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Migropath

Assessing impacts of offshore wind farms on migratory birds

Laura Jervis (l.jervis@apemltd.co.uk), Bethany Goddard, Stephanie McGovern
APEM Ltd www.apemltd.co.uk

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1. Background

- Monthly field surveys conducted for large offshore wind farm projects can provide information on the likely abundance and distribution of key seabird species for each biological period.
- Applied survey methods such as boat-based or aerial surveys cannot guarantee to provide reliable estimates of bird numbers during the migration period.
- This is due to some birds moving through in short pulses, in poor weather or at night (when no surveys take place), or at high altitudes, which makes recording their numbers extremely complex using standard methods.
- One solution is to model migratory bird movements. APEM has developed a tool to carry out such modelling - Migropath. This makes it possible to estimate the number (with confidence intervals) of migrating birds passing through wind farm development sites. The model is set up to focus on species that are associated with Natura 2000 sites (N2K).

2. Approach

- A scoping exercise identifies migrant bird species which are not recorded in significant numbers through a survey programme and are identified as potential migrants through a survey site are selected for modelling.
- Each N2K has its original designation figures. We thus have information on the numbers of birds over-wintering or breeding on these sites. From ringing/tagging data and other literature we know the likely origin of species populations we can therefore define a broad-front migration area for a given number of birds.
- Data from continental sites (e.g. staging posts, observatories) can be used to further refine the likely fronts, as well as provide information on temporal components of migration (for example, daily passage rate and duration of migration events).

3. Technical Method

- Information regarding each N2K site along with information of species-specific migratory pathways is fed into R (Figures 1 & 2) [1,2,3] .
- A random percentage of birds are assigned to each migratory route, and percentages within each wind farm development area produce the output. The model output provides a sum of the percentage of birds passing through the wind farm development areas within one migration period (Table 1).
- Estimates of the international population size and the most relevant migratory populations into and out from Great Britain and Ireland for each species are obtained from the SOSS-05 report[4]. Wright *et al*. (2012) has been selected as the most appropriate source for the total flyway population estimates used for modelling through Migropath. It is also used as the source for all Great Britain and Ireland population estimates.

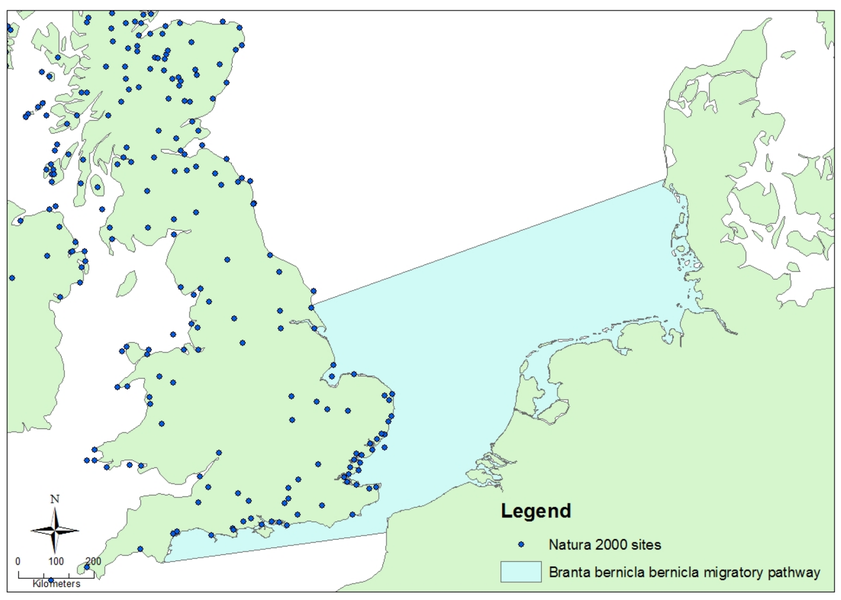

Figure 1. Dark-bellied brent goose (*Branta bernicla bernicla)* migratory pathway

4. Assumptions

- Straight line migration between the N2K site of interest and a given point (or defined area) out from the UK.
- All migration of a species to a particular suite of N2K sites can be defined within a set corridor.
- Broad-front migration.

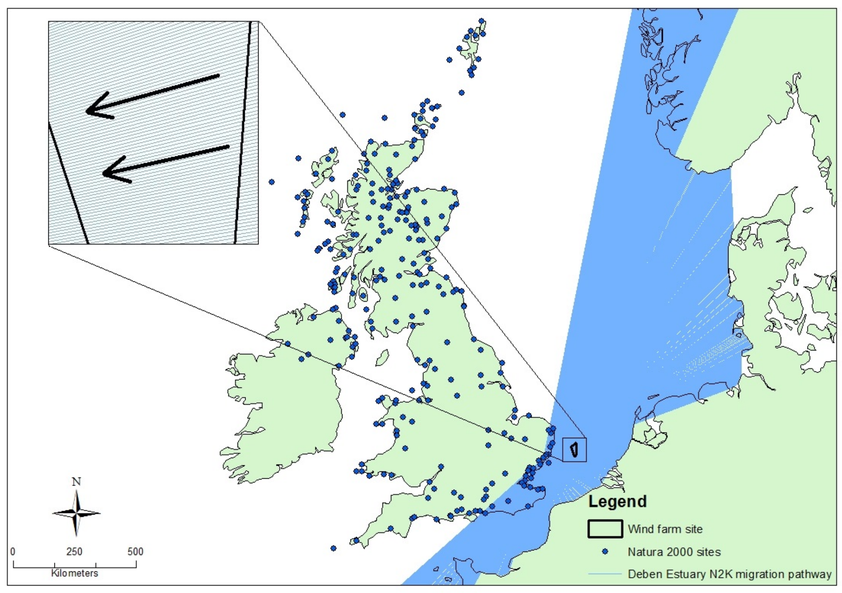

Figure 2. The Deben Estuary N2K site migration pathway through an offshore wind farm site

5. Model Output

Table 1. Numbers estimated to be migrating through a site with lower and upper confidence limits (LCL and UCL) during a single migration season run through Migropath.

Scientific name	Breeding/ Non-breeding	Percentage of flyway population staging at the Wadden Sea[5] (and season)	Relevant GB and Ireland population run through Migropath[4]	International Population Size (Individuals) (SOSS-05)	Migrant estimate through the study site	LCL	UCL	Percentage of GB & Ireland population passing through an OWF site	National Importance (Over 1% threshold)	Percentage of International population passing through an OWF site	International Importance (Over 1% threshold)
Branta bernicla bernicla	Non-breeding	99.8% (Spring)	91,000	200,000 - 280,000	**19,133**	**18,910**	**19,372**	21.0%	Yes	6.8 – 9.6%	Yes
		41.6% (Autumn)			**9,484**	**9,364**	**9,602**	10.4%	Yes	3.4 – 4.7%	Yes

6. Application

- **Migropath has been used to inform East Anglia ONE and Rampion consenting as well as consenting for other offshore wind farms.**

References

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