EFFECTIVE COLLABORATION METHOD BETWEEN NGOs AND GRID OPERATORS IN SPAIN

Godino, A.; Marrero, S.; Romero, C.; Machado, C.; Guerrero, A.

1.- INTRODUCTION

The reinforcement of the red kite´s (*Milvus milvus*) population in SW of Spain is an action implemented by AMUS in the framework of the Eurokite LIFE project, to promote the long-term conservation of the small and threatened population of red kite in this region.

Based on the IUCN Guidelines for Reintroductions and Other Conservation Translocations (IUCN/SSC, 2013), threats for the species involved in conservation translocation projects must be identified, detected and reduce or minimized to guarantee or improve the success of this action. For the red kite, electrocution with power lines is an important threat in Europe (Mattson *et al.*, 2022) and probably in wintering areas in Northern Africa (pers. obs), being an important step for the reinforcement project in SW Spain to try to reduce this threat.

2.- STUDY AREA

The area included in the feasibility study for the red kite´s reinforcement covers 600.000 ha. in northern part of Huelva province (Andalusia region) and southern part of Badajoz province (Extremadura region), SW of Spain.

The habitat of the area meets the ecological conditions of the species from the point of view of orography, height, structure and density of vegetation, etc. The landscape is defined by extensive dehesas along with pasture, forestry and olive groves. This has allowed the existence of contrasts of vegetation cover, the alternation of thinned-out forests of holm oaks and cork oaks, with denser cover of these species accompanied by understory, areas of crops or pastures and shrubs. The mosaic landscape with significant forested areas, where silvo-pastoral use occupies a large part of the surface area, are conditions positively selected for by the red kite.

The release place is a private estate of 660 ha, in addition with two continue public estates with 16.000 ha. These estates have a 10 years wildlife conservation agreement with AMUS and they were selected, from 4 release places proposed, by the committee of experts of the project due to the best characteristics from the point of view of habitat, threats´ control, food availability and social support.

3.- AIMS

With the goal of minimizing the impact of electrocution in the red kite´s reinforcement project, it was stablished a collaboration between AMUS and E-Distribución, the electric company responsible for the power lines net in the area. This company has a plan to correct and isolate electric pylons in the study area, based on the regional and national legislation to prevent birds' electrocution.

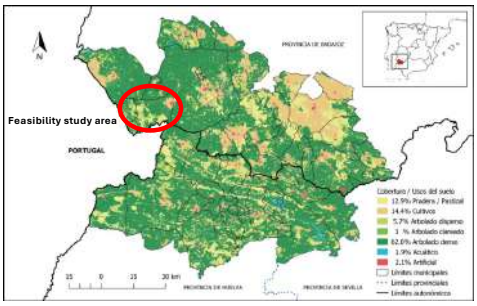

Fig. 1 – Map of the study area. The red circle indicates the releasing area selected for the reinforcement of the red kite in the SW of Spain, in the LIFE Eurokite project.

Fig. 2 – Wild red kite, in the SW of Spain.

Fig. 3 and 4 – Correction of an electric pylon, by E-Distribución, in the surroundings of the releasing area.

Fig. 5, 6 and 7 – Red kite released by the Eurokite LIFE project, with the wing tag X, in an electric pylon. On the left the electric pylon as before the correction by E-Distribución. On the middle and on the right the electric pylon was already been corrected and it was added a birds' perch, increasing the distance between the bird and the critical area of the pylon.

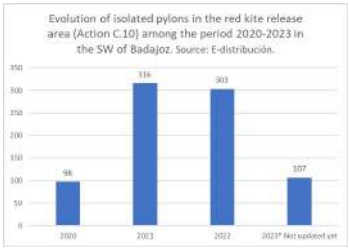

Fig. 8 –Number of isolated electric pylons in the releasing area, from 2020 until 2023. Source: E-Distribución.

4.- METHODOLOGY

There were two types of corrections :

A).- Urgent: When a bird was electrocuted, the pylon was isolated with covers adapted to each kind of upperpart pylon design. In the cases where the pylons were used frequently, additional birds´ perches were installed at the top of the pylon with the goal of separate the birds of the dangerous components.

B). Planned: Every year this company isolates randomly a number of electric pylons as a prevent measure to avoid birds´ electrocution.

Based on this planification to correct electric pylons, several meetings between AMUS and E-Distribution established the priority to focus the correction of electric pylons in the releasing area and other areas with an intensive spatial use of the red kites detected throughout the GPS of each released bird.

5.- RESULTS

Several meetings between AMUS and E-Distribution added two new criteria to prioritize the correction of power lines in 2023 and after:

- To focus the correction of electric pylons in the red kite´s releasing area and other areas with an intensive spatial use of the red kites detected throughout the GPS of each released bird.

- To prioritize the correction of dangerous electric pylons designs (pin-type insulators and jumpers, disconnectors and derivation of power lines) instead of the correction of all pylons of determinate power lines.

During the period 2020-2023, more than 824 electric pylons were corrected in the southern Badajoz province (Spanish Extremadura region). In the northern half of the feasibility study area for the red kite´s population reinforcement (300.000 ha), 582 disconnectors and dangerous pylons have been registered and E-Distribution established a plan to correct 117 pylons/year during 2023-2027 period. The mid/long term result of this plan will correct all disconnectors pylons in this area.

6.- CONCLUSIONS

Being the electrocution an important threat for birds´ conservation, it is possible and necessary to joint effort between electric companies, bird´s conservation organizations and wildlife authorities to reduce or minimize the impact of power lines. In spite of public economical support to implement this action in many countries of the European Union and the existence of technology and material to isolate electric pylons, the collaboration and exchange of information between all stakeholders involved will improve the effectiveness of this measure and a better optimization of public funds to prevent bird´s mortality.

ACKNOWLEDGEMENTS:

We are very grateful to J.C. Calzado and his team from E-Distribución, for their very proactive activity and collaboration to correct and minimize the electrocution of birds, and specially the red kites, in the releasing area. The LIFE Program of the European Commission (LIFE Eurokite project (LIFE18 NAT/AT/000048) and the electric company ENDESA, Mossy Earth, Fundación Banco de Santander, Diputación Provincial de Badajoz and Iberia have supported the red kite´s reinforcement project. The Regional Government of Extremadura, Junta de Extremadura; the Ministry for Ecological Transition and Demographic Challenge; and the Ministry for Agriculture, Fisheries and Food of the Spanish Government authorized all licenses and permits for the translocation. We also thank to the mayors of the municipalities of Oliva de la Frontera, L. Osorio and J. García; and Valencia del Mombuey, M. Naharro, to allows us the implementation of this project in their public estates and for the help we have received from these public bodies during the last decade.

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Effects of wind turbine dimensions on the collision risk of raptors: a simulation approach based on flight height distributions

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Background

Informed selection of wind turbine dimensions could mitigate the collision risk of birds.

But: Effects of turbine dimensions still unknown for many species!

Methodological problem: Fatality data associated with strong biases

→ Alternative approach:
Simulations based on **flight height data** allowing to keep confounding factors constant (e.g. bird abundance and behaviour)

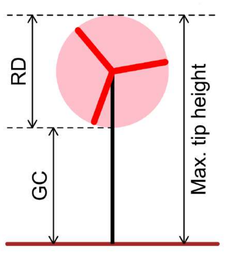


Figure 1: Illustration of the considered size parameters of wind turbines.
GC = ground clearance; RD = rotor diameter.

Methods

275 GPS-tagged individuals of **six raptor species** in 15 study areas in FR, BE, LU, NL, DE and SE

High-frequency GPS tracking to obtain accurate flight height data (6,126 h of HF flight tracks ↓)

Figure 2: Example of high-frequency flight track (GPS interval of 3 s).

