

**Appendix S4.** Correlation of native and exotic species richness: a global meta-analysis finds no invasion paradox across scales. Peng et al. *Ecology*.

**Table S1** Model fit statistics used in model selection of the 16 candidate multiple covariate meta-regression models.

Covariates	$\tau^2$	$\omega^2$	Q <sub>M</sub>	p	I <sup>2</sup>	pseudo- $R^2$	marginal- $R^2$	conditional- $R^2$	AICc
grain	0.1072	0.08469	33.8306	< 0.0001	98.25	0.2202	0.06247	0.4074	287.89
grain, latitude	0.1063	0.08346	35.9785	< 0.0001	98.19	0.2287	0.04917	0.3973	288.16
grain, longitude	0.09458	0.08270	44.8301	< 0.0001	98.01	0.2796	0.05269	0.3929	283.42
grain, extent	0.1073	0.07919	42.7816	< 0.0001	97.87	0.2423	0.02605	0.3864	295.16
grain, habitat	0.1039	0.08162	39.9262	< 0.0001	98.03	0.2462	0.02071	0.3782	295.74
grain, latitude, longitude	0.0956	0.08172	45.5297	< 0.0001	97.98	0.2794	0.05290	0.3929	284.90
grain, latitude, extent	0.1055	0.07887	44.3748	< 0.0001	97.81	0.2509	0.03831	0.3929	296.16
grain, latitude, habitat	0.1031	0.08130	41.3182	< 0.0001	97.98	0.2509	0.03167	0.3851	296.77
grain, longitude, extent	0.09428	0.0785	52.5426	< 0.0001	97.58	0.2979	0.02342	0.3763	292.30
grain, longitude, habitat	0.09423	0.07928	50.8502	< 0.0001	97.78	0.2949	0.01996	0.3730	291.51
grain, extent, habitat	0.1050	0.07556	49.7689	< 0.0001	97.65	0.2662	0.01734	0.3787	303.33
grain, extent, habitat, latitude	0.1031	0.07592	50.7647	< 0.0001	97.58	0.2724	0.02276	0.3818	304.95
grain, extent, habitat, longitude	0.09462	0.07473	59.0896	< 0.0001	97.33	0.3118	0.01655	0.3728	301.04
grain, latitude, longitude, habitat	0.09455	0.07894	51.2835	< 0.0001	97.74	0.2950	0.02184	0.3744	293.39
grain, longitude, extent, latitude	0.09460	0.07805	53.0125	< 0.0001	97.54	0.2984	0.02572	0.3778	294.20
Full model	0.09435	0.07473	59.3892	< 0.0001	97.27	0.3129	0.01730	0.3734	303.26

**Table S2** Estimates and 95% confidence intervals (CIs) for Fisher's  $z$  from single covariate meta-regressions.

Covariates	Subgroup	$z$	Lower CI	Upper CI
Grain	Intercept	0.1294	0.0193	0.2395
Grain	ln grain	0.0373	0.0247	0.0498
Extent	(0, 10)	0.3767	0.1801	0.5734
Extent	[10, 100)	0.4071	0.1341	0.6802
Extent	[ $10^2$ , $10^3$ )	0.2497	0.0510	0.4483
Extent	[ $10^3$ , $10^4$ )	0.2625	0.0481	0.4770
Extent	[ $10^4$ , $10^5$ )	0.1658	-0.1252	0.4568
Extent	[ $10^5$ , $10^6$ )	0.4123	0.1922	0.6323
Extent	[ $10^6$ , )	0.5133	0.1868	0.8398
Habitat (full)	Agricultural	0.2822	-0.0562	0.6207
Habitat (full)	Forest	0.2798	0.0922	0.4674
Habitat (full)	Grassland	0.1506	-0.0403	0.3414
Habitat (full)	Many	0.4965	0.3102	0.6828
Habitat (full)	Shrubland	0.2798	-0.0234	0.5830
Habitat (full)	Urban	0.8318	0.4336	1.2300
Habitat (full)	Wetland	0.2666	0.0753	0.4580
Habitat	Agricultural	0.2836	-0.0575	0.6248
Habitat	Forest	0.2833	0.0946	0.4721
Habitat	Grassland	0.1561	-0.0365	0.3486
Habitat	Shrubland	0.2802	-0.0249	0.5853
Habitat	Urban	0.8312	0.4302	1.2321
Habitat	Wetland	0.2683	0.0759	0.4606
Latitude	Intercept	-0.2268	-0.7959	0.3424
Latitude	Latitude	0.0136	-0.0001	0.0274
Longitude	Intercept	0.6033	0.4411	0.7654
Longitude	Longitude	0.0002	-0.0009	0.0012
Longitude	Longitude <sup>2</sup>	0.0000	-4.06×10 <sup>-5</sup>	-1.57×10 <sup>-5</sup>

