# Conserving evolutionary processes for three amphibian species in the Iberian Peninsula

Jeffrey O. Hanson\*1, Adam Marques1, Ínigo Martinez-Solano1, Guillermo Velo-Antón1, Ana Veríssimo1, Silvia B. Carvalho1  
1CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos da Universidade do Porto, Vairão, Portugal  
\*Correspondence should be addressed to jeffrey.hanson@uqconnect.edu.au

**Objectives**

To maximize the long-term persistence of biodiversity, protected areas need to maintain evolutionary processes. However, assessments of existing protected areas and prioritizations for establishing new reserves rarely account for such processes explicitly. Here we evaluate if protected areas in Portugal and Spain are adequately representing various evolutionary components that underpin the survival of three amphibian species (*Hyla molleri*, *Rana iberica*, and *Pelobates cultripes*).

**Methods**

We used environmental, genetic, and occurrence data to map patterns of (i) genetic fitness (individual heterozygosity), (ii) neutral genetic variation, (iii) adaptive genetic variation, (iv) environmental conditions, and (v) potential refugia for future climate change. We then assessed if existing protected areas are adequately representing these evolutionary components for each genetic lineage within each species, and identified priority areas for protected area establishment.

**Results**

We found that existing protected areas are covering a broad range of environmental conditions across the distribution of these species. However, they are also failing to represent many dimensions of genetic diversity. With two of these species listed as Near Threatened on the Red List by the International Union for Conservation of Nature, further erosion of genetic diversity could severely compromise their long-term persistence. To address these shortfalls, we also identified priority areas for new protected areas.

**Conclusions**

Strategic establishment of new protected areas could rapidly enhance the long-term persistence of these three species. By applying this framework to other taxa, conservation assessments and prioritizations can explicitly account for evolutionary processes and, ultimately, enhance the long-term persistence of biodiversity.

**Key words**: Conservation decisions, Gap analysis, spatial prioritization, protected areas, optimization.