Stochastic Band Collision Risk Model (sCRM) applied to range of wind turbine models using:

- Species-specific flight height distributions
- Rotation speed as a function of rotor diameter

Results (1): Flight height distributions

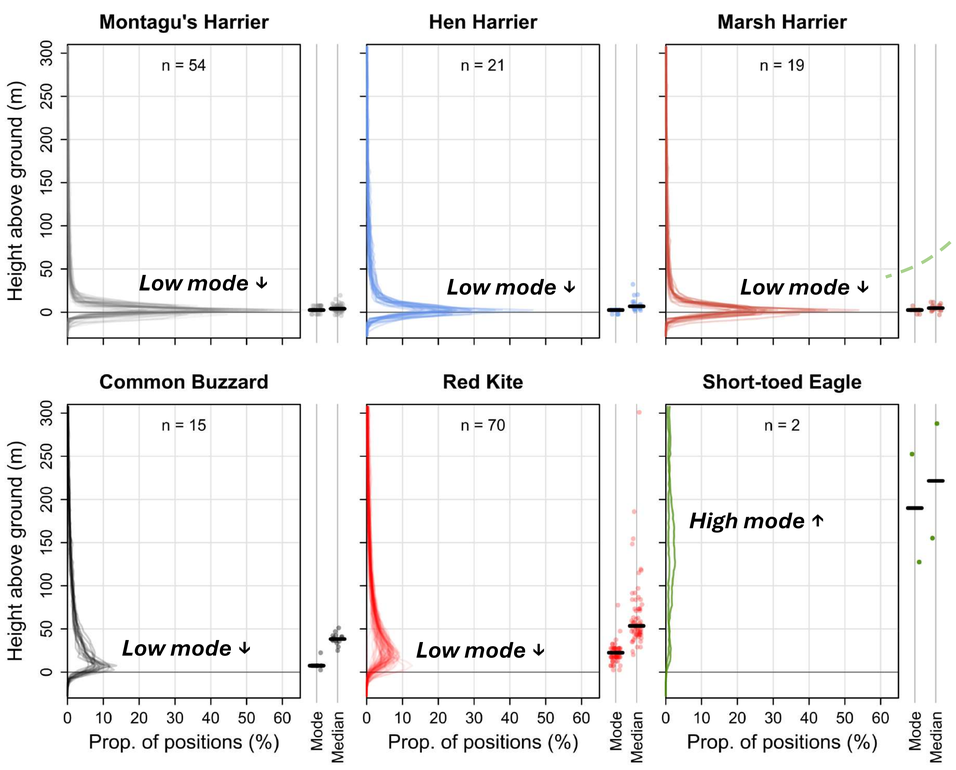


Figure 3: Flight height distributions per species in height bins of 5 m. Every line represents one individual bird; the mode and median per individual are indicated right of the panels (thick horizontal line: medians across individuals). Prop. = proportion.

Results (2): Effects of turbine dimensions

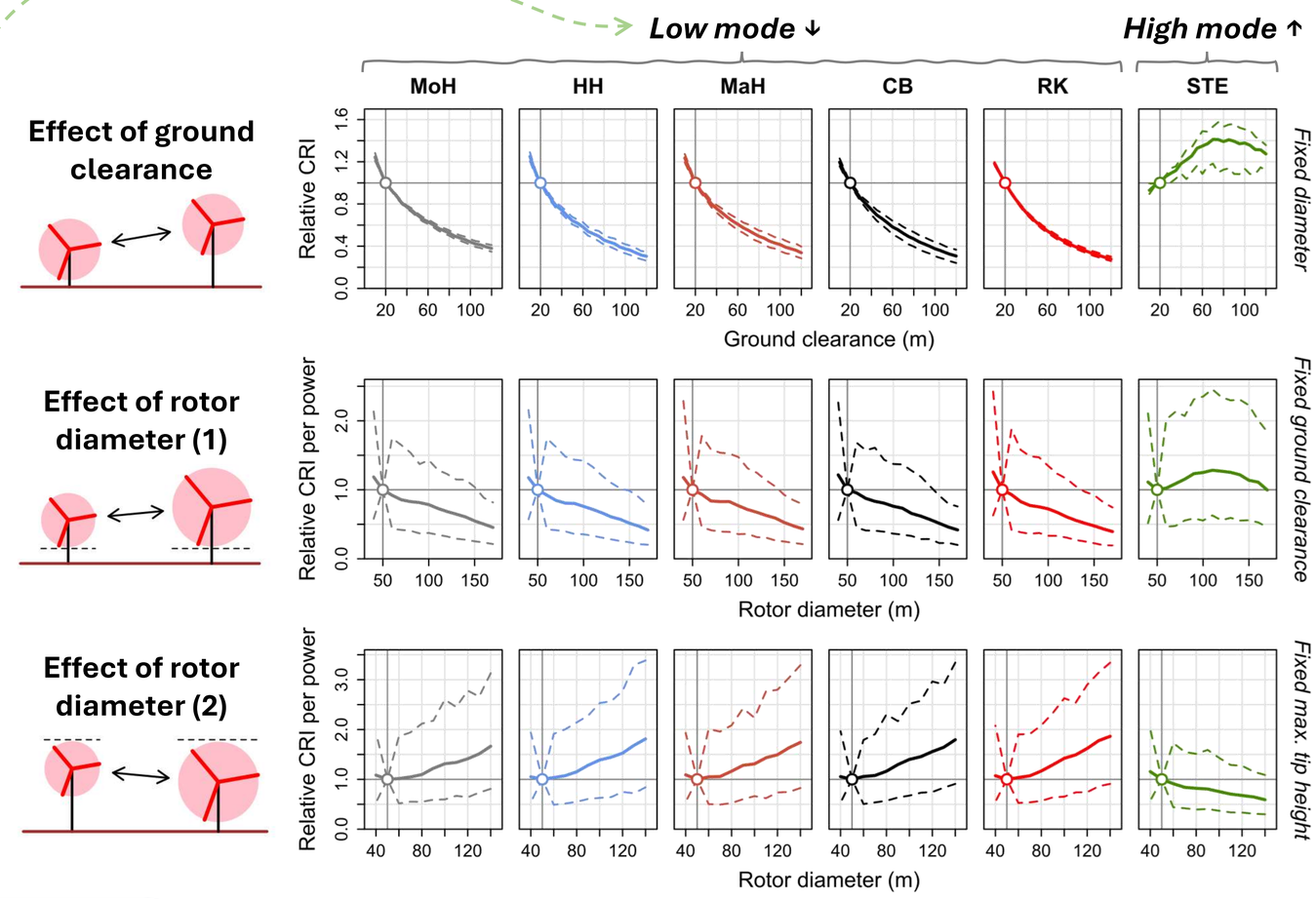


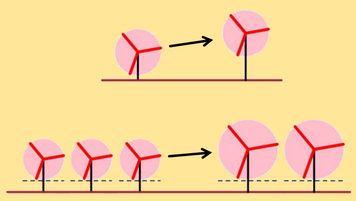
Figure 4: Effect of ground clearance and rotor diameter of wind turbines on collision risk relative to a reference level (thick vertical line). Panels show either collision risk index per turbine (first row) or per rated power (second and third row). Thick lines: means; dashed lines: 95% confidence intervals.

Conclusions:

Opposite effects of wind turbine dimensions on collision risk for different raptor species depending on the flight height distribution (low mode vs. high mode)

For **species with low mode**: Collision risk reduced when using

- turbines with **higher ground clearance**
- **less turbines with larger diameter** instead of more turbines with smaller diameter to achieve given total power (at fixed ground clearance)



Further reading:

Schaub et al. 2024 *Sci. Total Environ.*

PhD thesis Tonio Schaub

Up next:

Development of publicly available **online tool** allowing to apply approach to real-world wind energy projects

If you want to keep updated, feel free to send an email! ↓

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WE MAKE BIRD-SAFE POWER LINES IN WESTERN BULGARIA

LIFE BIRDS on POWER LINES, LIFE16 NAT/BG/000612

Power infrastructure often exposes the life of wild birds at risk.
lifebirds.eu

Project challenges

1) prevention of electrocution - When a bird alights on electric pole, it may cause electrocution resulting in its death and power interuption.

2) prevention of collicion with power lines - While flying, birds can, collide into overhead power lines as they are hardly visible, especially in bad weather conditions and low visabililty.

Introduced solutions

- Making bird-dangerous electric poles safe with the use of various insulation covers;
- Instalation of "diverters" to be hanged along the overhead power lines at specific distance to make cables visable for the birds;
- Making risky stork nests safer by lifting them on special metal platforms in order to increase the distance between the nest and the power lines;
- Installation of bird-friendly poles on site.