**Table S3** Estimates and 95% confidence intervals (CIs) for Fisher's  $z$  from multiple covariate meta-regression models with interaction terms.

Covariate	Subgroup	$z$	Lower CI	Upper CI
Grain × Extent (ord.)	Intercept	0.1139	-0.0130	0.2408
Grain × Extent (ord.)	ln grain	0.0448	0.0295	0.0601
Grain × Extent (ord.)	linear term (Extent)	-0.0598	-0.4029	0.2833
Grain × Extent (ord.)	quadratic term (Extent)	0.0267	-0.3146	0.3680
Grain × Extent (ord.)	cubic term (Extent)	-0.0760	-0.4035	0.2515
Grain × Extent (ord.)	fourth-order term (Extent)	-0.1491	-0.4106	0.1123
Grain × Extent (ord.)	fifth-order term (Extent)	0.0510	-0.2380	0.3400
Grain × Extent (ord.)	sixth-order term (Extent)	-0.0645	-0.3580	0.2290
Grain × Extent (ord.)	ln grain × linear term (Extent)	-0.0451	-0.0853	-0.0049
Grain × Extent (ord.)	ln grain × quadratic term (Extent)	0.0479	0.0096	0.0863
Grain × Extent (ord.)	ln grain × cubic term (Extent)	0.0069	-0.0354	0.0491
Grain × Extent (ord.)	ln grain × fourth-order term (Extent)	0.0135	-0.0239	0.0509
Grain × Extent (ord.)	ln grain × fifth-order term (Extent)	-0.0261	-0.0693	0.0171
Grain × Extent (ord.)	ln grain × sixth-order term (Extent)	0.0056	-0.0330	0.0442
Grain × Extent (cat.)	Intercept	0.1496	-0.0435	0.3427
Grain × Extent (cat.)	ln grain	0.1000	0.0606	0.1394
Grain × Extent (cat.)	[10, 100)	0.0749	-0.2626	0.4124
Grain × Extent (cat.)	[10 <sup>2</sup> , 10 <sup>3</sup> )	-0.1359	-0.4247	0.1529
Grain × Extent (cat.)	[10 <sup>3</sup> , 10 <sup>4</sup> )	-0.0771	-0.4020	0.2478
Grain × Extent (cat.)	[10 <sup>4</sup> , 10 <sup>5</sup> )	-0.0408	-0.4710	0.3895
Grain × Extent (cat.)	[10 <sup>5</sup> , 10 <sup>6</sup> )	0.0472	-0.2591	0.3536
Grain × Extent (cat.)	[10 <sup>6</sup> , )	-0.1187	-0.6390	0.4016
Grain × Extent (cat.)	ln grain × [10, 100)	-0.0555	-0.1217	0.0107
Grain × Extent (cat.)	ln grain × [10 <sup>2</sup> , 10 <sup>3</sup> )	-0.0415	-0.0971	0.0141
Grain × Extent (cat.)	ln grain × [10 <sup>3</sup> , 10 <sup>4</sup> )	-0.0733	-0.1217	-0.0249
Grain × Extent (cat.)	ln grain × [10 <sup>4</sup> , 10 <sup>5</sup> )	-0.0926	-0.1580	-0.0273
Grain × Extent (cat.)	ln grain × [10 <sup>5</sup> , 10 <sup>6</sup> )	-0.0724	-0.1171	-0.0277
Grain × Extent (cat.)	ln grain × [10 <sup>6</sup> , )	-0.0512	-0.1061	0.0036

