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Wind turbine risks to seabirds: new tool maps birds' sensitivity to offshore farms

A new tool has been developed to map the sensitivity of seabirds to offshore wind farm development. The Seabird Mapping and Sensitivity Tool (SeaMaST), currently for use in English waters, combines information on the sensitivity of seabird species to wind turbines with data on the birds' distributions. It provides maps that can be used for both the offshore wind farm industry and marine spatial planning.

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Contact: gareth.bradbury@wwtconsulting.co.uk

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In an effort to mitigate climate change, the EU aims to source 20% of its energy from renewables by 2020. As a result, many Member States are investing heavily in wind power, with offshore wind farms especially important in some countries.

However, offshore wind turbines can have damaging effects on seabirds: the birds can collide with the turbines and they may lose important feeding grounds by avoiding the turbines. Seabird populations also may be particularly vulnerable to additional sources of mortality as many species do not start breeding for several years and then raise relatively few offspring each year. Therefore, in order to achieve the dual EU aims of increasing the share of renewables and halting declines in biodiversity, offshore wind farms must be carefully sited to minimise these impacts.

To aid this process, researchers developed the mapping tool SeaMaST. They used two main sources of data to map the densities of seabird species in English waters: the European Seabirds at Sea database (which includes over 310 000 seabird records from 1979 to 2011) and data collected by the Wildfowl & Wetlands Trust (which covers 400 000 seabird records from surveys carried out between 2001 and 2011).

The densities were mapped onto 3 km x 3 km grid squares. The researchers were also able to map measures of certainty regarding the data, a particularly useful feature of the tool, as this can be important for decision making.

The sensitivity of the seabird species to wind turbines was scored using four factors that reflect the species conservation importance and six factors related to behaviour. Conservation importance was based on: status in relation to the Birds Directive[1], percentage of the population that occurs in English territory, adult survival rate and UK threat status.

The behavioural factors used included: flight altitude (with those flying at the height of turbine blades given the highest ranking), flight manoeuvrability, percentage of time spent flying, nocturnal flight activity, disturbance by wind farm structures and ship and helicopter traffic, and habitat specialisation.

From these rankings, the researchers produced two 'Species-specific Sensitivity Indices'. The first index shows sensitivity to collision; species with low flight manoeuvrability and which spend a lot of time flying at the height of the turbine blades, for instance, would have a high score in this index. Under the second index, which shows sensitivity due to displacement, species that would lose large amount of habitat through avoiding wind farms would score highly.

Both indices were then combined with data on seasonal abundances (excluding areas where the data were associated with low certainties) to produce robust maps of seabird sensitivity to wind turbines. Now available to UK marine planners, SeaMaST is valuable for a number of different purposes, the researchers say. For example, it can be used to provide evidence for Environmental Impact Assessments or to inform new Marine Protection Areas. Furthermore, the tool provides a framework which can be used with other data to map seabird sensitivity in other countries or across other sectors, such as wave and tidal energy, dredging or fishing.

1.See: http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm