



**AERIAL SURVEYS OF BIRDS IN
PROPOSED STRATEGIC AREAS FOR
OFFSHORE WINDFARM DEVELOPMENT,
ROUND 2: PRELIMINARY REPORT,
WINTER 2002/03**

WWT Research Report

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SUMMARY

To assist with the environmental assessment of the UK's offshore windfarm development, aerial surveys of the round 2 proposed strategic areas were undertaken to collect data on bird numbers and distribution. Surveys of the Greater Wash Strategic area were undertaken in February and March 2003.

A series of transects were flown at 4 km intervals over the strategic area, and observers recorded the numbers of birds encountered. Combined with data from a Global Positioning System, used to record the flight path of the plane, their location could be calculated to a high degree of accuracy.

A series of maps shows the distribution of the key bird species or species groups in 4 x 4 km cells, calculated as the number of birds encountered corrected for survey effort (i.e. the length of transect flown).

The patterns of distribution showed divers to be thinly distributed relatively close to shore in February, and an increase in March when most were located 10-20 km from shore. Scoters were found in a relatively localised area close to the northwest Norfolk coastline. Kittiwakes and auks showed pelagic distributions, concentrated in the offshore parts of the strategic area and with markedly different distributions in the two months. Gulls, considered as a group, were widely distributed over the strategic area in both months.

Bird distribution will vary with and between winters, and surveys in early and mid winter, and in other years, are required to provide an appropriate assessment of the winter distribution of birds in the strategic areas.

1 INTRODUCTION

The UK has made a commitment that 10% of electricity in the UK should be generated from renewable sources by 2010. Offshore windfarms have the potential to make a significant contribution to this target and the UK Government's announcement of the first major round of UK offshore windfarm development in December 2000 resulted in eighteen companies pre-qualifying for site development.

To ensure that a long term view is taken that adheres to the principle of sustainability, contributes to UK Government targets for renewable energy, complies with European Directives, (including the forthcoming Strategic Environmental Assessment Directive (SEA)), the DTI launched a consultation paper 'Future Offshore'. This proposed a strategic planning framework as a basis for expansion of the offshore wind industry and set out the DTI's commitment to undertake an SEA for the second round of licences in three strategic areas: the North West, the Greater Wash, and the Thames Estuary.

Assessing the environmental impacts of these major developments is, in many cases, complicated by the relative paucity of suitable environmental data in marine areas. For example, few data are available on the numbers and distribution of birds at sea in sufficient detail for appropriate assessment to be made. Data are required at a number of levels: to enable assessment of the individual development, to provide context to the relative importance of individual sites, to enable the cumulative impact of multiple developments in a region to be assessed and to allow a strategic overview of the environmental impacts of a round of developments to aid the decision making process.

To provide contextual information for the proposed strategic areas for the second round of offshore windfarm development, a programme of bird surveys was funded by DTI and developed by the Royal Society for the Protection of Birds (RSPB) in conjunction with The Wildfowl & Wetlands Trust (WWT) and the Joint Nature Conservation Committee (JNCC). A programme of work was agreed in early 2003, to include aerial surveys of the three strategic areas in winter 2002/03. This report provides preliminary results from aerial surveys in the Greater Wash strategic area, undertaken by WWT in early 2003. It has been produced at this time to help inform the decision making process for Round 2 which is taking place in June 2003.

2 METHODS

2.1 Aerial survey

Aerial surveys have been used for several decades to count birds at sea, particularly in the Baltic and southern North Sea. A small plane with two observers is used, flying at low altitude: each observer counts birds on or flying just above the water's surface to one side of the plane. Historically, surveys used either a 'total count' method, aiming to count all birds within a predefined area, or to cover larger areas using 'transect counts', whereby observers counted birds in a strip of water that extended a set distance to either side of the flight path of the plane; the total number of birds in the study area was then calculated based on the proportion of the total area represented by the surveyed strips.

Aerial surveys used for this report were undertaken using a methodology recently developed in Denmark by the National Environment Research Institute (NERI) (Kahlert *et al.* 2000). This involved a 'distance sampling' approach (see Buckland *et al.* 2001), whereby the distance to each bird/flock of birds was recorded. Because birds further from the observer will be more difficult to detect, recording of distance allows the number of missed birds to be estimated. This approach allows statistical analyses of the data (e.g. confidence limits to be calculated for estimates of numbers) that are not possible with data collected using previous aerial survey methods. Further, using a combination of the time at which birds were encountered and the track flown by the plane (recorded using a Global Positioning System (GPS)), the locations of observed birds can be calculated with considerable accuracy (in most cases, to within a few hundred metres).

