

Assessing the range dynamics of the imperial eagle in Central Europe

Benjamin Balog, Bachelor Thesis

Abstract

Range shifts in the avian species can have various causes ranging from changes in foraging and nesting behaviors, and anthropogenic impacts such as persecution and habitat encroachment, loss or fragmentation. Climate and land-use changes are known to be key drivers of range shifts in birds, which could have significant impacts on their persistence. In certain cases, the range shift leads to the expansion of a population, whereas in other cases, it leads to population decline, if the range shifts to a less suitable habitat. The eastern imperial eagle (*Aquila heliaca*) is a globally threatened bird of prey, and the Carpathian basin is known to host the westernmost population of this species. Unlike other populations, the imperial eagles of the Carpathian are not migratory, and their number has increased since conservation measures were introduced in the 1980s. Over the past decades, there are indications of a shift in habitat use of this population in Hungary and Slovakia: while most pairs bred in forested mountainous areas in the 1980s, today almost all individuals breed and forage on the plains characterized by agricultural land-use patterns. Several studies have explored the intensity and variety of threats to imperial eagles in the Carpathian Basin, however, most studies focused on either rather small-scale assessments, or on smaller landscape units, and not at the entire population range. Moreover, most studies base their assessments on a number of breeding pairs and not on observational data from across the range. Using various datasets such as eBird and GBIF and species distribution modeling, this study will delineate the extent of this shift across the entire range of the Carpathian population. The model includes occurrence points (ranging from the 1980s to now) and variables such as land cover, elevation and climate to produce maps and to test the following hypothesis: imperial eagles in the Carpathian basin shifted their range from mountainous areas to lowland habitats once the human persecutions were removed. This study aims to use citizen science-based information for further conservation action in the Carpathian basin to secure the future development of the eastern imperial eagle population in the region.



Fig. 1. Imperial Eagle - *Aquila heliaca* Savigni. Source: [European Environment Agency](#) (2022).