Project objectives

- Reduction of bird mortality caused by electrocution upon alighting on distribution poles and crashing into overhead power lines;
- Ensuring safe nesting places for white stork (Ciconia ciconia) in Western Bulgaria;
- Reinforcing the support of the society and the stakeholders in solving the conflict between wild birds and overhead power lines.
- Promotion of general benefits for biodiversity and people.

Methods

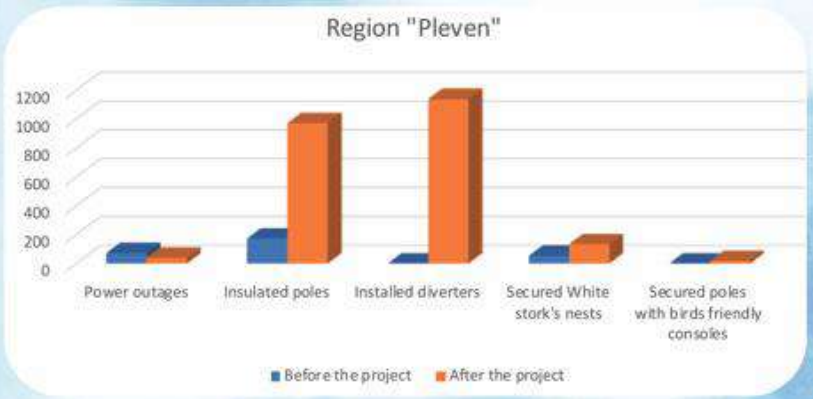
- Field surveys to check birds mortality caused by electrocution/ collision.
- Assessment of the number of platforms occupied by White Storks.
- Assessment of the number and trends in the local population of White Storks.
- Analysis of the reasons of power outages.

Main project activities

- Indefication of power lines that are dangerous for the birds;
- Creating of GIS database of risk sections;
- Carring out field researches about bird mortality in conflict areas with the power distribution system;
- Making power distribution poles safe by installation of insulation and protective products that protect birds against electrocution;
- Making overhead power lines with diverters;
- Making 900 risky stork nests safe by installation of metal platforms;
- Design of pole prototype that is safe for the birds and instalation of such pole in key project areas;
- Raising awareness of key institutions and other stakeholders about the nature of challenges and solutions.

Results

- After the field survey in 2022 two victims of collision were found. No victims were found in 2023.
- About 97% of the installed platforms are occupied by White Storks.
- Increased public awareness.
- The highest percentage in power outages is achieved in "Pleven" region – app. 45%.



	Before the project	After the project
Power outages	72	39
Insulated poles	173	973
Installed diverters	0	1140
Secured White stork's nests	53	133
Secured poles with birds friendly consoles	0	16

EDG WEST

lifebirds

NATURA 2000

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Life

WE MAKE THE POWER LINES ALONG THE DANUBE RIVER SAFE FOR BIRDS

Wingspan 2024: Partnerships for a bird-friendly energy transition, Brussels, 15-17.10.2024

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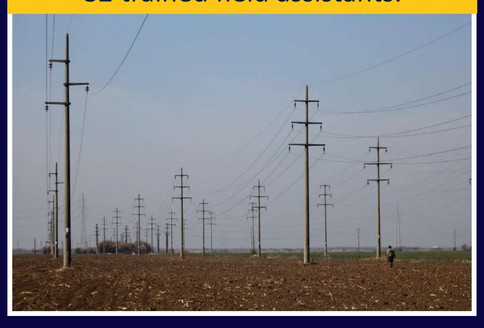
LIFE DANUBE FREE SKY (2020-2026)

One of the biggest threats for the wild living species of birds is electrocution and collisions with power lines causing thousands of avoidable deaths and injuries. These threats are targeted by the LIFE Danube Free Sky project, representing a unique example of wide transnational cooperation along with one of the most important migration corridors, stop-over sites, and wintering places for many bird species in Europe - the Danube river.

A total of 15 partners (electricity companies, nature conservation authorities, non-governmental organisations, railway company) from 7 countries are cooperating on implementation of the project to achieve common goals. Our mission is to increase safety of power lines in 25 Special Protection Areas (SPAs) and 9 Important Bird Areas (IBAs) along the Danube river not only for 12 priority target bird species: *Anser erythropus, Aquila heliaca, Botaurus stellaris, Branta ruficollis, Clanga clanga, Clanga pomarina, Coracias garrulus, Crex crex, Falco cherrug, Falco vespertinus, Otis tarda, Pelecanus crispus*, but also for many other bird species that are at risk of electrocution and/or collision.

82 trained field assistants.

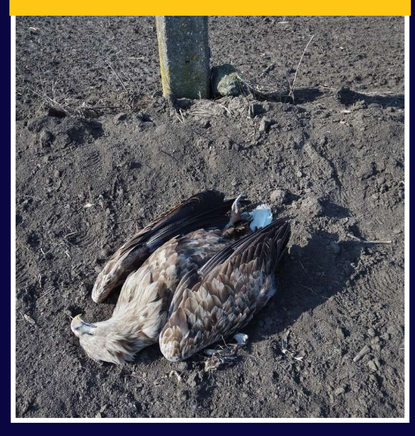


A field survey was carried out (01/2021 - 10/2022), covered almost 1,580 km of 8 types of the above ground power lines (10 kV, 20 kV, 22 kV, 35 kV, 110 kV, 220 kV, 400 kV, and electric railway lines) and 12,535 poles in 25 SPAs and their adjacent areas located in Austria, Slovakia, Hungary, Croatia, Bulgaria, Romania, and in 9 IBAs in Serbia.

For 1,833 individuals belonging to 93 species and 18 orders, it was possible to determine the exact cause of death. Electrocutions accounted for 55% (1,009 ind.), belonging to 35 bird species; collisions accounted for 45% (824 ind.), involving 78 bird species.

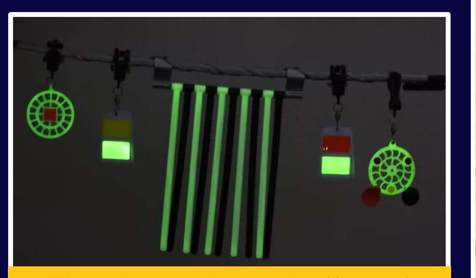
The eurasian magpie (*Pica pica*) was the most frequentlly detected and associated with 27 % (n=193) of all electrocutions. The second highest mortality was observed for the common buzzard (*Buteo buteo*) with 22% (157 ind.). The mute swan (*Cygnus olor*) was the most common bird detected with 20 % (155 ind.) of all identified collisions.

More than 2,100 bird carcasses were found from 103 species.



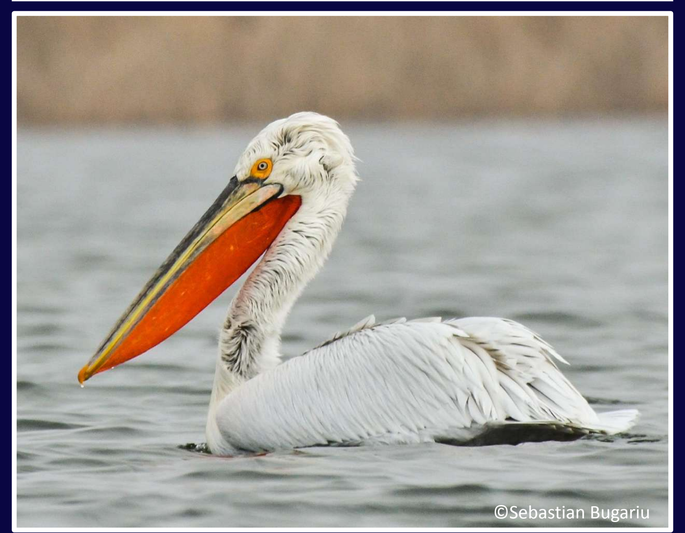
Several types of bird flight diverters were used, new types were developed and tested.

Almost 270 km of power lines were identified as a priority for increasing the visibility via installation of bird flight diverters and use of insulated conductors.



The glow in the dark effect of some of the installed diverters.

Different methods of installation of bird flight diverters were applied.



Using a special drone to install the diverters reduces conflicts between the farmers and the electricity companies. There is no need to pay compensation for destroyed crop. At the same time, there is no need to shut down the line during the installation of the diverters.

More than 4,000 utility poles insulated or modified to avoid electrocution. The elements must be installed properly to ensure safety for birds.