Aerial surveys were undertaken by WWT using experienced observers who have undertaken aerial survey around Wales and for many of the round 1 windfarm sites in the UK in 2001/02 and 2002/03, ensuring consistency of information collected for windfarm EIAs. A Partenavia PN68 aircraft was used, flying at an altitude of 250 ft and at a speed of approximately 180 kmh⁻¹. Using a clinometer, birds were located in one of four distance bands covering an area from 60 m to 1000 m either the side of the plane; birds beyond 1000 m from the flight path of the plane were not recorded. A series of transects spaced 4 km apart was designed to cover the strategic areas. The transects were displaced by 2 km in subsequent months so that all sea in within the strategic area would fall within the counted 1000 m distance band during the course of two months' surveys. Transects were orientated perpendicular to major environmental gradients (primarily sea depth) and, where possible, to run north-south to reduce the effect of glare at the time of the survey (surveys were undertaken centred around midday). Two experienced aerial survey observers were used to count birds, and a navigator guided the pilot along transect lines with the aid of a GPS. For each bird or flock of birds, the species (or species-group where specific identification was not possible), number, its behaviour, distance band and the time at which it was perpendicular to the flight path of the plane were recorded using a Dictaphone. The location of the plane, recorded using a GPS, was downloaded onto a laptop computer every five seconds. Surveys were undertaken in good weather conditions, generally with winds of 15 knots or less.

2.2 Coverage

Due to limitations imposed by appropriate weather conditions, and the availability of the particular type of aircraft required and of the experienced observers, it was not possible to cover all three strategic areas in winter 2002/03.

Survey of the Greater Wash aimed to cover all but the northeast corner of the strategic area (that furthest from shore) over the course of three days. Survey was achieved on 13th, 14th and 17 February (covering just over 1900 km), and of the western and central sections on 13th and 14th of March (covering just over 1300 km); coverage of the eastern section was not possible in that month (Figs 1 & 2).

Coverage of the Thames was achieved in both January and February 2003 (using 2-km transect separation) for individual windfarm EIAs. These surveys were funded by the windfarm developers and the data are owned by relevant companies at those sites. The possibility of using these data for the round 2 SEA are being pursued and it is hoped that they will be released in due course.

Aerial survey of the North West strategic area was not possible during winter 2002/03. Coverage of the nearshore waters (extending approximately 25 km offshore) was achieved for an area extending from Anglesey to Morecambe Bay in January and February 2003 as part of the All Wales Common Scoter Survey, organised by the Countryside Council for Wales.



Figure 1. Aerial survey tracks flown in the Greater Wash strategic area during February 2003.

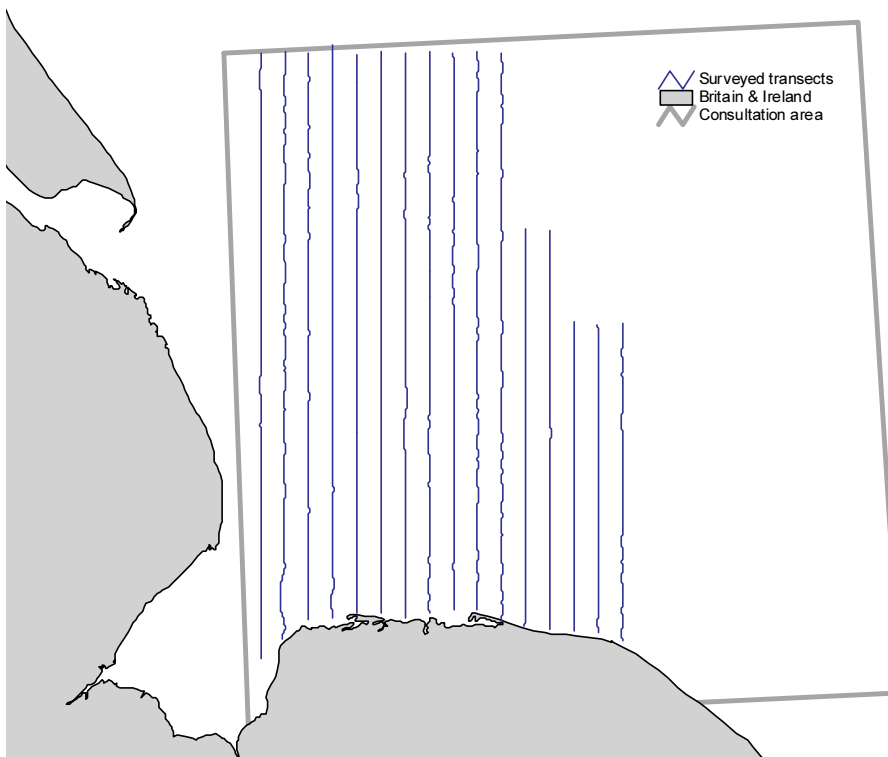


Figure 2. Aerial survey tracks flown in the Greater Wash strategic area during March 2003.

