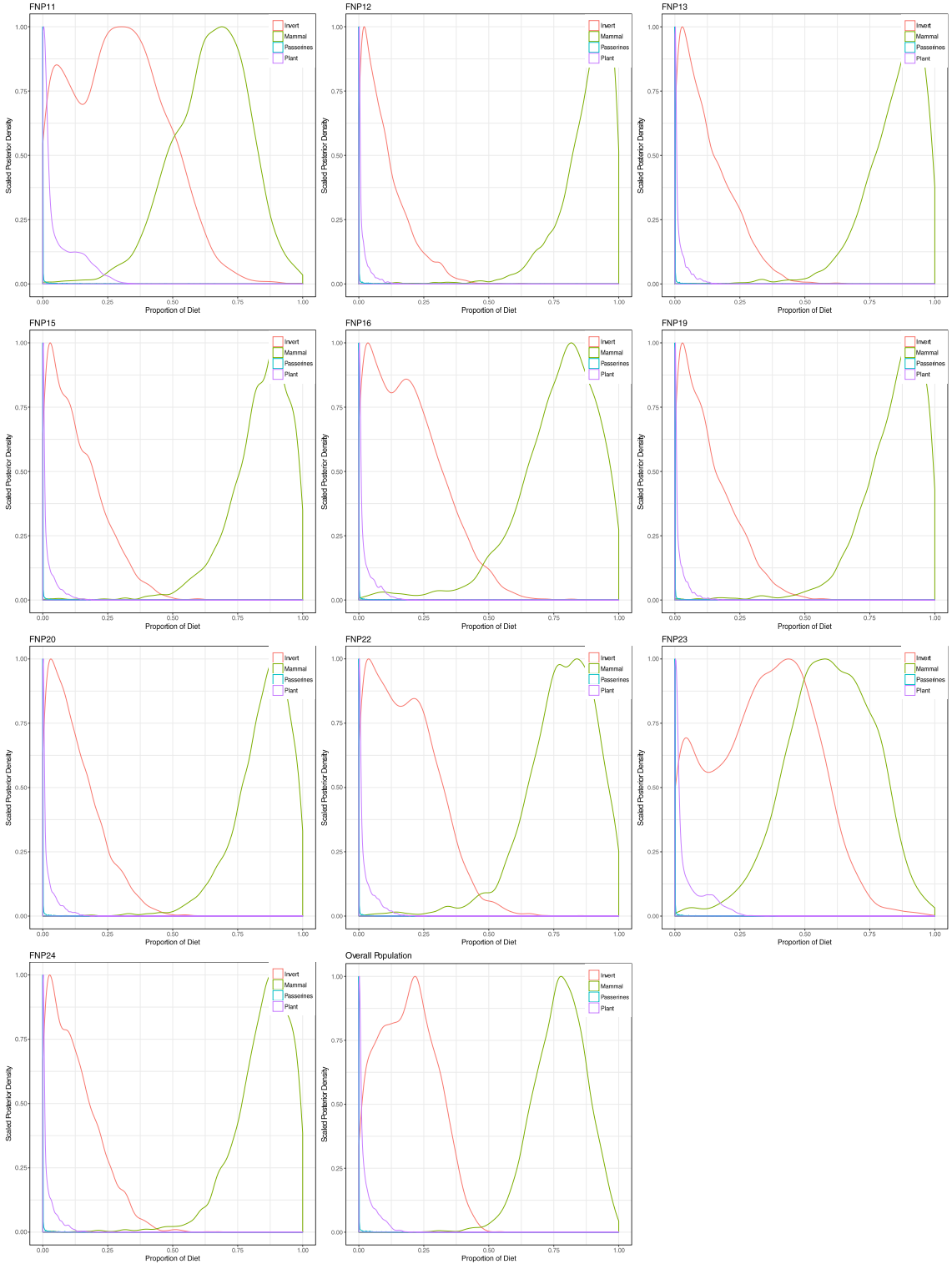
Factor	Df	Chisq	Pr(>Chisq)	Significance
Passerine 'Site Model' (ΔAIC Site: 0.00)				
Age	1	0.085	0.770	
Sex	1	0.444	0.505	
Elevation	1	0.101	0.751	
Site	2	472.981	<2e-16	***
Age:Sex	1	0.014	0.904	
Age:Site	2	3.175	0.205	
AltAboveTL:Site	2	0.350	0.839	
Passerine 'Rat Model' (ΔAIC Rat: 117.33)				
Age	1	0.105	0.746	
Sex	1	0.001	0.982	
Elevation	1	0.555	0.456	
RatC100TN	1	0	0.995	**
Age:Sex	1	0.933	0.334	
Age:RatC100TN	1	0.048	0.826	
AltAboveTL:RatC100TN	1	0.679	0.41	
Passerine 'Stoat Model' (ΔAIC Stoat: 20.69)				
Age	1	0.0835	0.7726	
Sex	1	0.1867	0.6657	
Elevation	1	0.3859	0.5345	
StoatC100TN	1	284.0759	<2e-16	***
Age:Sex	1	0	0.9975	
Age:StoatC100TN	1	0.4057	0.5242	
AltAboveTL:StoatC100TN	1	0.7997	0.3712	

Appendix S5. Posterior distributions showing proportional contributions from different prey categories to the diet of individuals stoats in the alpine zone of Nelson Lakes (NLNP & SANP), Mt. Aspiring (MANP) and Fiordland (FNP) National Parks. Each graph shows the diet of a separate individual. Distinct models were run for each site with individual stoats as a fixed factor using informative priors from stomach contents data of a subset of suitable stoats.




MANP16
MANP18
MANP23
MANP25
NLNP21
NLNP24
NLNP25
NLNP27
NLNP28
SANP1
SANP2
SANP3
Invert
Mammal
Passerines
Plant
Skink
Scaled Posterior Density
Proportion of Diet
0.00
0.25
0.50
0.75
1.00


SANP4
SANP5
SANP6
SANP7
SANP8
SANP9
FNP01
FNP03
FNP04
FNP05
FNP06
FNP07
FNP08
FNP09
FNP10
Invert
Mammal
Passerines
Plant
Skink
Scaled Posterior Density
Proportion of Diet
0.00
0.25
0.50
0.75
1.00


FNP11
FNP12
FNP13
FNP15
FNP16
FNP19
FNP20
FNP22
FNP23
FNP24
Overall Population
Invert
Mammal
Passerines
Plant
Scaled Posterior Density
Proportion of Diet
0.00
0.25
0.50
0.75
1.00