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Survival estimation of breeding eastern imperial eagles in Hungary based on genotypes determined from naturally shed and chick feathers

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The eastern imperial eagle (*Aquila heliaca*) is a globally endangered, large-sized, territorial and socially monogamous raptor species. A significant part of its European population breeds in the Carpathian Basin. The size of the Hungarian population is constantly increasing due to the species conservation projects. In order to evaluate the success of the HELICON Life project (2011–2016) we estimated the survival probabilities of the Hungarian breeding pairs for the years 2011–2017.

A capture-recapture method (CJS model) was used to estimate survival probabilities. Individual identification was based on DNA profiles determined from naturally shed feathers collected at the nest sites and feathers pulled from chicks. Capture histories for 395 breeding individuals were constructed. When we could not sample a breeding bird in a particular year, we used the samples of the chicks from the same year to identify the missing bird, thus gaining additional estimated presence data.

The QAICc-based model selection resulted in three best supported models: (i) constant 90,3% survival over the study period, (ii) sex-dependent survival, with males having lower, 88,6% survival compared to females with higher, 90,9% survival, (iii) time-dependent survival with a 4,2-8,6 percentage point lower survival for the interval 2011–2013 compared to the following years. The additional estimated presence data reduced the uncertainty of the estimates of survival, especially for males.

Slightly lower male survival can be explained by the different behaviour of the sexes: the males face more danger as they spend more time hunting and protecting the territory. The lower survival for 2011–2013 may be in connection with the high poisoning rates at that time. The higher survival rates of the later years show the successfulness of the HELICON Life project.