2.3 Analysis and map production

The precise location of each bird or flock of birds was calculated by linking the time (to the nearest second) at which they were recorded and the location of the plane, recorded from the GPS every five seconds. Interpolation of the GPS data enabled each position to be located along the flight path. In Figures 3 and 4, the locations of any birds detected are shown as dots along the transect lines, displaced at different distances either side of the flight path according to side of the plane and the distance band in which they recorded. The location of most observations is considered to be accurate to within 2-300 m.



Figure 3. Locations of all bird observations in the Greater Wash strategic area, February 2003.

The distribution of the more numerous species (or species groups) in the strategic area is shown using encounter rate, i.e. the numbers of birds counted per unit length of transect flown. Data are summarised by 4 x 4 km grid squares, corrected for survey effort in each cell. The density scales used in the maps were selected to illustrate the distribution patterns of encounter rates. They are consistent between surveys but are not comparable between species due to the different detectability of different species.



Figure 4. Locations of all bird observations in the Greater Wash strategic area, March 2003.

3 RESULTS

3.1 Counted numbers of birds

Total numbers of birds encountered during the surveys of the Greater Wash strategic area are presented in Table 1. Note that these are not the absolute numbers present in the survey area but the number detected

A cautionary approach is taken with regard to species identification, such that only those individuals which are observed clearly are identified to species level. The majority of divers in the area are considered to be Red-throated Divers *Gavia stellata*, and the majority of scoters are considered to be Common Scoter *Melanitta nigra*. Most of the species given as gulls in the table are likely to be *Larus* spp.

Table 1. Numbers of birds counted during aerial survey of the Greater Wash strategic area, winter 2002/03.

Species or species group	February 2003	March 2003
Red-throated Diver	14	39
diver spp.	27	108
Fulmar	14	26
Gannet	6	8
Cormorant	1	0
Cormorant/Shag	0	1
Scoter (<i>Melanitta</i> spp.)	2042	170
Goldeneye	1	0
duck spp.	0	807
black-backed gull spp	5	8
Black-headed Gull	8	9
Common Gull	2	2
Lesser black-backed Gull	3	1
Herring Gull	7	7
Great Black-backed Gull	2	2
Kittiwake	197	481
large gull spp.	40	18
grey gull spp (Herring or Common Gull)	80	85
gull spp.	648	256
auk spp.	620	534
Total transect length flown (km)	1913	1316

3.2 Bird distributions

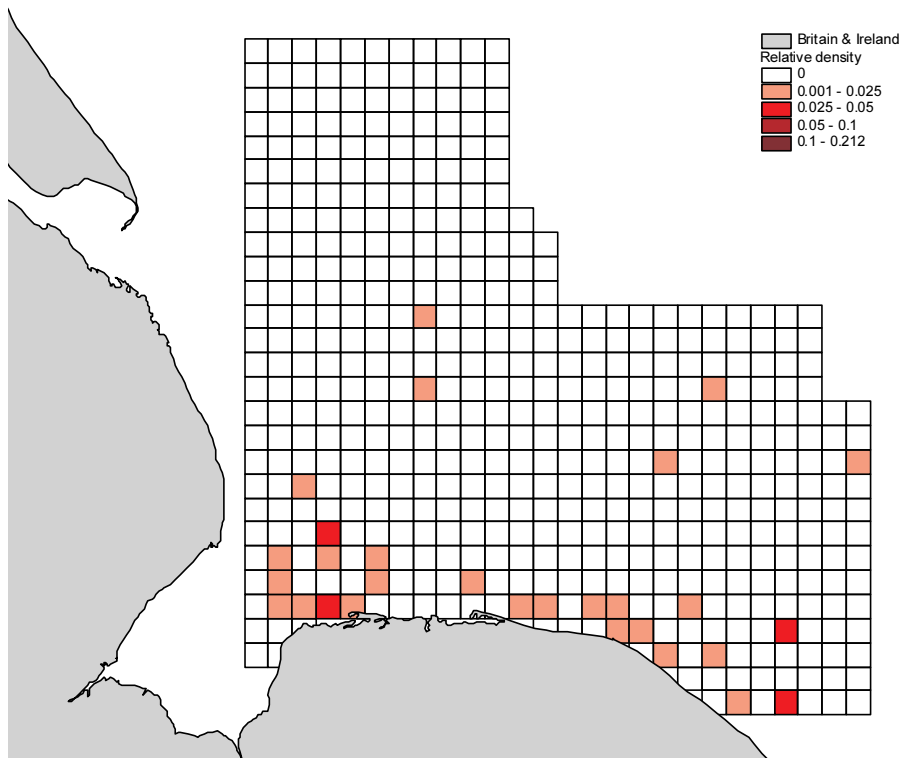


Figure 5. Relative encounter rate for all observations of divers (*Gavia* spp.) in the Greater Wash strategic area, February 2003.

