

Supplementary materials

Appendix S1. Sample locations

Ruahine

No public tracks. Traverses of the north-west ridge from Cape Barrier Road (Topographic Map 260-T09; Grid. Ref: 378356; 120–402 m, 1.5 km) and from the summit to sea-level (T09-375380) via a stream valley to the east (0–402 m, 1.5 km). Additional observations were made on a transect running to sea-level from Cape Barrier Road (T09-365367) to the south 0–120 m, 0.75 km).

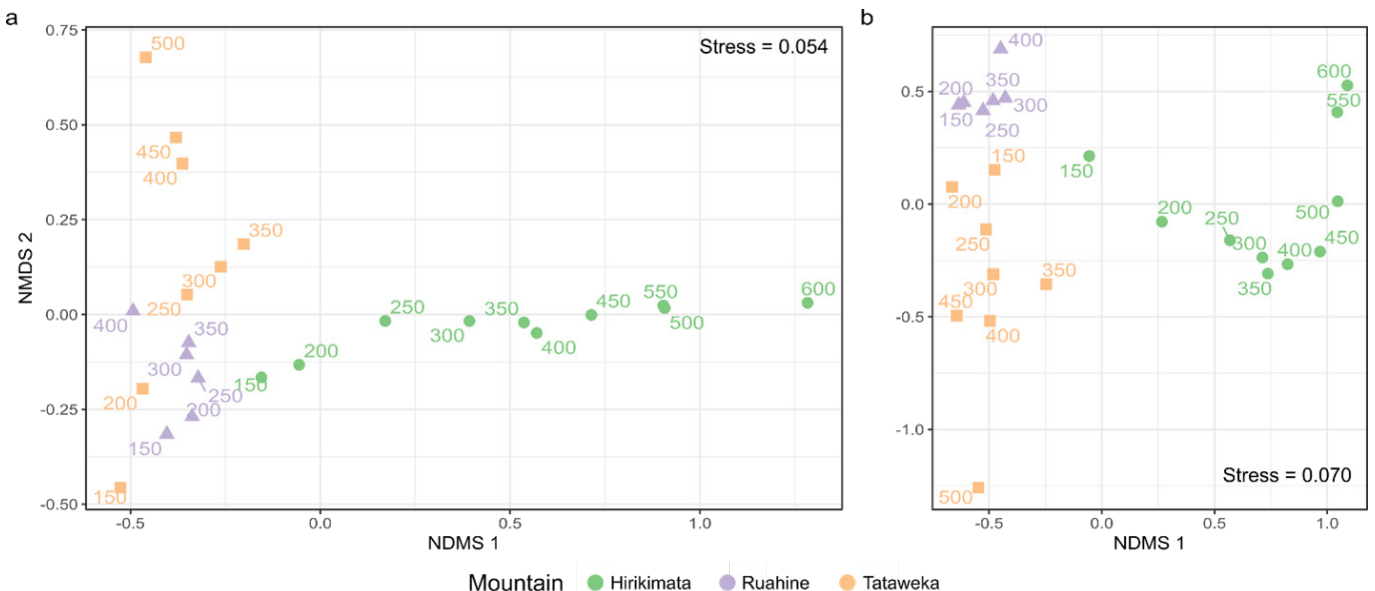
Hirakimata

The eastern traverse was from Aotea Rd. (NZTopo Map 50 AY34; Grid Ref: 945191) on the Windy Canyon track (320–627m, 3km.). The western traverse was from the Kaiarara Hut (AY34- 931137) via the Kaiarara track (0–627 m, 4.0 km), supplemented by additional observations at lower elevations on the Kaiarara track, and the upper elevational limits on the South Fork track (Mt. Heale).

Tataweka

The Burrell’s track from Mabey Rd (NZTopo Map 50 AY34; Grid Ref: 002163) was traversed to the summit (20–526 m, 7.0 km), and additional observations were made on the lower part of this track (< 260 m) on four other occasions. A ridge from Rangiwheakea Bay (AY34 Grid Ref:030170) was traversed twice from sea level to the point where it intersects the Tataweka track (AY34- 020163) at c. 260 m elevation (1.25 km).

