

Table S3. Multilevel publication bias tests revealed two models (soil pH and vertebrate diversity in models with African megafauna versus introduced megafauna) with significant evidence of publication bias. Publication bias tests were based on (Nakagawa et al. 2022) and used multilevel error structures to test whether effect sizes were a function of the inverse of the square root of effective sample size. We then used a similar model with 1/effective N to estimate bias-corrected estimates (reported in second row). We also report intercept-only model results to provide comparison (from main text models).

type	estimate	SE	lower CI	upper CI	t	p	bias
Vertebrate Diversity - Africa comparison							
Testing for bias	3.74	1.61	0.47	7.02	2.33	0.0264	yes
Corrected estimate	-0.41	0.14	-0.78	-0.03	-3.03	0.0390	
Uncorrected estimate	-0.17	0.11	-0.45	0.10	-1.61	0.1679	
Vertebrate Diversity - Nativeness							
Testing for bias	0.95	0.70	-0.45	2.35	1.35	0.1802	no
Corrected estimate	-0.24	0.06	-0.36	-0.12	-4.24	0.0011	
Uncorrected estimate	-0.18	0.04	-0.28	-0.09	-4.22	0.0010	
Vertebrate Abundance - Africa comparison							
Testing for bias	-0.05	1.39	-2.89	2.78	-0.04	0.9708	no
Corrected estimate	-0.36	0.19	-0.77	0.05	-1.90	0.0784	
Uncorrected estimate	-0.41	0.13	-0.68	-0.14	-3.27	0.0052	
Vertebrate Abundance - Nativeness							
Testing for bias	0.28	0.67	-1.03	1.59	0.42	0.6756	no
Corrected estimate	-0.24	0.10	-0.44	-0.04	-2.39	0.0227	
Uncorrected estimate	-0.21	0.07	-0.36	-0.06	-2.92	0.0063	
Vertebrate Abundance - Invasiveness							
Testing for bias	0.26	0.68	-1.09	1.60	0.38	0.7072	no
Corrected estimate	-0.22	0.10	-0.43	-0.01	-2.18	0.0376	
Uncorrected estimate	-0.21	0.08	-0.36	-0.05	-2.68	0.0118	

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type	estimate	SE	lower CI	upper CI	t	p	bias
Mammal Abundance - Africa comparison							
Testing for bias	-2.28	1.83	-6.76	2.20	-1.25	0.2589	no
Corrected estimate	-0.06	0.32	-0.84	0.72	-0.19	0.8566	
Uncorrected estimate	-0.45	0.21	-0.95	0.05	-2.13	0.0704	
Mammal Abundance - Nativeness							
Testing for bias	-1.97	1.13	-4.25	0.31	-1.74	0.0890	no
Corrected estimate	-0.07	0.16	-0.41	0.28	-0.41	0.6873	
Uncorrected estimate	-0.34	0.14	-0.63	-0.05	-2.46	0.0259	
Small Mammal Abundance - Africa comparison							
Testing for bias	-2.28	1.83	-6.76	2.20	-1.25	0.2589	no
Corrected estimate	-0.06	0.32	-0.84	0.72	-0.19	0.8566	
Uncorrected estimate	-0.45	0.21	-0.95	0.05	-2.13	0.0704	
Small Mammal Abundance - Nativeness							
Testing for bias	-2.02	1.19	-4.61	0.58	-1.69	0.1166	no
Corrected estimate	-0.22	0.17	-0.59	0.16	-1.27	0.2291	
Uncorrected estimate	-0.47	0.14	-0.77	-0.18	-3.43	0.0045	
Bird Diversity - Nativeness							
Testing for bias	0.55	0.92	-1.29	2.39	0.60	0.5521	no
Corrected estimate	-0.22	0.06	-0.37	-0.07	-3.42	0.0091	
Uncorrected estimate	-0.19	0.05	-0.30	-0.07	-3.72	0.0048	