Thousands of birds saved each year!

Safe railway lines in Austria.

Co-funded by the European Union

The LIFE Danube Free Sky – Transnational conservation of birds along the Danube river (LIFE19 NAT/SK/001023) project has received funding from the LIFE Programme of the European Union and the Ministry of Environment of the Slovak Republic.

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Photo: M. Gális, S. Bugariu, LIFE Danube Free Sky

Mitigating Bird Electrocution: Conservation Efforts and Successes in Andalusia, SE Spain

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Introduction

Bird electrocution on power lines is a significant conservation issue, particularly for endangered species. In Andalusia, Spain, there are approximately 150,000 power line structures that pose a risk to birds, causing an estimated 4,000 deaths annually until 2015. This high mortality rate nearly drove species like the Spanish imperial eagle to extinction and was the main limiting factor for Bonelli's eagle populations. Since the late 20th century, the Andalusian government has worked to mitigate this problem by correcting dangerous power lines and developing legislation for utility companies. However, it wasn't until 2015 that efforts became more effective, with the systematic collection of data and collaboration with major electric companies. This collaboration deepened in 2019 through an agreement with Enel-Endesa, enabling urgent modifications to the most dangerous power lines, particularly those responsible for bird deaths or located in critical areas for endangered species. This presentation aims to showcase the effectiveness of these efforts in reducing bird electrocution and its threat to the extinction of bird populations, especially endangered species, through targeted infrastructure modifications

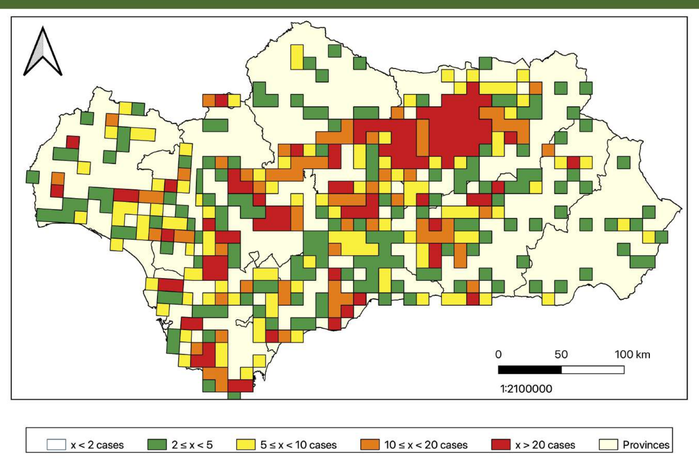
Method

To assess whether efforts in Andalusia have effectively reduced bird electrocution on power lines as a threat to avian extinction, an analysis was conducted using the Andalusian government's updated mortality database. The study examined changes in the number of electrocution black spots over three periods. The first period (1990-2015) saw no systematic data collection or targeted modification of dangerous power lines. The second period (2016-2019) included systematic data collection and adaptations based on electrocutions, along with regional (Decree 178/2006) and national legislation (Royal Decree 1432/2008) focused mainly on protected areas. The third period (2020-2023) continued systematic data collection but involved collaboration with Enel-Endesa under an agreement, allowing modifications to the most dangerous structures, regardless of their location within protected areas. Electrocution black spots were defined as 10x10 km UTM grid squares with more than 10 electrocutions per period. Six categories of electrocution frequency were identified: fewer than two, 2 to 5, 5 to 10, 11 to 20, and more than 20 electrocutions, with black spots defined as those with more than 10. A Chi-square test was performed to assess significant differences in the number of grid squares with over 10 electrocutions across the three periods, compared to the total number of squares with more than one electrocution

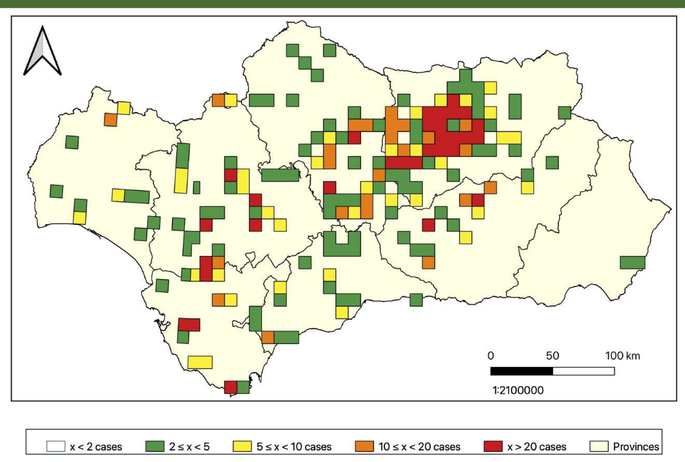
Result

Since 1990, 8,172 electrocutions of 70 different species have been recorded, including 7 species listed as threatened under Andalusian legislation (see table). During this period, around 35,000 dangerous power line structures have been modified in Andalusia, with 25,000 adapted by 2019. This has led to a significant reduction in the number of 10x10 km grid squares classified as electrocution black spots (see maps), decreasing from 41.5% of grid squares with more than 2 electrocutions in the first period, to 30.7% in the second, and to 18.8% in the 2020-2023 period (Chi-square=26.45, 2 degrees of freedom, $p<0.001$). The greatest reduction occurred in the last period, despite only 8,500 supports being modified, as these were targeted in the most critical areas for sensitive species distribution.It is noteworthy that most of the affected species now show increasing breeding trends (see table), including storks and medium to large raptors. Among the threatened species with negative trends, only the red kite remains vulnerable to electrocution due to its small population size in the region. In contrast, electrocutions of Egyptian vultures and Montagu's harriers are rare, but given their poor conservation status, further efforts to reduce these incidents are still needed.

