Offshore wind and birds: how can key gaps in knowledge be addressed?

The Strategic Ornithological Support Services (SOSS) group brought together expert stakeholders to identify key ornithological issues relating to the expansion of the UK offshore wind industry, and to determine programmes of work to address these issues and inform the consenting process. Details of five projects carried out by SOSS, and their outputs, are available on the SOSS website: www.bto.org/soss.

This document provides a summary of additional priority research ideas, identified by the SOSS Steering Group, that are required to address outstanding gaps in knowledge.

1. Studies of collision/avoidance rates

The analyses of avian collision risk that are currently undertaken to inform the assessments for proposed wind farm developments are dependent on a number of assumptions, most notably the avoidance rates used. Existing studies of avoidance have varied in their methods, and while some notable studies have taken place recently, there remains a very limited evidence base. There is, therefore, an urgent need for a strategic field-based project to collect data on actual collision rates at offshore wind farms and so validate the avoidance rates used in impact assessments.

2. Studies of displacement

There have been limited studies investigating the displacement of bird species from offshore wind farms and further study is required to determine the magnitude, spatial scale and duration of displacement and how best to evaluate its potential population level consequences. This will require field studies designed to enable, through modelling, the statistical testing of changes in bird densities (recorded at suitable spatial resolution), both inside the wind farm and at an adequate spatial extent around it. The modelling approach used should allow for the incorporation of environmental covariates in order to increase the power of detecting change (Maclean *et al.* 2012). A large spatial scale may be required to detect displacement, and thus whether or not population-level changes in abundance have occurred, and a large study area would allow consideration of the cumulative impacts from different wind farm developments.

3. Population consequences

Building on a SOSS project that developed population viability analysis for gannets, further development and application of population models for the range of priority seabird species relevant to offshore wind development in UK waters would be beneficial in understanding the potential impacts of key effects such as collision and displacement (cf Poot *et al.* 2011) and would help to provide an understanding of the thresholds above which populations might be impacted by cumulative development. Such work should consider the appropriate modelling framework and development required to ensure accurate representations of demographic processes and constraints. Key considerations from the SOSS-04 project include: the spatial scale over which impacts operate and thus the population involved, the suitability of demographic data for different species (see Maclean *et al.* 2007), the need for model validation, and defining and quantifying the impact of concern and the outputs required.

4. Cumulative impacts

Further development of appropriate methods for the assessment of in combination and cumulative impacts, building on existing guidance such as King *et al.* (2009) would be beneficial in providing best practice guidance.

In relation to this, building on SOSS work on migrant birds and collision risk, a cumulative assessment of the potential impacts from collisions for migrants from UK protected sites would help avoid duplication of effort and inconsistent results (for example, due to the geographic region considered). It would be a cost-effective way of identifying which migratory species are most likely to be at risk and which are unlikely to be affected, reducing the work required in individual EIAs.

5. Strategic surveys of bird distributions at sea and collation of data

Up-to-date, comparable and contextual data on bird distributions/densities at sea, including inter-annual variation, are fundamental to all assessments. This requires strategic survey effort, most effectively combined with modelling to improve understanding of key areas. Useful examples include Marine Scotland commissioned surveys for wave & tidal stream deployment rounds and DTI/DBERR/DECC co-ordinated aerial surveys. In addition to surveys for future rounds of renewable development, consideration should be given to the need for surveying the large areas that might need to be covered to measure the displacement of seabirds from wind farm sites within Scottish Territorial Waters and Round 3 areas.

Consideration should also be given to improved data sharing and collation (cf the Joint Cetacean Protocol: http://jncc.defra.gov.uk/page-5657).

6. Review of survey methods

Advances in survey methods, especially digital aerial survey techniques, need to be taken into account in determining the most useful methodology for future strategic surveys. A workshop would be beneficial in reviewing these advances and considering issues such as accounting for birds under the water that may be missed by aerial snapshots, methods to estimate flight heights and appropriate survey design.

7. Connectivity between protected sites and development areas

In conjunction with the need for up-to-date information on distribution and abundance (5) and statistical methods to evaluate the environmental factors influencing these (2), tracking technologies are available to enhance our understanding of connectivity between protected sites and development areas. Tracking may be used to evaluate: i. the areas used by seabird species from protected sites during the breeding season; ii. the areas used by the same seabird species during the non-breeding seasons; and iii. the migration routes of birds from protected sites and their flight heights.

References

King, S., Maclean, I.M.D., Norman, T. & Prior, A. 2009. *Developing guidance on ornithological cumulative impact assessment for offshore wind farm developers*. COWRIE.

Maclean, I.M.D., Frederikson, M. & Rehfisch, M.M. 2007. *Potential use of population viability analysis to assess the impact of offshore windfarms on bird populations*. BTO Research Report No. 480 to COWRIE. BTO, Thetford.

Maclean, I.M.D., Rehfisch, M.M., Skov, H. & Thaxter, C.B. 2012. Evaluating the statistical power of detecting changes in the abundance of seabirds at sea. *Ibis*.

Poot, M.J.M., M.P. Collier, P.W. van Horssen, R. Lensink & S. Dirksen, 2011. *Effect studies Offshore Wind Egmond aan Zee: Cumulative effects on seabirds. A modelling approach to estimate effects on population levels in seabirds*. NoordzeeWind Report OWEZ_R_212_20111123_Cumulative_Effects. Bureau Waardenburg report 11-026. Culemborg, Netherlands.

Acknowledgments: SOSS was funded by The Crown Estate's Planning and Consenting Strategic Workstream, and was guided by a Steering Group comprising representatives of the UK offshore wind industry, regulators and their advisors, and experts including the British Trust for Ornithology (BTO), Bureau Waardenburg, Centre for Research into Ecological and Environmental Modelling (University of St Andrews) and Royal Society for the Protection of Birds. A secretariat, run by the BTO, oversaw the work of the group.