Oikos

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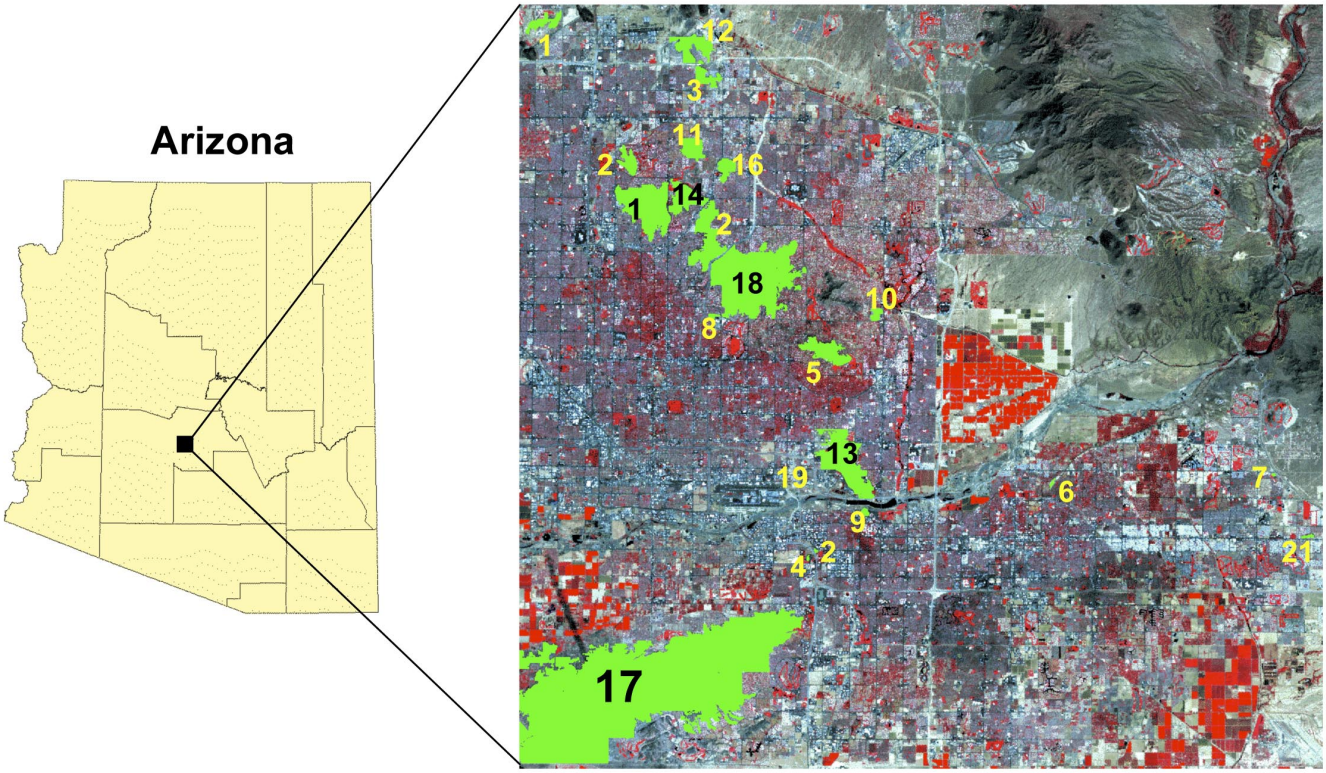

Arthur Stiles

Appendix 1. The locations of study sites within the Phoenix metropolitan area.

Sites are identified as: 1. Adobe Dam Recreation Area, 2. Broadway Butte, 3. Buffalo Ridge Park, 4. Buttes Resort, 5. Camelback Mountain, 6. Park of Canals, 7. Falcon Hill, 8. Granada Park, 9. Hayden Butte, 10. Lincoln Avenue patch, 11. Lookout Mountain, 12. Outer Union patch, 13. Papago Park, 14. Phoenix Mountain Preserve East, 15. Phoenix Mountain Preserve West, 16. Shadow Mountain, 17. South Mountain Park, 18. Squaw Peak Recreation Area, 19. Tempe Salt Bush patch (currently developed), 20. Thunderbird Avenue Butte, 21. Twin Buttes, and 22. West Squaw patch. Outlying areas are outside this view: the White Tank Mountains are due west of Phoenix; the Union Hills are due north; and Usery Mountain Park is northeast of Falcon Hill (site 7).

Appendix 2. Analysis of assumptions for AIC.

This method of presenting AIC values assumes that the residuals are normally distributed. In order to test this assumption, we utilized the one sample Kolmogorov-Smirnov statistic on Systat. Most residual distributions for the best fitting functions were normal. Exceptions included sites 5, 13, 15, 17, 22 and 25 for the woody species datasets. In a second step, residuals were plotted as histograms and visually examined. We observed that all datasets, except site 15, were bell-shaped though they contained several outlying points. These outliers had all occurred in the smaller-scale portion of the curves and were observed in all functions fit to those datasets. This indicates that while the best fit was identified from the alternative functions available, the fit in these cases was not perfect and further research into developing species-area functions would be useful. For all datasets tested, deviations from normality increased as statistical fits to functions worsened.

Variance of residuals across the range of the independent variable was assessed by plotting the residuals vs area. We observed that a minority of cases had constant variance, including woody datasets for sites 2, 4, 5, 6, 7, 8, 19 and 22 and herbaceous datasets for sites 2, 9, 13, 16 and 19. Even with these cases, only the first and some of the second best fitting functions had constant variance. For other datasets lacking constant variance, this property was shared by the residuals for all functions tested.

