

Ecography

ECOG-02318

Westgate, M. J., Tulloch, A. I. T., Barton, P. S., Pierson, J. C. and Lindenmayer, D. B. 2016. Optimal taxonomic groups for biodiversity assessment: a meta-analytic approach. – Ecography doi: 10.1111/ecog.02318

Supplementary material

Appendix 1

We tested the optimal set found for each of our three methods for aggregating R^2 values between studies, and for each of our three surrogacy objectives (representing all taxa, just vertebrates, or just invertebrates), against a random set of surrogates, for every budget. Three main results were evident from this analysis. First, the optimal set of surrogates always results in higher power (i.e. higher cumulative congruence) than a randomly selected set of the same number of surrogates (Table A1), except at very high budgets, when the value of the random set is equal to the optimal set. Second, simple methods of data aggregation (methods 1 and 2) always over-estimate the value of the selected surrogate set compared with a more complex approach (method 3). Third, more surrogacy power is lost by selecting non-optimal surrogates (e.g. a random set) when there is a targeted set of surrogates (e.g. for method 3, depending on the budget, up to 89% lost for a target of vertebrates and 73% lost for a target of invertebrates) compared with if all biodiversity is the target (up to 4% lost surrogacy power; Figure A1).

Table A1. Difference in monitoring power between our optimal approach and a random approach to selecting surrogates

Congruency approach	Method	Target	Average improvement in power using optimal method across all budgets (%)	Maximum percentage of optimal power lost by selecting a random surrogate set (%)
Richness	Method 1	All taxa	7.54	16.75
		Invertebrates	81.25	77.14
		Vertebrates	158.10	83.75
	Method 2	All taxa	4.55	12.10
		Invertebrates	75.13	67.31
		Vertebrates	220.65	86.88
	Method 3	All taxa	1.42	3.26
		Invertebrates	77.79	72.86
		Vertebrates	253.59	88.68
Composition	Method 1	All taxa	10.60	22.81
		Invertebrates	34.31	54.79
		Vertebrates	137.37	84.80
	Method 2	All taxa	5.48	11.70
		Invertebrates	52.97	72.37
		Vertebrates	184.09	89.69
	Method 3	All taxa	2.27	4.35
		Invertebrates	68.09	80.35
		Vertebrates	220.44	91.71

Figure A1. Results of comparing optimal surrogate sets with a random set of surrogates for every combination of budget, metric and target: (a) richness, vertebrates; (b) composition, vertebrates; (c) richness, invertebrates; (d) composition, invertebrates; (e) richness, all species; (f) composition, all species.