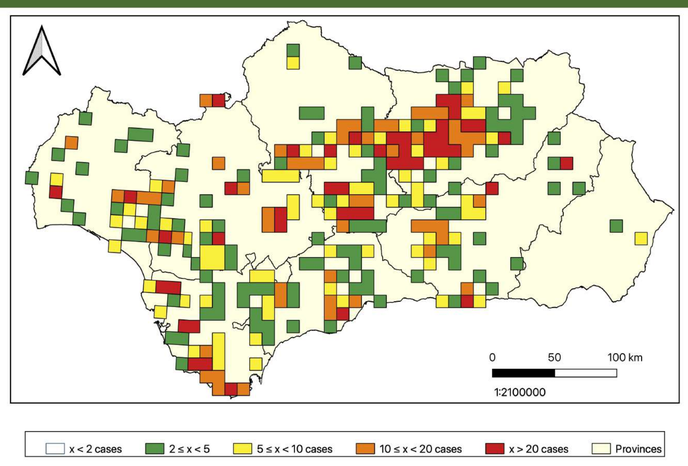
Electrocutions 1990-2023



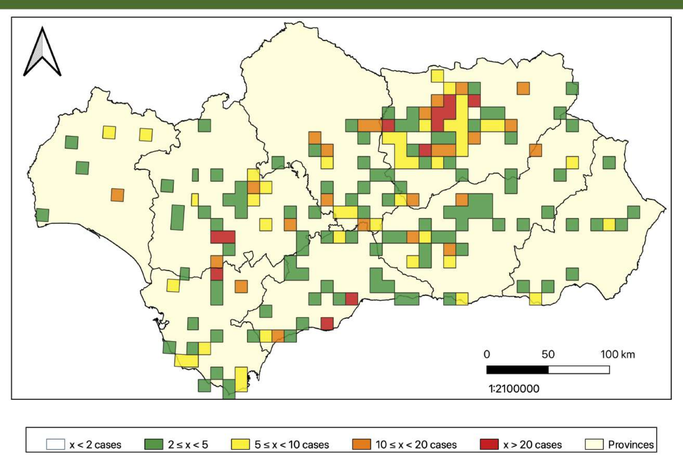
Electrocutions 2016-2019



Electrocutions 1990-2015



Electrocutions 2020-2023



Scientific name	Common name	Threat category	No. electrocutions	%	Breeding trend
Ciconia ciconia	White stork	NON THREATENED	1.818	22	↑
Bubo bubo	Eurasian eagle-owl	NON THREATENED	1.032	13	↑
Corvus corax	Northern raven	NON THREATENED	998	12	↓
Buteo buteo	Common buzzard	NON THREATENED	904	11	=
Gyps fulvus	Griffon vulture	NON THREATENED	373	5	↑
Circaetus gallicus	Short-toed snake eagle	NON THREATENED	305	4	↑
Milvus migrans	Black kite	NON THREATENED	301	4	=
Aquila fasciata	**Bonelli´s eagle**	**VU**	**235**	**3**	**=**
Falco tinnunculus	Common kestrel	NON THREATENED	169	2	↓
Falco naumanni	Lesser kestrel	NON THREATENED	125	2	↓
Aquila adalberti	**Spanish imperial eagle**	**EN**	**115**	**1**	**↑**
Hieraaetus pennatus	Booted eagle	NON THREATENED	114	1	↑
Aquila chrysaetos	Golden eagle	NON THREATENED	113	1	↑
Corvus monedula	Western jackdaw	NON THREATENED	68	1	↓
Accipiter gentilis	Northern goshawk	NON THREATENED	54	1	=
Sturnus unicolor	Spotless starling	NON THREATENED	45	1	=
Geronticus eremita	Northern bald ibis	NON THREATENED	43	1	↑
Milvus milvus	**Red kite**	**EN**	**41**	**1**	**↓**
Elanus caeruleus	Black-winged kite	NON THREATENED	33	0	=
Bubulcus ibis	Cattle egret	NON THREATENED	31	0	↓
Pandion haliaetus	Osprey	VU	20	4	=
Ciconia nigra	**Black stork**	**EN**	**15**	**3**	**=**
Aegypius monachus	**Cinereous vulture**	**VU**	**13**	**3**	**=**
Circus pygargus	**Montagu´s harrier**	**VU**	**6**	**1**	**↓**
Neophron percnopteru	**Egyptian vulture**	**EN**	**6**	**1**	**↓**
Other species (n=45)	-	-	1.255	15	-
Total (n=70 species)	**-**	**-**	**8.172**	**100**	**-**

Discussion

The results obtained indicate that the conflict between birds and power lines no longer represents a cause of extinction for bird species in Andalusia. Although the conflict persists and power lines continue to cause bird deaths due to the extensive electrical network and the growing populations of sensitive species, such as the Spanish imperial eagle, which are colonizing new areas previously considered non-critical, we are making progress toward eliminating this threat as a factor in extinction. Continuing in the same vein of collaboration with electric companies to adapt power lines, prioritizing the most sensitive areas, we estimate that by 2027-2030, no bird populations will be threatened by power lines. However, significant challenges remain, such as the adaptation of dangerous power lines owned by small proprietors who are unable to make these modifications themselves. In this regard, the regional government continues to work on securing funding for their adaptation. We believe that the solutions adopted in Andalusia, which are similar to those implemented elsewhere in Spain where have proven equally effective, should serve as a model for other European countries with less experience in addressing this issue. Andalusia collaborates in this area by developing cooperation programs with the IUCN Mediterranean Cooperation Center to identify and minimize these impacts in North Africa, thus promoting the conservation of European birds also in their migration and wintering areas, as well as producing reference documents and manuals for a global audience.

Junta de Andalucía

UICN

The value of cooperation and knowledge transfer to reduce raptor mortality due to power lines in the Western Mediterranean

H. Clavero-Sousa[1], J. Martín[2], J.R. Garrido[3] & C. Numa[1]

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INTRODUCTION

Capacity building and knowledge transfer are key tools to engage and empower stakeholders and citizens in conservation. Since 2015, the IUCN Centre for Mediterranean Cooperation has been working in collaboration with its Members and other actors - mainly the regional government of Andalusia and the Ministry of Environment (Spain) and competent authorities and NGOs in Northwest African countries - to promote cooperation and knowledge transfer in identifying and minimising the impacts of power lines on birds.

METHODS

Several training and experience-sharing workshops on the identification, mitigation and prevention of the wildlife impacts of electricity infrastructure have been organised, involving the participation of authorities, grid operators and civil society in Morocco, Tunisia and Algeria, along with Spanish and other international experts.

Field work has been carried out in collaboration with local and national authorities and NGOs, to better understand raptor populations and their threats in these three countries, accompanied by training on monitoring programmes, censuses and protocols.

Technical and financial support has been provided to projects on monitoring (e.g. by GPS) and conservation of threatened raptors (e.g. through wildlife recovery centres) carried out by NGOs in Morocco.

Development of tools to better understand the interactions between wildlife and electricity grids, to disseminate the most effective solutions, and for standardised data collection, adapted to the North African context, in collaboration with experts on the topic as well as national stakeholders.

Promotion and coordination of networks for data and knowledge exchange, in each country and at the regional level.

Practical training session on identifying power lines dangerous for wildlife (Algeria, 2024)

MAIN RESULTS

ACTIONS

- The impact and distribution of threats is being monitored by an international network of 25+ organisations to support the development of preventative and mitigation measures.
- 200+ relevant actors from environmental authorities, electricity companies and NGOs, among others, have been trained on this subject thanks to the organisation of or participation in eight training workshops.
- First power line monitoring in Morocco: survey of 550+ km of power lines in different areas of Morocco, characterising dangerous power lines and identifying the first hotspots of bird mortality from this cause in North Africa.
- Creation of a database of power lines and wildlife fatalities, with nearly 3,000 characterised pylons and 420 mortality records of 18 species (mainly birds of prey in Morocco).

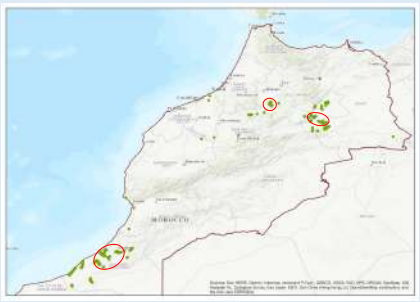
REPORTS

- Results of the first census of diurnal cliff-nesting raptors in Morocco (2019-2020), with data on mortality due to power lines.
- Results of the analysis of hazardous power lines in the Guelmin area (western Morocco, 2016), where a very high mortality rate was detected on certain pylons.
- Action plan for remediating the most dangerous power lines and pylons in the Guelmin area.
- Avian sensitivity mapping regarding electrocution and collision with power lines in Morocco.

TOOLS (available in various languages)

- Guidelines to prevent and mitigate wildlife mortality associated with electricity grids.
- Mobile app for the characterisation of power lines and recording of associated mortality, supported by a web platform for data management, visualisation and download.
- Online course (MOOC) on birds and power lines.

Actions



SPECIES		N
Gyps fulvus	Griffon vulture	2
Gyps rueppelli	Rüppell's vulture	1
Pandion halietus	Osprey	2
Aquila chrysaetos	Golden eagle	14
Aquila fasciata	Bonelli's eagle	86
Aquila adalberti	Spanish imperial eagle	6
Buteo rufinus	Long-legged buzzard	89
Circaetus gallicus	Short-toed snake eagle	10
Milvus migrans	Black kite	1
Falco tinnunculus	Common krestel	2
Falco biarmicus	Lanner falcon	11
Falco peregrinus	Peregrin falcon	1
Bubo ascalaphus	Pharaoh eagle-owl	7
Bubulcus ibis	Cattle egret	1
Ciconia ciconia	White stork	122
Corvus corax	Common raven	60
Corvus ruficollis	Brown-necked raven	3
Genetta genetta	Common genet	1
TOTAL		420

Map: *Location of monitored and characterised power lines in Morocco in 2019, included in the database of hazardous power lines. Red circles: main areas of electrocution.* ***Table****: Power line fatality data recorded in Morocco (during fieldwork carried out between 2016 and 2020). Source: Map:* Premier dénombrement national des rapaces rupicoles diurnes du Maroc*. UICN & DEF, 2020 (Available at: https://portals.iucn.org/library/). Table: IUCN Mortality Database (available on request).*

Results of a day's work monitoring power lines (Morocco, 2019)

Bonelli's eagle electrocuted

Golden eagle electrocuted

Monitoring mortality on power lines and electricity grids

Training courses in Morocco and Tunisia

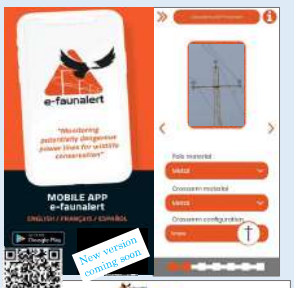
International team participating in a field mission to monitor grids in Morocco

Lanner falcon electrocuted

Common genet electrocuted

IUCN Toolkit

Guidelines to prevent and mitigate wildlife mortality associated with power lines (English & French)



Online training course "Birds and Power Lines"
https://www.conservationtraining.org/

e-faunalert mobile APP and website
http://e-faunalert.org

Reports

Unpublished report (available on request)

In press

OUTLOOK

Our work is an example of the importance of inter-institutional and transnational collaboration in preserving bird populations and enabling their coexistence with electricity infrastructure, as these species do not recognise borders, nor the areas of competence of the institutions involved in their conservation.

