Naturvårdsverket
Att. Richard Kristoffersson
richard.kristoffersson@naturvardsverket.se
registrator@naturvardsverket.se

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Response to notification in accordance with Article 3 of the Convention on Environmental Impact Assessment in a Transboundary Context, regarding installation and operation of the offshore wind farm Windanker in the German Exclusive Economic Zone of the Baltic Sea

BirdLife Sweden has been offered to comment on the necessity of further Swedish involvement in the Espoo Convention process regarding the proposed wind farm Windanker in Germany. As the Baltic Sea is regarded as a homogeneous wintering area for e.g. many sea ducks, and due to the fact that millions of birds cross over the Baltic Sea regardless of national borders, the potential effects on birds are indeed transboundary. Hence, Sweden should ask to participate in the environmental impact assessment procedures as a potentially affected country.

Potential effects on birds

There are robust evidence for the fact that e.g. red-thorated diver, long-tailed duck, and black scoter avoid the proximity of offshore wind turbines[1]. The red-thorated diver is regarded as particularly vulnerable in this respect, shown by a synthesis of studies based on different analytic metodhs[2]. Avoidance is most evident up to 5 kilometers from offshore wind turbines, but a significant effect may exist up to 10–15 kilometers distance.

Site avoidance results in a functional loss of habitat. For long-lived species with "slow" reproduction systems, even a minor mortality increase among adult individuals – e.g. as a consequence of forced avoidance of favourable feeding areas – may lead to a significant effect on populational level. Telemetric studies on red-throated divers show that this species covers large distances duiring winter[3]. Therefore, barrier effects may also be an issue to consider.

Large numbers of nocturnally migrating birds may in certain weather conditions (particularly foggy nights) be attracted to illuminated constructions[4], such as lighthouses, skyscrapers, towers, wind turbines, oil rigs etc. [Extreme cases report e.g 10 000 longspurs (*Calcarius lapponicus*) in Kansas 1998[5], and >12 000 birds in Wisconsin 1963[6].] Even if studies of migrating birds have concluded

[1] Fox A & Petersen IK. 2019. *Offshore wind farms and their effects on birds*. Dansk Ornitologisk Forenings Tidsskrift 113: 86–101; https://pub.dof.dk/artikler/454/download/doft-113-2019-86-101-havvindmoeller-og-deres-paavirkning-af-fugle.

[2] Heinänen S *et al.* 2020. *Satellite telemetry and digital aerial surveys show strong displacement of red-throated divers (Gavia stellata) from offshore windfarms*. Marine Environmental Research 160: 104989; https://doi.org/10.1016/j.marenvres.2020.104989.

[3] Dorsch M *et al.* 2019. *DIVER – German tracking study of seabirds in areas of planned Offshore Wind Farms at the example of divers*. Final report on the joint project DIVER, FKZ 0325747A/B, funded by the Federal Ministry of Economics and Energy (BMWi) on the basis of a decision by the German Bundestag; https://www.bioconsult-sh.de/site/assets/files/1820/bmwi-fkz0325747a_b_final_150dpi.pdf.

[4] Longcore T *et al.* 2012. *An Estimate of Avian Mortality at Communication Towers in the United States and Canada*. PLoS One 7(4): e34025.

[5] Manville AM. 2000. *Avian mortality at communication towers: background and overview*. I Evans & Manville, editors. Proceedings of the workshop on avian mortality at communication towers; 1–5.

[6] Kemper C. 1996. *A study of bird mortality at a west central Wisconsin TV tower from 1957-1995*. The Passenger Pigeon 58(3): 219–235.

that they are able to avoid collisions to a large extent, ”mass collisions” still occur on a regular basis (known also from the bridge between Sweden and Denmark). The wind turbines height, as well as the length and mortal speed of the rotor blades, increase the danger compared to other illuminated constructions. Significant mortality risk is evident even without illumination. It should be stated that establishment of wind farms in the immediate passage of millions of birds is clearly a breach of the precautionary principle.

Environmental Impact Assessment

The planned Environmental Impact Assessment (EIA) should include the following:

- The EIA must be based on the birds that use (and can be predicted to use) the proposed wind farm area, and assessment of the occurrences/effects should be lead by up-to-date knowledge on risks for birds in relation to offshore wind farms. For example, previous studies have revealed that the Windanker area is used for feeding by many common guillemots.
- A considerable part of the common cranes migrating between Sweden and Rügen pass through the proposed wind farm area (possibly via Bornholm), and a significant proportion of the cranes are likely to fly within the rotor-swept area, as their flight altitude decreases after long distances over open water. Obviously, the crane migration needs to be a major part of the EIA.
- In-depth and prolonged radar studies must be performed to cover the magnitude, diversity, and variation of the massive bird (and possibly bat) migration. Analyses of radar data for birds/bats must be combined with weather data to understand the migration patterns.
- The EIA should evaluate an aggregated avoidance effect, which leads to a functional habitat loss, of the proposed wind farm together with other established or potential wind farms in the region. The importance of barrier effects, likely to be most substantial in connection to local movements during winter, should also be included. Finally, the effects of increased vessel traffic connected to the wind farm should be assessed.
- After the two assessment steps above, it is of great importance to evaluate the cumulative effects from the wind farm(s) together with other activities, such as shipping and fishing, affecting bird populations being present in the wind farm area.

Protective measures

- In order to minimize mass collision events, the illumination lights of the wind farm must be adapted in the best possible way to avoid attraction of birds.
- For birds passing in daylight, the possibility of triggering a stronger avoidance effect (e.g. by painting one or more of the rotor blades[7,8]) should be investigated and implemented.

[7] Stokke BG *et al.* 2020. *Effect of tower base painting on willow ptarmigan collision rates with wind turbines*. Ecology and Evolution 10(12): 5670–5679; https://doi.org/10.1002/ece3.6307

[8] May R *et al.* 2020. *Paint it black: Efficacy of increased wind turbine rotor blade visibility to reduce avian fatalities*. Ecology and Evolution 10(16): 8927–8935; https://doi.org/10.1002/ece3.6592

- Implementation of instantaneous shut-down of wind turbines under specific conditions has been shown to be an effective measure to avoid collisions[9]. By analyses of weather data and migration patterns with radar, high-risk events can be identified when large concentrations of birds occur, which should trigger immediate shut-down. This tecnique has already been tested in The Netherlands[10], and must be developed further within the offshore wind industry.

Daniel Bengtsson, Head of Conservation
Mobile: +46 70 515 45 33
E-mail: daniel.bengtsson@birdlife.se

[9] de Lucas M *et al*. 2012. *Griffon vulture mortality at wind farms in southern Spain: distribution of fatalities and active mitigation measures*. Biological Conservation 147: 184–189.
[10] https://www.youtube.com/watch?v=mkScszf8NC4