Appendix S2. Ordination via non-metric multidimensional scaling of (a) woody species and (b) ferns. Numbers show the elevation of each site. Here we show ordination analyses for the three peaks to complement the hierarchical classifications shown in Fig. 5. The woody species ordinations further demonstrate the differences between the mountains, and the elevational trends (Fig S2-1a). The first axis of the ordination is related to the elevational sequence on Hirakimata and the second to the sequence on Tataweka. The absence of Ruahine sites from the upper ranges in ordination space emphasises the differences between the three mountains (Fig. 4). The fern ordination (Fig. S2-1b) similarly separates the upper elevational samples in extreme axis positions for all three mountains: Ruahine is covered by the Oceanic Temperate Forest. The three mountains differ in their location in ordination space (based on group and pairwise PERMANOVA) for both woody species and ferns (Appendix S4).



Appendix S3. Generalised linear model Poisson regression models for elevation-species richness relationships for each mountain. Poisson regression models of species richness on elevation for woody species and ferns for each site. AICc = small sample corrected AIC (which was in all cases lower than for a negative binomial model; not shown).

Site	Group	Term	Estimate	Std error	z-statistic	p	AICc
Hirakimata	Woody	(Intercept)	4.351	0.122	35.704	0.000	
Hirakimata	Woody	Elevation	-0.001	0.000	-4.283	0.000	66.929
Hirakimata	Ferns	(Intercept)	3.931	0.173	22.724	0.000	
Hirakimata	Ferns	Elevation	-0.002	0.000	-4.940	0.000	55.333
Ruahine	Woody	(Intercept)	4.232	0.187	22.683	0.000	
Ruahine	Woody	Elevation	-0.001	0.001	-1.557	0.120	43.368
Ruahine	Ferns	(Intercept)	3.289	0.289	11.395	0.000	
Ruahine	Ferns	Elevation	-0.001	0.001	-0.713	0.476	38.301
Tataweka	Woody	(Intercept)	4.379	0.150	29.153	0.000	
Tataweka	Woody	Elevation	-0.002	0.000	-3.932	0.000	54.795
Tataweka	Ferns	(Intercept)	3.210	0.260	12.364	0.000	
Tataweka	Ferns	Elevation	-0.002	0.001	-1.930	0.054	48.952

Appendix S4. Analyses of location and dispersion for site ordinations. Location and dispersion tests for woody species and ferns at all three sites. *P*-values not corrected for multiple tests in pairwise-case.

Location tests: woody species

	Df	Sum of squares	R ²	F	Pr (> F)
<i>Location: woody species grouped across all sites and pairwise</i>					
Site	2	1.349	0.569	13.851	1 × 10 ⁻⁴
Residual	21	1.023	0.431		
Total	23	2.371	1.000		
<i>Hirakimata vs. Ruahine</i>					
Site	1	0.794	0.535	16.082	6 × 10 ⁻⁴
Residual	14	0.691	0.465		
Total	15	1.485	1.000		
<i>Hirakimata vs. Tataweka</i>					
Site	1	0.988	0.513	16.82	2 × 10 ⁻⁴
Residual	16	0.940	0.487		
Total	17	1.929	1.000		
<i>Ruahine vs. Tataweka</i>					
Site	1	0.134	0.245	3.897	0.032
Residual	12	0.414	0.755		
Total	13	0.548	1.000		

Location tests: fern species

	Df	Sum of squares	R ²	F	Pr (> F)
<i>Location: ferns species grouped across all sites and pairwise</i>					
Site	2	2.780	0.654	19.890	1 × 10 ⁻⁴
Residual	21	1.468	0.326		
Total	23	4.248	1.00		
<i>Hirakimata vs Ruahine</i>					
Site	1	1.662	0.654	26.504	4 × 10 ⁻⁴
Residual	14	0.878	0.346		
Total	15	2.540	1.00		
<i>Hirakimata vs Tataweka</i>					
Site	1	1.710	0.560	20.324	1 × 10 ⁻⁴
Residual	16	1.345	0.440		
Total	17	3.055	1.00		
<i>Ruahine vs Tataweka</i>					
Site	1	0.667	0.484	11.239	5 × 10 ⁻⁴
Residual	12	0.712	0.516		
Total	13	1.379	1.00		

Appendix S4 continued**Dispersion: analysis of variance tables for woody species and ferns**

	Df	Sum of squares	Mean squares	F	Pr (> F)
<i>Woody species</i>					
Site	2	0.036	0.018	1.228	0.313
Residual	21	0.305	0.015		
<i>Fern species</i>					
Site	2	0.064	0.032	1.661	0.214
Residual	21	0.407	0.019		