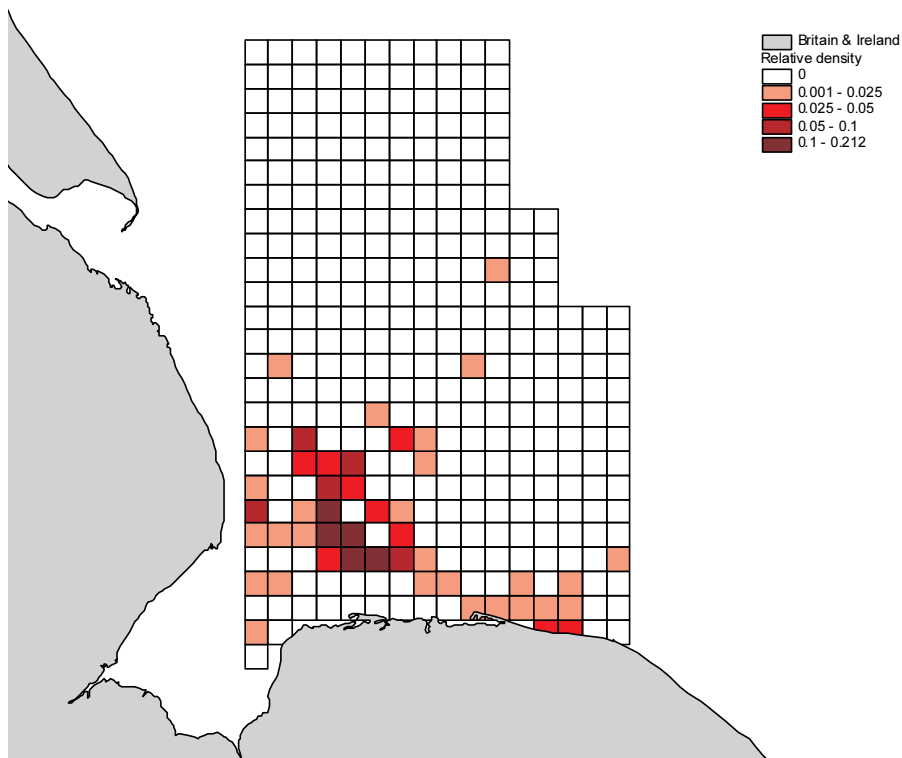


Figure 6. Relative encounter rate for all observations of divers (*Gavia* spp.) in the Greater Wash strategic area, March 2003.

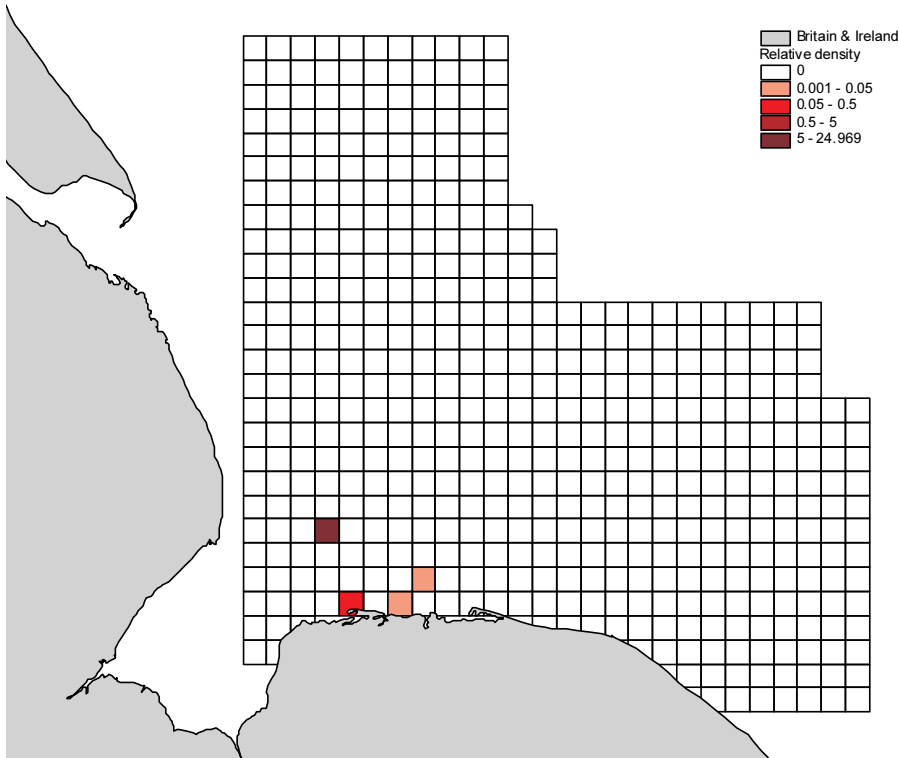


Figure 7. Relative encounter rate for all observations of scoters (*Melanitta* spp.) in the Greater Wash strategic area, February 2003.

