rGAI: An R package for fitting the generalised abundance index to seasonal count data

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Abstract

1. The Generalised Abundance Index (GAI) provides a useful tool for estimating relative population sizes and trends of seasonal invertebrates from species' count data, and offers potential for inferring which external factors may influence phenology and demography through parametric descriptions of seasonal variation. 2. We provide an R package that extends previous software with the ability to include covariates when fitting parametric GAI models, where seasonal variation is described by either a mixture of Normal distributions or a stopover model which provides estimates of lifespan. The package also generalises the model to allow any number of broods/generations in the target population within a defined season. The option to perform bootstrapping, either parametrically or non-parametrically, is also provided. 3. The new package allows models to be far more flexible when describing seasonal variation, which may be dependent on site-specific environmental factors or consist of many broods/generations which may overlap, as demonstrated by two case studies. 4. Our open-source software, available at <https://github.com/calliste-fagard-jenkin/GAI> and <https://github.com/calliste-fagard-jenkin/rGAI>, makes this extension widely and freely available, allowing the complexity of GAI models used by ecologists and applied statisticians to increase accordingly.

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