South West of England Regional Development Agency

Wave Hub

Appendix E to the Environmental Statement

June 2006

Halcrow

South West *of* England
Regional Development Agency

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Wave Hub Environmental Impact Assessment

Offshore Bird Surveys

April 2006

Halcrow Group Limited

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South West England Regional Development Agency

Wave Hub Environmental Impact Assessment
Offshore Bird Surveys

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	0	Draft for internal review	03/06	SC
2	0	Final	04/06	SC
2	1	Final with minor amendments following comments from client	05/06	SC

Contents

1 Introduction

1.1 *Background*

The South West Regional Development Agency (SWRDA) is proposing the Wave Hub project to provide the electrical infrastructure necessary to support and encourage developers of wave energy converter devices (WECs). The Wave Hub will facilitate WEC development through final demonstration and pre-commercialisation development stages by allowing developers to install and operate WECs at commercial-scale conditions over a number of years.

The Wave Hub will, in essence, consist of an offshore 'socket' into which the WECs will be connected. The hub will be located approximately 12 nautical miles north of St Ives, and will be connected to the national grid via a sub-sea cable. The cable will come ashore at Towan's Beach, near Hayle, and pass under the adjacent Dunes to a new electricity substation which will form part of an existing Western Power Distribution substation site.

An environmental impact assessment is required for this project, the results of which will be presented in an Environmental Statement. The Scoping Report prepared by Halcrow Group Limited (February 2005) identified the need to assess the impacts on seabirds present in the Wave Hub deployment area. This report presents the results of survey work undertaken during 2005 and 2006 to assess the extent of bird use within this area. These results will be used to inform the environmental impact assessment.

2 Method

2.1 *Field Survey*

2.1.1 *Objectives and Background*

The objective of the survey was to establish the extent of use by seabirds in the vicinity of the proposed wave hub deployment area.

Given that the proposed Wave Hub is a novel scheme in the context of UK offshore waters, there is no specific guidance or standard methodology for surveys to inform an assessment of impacts on seabirds. The methodology that has been adopted, therefore, has been modified from the approach used to assess the impacts of offshore windfarms. This has been based on two key references:

- Komdeur, J *et al.* (Eds) 1992. *Manual for aeroplane and ship surveys of waterfowl and seabirds.* IWRB Spec. Publ. 19.

- Camphuysen, CJ *et al.* 2004. *Towards standardised seabirds at sea census techniques in connection with environmental impact assessments for offshore windfarms in the UK.* Cowrie / KNIOZ.

The methodology and approach has been discussed and agreed with English Nature (EN), the Department for Trade and Industry (DTI), the Joint Nature Conservation Committee (JNCC) Seabirds at Sea Team, and the Royal Society for the Protection of Birds (RSPB).

2.1.2 *Methodology*

The survey area covered a 10 x 10km square centred on the proposed wave hub location. The square was orientated to lie approximately parallel to the coast (refer to Figure 1).

It was initially proposed that 12 monthly surveys would be undertaken in a one year period between March 2005 and February 2006. However, it was recognised that the exposed nature of the site would mean that weather conditions might prevent some surveys being undertaken. It was therefore agreed with EN and DTI that where a survey in any month could not be undertaken then a survey in the following month would be essential for the integrity of the results to be maintained.

Surveys were undertaken from three different vessels during the twelve month period; the MV Datchet from Appledore, the Terramare from Penzance and the Pamela P from Penzance. All vessels provided an observation platform with an eye height at least 5m above sea level, in accordance with the recognised guidelines, and a cruising speed of 8-10 knots.

The surveys were undertaken using line transects with sub-bands and 'snap-shots' for flying birds in accordance with the methods developed by the European Seabirds at Sea (ESAS) Team, and recommended in the Cowrie guidelines. Each survey comprised six 10km long transects running SE-NW (i.e. perpendicular to the coast), each 2km apart. The approximate transect lines are shown on Figure 1.

Two observers were used for each survey. The primary observer was trained by the JNCC to undertake seabird census from ships, and was responsible for the observation and identification of birds. The second observer was primarily responsible for recording seabird and navigation data, as well as undertaking seabird observation.

The captain of the vessel being used was provided with the location of the start and end point for each transect, and as far as possible maintained a straight course and steady cruising speed along the transect line, subject to navigational requirements (eg the presence of other vessels). Each transect line was divided into 5 minute sections, and navigational data (location, speed and heading) was recorded at the end of each section. Once the transect end point was reached, the heading was maintained until the current 5 minute section was complete, before moving to the next transect.

During the first survey, A 180° scan ahead and to both sides of the vessel was used, together with a 300m transect on both sides. However, following the experiences of this survey and consultation with the JNCC, a 90° scan and 300m transect on one side of the vessel only was used for subsequent surveys.

For birds sitting on the water, each was recorded using the standard line-transect method, with a 300m strip width. Each record included:

- distance from the vessel using a rangefinder (using standard strips A=0-50m, B=50-100m, C=100-200m, D=200-300m, E=>300m);
- species; and

- where possible, plumage, age, and behaviour.

All birds within the 90° scan area were recorded, and birds within 300m of the vessel course at the time they were first observed identified as being 'in transect'.

All flying birds within the 90° scan area were also recorded, and the 'snapshot' method was used to determine which birds were within transect. The snapshot is an instantaneous count of birds within a 'box' encompassing the transect line for a distance ahead of the ship, undertaken at exactly 1 minute intervals. The distance ahead of the ship is determined by vessel speed, typically 300m at 10 knots. The direction of flight was recorded where possible, but flying height was not recorded as this can be difficult to assess accurately and is not considered to be particularly relevant to this scheme, as it might be for a windfarm development.

Birds were located during the survey principally with the naked eye, and binoculars were used mainly for identification only. Occasional scans ahead of the vessel were made using binoculars to locate birds on the water that might otherwise be flushed before they were located.

Other information recorded during the survey included environmental conditions (weather, sea state) and the presence of shipping and fishing vessels. All cetaceans and elasmobranchs observed were also recorded.

2.1.3 *Data Analysis*

Environmental, navigational and seabird data for each survey was tabulated onto Excel spreadsheets, and navigational data plotted onto Mapinfo GIS.

It was originally intended that data would be analysed using *Distance* software in order to determine population density. However, the relatively small amount of data obtained was not sufficient to allow this type of analysis to be undertaken. Density has therefore been calculated manually as follows:

1. The exact length of each transect line is calculated using Mapinfo GIS.

2. The total number of birds for each species recorded <u>in transect</u> is calculated for each transect line, separated into birds on the water and flying birds.

3. The density of birds is calculated as:

$$\text{Density} = \frac{\text{total number of birds}}{\text{total survey area}}$$

4. The survey area is calculated as:

   Survey area = transect length x transect width

   So for a transect exactly 10km long, this would equate to 10km x 0.3km (300m) = 3km^2.

5. The total number of birds is the sum of the total number of birds in transect on the water, and the total in transect flying. However, because a proportion of the birds that are present in the transect will be overlooked, particularly towards the outer edge of the transect, a correction factor must be applied. This can be calculated for each species by analysing the number of birds recorded in each of the transect bands. However, the relatively small amount of data obtained for this survey has meant such analysis has not been possible, and therefore a standard correction factor has been applied for each species using the factors in *The Atlas of Seabird Distribution in North-west European Waters* [1]. The correction factor varies between species; for example, a very visible species such as Gannet (*Morus bassanus*) has a correction factor of 1.0, while less prominent species such as razorbill (*Alca torda*) have a correction factor of 1.5. The total number of birds for each transect is therefore calculated as:

   Number of birds = (W x C) + F

   Where W = number of birds on the water, C = correction factor and F = number of flying birds

6. Using this information, therefore, the density of birds recorded for each transect and for the whole survey area can be estimated. This method provides a relatively crude estimate of density compared to other distance sampling statistical methods such as 'kriging'. However, the relatively small amount of data gathered means that this more basic analysis is appropriate for this survey.

[1] Stone CJ et al (1995) *An Atlas of Seabird Distribution in North-west European Waters* - JNCC

2.2 *Desk Study*

Consultation was undertaken with the Environmental Records Centre for Cornwall and Isles of Scilly (ERCCIS), JNCC, RSPB and the Cornwall County Bird Recorder to obtain exiting records for the area. This consultation revealed that there is very little available data for offshore seabird records in the area. The main source of available data, therefore, is the *The Atlas of Seabird Distribution in North-west European Waters*. Although this report was published in 1995 it remains the most comprehensive analysis of seabird distribution around the UK. Data has therefore been used to compare the species densities encountered during the surveys.

3 Results

3.1 *Introduction*

The results are presented in three parts:

- The raw field data and data analysis, tabulated onto Excel spreadsheets, are presented in Appendix 1.

- A brief analysis and summary of each of the monthly surveys is presented in section 3.2, including comparison with published data from *The Atlas of Seabird Distribution in North-west European Waters*.

- Species accounts for selected species, including comparison with published data from *The Atlas of Seabird Distribution in North-west European Waters*, are presented in section 3.3.

3.2 *Monthly summaries*

A summary of each of the monthly surveys is presented below. Each month's results also includes a chart showing the density of each species recorded during the survey, together with a comparison with data from *The Atlas of Seabird Distribution in North-west European Waters*. Data from two areas has been included, 'The Celtic Sea' and 'English and Bristol Channels', as the survey area lies on the boundary between these regions.

3.2.1 *March 2005*

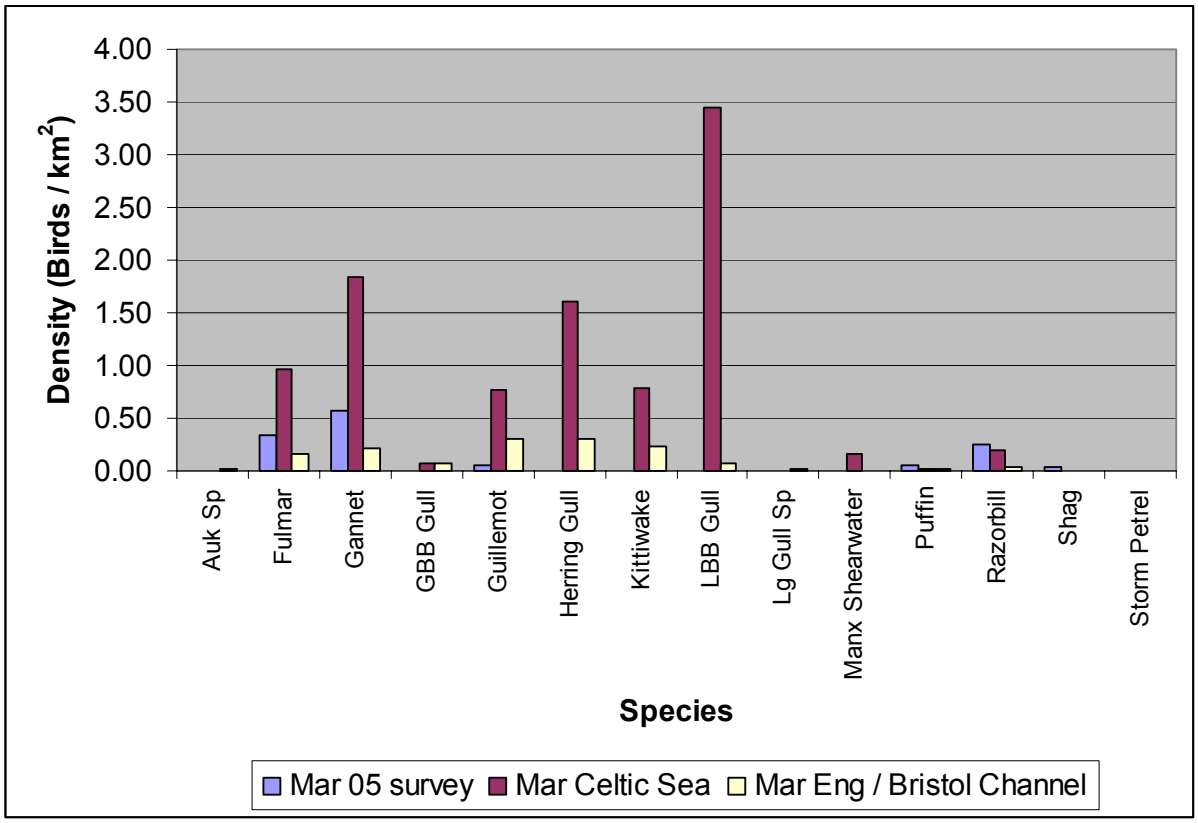
This survey was undertaken on 11 March 2005 from the MV Datchet. Only five of the six transects were completed due to forecast deteriorating weather and the need to return to harbour on the next high tide. The survey commenced at 06:35 GMT and was completed at 10:25. The weather during the survey was fair with a moderate north-westerly breeze and slight to moderate seas. The weather deteriorated somewhat during the survey, and significantly so during the return to port after the survey was complete.

Because this was the first survey to be undertaken, the approach used was slightly different to the remaining surveys, which were modified to take account of the initial experiences and following consultation with JNCC. Most significantly, two 300m transects were surveyed simultaneously on either side of the boat, with a

180° scan. Because of the high observer demand, gull species were not recorded during this survey. Subsequent surveys used a 90° scan with a single transect on one side of the boat only, and all species were recorded.

Excluding gulls, a total of six species were recorded during the survey. A summary of the results is presented in Chart 1. Relatively low densities of all bird species were recorded during the survey, in the main below those recorded from the atlas. Very few birds were observed on the water, with the huge majority flying through. There was no evidence of birds feeding in the area. Two common dolphins *Delphinus delphis* were recorded together during the survey, briefly bow-riding the boat.

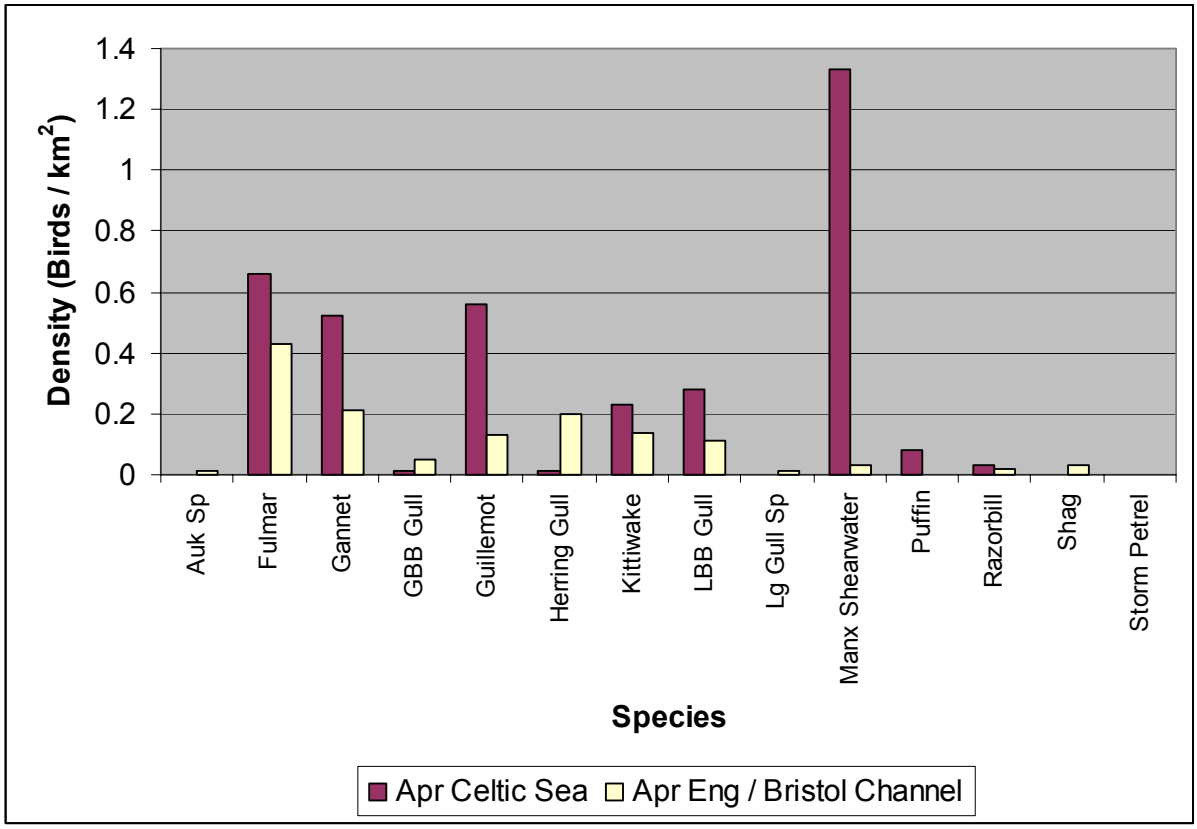
Chart 1 – Summary of March survey results, compared to data from *The Atlas of Seabird Distribution in North-west European Waters* (Note that gulls were not recorded during this survey)



3.2.2 *April 2005*

Due to poor weather no survey was undertaken during April. For information, Chart 2 shows the density of species recorded in *The Atlas of Seabird Distribution in North-west European Waters* for the areas covering the Wave Hub site.

Chart 2 – Summary of Existing Species Records for April from *The Atlas of Seabird Distribution in North-west European Waters*



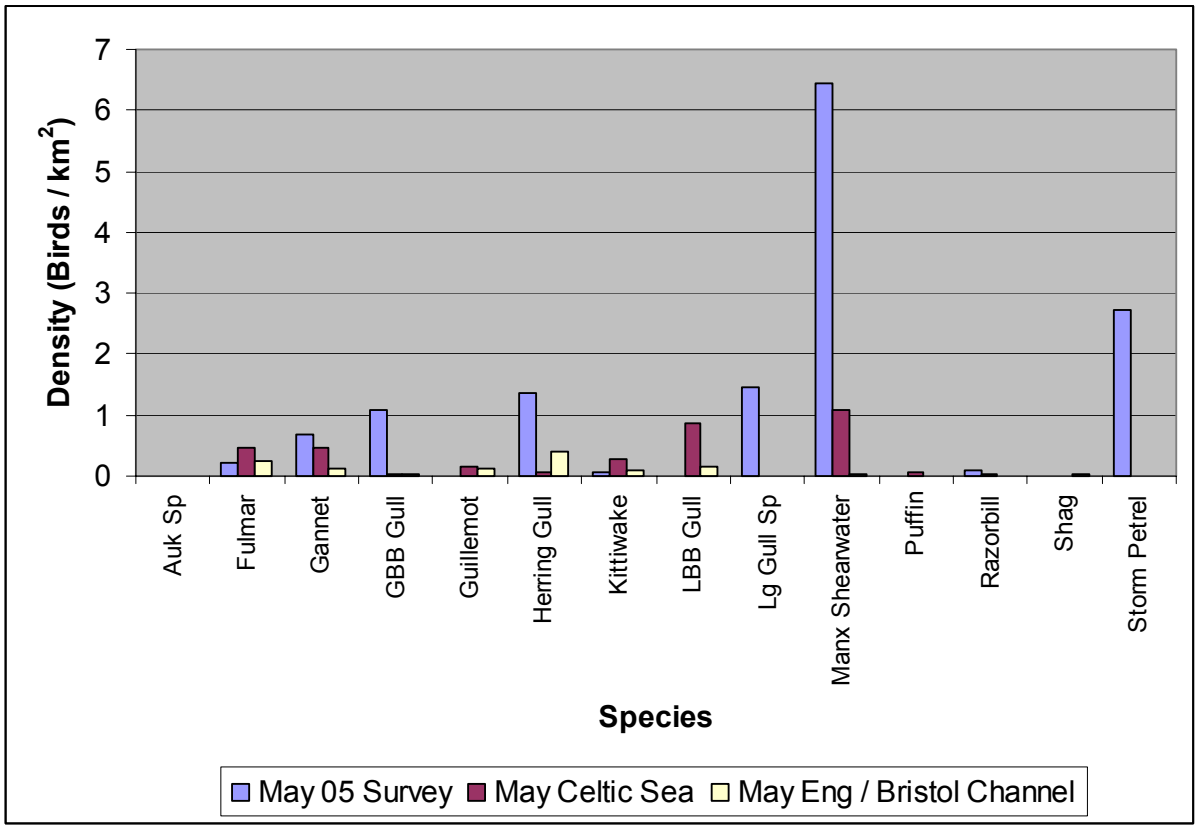
3.2.3 *May 2005*

This survey was undertaken on 10 May 2005 from the MV Datchet. All six transects were completed. The survey commenced at 05:05 GMT and was completed at 09:55. The weather during the survey was fair with a north-easterly breeze and moderate seas.

A total of eight species were recorded during the survey. A summary of the results is presented in Chart 3. Densities were generally higher than the April survey.

