

Chapter 2

Project Structure and Methodological Approach

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2.1 Project Structure

The study was carried in the five German federal states of Schleswig-Holstein, Mecklenburg-Western Pomerania, Brandenburg, Saxony-Anhalt and North Rhine-Westphalia in cooperation of seven institutions with long-term experience in research of birds of prey and ecological impacts of wind turbines.

Participating institutions

- NABU (Nature And Biodiversity Conservation Union) Michael-Otto-Institute, (www.bergenhusen.nabu.de), Goosstroot 1, D-24861 Bergenhusen (project lead)
- BioConsult SH GmbH & Co. KG, (www.biocosult-sh.de), Schobüller Str. 36, D-25813 Husum
- Leibniz Institute for Zoo and Wildlife Research (IZW), (www.izw-berlin.de), Alfred-Kowalke-Str. 17, D-10315 Berlin
- ÖKOTOP GbR (www.oekotop-halle.de), Willy-Brandt-Straße 44, D-06110 Halle (Saale)
- Förderverein für Ökologie und Monitoring von Greifvogel- und Eulenarten e.V. (MEROS—Monitoring European Raptors and Owls), (www.greifvogelmonitoring.de), Buchenweg 14, 06132 Halle (Saale)
- Staatliche Vogelschutzwarte (State Bird Observatory and Field Centre) of Landesumweltamt Brandenburg (Brandenburg Environmental Agency), Buckower Dorfstr. 34, D-14715 Nennhausen-Buckow

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- Arbeitsgemeinschaft Biologischer Umweltschutz im Kreis Soest e.V. (Soest district working group for nature conservation and landscape management), (www.abu-naturschutz.de), Teichstraße 19, D-59505 Bad Sassendorf-Lohne.

Three of the institutions submitted a total of three coordinated project proposals to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) (NABU (Nature And Biodiversity Conservation Union)—Michael-Otto-Institute (coordinator); BioConsult SH; Leibniz Institute for Zoo and Wildlife Research). Cooperation is shown in Fig. 2.1. The project was subdivided into several partial projects which were carried out by one or several of the project partners (Fig. 2.1). The partial projects were of differing duration (see below).

After the end of the first phase of the project some of the partial projects were prolonged until 31.12.2010.

Over the entire project period the project was accompanied by a working group comprising the following members (participating for differing periods of time):

Mrs. Hofmann, Mrs. Radecke	BMU
Mr. Heider, Mr. Verfuß	Project developer Jülich (PTJ)
Mr. Igel	German Federal Agency for Nature Conservation (BfN)
Mrs. Findeisen	Umweltbundesamt (UBA)
Mr. Wetzig, Mrs. Lepinski	German Wind Energy Association (BWE)
Mr. Ratzbor	Schmal & Ratzbor
Mr. Schlüter	Enerplan
Mr. Boris de Wolf	Enercon
Mr. Jaehne	Working Group of German State Bird Conservancies (Länderarbeitsgemeinschaft staatl. Vogelschutzwarten)

The basic project as well as extended versions of abstracts of project events were published on the project home page (<http://bergenhusen.nabu.de/forschung/greifvoegel/>).

Apart from data collection and evaluation, two major project events were scheduled within the project period. The first event, an international workshop on 21 and 22 October 2008 in Berlin served to exchange expertise with colleagues from Germany and abroad. The results of this workshop are documented in detail on the internet (Hötter 2009). Also in Berlin, the most important preliminary project results were presented to an audience of experts of wind farm planners and operators. Authority representatives, lawyers, researchers and representatives of nature conservation organizations in a final event on 8 November 2010. This event is likewise documented on the internet (<http://bergenhusen.nabu.de/forschung/greifvoegel/berichtevortraege/>).

