

Assessing impacts on seabirds during construction

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Background

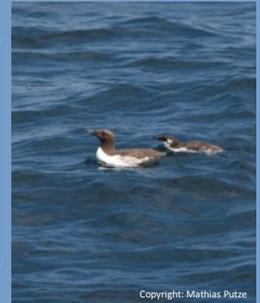
Here, we assess potential displacement effects for two highly pelagic species, that have not been considered to be highly vulnerable to offshore wind farms (Garthe and Hüppop 2004, Furness et al. 2013) – the Common Guillemot (*Uria aalge*) and the Northern Fulmar (*Fulmarus glacialis*).

Methods

- Dataset: two years pre-construction (03/2008-02/2010), entire construction phase (04/2010-03/2013) of the offshore wind farm "BARD Offshore 1"
- Data collection: ship based line-transect surveys (24 per year, according to StUK 3, BSH 2007)
- Study area: comprised the construction site and its vicinity (8 km) as well as an nearby area undisturbed by construction activities (reference area).
- Statistical analysis: spatial distribution of Guillemots was estimated using ordinary kriging methods; differences between the two areas were analyzed by means of generalized additive models (GAM)



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Northern Fulmar

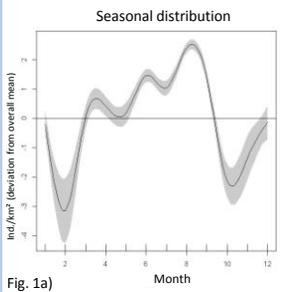


Fig. 1a)

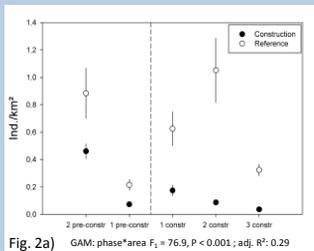


Fig. 2a) GAM: phase*area $F_1 = 76.9, P < 0.001$; adj. $R^2 = 0.29$

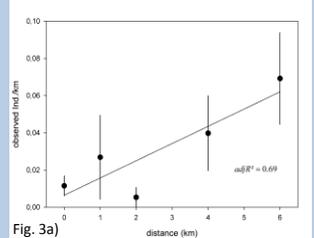


Fig. 3a)

Result applies to...

- ...both species: Distinct seasonal distribution pattern, with highest densities during summer (Fig. 1a/b).
- ...Guillemot: peak period coincides with synchronized post-breeding dispersal. During this period, Guillemots occurred in significantly higher densities in the reference area, but only in construction years (Fig. 4a-d).

- ...both species: Mean densities were significantly higher within the reference area than at the construction site, especially during the first two years of the construction phase (Fig. 2a/b).

- ...both species: In the 3rd year of construction, when most wind turbines were installed, numbers of individuals increased with increasing distance from the wind farm area (Fig. 3a/b).

Common Guillemot

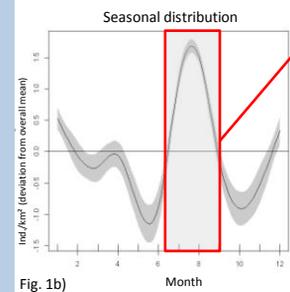


Fig. 1b)

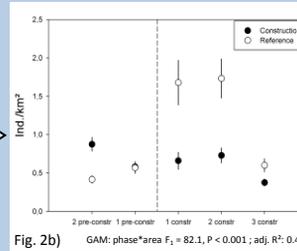


Fig. 2b) GAM: phase*area $F_1 = 82.1, P < 0.001$; adj. $R^2 = 0.40$

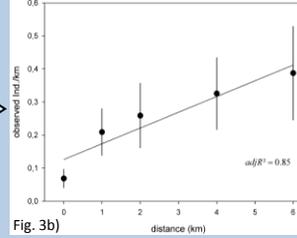


Fig. 3b)

Post-breeding dispersal

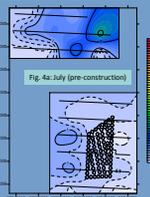


Fig. 4a: July (pre-construction)

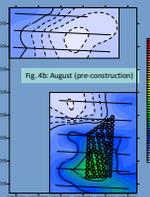


Fig. 4b: August (pre-construction)

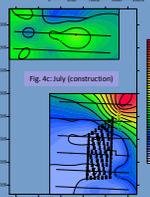


Fig. 4c: July (construction)

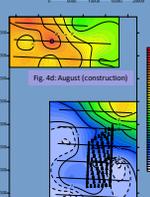


Fig. 4d: August (construction)

Discussion

Our results indicate local avoidance behaviour of both species resulting in small scale displacement from the construction site of the offshore wind farm "BARD Offshore 1". Given a distinct seasonal distribution pattern, Guillemots may be especially vulnerable during the post-breeding period when adults guide their offspring to the foraging grounds. Avoidance could be caused by effects of construction activity itself (incl. ship/helicopter traffic) but may also interfere with effects of operating turbines, especially during the third year of construction when most wind turbines were installed. As both species are pelagic, they may perceive wind farms as "land-like" structures and thus avoid the wind farm area. This should be further focused on during the operation phase. Furthermore, Fulmars are known to benefit from discard or offal of fishery (Hamer et al. 1997) and thus the absence of fishing vessels might be unattractive. Results from other wind farm site in D, NL, UK and DK are inconsistent for both species, suggesting that vulnerability to offshore wind farms is not only species-specific but also site-dependent.

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Literature

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Acknowledgements

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