

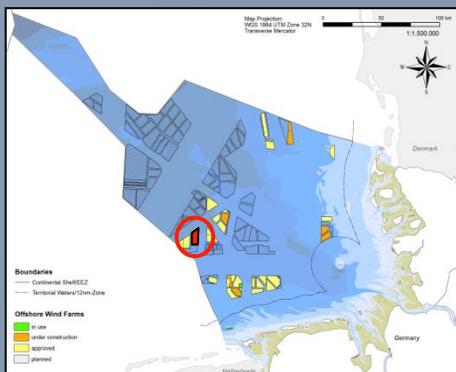
# One man's joy is a seabirds sorrow?

## Northern Fulmars (*Fulmarus glacialis*) at an offshore-wind farm construction site in the North Sea

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### Introduction

The expansion of offshore wind farms requires cautious monitoring of the environmental impacts on marine wildlife. For marine birds mainly two potentially threats have been stated – direct collision and displacement. In order to enable approving authorities to perceive the most vulnerable species, the use of a wind farm sensitivity index has been suggested resulting in ranked species vulnerability lists (Garthe and Hüppop 2004, Furness et al. 2013). Accordingly, the highly pelagic Northern Fulmar (*Fulmarus glacialis*) is considered to be one of the least vulnerable seabirds (flying below rotor blade height, wide ranging foraging trips). However, it has to be noticed that the sensitivity index is based mainly on data from nearshore areas. Multiannual environmental impact studies associated with the construction of the offshore wind farm “BARD Offshore 1” (80 wind turbines á 5 MW) offer the opportunity to validate this assumption in real offshore condition.

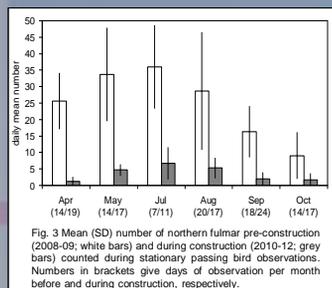
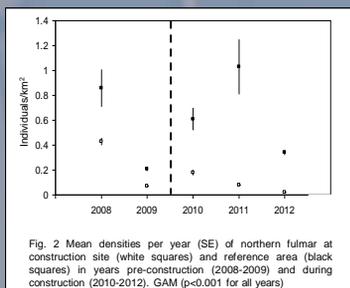
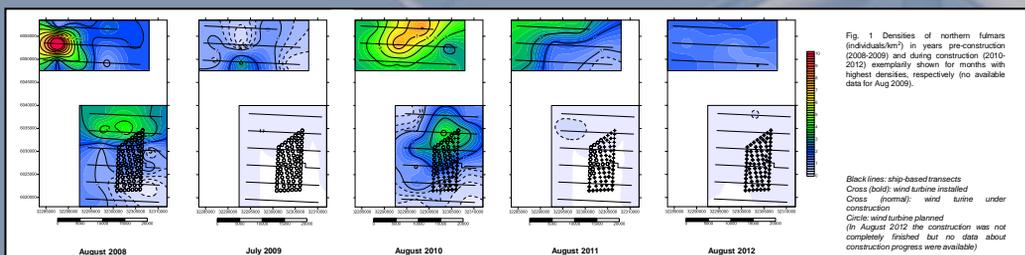


### Methods

- Data from five years of observation have been analysed (pre-construction 2008-09 and during construction of the offshore wind farm “BARD Offshore 1” 2010-12, Fig. 1).
- ship based line-transects (24 per year) have been conducted following seabirds at sea (SAS) method (Garthe et al. 2002). Transects covered a study area of 590 km<sup>2</sup> including the construction site and its vicinity as well as an area undisturbed by construction activities (reference area). The spatial distribution of fulmars has been estimated using point kriging method (exemplary only months with highest densities are depicted). To analyse density differences between the two areas generalized additive models (GAM) were applied.
- In order to register bird passage locally at the construction site, stationary visual observations on board an anchoring vessels have been conducted covering the months of migration (Mar-May and Jul-Nov). Within a radius of 1,500 m all birds have been counted.

### Results

- In all years densities of fulmars were highest in summer months during breeding period.
- Mean densities at reference area were higher than at construction site throughout the study period (Fig. 2).
- Densities at construction site did not differ significantly between years before and during construction
- Numbers of fulmars observed during stationary passage bird counts at the construction site decreased during construction (Fig. 3).



### Discussion

- Our results indicate local avoidance behaviour resulting in small scale displacement of northern fulmars from the construction site of the offshore wind farm “BARD Offshore 1”. Higher numbers pre-construction are not related with birds that were attracted to the observation vessel, as only flying birds with code “not associated with the ship” were included in the data-analysis
- On a larger scale no significant avoidance could be detected, but possibly densities near the construction site are too low to detect effects.
- Small scale avoidance is surprising as other studies indicate a low sensitivity of fulmars towards offshore wind farms (reviewed by Furness et al. 2013). Therefore, it appears important to distinguish between construction phase and completed wind farm when evaluating the wind park related sensitivity of fulmars.
- Possibly the greater number of vessels present (esp. large construction vessels) act as a displacement factor. 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.

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#### Literature

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**BARD**  
Energy | Competence | Offshore