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HOW CAN SPECIES DISTRIBUTION MODELS PROMOTE BIRD CONSERVATION? NEW APPLICATIONS TO GO BEYOND THE SIMPLE MAPPING OF SUITABLE AREAS

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Species Distribution Models (SDMs) are increasingly used as tools in ecology and conservation. Models provide a measure of the probability of presence, which can be used to define species' spatial occurrence, but also to inform surveys, evaluate impacts of environmental change, predict species' invasions, inform conservation planning, estimate abundance. SDMs assess relationships between distribution data and environmental features to provide a measure of the probability of presence. If the outputs of SDMs accurately represent the relationships between habitat features and species performance, the species-habitat relationships depicted by the models can provide useful information on the effect of specific habitat traits on habitat suitability, thus being relevant to management, and SDM results can be related also to additional key parameters of populations, other than distribution.

Here, we show some examples of how SDMs for bird species may be used for a variety of purposes: 1) to estimate reproductive parameters (on the base of adaptive habitat selection resulting in habitat suitability correlated with habitat quality), thus allowing for an identification of high-quality sites of overriding importance for population persistence and thus of conservation priority; 2) to evaluate the importance of specific habitat factors and relative values for species occurrence (and whenever possible reproductive outputs), allowing for the definition of habitat reference values to be used as conservation target for an appropriate habitat management, e.g. within SPAs; 3) to estimate species richness to identify areas with highest species diversity, to be included within priority areas for conservation at the regional scale, and within possible core areas in ecological networks at the regional scale; 4) in wide-ranging species, to model the effect of the availability of habitats used for different purposes on the distribution, considering it as the result of the combined availability of different kind of habitats. This new approach can enable researchers to identify what (and where) habitats and factors are limiting species distribution, thus providing with relevant management implications, and in particular with detailed and spatially explicit recommendations for habitat management targeted at priority species.

The ever increasing availability of fine-scaled environmental layers will enable even finer SDMs; in turn, the increasing production of high-precision SDMs will provide with a wide range of detailed and spatially explicit information of potentially high relevance for conservation. Such information can include much more knowledge than the simple mapping of suitable areas for a species.