Grain × Habitat	Intercept	0.2526	-0.0730	0.5781
Grain × Habitat	ln grain	0.0147	-0.0440	0.0734
Grain × Habitat	forest (Habitat)	-0.1165	-0.4991	0.2660
Grain × Habitat	grassland (Habitat)	-0.2600	-0.6150	0.0950
Grain × Habitat	shrubland (Habitat)	-0.1764	-0.6852	0.3325
Grain × Habitat	urban (Habitat)	0.0691	-0.7027	0.8410
Grain × Habitat	wetland (Habitat)	-0.0563	-0.4431	0.3305
Grain × Habitat	ln grain × forest (Habitat)	0.0255	-0.0411	0.0921
Grain × Habitat	ln grain × grassland (Habitat)	0.0578	-0.0137	0.1293
Grain × Habitat	ln grain × shrubland (Habitat)	0.0447	-0.0585	0.1479
Grain × Habitat	ln grain × urban (Habitat)	0.0405	-0.0452	0.1262
Grain × Habitat	ln grain × wetland (Habitat)	0.0021	-0.0651	0.0693

**Table S4** Estimates and 95% confidence intervals (CIs) for Fisher's  $z$  from multiple covariate meta-regressions used in model selection.

Model	Coefficient	$z$	Lower CI	Upper CI
Grain, Latitude	Intercept	-0.2164	-0.7282	0.2954
Grain, Latitude	ln grain	0.0361	0.0235	0.0487
Grain, Latitude	Latitude	0.0086	-0.0038	0.0211
Grain, longitude	Intercept	0.3153	0.1219	0.5086
Grain, longitude	ln grain	0.0316	0.0185	0.0447
Grain, longitude	Longitude	-0.0003	-0.0013	0.0008
Grain, longitude	Longitude <sup>2</sup>	$-1.80 \times 10^{-5}$	$-3.03 \times 10^{-5}$	$-5.56 \times 10^{-6}$
Grain, extent	Intercept	0.2671	0.0906	0.4436
Grain, extent	ln grain	0.0415	0.0282	0.0549
Grain, extent	[10, 100)	-0.0157	-0.3101	0.2788
Grain, extent	[ $10^2$ , $10^3$ )	-0.1777	-0.4211	0.0658
Grain, extent	[ $10^3$ , $10^4$ )	-0.3005	-0.5664	-0.0347
Grain, extent	[ $10^4$ , $10^5$ )	-0.3200	-0.6283	-0.0118
Grain, extent	[ $10^5$ , $10^6$ )	-0.1765	-0.4416	0.0885
Grain, extent	[ $10^6$ , )	-0.1809	-0.5297	0.1679
Grain, habitat	Intercept	0.2329	-0.0802	0.5461
Grain, habitat	ln grain	0.0367	0.0222	0.0512
Grain, habitat	Forest	-0.0901	-0.4478	0.2676
Grain, habitat	Grassland	-0.1735	-0.5099	0.1629
Grain, habitat	Many	-0.1458	-0.5268	0.2352
Grain, habitat	Shrubland	-0.0837	-0.5025	0.3351
Grain, habitat	Urban	0.2577	-0.2362	0.7517
Grain, habitat	Wetland	-0.0985	-0.4580	0.2610
Grain, latitude, longitude	Intercept	0.0954	-0.4658	0.6566
Grain, latitude, longitude	ln grain	0.0313	0.0182	0.0444
Grain, latitude, longitude	Latitude	0.0051	-0.0072	0.0175
Grain, latitude, longitude	Longitude	-0.0003	-0.0013	0.0008
Grain, latitude, longitude	Longitude <sup>2</sup>	$-1.68 \times 10^{-5}$	$-2.95 \times 10^{-5}$	$-4.18 \times 10^{-6}$
Grain, latitude, extent	Intercept	-0.0391	-0.5920	0.5138

