FRB
FONDATION POUR LA RECHERCHE SUR LA BIODIVERSITÉ

IMPACT OF WIND ENERGY ON BIODIVERSITY

Project summary

CHIRO-EOLHAB

Impacts of wind energy on bat habitat use over time and across landscapes: implications for impact assessment and prediction

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Introduction

This project aims to improve measures for reducing the impacts of wind energy infrastructure by studying bats' behavioural responses of attraction to and avoidance of wind turbines according to seasonality (spring–autumn), landscape context (hedgerow-dominated landscapes–open landscapes), and the age of the wind farm.

Context and objectives

Wind turbines can trigger attraction and avoidance responses in bats, potentially increasing collision risks and causing habitat loss.

While we know that habitat attractiveness (e.g. distance to hedgerows) is a key factor determining bats' responses to wind turbines, the wake effect is also thought to be another mechanism that may explain these responses. The wake effect occurs downstream of a wind turbine and is characterised by (i) turbulence and (ii) a reduction in wind speed (as wind energy is absorbed by the turbine). However, a crucial knowledge gap remains regarding how general these behavioural responses are across landscapes and over time.

The objectives of ChiroEolHab were therefore to assess bats' responses to wind turbines and the wake effects they generate according to:

- **Season:** by comparing spring (parturition period) and autumn (migration period);
- **Landscape context:** by comparing two regions characterised by very different landscapes – western France (a landscape dominated by hedgerows) and northern France (a very open landscape);
- **Wind farm age:** to determine whether bats become habituated to wind turbines, whether habitat functionality progressively deteriorates, or whether there is no change over time. This will help improve the assessment of the potential effects of wind turbines on bat habitat use in environmental impact assessments.

Methods and approaches used for the project

Bats' responses to wind turbines were modelled based on their acoustic activity (the total number of contacts recorded for a species or species group per night), at varying distances from wind farms, both within and outside the wake effect, using standards widely applied in Europe.

Principal conclusions

This project highlighted the predominant role of the time of year in bats' responses to wind turbines.

Although some species appear to avoid the turbulence generated by the rotation of wind turbine blades, bats' responses to the proximity of wind turbines are more pronounced in spring than in autumn.

However, weather conditions appear to play a more important role in bat activity in autumn than in spring.

Finally, no effect of the turbine commissioning date on bats' responses was observed. There was therefore no evidence that the age of wind farms affects changes in the behaviour of these animals.

Anticipated (or actual) impact of these results for science, society, and public and private decision making

The results of this study will enable bats to be better taken into account in wind energy projects and will improve the impact reduction stage of the mitigation hierarchy (Avoidance, Reduction and Compensation – ERC). For example, variations in bats' responses according to season will make it possible to refine wind turbine curtailment plans. The methodological developments, particularly those relating to modelling the wake effect, may also benefit academic research in conservation biology, including research on other taxa such as birds.