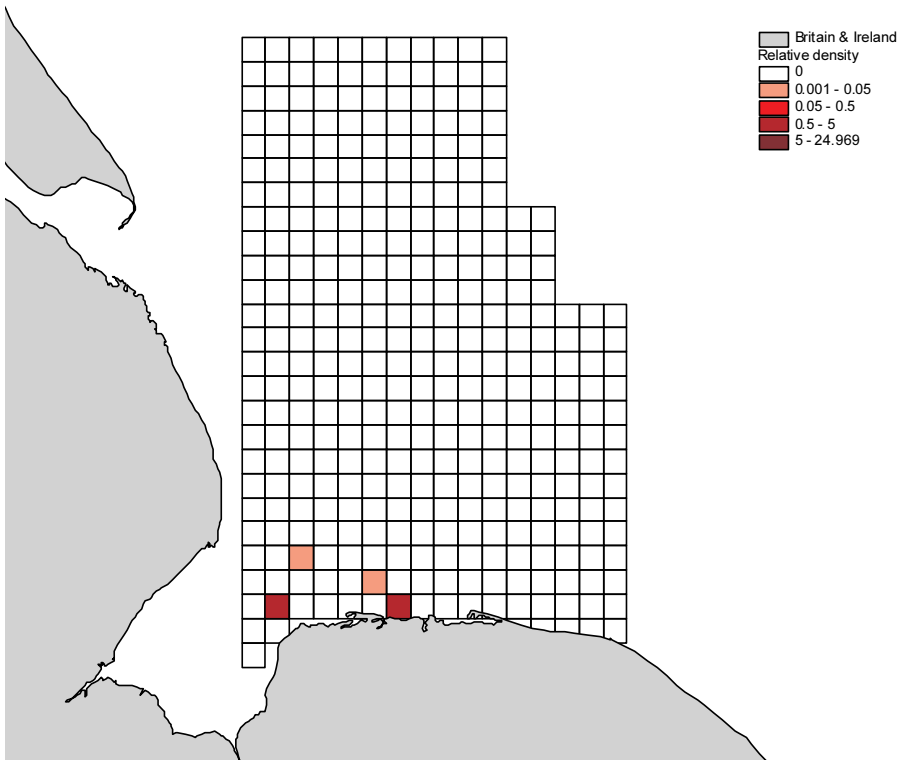


Figure 8. Relative encounter rate for all observations of scoters (*Melanitta* spp.) in the Greater Wash strategic area, March 2003.

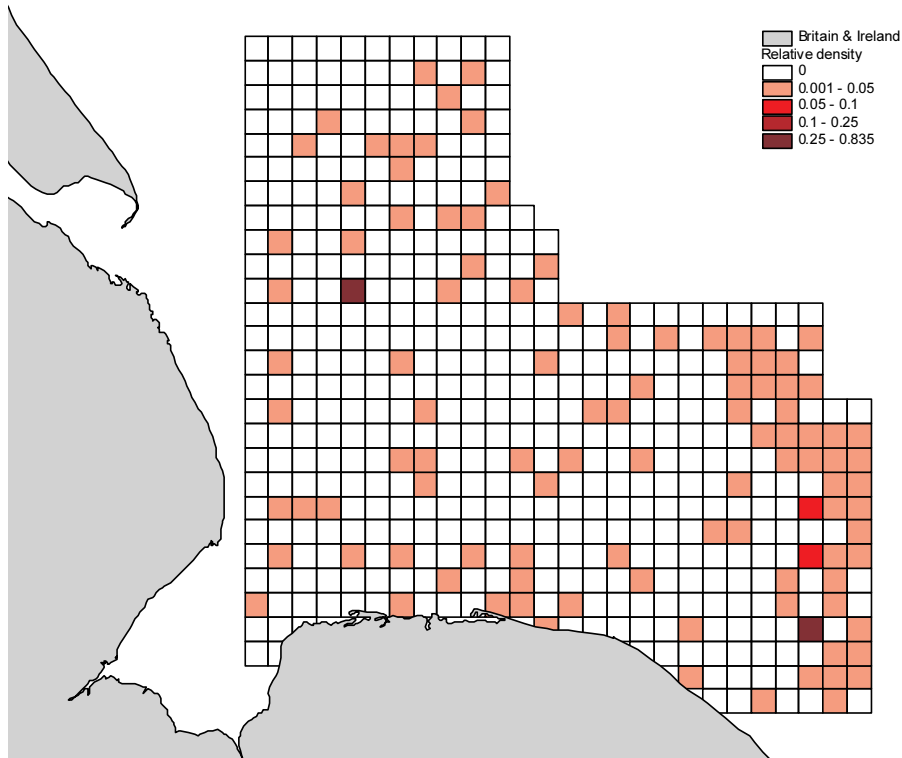


Figure 9. Relative encounter rate for all observations of Kittiwake (*Rissa tridactyla*) in the Greater Wash strategic area, February 2003.