Grain, latitude, extent	ln grain	0.0407	0.0273	0.0541
Grain, latitude, extent	Latitude	0.0074	-0.0053	0.0201
Grain, latitude, extent	[10, 100)	0.0026	-0.2921	0.2972
Grain, latitude, extent	[10 <sup>2</sup> , 10 <sup>3</sup> )	-0.1564	-0.4012	0.0884
Grain, latitude, extent	[10 <sup>3</sup> , 10 <sup>4</sup> )	-0.2815	-0.5479	-0.0151
Grain, latitude, extent	[10 <sup>4</sup> , 10 <sup>5</sup> )	-0.3084	-0.6156	-0.0011
Grain, latitude, extent	[10 <sup>5</sup> , 10 <sup>6</sup> )	-0.1835	-0.4475	0.0806
Grain, latitude, extent	[10 <sup>6</sup> , )	-0.1845	-0.5317	0.1626
Grain, latitude, habitat	Intercept	-0.1057	-0.7870	0.5756
Grain, latitude, habitat	ln grain	0.0353	0.0207	0.0500
Grain, latitude, habitat	Latitude	0.0073	-0.0057	0.0202
Grain, latitude, habitat	Forest	-0.0341	-0.4047	0.3365
Grain, latitude, habitat	Grassland	-0.1287	-0.4737	0.2163
Grain, latitude, habitat	Many	-0.0882	-0.4820	0.3057
Grain, latitude, habitat	Shrubland	-0.0145	-0.4503	0.4214
Grain, latitude, habitat	Urban	0.2910	-0.2054	0.7874
Grain, latitude, habitat	Wetland	-0.0500	-0.4189	0.3190
Grain, longitude, extent	Intercept	0.4129	0.1847	0.6410
Grain, longitude, extent	ln grain	0.0362	0.0223	0.0501
Grain, longitude, extent	Longitude	-0.0003	-0.0013	0.0008
Grain, longitude, extent	Longitude <sup>2</sup>	-1.70×10 <sup>-5</sup>	-2.96×10 <sup>-5</sup>	-4.47×10 <sup>-6</sup>
Grain, longitude, extent	[10, 100)	-0.0160	-0.3016	0.2697
Grain, longitude, extent	[10 <sup>2</sup> , 10 <sup>3</sup> )	-0.1046	-0.3467	0.1376
Grain, longitude, extent	[10 <sup>3</sup> , 10 <sup>4</sup> )	-0.2921	-0.5495	-0.0347
Grain, longitude, extent	[10 <sup>4</sup> , 10 <sup>5</sup> )	-0.2433	-0.5465	0.0599
Grain, longitude, extent	[10 <sup>5</sup> , 10 <sup>6</sup> )	-0.1380	-0.3954	0.1195
Grain, longitude, extent	[10 <sup>6</sup> , )	-0.1799	-0.5175	0.1576
Grain, longitude, habitat	Intercept	0.3437	0.0134	0.6739
Grain, longitude, habitat	ln grain	0.0315	0.0162	0.0468
Grain, longitude, habitat	Longitude	-0.0006	-0.0018	0.0005
Grain, longitude, habitat	Longitude <sup>2</sup>	-1.60×10 <sup>-5</sup>	-2.90×10 <sup>-5</sup>	-3.02×10 <sup>-6</sup>
Grain, longitude, habitat	Forest	-0.0796	-0.4314	0.2722
Grain, longitude, habitat	Grassland	-0.1248	-0.4622	0.2125