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type	estimate	SE	lower CI	upper CI	t	p	bias
Bird Abundance - Nateness							
Testing for bias	0.72	0.75	-0.77	2.20	0.96	0.3408	no
Corrected estimate	-0.27	0.12	-0.54	-0.01	-2.25	0.0459	
Uncorrected estimate	-0.19	0.09	-0.39	0.01	-2.10	0.0572	
Bird Abundance - Invasiveness							
Testing for bias	0.67	0.77	-0.85	2.18	0.87	0.3867	no
Corrected estimate	-0.25	0.13	-0.54	0.03	-1.99	0.0742	
Uncorrected estimate	-0.18	0.10	-0.39	0.03	-1.84	0.0930	
Invertebrate Diversity - Africa comparison							
Testing for bias	-0.58	1.22	-3.02	1.85	-0.48	0.6349	no
Corrected estimate	-0.05	0.10	-0.29	0.19	-0.49	0.6374	
Uncorrected estimate	-0.09	0.07	-0.25	0.07	-1.29	0.2301	
Invertebrate Diversity - Nateness							
Testing for bias	-0.56	1.44	-3.40	2.27	-0.39	0.6954	no
Corrected estimate	-0.33	0.21	-0.77	0.11	-1.56	0.1308	
Uncorrected estimate	-0.34	0.14	-0.64	-0.04	-2.33	0.0280	
Invertebrate Diversity - Invasiveness							
Testing for bias	-0.98	1.65	-4.24	2.28	-0.59	0.5534	no
Corrected estimate	-0.36	0.23	-0.85	0.12	-1.56	0.1345	
Uncorrected estimate	-0.40	0.16	-0.74	-0.06	-2.47	0.0221	

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type	estimate	SE	lower CI	upper CI	t	p	bias
Invertebrate Abundance - Africa comparison							
Testing for bias	-0.69	0.94	-2.54	1.17	-0.73	0.4669	no
Corrected estimate	0.11	0.13	-0.16	0.39	0.86	0.3988	
Uncorrected estimate	0.03	0.09	-0.15	0.22	0.38	0.7081	
Invertebrate Abundance - Nativeness							
Testing for bias	-0.18	0.79	-1.73	1.38	-0.22	0.8237	no
Corrected estimate	-0.01	0.11	-0.23	0.21	-0.07	0.9435	
Uncorrected estimate	-0.04	0.08	-0.21	0.13	-0.46	0.6487	
Invertebrate Abundance - Invasiveness							
Testing for bias	-0.30	0.86	-1.99	1.38	-0.35	0.7241	no
Corrected estimate	-0.02	0.11	-0.25	0.21	-0.17	0.8687	
Uncorrected estimate	-0.06	0.09	-0.24	0.12	-0.64	0.5269	
Invert Herbivore Abundance - Africa comparison							
Testing for bias	-1.02	2.00	-5.92	3.88	-0.51	0.6283	no
Corrected estimate	0.01	0.29	-0.69	0.71	0.05	0.9635	
Uncorrected estimate	-0.14	0.19	-0.58	0.30	-0.77	0.4682	
Invert Herbivore Abundance - Nativeness							
Testing for bias	0.12	1.49	-2.81	3.06	0.08	0.9334	no
Corrected estimate	-0.23	0.20	-0.64	0.18	-1.15	0.2618	
Uncorrected estimate	-0.29	0.13	-0.55	-0.03	-2.27	0.0327	

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type	estimate	SE	lower CI	upper CI	t	p	bias
Invert Predator Abundance - Africa comparison							
Testing for bias	1.72	0.91	-0.43	3.87	1.89	0.1005	no
Corrected estimate	-0.06	0.09	-0.28	0.16	-0.64	0.5439	
Uncorrected estimate	0.07	0.11	-0.17	0.31	0.67	0.5219	
Invert Predator Abundance - Nativeness							
Testing for bias	1.42	0.83	-0.22	3.06	1.71	0.0891	no
Corrected estimate	-0.17	0.10	-0.37	0.04	-1.64	0.1144	
Uncorrected estimate	-0.03	0.07	-0.18	0.11	-0.48	0.6333	
Invert Detritivore Abundance - Nativeness							
Testing for bias	-2.21	2.22	-6.61	2.19	-0.99	0.3221	no
Corrected estimate	0.69	0.31	0.03	1.35	2.18	0.0418	
Uncorrected estimate	0.41	0.22	-0.05	0.88	1.85	0.0793	
Invert Detritivore Abundance - Invasiveness							
Testing for bias	-2.49	2.36	-7.15	2.17	-1.06	0.2930	no
Corrected estimate	0.70	0.33	0.02	1.38	2.15	0.0453	
Uncorrected estimate	0.42	0.24	-0.09	0.92	1.72	0.1022	
Dead Vegetation - Nativeness							
Testing for bias	0.11	0.83	-1.53	1.74	0.13	0.8966	no
Corrected estimate	-0.53	0.12	-0.77	-0.30	-4.52	0.0000	
Uncorrected estimate	-0.53	0.09	-0.70	-0.36	-6.18	0.0000	

