Mapping species abundance by a spatial zero-inflated Poisson model: a case study in the NL-Wadden Sea

The objective of the study was to provide a general procedure for mapping species abundance when data are zero-inflated and spatially correlated counts. The bivalve species *Macoma balthica* was observed on a 500×500 m grid in the Dutch part of the Wadden Sea. In total, 66% of the 3451 counts were zeros. A zero-inflated Poisson mixture model was used to relate counts to environmental covariates. Two models were considered, one with relatively fewer covariates (model "small") than the other (model "large"). The models contained two processes: a Bernoulli (species prevalence) and a Poisson (species intensity, when the Bernoulli process predicts presence). The model was used to make predictions for sites where only environmental data are available. Predicted prevalences and intensities show that the model "small" predicts lower mean prevalence and higher mean intensity, than the model "large". Yet, the product of prevalence and intensity, which might be called the unconditional intensity, is very similar. Cross-validation showed that the model "small" performed slightly better, but the difference was small. The proposed methodology might be generally applicable, but is computer intensive.

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