Monitoring displacement effects of the Thorntonbank wind farm on seabirds

Vanermen N, Stienen E, Onkelinx T, Courtens W & Van de walle M

Research Institute for Nature and Forest

Introduction

The Belgian Part of the North Sea is of international importance to many seabirds. In the near future this area will be subject to large scale exploitation of offshore wind energy, since a large concession zone comprising almost 10% of Belgium's continental waters has been reserved for wind farming. Presently, 6 turbines are installed at the Thorntonbank, while 55 turbines are present at the Blighbank. In the next few years, another 177 turbines will be installed.

We set up a BACI monitoring study to assess potential seabird displacement effects, caused by the turbines. Full impact has not occurred yet, but we analysed the statistical value of our reference data - collected prior to the installation of the first turbines in 2008 - by means of impact data simulation combined with power analyses.

Material and methods

Each month and ever since 2005, INBO sets out with the RV 'Zeeleeuw' to perform standardised seabird counts in the future wind farm areas, as well as in carefully delineated reference areas (Fig. 1), following a BACI design. Count data are grouped per area and per month to minimize variation and to avoid auto-correlation effects.

The resulting reference data are modelled applying quasi-poisson modelling (GLM). As explanatory variables we only used a sine function describing seasonality and a two-level factor variable indicating the area (control vs. impact). The selected reference models are used for random impact data simulations, on which we performed power analyses. We studied how the statistical power is influenced by seabird distribution, seabird densities, monitoring intensity & survey length.

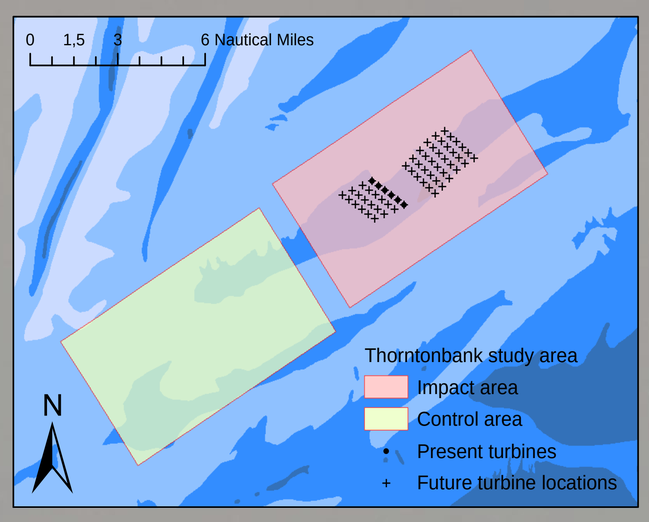

Fig. 1: Control and Impact area at the Thorntonbank

Reference situation

During reference years, the wind farm area held high densities of Northern gannets, gulls and auks. Moreover, considering their vulnerable population status, the area is of particular value to Little gull, Sandwich tern & Common tern.

Reference data modelling

For each species, we selected the most suitable reference model (Fig. 2). Seasonality contributed significantly to all the models, while an area effect was present in only 4 out of 12 species. Modelling also revealed strongly varying levels of over-dispersion, going from 'slight' in both tern species (<1.5) to extremely high in Lesser black-backed gull (=88.6).

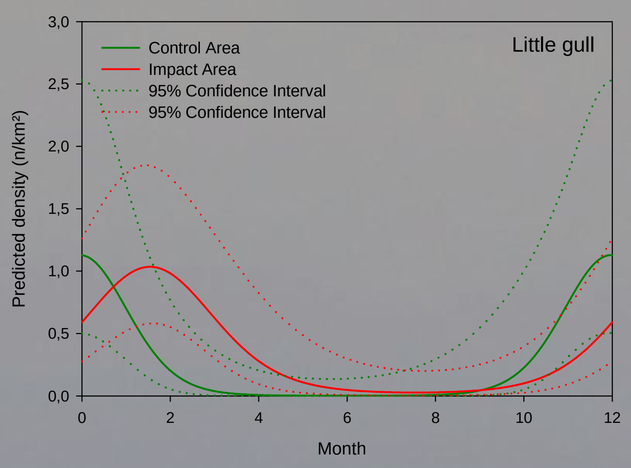

Fig. 2: Predicted densities in the control and impact area according to the selected reference models for two seabird species

Power analysis

The statistical power of our impact study increases with species abundance, while the opposite holds true for over-dispersion (Fig. 3). Otherwise, as researchers we can strongly enhance the power by counting more intensively or by increasing monitoring time, but remarkably, also through careful delineation of a suitable control area, i.e. an area hosting seabird numbers highly comparable to the impact site.

Importantly, we found – based on our true reference data – that the current monitoring intensity is suitable to significantly detect realistic changes in 8 seabird species after 8 years of monitoring (Fig. 4).

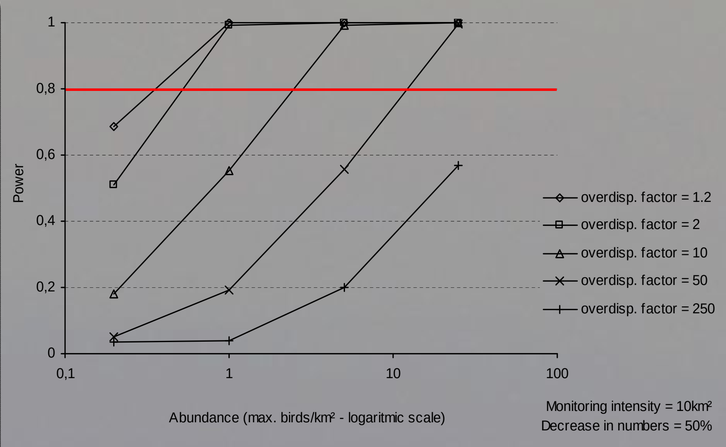

Fig. 3: Power depending on seabird abundance and over-dispersion level

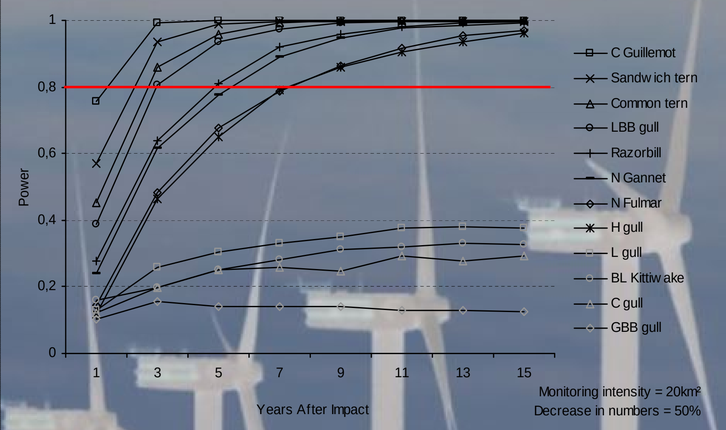

Fig. 4: Power depending on seabird species and survey length

Conclusions

The reference data we collected prior to the installation of the first turbines will allow us to perform a reliable impact study regarding displacement effects on seabirds. Despite limiting logistics and the statistical difficulties that come along with 'seabirds at sea' - data, we will be able to detect changes in numbers of 30 - 70% for 8 seabird species within an impact monitoring period of 8 years.

Nicolas.Vanermen@inbo.be, INBO, Kliniekstraat 25, 1070 Brussels, Belgium +32 2 525 03 48