Objective recognition of guilds: testing for statistically significant species clusters

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Summary

Presently, no standard protocol for objective guild recognition is consistently used by ecologists. Apart from intuitive designations of guild membership, four statistically-based protocols are currently available: those of Colwell (1977); Holmes (1979); Lawlor (1980); and Adams (1985). The first is based on nearest-neighbor variance in overlap, the second on multivariate statistics, the third on clustering techniques, and the fourth on psychometric analysis. We propose a fifth approach, first developed by Strauss (1982) for purposes other than guild recognition. We advocate the use of bootstrap procedures to resample any given empirical matrix of consumers by resources, within constraints set by either of four different randomization algorithms. Subsequently, pseudovalues of similarity in resource use between the consumers are computed and their frequency distribution is displayed in a histogram. The overlap pseudovalue that exceeds percentile 95 may be considered statistically significant and chosen as the cutoff point that identifies significant species clusters (guilds) in the original (empirical) similarity matrix. We exemplify use of this approach with the food-niche matrix obtained for a predatory assemblage in California, and discuss its implications for the general analysis of guild structure.

Key words