Particularly high densities of storm petrel (*Hydrobates pelagicus*) and Manx shearwater (*Puffinus puffinus*) were recorded. However, the storm petrel overall density was biased by a flock of 50 birds associated with a fishing vessel. Removing this flock from the data reduces density from 2.73 birds / km² to 0.11 birds / km². Manx shearwater density has also been biased by two flocks of 20 birds, although these were not directly associated with a fishing vessel.

Chart 3 – Summary of May survey results, compared to data from *The Atlas of Seabird Distribution in North-west European Waters*

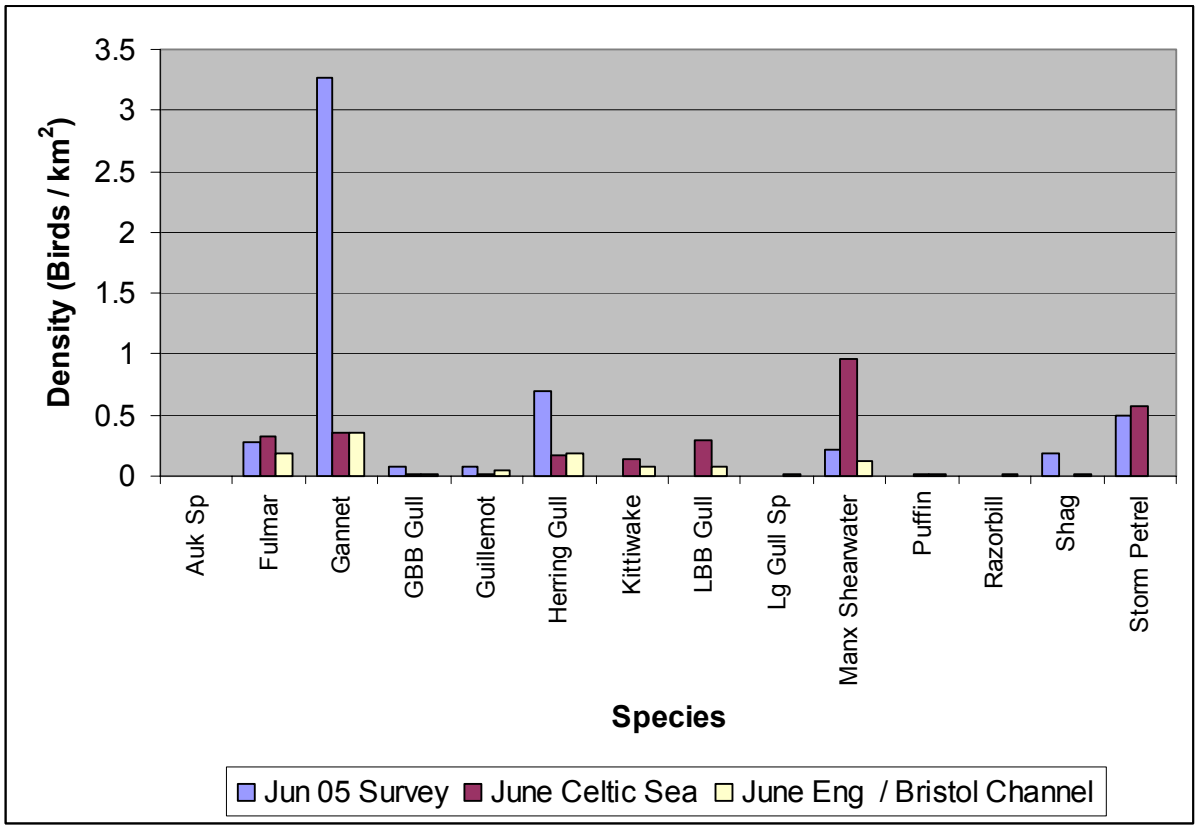


3.2.4 *June 2005*

This survey was undertaken on 22 June 2005 from the Terramare. Six transects were completed, although due to a navigational error the transect lines were slightly offset from the expected routes. This is not considered to have affected the quality of the results. The survey commenced at 07:22 GMT and was completed at 13:37. The weather during the survey was good with a light north-easterly breeze and slight or smooth seas.

Eight species were recorded during the survey. A summary of the results is presented in Chart 4. Generally densities were similar to the May survey, although storm petrel and Manx shearwater were significantly lower. Gannet densities were high during the survey, with large numbers of birds recorded flying and on the water. One flock of feeding birds was also recorded, although this was outside of the transect. Six common dolphin, four harbour porpoise (*Phocoena phocoena*) and five basking sharks (*Cetorhinus maximus*) were recorded during the survey.

Chart 4 – Summary of June survey results, compared to data from *The Atlas of Seabird Distribution in North-west European Waters*

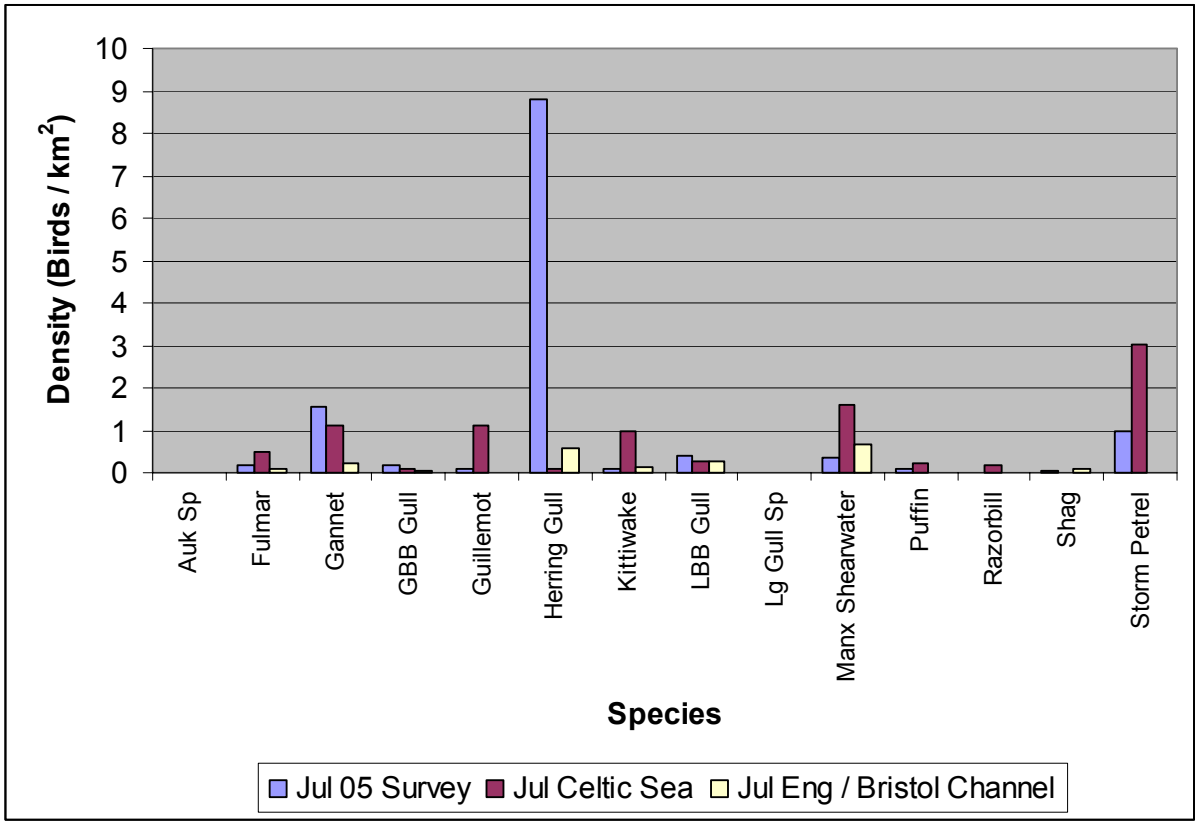


3.2.5 *July 2005*

This survey was undertaken on 12 July 2005 from the Terramare, and all six transects were completed. The survey commenced at 07:38 GMT and was completed at 13:38. The weather during the survey was good with a light north-westerly breeze and smooth seas.

Eleven species were recorded during the survey. A summary of the results is presented in Chart 5. In general densities were slightly higher than the June survey, though this may in part be explained by the excellent conditions during the survey. Gannet densities were greatly reduced, although still slightly higher than those recorded in the Atlas. Herring gull densities were very high, but this is due mainly to a flock of 100 birds recorded associating with a fishing vessel. Five unidentified dolphin, seven harbour porpoise and one grey seal (*Halichoerus grypus*) were recorded during the survey.

Chart 5 – Summary of July survey results, compared to data from *The Atlas of Seabird Distribution in North-west European Waters*

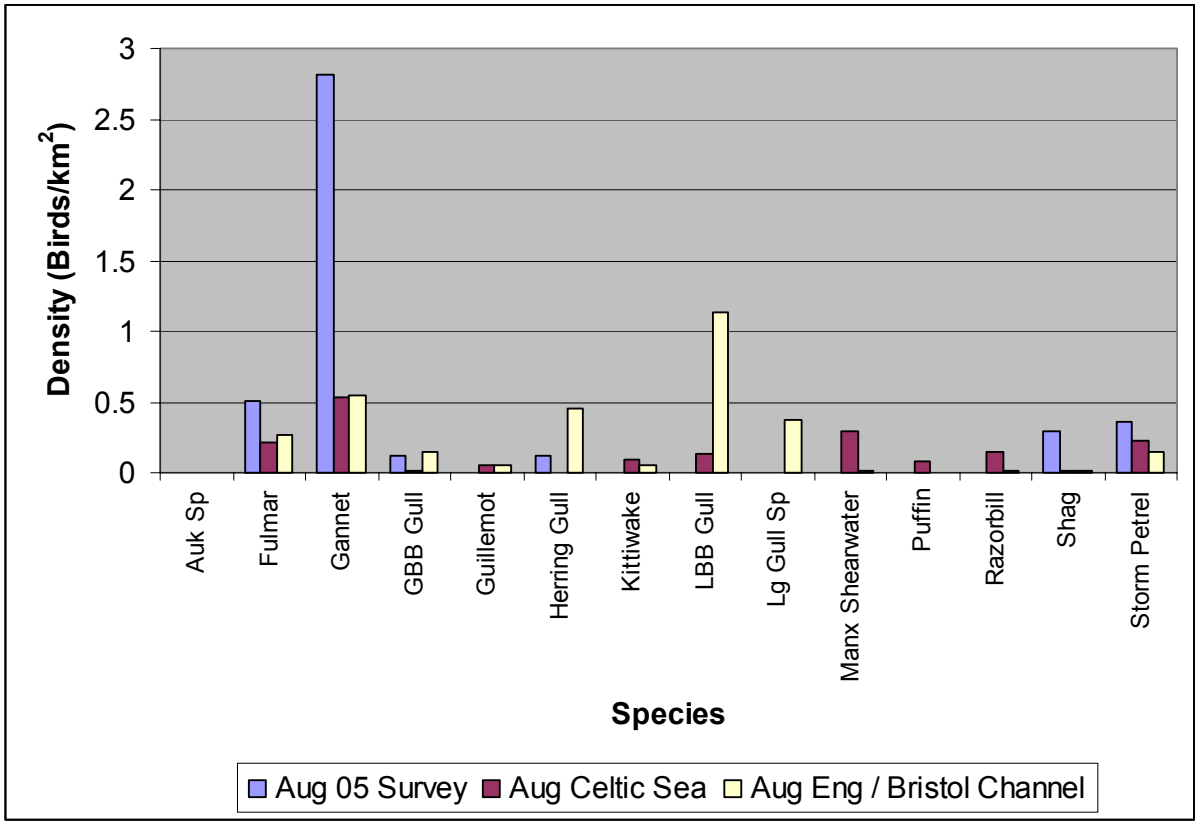


3.2.6 *August 2005*

This survey was undertaken on 17 August 2005 from the MV Datchet, and all six transects were completed. The survey commenced at 12:14 GMT and was completed at 16:40. The weather during the survey was good with a light southerly breeze and smooth seas.

A total of six species were recorded during the survey. A summary of the results is shown in Chart 6. Densities of most species were similar to those recorded in previous months, although no Manx shearwaters were seen. Density of gannets was again high. The most notable record from this survey was the large numbers of basking sharks encountered. A total of 61 were seen during the survey, 43 of which were on the transect side of the boat. One group of 13 sharks was noted. In addition, five harbour porpoise, an unidentified dolphin and one ocean sunfish (*Mola mola)* were seen.

Chart 6 – Summary of August survey results, compared to data from *The Atlas of Seabird Distribution in North-west European Waters*

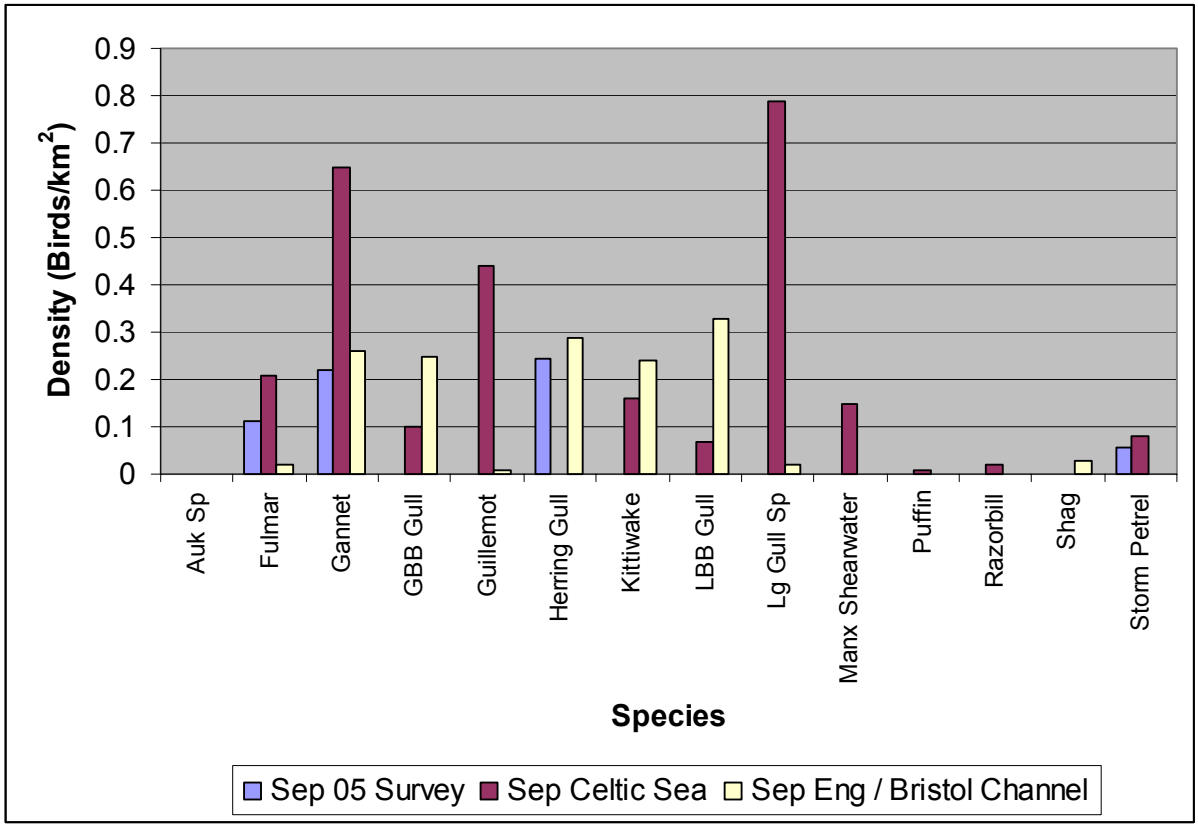


3.2.7 *September 2005*

This survey was undertaken on 29 September 2005 from the MV Datchet, and all six transects were completed. The survey commenced at 06:30 GMT and was completed at 10:54. The weather during the survey was fair with a moderate south-westerly breeze and slight to moderate seas.

Densities of birds were some of the lowest of all the surveys carried out during the year, with only four species recorded. A summary of the results is shown in Chart 7.

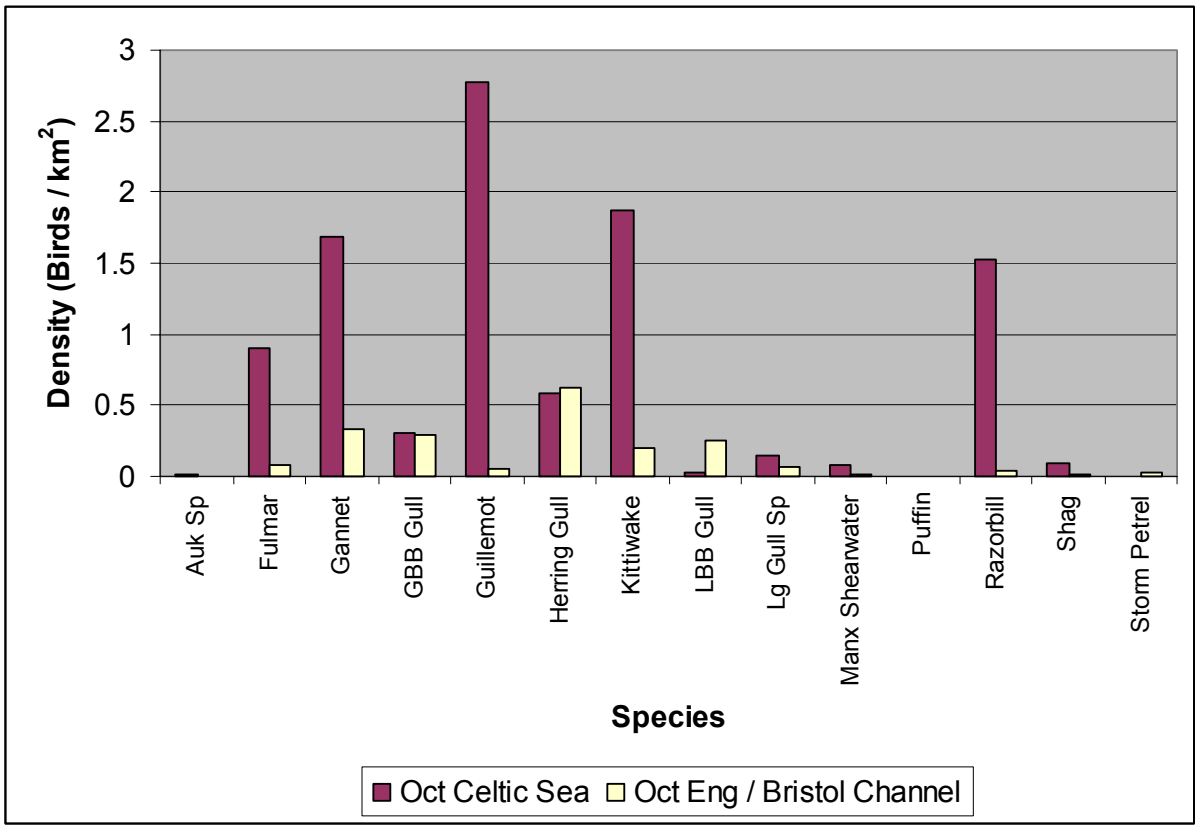
Chart 7 – Summary of September survey results, compared to data from *The Atlas of Seabird Distribution in North-west European Waters*



3.2.8 *October 2005*

Due to poor weather no survey was undertaken during October. For information, Chart 8 shows the density of species recorded in *The Atlas of Seabird Distribution in North-west European Waters* for the areas covering the Wave Hub site.