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type	estimate	SE	lower CI	upper CI	t	p	bias
Dead Vegetation - Invasiveness							
Testing for bias	0.23	0.86	-1.47	1.94	0.27	0.7864	no
Corrected estimate	-0.49	0.12	-0.74	-0.24	-3.94	0.0003	
Uncorrected estimate	-0.49	0.09	-0.67	-0.30	-5.24	0.0000	
NA - Africa comparison							
Testing for bias	-2.44	2.53	-7.50	2.63	-0.96	0.3392	no
Corrected estimate	-0.15	0.34	-0.93	0.63	-0.45	0.6636	
Uncorrected estimate	-0.40	0.19	-0.82	0.02	-2.18	0.0573	
Testing for bias	1.24	2.73	-4.51	6.98	0.45	0.6558	no
Corrected estimate	-0.40	0.28	-1.12	0.32	-1.42	0.2148	
Uncorrected estimate	-0.30	0.18	-0.75	0.14	-1.66	0.1474	
NA - Nativeness							
Testing for bias	-0.36	1.38	-3.09	2.37	-0.26	0.7943	no
Corrected estimate	-0.39	0.20	-0.80	0.03	-1.98	0.0650	
Uncorrected estimate	-0.43	0.12	-0.68	-0.17	-3.56	0.0024	
Testing for bias	2.71	2.26	-1.86	7.29	1.20	0.2373	no
Corrected estimate	-0.50	0.26	-1.07	0.07	-1.91	0.0798	
Uncorrected estimate	-0.25	0.15	-0.56	0.07	-1.71	0.1117	
Litter Cover - Nativeness							
Testing for bias	0.09	1.10	-2.08	2.27	0.08	0.9332	no

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type	estimate	SE	lower CI	upper CI	t	p	bias
Corrected estimate	-0.58	0.15	-0.89	-0.27	-3.75	0.0005	
Uncorrected estimate	-0.57	0.11	-0.79	-0.35	-5.24	0.0000	
Litter Cover - Invasiveness							
Testing for bias	0.30	1.19	-2.06	2.66	0.25	0.8025	no
Corrected estimate	-0.52	0.17	-0.85	-0.18	-3.14	0.0036	
Uncorrected estimate	-0.51	0.12	-0.76	-0.26	-4.19	0.0002	
Bare Ground - Africa comparison							
Testing for bias	2.04	2.90	-3.83	7.91	0.70	0.4861	no
Corrected estimate	0.99	0.33	0.30	1.68	2.98	0.0071	
Uncorrected estimate	1.12	0.21	0.68	1.56	5.30	0.0000	
Bare Ground - Nativeness							
Testing for bias	3.38	1.74	-0.08	6.84	1.95	0.0555	no
Corrected estimate	0.66	0.20	0.25	1.08	3.24	0.0027	
Uncorrected estimate	0.92	0.15	0.62	1.22	6.22	0.0000	
Bare Ground - Invasiveness							
Testing for bias	3.00	1.66	-0.32	6.32	1.81	0.0755	no
Corrected estimate	0.54	0.18	0.17	0.92	2.96	0.0065	
Uncorrected estimate	0.76	0.14	0.48	1.05	5.52	0.0000	
Soil Compaction - Nativeness							
Testing for bias	3.46	3.03	-2.65	9.57	1.14	0.2603	no

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type	estimate	SE	lower CI	upper CI	t	p	bias
Corrected estimate	0.33	0.36	-0.45	1.11	0.92	0.3731	
Uncorrected estimate	0.42	0.17	0.06	0.77	2.49	0.0260	
Soil Compaction - Invasiveness							
Testing for bias	1.13	2.55	-4.02	6.28	0.44	0.6599	no
Corrected estimate	0.30	0.28	-0.32	0.92	1.08	0.3047	
Uncorrected estimate	0.24	0.12	-0.03	0.51	1.97	0.0749	
Soil Moisture - Nativeness							
Testing for bias	3.60	2.49	-1.38	8.57	1.44	0.1534	no
Corrected estimate	-0.58	0.33	-1.27	0.12	-1.73	0.0987	
Uncorrected estimate	-0.18	0.18	-0.54	0.19	-0.99	0.3337	
Soil Moisture - Invasiveness							
Testing for bias	4.00	2.59	-1.18	9.17	1.55	0.1277	no
Corrected estimate	-0.77	0.36	-1.53	-0.01	-2.15	0.0465	
Uncorrected estimate	-0.28	0.20	-0.70	0.13	-1.46	0.1623	
Soil Respiration - Nativeness							
Testing for bias	1.21	2.39	-3.53	5.94	0.50	0.6151	no
Corrected estimate	-0.39	0.34	-1.15	0.38	-1.13	0.2862	
Uncorrected estimate	-0.29	0.17	-0.68	0.09	-1.69	0.1198	
Soil Respiration - Invasiveness							
Testing for bias	1.21	2.39	-3.53	5.94	0.50	0.6151	no

