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Abstract

Modelling the Distribution of Freshwater Fish Species to Update Natura 2000 Standard Data Forms in Spain †

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Abstract: Freshwater systems are among the most threatened ecosystems worldwide, and fish species inhabiting them are increasingly endangered by different pressures. One of the most important tools in the European Union (EU) to halt this decline is the Natura 2000 network (N2000). The Habitat Directive (HD) includes freshwater habitats and 39 native fish species from Spain considered of Community interest. Here, we evaluate the degree of spatial coverage of freshwater fish in the N2000 network in Spain, in accordance with reporting needs for the HD. Each N2000 site needs to provide estimates of occupancy as part of the Standard Data Forms, that could be outdated or incomplete. Updated information should help enhance conservation of freshwater fish species in Spain. We compiled a dataset with 10,000 field observations for 60 species and a dataset of environmental predictors including climate, topography, and land cover variables. We then used BIOMOD2 for modelling the spatial distribution of 40 freshwater fish species, 28 of them included in the HD. We then translated these distributions into two presence-absence maps: a maximum potential distribution, and a minimum potential distribution, and used them to measure the degree of coverage of species in the N2000. We found that, on average, up to 30% and 35% of the maximum and minimum potential distribution, respectively, of freshwater fish species were covered under N2000. However, there were differences between species, only a quarter of the species had at least 40% of its minimum potential distribution under N2000. For instance, *Cobitis calderoni* had a coverage of its minimum potential distribution inside N2000 under the 10% compared with *Parachondrostoma turiense* or *Pseudochondrostoma polylepis* that reached the 70% of coverage. The spatial coverage of species under N2000 and its consideration in the policy framework could help to ensure its conservation and to better monitor its conservation status over time. The information presented here could help prioritizing conservation measures inside N2000 for freshwater ecosystems, and to designate new Special Areas of Conservations to fill some of the gaps identified in this study, as part of the objectives of the new EU Biodiversity Strategy.

Keywords: species distribution models; conservation; Natura 2000 network

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