
Using Species Distribution Models with non-equilibrium species: the case of spreading bird species in the town of Marseille, France

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Abstract

Understand the processes driving the spatial distributions of species is a fundamental goal of ecology and was recently identified as one of the five "grand challenges" in biology. Species Distribution Models (SDMs) are correlative methods which provide methodological framework to study the relation between species and their environment and to predict spatial distributions of organisms. For the last two decades, many new methods have emerged, allowing to deal with different types of data sets. One of the assumptions underlying SDMs is that the target species is in equilibrium with its environment. However, cases of populations being spread involve using presence-only models because of bias of false absences (i.e. areas suitable but not yet colonized). We have compared the performances of several presence-only and presence-absence models using occurrence data of two species within the town of Marseille: the rose-ringed parakeet *Psittacula krameri*, an exotic bird species introduced in the 1990's and the jackdaw *Corvus monedula*, a native species which spatially expand since few years. We used multi-temporal and multi-scale data in order to assess the capacity of these two types of models to predict the potential future spatial distribution of this species and to highlight driving environmental factors. Results suggest that incorporating species absence data significantly improved the performance of SDMs. Stage of invasion is also an important parameter to take into account in order to produce ecologically meaningful prediction in a given period of time. Argued discussion will permit to orientate future choice of models in invasive and colonization processes.

Keywords: Species Distribution Models, Exotic species, Urban birds, non, equilibrium

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