Chart 8 – Summary of Existing Species Records for October from *The Atlas of Seabird Distribution in North-west European Waters*



3.2.9 *November 2005*

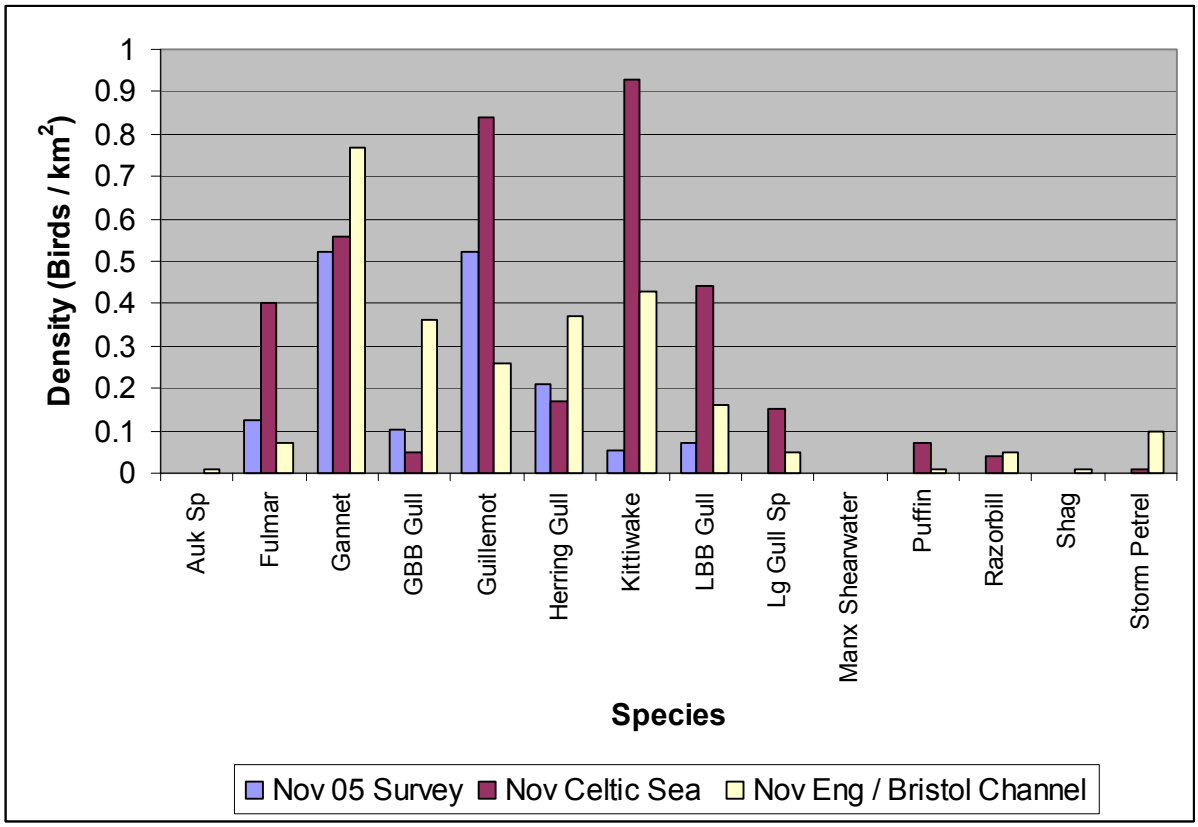
This survey was undertaken on two dates during November. During the first survey only one transect was completed due to poor weather conditions, and the remaining five transects were therefore undertaken on a different day. Both surveys were carried out from the Pamela P.

The first survey was undertaken on 18 November 2005. The survey commenced at 08:25 and was completed at 9:00. The weather during the survey was fair with a fresh south-easterly breeze and moderate seas. The second survey was undertaken on 23 November 2005. The survey commenced at 09:09 and was completed at 13:06. The weather was fine with a light breeze and slight seas.

Data for both surveys have been combined to calculate species density, and these are summarised in Chart 9. A total of seven species were recorded, and densities during the survey were generally fairly low, although higher than those for

September. A single Balearic shearwater (*Puffinus mauretanicus*) was recorded out of transect on the 18 November.

Chart 9 – Summary of November survey results, compared to data from *The Atlas of Seabird Distribution in North-west European Waters*

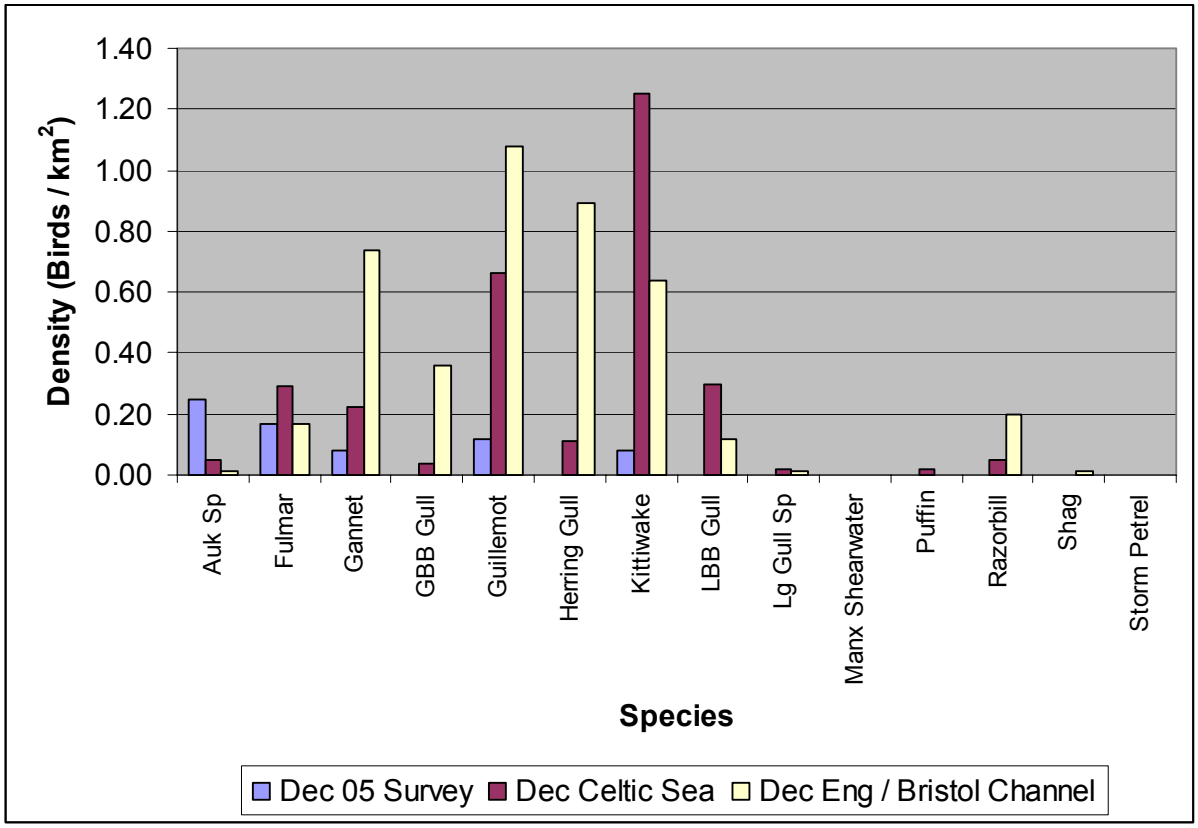


3.2.10 *December 2005*

This survey was undertaken on 19 December 2005 from the Pamela P. Due to poor weather only four of the six transects were completed, although it has still been possible to estimate population densities from this information. The survey commenced at 08:44 and was completed at 12:48. The weather during the survey was fair with a moderate westerly breeze and moderate seas.

Just four species were recorded during the survey, the results of which are summarised in Chart 10. Densities of the species recorded were low, with the great majority of birds flying and very few on the water.

Chart 10 – Summary of December survey results, compared to data from *The Atlas of Seabird Distribution in North-west European Waters*



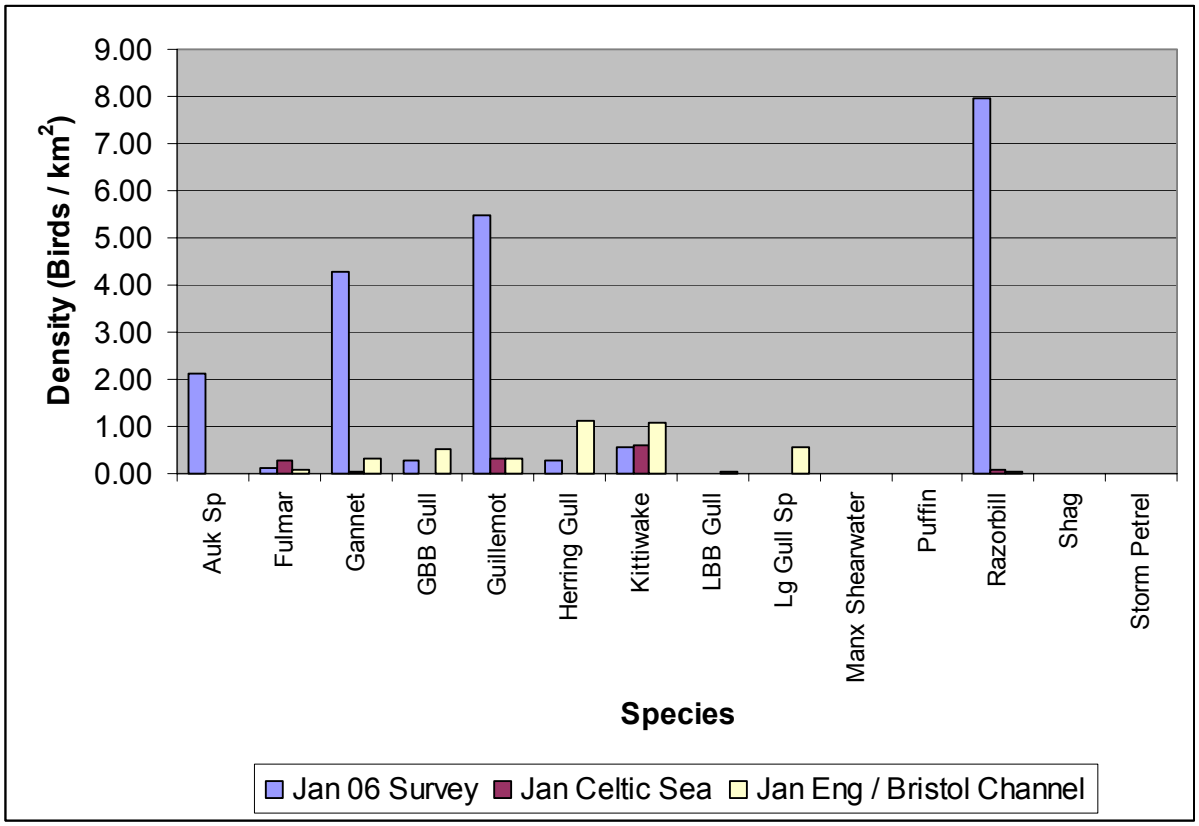
3.2.11

January 2006

This survey was undertaken on 31 January 2006 from the MV Datchet. Only five of the six transects were completed due to failing light. The survey commenced at 13:23 and was completed at 17:01. Weather during the survey was good, with a gentle north-easterly breeze and slight seas.

A total of seven species were recorded during the survey, the results of which are summarised in Chart 11. High densities of razorbills, guillemots (*Uria aalge*) and gannets were recorded. However, informal observations from the transit to and from Appledore suggest that similar densities of these species were present in the wider area, and that there was no unusual concentration within the survey area.

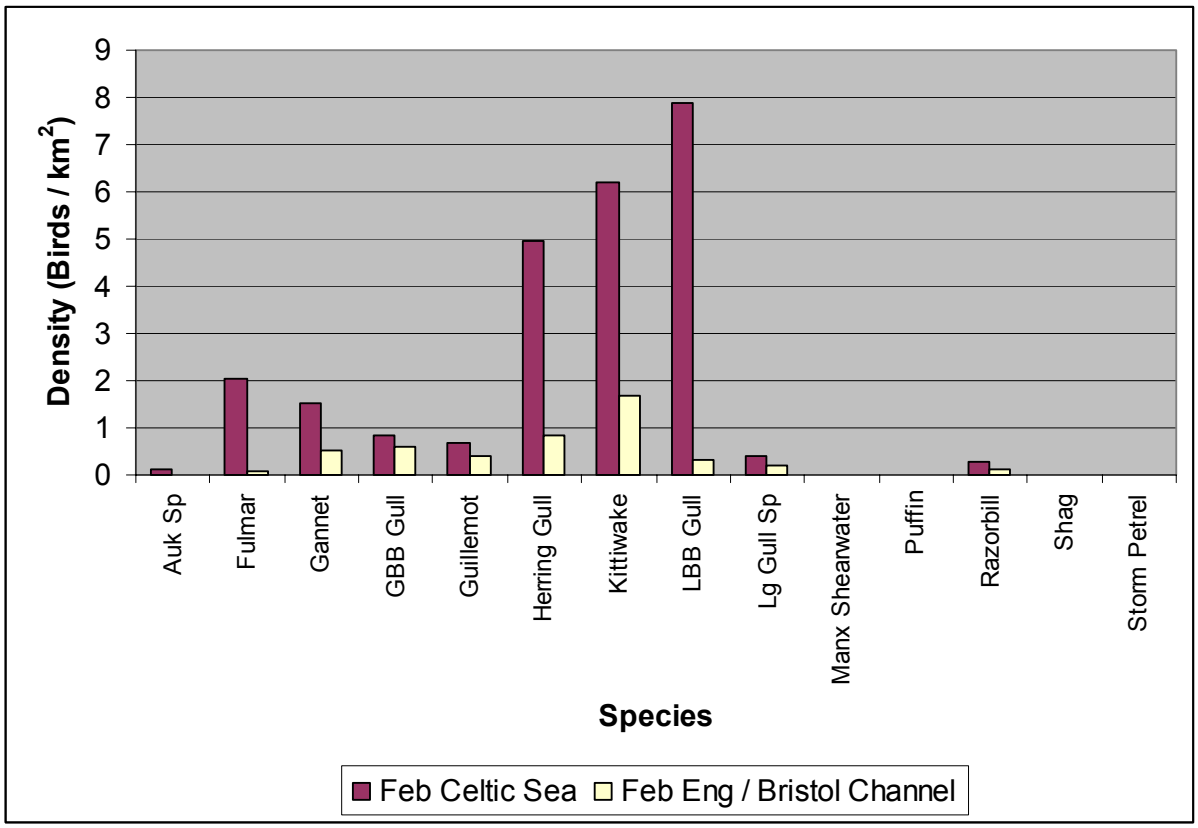
Chart 11 – Summary of January survey results, compared to data from *The Atlas of Seabird Distribution in North-west European Waters*



3.2.12 *February 2006*

Due to poor weather no survey was undertaken during February. For information, Chart 12 shows the density of species recorded in *The Atlas of Seabird Distribution in North-west European Waters* for the areas covering the Wave Hub site.

Chart 12 – Summary of Existing Species Records for February from *The Atlas of Seabird Distribution in North-west European Waters*



3.3 *Species Accounts*

This section provides an analysis of the results for key species across the year. These species are:

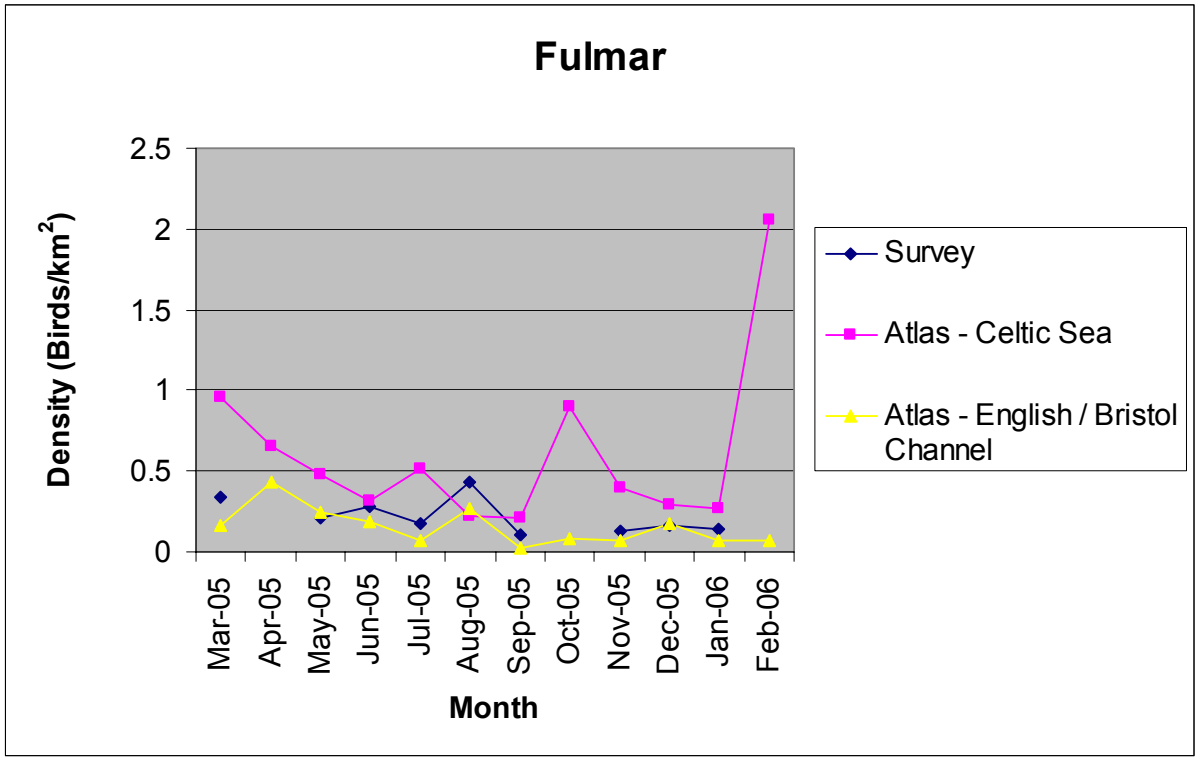
- Fulmar (*Fulmarus glacialis*)
- Manx shearwater
- Storm petrel
- Gannet
- Guillemot
- Razorbill

The results are presented in the form of line charts showing the density of birds in each month for the survey, Celtic Sea and English and Bristol Channel areas from *The Atlas of Seabird Distribution in North-west European Waters*.

3.3.1 *Fulmar*

Chart 13 provides a summary of survey results for fulmar over the 12 month period.

Chart 13 – Summary of survey results for fulmar (*Fulmarus glacialis*) compared to data from *The Atlas of Seabird Distribution in North-west European Waters*

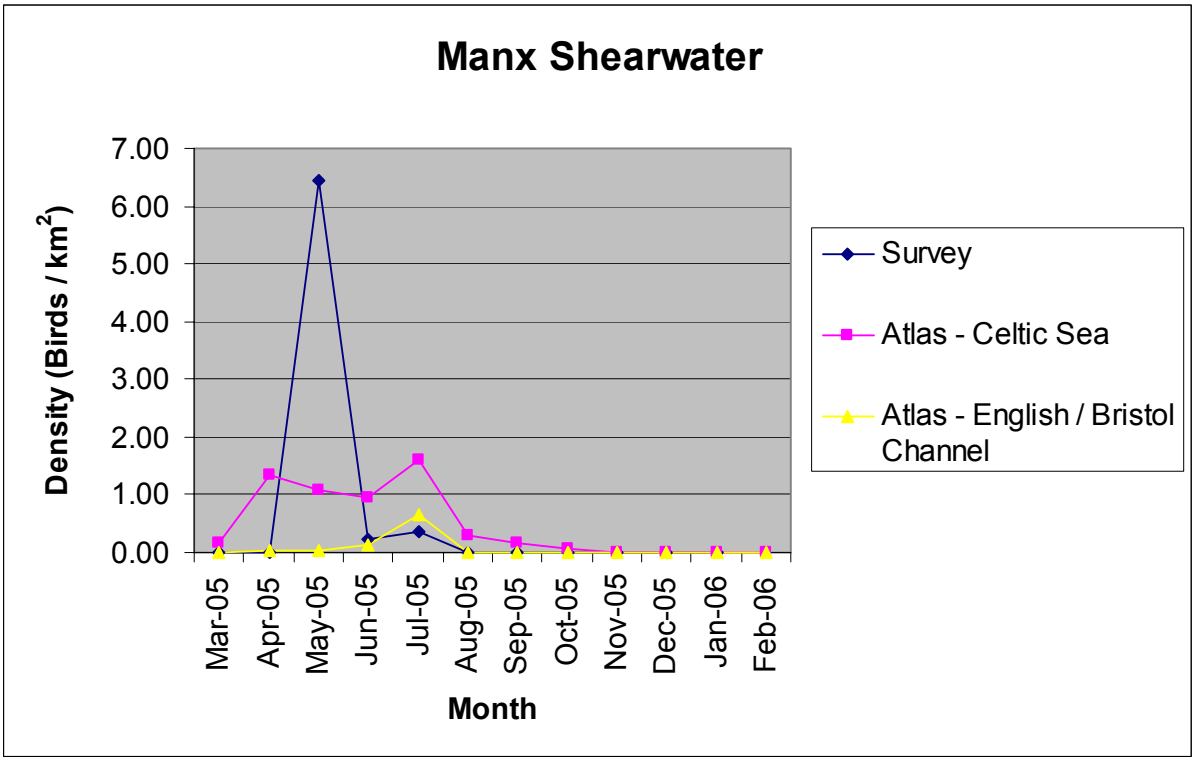


Densities recorded during the survey were generally low, and usually equal to or lower than historic results from the Celtic Sea area, and slightly higher than the English / Bristol Channel area. The greatest concentrations of fulmar occur to the north and east of the UK, with lowest densities along the English Channel. The species breeds widely on cliffs in the southwest and moves into pelagic areas during the winter. The location of the wave hub site would probably be considered to be on the boundary of inshore waters and open ocean, and this may account for the similar densities throughout the year. The results obtained during the surveys therefore suggest that densities of fulmar within the survey area are similar to those that occur in the wider area.

3.3.2 *Manx Shearwater*

Chart 14 provides a summary of survey results for Manx shearwater over the 12 month period.

Chart 14 – Summary of survey results for Manx shearwater (*Puffinus puffinus*) compared to data from *The Atlas of Seabird Distribution in North-west European Waters*



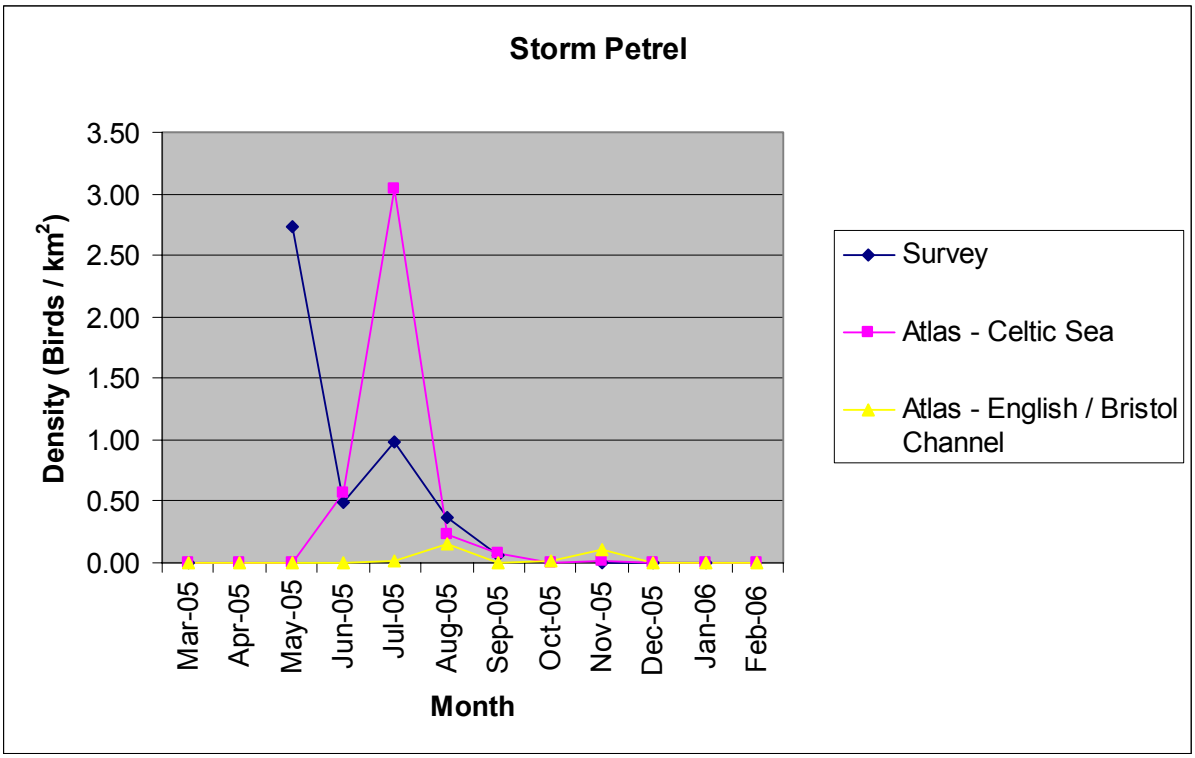
Manx shearwater is a highly pelagic species that breeds on islands around the UK. The nearest colonies to the survey site occur on the Isles of Scilly, Lundy and off Pembrokeshire. A high density of this species was recorded during the May survey, but as discussed in section 3.2.3 this is partly due to the presence flocks of 10-20 birds within the survey transect that have greatly inflated the overall density. Removing these from the data reduces density to 2.68 birds / km², which suggests that densities were probably genuinely higher than historic data from the Atlas. During this incubation period birds can wander widely from the nest site as each parent typically spends a six day 'shift' on the nest. It is therefore possible that the birds recorded were from any of the three breeding centres in the southwest. However, the fact that density during the remaining summer months was somewhat lower that the historic figures suggest that such high densities do not

occur regularly. It seems likely, therefore, that densities within the proposed wave hub site are similar to those that occur in the wider area.

3.3.3 *Storm Petrel*

Chart 15 provides a summary of survey results for storm petrel over the 12 month period.

Chart 15 – Summary of survey results for storm petrel (*Hydrobates pelagicus*) compared to data from *The Atlas of Seabird Distribution in North-west European Waters*

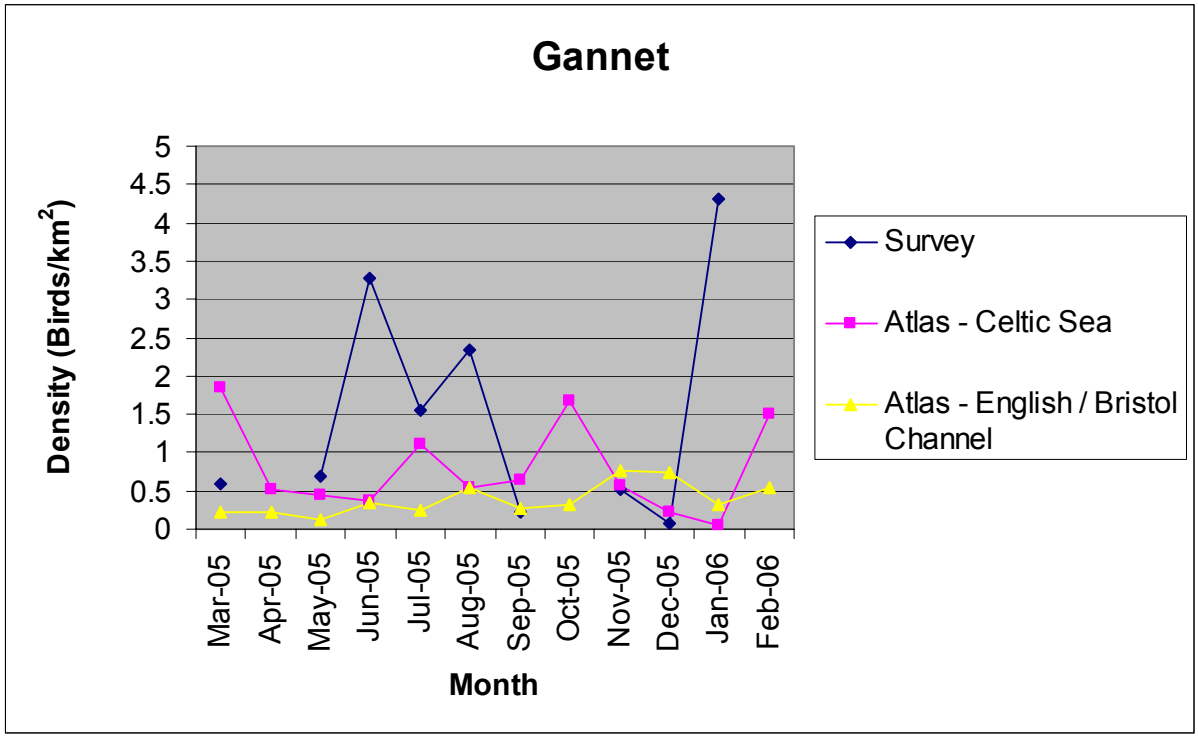


Like Manx shearwater, storm petrels nest on islands around the UK, with colonies on the Isles of Scilly and off Pembrokeshire. As discussed in Section 3.2.3 the very high density of birds recorded during the May survey is due to a large flock of birds recorded in transect associated with a fishing boat. Removing this flock from the analysis reduces density from 2.73 birds / km² to 0.11 birds / km². In general, therefore, densities appear to be in the same order of magnitude as those recorded in the atlas. The high density recorded for the Celtic Sea in July has been attributed to a slightly different survey technique used during surveys in this area, and it is therefore likely that density has been exaggerated.

3.3.4 *Gannet*

Chart 16 provides a summary of survey results for gannet over the 12 month period.

Chart 16 – Summary of survey results for gannet (*Morus bassanus*) compared to data from *The Atlas of Seabird Distribution in North-west European Waters*



Gannets nest in large offshore colonies at a number of locations around the UK. The nearest to the wave hub site occur at Grassholm off Pembrokeshire and off southern Ireland. Densities of gannets during the surveys were typically some of the highest of all of the species, and from the above chart it is evident that densities were often above those recorded in the atlas. However, examination of the distribution maps from the atlas shows that 'hotspots' of high density can occur within the area between north Cornwall, south west Wales and southern Ireland, occasionally in excess of 5 birds / km^2.

Gannets were also one of the few species recorded showing feeding behaviour away from fishing boats, with occasional plunge dives observed.

3.3.5 *Guillemot & Razorbill*

Charts 17 and 18 provide a summary of survey results over the 12 month period for guillemot and razorbill respectively.

Chart 17 – Summary of survey results for guillemot (*Uria aalge*) compared to data from *The Atlas of Seabird Distribution in North-west European Waters*

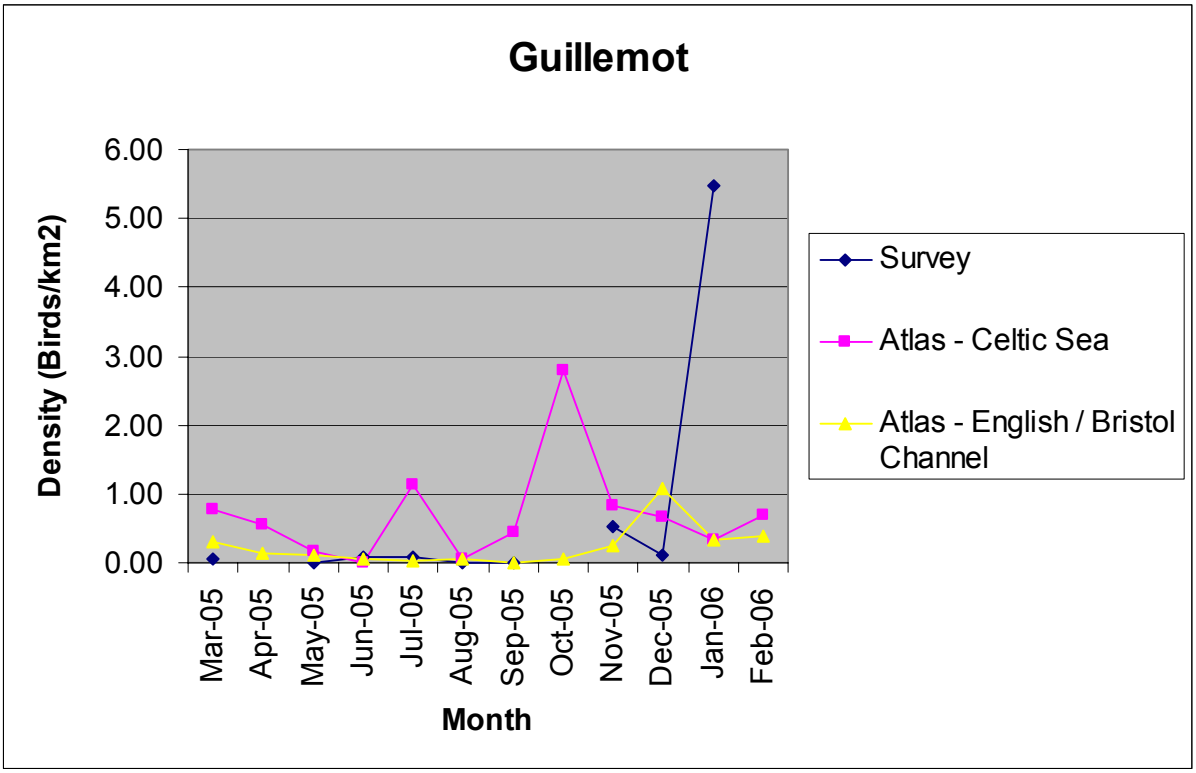
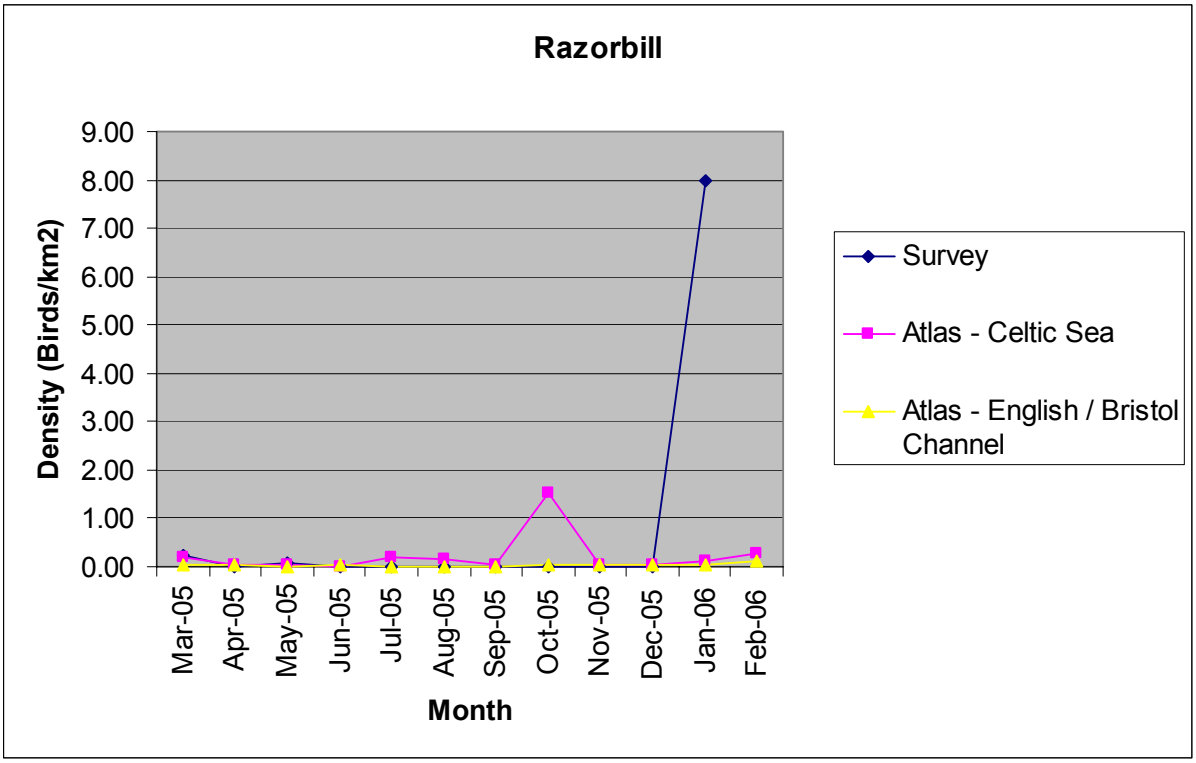


Chart 18 – Summary of survey results for razorbill (*Alca torda*) compared to data from *The Atlas of Seabird Distribution in North-west European Waters*



Guillemot and razorbill are cliff nesting species that are present widely around UK coasts, although guillemots are by far the most common species, with a Britsh Isles population of 890,000 pairs against 110,000 pairs of razorbill. Low numbers of both species were recorded during the autumn and winter, with very few birds present during the summer months. Both species were present in high densities during the January survey, but as described in 3.2.11 observation suggested that this density was typical of the wider area and was not the result of concentration around the Wave Hub site.

4 Discussion and Preliminary Assessment of Impacts

4.1 *Discussion*

The seabird surveys undertaken during 2005 and 2006 have provided an indication of the densities of seabirds present in the area around the proposed Wave Hub site. When compared to data from *The Atlas of Seabird Distribution in North-west European Waters* the species composition and density are broadly similar, with some exceptions that are discussed in the species accounts in Section 3.3.

Some caution should be employed when interpreting the results, as inevitably constraints apply to the survey data. These include:

- Each survey is a 'snapshot' of the conditions that occur at that time. It is not possible to say that the same results would be obtained the following day, or even at a different time on the same day. It is likely that density of birds will be influenced by a variety of environmental conditions, which may vary annually, seasonally, daily or even hourly.

- It is not possible to calculate confidence limits from the data that has been obtained, but the relatively small data-sets would suggest that actual density may vary considerably from the results obtained.

- Data against which these results have been compared is from a single source, and is now somewhat out of date. However, it remains the only systematic and detailed analysis of seabird density around the UK.

However, the fact that densities recorded are largely of the same order as those in the Atlas, suggests that the results do have validity at a broad scale.

Therefore, the results suggest that no important concentrations of seabirds occur around the Wave Hub site. No diver, grebe or sea duck species were recorded during the survey, and this is significant because these species can occur in high concentrations in some areas and can be particularly vulnerable to disturbance. The species that have been identified appear to occur in concentrations typical of the

wider area, and although occasional 'hotspots' of higher density have been recorded, there is no evidence to suggest that such concentrations occur specifically around the proposed wave hub site.

4.2 Preliminary Assessment of Impacts

Given that the proposed Wave Hub development is the first of its kind within the UK, the likely impacts will inevitably be subject to some uncertainty. However, the nature and scale of the development is altogether different from offshore windfarms, against which the proposals will inevitably be compared. During operation, it is anticipated that the Wave Energy Converters (WECs) will be static or slow moving, and their effects would therefore be comparable to large buoys or moored ships. The wave hub itself will be sited on the sea bed.

Possible impacts would include:

- Disturbance during construction, operation and maintenance, primarily through increased shipping activity.
- Impacts of accidental pollution during construction and operation.
- Loss of feeding area due to the presence of WECs.
- Risk of collision / entanglement with WECs, cabling and anchoring.
- Disturbance / disorientation of birds due to lighting at night, particularly for migrating species.

In reality many of these impacts are likely to be small given existing shipping activity in the area. It is also possible that the creation of an 'Area to be Avoided' around the Wave Hub site will create a refuge for marine species that would benefit feeding seabirds in the longer term.

As it is not possible to be certain about the impacts, and given the novel nature of the proposals, it is considered that post construction monitoring should be undertaken to gauge the effects. Ideally this should follow a BACI (Before-After-Control-Impact) methodology.

A full assessment of the likely impacts and recommendations for mitigation will be provided in the Environmental Statement for the Wave Hub scheme.

5 Conclusion

The survey work undertaken during 2005 and 2006 suggests that the area around the wave hub is used by seabirds at densities similar to those that occur in the wider area. There is no evidence that important concentrations of birds occur within the area, nor that divers, grebes or sea duck, which are particularly vulnerable to disturbance, occur around the proposed Wave Hub site. Some small impacts on birds can be foreseen as a result of the proposed development, but it is anticipated that following mitigation the net effects of these impacts will be negligible. However, given the novel nature of the project it is recommended that post-construction monitoring is undertaken to examine any effects that occur.