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type	estimate	SE	lower CI	upper CI	t	p	bias
Corrected estimate	-0.39	0.34	-1.15	0.38	-1.13	0.2862	
Uncorrected estimate	-0.29	0.17	-0.68	0.09	-1.69	0.1198	
CO2 Respiration - Nativeness							
Testing for bias	0.04	3.23	-7.42	7.49	0.01	0.9914	no
Corrected estimate	-0.23	0.51	-1.40	0.95	-0.45	0.6680	
Uncorrected estimate	-0.29	0.24	-0.84	0.25	-1.21	0.2560	
CO2 Respiration - Invasiveness							
Testing for bias	0.04	3.23	-7.42	7.49	0.01	0.9914	no
Corrected estimate	-0.23	0.51	-1.40	0.95	-0.45	0.6680	
Uncorrected estimate	-0.29	0.24	-0.84	0.25	-1.21	0.2560	
Root Biomass - Nativeness							
Testing for bias	0.14	0.70	-1.27	1.54	0.20	0.8460	no
Corrected estimate	-0.01	0.07	-0.18	0.16	-0.15	0.8832	
Uncorrected estimate	0.00	0.06	-0.13	0.12	-0.06	0.9534	
Root Biomass - Invasiveness							
Testing for bias	0.14	0.70	-1.27	1.54	0.20	0.8460	no
Corrected estimate	-0.01	0.07	-0.18	0.16	-0.15	0.8832	
Uncorrected estimate	0.00	0.06	-0.13	0.12	-0.06	0.9534	
Soil Organic Matter - Nativeness							
Testing for bias	0.24	2.21	-4.25	4.73	0.11	0.9148	no

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type	estimate	SE	lower CI	upper CI	t	p	bias
Corrected estimate	-0.24	0.25	-0.78	0.30	-0.96	0.3517	
Uncorrected estimate	-0.16	0.15	-0.48	0.15	-1.11	0.2840	
Soil Organic C - Nateness							
Testing for bias	-0.95	1.68	-4.31	2.40	-0.57	0.5727	no
Corrected estimate	0.20	0.20	-0.24	0.63	0.98	0.3475	
Uncorrected estimate	0.06	0.12	-0.19	0.32	0.55	0.5915	
Soil Organic C - Invasiveness							
Testing for bias	-1.09	1.78	-5.00	2.83	-0.61	0.5537	no
Corrected estimate	0.23	0.22	-0.25	0.71	1.04	0.3205	
Uncorrected estimate	0.08	0.13	-0.21	0.36	0.59	0.5685	
Soil Total C - Africa comparison							
Testing for bias	3.78	2.18	-0.63	8.18	1.73	0.0907	no
Corrected estimate	-0.43	0.23	-0.92	0.05	-1.92	0.0774	
Uncorrected estimate	-0.10	0.13	-0.38	0.18	-0.76	0.4584	
Soil Total C - Nateness							
Testing for bias	1.55	1.08	-0.58	3.68	1.44	0.1532	no
Corrected estimate	-0.18	0.13	-0.45	0.08	-1.40	0.1706	
Uncorrected estimate	-0.08	0.08	-0.24	0.08	-0.99	0.3286	
Soil Total C - Invasiveness							
Testing for bias	1.47	1.12	-0.75	3.69	1.31	0.1919	no

