

IN PRACTICE



Bird flight diverters on overhead power lines – an expert convention proposal to take account of the species-specific protective effect in planning and approval procedures

Bird flight diverters on high-voltage lines reduce the approach and collision risks for birds. However, expert conservation examination of new construction projects still leaves uncertainty in assessing their effectiveness for individual bird species in practice. The new convention proposal makes the first assessment of the degree to which the constellation-specific risk (CSR) for 164 bird species can be reduced by the use of bird diverters.

The reason that birds collide with stationary obstacles is puzzling: why do the proverbial “eagle eyes” not suffice to recognise them? Evolution supplies the reason behind this: in flight some bird species – including eagles, bustards, cranes and vultures – concentrate entirely on finding food and therefore only look down towards the ground. So their field of view has a proven blind

area. In other words they have a blind spot ahead. When flying horizontally at high speeds, such as those achieved by the common crane, even the best range of vision is of little use. As a result, high voltage and extra-high voltage transmission lines and the even thinner overhead earth wires become obstacles that birds find hard to see.

FOR

- Energy policy makers
- Energy scientists
- Nature conservation authorities
- Regional planners

NATURE CONSERVATION FACTORS

Species protection

KEY WORDS

- Expert convention proposal procedure
- Methods and management strategies
- Federal grid plan
- Grid expansion
- Mortality risk



Summer 2020: A total of 68 bird diverters were attached to four sections of this overhead earth wire of the 110 kV power line from Etting to Ingolstadt near Zuchering (Upper Bavaria).

The straps of this so-called “zebra marker” move in the wind, making them more visible to birds. Zebra markers are currently the most up-to-date technology and are the type of bird flight diverters mainly used on overhead power lines.



Marking the overhead earth wire

The live power cables of a long-distance transmission line usually run in thick bundles. Above these multi-level lines runs the overhead earth wire as a lightning protection from the top of one pylon to the next. This wire is thinner than the long-distance line and therefore difficult to see. Thus, it is often this earth wire that poses the actual collision risk. Approaching birds often swerve above the lower long-distance transmission lines at the last moment and then collide with the overhead earth wire. Bird flight diverters are therefore usually attached to the overhead earth wire.

There are various types of bird flight diverters. Their form, colouring and movement should ensure that the markers can be seen in different visibility conditions and in varying wind conditions and speeds. As bird flight diverters should be effective for all bird species of relevance in an area for birds with differing perception and flight behaviour, types of markers that are as universally effective as possible are required. In Germany what are known as active diverters are seen as state-of-the-art: these have parts which move in the wind in contrast to passive diverters.

Constellation-specific risk: statement

Not all types of birds (as individuals or species) are equally at risk from overhead transmission lines and the collision risk is not the same for every section of the line. This is why planning and approval procedures require to identify the “constellation-specific risk” (CSR). This defines the risk for the species present in a specific section of the transmission power line. The BfN working aid for species and area protection assessment for overhead transmission powerline projects (BfN-Arbeitshilfe zur arten- und gebietsschutzrechtlichen Prüfung bei Freileitungsvorhaben) published in 2018 by the Federal Agency for Nature Conservation provides a practical and uniform evaluation and assessment framework for this. The evaluation includes first the project-type-specific sensitivity to mortality of the specie at overhead transmission power lines and, second, the spatial proximity of planned overhead lines to for example breeding or resting areas of relevant species, and the specific conflict intensity of the design of the overhead power line.

If an overhead transmission line project turns out to be inadmissible under species

protection law due to the CSR, then various measures can be considered. For instance, areas subject to numerous conflicts, such as breeding and resting areas of particularly collision-prone species can be avoided. Switching from multiple-level to single-level pylon (reduction: one level) or to underground cables (complete removal of the CSR) are also options worth considering for critical line sections.

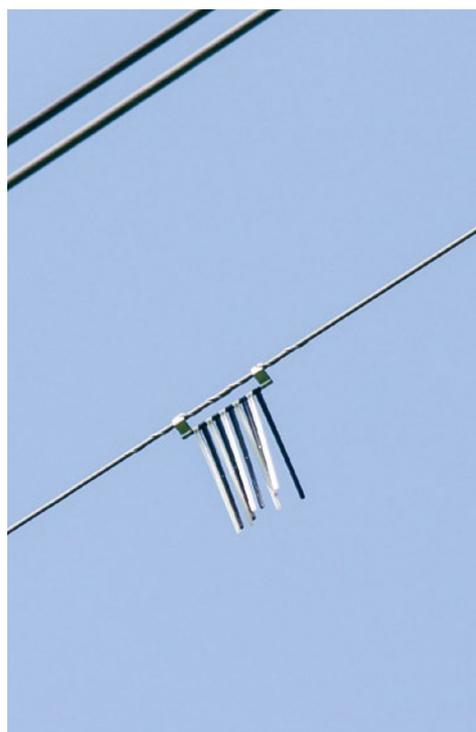
Species-specific reduction in the CSR using bird flight diverters

The use of bird flight diverters has become established worldwide as a further measure for reducing the collision risk. In its judgement on the “Uckermarkleitung” in Brandenburg (BVerwG 2016 4 A 5.14 of 21.01.2016, marginal numbers 82-110), the Federal Administrative Court has urged that the “species-specific reduction effect of the bird flight diverters used” must be duly considered when determining the degree to which a project increases the mortality risk for various bird species. In practice there is a comparatively small empirical basis on which the species-specific effectiveness of diverters can be assessed. This is almost im-

possible to establish for rare and endangered species.

