Incorporating species interactions into predictive species distribution models for invasive species

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Abstract: The field of species distribution modelling has become increasingly complex as models have advanced from modelling single species to incorporating interactions between species within a single model. Here, we develop a model that specifically incorporates interactions between competing pollinator species and their host plants. We utilize a generalized additive model as the basis for the species distribution model. This model is calibrated based on current environmental variables; however, to predict future species distributions, future scenarios of climate and land use change are used. The merits of including dispersal rate, environmental tolerance ranges and different environmental variables will be discussed. As a practical application, this model is applied to native honey bee (*Bombus occidentalis*) and introduced, invasive honey bee (such as *Apis mellifera*) species in North America, where competition has resulted in a decline in the native honey bee population.