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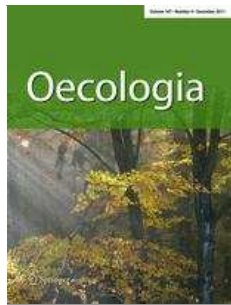
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The relationship between species detection probability and local extinction probability

Abstract

In community-level ecological studies, generally not all species present in sampled areas are detected. Many authors have proposed the use of estimation methods that allow detection probabilities that are <1 and that are heterogeneous among species. These methods can also be used to estimate community-dynamic parameters such as species local extinction probability and turnover rates (Nichols et al. *Ecol Appl* 8:1213–1225; *Conserv Biol* 12:1390–1398). Here, we present an ad hoc approach to estimating community-level vital rates in the presence of joint heterogeneity of detection probabilities and vital rates. The method consists of partitioning the number of species into two groups using the detection frequencies and then estimating vital rates (e.g., local extinction probabilities) for each group. Estimators from each group are combined in a weighted estimator of vital rates that accounts for the effect of heterogeneity. Using data from the North American Breeding Bird Survey, we computed such estimates and tested the hypothesis that detection probabilities and local extinction probabilities were negatively related. Our analyses support the hypothesis that species detection probability covaries negatively with local probability of extinction and turnover rates. A simulation study was conducted to assess the performance of vital parameter estimators as well as other estimators relevant to questions about heterogeneity, such as coefficient of variation of detection probabilities and proportion of species in each group. Both the weighted estimator suggested in this paper and the original unweighted estimator for local extinction probability performed fairly well and provided no basis for preferring one to the other.



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