Figure 1 – Survey Areas

South West Wave Hub Project

Wave Hub Bird Survey

Offshore Seabird Survey Transects

Approximate Original Deployment Area

Indicative 10km Survey Area

Approximate Revised Deployment Area

North

Scale 1:100,000 at A3

0 5km

Legend

2 — Approximate Transect Line and Number

9 — Waypoint Number

Waypoint	50°North	005° West
1	17.60	40.70
2	21.80	46.20
3	22.50	44.90
4	18.40	39.30
5	19.10	38.10
6	23.20	43.55
7	23.90	42.35
8	19.80	36.80
9	20.50	35.50
10	24.60	41.10
11	25.30	39.80
12	21.20	34.40

South West of England Regional Development Agency

Halcrow

Appendix 1 – Survey Results

Survey 1 – March 2005

Wave hub seabird survey

Trip data

Date: **11/03/2005**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
1	06:35	Ross Bower / Richard Knott	Strip Transect	180°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observeers
MV Datchet	6.7	300	5	2

NB transect 6 not surveyed due to lack of time

Environmental Data

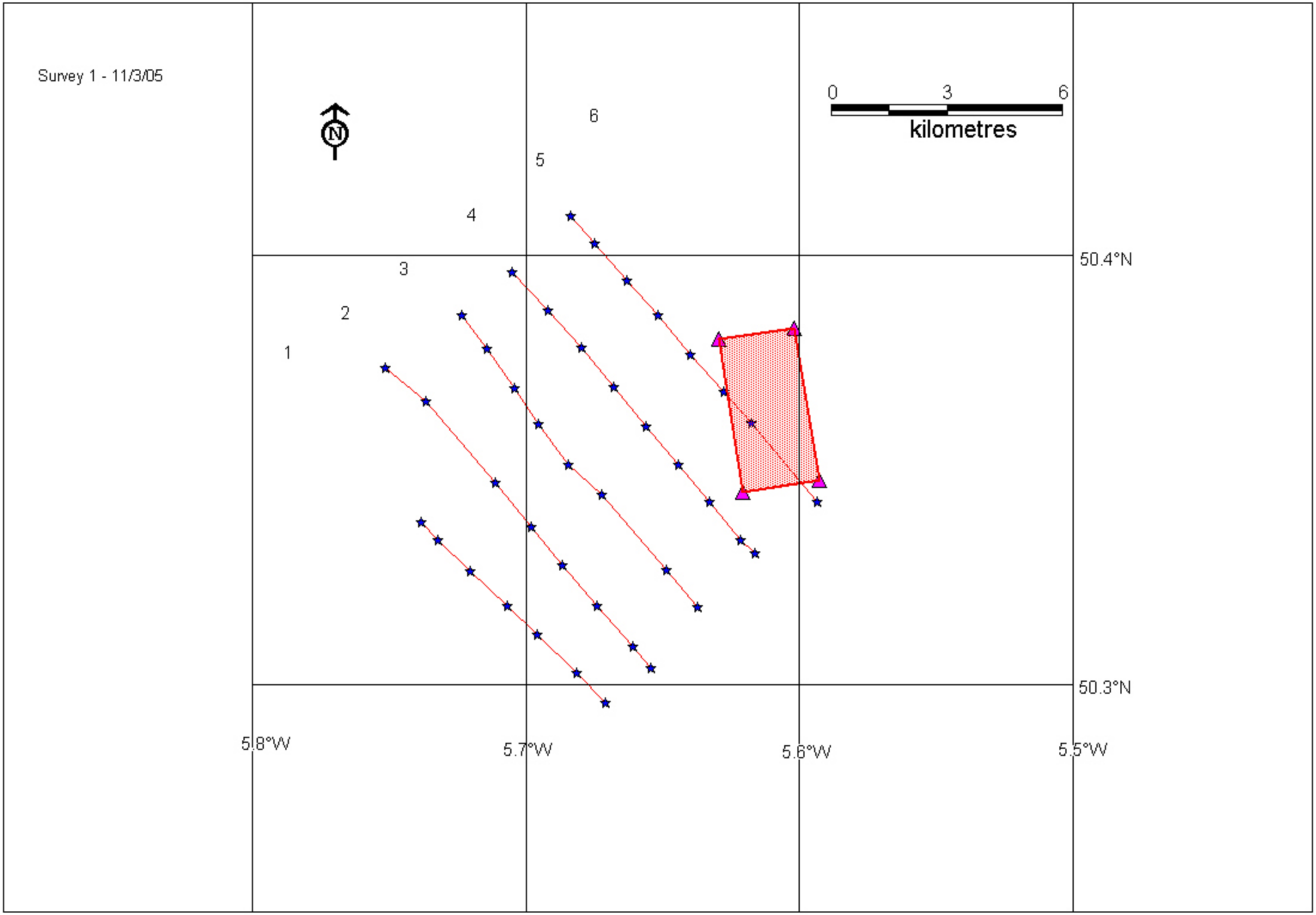
Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Notes
06:35	NW	03-Apr	3-4	1m	Excellent	8/8	no	Wind increasing later

Wave hub seabird survey

Navigation Data

Ship MV Datchet
Observer RB / RK
Date 11/03/2005

Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments
1	1	06:35	50	17.75	5	40.27			
1	1	06:40	50	18.17	5	40.90			
1	1	06:45	50	18.70	5	41.75			
1	1	06:50	50	19.10	5	42.42			
1	1	06:55	50	19.58	5	43.23			
1	1	07:00	50	20.02	5	43.93			
1	1	07:05							
1	1	07:10	50	20.27	5	44.30			
1	2	07:23	50	22.43	5	45.10			
1	2	07:28	50	21.97	5	44.20			
1	2	07:33							
1	2	07:38	50	20.83	5	42.68			
1	2	07:43	50	20.20	5	41.88			
1	2	07:48	50	19.67	5	41.20			
1	2	07:53	50	19.10	5	40.45			
1	2	07:58	50	18.53	5	39.67			
1	2	08:01	50	18.23	5	39.27			
1	3	08:11	50	19.08	5	38.25			
1	3	08:16	50	19.60	5	38.92			
1	3	08:21							
1	3	08:26	50	20.65	5	40.35			
1	3	08:31	50	21.08	5	41.08			
1	3	08:36	50	21.65	5	41.73			
1	3	08:41	50	22.15	5	42.27			
1	3	08:46	50	22.70	5	42.87			
1	3	08:50	50	23.17	5	43.42			
1	4	08:59	50	23.77	5	42.30			
1	4	09:04	50	23.23	5	41.52			
1	4	09:09	50	22.72	5	40.78			
1	4	09:14	50	22.17	5	40.07			
1	4	09:19	50	21.62	5	39.37			
1	4	09:24	50	21.08	5	38.65			
1	4	09:29	50	20.55	5	37.97			
1	4	09:34	50	20.02	5	37.28			
1	4	09:36	50	19.83	5	36.98			
1	5	09:47	50	20.55	5	35.62			
1	5	09:52							
1	5	09:58	50	21.67	5	37.07			
1	5	10:02	50	22.10	5	37.65			
1	5	10:07	50	22.62	5	38.38			
1	5	10:12	50	23.17	5	39.12			
1	5	10:17	50	23.65	5	39.78			
1	5	10:22	50	24.18	5	40.50			
1	5	10:26	50	24.57	5	41.03			


Survey 1 - 11/3/05
N
0
3
6
kilometres
1
2
3
4
5
6
50.4°N
50.3°N
5.8°W
5.7°W
5.6°W
5.5°W

Wave hub seabird survey

Bird Records

Ship MV Datchet
Observer RB / RK
Date 11/03/2005

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?	
1	1	1	06:35	no birds										
1	1	1	06:40	Fulmar					1					OUT
1	1	4	06:40	Gannet					1					LHS
1	1	6	06:45	Fulmar					1				Y	IN
1	1	7	06:45	Gannet					1					OUT
1	1	8	06:45	Razorbill					1					OUT
1	1	9	06:45	Razorbill			A			2		1 winter, 1 sun	Y	RHS
1	1	11	06:50	Fulmar					1					OUT
1	1	12	06:50	Fulmar					1					?
1	1	13	06:50	Fulmar					1				Y	IN
1	1	14	06:50	Gannet					1				Y	IN
1	1	15	06:50	Razorbill					1				Y	IN
1	1	17	06:55	Gannet					1					?
1	1	18	06:55	Fulmar					1					?
1	1	19	07:00	Fulmar					1					OUT
1	1	20	07:00	Fulmar					1					OUT
1	1	21	07:00	Gannet					1				Y	IN
1	1	22	07:00	Fulmar					1					OUT
1	1	23	07:05	Puffin			A			1			Y	LHS
1	1	24	07:05	Gannet					4				Y	IN
1	1	25	07:05	Fulmar					2					OUT
1	1	26	07:05	Gannet					1					RHS
1	1	27	07:05	Fulmar					1					RHS
1	1	28	07:05	Auk sp.					1					OUT
1	1	29	07:05	Gannet					1					OUT
1	1	30	07:10	Gannet					3				Y	IN
1	1	31	07:10	Gannet					1					OUT
1	1	32	07:10	Gannet					1					OUT
1	1	33	07:10	Fulmar					1					OUT
1	1	34	07:10	Razorbill					3					RHS
1	1	35	07:15	Fulmar					3				Y	IN
1	2	1	07:23	Gannet					1				Y	IN
1	2	2	07:28	Gannet					1					RHS
1	2	3	07:28	Fulmar					1					RHS
1	2	4	07:28	Fulmar					2					OUT
1	2	5	07:33	Gannet					1					LHS
1	2	6	07:33	Gannet					2					OUT
1	2	7	07:33	Gannet					2					OUT
1	2	8	07:38	Razorbill					1					RHS
1	2	9	07:38	Gannet					1					OUT
1	2	10	07:38	Razorbill					4					OUT
1	2	11	07:38	Gannet					2					OUT
1	2	12	07:38	Guillemot					1					OUT
1	2	13	07:43	Gannet					1					OUT
1	2	14	07:48	Common Dolphin								2 in front and bowriding		
1	2	15	07:48	Gannet					7					OUT
1	2	16	07:53	Gannet					1					LHS
1	2	17	07:53	Gannet					1					RHS
1	2	18	07:53	Gannet					1					OUT
1	2	19	07:53	Gannet					2					OUT
1	2	20	07:53	Gannet					1					OUT
1	2	21	07:53	Gannet					3					OUT
1	2	22	07:58	Gannet					1					RHS
1	2	23	07:58	Gannet					1					OUT
1	3	1	08:11	Razorbill					1					OUT
1	3	2	08:16	Gannet					1					OUT
1	3	3	08:16	Gannet					1					OUT
1	3	4	08:16	Kittiwake					1					OUT
1	3	5	08:21	Guillemot					1					OUT
1	3	6	08:21	Gannet					1					LHS
1	3	7	08:21	Fulmar					1					OUT
1	3	8	08:21	Gannet					2					RHS
1	3	9	08:21	Gannet					3				Y	IN
1	3	10	08:26	Auk sp.					2					RHS
1	3	11	08:26	Gannet					1					RHS
1	3	12	08:26	Gannet					2					OUT
1	3	13	08:26	Auk sp.					2					OUT
1	3	14	08:26	Auk sp.					2					LHS
1	3	15	08:26	Guillemot					4					OUT
1	3	16	08:26	Gannet					1					RHS
1	3	17	08:26	Guillemot			A			1			Y	LHS
1	3	18	08:26	Fulmar					1					LHS
1	3	19	08:31	Gannet					1					OUT
1	3	20	08:31	Gannet					2					OUT
1	3	21	08:31	Gannet					2					OUT
1	3	22	08:31	Gannet					1					LHS
1	3	23	08:31	Gannet					2					OUT
1	3	24	08:36	Gannet					2				Y	IN

1	3	25	08:36	Gannet		2				?
1	3	26	08:36	Fulmar	B		4		Y	LHS
1	3	27	08:36	Fulmar		10				OUT
1	3	28	08:36	Auk sp.		5				OUT
1	3	29	08:36	Fulmar		1				LHS
1	3	30	08:41	Fulmar		1				OUT
1	3	31	08:41	Fulmar		1				LHS
1	3	31	08:41	Fulmar		2				OUT
1	3	32	08:41	Razorbill	A			ahead flushed	Y	
1	3	33	08:46	Fulmar		2				RHS
1	3	34	08:46	Gannet		1				OUT
1	3	35	08:46	Gannet		1				RHS
1	3	36	08:46	Auk sp.		1				RHS
1	4	1	08:59	Gannet		1				OUT
1	4	2	08:59	Gannet		1				OUT
1	4	3	08:59	Fulmar		1				OUT
1	4	4	08:59	Gannet		2				LHS
1	4	4	08:59	Gannet		1				RHS
1	4	5	08:59	Herring Gull		1				OUT
1	4	6	08:59	Gannet		1				OUT
1	4	7	08:59	Guillemot		2				OUT
1	4	8	09:04	Fulmar		2				OUT
1	4	9	09:04	Kittiwake		1				OUT
1	4	10	09:04	Fulmar		1				RHS
1	4	11	09:04	Gannet		1				OUT
1	4	12	09:09	Herring Gull		5				RHS
1	4	13	09:09	Gannet		1				RHS
1	4	14	09:09	Gannet		1				RHS
1	4	15	09:09	Fulmar		1				OUT
1	4	16	09:09	Fulmar		2				RHS
1	4	17	09:09	Herring Gull		14				OUT
1	4	18	09:09	Gannet		1				OUT
1	4	19	09:14	Fulmar		1				LHS
1	4	20	09:14	Herring Gull		5				OUT
1	4	21	09:14	Gannet	C		1		Y	RHS
1	4	22	09:14	Gannet		1				OUT
1	4	23	09:14	Kittiwake		1				OUT
1	4	24	09:19	Fulmar		1				OUT
1	4	25	09:19	Fulmar		1				OUT
1	4	26	09:19	Fulmar		1				LHS
1	4	27	09:19	Gannet		1				OUT
1	4	28	09:19	Razorbill		2				LHS
1	4	29	09:24	Gannet		1				OUT
1	4	30	09:24	Fulmar		1				OUT
1	4	31	09:24	Gannet		3		2 ad, 1 imm		RHS
1	4	32	09:29	Fulmar		1				LHS
1	4	33	09:29	Fulmar		1				OUT
1	4	34	09:29	Fulmar		1				LHS
1	4	35	09:29	Auk sp.		1				OUT
1	5	1	09:47	Auk sp.		1				LHS
1	5	2	09:47	Fulmar		1				OUT
1	5	3	09:47	Fulmar		1				LHS
1	5	4	09:47	Shag	A		1		Y	LHS
1	5	5	09:52	Razorbill		2				RHS
1	5	6	09:52	Kittiwake		1				OUT
1	5	7	09:52	Guillemot		1				LHS
1	5	8	19:57	Razorbill	A		1		Y	RHS
1	5	9	10:02	Gannet		3				RHS
1	5	10	10:02	Gannet		1				OUT
1	5	11	10:02	Gannet		1				OUT
1	5	12	10:02	Fulmar		1				OUT
1	5	13	10:02	Gannet		2				LHS
1	5	14	10:02	Fulmar		1				RHS
1	5	15	10:02	Gannet		2				OUT
1	5	16	10:07	Gannet		1				LHS
1	5	17	10:07	Gannet		1				OUT
1	5	18	10:07	Fulmar		1				OUT
1	5	19	10:07	Guillemot		1				OUT
1	5	20	10:12	Auk sp.		2				OUT
1	5	21	10:12	Gannet		1				LHS
1	5	22	10:12	Gannet		1				OUT
1	5	23	10:12	Guillemot		1				OUT
1	5	24	10:12	Auk sp.		3				OUT
1	5	25	10:12	Guillemot		2				RHS
1	5	26	10:17	Gannet		2				RHS
1	5	27	10:17	Gannet		2				OUT
1	5	28	10:17	Gannet		1				LHS
1	5	29	10:22	Fulmar		1				RHS
1	5	30	10:22	Gannet		1				LHS
1	5	31	10:22	Fulmar		1				LHS
1	5	32	10:22	Kittiwake		1				OUT
1	5	33	10:22	Fulmar		2				LHS

Wave hub seabird survey

Data Analysis

Ship MV Datchet
Observer RB / RK
Date 11/03/2005

	Species	Auk Sp.	Fulmar	Gannet	GBB Gull	Guillemot	Herring Gull	Kittiwake	LBB Gull	Lg Gull Sp	Manx Shearwater	Puffin	Razorbill	Shag	Storm Petrel
Transect 1	Sea											1	2		
	Fly		5	9									1		
	Length (km)	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68
	Area (km^2)	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01
	Density (birds / km^2)	0.00	1.25	2.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	1.00	0.00	0.00
Transect 2	Sea														
	Fly			1											
	Length (km)	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42	10.42
	Area (km^2)	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
	Density (birds / km^2)	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 3	Sea		4	5		1							1		
	Fly														
	Length (km)	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75
	Area (km^2)	2.93	5.85	5.85	5.85	5.85	5.85	5.85	5.85	5.85	5.85	5.85	5.85	5.85	5.85
	Density (birds / km^2)	0.00	0.75	0.85	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00
Transect 4	Sea			1											
	Fly														
	Length (km)	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63	9.63
	Area (km^2)	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78	5.78
	Density (birds / km^2)	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 5	Sea												1	1	
	Fly														
	Length (km)	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82
	Area (km^2)	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89
	Density (birds / km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.19	0.00
All	Sea	0	4	6	0	1	0	0	0	0	0	1	4	1	0
	Fly	0	5	10	0	0	0	0	0	0	0	0	1	0	0
	Length (km)	46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30	46.30
	Area (km^2)	27.78	27.78	27.78	27.78	27.78	27.78	27.78	27.78	27.78	27.78	27.78	27.78	27.78	27.78
	Density (birds / km^2)	**0.00**	**0.34**	**0.58**	**0.00**	**0.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.25**	**0.04**	**0.00**
Correction Factor		1.5	1.10	1.00	1.40	1.40	1.40	1.40	1.40	1.40	1.30	1.50	1.50	1.10	1.50

Survey 2 – May 2005

Wave hub seabird survey

Trip data

Date: **10/05/2005**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
2	05:05	Ross Bower / Richard Knott	Strip Transect	90°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observeers
MV Datchet	6.7	300	5	2

Environmental Data

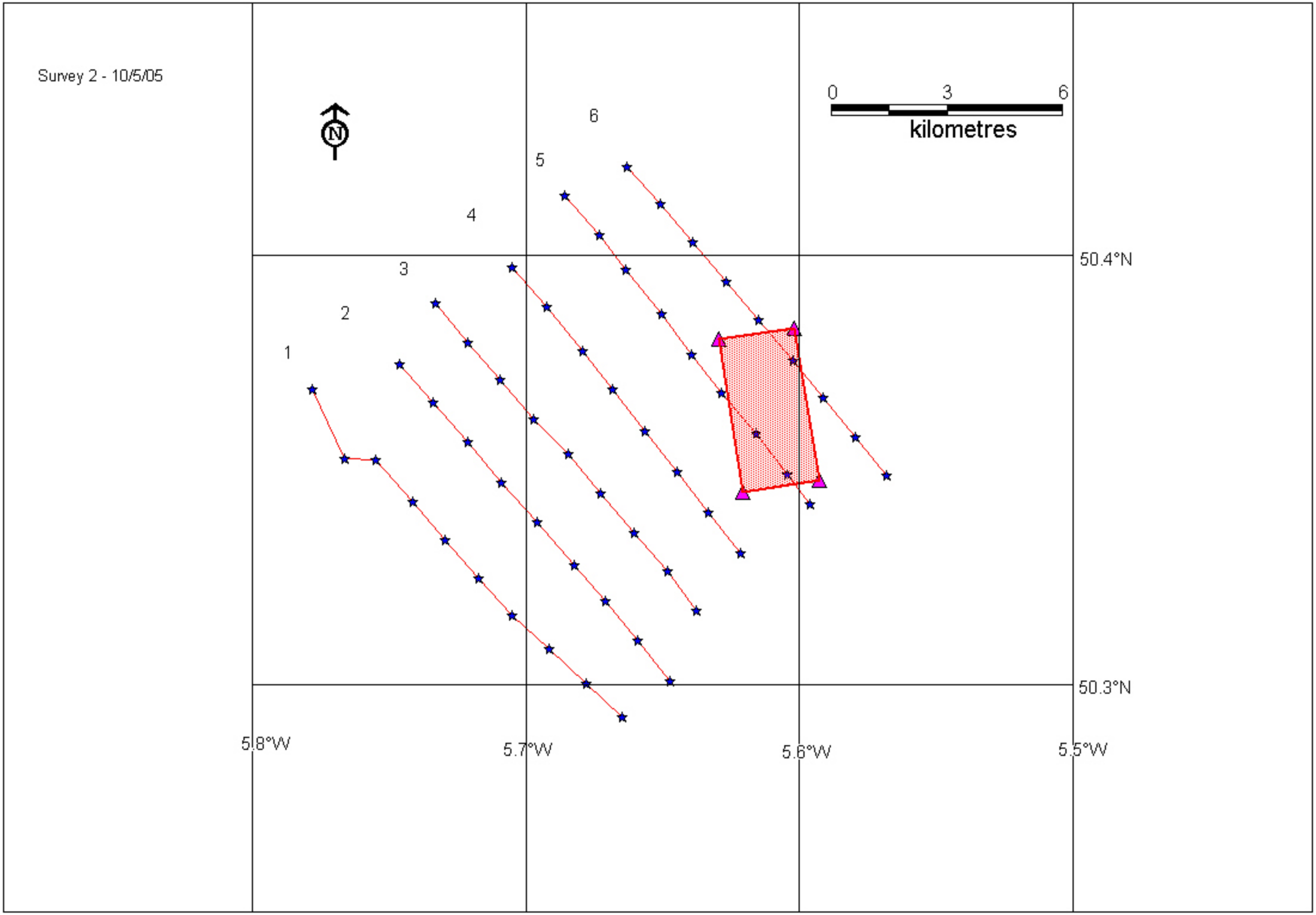
Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Notes
05:05	N	3	5	0.5-1	excellent	1	no	
07:30	NE	3	5	0.5-1	excellent	0	no	
08:15	NE	3-4	4	0.5-1	excellent	0	no	
09:15	E	3	3	0.5	excellent	0	no	