Appendix 3A. Mean corrected R^2 values for woody species datasets fit to convex species-area functions.

Site ID	Exponential	Power	Monod	Negative exponential	Asymptotic regression	Rational
1	0.996	0.958	0.999	0.975		0.999
2	0.986	0.995	0.988	0.970		
3	0.992	0.965	0.994	0.968		0.999
4	0.966	0.922	0.993	0.967		
5	0.997	0.976	0.985	0.931		0.997
6	0.940	0.999	0.985			
7	0.996	0.994	0.988	0.957		0.858
8	0.955	1.000	0.987	0.978		0.999
9	0.987	0.987	0.996	0.983		0.999
10	0.994	0.975	0.998			
11	0.975	0.998	0.951	0.890		0.996
12	0.985	0.986	0.991	0.967		0.999
13	0.978	0.985	0.993	0.974		1.000
14	0.994	0.984	0.978	0.921		0.998
15	0.982	0.997	0.924	0.817		0.984
16	0.967	0.998	0.949	0.893		0.990
17	0.991	0.955	0.944	0.772		0.979
18	0.998	0.972	0.966			0.993
19	0.990	0.997	0.651	0.993		0.903
20	0.996	0.991	0.969	0.903	0.984	0.992
21	0.992	0.961	0.993	0.958		0.999
22	0.977	0.998	0.956			0.994
23	0.979	0.929	0.995	0.936		1.000
24	0.995	0.990	0.971	0.968		0.991
25	0.999	0.971	0.968			0.987
All Islands	0.655	0.634	0.516	0.444	0.610	0.627

Note: empty cells did not converge to a solution

Appendix 3B. Mean corrected R^2 values for woody species datasets fit to sigmoid species-area functions.

Site ID	Logistic	Tjørve logistik	Gompertz	Extreme value function	Hill	Lomolino	Chapman-Richards	Cumulative Weibull	Cumulative Beta-P
1	1.000	0.969	0.980	0.820	1.000	1.000			
2	0.999	0.996	0.999	0.943	0.999	0.999			
3	0.999	0.982	0.990	0.870	0.999				
4	0.993	0.995	0.998	0.976	0.993	0.993			
5	1.000	0.967	0.977	0.835	1.000	1.000			
6	0.999	0.996	0.998	0.959					
7	1.000	0.995	0.997	0.931	1.000				
8	1.000	0.990	0.995	0.944	1.000				
9	1.000	0.978		0.873	1.000				
10	0.999	0.989	0.995	0.893	0.999	0.999			
11	0.999	0.983	0.989	0.918	0.999	0.999			
12	1.000	0.978	0.987	0.874	1.000	1.000			
13	1.000	0.978	0.988	0.874	1.000	1.000			
14	1.000	0.974	0.983	0.820	1.000	1.000			
15	0.997	0.959	0.967	0.882	0.997	0.997			
16	0.998	0.971	0.978	0.908	0.622				
17	0.997	0.912	0.924	0.740	0.997	0.997			
18	1.000	0.949	0.960	0.795	1.000	1.000			
19	0.999	1.000	1.000	0.964	0.999	0.999			
20	0.998	0.967	0.975	0.885	0.998				
21	0.998	0.987	0.993	0.907	0.998	0.998			
22	1.000	0.973	0.980	0.886	0.998				
23	1.000	0.963	0.974	0.767	1.000	1.000			
24	0.998	0.963	0.972	0.871		0.998			
25	0.997	0.936	0.948	0.793	0.997	0.997			
All islands	0.652	0.600	0.604			0.652	0.648		

Note: empty cells did not converge to a solution

Appendix 3C. Mean corrected R^2 values for herbaceous species datasets fit to convex species-area functions.

Site ID	Exponential	Power	Monod	Negative exponential	Asymptotic regression	Rational
1	0.994	0.958		0.957		0.999
2	0.963	0.930	0.987	1.000	0.841	0.997
8	0.993	0.993	0.991	0.969		1.000
9	0.995	0.995	0.979	0.934		0.999
11	0.994	0.962		0.942		0.999
13	0.998	0.971		0.978		1.000
14	0.983	0.948	0.999	0.955		1.000
15	0.998	0.978	0.996	0.972		1.000
16	0.999	0.986		0.956		0.998
17	0.997	0.970	0.997	0.964		1.000
19	0.978	0.998		0.944		
24	0.999	0.984	0.991	0.941		1.000

Note: empty cells did not converge to a solution

Appendix 3D. Mean corrected R^2 values for herbaceous species datasets fit to sigmoid species-area functions.

Site ID	Logistic	Tjørve logistik	Gompertz	Extreme value function	Hill	Lomolino	Chapman-Richards	Cumulative Weibull	Cumulative Beta-P
1	1.000	0.972	0.982	0.831		1.000			
2	0.998	1.000	1.000	0.943	0.998			0.841	
8	1.000	0.990	0.995	0.912					
9	1.000	0.990	0.994	0.922					
11	1.000		0.983	0.836	1.000				
13	1.000	0.983	0.990	0.876	1.000				
14	1.000	0.980	0.986	0.771					
15	1.000	0.990	0.995	0.838					
16	1.000	0.981	0.987	0.884					
17	1.000	0.985	0.991	0.864				1.000	
19	1.000	0.998	0.999	0.986					
24	1.000	0.993	0.996	0.916					

Note: empty cells did not converge to a solution