Grain, longitude, habitat	Many	-0.0972	-0.4755	0.2811
Grain, longitude, habitat	Shrubland	-0.0277	-0.4436	0.3882
Grain, longitude, habitat	Urban	0.3293	-0.1568	0.8155
Grain, longitude, habitat	Wetland	-0.0810	-0.4304	0.2684
Grain, extent, habitat	Intercept	0.3544	0.0026	0.7061
Grain, extent, habitat	ln grain	0.0392	0.0244	0.0541
Grain, extent, habitat	[10, 100)	-0.0737	-0.4025	0.2551
Grain, extent, habitat	[10 <sup>2</sup> , 10 <sup>3</sup> )	-0.2383	-0.4869	0.0104
Grain, extent, habitat	[10 <sup>3</sup> , 10 <sup>4</sup> )	-0.3340	-0.6096	-0.0584
Grain, extent, habitat	[10 <sup>4</sup> , 10 <sup>5</sup> )	-0.3281	-0.6413	-0.0149
Grain, extent, habitat	[10 <sup>5</sup> , 10 <sup>6</sup> )	-0.2229	-0.4954	0.0496
Grain, extent, habitat	[10 <sup>6</sup> , )	-0.2196	-0.5691	0.1299
Grain, extent, habitat	Forest	-0.0372	-0.4021	0.3276
Grain, extent, habitat	Grassland	-0.1603	-0.5090	0.1885
Grain, extent, habitat	Many	-0.0456	-0.4401	0.3490
Grain, extent, habitat	Shrubland	-0.0344	-0.4535	0.3847
Grain, extent, habitat	Urban	0.3390	-0.1718	0.8499
Grain, extent, habitat	Wetland	-0.0209	-0.3882	0.3464
Grain, extent, habitat, latitude	Intercept	0.0628	-0.6577	0.7833
Grain, extent, habitat, latitude	ln grain	0.0383	0.0233	0.0533
Grain, extent, habitat, latitude	[10, 100)	-0.0549	-0.3848	0.2749
Grain, extent, habitat, latitude	[10 <sup>2</sup> , 10 <sup>3</sup> )	-0.2222	-0.4721	0.0276
Grain, extent, habitat, latitude	[10 <sup>3</sup> , 10 <sup>4</sup> )	-0.3211	-0.5970	-0.0453
Grain, extent, habitat, latitude	[10 <sup>4</sup> , 10 <sup>5</sup> )	-0.3189	-0.6315	-0.0063
Grain, extent, habitat, latitude	[10 <sup>5</sup> , 10 <sup>6</sup> )	-0.2288	-0.5007	0.0432
Grain, extent, habitat, latitude	[10 <sup>6</sup> , )	-0.2245	-0.5729	0.1239
Grain, extent, habitat, latitude	Forest	0.0099	-0.3677	0.3875
Grain, extent, habitat, latitude	Grassland	-0.1210	-0.4793	0.2373
Grain, extent, habitat, latitude	Many	0.0029	-0.4046	0.4104
Grain, extent, habitat, latitude	Shrubland	0.0168	-0.4161	0.4498
Grain, extent, habitat, latitude	Urban	0.3645	-0.1482	0.8771
Grain, extent, habitat, latitude	Wetland	0.0189	-0.3574	0.3952
Grain, extent, habitat, latitude	Latitude	0.0061	-0.0071	0.0193