In the coming years, we hope to continue with training activities and the promotion of new cross-sector collaborations, in partnership with new actors, to help ensure that the best technologies are integrated into the deployment of new electricity grids associated with the fight against climate change in the Mediterranean region, especially in North Africa.

Please contact us if you are interested in collaborating.

Email: medspecies@iucn.org

Towards a better understanding of bird collisions in windfarms using data from ADS

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CONTEXT

The rapid expansion of wind power energy has direct negative impacts on biodiversity, such as birds colliding with turbines. A better understanding of the causes of collision is key to improve mitigation efforts.

However, to date, potential risk factors have mostly been assessed individually, in a few species of interest and/or at small spatiotemporal scales, despite the multifaceted nature of collision risk[1].

To fill this gap, we here aim at assessing which factors increase collision risk with the endgame of identifying high-risk situations in which mitigation measures must be improved.

METHODS

We conducted a global analysis including several bird species, 14 Wind Energy Facilities (WEFs) in Europe, environmental factors and 6 years to simultaneously assess the effects of environmental factors on birds' :

exposure (number of birds detected),

sensitivity (intrusion duration within risk zone),

vulnerability (sensitivity*exposure) to collisions.

We analysed 205,879 bird trajectories from 14 WEFs in Europe, recorded by ADS between 2018 and 2023.

ADS data collection
Gathering ADS data (videos from 2D ADS + bird 3D positions during the detection from 3D ADS)

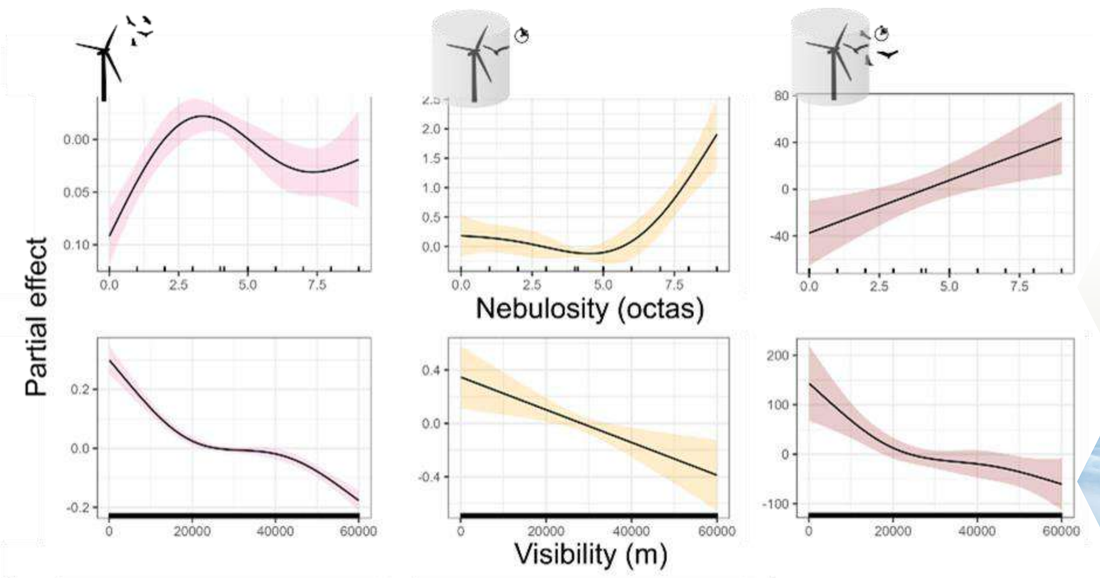
Contextual data collection
Gathering SCADA data, weather (Météo France), landscape context (CLC), and WEF features

Video analysis
Extracting 2D position of birds in each video frame, using a software developed by **WIPSEA**

Flight behaviour analysis
Reconstructing and characterising flight trajectories of birds, then classifying to discriminate two flight types (transit *vs* foraging flights)[2]

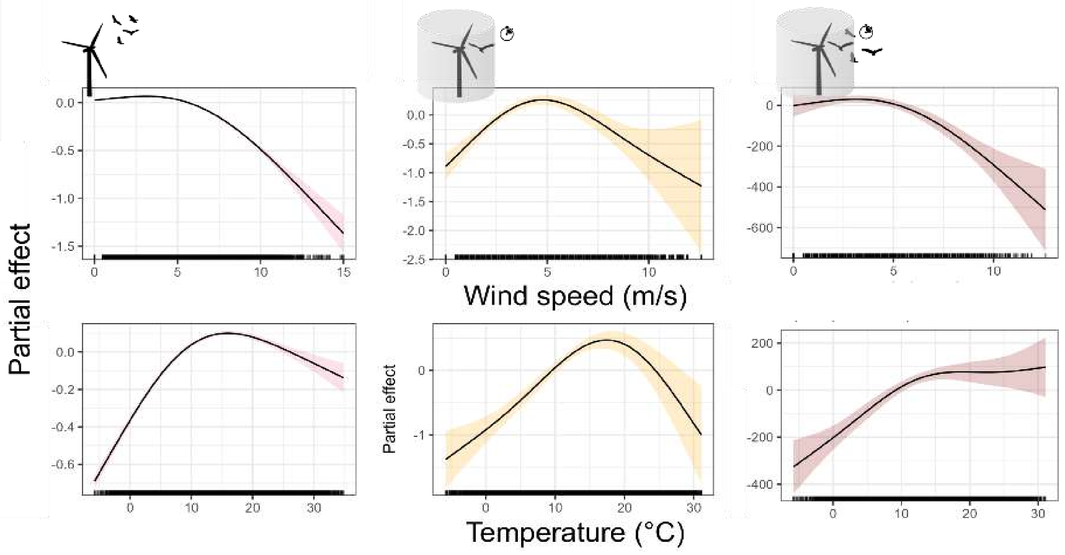
Statistical analysis and modelling
Running GAMM to assess the combined effect of environmental factors and bird flight behaviour on sensitivity, exposure, and vulnerability.

RESULTS & DISCUSSION



High exposure, sensitivity, and vulnerability in **high nebulosity** and **low visibility**.

→ *Hyp:* poor visual perception of achromatic contrasts[3] by birds, exacerbated in conditions that reduce the contrast between the turbines and their background

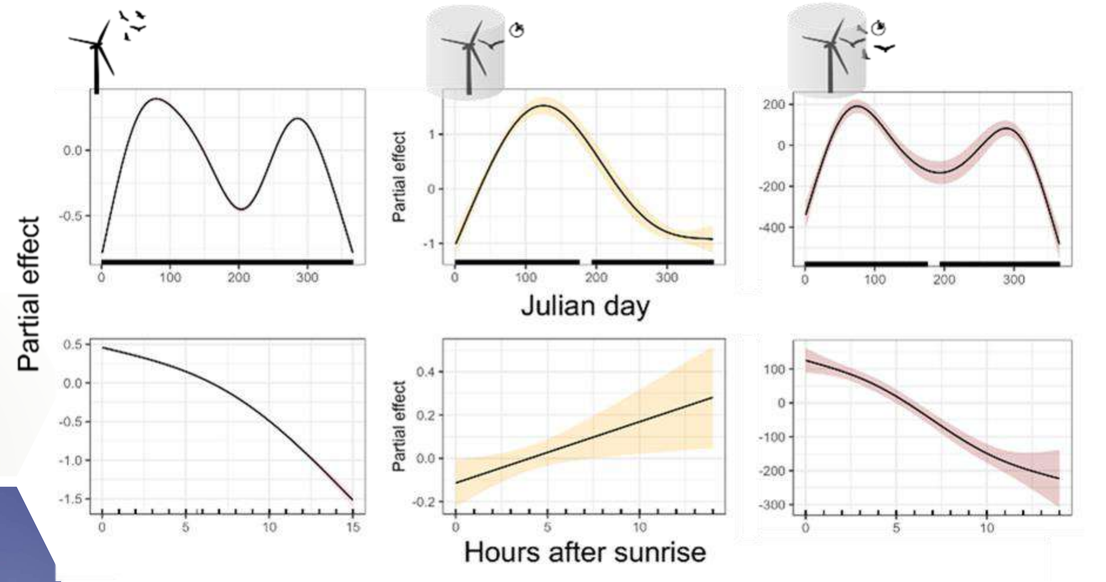


High exposure, sensitivity, and vulnerability **at low and moderate wind speeds**

→ *Hyp*: when updraft airflows used by birds to fly are weak[4,5]

High exposure, sensitivity, and vulnerability at **medium temperatures** (10-20°C), contrary to our expectations, based on the birds' use of thermal updrafts to fly[5].

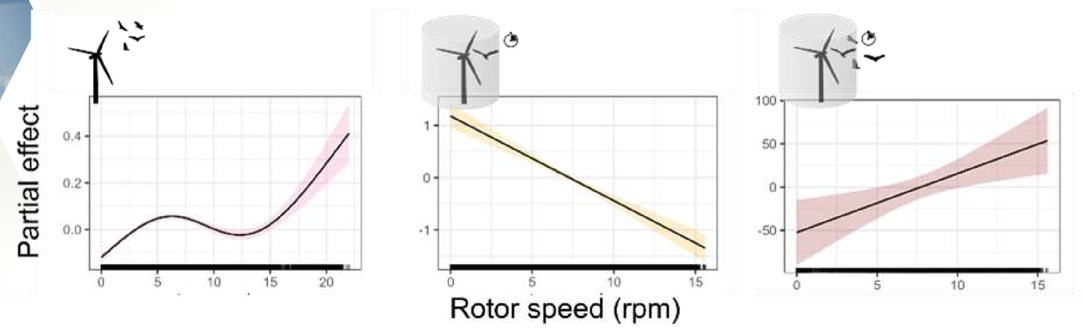
→ *Hyp*: mix of species with different ecologies and behaviors, potentially leading to oversimplification



Peaks of **exposure and vulnerability** in **spring and autumn**
→ *Hyp*: peaks in abundance and migration in central Europe[6,7]

Peak of **sensitivity in summer and dusk**
→ *Hyp*: intensive use of WEF by residents

Peaks of **exposure at dawn**
→ *Hyp*: detected birds active during first hours of daylight



High exposure at high rotor speeds

→ *Hyp:* related to strong winds, when large detected soaring birds have a high activity

High sensitivity at very low rotor speeds

→ *Hyp:* at low speeds, some bird species perceive the turbines as stationary[8] and are more likely to approach

CONCLUSIONS

- Bird sensitivity, exposure and vulnerability were high:
  - during periods of **high bird activity**
  - in conditions **reducing visual perception** of turbines
  - in conditions influencing **flight height**
- Site and inter-specific heterogeneity should be the focus of future research to obtain a deeper understanding of bird collisions.
- The non-synchronicity of exposure and sensitivity peaks highlights the importance of **examining both aspects**[9].
- Our results plead for a **wider use of ADS** to assess collision risks in anthropogenic facilities.

This work is part of MAPE, a collaborative research program that aims to produce knowledge to efficiently mitigate bird fatalities at onshore WEFs. We are very grateful to all MAPE participants, especially members of the steering committee for their guidance, windfarm managers who agreed to share data for their contribution, and ADS manufacturers for their support in data collection.

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Predict to protect: developing trait-based vulnerability indices to wind energy development for birds and bats.

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LIÈGE université — MUSÉUM NATIONAL D'HISTOIRE NATURELLE — TEMPLE UNIVERSITY — PURDUE UNIVERSITY

INTRODUCTION

The wind power industry is rapidly developing across the whole planet with ambitious goals in the short and long terms. The impact of wind farms on biodiversity, especially birds and bats, requires urgent solutions at local and global scales. The main goal of my PhD project is to propose new tools to mitigate mortality caused to birds and bats by wind power development (onshore and offshore). These tools are vulnerability indexes to identify the most vulnerable species, and risk maps to identify the most sensitive regions for aerial biodiversity. These tools will contribute to better wind energy development planning regarding bird and bat protection.

Wildlife mortality by windmills is a global issue. However, I decided to implement my approach on two large territories: the European Union (EU) and the United States of America (USA). These two regions are among the top producers of wind energy and have the most data available on bird and bat distributions, and impact of windmills on birds and bats. They harbor different policies and wind farm development approaches, which will be compared during my project.

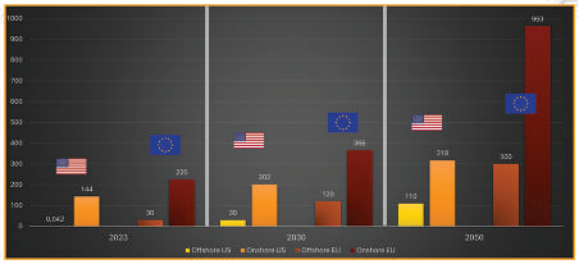

Figure1: Present and future wind farms development in the EU and in the USA

1st OBJECTIVE

Develop a method to calculate the demographic sensitivity, and the displacement and collision vulnerabilities to wind turbines for each species of raptor, seabird and bat in the EU and the USA. Use them to compute a global risk assessment score of the species to wind turbines. Validate the results using existing mortality data for the vulnerable species.

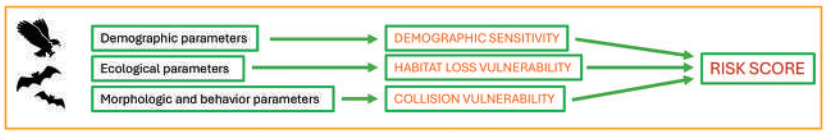

Figure 2: schematic representation of the risk score assessment

2nd OBJECTIVE

Aggregate maps of species distributions for birds and bats in Europe and the USA, to map the vulnerability of biodiversity to wind turbines. For this, the risk assessment score will be used to weigh species. Cross them with maps of present and future development of wind turbines. Define regions of high risk and regions of low risk suitable for present and future wind energy development.

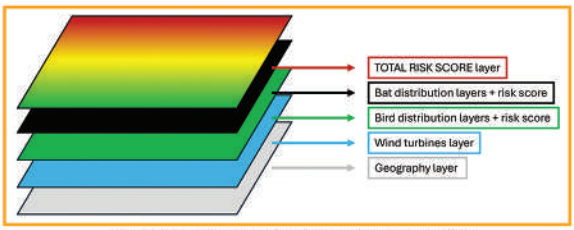

Figure 3: schematic representation of the risk map layers

3rd OBJECTIVE

Assess the policies framework implemented in the EU and in the USA to protect the vulnerable species determined by the risk assessment and compare the approaches between the two continents.

PURPOSE

At the end of the project, I will provide a synthesis of the vulnerable species on both continents,with a map of sensitive regions where the development of wind farms is more likely to harm bird and bats biodiversity. In addition to generating invaluable biological knowledge, these tools will help consulting firms, wind energy developers and decision makers to act in the best interests of birds, bats and humans.

Cumulative impact of wind energy on Red Kite population in Wallonia (Belgium)

Arnaud BECKERS[1], Arnaud VANSTEENKISTE[2] , Stef VAN RIJN[3] and Nicolas MAGAIN[2]

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[2] Evolution and Conservation Biology, InBioS Research Center, University of Liège, Belgium
[3] Delta Milieu, Vlissingen, The Netherlands
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Introduction

The impact of wind energy on European raptor populations is a matter of concern considering the high number of carcasses found under wind turbines (WT). We studied the impact of existing and future wind turbines in Wallonia (Belgium) on the European-endemic Red Kite, considering the ambitious goal of the regional government to multiply by 3 the wind power capacity in the next 6 years. Wallonia hosts ~550 breeding pairs, mainly in the Eastern side of the region.