In view of this, the expert convention proposal made by the BfN in 2019 fills a gap. In a detailed procedure which includes the requirements of an expert convention, the reduction impact of bird flight diverters for collision risk bird species was classified clearly and reliably. This also included those bird species for which there was previously no verified evidence. This classification complies first time the statutory species and habitat protection requirements in relation to bird flight diverters contained in approval procedures for transmission line projects.

The expert convention proposal makes statements on a total of 164 bird species in relation to the “species-specific reduction effects” from bird flight diverters. The use of bird flight diverters achieved the highest possible downgrading of the collision risk by three levels for 27 of these species – principally swans, geese and ducks. A reduction effect of two levels was achieved for a further 39 species – mainly diving ducks, grebes and sawbills. A reduction effect of one level was assigned to the bird flight diverters for the remaining 98 species.



Bird flight diverters on the overhead earth wire of the Vierraden-Krajnik 380 kV powerline in the Uckermark district (Brandenburg)



Procedure / Methods

The expert convention proposal has been developed on the basis of a comprehensive review of the literature, a written survey of experts and a workshop with national and international specialists. Information was gathered on both, the results of existing (species-specific) studies on the reduction effects of bird flight diverters as well as their reliability. It was therefore possible to identify bird species for which exists reliable results on the effectiveness of bird flight diverters. These results were applied to other species using a detailed similarity index. The newly developed similarity index covers criteria such as relatedness i.e. taxonomy, body size, visual physiology, flight speed and manoeuvrability as well as aspects of behavioural ecology in different life phases (e.g. ecology of feeding, status and migratory behaviour, activity periods and the formation of flocks). The specified “reference species” for the effectiveness of bird flight diverters are the great bustard, common crane, grey heron, mute swan, cormorant, lapwing, gadwall, wigeon, mallard, wood pigeon, barnacle goose, greylag goose, carrion crow and black-headed gull.

Continuation and transferability of the methods

New field studies and research results on the species-specific effectiveness of bird flight diverters can be integrated in the evaluation method framework of the expert convention proposal. To this end a special set of rules was developed and clearly explained. This also guarantees that the work will continue in the future and ensures that a scientific and technological current state-of-the-art will be available to planning practice, as per the aim of an approved expert conference.

The methodological approach of using a similarity index to establish the species-specific effectiveness of technical mitigation measures is very promising. Tests will be able to be run in future to see whether it can be applied to other technical systems for protecting the avifauna.



BioConsult SH GmbH & Co. KG
Schobüller Str. 36 · D-25813 Husum
Dr Monique Liesenjohann
Phone +49 4841 6632928
m.liesenjohann@bioconsult-sh.de

ARSU – Arbeitsgruppe für regionale
Struktur- und Umweltforschung GmbH
Escherweg 1 · D-26121 Oldenburg
Dr Marc Reichenbach
Phone +49 441 9717493
reichenbach@arsu.de

Federal Agency for Nature Conservation
(Bundesamt für Naturschutz, BfN)
Alte Messe 6 · D-04013 Leipzig
Dirk Bernotat
Head of FG II 4.2 Impact regulation,
Traffic route planning
Phone +49 341 30977140
Dirk.Bernotat@BfN.de



Funding:
Federal Agency for Nature Conservation
(Bundesamt für Naturschutz, BfN)
FKZ 3516 83 0700
UFOPLAN 2016 (Departmental
Research Plan)
Term: December 2016–December 2018

REFERENCES

- M. Liesenjohann, J. Blew, S. Fronczek, M. Reichenbach, D. Bernotat: Artspezifische Wirksamkeiten von Vogelschutzmarkern an Freileitungen. Methodische Grundlagen zur Einstufung der Minderungswirkung durch Vogelschutzmarker – ein Fachkonventionsvorschlag. BfN-Skripten 537, 2019. Download: www.bfn.de/fileadmin/BfN/service/Dokumente/skripten/Skript537.pdf
- D. Bernotat, S. Rogahn, C. Rickert, K. Follner, C. Schönhofer: BfN-Arbeitshilfe zur arten- und gebietsschutzrechtlichen Prüfung bei Freileitungsvorhaben. BfN-Skripten 512, 2018. Download: www.bfn.de/fileadmin/BfN/service/Dokumente/skripten/Skript512.pdf

IN PRACTICE 3

Date February 2021
Federal Agency for Nature Conservation
(Bundesamt für Naturschutz, BfN)
FG II Nature conservation and renewable energies
Alte Messe 6, D-04103 Leipzig

www.natur-und-erneuerbare.de/en

Download: www.natur-und-erneuerbare.de/en/results

Where to obtain printed copies:
info@natur-und-erneuerbare.de

PHOTO CREDITS

p. 1: Günter Drewnitzky; p. 2: Archiv Staatliche Vogelschutzwarte für Hessen, Rheinland-Pfalz und Saarland; p.3: Iöwenholz

Bonn-Bad Godesberg, February 2021, 1st edition