Goose sensitivity map for wind farm development Coastal Dobrudzha – a quick guide

Why is the map required?

The Coastal Dobrudzha region is the most important wintering site for the globally Endangered Red-Breasted Goose. The area regularly holds almost the entire world population of the species (approximately 50,000 birds) during winter, the majority of which use Durankulak and Shabla lakes as their overnight roosts. The adjacent coastal waters of the Black Sea can also support internationally important numbers of roosting red-breasts. While the lakes and parts of the coastal strip are designated as Special Protected Areas (SPAs), many of the most important feeding areas – agricultural fields seeded with winter cereals – lay outside of protected zones. The requirements of EU Birds and Habitats Directives' to protect priority species and habitats both in and outside of designated sites, are, therefore, highly relevant in Coastal Dobrudzha.

Bulgaria has seen major investment in wind energy infrastructure since its accession to the EU, much of which has been focussed in Dobrudzha. All wind farm proposals in the EU require some level of planning or assessment on the likely impacts on wildlife. This mapping tool was created to aid the strategic planning of wind farm developments in relation to the sensitivity of areas for geese. Studies show geese to be particularly sensitive to wind farms, mostly through habitat displacement, but also collision mortality and potential effects on energy expenditure due to barrier effects.

What does the map tell me?

This mapping tool highlights the areas of Coastal Dobrudzha where wintering geese (Red-breasted Goose as well as the more numerous European White-fronted Goose) are expected to be most sensitive to wind farm development. At a finer scale, it gives an indication as to whether a particular area is important for geese, which could be used for early-stage scoping of suitable development sites, or to target areas for which detailed, site-specific Environmental Impact Assessments (EIA) or Appropriate Assessments (AA) should be undertaken.

The map does not represent 'no-go' areas or replace the need for specific EIAs.

It is based on the most detailed information available on the distribution of wintering geese in the region and the features of the landscape that drive this. Goose movements in the region are highly variable both within and between winters. Hence, rather than providing a definitive guide to the presence or absence of geese in a particular area, the map gives a best estimate of the relative importance of areas.

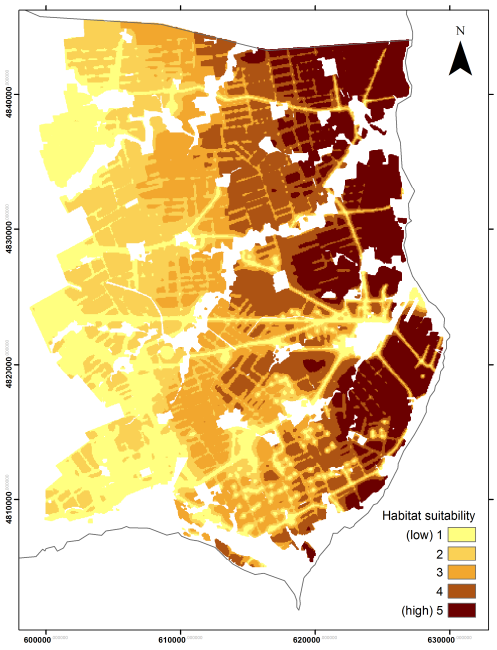

Figure 1. Predicted habitat suitability map.

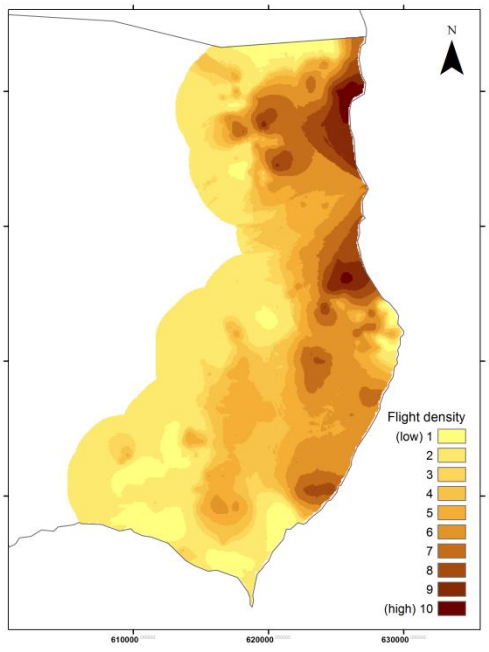

Figure 2. Interpolated flight density map.

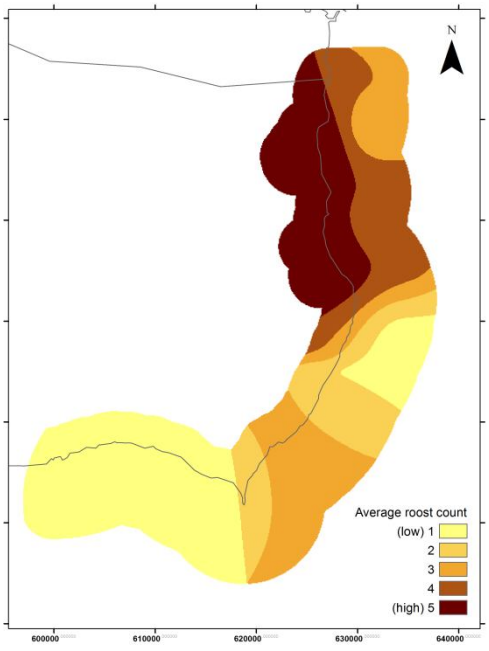

Figure 3. Interpolated roost importance.