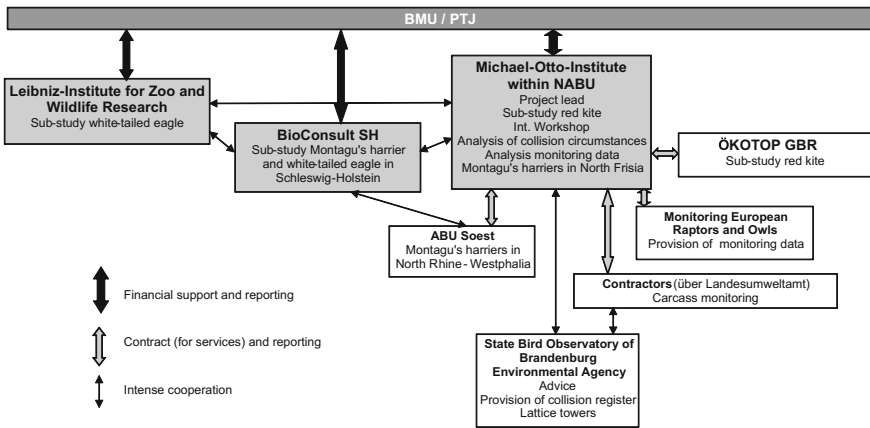


Fig. 2.1 Cooperation of the project partners of the project “Birds of prey and wind turbines: Analysis of problems and possible solutions”

2.2 Methodological Approach

It was planned to investigate the behaviour of the target species white-tailed sea eagle (*Haliaeetus albicilla*), red kite (*Milvus milvus*) and Montagu’s harrier (*Circus pygargus*) within existing wind farms and to determine the threat level. To achieve this, flight paths and heights as well as reactions and behaviours within wind farms were to be observed and recorded. An investigation merely based on recorded collision victims would not have resulted in reliable results considering the short project period. Risk estimates based on behavioural observations were therefore assumed to be suitable. Direct observations were to be supported by telemetric methods. Using telemetric monitoring more and higher quality data could be collected within a shorter period of time than in observations alone. Use of telemetric monitoring allowed to track individual birds of prey within a larger area and to determine use or avoidance of wind farms within the home range. Last but not least, telemetric monitoring helped to save expenses.

Investigations were to be carried out within the main areas of distribution of the species in Germany (white-tailed sea eagle: Schleswig-Holstein, Mecklenburg-Western Pomerania, red kite: Saxony-Anhalt, Montagu’s harrier: north-western Schleswig-Holstein, Hellweg Börde in North Rhine-Westphalia).

Additionally, existing data was to be reviewed and the circumstances of collisions of red kites and white-tailed sea eagles were to be researched.

2.2.1 Sub-study on Red Kite (2007–2010)

Studies of red kites pursued three objectives. Firstly, the question whether red kites show avoidance behaviour towards wind farms during the breeding season or are quite in the contrary attracted to wind farms due to specific structures (fallows around wind turbines as an attractive foraging ground) was to be answered. Secondly, methods to keep red kites away from wind turbines were to be tested. For this purpose the tower base area of some of the wind turbines were to be covered with agricultural film or gravel to prevent an establishment of rodent populations, which might attract red kites towards the dangerous rotor swept area. Some of the turbine base fallows remained uncovered for reference. Thirdly, it was to be verified, whether red kites may be kept away from wind farms through creation of attractive sources of food elsewhere.

Two methodological approaches were used in the collection of data. Standardised watches of red kites were carried out in the experimentally modified wind farms. Other bird of prey species, especially common buzzards (*Buteo buteo*) and black kites (*Milvus migrans*), were included. The behaviour of the birds (flight height, distance from wind turbines, interactions, etc.) was documented to allow for conclusions on the relatively high number of collision victims and to verify the effectiveness of measures taken to reduce the collision risk. Secondly, red kites were to be equipped with small direction-finding transmitters to gain insight in habitat use in relation to wind farms or turbines.

Red kites breeding birds were investigated in Saxony-Anhalt, where the population density of the species is highest in Germany and a large number of wind turbines were constructed and alternative sources of food were established due to compensation measures at the same time.

Investigations of red kites were to be carried out in close cooperation between ÖKOTOP GbR and the NABU Michael-Otto-Institute. A contract for services was concluded with ÖKOTOP GbR.

2.2.2 Sub-study on Telemetric Monitoring of Montagu's Harriers (2007–2009)

Investigations of Montagu's harriers breeding pairs in western part of Schleswig-Holstein aimed to complement the comprehensive approach by taking account of open landscape habitats. The North Frisian marshes of the North German plain hosted a breeding population of about 50 Montagu's harrier pairs with a large number of wind turbines within their habitats. Therefore, this region was highly suitable to investigate the potential for conflict with wind turbines. Two questions were to be answered in the investigations of Montagu's harriers. The risk of colliding with wind turbines and a possible disturbance effect of wind farms causing a displacement of breeding pairs. Possible displacement was investigated in

the two sub-studies “Montagu’s harriers in the Hellweg Börde” and “Montagu’s harriers in North Frisia” (see below).