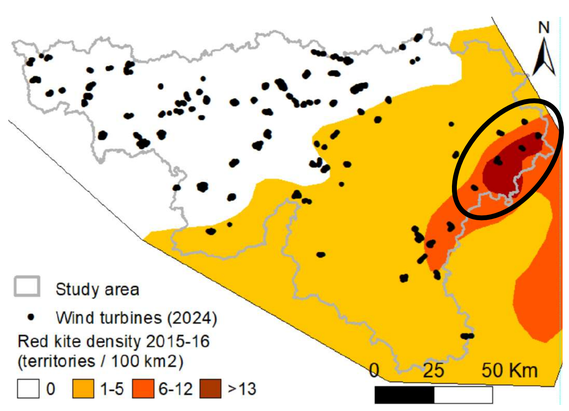
Methods

1 Measuring present-day fatality rate in the core breeding range

- Core breeding range = ~800 km² in Eastern Belgium, 31 WT in 2024
- 10 WT monitored in 2018, 9 WT in 2023
- **1.000 carcass searches**, radius of 100 m around WT (transects with human + UAV)
- Searcher efficiency and carcasses persistency tests with dead raptors

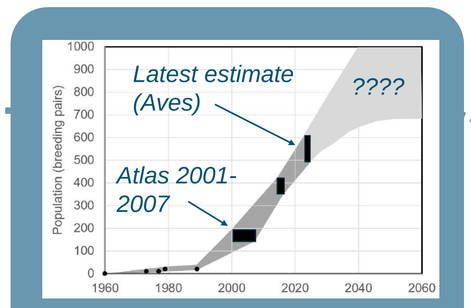
2 Extrapolation to the whole region

- Assumption : fatality rate per wind turbine decreases linearly with Red Kite density



3 Scenarios for future wind energy development (2024-2054)

- We developed 7 scenarios around the government's target, including repowerings of existing wind farms
- Repowering increases fatality rate per WT by ~1.25 (Schaub, 2024)



Red Kite population in Wallonia (breeding)

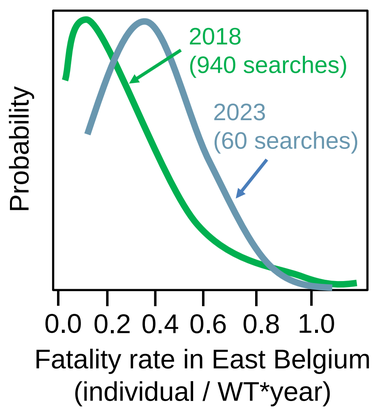
4 Link between wind energy development and fatality rates

5 Population viability analysis (2024-2054)

- We used the EolPop tool (French MAPE project)
- Static approach : all new wind turbines are already built in 2025
- Specific analyses to estimate the carrying capacity from demographic data (challenge !)

Results

- Present-day fatality rates in the core breeding range (Eastern Belgium, 31 WT) : ~6 individuals / year
- Present-day fatality rate in Wallonia (590 WT) : **~21 individuals per year**
- 7 scenarios for future wind energy development between 2,000 and 10,000 GWh/yr (table)
- Population viabiltiy analysis:
  - Results are very sensitive to initial population growth rate (4 to 6,8 %) and estimated carrying capacity
  - In most scenario combinations, trends remain positive, but the impact on the final population size is clear (0 to 37%)



Results of the systematic carcass searches in East Belgium

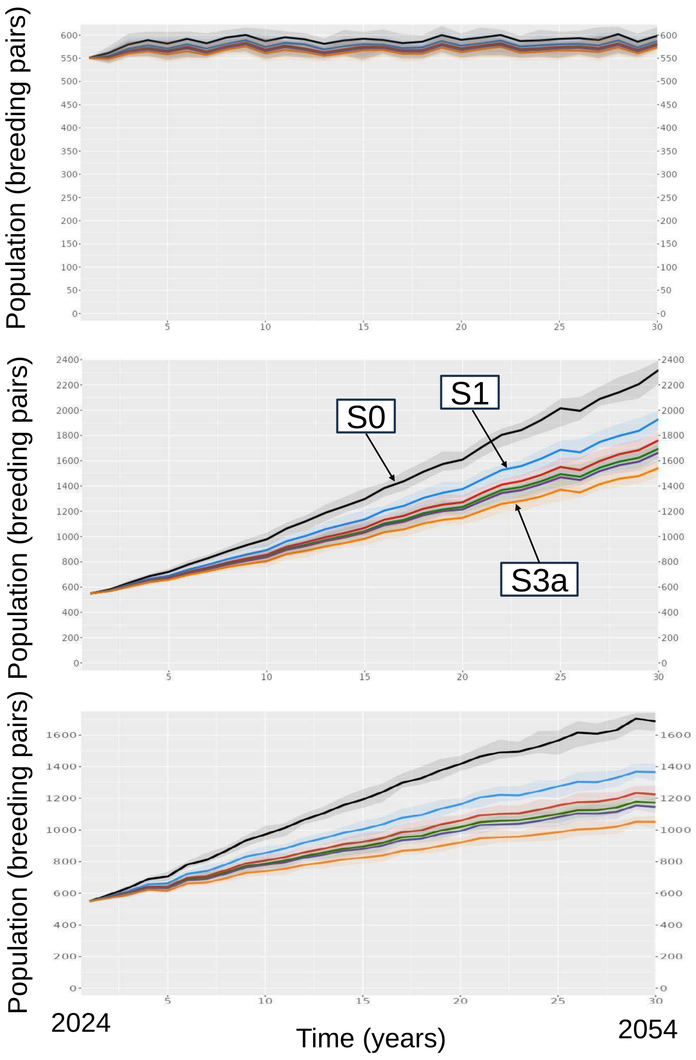
Scenarios for future (2054) wind energy development in Wallonia and estimated annual fatality

Name	Description	Number of wind turbines	Annual wind power production (GWh)	Estimated annual Red Kite fatality (individuals and rate at the beginning of each simulation)
S0	All wind turbines are dismanteld after 2024	0	0	0 (0 %)
S1A	No new wind turbine after 2024, no new repowering	596	2,205	21 (1.1 %)
S1B	No new wind turbine after 2024, repowering of old turbines (>= 20 yrs)	596	3,854	22 (1.1 %)
S2A	The objective of 6,200 GWh/yr in 2030 is reached . After 2030, the increase is slower due to the progressive saturation of the territory. Spatially homogeneous growth	931	7,877	37 (1.9 %)
S2B	Same as S2A but lower growth in East Belgium to protect the Red Kite core breeding range	931	7,877	30 (1.6 %)
S3A	Same as S3A but stronger growth after 2030	1,108	10,000	45 (2.3 %)
S3B	Same as S2B but stronger growth after 2030	1,108	10,000	34 (1.8 %)

Low growth rate (4-4.2 %/yr); low carrying capacity (595 breeding pairs)

High growth rate (6.6-6.8 %/yr); high carrying capacity (3,340 breeding pairs)

High growth rate (6.6-6.8 %/yr); medium carrying capacity (2,018 breeding pairs), fatality rate per WT increased by 50 % to consider potential underestimate



Automatic bird detection systems

- CSD Engineers was involved in the testing of SafeWind (field tests in 2022 with ornithologists in West Belgium, target species : Harriers) and parameterization of BPS (advice in the parameterization in Luxemburg in 2024, no field test, target species : Red Kite)
- SafeWind :
  - Good detection performances in a radius of 100-150 m
- Bioseco :
  - Many stops when the reaction distance was set up at 400 m
  - We advised to reduce to 300 m and add an altitude threshold
- These tools (+ others like IdentiFlight) seem very relevant to mitigate the collision risk for large birds
- If used to completely avoid the risk, detection and reaction distances need to be very large and could induce significant production losses in areas where the densities of target species or very similar species are high (e.g. Common Buzzards). We advise to consider these tools as **mitigation measure**

Conclusion and recommendations

- **As long as the natural growth in the Red Kite population is ≥ 3-4% / yr, wind farm development in Wallonia is unlikely to hinder population growth**
- **However, without mitigation measures, wind farms are expected to kill annually 21 to 45 Red Kites and will have an impact on population size**
- **We recommend to improve the monitoring of raptor population size and productivity in Wallonia (Red Kite, Common Buzzard and Kestrel) to make sure that the impact of wind energy will not become a threat in the future**

This research project is partially funded by the *Service public de Wallonie (SPW) (2023-2024)*