How was the map constructed?

The tool is a combination of map layers showing the sensitivity of geese to wind infrastructure, in relation to the risk of (1) displacement-related habitat loss, (2) collision mortality, and (3) proximity to important roosts, which were considered the most important components of a planning tool specifically for geese in Dobrudzha. Data for each layer was collected during targeted field studies undertaken between 2010 and 2014.

Components of the map include:

Suitability of feeding habitat (displacement risk)

Statistical modelling of the factors driving goose feeding distribution at two spatial scales – *field* and *within-field* – allowed the prediction of habitat suitability across all agricultural areas of the region. A single predicted map combining outputs of the two models shows the key foraging areas for geese in the region, accounting for the influence of key landscape features (Figure 1).

Intensity of flight activity (collision risk)

Data collected from vantage point observations was used to create an interpolated density surface of flying birds for the area between roosts and feeding areas (Figure 2).

Roost site importance

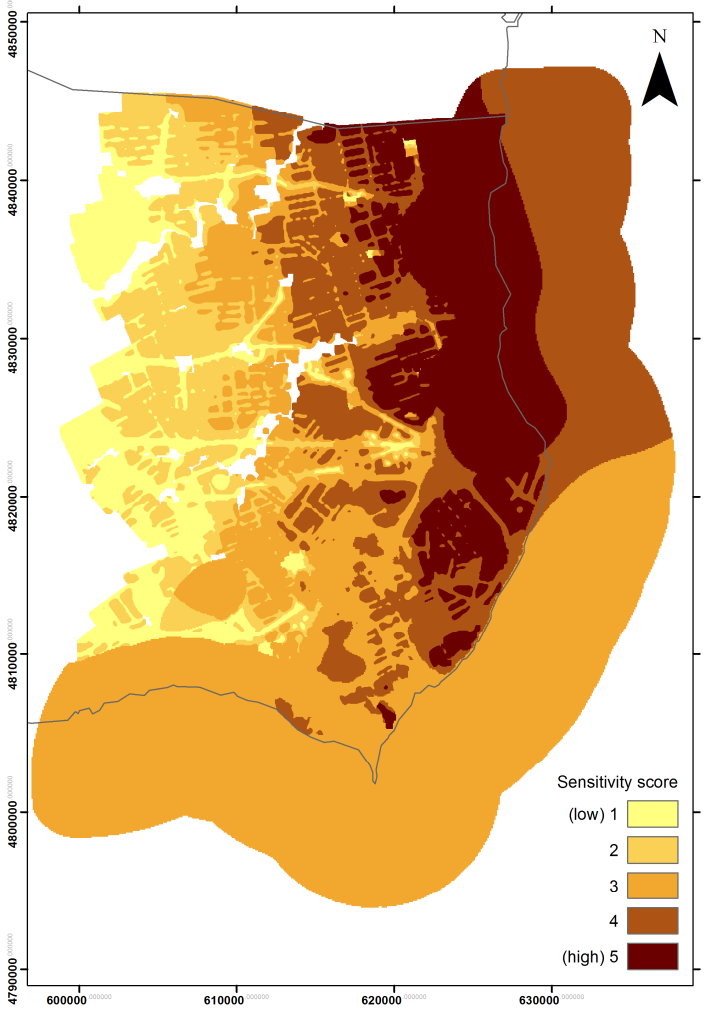

Figure 4. Relative sensitivity of geese to wind farms in Coastal Dobrudzha.

Roost locations were mapped and weighted by their relative importance (Figure 3), using the average count over four winters of systematic surveys. Interpolation to the immediate areas around roosts resulted in a map of the relative importance of roost sites for geese.

To consolidate these layers into a single sensitivity map, each map was reclassified to a comparable scale from 1 (low sensitivity) to 5 (high sensitivity). Scaled layers were combined into a single raster surface (Figure 4) by taking the maximum value from the contributing layers.

Interpreting the sensitivity map

The colour within each 20-m pixel of the map represents the pixel's assigned sensitivity score. The score acts as a guide to the potential sensitivity of an area for geese in relation to the risks associated with wind farm development (collision, habitat displacement or roost proximity). A score of 1 represents the lowest relative risk, while 5 represents the highest.

Users may examine the specific risk with which the score of a defined area is associated by viewing the sensitivity map alongside the individual contributing layers derived from the foraging, movement and roost importance layers (see above). Alternatively, users may wish to import the relevant layers into their GIS program, and use appropriate interrogation tools, e.g. the *Identify* tool in ESRI ArcGIS, to show values for multiple layers simultaneously. Additional spatial layers, such as boundaries of proposed development areas or average wind speed maps, may be overlaid to allow further interrogation.