Wave hub seabird survey

Navigation Data

Ship MV Datchet
Observer RB / RK
Date 10/05/2005

Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments
2	1	05:05	50	17.55	5	39.90	310	8	
2	1	05:10	50	18.02	5	40.69	310	8	
2	1	05:15	50	18.50	5	41.48	310	8	
2	1	05:20	50	18.96	5	42.30	310	8	
2	1	05:25	50	19.49	5	43.03	310	8	
2	1	05:30	50	20.02	5	43.77	310	8	
2	1	05:35	50	20.56	5	44.48	310	8	
2	1	05:40	50	21.14	5	45.31	310	8	
2	1	05:45	50	21.16	5	45.97	310	8	
2	1	05:50	50	22.13	5	46.70	310	8	
2	2	06:00	50	22.48	5	44.78	135	8	
2	2	06:05	50	21.95	5	44.04	135	8	
2	2	06:10	50	21.40	5	43.28	135	8	
2	2	06:15	50	20.82	5	42.53	135	8	
2	2	06:20	50	20.27	5	41.76	135	8	
2	2	06:25	50	19.67	5	40.95	135	8	
2	2	06:30	50	19.17	5	40.27	135	8	
2	2	06:35	50	18.61	5	39.55	135	8	
2	2	06:40	50	18.04	5	38.85	135	8	
2	3	06:50	50	19.04	5	38.27	320	8	
2	3	06:55	50	19.59	5	38.89	320	8	
2	3	07:00	50	20.13	5	39.64	320	8	
2	3	07:05	50	20.67	5	40.37	320	8	
2	3	07:10	50	21.22	5	41.07	320	8	fishing boat <2km
2	3	07:15	50	21.72	5	41.84	320	8	fishing boat <2km
2	3	07:20	50	22.26	5	42.57	320	8	
2	3	07:25	50	22.79	5	43.28	320	8	
2	3	07:30	50	23.34	5	43.98	320	8	
2	4	07:40	50	23.84	5	42.30	140	8	fishing boat <2km
2	4	07:45	50	23.29	5	41.54	140	8	fishing boat <2km
2	4	07:50	50	22.67	5	40.76	140	8	
2	4	07:55	50	22.14	5	40.09	140	8	
2	4	08:00	50	21.55	5	39.40	140	8	
2	4	08:05	50	20.98	5	38.68	140	8	
2	4	08:10	50	20.40	5	37.99	140	8	
2	4	08:15	50	19.84	5	37.28	140	8	
2	5	08:25	50	20.52	5	35.78	320	8	fishing boat 2km
2	5	08:30	50	20.95	5	36.28	320	8	fishing boat 1km
2	5	08:35	50	21.52	5	36.95	320	8	fishing boat <1km
2	5	08:40	50	22.08	5	37.71	320	8	fishing boat 300m
2	5	08:45	50	22.62	5	38.36	320	8	fishing boat 1km
2	5	08:50	50	23.19	5	39.03	320	8	
2	5	08:55	50	23.80	5	39.80	320	8	
2	5	09:00	50	24.30	5	40.40	320	8	
2	5	09:05	50	24.85	5	41.14	320	8	
2	6	09:15	50	25.25	5	39.79	135	8	
2	6	09:20	50	24.72	5	39.06	135	8	
2	6	09:25	50	24.19	5	38.34	135	8	
2	6	09:30	50	23.64	5	37.61	135	8	
2	6	09:35	50	23.10	5	36.90	135	8	
2	6	09:40	50	22.53	5	36.15	135	8	
2	6	09:45	50	22.01	5	35.47	135	8	fishing boat <2km
2	6	09:50	50	21.46	5	34.77	135	8	fishing boat <1km
2	6	09:55	50	20.93	5	34.09	135	8	


Survey 2 - 10/5/05
N
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50.4°N
50.3°N
5.8°W
5.7°W
5.6°W
5.5°W

Wave hub seabird survey

Bird Records

Ship MV Datchet
Observer RB / RK
Date 10/05/2005

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?
2	1	1	05:05	Manx Shearwater				NE	1				
2	1	2	05:05	Herring Gull					2				Y
2	1	3	05:05	Great black-backed gull	I				1				Y
2	1	4	05:05	Herring Gull					1				
2	1	5	05:10	Fulmar		LL			1				
2	1	6	05:10	Manx Shearwater				NE	2				
2	1	7	05:10	Manx Shearwater				NE	1				
2	1	8	05:10	Kittiwake				NE	1				Y
2	1	9	05:15	Gannet					1				
2	1	10	05:15	Manx Shearwater			A			2			Y
2	1	11	05:15	auk sp.				NE	1				
2	1	12	05:15	Manx Shearwater				NE	3				
2	1	13	05:15	Manx Shearwater					1				
2	1	14	05:20	Gannet			C			1			Y
2	1	15	05:20	Manx Shearwater				NE	1				Y
2	1	16	05:20	Fulmar				SW	1				
2	1	17	05:20	Manx Shearwater				NE	1				
2	1	18	05:25	Manx Shearwater				NE	5				Y
2	1	19	05:25	Manx Shearwater					1				
2	1	20	05:30	Gannet				NE	1				
2	1	21	05:30	Manx Shearwater				NE	1				Y
2	1	22	05:30	Gannet				NE	1				
2	1	23	05:30	Gannet				SW	1				
2	1	24	05:30	Fulmar				SW	1				
2	1	25	05:35	Fulmar				SW	1				
2	1	26	05:35	Gannet				SW	1				
2	1	27	05:35	Manx Shearwater				NE	2				Y
2	1	28	05:35	Fulmar					1				
2	1	29	05:35	Gannet				SW	1				
2	1	30	05:35	Storm Petrel				E	1				
2	1	31	05:35	Storm Petrel				E	1				
2	1	32	05:40	Gannet				NE	1				
2	1	33	05:40	Gannet			A			1			Y
2	1	34	05:45	no birds									
2	2	1	06:00	Gannet					1				Y
2	2	2	06:05	no birds									
2	2	3	06:10	Fulmar				W	1				
2	2	4	06:10	Storm Petrel				NE	1				
2	2	5	06:10	Fulmar				SE	1				
2	2	6	06:15	Herring Gull				N	1				
2	2	7	06:15	Gannet				W	1				Y
2	2	8	06:15	Gannet				W	1				
2	2	9	06:15	Manx Shearwater				SW	1				Y
2	2	10	06:20	Gannet				N	1				Y
2	2	11	06:20	Herring Gull	I			NW	1				
2	2	12	06:20	Manx Shearwater					1				Y
2	2	13	06:25	no birds									
2	2	14	06:30	Fulmar					1				Y
2	2	15	06:35	Manx Shearwater			B			1			Y
2	2	16	06:35	Manx Shearwater			C			1			Y
2	3	1	06:50	Fulmar				SW	1				
2	3	2	06:55	Herring Gull				SE	1				
2	3	3	06:55	Storm Petrel				NE	1				
2	3	4	06:55	Herring Gull					1				
2	3	5	06:55	Storm Petrel				NE	1				Y
2	3	6	07:00	Herring Gull	I			S	1				
2	3	7	07:05	Gannet					2				
2	3	8	07:05	Gannet				E	1				
2	3	9	07:05	Puffin				N	1				
2	3	10	07:05	Gannet			E			1			
2	3	11	07:10	Manx Shearwater			C			1			Y
2	3	12	07:10	Gannet				NW	1				
2	3	13	07:10	Herring Gull	I				1				
2	3	14	07:10	Fulmar				SW	1				Y
2	3	15	07:15	Gannet				NW	1				Y
2	3	16	07:15	Gannet				NE	1				
2	3	17	07:20	Manx Shearwater				NE	1				
2	3	18	07:20	Gannet				NW	1				Y
2	3	19	07:25	no birds									
2	4	1	07:40	no birds							FB		
2	4	2	07:45	Lesser back-backed gull					4		FB		
2	4	3	07:45	Gannet			A			2			Y
2	4	4	07:45	Fulmar				NW	1				
2	4	5	07:45	Gannet				W	1				
2	4	6	07:45	Fulmar				NW	1				
2	4	7	07:45	Herring Gull			D			2			Y
2	4	8	07:45	Great black-backed gull			D			2			Y
2	4	9	07:45	Herring Gull				NW	5				
2	4	10	07:45	Gannet				NW	1				
2	4	11	07:50	Lesser back-backed gull				NW	1				
2	4	12	07:50	Gannet				NW	1				
2	4	13	07:50	Manx Shearwater				S	1				
2	4	14	07:50	Great black-backed gull				NW	1				Y

2	4	15	07:55	Gannet				NW	1				
2	4	16	07:55	Storm Petrel				SE	1				
2	4	17	07:55	Lesser back-backed gull	I			NW	2				
2	4	18	07:55	Herring Gull				NW	4				
2	4	19	07:55	Great black-backed gull	I		A			1			Y
2	4	20	07:55	Lesser back-backed gull				W	2				
2	4	21	07:55	Herring Gull			B			1			Y
2	4	22	07:55	Storm Petrel				NW	1				
2	4	23	07:55	Herring Gull	I		B			1			Y
2	4	24	08:00	Herring Gull				NW	1			}	
2	4	25	08:00	Herring Gull	I			NW	1			}	
2	4	26	08:00	Fulmar				NW	1				Y
2	4	27	08:00	Storm Petrel				NW	1				
2	4	28	08:00	Great black-backed gull	I		A			1			Y
2	4	29	08:00	Great black-backed gull	I		B			3			Y
2	4	30	08:00	Great black-backed gull				NE	1				Y
2	4	31	08:05	Storm Petrel				NE	1				
2	4	32	08:05	Manx Shearwater				NW	1				
2	4	33	08:05	Storm Petrel				NE	1				Y
2	4	34	08:10	Great black-backed gull	I			NE	1				Y
2	5	1	08:25	Gannet	I			NW	1				
2	5	2	08:30	Herring Gull				NW	3				Y
2	5	3	08:30	Gannet				NW	1				Y
2	5	4	08:30	Herring Gull				NW	4				Y
2	5	5	08:35	lg gull sp			D			10		FB	Y
2	5	6	08:35	Herring Gull				E	1			FB	
2	5	7	08:35	Herring Gull			C			1		FB	Y
2	5	8	08:35	Storm Petrel					2			FB	
2	5	9	08:35	lg gull sp			C			10		FB	Y
2	5	10	08:35	Storm Petrel					50			FB	Y
2	5	11	08:35	Great black-backed gull			A			4		FB	Y
2	5	12	08:35	Gannet				SW	1			FB	
2	5	13	08:40	Razorbill	I		C			1			Y
2	5	14	08:40	Gannet			B			1			Y
2	5	15	08:40	Manx Shearwater			A			2			Y
2	5	16	08:40	Manx Shearwater			B			4			Y
2	5	17	08:45	Manx Shearwater			C			15		}	Y
2	5	18	08:45	Herring Gull			C			1		}	Y
2	5	19	08:45	Manx Shearwater				SW	1				
2	5	20	08:45	Gannet				NW	1				
2	5	21	08:45	Manx Shearwater				NW	3				
2	5	22	08:45	Manx Shearwater				NW	1				
2	5	23	08:50	Herring Gull	I				2				Y
2	5	24	08:50	Fulmar				SW	1				
2	5	25	08:50	Fulmar			B			1			Y
2	5	26	08:50	Manx Shearwater			D			20			Y
2	5	27	08:50	Herring Gull			C			3			Y
2	5	28	09:00	Manx Shearwater			C			3			Y
2	5	29	09:00	Manx Shearwater			C			4			Y
2	5	30	09:00	Manx Shearwater			B			2			Y
2	5	31	09:00	Gannet				NW	1				
2	6	1	09:15	no birds									
2	6	2	09:20	Lesser back-backed gull				NW	2				
2	6	3	09:20	Herring Gull			D			1			Y
2	6	4	09:20	Manx Shearwater				NW	1				
2	6	5	09:20	Gannet			B			1			Y
2	6	6	09:20	Gannet				N	1				
2	6	7	09:20	Herring Gull				N	1				
2	6	8	09:20	Herring Gull				N	1				
2	6	9	09:20	Herring Gull	I			N	1				
2	6	10	09:25	no birds									
2	6	11	09:30	Manx Shearwater			B			3			Y
2	6	12	09:35	Manx Shearwater			C			2			Y
2	6	13	09:35	Manx Shearwater				NW	3				
2	6	14	09:35	Great black-backed gull	I			NW	1				
2	6	15	09:40	no birds									
2	6	16	09:45	Manx Shearwater			A			3			Y
2	6	17	09:45	Manx Shearwater				E	2				
2	6	18	09:45	Manx Shearwater			A			20			Y
2	6	19	09:45	Manx Shearwater				E	1				Y
2	6	20	09:45	Gannet			C			1			Y
2	6	21	09:45	Fulmar				NW	1				
2	6	22	09:45	Herring Gull				SE	1				Y
2	6	23	09:50	Manx Shearwater			B			2			Y
2	6	24	09:50	Great black-backed gull				NW	1				Y

Wave hub seabird survey

Data Analysis

Ship MV Datchet
Observer RB / RK
Date 10/05/2005

	Species	Fulmar	Gannet	GBB Gull	Herring Gull	Kittiwake	Lg Gull Sp	Manx Shearwater	Razorbill	Storm Petrel
Transect 1	Sea		2					2		
	Fly			1	2	1		9		
	Length (km)	12.02	12.02	12.02	12.02	12.02	12.02	12.02	12.02	12.02
	Area (km^2)	3.61	3.61	3.61	3.61	3.61	3.61	3.61	3.61	3.61
	Density (birds / km^2)	0.00	0.55	0.28	0.55	0.28	0.00	3.22	0.00	0.00
Transect 2	Sea							2		
	Fly	1	3					2		
	Length (km)	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81
	Area (km^2)	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24
	Density (birds / km^2)	0.31	0.93	0.00	0.00	0.00	0.00	1.42	0.00	0.00
Transect 3	Sea							1		
	Fly	1	2							1
	Length (km)	10.45	10.45	10.45	10.45	10.45	10.45	10.45	10.45	10.45
	Area (km^2)	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
	Density (birds / km^2)	0.32	0.64	0.00	0.00	0.00	0.00	0.41	0.00	0.32
Transect 4	Sea		2	7	4					
	Fly	1		3						1
	Length (km)	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50
	Area (km^2)	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
	Density (birds / km^2)	0.35	0.70	4.49	1.96	0.00	0.00	0.00	0.00	0.35
Transect 5	Sea	1	1	4	5		20	15	1	
	Fly		1		9					50
	Length (km)	10.23	10.23	10.23	10.23	10.23	10.23	10.23	10.23	10.23
	Area (km^2)	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07
	Density (birds / km^2)	0.36	0.65	1.82	5.21	0.00	9.12	6.35	0.49	16.29
Transect 6	Sea		2	1	1			10		
	Fly				1			1		
	Length (km)	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46	10.46
	Area (km^2)	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14
	Density (birds / km^2)	0.00	0.64	0.45	0.76	0.00	0.00	4.46	0.00	0.00
All	Sea	1	7	12	10	0	20	30	1	0
	Fly	3	6	4	12	1	0	12	0	52
	Length (km)	63.47	63.47	63.47	63.47	63.47	63.47	63.47	63.47	63.47
	Area (km^2)	19.04	19.04	19.04	19.04	19.04	19.04	19.04	19.04	19.04
	Density (birds / km^2)	**0.22**	**0.68**	**1.09**	**1.37**	**0.05**	**1.47**	**2.68**	**0.08**	**2.73**
Correction Factor		1.10	1.00	1.40	1.40	1.40	1.40	1.30	1.50	1.50

Survey 3 – June 2005

Wave hub seabird survey

Trip data

Date: **22/06/2005**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
3	07:22	Ross Bower / Richard Knott	Strip Transect	90°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observers
Terramare	9.7	300	5	2

NB transects run in REVERSE order i.e. T6 to T1; T2 out of sequence

Environmental Data

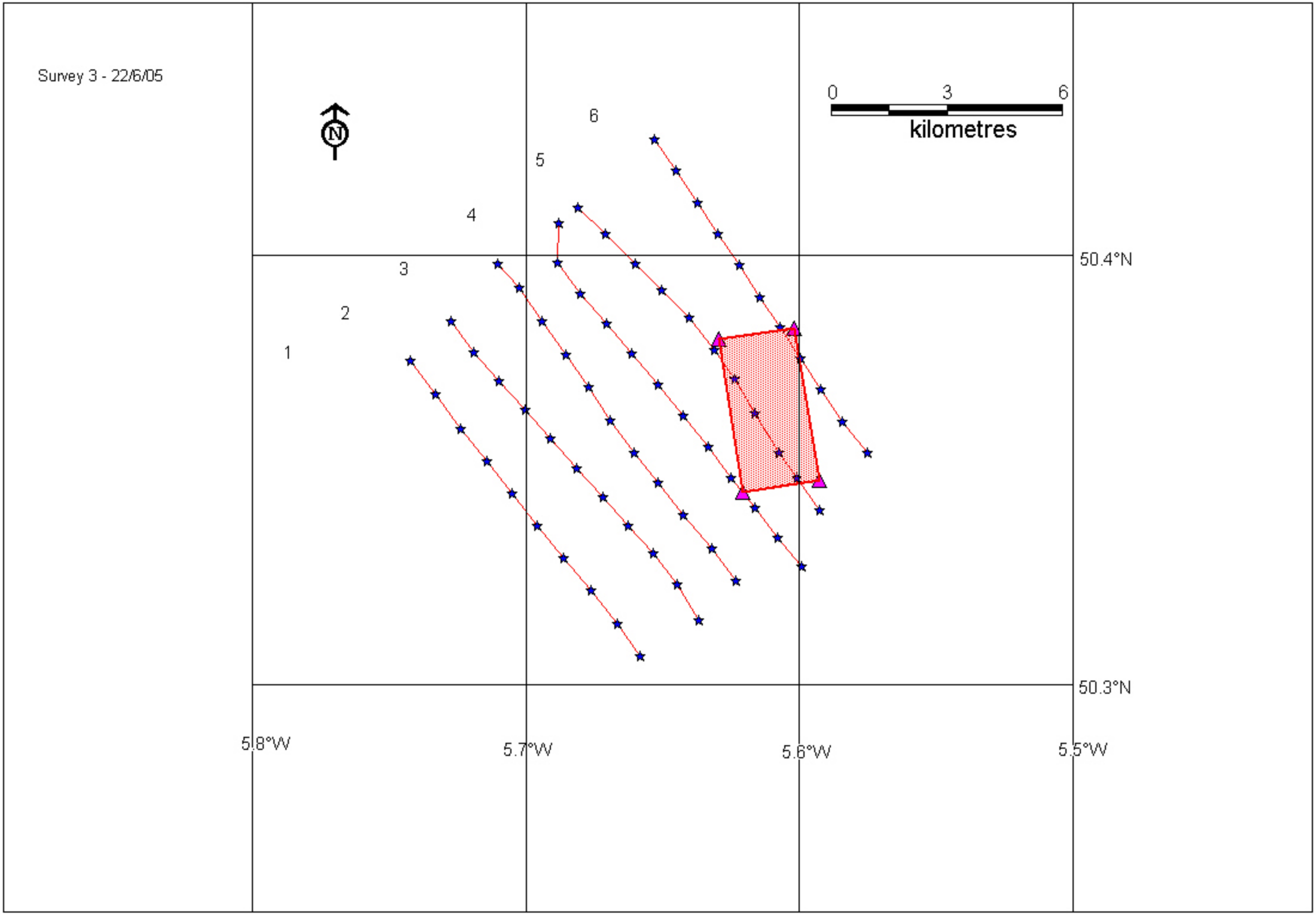
Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Notes
07:22	NE	1-2	1	0.5-1	excellent	1	no	
08:29	NE	2	1	0.5-1	excellent	1	no	
10:32	NE	2	2	0.5-1	excellent	0	no	
12:47	NE	2	2-3	0.5-1	excellent	0	no	