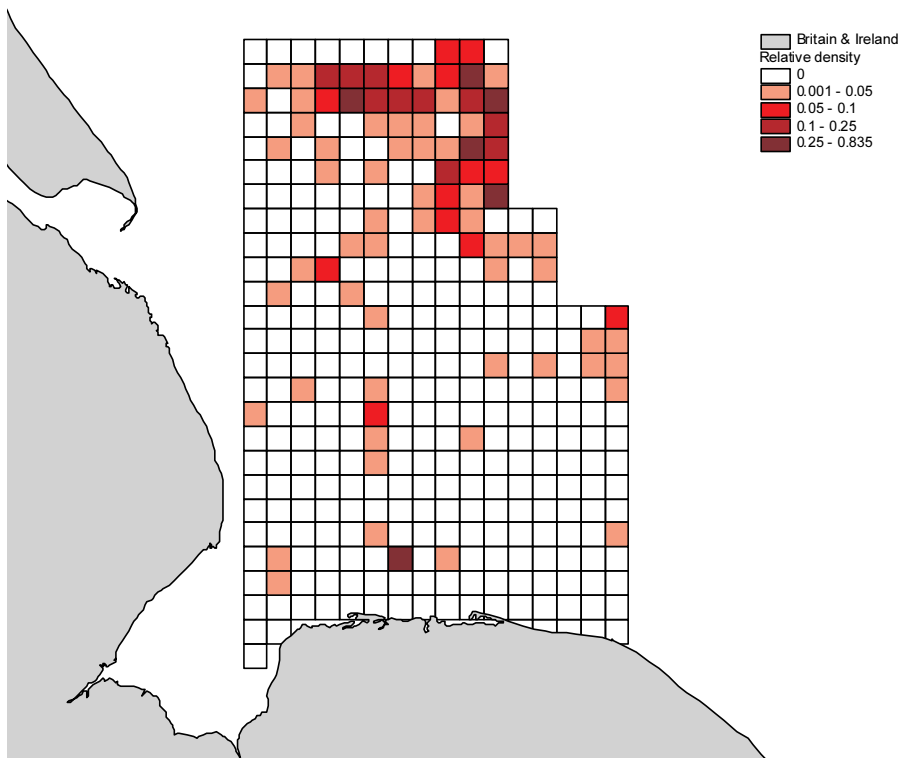


Figure 10. Relative encounter rate for all observations of Kittiwake (*Rissa tridactyla*) in the Greater Wash strategic area, March 2003.

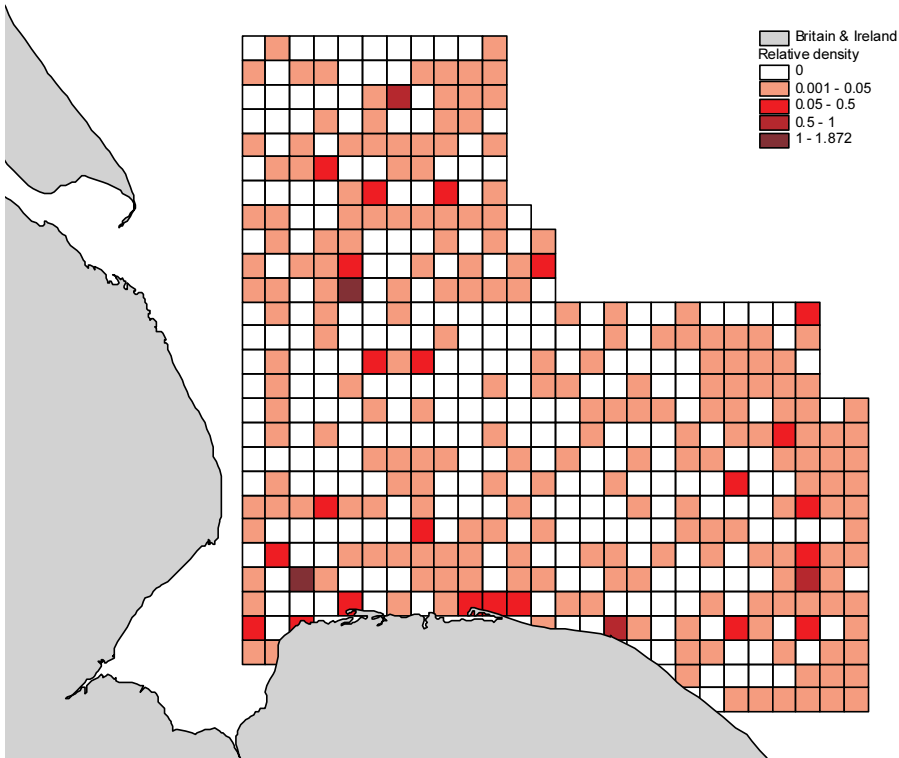


Figure 11. Relative encounter rate for all observations of gulls (*Larus/Rissa* spp.) in the Greater Wash strategic area, February 2003.

