

# Saving two endangered adult Bonelli's eagles per year could prevent species loss

September 30 2016

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Image of the ringed bird in 2008 –baby bird 0M- that died due electrocution in 2014 in a high power line density area in Penedès. Image: Conservation Biology Group of the University of Barcelona and the IRBio.

Dying from electrocution at power lines is the most common death for Bonelli's eagles (*Aquila fasciata*), a threatened species in Europe. This is the case of a baby bird that died at Montserrat Mountain (Barcelona, Spain) in 2014 in a place with a high density of power lines. Another ringed eagle was electrocuted in Vallès mountains in 2015 at the bottom of an electric tower in Empordà (Girona, Spain).

These are only two examples of the 92 Bonelli's eagles that died due to electrocution in Catalonia from 1990 to 2014, a problem that plagues birds around the world. In other parts of the peninsula, this affects other

species with great ecological value, such as the Spanish imperial eagle (*Aquila adalberti*), another of the most threatened species around the world. In the United States, the American bald eagle (*Haliaeetus leucocephalus*) often dies by electrocution; it is the national symbol of a country where there are between 12 and 64 million bird deaths due to power lines (around 11 million electrocutions) annually.

## **Power lines: bird death traps**

"Saving two adult birds or four young eagles per year would be enough to stabilize the Bonelli's eagle population. In order to do so, the most efficient action would be to join preservation efforts to correct some electric towers, which are danger spots for the birds," says Joan Real, director of the Conservation Biology Group linked to the Department of Evolutionary Biology, Ecology and Environmental Sciences and the Biodiversity Research Institute of the University of Barcelona (IRBio), and one of the authors of a new article published in the journal *Biological Conservation*, together with Antonio Hernández Matías (first author of the article) and Francesc Parés (UB and IRBio), and Roger Pradel (University of Montpellier).

This work shows a statistical model to evaluate the impact of electrocution deaths in Bonelli's eagles in Catalonia and quantifies which mitigation actions would be necessary to preserve the eagle population in different areas. "Regarding preservation, the new model will allow managers calculating the needed mitigation effort to guarantee the population viability of these birds" says the researcher Antonio Hernández Matías, member of the Conservation Biology Group of the University of Barcelona.

## **Stopping adult bird deaths is a more efficient strategy**

Increasing the number of [baby birds](#) is a classic strategy to preserve Bonelli's eagle. For example, moving baby birds that would probably die to other nests is a positive task but not the most efficient one regarding the preservation of its population. Identifying the priority measures to be promoted is the key factor when facing the challenge of Bonelli's eagle preservation.

"One first step, for example, would be to decide if protection or mitigation measures are centered on adult or young populations, which use separated areas in lots of territory species" says Joan Real, who, since 1980, led a reference group on research of the Bonelli's eagle ecology and finding solutions to improve its preservation.

"The new statistical model as well as other studies carried out in recent years shows that stopping adult deaths is 10 times more efficient demographically than trying to make baby birds fly. This information is very important for the conservation managers because it allows them to be more effective and optimize their means."

## **Preventing eagle population decrease with a new statistic model**

Most of the Bonelli's eagle population—between 920 and 1100 couples—lives in the Iberian Peninsula. This species, threatened throughout Europe, has declined dramatically in recent decades. Catalonia is not an exception regarding this general tendency.

In the 1990s, there were around 100 couples, which were reduced to 60 by 2000. However, the population has stabilized now, and there is some colonization in some territories. Nevertheless, in the northwest sector and center of the Peninsula, the situation has become alarming, and some populations are in danger of disappearing.

Most of the deaths are caused by power lines and human hunting. "To understand how human activity causes demographic decrease in endangered species is essential to establish the priorities in preservation actions," says Joan Real. To assess the mortality impact of electrocution in the populations, the authors designed a new statistical model that uses warning information on ringed eagles from experts with demographic data about the eagle populations from 1990 to 2014.

Antonio Hernández says, "The new statistic model allows adding information on monitoring and multievent models of hunting and warning, so it was possible to estimate death probability due specific causes as well as probability of finding a dead individual for the same reason. In this sense, it was estimated that it is three times more probable to find dead individuals due electrocution than other causes, and the probability of finding dead individuals for electrocution was of 62 percent in non-territorial individuals and 26 percent in territorial individuals."

## **Combining efforts to correct the most dangerous power towers**

Once the electrocution impact was known, it was applied on a demographic model based on the monitoring of the population in Catalonia driven by the Conservation Biology Group of the UB in recent decades. As a final result, they could prove that reduced bird electrocution would guarantee the viability of the population, a topic which had some controversy due the lack of quantitative analysis.

"As a consequence, they could estimate what correction efforts on electric support would be necessary so to stabilize the Catalan population," said Joan Real. The new work obtained the support of the company ENDESA, the Swiss foundation MAVA, the Spanish

Government, Diputació de Barcelona and Miquel Torres Foundation, from Vilafranca del Penedès.

## A protocol against electrocution points in Catalonia

The UB and IRBio group also designed a protocol to efficiently mitigate the bird electrocution problem. With the technical characteristics of the electric supports and their positions, one predictive model developed by the researchers identifies the most dangerous towers and focuses the correction effort on black spots, the ones that have more electrocutions. This procedure allows optimizing by more than a 70 percent the resources dedicated to the correction, with a positive effect on the eagles. "The pioneer test of this initiative happened in Parc Natural de Sant Llorenç del Munt and it reduced eagle mortality from 23 percent to zero in recent years," says the researcher.

"However, it is quite worrying that although legislation has existed from the Spanish and the Catalan governments for more than 10 years, in Catalonia, there are no [power lines](#) corrected yet and thousands of birds are electrocuted every day. For the eagles, this is one of the worst impacts for the survival of the populations" says Joan Real. The Conservation Biology Group of the UB is also author of the project "The Viability of the Population of Bonelli's Eagle in Catalonia: Guidelines for Conservation," the first scientific report that presents guidelines to preserve this endangered species in Europe.

**More information:** Antonio Hernández-Matías et al. Electrocution threatens the viability of populations of the endangered Bonelli's eagle (*Aquila fasciata*) in Southern Europe, *Biological Conservation* (2015). [DOI: 10.1016/j.biocon.2015.06.028](https://doi.org/10.1016/j.biocon.2015.06.028)

Provided by University of Barcelona

Citation: Saving two endangered adult Bonelli's eagles per year could prevent species loss (2016, September 30) retrieved 26 April 2024 from <https://phys.org/news/2016-09-endangered-adult-bonelli-eagles-year.html>

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