Scale of spatial pattern: four methods compared*

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Abstract

Four methods of pattern analysis were compared using simulated data. Simulated transects were of five types: 1) equal patch–equal gap, in which gap and patch length were equal, 2) unequal but fixed patch–fixed gap, in which patch length was approximately one sixth gap length, and transects in which 3) the length of the patch, or 4) gap, or 5) both varied randomly. The first peak of the variance-block size graph was used to identify patch size, instead of the more commonly used highest peak.

The random pairing method estimated patch size more accurately than hierarchical ANOVA, two-term local variance, or spectral analysis. The average position of the first peak (calculated from eight replicate random pairing analyses) detected correct average patch size, even when simulated patches were randomly placed or patch size followed a uniform distribution with a range twice the mean. Hierarchical ANOVA and two-term local variance confounded patch and gap lengths and therefore overestimated the patch size. The highest peak of spectral analysis detected the full cycle (patch + gap) of the pattern but was unable to partition the components of grain.

The expected variance of an independent, random pattern is suggested as a reference point for identifying meaningful peaks and troughs in random pairing analyses of field data. The method is illustrated by analysis of a transect through submersed aquatic vegetation.