Wave hub seabird survey

Navigation Data

Ship Terramare
Observer RB / RK
Date 22/06/2005

Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments
3	6	07:22	50	21.24	5	34.52	335	7	
3	6	07:27	50	21.68	5	35.06	340	6.8	
3	6	07:32	50	22.14	5	35.54	340	6.5	
3	6	07:37	50	22.57	5	35.99	340	6.2	
3	6	07:42	50	23.00	5	36.43	340	6.2	
3	6	07:47	50	23.43	5	36.87	340	6.2	
3	6	07:52	50	23.87	5	37.32	340	6.4	
3	6	07:57	50	24.31	5	37.79	340	6.5	
3	6	08:02	50	24.75	5	38.25	340	6.4	
3	6	08:07	50	25.19	5	38.71	340	6.4	
3	6	08:12	50	25.63	5	39.17	340	6.4	
3	4	08:29	50	24.46	5	41.27	190	7.4	
3	4	08:34	50	23.91	5	41.31	140	6.6	
3	4	08:39	50	23.48	5	40.80	135	6.6	
3	4	08:44	50	23.05	5	40.24	135	6.8	
3	4	08:49	50	22.63	5	39.68	130	6.7	
3	4	08:54	50	22.20	5	39.11	130	6.6	
3	4	08:59	50	21.77	5	38.55	135	6.6	
3	4	09:04	50	21.32	5	38.01	135	6.6	
3	4	09:09	50	20.89	5	37.49	135	6.6	
3	4	09:14	50	20.47	5	36.99	130	6.4	
3	4	09:19	50	20.05	5	36.48	130	6.4	
3	4	09:24	50	19.65	5	35.96	130	6.4	
3	3	09:34	50	19.45	5	37.40	340	6.8	
3	3	09:39	50	19.91	5	37.93	340	6.8	
3	3	09:44	50	20.37	5	38.54	340	7.2	fishing boat 2km
3	3	09:49	50	20.82	5	39.11	340	7	fishing boat 1km
3	3	09:54	50	21.25	5	39.64	340	7	fishing boat 1km
3	3	09:59	50	21.70	5	40.15	340	6.9	fishing boat 2km
3	3	10:04	50	22.16	5	40.63	340	6.8	
3	3	10:09	50	22.62	5	41.13	345	6.8	
3	3	10:14	50	23.08	5	41.64	340	6.6	
3	3	10:19	50	23.55	5	42.15	345	6.8	
3	3	10:24	50	23.89	5	42.62	345	6.8	
3	2	10:32	50	23.08	5	43.65	150	6.3	
3	2	10:37	50	22.65	5	43.15	150	6.3	
3	2	10:42	50	22.25	5	42.59	130	6.3	
3	2	10:47	50	21.85	5	42.03	130	6.4	
3	2	10:52	50	21.44	5	41.46	130	6.4	
3	2	10:57	50	21.03	5	40.89	135	6.7	
3	2	11:02	50	20.62	5	40.31	135	6.7	
3	2	11:07	50	20.23	5	39.75	135	6.5	
3	2	11:12	50	19.84	5	39.20	135	6.5	
3	2	11:17	50	19.40	5	38.69	140	6.5	
3	2	11:22	50	18.90	5	38.22	140	6.5	
3	1	11:32	50	18.39	5	39.51	335	6.8	
3	1	11:37	50	18.85	5	39.99	335	6.8	
3	1	11:42	50	19.31	5	40.57	335	7	
3	1	11:47	50	19.77	5	41.18	335	7	
3	1	11:52	50	20.23	5	41.75	330	6.9	
3	1	11:57	50	20.67	5	42.31	330	6.9	
3	1	12:02	50	21.12	5	42.86	330	6.9	
3	1	12:07	50	21.58	5	43.43	330	7.1	
3	1	12:12	50	22.06	5	43.99	330	6.9	
3	1	12:17	50	22.53	5	44.53	330	6.9	
3	5	12:47	50	24.68	5	40.87	130	6.7	
3	5	12:52	50	24.31	5	40.26	135	6.7	
3	5	12:57	50	23.89	5	39.61	135	6.5	
3	5	13:02	50	23.53	5	39.02	135	6.5	
3	5	13:07	50	23.14	5	38.42	135	6.4	
3	5	13:12	50	22.69	5	37.87	135	6.4	
3	5	13:17	50	22.28	5	37.43	150	6.5	
3	5	13:22	50	21.80	5	36.99	160	6.5	
3	5	13:27	50	21.25	5	36.45	135	6.5	fishing boat 2km
3	5	13:32	50	20.89	5	36.07	135	6.7	fishing boat 2km
3	5	13:37	50	20.44	5	35.56	135	6.7	


Survey 3 - 22/6/05
N
0
3
6
kilometres
1
2
3
4
5
6
50.4°N
50.3°N
5.8°W
5.7°W
5.6°W
5.5°W

Wave hub seabird survey

Bird Records

Ship Terramare
Observer RB / RK
Date 22/06/2005

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?
3	6	1	07:22	Storm Petrel				NW	1				Y
3	6	2	07:22	Gannet					2				
3	6	3	07:22	Gannet			E			1			
3	6	4	07:22	Herring Gull	I			W	1				
3	6	5	07:22	Gannet				W	1				
3	6	6	07:27	Gannet				W	3				
3	6	7	07:27	Gannet				NE	1				Y
3	6	8	07:27	Fulmar				W	1				Y
3	6	9	07:27	Gannet				S	1				Y
3	6	10	07:27	Herring Gull				W	1				
3	6	11	07:27	Herring Gull	I			W	1				
3	6	12	07:27	Herring Gull				W	1				
3	6	13	07:27	Gannet			E			1			
3	6	14	07:27	Gannet				W	1				
3	6	15	07:27	Storm Petrel				W	1				
3	6	16	07:27	Gannet				W	1				
3	6	17	07:32	Gannet			A			1			Y
3	6	18	07:32	Gannet				W	1				
3	6	19	07:32	Manx Shearwater				E	1				
3	6	20	07:32	Fulmar				E	1				
3	6	21	07:32	Gannet				E	2				
3	6	22	07:32	Herring Gull				W	1				
3	6	23	07:32	Gannet				W	1				
3	6	24	07:32	Herring Gull				W	2				
3	6	25	07:32	Gannet				W	1				
3	6	26	07:32	Fulmar				SW	1				Y
3	6	27	07:32	Gannet				NW	1				
3	6	28	07:32	Gannet				E	1				
3	6	29	07:37	lg gull sp.				NW	1				
3	6	30	07:37	Herring Gull				NW	2				
3	6	31	07:37	Manx Shearwater				E	1				
3	6	32	07:37	Gannet				W	1				
3	6	33	07:37	Manx Shearwater				E	2				
3	6	34	07:37	Manx Shearwater				E	1				
3	6	35	07:37	Gannet				NW	1				
3	6	36	07:37	Gannet				E	1				
3	6	37	07:37	Gannet	I			E	1				
3	6	38	07:42	Herring Gull				W	1				Y
3	6	39	07:42	Herring Gull	I			W	1				Y
3	6	40	07:42	Gannet	I			E	1				
3	6	41	07:42	Storm Petrel					1				
3	6	42	07:42	Manx Shearwater				N	1				Y
3	6	43	07:42	Manx Shearwater				N	1				
3	6	44	07:42	Herring Gull	I			W	2				
3	6	45	07:42	Gannet				SW	1				
3	6	46	07:42	Gannet				NE	1				
3	6	47	07:42	Fulmar				NE	1				
3	6	48	07:47	Gannet			E			1			
3	6	49	07:47	Fulmar				NE	1				Y
3	6	50	07:47	Gannet				NE	5				
3	6	51	07:47	Gannet	I			NE	2				
3	6	52	07:47	Manx Shearwater				N	2				
3	6	53	07:52	Herring Gull				S	1				
3	6	54	07:52	Herring Gull	I			NW	1				Y
3	6	55	07:52	Herring Gull				NW	1				
3	6	56	07:52	Gannet				W	3				
3	6	57	07:57	Gannet	I			NW	1				
3	6	58	07:57	Manx Shearwater				W	1				
3	6	59	07:57	Gannet				NE	1				
3	6	60	07:57	Herring Gull				W	1				
3	6	61	07:57	Gannet				NW	1				
3	6	62	08:02	Gannet	I			N	1				
3	6	63	08:02	Manx Shearwater				NE	4				
3	6	64	08:02	Great Black-backed Gull	I			W	1			high	
3	6	65	08:02	Herring Gull				S	1				Y
3	6	66	08:07	no birds									
3	4	1	08:29	Fulmar				W	1				Y
3	4	2	08:29	Manx Shearwater				W	1				
3	4	3	08:29	Herring Gull				W	1				
3	4	4	08:29	Herring Gull				S	1				
3	4	5	08:29	Herring Gull				S	1				Y
3	4	6	08:29	Gannet				NE	2				
3	4	7	08:29	Gannet				SW	2				
3	4	8	08:29	Gannet				SW	1				
3	4	9	08:29	Gannet				S	1				
3	4	10	08:29	Gannet			E			1			
3	4	11	08:34	Gannet				S	1				Y
3	4	12	08:34	Herring Gull				SE	2				Y
3	4	13	08:34	Herring Gull				N	1				
3	4	14	08:34	Herring Gull			C			1			Y
3	4	15	08:34	Gannet				NW	1				
3	4	16	08:34	Gannet				N	1				Y
3	4	17	08:34	Gannet			B			1			Y
3	4	18	08:34	Herring Gull				S	1				

3	4	19	08:34	Herring Gull			S	1						
3	4	20	08:34	Gannet		E			1					
3	4	21	08:39	Herring Gull	I		S	1						Y
3	4	22	08:39	Gannet	I		NE	1						
3	4	23	08:39	lg gull sp.			SW	1						
3	4	24	08:39	Herring Gull			SW	1						
3	4	25	08:39	Herring Gull			W	3						
3	4	26	08:44	Storm Petrel			SW	1						
3	4	27	08:44	Fulmar			SE	2						
3	4	28	08:44	Gannet			SW	2				}		
3	4	29	08:44	Gannet	I		SW	1				}		
3	4	30	08:44	Gannet			E	1						
3	4	31	08:44	Gannet	I		E	1						
3	4	32	08:44	Storm Petrel			SW	1						
3	4	33	08:44	Storm Petrel			SW	1						
3	4	34	08:49	Storm Petrel			NE	1						
3	4	35	08:49	Fulmar			N	1						
3	4	36	08:54	Gannet			SW	2						
3	4	37	08:59	Gannet			SW	2						
3	4	38	08:59	Storm Petrel			SW	1						
3	4	39	08:59	Gannet		E			2					
3	4	40	08:59	Gannet		C			1					Y
3	4	41	09:04	harbour porpoise		E	NW		2					
3	4	42	09:04	Gannet		E			1					
3	4	43	09:04	Gannet			NE	1						
3	4	44	09:04	Gannet			W	2						Y
3	4	45	09:04	Gannet			W			1				
3	4	46	09:04	Gannet			E	1						
3	4	47	09:04	Herring Gull			E	2						
3	4	48	09:04	Storm Petrel			NE	1						
3	4	49	09:09	Herring Gull			SE	1						
3	4	50	09:09	Herring Gull			E	1						
3	4	51	09:09	Storm Petrel			NW	1						
3	4	52	09:09	Guillemot			NE	1						
3	4	53	09:14	basking shark		E			3					
3	4	54	09:14	Storm Petrel			NE	1						
3	4	55	09:14	Gannet		E				1				
3	4	56	09:14	Manx Shearwater			NE	1						
3	4	57	09:19	Manx Shearwater			E	1						
3	4	58	09:19	Gannet		E			1					
3	4	59	09:19	Herring Gull			E	1						
3	4	60	09:19	Shag		E			5					
3	3	1	09:34	basking shark		B			1					Y
3	3	2	09:34	Gannet			W	2						
3	3	3	09:34	Herring Gull			SE	1						
3	3	4	09:34	Fulmar			NE	1						Y
3	3	5	09:34	Herring Gull		E			3					assoc small boat
3	3	6	09:34	Manx Shearwater			N	1						
3	3	7	09:34	Storm Petrel			N	1						
3	3	8	09:39	Storm Petrel			N	1						Y
3	3	9	09:39	Storm Petrel			N	1						
3	3	10	09:39	Storm Petrel			N	1						
3	3	11	09:39	Herring Gull			E	1						
3	3	12	09:39	Storm Petrel			NE	2						
3	3	13	09:39	Fulmar			SE	1						
3	3	14	09:39	Gannet			E	1						
3	3	15	09:39	Gannet		B			1					Y
3	3	16	09:39	Storm Petrel			N	1						
3	3	17	09:44	Storm Petrel			N	1						Y
3	3	18	09:44	Storm Petrel			NE	1						
3	3	19	09:44	Gannet			SW	1						
3	3	20	09:44	Manx Shearwater			NW	1						Y
3	3	21	09:44	Storm Petrel			N	1						
3	3	22	09:44	Manx Shearwater			NE	1						
3	3	23	09:44	Gannet		E			1					
3	3	24	09:44	Storm Petrel			SE	2						
3	3	25	09:44	Gannet			NE	1						Y
3	3	26	09:44	Herring Gull			E	1						Y
3	3	27	09:44	Gannet		C			1					Y
3	3	28	09:44	Storm Petrel			NE	1						
3	3	29	09:44	Storm Petrel			NE	1						
3	3	30	09:44	Gannet			NW	1						Y
3	3	31	09:49	Herring Gull	I		NW	1						
3	3	32	09:49	Gannet			SW	1						
3	3	33	09:49	Herring Gull			E	2						
3	3	34	09:49	Gannet			E	1						
3	3	35	09:49	Herring Gull			NE	1						
3	3	36	09:49	Storm Petrel			NW	1						Y
3	3	37	09:49	Gannet	I		NE	1					} fish boat <1km	
3	3	38	09:49	Gannet			NE	1					} fish boat <1km	
3	3	39	09:49	Gannet			NE	1					fish boat <1km	
3	3	40	09:49	Gannet			NE	1					fish boat <1km	Y
3	3	41	09:49	Gannet		B			1				fish boat <1km	Y
3	3	42	09:54	Manx Shearwater			NW	1					fish boat <1km	Y
3	3	43	09:54	Manx Shearwater			NE	1						
3	3	44	09:54	Herring Gull	I		SE	1					}	
3	3	45	09:54	Herring Gull			SE	1					}	
3	3	46	09:54	Gannet			SE	1						
3	3	47	09:54	Storm Petrel			SW	1						
3	3	48	09:54	Gannet		E			1					
3	3	49	09:54	Herring Gull			SE	2						
3	3	50	09:54	Gannet		E			1				}	
3	3	51	09:54	Gannet		E			1				}	

3	3	52	09:54	Gannet		D			1				Y
3	3	53	09:59	Storm Petrel			S	1					
3	3	54	10:04	Manx Shearwater			NE	1					
3	3	55	10:09	Great Black-backed Gull		E			1				
3	3	56	10:09	Gannet	I		NE	1					
3	3	57	10:14	Gannet			S	1					
3	3	58	10:14	Fulmar			W	1					
3	3	59	10:19	no birds									
3	2	1	10:32	Manx Shearwater			NE	1					
3	2	2	10:32	Gannet		E			2				
3	2	3	10:37	Gannet	I		NE	1					
3	2	4	10:37	Storm Petrel			NW	1					Y
3	2	5	10:37	Storm Petrel			NW	1					
3	2	6	10:42	Gannet			NE	1					
3	2	7	10:47	Gannet			NE	1					
3	2	8	10:52	Gannet		D			1				Y
3	2	9	10:52	Storm Petrel			NW	1					
3	2	10	10:52	Herring Gull			SW	1					
3	2	11	10:57	Gannet			NE	1					
3	2	12	10:57	Storm Petrel			NE	1					
3	2	13	10:57	Fulmar			NW	1					
3	2	14	10:57	Gannet		D			1				Y
3	2	15	10:57	Manx Shearwater			SE	1					Y
3	2	16	10:57	Fulmar			SW	1					
3	2	17	10:57	Storm Petrel			NE	1					
3	2	18	10:57	Gannet			NE	1					
3	2	19	11:02	Storm Petrel			SE	1					Y
3	2	20	11:02	Gannet		D			3				Y
3	2	21	11:02	Storm Petrel			S	1					
3	2	22	11:02	Gannet			NE	1					
3	2	23	11:02	Gannet			SE	1					
3	2	24	11:02	Gannet			NE	1					
3	2	25	11:02	Gannet	I	D			1				Y
3	2	26	11:02	Gannet	I	E			1				
3	2	27	11:02	Storm Petrel			NE	1					
3	2	28	11:02	Herring Gull	1		NE	1					
3	2	29	11:02	Storm Petrel			SW	1					
3	2	30	11:07	Storm Petrel			SW			1			Y
3	2	31	11:07	Storm Petrel			SW	1					
3	2	32	11:07	Gannet			SE	1					
3	2	33	11:07	Great Black-backed Gull			NE	1					
3	2	34	11:07	Storm Petrel			SW	1					
3	2	35	11:12	Storm Petrel			NE	1					
3	2	36	11:12	Gannet		C			3				Y
3	2	37	11:12	Gannet		D			1				Y
3	2	38	11:12	Manx Shearwater			NE	1					
3	2	39	11:12	Gannet		A			1				Y
3	2	40	11:12	Fulmar			W	1					
3	2	41	11:17	Guillemot		A			1				Y
3	2	42	11:17	Herring Gull			NW	1					
3	1	1	11:32	Gannet		E			1				
3	1	2	11:32	Gannet	I	A			1				Y
3	1	3	11:32	Gannet		A			1				Y
3	1	4	11:32	Gannet		B			1				Y
3	1	5	11:32	Fulmar			NE	1					
3	1	6	11:32	Fulmar			NE	1					
3	1	7	11:32	Shag		A			2				Y
3	1	8	11:32	Gannet		E			1				
3	1	9	11:37	Gannet			NE	1					
3	1	10	11:37	Gannet			NE	1					
3	1	11	11:37	Manx Shearwater			NE	2					
3	1	12	11:37	Manx Shearwater			NE	1					
3	1	13	11:42	Gannet		A			1				Y
3	1	14	11:42	Gannet		B			1				Y
3	1	15	11:42	Herring Gull		D			1				Y
3	1	16	11:47	Storm Petrel			N	1					Y
3	1	17	11:47	Great Black-backed Gull	I	D			1				Y
3	1	18	11:47	Gannet			SW	1					
3	1	19	11:47	Gannet			SW	1					
3	1	20	11:47	Gannet		E			1				
3	1	21	11:47	Fulmar			S	1					
3	1	22	11:52	Gannet			SW	1					
3	1	23	11:52	Gannet			SW	1					
3	1	24	11:57	Fulmar			E	1					
3	1	25	11:57	Storm Petrel			NW	1					Y
3	1	26	11:57	Fulmar			NE	1					
3	1	27	11:57	Gannet			SW	2					
3	1	28	12:02	Gannet			N	1					Y
3	1	29	12:02	Gannet			SW	1					
3	1	30	12:07	no birds									
3	1	31	12:12	Manx Shearwater			NW	1					
3	5	1	12:47	Gannet			N	3				}	Y
3	5	2	12:47	Gannet	I		N	1				}	Y
3	5	3	12:47	Gannet	I		NW	1					Y
3	5	4	12:47	Gannet			NE	1					
3	5	5	12:47	Gannet	1		N	1					
3	5	6	12:52	harbour porpoise		D			2				Y
3	5	7	12:52	Storm Petrel			NE	1					
3	5	8	12:52	Gannet			SW	1					
3	5	9	12:57	no birds									
3	5	10	13:02	Herring Gull			SE	1					

3	5	11	13:02	Herring Gull				SE	1				
3	5	12	13:07	Herring Gull	I			W	1				
3	5	13	13:07	Herring Gull				NE	1				
3	5	14	13:07	Gannet	I			E	1				
3	5	15	13:07	common dolphin		E				6		assoc gannets feeding	
3	5	16	13:12	Gannet		C				12			Y
3	5	17	13:12	Storm Petrel				NE	1				
3	5	18	13:12	Gannet				N	3				
3	5	19	13:12	Herring Gull				SE	1				
3	5	20	13:12	Gannet		E					50	~500m	
3	5	21	13:12	Gannet		A				4			Y
3	5	22	13:12	Gannet		B				5			Y
3	5	23	13:12	basking shark		D				1			Y
3	5	24	13:12	Gannet		E				2			
3	5	25	13:17	Gannet	I	E				1			
3	5	26	13:17	Storm Petrel				SW	1				
3	5	27	13:17	Storm Petrel				SW	1				
3	5	28	13:22	Gannet				SW	1				
3	5	29	13:22	Gannet				NW	1				
3	5	30	13:22	Herring Gull				E	1				Y
3	5	31	13:27	Gannet		C				1			Y
3	5	32	13:27	Gannet				W	1				
3	5	33	13:27	Gannet				SW	1				
3	5	34	13:27	Gannet				SW	1				
3	5	35	13:27	Gannet				E	2				
3	5	36	13:27	Gannet				SW	1				
3	5	37	13:32	Gannet				W	1				
3	5	38	13:32	Gannet		E					1		
3	5	39	13:32	Gannet		E				1			
3	5	40	13:32	Shag		A				1			Y
3	5	41	13:32	Gannet				NE	1				