Grain, extent, habitat, longitude	Intercept	0.4484	0.0863	0.8106
Grain, extent, habitat, longitude	ln grain	0.0349	0.0193	0.0506
Grain, extent, habitat, longitude	[10, 100)	-0.0843	-0.4049	0.2364
Grain, extent, habitat, longitude	[10 <sup>2</sup> , 10 <sup>3</sup> )	-0.1631	-0.4104	0.0841
Grain, extent, habitat, longitude	[10 <sup>3</sup> , 10 <sup>4</sup> )	-0.3320	-0.6008	-0.0633
Grain, extent, habitat, longitude	[10 <sup>4</sup> , 10 <sup>5</sup> )	-0.2460	-0.5555	0.0636
Grain, extent, habitat, longitude	[10 <sup>5</sup> , 10 <sup>6</sup> )	-0.1927	-0.4600	0.0745
Grain, extent, habitat, longitude	[10 <sup>6</sup> , )	-0.2284	-0.5689	0.1121
Grain, extent, habitat, longitude	Forest	-0.0512	-0.4114	0.3090
Grain, extent, habitat, longitude	Grassland	-0.1425	-0.4936	0.2086
Grain, extent, habitat, longitude	Many	-0.0282	-0.4198	0.3634
Grain, extent, habitat, longitude	Shrubland	0.0047	-0.4117	0.4210
Grain, extent, habitat, longitude	Urban	0.3638	-0.1366	0.8642
Grain, extent, habitat, longitude	Wetland	-0.0372	-0.3949	0.3204
Grain, extent, habitat, longitude	Longitude	-0.0007	-0.0018	0.0005
Grain, extent, habitat, longitude	Longitude <sup>2</sup>	-1.47×10 <sup>-5</sup>	-2.79×10 <sup>-5</sup>	-1.46×10 <sup>-6</sup>
Grain, extent, habitat, latitude	Intercept	0.1440	-0.5537	0.8417
Grain, extent, habitat, latitude	ln grain	0.0309	0.0156	0.0463
Grain, extent, habitat, latitude	Forest	-0.0488	-0.4134	0.3157
Grain, extent, habitat, latitude	Grassland	-0.1020	-0.4465	0.2425
Grain, extent, habitat, latitude	Many	-0.0666	-0.4563	0.3231
Grain, extent, habitat, latitude	Shrubland	0.0092	-0.4219	0.4402
Grain, extent, habitat, latitude	Urban	0.3472	-0.1419	0.8363
Grain, extent, habitat, latitude	Wetland	-0.0537	-0.4131	0.3056
Grain, extent, habitat, latitude	Latitude	0.0042	-0.0086	0.0170
Grain, extent, habitat, latitude	Longitude	-0.0006	-0.0018	0.0005
Grain, extent, habitat, latitude	Longitude <sup>2</sup>	-1.53×10 <sup>-5</sup>	-2.85×10 <sup>-5</sup>	-2.17×10 <sup>-6</sup>
Grain, extent, habitat, longitude	Intercept	0.2290	-0.3675	0.8255
Grain, extent, habitat, longitude	ln grain	0.0360	0.0222	0.0499
Grain, extent, habitat, longitude	[10, 100)	-0.0055	-0.2928	0.2817
Grain, extent, habitat, longitude	[10 <sup>2</sup> , 10 <sup>3</sup> )	-0.0956	-0.3393	0.1481
Grain, extent, habitat, longitude	[10 <sup>3</sup> , 10 <sup>4</sup> )	-0.2823	-0.5414	-0.0232
Grain, extent, habitat, longitude	[10 <sup>4</sup> , 10 <sup>5</sup> )	-0.2403	-0.5436	0.0629

Grain, extent, habitat, longitude	[ $10^5$ , $10^6$ )	-0.1445	-0.4025	0.1136
Grain, extent, habitat, longitude	[ $10^6$ , )	-0.1821	-0.5197	0.1554
Grain, extent, habitat, longitude	Latitude	0.0042	-0.0084	0.0168
Grain, extent, habitat, longitude	Longitude	-0.0003	-0.0013	0.0008
Grain, extent, habitat, longitude	Longitude <sup>2</sup>	- $1.61 \times 10^{-5}$	- $2.89 \times 10^{-5}$	- $3.29 \times 10^{-6}$
Full model	Intercept	0.2822	-0.4533	1.0177
Full model	ln grain	0.0346	0.0189	0.0503
Full model	Latitude	0.0034	-0.0097	0.0164
Full model	Longitude	-0.0007	-0.0018	0.0005
Full model	Longitude <sup>2</sup>	- $1.41 \times 10^{-5}$	- $2.75 \times 10^{-5}$	- $7.12 \times 10^{-7}$
Full model	[10, 100)	-0.0739	-0.3968	0.2489
Full model	[ $10^2$ , $10^3$ )	-0.1568	-0.4050	0.0914
Full model	[ $10^3$ , $10^4$ )	-0.3255	-0.5951	-0.0558
Full model	[ $10^4$ , $10^5$ )	-0.2440	-0.5534	0.0655
Full model	[ $10^5$ , $10^6$ )	-0.1977	-0.4654	0.0701
Full model	[ $10^6$ , )	-0.2309	-0.5714	0.1095
Full model	Forest	-0.0254	-0.3988	0.3480
Full model	Grassland	-0.1225	-0.4818	0.2368
Full model	Many	-0.0025	-0.4062	0.4012
Full model	Shrubland	0.0312	-0.3974	0.4599
Full model	Urban	0.3786	-0.1248	0.8821
Full model	Wetland	-0.0144	-0.3825	0.3536