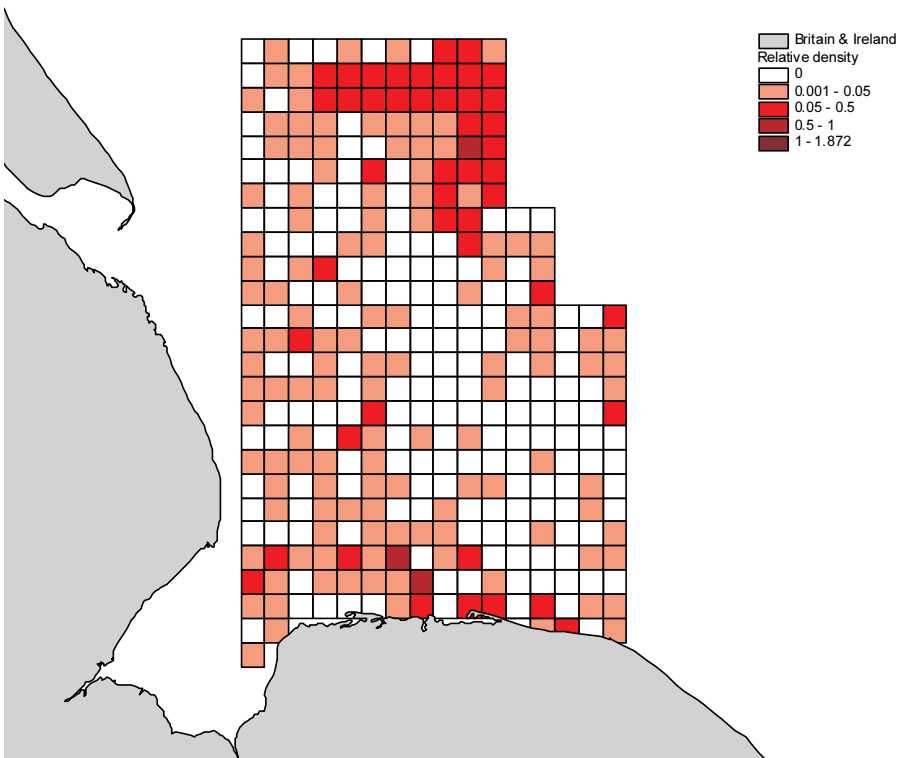


Figure 12. Relative encounter rate for all observations of gulls (*Larus/Rissa* spp.) in the Greater Wash strategic area, March 2003.

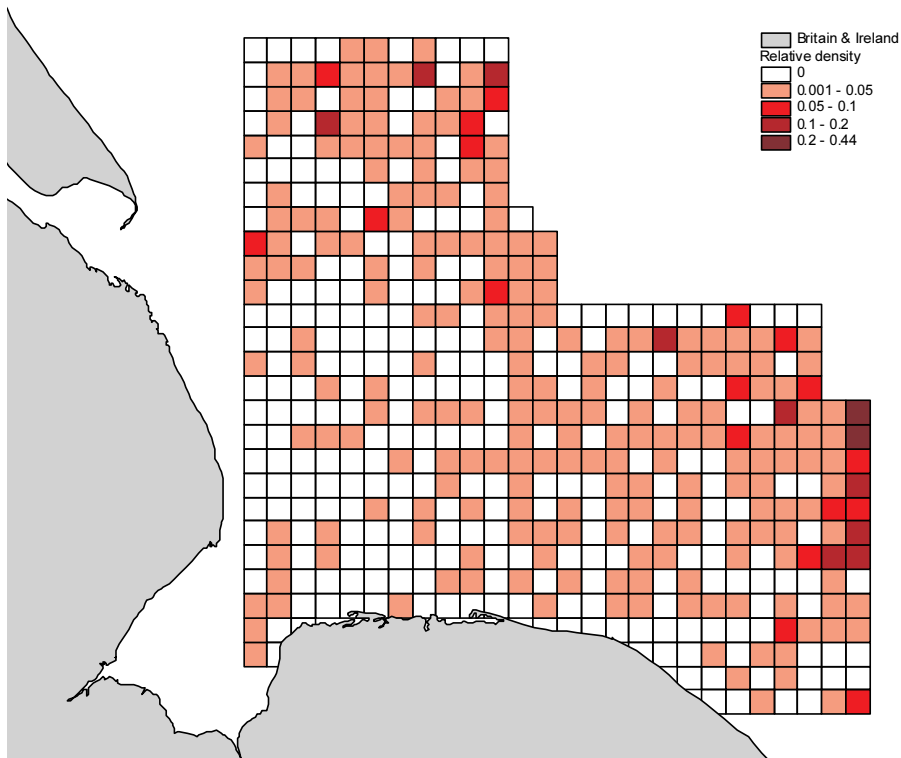


Figure 13. Relative encounter rate for all observations of auks (*Uria/Alca* spp.) in the Greater Wash strategic area, February 2003.