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type	estimate	SE	lower CI	upper CI	t	p	bias
Corrected estimate	-0.17	0.14	-0.45	0.11	-1.22	0.2304	
Uncorrected estimate	-0.07	0.09	-0.25	0.10	-0.86	0.3965	
Soil C:N - Nativeness							
Testing for bias	0.51	2.06	-3.70	4.73	0.25	0.8043	no
Corrected estimate	-0.05	0.25	-0.59	0.48	-0.21	0.8343	
Uncorrected estimate	0.04	0.12	-0.22	0.29	0.31	0.7629	
Soil Total N - Africa comparison							
Testing for bias	0.99	1.38	-1.77	3.75	0.71	0.4774	no
Corrected estimate	-0.19	0.16	-0.52	0.14	-1.22	0.2383	
Uncorrected estimate	-0.13	0.10	-0.34	0.08	-1.31	0.2060	
Soil Total N - Nativeness							
Testing for bias	0.66	0.84	-0.99	2.31	0.79	0.4290	no
Corrected estimate	-0.10	0.11	-0.32	0.12	-0.90	0.3742	
Uncorrected estimate	-0.05	0.06	-0.18	0.08	-0.83	0.4084	
Soil Total N - Invasiveness							
Testing for bias	0.43	0.89	-1.32	2.18	0.48	0.6309	no
Corrected estimate	-0.07	0.12	-0.31	0.16	-0.63	0.5291	
Uncorrected estimate	-0.05	0.07	-0.19	0.09	-0.75	0.4603	
Soil Labile N - Nativeness							
Testing for bias	0.39	0.96	-1.53	2.30	0.40	0.6900	no

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type	estimate	SE	lower CI	upper CI	t	p	bias
Corrected estimate	0.18	0.12	-0.08	0.44	1.43	0.1684	
Uncorrected estimate	0.24	0.08	0.07	0.41	2.96	0.0075	
Soil Total P - Africa comparison							
Testing for bias	1.91	1.30	-0.70	4.52	1.47	0.1481	no
Corrected estimate	-0.38	0.15	-0.71	-0.05	-2.46	0.0289	
Uncorrected estimate	-0.21	0.11	-0.44	0.02	-1.95	0.0715	
Soil Total P - Nativeness							
Testing for bias	1.76	1.46	-1.15	4.68	1.21	0.2310	no
Corrected estimate	-0.24	0.17	-0.60	0.12	-1.39	0.1830	
Uncorrected estimate	-0.09	0.11	-0.33	0.14	-0.82	0.4204	
Soil Total Ca - Africa comparison							
Testing for bias	1.43	2.82	-4.45	7.31	0.51	0.6171	no
Corrected estimate	-0.49	0.26	-1.15	0.18	-1.87	0.1203	
Uncorrected estimate	-0.40	0.16	-0.79	-0.02	-2.54	0.0439	
Soil Total Ca - Nativeness							
Testing for bias	2.52	2.02	-1.57	6.61	1.25	0.2199	no
Corrected estimate	-0.51	0.22	-0.99	-0.03	-2.33	0.0378	
Uncorrected estimate	-0.30	0.12	-0.55	-0.05	-2.61	0.0214	
Soil K - Nativeness							
Testing for bias	1.25	2.34	-3.51	6.01	0.53	0.5963	no

Table S3. Multilevel publication bias tests revealed two models (soil pH and vertebrate diversity in models with African megafauna versus introduced megafauna) with significant evidence of publication bias. Publication bias tests were based on (Nakagawa et al. 2022) and used multilevel error structures to test whether effect sizes were a function of the inverse of the square root of effective sample size. We then used a similar model with 1/effective N to estimate bias-corrected estimates (reported in second row). We also report intercept-only model results to provide comparison (from main text models).

type	estimate	SE	lower CI	upper CI	t	p	bias
Corrected estimate	-0.16	0.24	-0.69	0.37	-0.67	0.5145	
Uncorrected estimate	-0.04	0.12	-0.31	0.23	-0.36	0.7260	
Soil pH - Africa comparison							
Testing for bias	3.12	2.91	-2.87	9.10	1.07	0.2941	no
Corrected estimate	-0.37	0.30	-1.07	0.32	-1.24	0.2505	
Uncorrected estimate	-0.16	0.14	-0.47	0.15	-1.17	0.2718	
Soil pH - Nateness							
Testing for bias	7.67	3.57	0.52	14.81	2.15	0.0359	yes
Corrected estimate	-1.01	0.46	-1.98	-0.04	-2.20	0.0414	
Uncorrected estimate	-0.29	0.24	-0.80	0.22	-1.19	0.2500	
Microbe Abundance - Nateness							
Testing for bias	1.54	2.85	-4.18	7.27	0.54	0.5906	no
Corrected estimate	-0.34	0.38	-1.19	0.52	-0.89	0.3983	
Uncorrected estimate	-0.30	0.20	-0.75	0.15	-1.47	0.1731	
Microbe Abundance - Invasiveness							
Testing for bias	1.74	3.01	-4.31	7.79	0.58	0.5653	no
Corrected estimate	-0.33	0.42	-1.29	0.63	-0.80	0.4494	
Uncorrected estimate	-0.28	0.23	-0.79	0.23	-1.25	0.2445	