Investigation of the collision risk was of major importance due to extensive overlap of breeding areas and areas for wind energy use. To achieve this, flight movements of this species within existing wind farms were investigated. The collision risk was estimated in standardised watches of the behaviour of this species within wind farms, documenting flight direction and height as well as reactions towards wind turbines and distance from and duration of stay within wind farms. Telemetric monitoring by means of direction-finding transmitters was possible for both Montagu’s harriers and red kites. Telemetric monitoring was important to track and observe the birds during long-range hunting flights. Telemetric monitoring of Montagu’s harriers was carried out by BioConsult SH.

2.2.3 Sub-study on White-Tailed Sea Eagle (2007–2010)

Aim of the investigations was to determine which wind turbine models in the surrounding area of white-tailed sea eagle nests held particular risks for the eagles and which turbines were less problematic.

Visual observations supported by telemetric methods were carried out. Observations aimed to determine flight paths of the eagles and how far wind farms are included in the home range. The size of white-tailed sea eagles allowed using spatially high resolution GPS transmitters or data loggers which allow to record flight movements over a longer period of time to determine spatial and temporal activity patterns. Recorded coordinates can be transmitted via GSM (mobile communication) or downloaded as UHF signal. At the same time, transmitter and data logger transmit signals in the VHF band which can be tracked and traced by means of a portable receiver. Activities of single eagles may be tracked individually.

To determine the impacts of wind turbines on local breeding pairs and their breeding success, young birds as well as adult birds were to be equipped with GPS transmitters. Dr. Krone, IZW, was responsible for telemetric monitoring of white-tailed sea eagles. Observations of tagged white-tailed sea eagles were carried out by staff members of IZW and BioConsult SH.

2.2.4 Sub-studies on Montagu’s Harriers in the Hellweg Börde and in North Frisia (2007–2008)

Possible disturbance effects caused by wind turbines were especially in North Rhine-Westphalia in the focus of discussions. This issue was to be investigated by comparison of long-term data on the development of the breeding population of

Montagu's harriers to data on the development of wind energy use in the Hellweg Börde near Soest and in the northern part of North Frisia. Long-term, exact data were available for both regions suitable to carry out GIS-based analyses. Evaluation of the data for the Hellweg Börde was to be performed by the ABU Soest, which has already mapped breeding sites of this species since 1993. Data for the northern part of North Frisia were available from the species protection programme and was to be evaluated by the NABU Michael-Otto-Institute.

2.2.5 Sub-study Analysis of the Circumstances of Bird of Prey Collisions (2007–2009)

The State Bird Observatory and Field Centre of the Brandenburg Environmental Agency keeps a register of birds which have collided with wind turbines. Within the framework of the sub-study, collisions of the investigated bird of prey species and other large bird species (herons, storks, crane, further bird of prey species) was to be assessed with focus on the circumstances (habitat, site conditions, wind turbine model, age of the bird, etc.) and analysis of the data.

2.2.6 Sub-study on Lattice Towers (2008)

The analysis of the circumstances of bird of prey collisions aimed to assess the impacts of different wind turbine models on the mortality of birds of prey. The central database of the Brandenburg Environmental Agency (State Bird Observatory) did not include data on wind turbines with lattice towers and a relatively small amount of data on searches of wind turbines with a total height of over 140 m. Statements made on the basis of this database were therefore only to a limited amount transferable to wind turbines with a capacity of between 2.5 and 3 MW and not at all to wind turbines with lattice towers. In 2008 targeted investigations to record mortality were carried out in two wind farms with ten wind turbines each to estimate the potential risk for birds of prey caused by these currently mainly used types of wind turbine.

2.2.7 Band Model

Detailed telemetric data and visual observations of red kites and Montagu's harriers were used to simulate the collision risk in Band models (Band et al. 2007). Even if the absolute risk of collision cannot be estimated, the method allows for comparison of relative risks.

2.2.8 Sub-study on Bird of Prey Monitoring (2007–2009)

Since 1988, data on bird of prey populations and reproduction rates was annually collected in more than 500 mostly larger monitoring areas within the framework of the MEROS (Monitoring European Raptors and Owls) research project. Over the entire project period, wind turbines erected within these monitoring areas as well as possible influences on the size of the populations or the reproductive success were recorded.

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