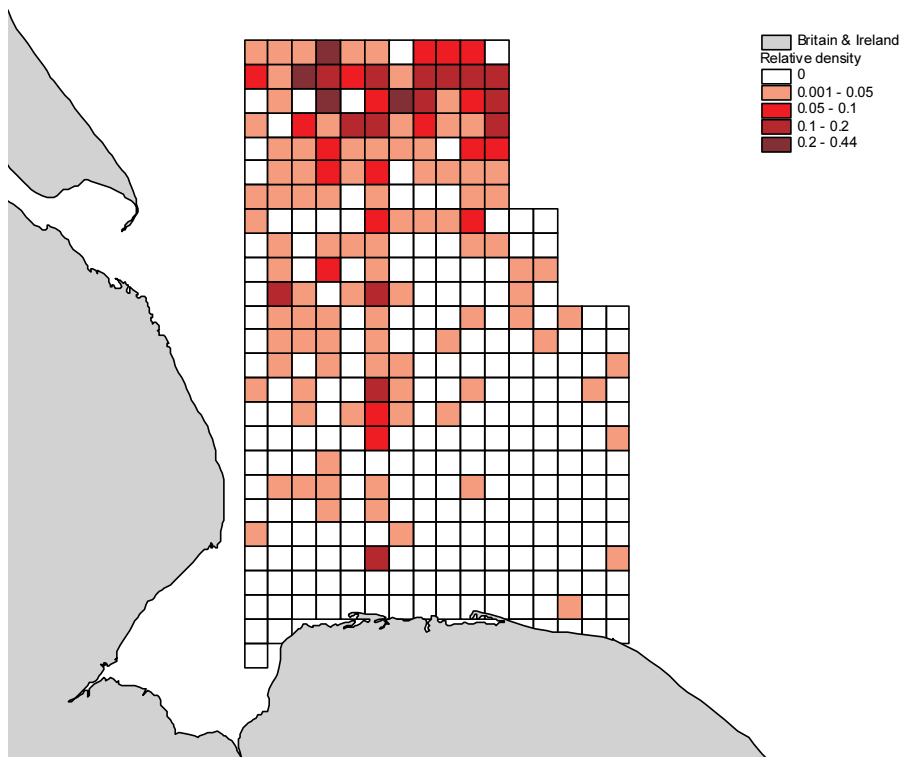


Figure 14. Relative encounter rate for all observations of auks (*Uria/Alca* spp.) in the Greater Wash strategic area, March 2003.

4 DISCUSSION

4.1 Winter 2002/03

The distribution maps demonstrate the occurrence of birds throughout the Greater Wash strategic area during February and March 2003. Whilst it would be premature to identify areas of importance based on the results of just two surveys in one winter, the patterns suggested by the surveys are consistent with existing knowledge of these species' ecology, giving confidence in the efficacy of this survey technique. For example, the maps show the occurrence of more pelagic species, such as auks and Kittiwakes, to be located further offshore. Marked differences, even during the relatively short period between the two surveys, are indicative of species which move in relation to mobile prey (particularly small fish). Other gulls are more generalist feeders and are relatively evenly spread throughout the survey area. Divers occur nearer shore with, apparently, a marked increase in March, perhaps indicative of passage through the area at that time. Although a large proportion was not identified to species, it is believed that the majority of divers in the area were Red-throated Divers. Scoters showed a relatively localised distribution. Land-based observations suggest that a flock, numbering 5-10,000 Common Scoters, is normally found off the northwest Norfolk coastline during recent winters. This group is often highly aggregated into one or two flocks (personal observation), and it is likely that aerial surveys using transects 4 km apart may only encounter one part of the flock, or that a large proportion of the birds may be missed in the 2 km of sea that is not counted between transects using 4 km spacing. This survey has, however, highlighted the main area of use, which can be investigated in more detail if necessary.

Encounter rates for most species were comparable with or lower than in Liverpool Bay in 2001/02 and 2002/03 (WWT Wetlands Advisory Service 2003). It is likely, however, that distribution patterns and numbers of birds within the strategic area vary both within and between winters.

4.2 Future work

These data were collected in late winter in one season. Surveys in early and mid winter (between October and January) are required to assess numbers at that time, and to assess the consistency of distribution patterns between years, in order to provide a full assessment of ornithological interest in the strategic area in winter.

The total numbers of birds in the survey area (i.e. allowing for those missed by the observers due to their greater distance from the plane) will be assessed using 'distance' calculations and provided in a subsequent report.

More intensive surveys (using 2 km transect separation) may be required to assess the numbers and distribution of aggregated species such as scoters more accurately.

Ongoing work on the distribution patterns of terns around their breeding colonies is also needed to complete the year round picture.

5 REFERENCES

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