Wave hub seabird survey

Data Analysis

Ship Terramare
Observer RB / RK
Date 22/06/2005

	Species	Fulmar	Gannet	GBB Gull	Guillemot	Herring Gull	Kittiwake	Lg Gull Sp	Manx Shearwater	Razorbill	Shag	Storm Petrel
Transect 1	Sea		5	1		1					2	
	Fly		1									2
	Length (km)	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.71
	Area (km^2)	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91
	Density (birds / km^2)	0.00	2.06	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.76	0.69
Transect 2	Sea		11		1							
	Fly								1			3
	Length (km)	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08	10.08
	Area (km^2)	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02	3.02
	Density (birds / km^2)	0.00	3.64	0.00	0.46	0.00	0.00	0.00	0.33	0.00	0.00	0.99
Transect 3	Sea		4									
	Fly	1	3			1			2			3
	Length (km)	10.29	10.29	10.29	10.29	10.29	10.29	10.29	10.29	10.29	10.29	10.29
	Area (km^2)	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09	3.09
	Density (birds / km^2)	0.32	2.27	0.00	0.00	0.32	0.00	0.00	0.65	0.00	0.00	0.97
Transect 4	Sea	1	2			1						
	Fly		4			4						
	Length (km)	11.14	11.14	11.14	11.14	11.14	11.14	11.14	11.14	11.14	11.14	11.14
	Area (km^2)	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34
	Density (birds / km^2)	0.33	1.80	0.00	0.00	1.62	0.00	0.00	0.00	0.00	0.00	0.00
Transect 5	Sea		22								1	
	Fly		5			1						
	Length (km)	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11	10.11
	Area (km^2)	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
	Density (birds / km^2)	0.00	8.90	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.36	0.00
Transect 6	Sea		1									
	Fly	3	2			4			1			1
	Length (km)	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82	9.82
	Area (km^2)	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.95
	Density (birds / km^2)	1.02	1.02	0.00	0.00	1.36	0.00	0.00	0.34	0.00	0.00	0.34
All	Sea	1	45	1	1	2	0	0	0	0	3	0
	Fly	4	15	0	0	10	0	0	4	0	0	9
	Length (km)	61.15	61.15	61.15	61.15	61.15	61.15	61.15	61.15	61.15	61.15	61.15
	Area (km^2)	18.34	18.34	18.34	18.34	18.34	18.34	18.34	18.34	18.34	18.34	18.34
	Density (birds / km^2)	**0.28**	**3.27**	**0.08**	**0.08**	**0.70**	**0.00**	**0.00**	**0.22**	**0.00**	**0.18**	**0.49**
Correction Factor		1.10	1.00	1.40	1.40	1.40	1.40	1.40	1.30	1.50	1.10	1.50

Survey 4 – July 2005

Wave hub seabird survey

Trip data

Date: **12/07/2005**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
4	07:38	Ross Bower / Richard Knott	Strip Transect	90°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observers
Terramare	9.7	300	5	2

Environmental Data

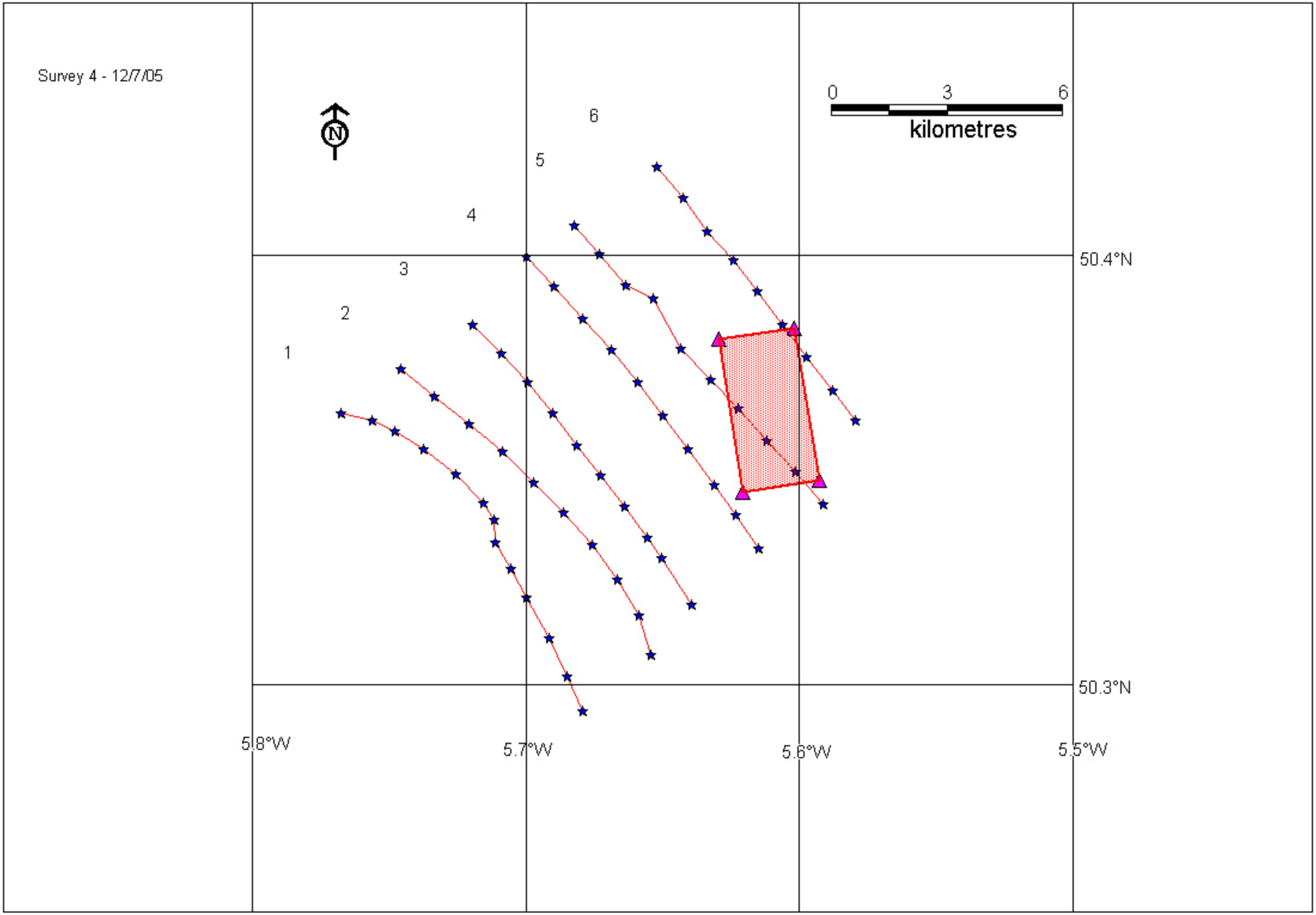
Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Notes
07:38	NW	2	2	<0.5	excellent	0	no	
10:51	NW	1	1	<0.5	excellent	0	no	

Wave hub seabird survey

Navigation Data

Ship Terramare
Observer RB / RK
Date 12/07/2005

Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments		
4	1	07:38	50	17.62	5	40.75	335	7			
4	1	07:43	50	18.12	5	41.11	335	7			
4	1	07:48	50	18.64	5	41.49	335	7			
4	1	07:53	50	19.21	5	41.98	335	6.7			
4	1	07:58	50	19.62	5	42.34	325	6.5	slowed - boat passing		
4	1	08:03	50	19.98	5	42.68	325	3.7	slowed - boat passing		
4	1	08:08	50	20.31	5	42.70	000	3.7	slowed - boat passing		
4	1	08:13	50	20.54	5	42.94	325	6.4			
4	1	08:18	50	20.94	5	43.54	310	6.7			
4	1	08:23	50	21.30	5	44.25	310	6.3			
4	1	08:28	50	21.54	5	44.89	300	6.3	fishing boat ~1km		
4	1	08:33	50	21.69	5	45.37	300	5	slowed - fish boat passing		
4	1	08:38	50	21.79	5	46.07	300	6	fishing boat ~1km		
4	2	08:50	50	22.42	5	44.76	135	7.6			
4	2	08:55	50	22.04	5	44.00	135	7.8			
4	2	09:00	50	21.64	5	43.25					
4	2	09:05	50	21.26	5	42.51	140	7			
4	2	09:10	50	20.83	5	41.83					
4	2	09:15	50	20.40	5	41.17	140	7.4			
4	2	09:20	50	19.95	5	40.54	150				
4	2	09:25	50	19.47	5	39.99		7			
4	2	09:30	50	18.97	5	39.52					
4	2	09:35	50	18.42	5	39.27		7.2			
4	3	09:47	50	19.11	5	38.37					
4	3	09:52	50	19.77	5	39.02	335	6.8			
4	3	09:57	50	20.05	5	39.33					
4	3	10:02	50	20.49	5	39.85	330	6.6	wessex explorer near		
4	3	10:07	50	20.92	5	40.37			waverider bouy		
4	3	10:12	50	21.35	5	40.89	330	6.5			
4	3	10:17	50	21.79	5	41.42					
4	3	10:22	50	22.23	5	41.96	330	6.7	fishing boat 2km //		
4	3	10:27	50	22.63	5	42.55			fishing boat <500m ahead		
4	3	10:32	50	23.03	5	43.18			fishing boat		
4	4	10:51	50	23.99	5	41.99				50.39983	-5.699833
4	4	10:56	50	23.57	5	41.38	135	7.2			
4	4	11:01	50	23.12	5	40.76					
4	4	11:06	50	22.69	5	40.14	135	7.1			
4	4	11:11	50	22.24	5	39.54					
4	4	11:16	50	21.77	5	39.00	135	7.1			
4	4	11:21	50	21.29	5	38.44					
4	4	11:26	50	20.80	5	37.87	135	6.7			
4	4	11:31	50	20.37	5	37.40					
4	4	11:36	50	19.91	5	36.91	135	6.8			
4	5	11:52	50	20.52	5	35.49					
4	5	11:57	50	20.98	5	36.08	330	7			
4	5	12:02	50	21.42	5	36.71					
4	5	12:07	50	21.86	5	37.35	330	6.9			
4	5	12:12	50	22.27	5	37.96					
4	5	12:17	50	22.70	5	38.60	335	7			
4	5	12:22	50	23.41	5	39.21					
4	5	12:27	50	23.59	5	39.82	335	6.7			
4	5	12:32	50	24.03	5	40.39					
4	5	12:37	50	24.43	5	40.94		6.7			
4	6	12:58	50	25.24	5	39.12					
4	6	13:03	50	24.82	5	38.56	135	6.4			
4	6	13:08	50	24.34	5	38.03					
4	6	13:13	50	23.94	5	37.46	135	6.4			
4	6	13:18	50	23.50	5	36.93					
4	6	13:23	50	23.04	5	36.37	135	6.4			
4	6	13:28	50	22.58	5	35.84					
4	6	13:33	50	22.11	5	35.28					
4	6	13:38	50	21.69	5	34.76	135	6.5			


Survey 4 - 12/7/05
N
0
3
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kilometres
1
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3
4
5
6
50.4°N
50.3°N
5.8°W
5.7°W
5.6°W
5.5°W

Wave hub seabird survey

Bird Records

Ship Terramare
Observer RB / RK
Date 12/07/2005

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?
4	1	1	07:38	Gannet				NE	1				
4	1	2	07:43	unid. cetacean			D			1			
4	1	3	07:43	Herring Gull			C			1			Y
4	1	4	07:43	Herring Gull			D			2			Y
4	1	5	07:43	Gannet			E			2		}	
4	1	6	07:43	Fulmar				SE	1			}	
4	1	7	07:48	Gannet				NW	1				
4	1	8	07:48	Storm Petrel				N	1				
4	1	9	07:48	Gannet				N	1				
4	1	10	07:48	Storm Petrel				NE	1				
4	1	11	07:53	Gannet				NE	1				
4	1	12	07:53	Herring Gull				E	1				
4	1	13	07:58	Guillemot		I/winter	D			1		slowed down	Y
4	1	14	08:03	Manx Shearwater			A			3		slowed down	Y
4	1	15	08:08	no birds								boat acroos bow	
4	1	16	08:13	no birds									
4	1	17	08:18	Manx Shearwater				N	1				
4	1	18	08:18	grey seal			A						Y
4	1	19	08:18	Gannet				W			1	plunge dive	
4	1	20	08:18	Gannet				E	22				
4	1	21	08:18	Gannet				E	1				
4	1	22	08:23	Gannet				E	1				
4	1	23	08:23	Manx Shearwater				E	2				
4	1	24	08:28	Gannet				W	1			fish boat 1km	
4	1	25	08:28	Gannet				W	1			fish boat 1km	
4	1	26	08:28	Gannet				SW	1			slowed + fishing boat	
4	1	27	08:28	Fulmar				SW	1			slowed + fishing boat	
4	1	28	08:28	Gannet				SE	1			slowed + fishing boat	
4	1	29	08:33	Gannet				E	3			slowed + fishing boat	
4	1	30	08:33	Gannet			C			1		slowed + fishing boa	Y
4	1	31	08:33	Razorbill				E	1			slowed + fishing boat	
4	2	1	08:50	Fulmar				NW	1				
4	2	2	08:50	Gannet				NE	1				
4	2	3	08:50	Gannet				N	1				
4	2	4	08:50	Shag				NE	1				
4	2	5	08:50	Fulmar				SW	1				Y
4	2	6	08:50	Gannet				SW	1				Y
4	2	7	08:50	Gannet						1			Y
4	2	8	08:55	Herring Gull				E	1				
4	2	9	08:55	Gannet						1			
4	2	10	08:55	Gannet				SW	1				
4	2	11	08:55	Fulmar				W	1				
4	2	12	08:55	Storm Petrel				SE	1				
4	2	13	09:00	Manx Shearwater				NE	1				Y
4	2	14	09:00	Gannet				NE	2				
4	2	15	09:00	Storm Petrel				NE	1				
4	2	16	09:05	Gannet				NW	2				
4	2	17	09:05	Storm Petrel				SW	1				Y
4	2	18	09:05	Storm Petrel				SE	1				
4	2	19	09:10	Storm Petrel				E	1				Y
4	2	20	09:15	Storm Petrel				N	1				Y
4	2	21	09:15	Storm Petrel				S	1				
4	2	22	09:20	Storm Petrel				SE	1				
4	2	23	09:20	Storm Petrel				SW	1				Y
4	2	24	09:20	Storm Petrel				S	1				
4	2	25	09:20	Storm Petrel				NE	1				
4	2	26	09:25	Herring Gull			C			1			Y
4	2	27	09:25	Storm Petrel				SW	1				
4	2	28	09:25	Herring Gull			E			2			
4	2	29	09:25	Kittiwake				NW	1				
4	2	30	09:30	Herring Gull				NW	1				
4	2	31	09:30	Storm Petrel				NE	1				
4	3	1	09:47	Storm Petrel			A	NE	1				
4	3	2	09:47	Herring Gull						1			Y
4	3	3	09:47	Gannet	IMM			NE	2				Y
4	3	4	09:47	Fulmar				S	1				
4	3	5	09:47	Gannet	IMM			NE	2				
4	3	6	09:47	Gannet				NE	2				
4	3	7	09:52	Herring Gull			E			13			
4	3	8	09:52	Puffin			D			1			Y
4	3	9	09:57	Storm Petrel			D	NE	1				
4	3	10	09:57	Storm Petrel				N	1				
4	3	11	09:57	Storm Petrel				SW	1				
4	3	12	10:02	Fulmar				NW	1				
4	3	13	10:02	Storm Petrel				NE	1				
4	3	14	10:02	Manx Shearwater				N	1				
4	3	15	10:02	Manx Shearwater				N	1				
4	3	16	10:07	Manx Shearwater			C			1			Y
4	3	17	10:07	Gannet			D			1			Y
4	3	18	10:07	Gannet				NE	1				Y
4	3	19	10:12	Fulmar				NW	1				
4	3	20	10:12	Herring Gull				NW	1				
4	3	21	10:12	Gannet	IMM			SW	1				
4	3	22	10:12	Herring Gull				NE	1				
4	3	23	10:12	Gannet	IMM			NE	1			}	

4	3	24	10:12	Gannet			NE	2		}	
4	3	25	10:17	Gannet			S	1			
4	3	26	10:22	Gannet			S	1			
4	3	27	10:22	Gannet			NE	1			
4	3	28	10:22	Gannet			S	1			
4	3	29	10:27	Fulmar			W	1		fish boat	
4	3	30	10:27	Gannet			NE	1		fish boat	Y
4	3	31	10:27	Gannet		B			1		Y
4	3	32	10:27	Herring Gull			NW	1			
4	3	33	10:27	Herring Gull		B			100	}assoc. fish boat	Y
4	3	34	10:27	GB		B			2	}assoc. fish boat	Y
4	3	35	10:27	Lesser Black-backed Gull		B			5	}assoc. fish boat	Y
4	3	36	10:27	Storm Petrel		B			5	}assoc. fish boat	Y
4	3	37	10:27	Gannet		B			10	}assoc. fish boat	Y
4	3	38	10:27	Kittiwake		B			1	}assoc. fish boat	Y
4	3	39	10:32	Fulmar			NW	2		fish boat	
4	3	40	10:32	Gannet			SE	1		fish boat	
4	3	41	10:32	Lesser Black-backed Gull			E	1		fish boat	
4	3	42	10:32	Gannet			S	1			
4	3	43	10:32	Gannet			S	1			
4	4	1	10:51	Gannet			NE	1			
4	4	2	10:56	Storm Petrel			N	1			
4	4	3	10:56	Fulmar			N	1			Y
4	4	4	10:56	Fulmar			N	1			
4	4	5	11:01	Gannet		D			1		Y
4	4	6	11:01	Storm Petrel			E	1			
4	4	7	11:06	no birds							
4	4	8	11:11	Gannet		E			1		
4	4	9	11:11	Razorbill			NE	1			
4	4	10	11:11	Herring Gull			NE	1			Y
4	4	11	11:16	Herring Gull	IMM		NW	1			
4	4	12	11:16	Gannet			SE	1			
4	4	13	11:16	Gannet			E	1			
4	4	14	11:21	Storm Petrel				1		1	Y
4	4	15	11:21	Gannet		C			1		Y
4	4	16	11:21	Fulmar			S		1		Y
4	4	17	11:21	hrb porpoise		D			2		
4	4	18	11:21	Storm Petrel			S		1		
4	4	19	11:26	Herring Gull		E			1		
4	4	20	11:26	Gannet		D			1		Y
4	4	21	11:26	Storm Petrel			E	1			Y
4	4	22	11:31	Manx Shearwater			NE	1			
4	4	23	11:31	Gannet			E	1			Y
4	4	24	11:31	Storm Petrel		E				1	
4	4	25	11:31	Shag		C			1		Y
4	4	26	11:36	Fulmar			N	1			
4	5	1	11:52	Gannet	IMM	D			1		Y
4	5	2	11:52	Fulmar			E	1			
4	5	3	11:52	Storm Petrel			W	1			
4	5	4	11:57	Fulmar			E	1			
4	5	5	11:57	Herring Gull		A			2		Y
4	5	6	11:57	Herring Gull		D			1		Y
4	5	7	11:57	Storm Petrel			NE	1			Y
4	5	8	11:57	Fulmar		E			1		
4	5	9	11:57	Fulmar			N	1			
4	5	10	12:02	Herring Gull			NW	1			
4	5	11	12:02	Storm Petrel			N	1			
4	5	12	12:07	Fulmar			W	1			
4	5	13	12:07	Gannet		B			1		Y
4	5	14	12:12	no birds							
4	5	15	12:17	Herring Gull			E	1			
4	5	16	12:17	Storm Petrel			W	2			
4	5	17	12:17	Storm Petrel			NE	1			
4	5	18	12:17	Storm Petrel		A			7		Y
4	5	19	12:22	hrb porpoise		E			2		
4	5	20	12:27	Gannet			W	1			Y
4	5	21	12:27	Black-headed gull		E			1		
4	5	22	12:32	Gannet			W	1			
4	5	23	12:32	Fulmar			S	1			
4	5	24	12:37	Herring Gull	IMM		SW	1			Y
4	5	25	12:37	hrb porpoise		E			1		
4	6	1	12:58	common / arctic tern			SE	1		common / arctic tern	
4	6	2	12:58	Gannet			SE	1			
4	6	3	13:03	Gannet	IMM		NE	1			
4	6	4	13:03	hrb porpoise		D	N		2		
4	6	5	13:08	Gannet		B			1		Y
4	6	6	13:08	Fulmar			E	1			
4	6	7	13:13	Herring Gull				1			
4	6	8	13:13	Fulmar			NE	1			
4	6	9	13:18	no birds			NW				
4	6	10	13:23	dolphin sp					2	large, probable bottlenose	
4	6	11	13:28	Storm Petrel				1			
4	6	12	13:28	Gannet		E	E		1		
4	6	13	13:28	dolphin sp					1	large, probable bottlenose	
4	6	14	13:28	Gannet		E			1		
4	6	15	13:33	Gannet		E			1		
4	6	16	13:33	Storm Petrel			NE	1			
4	6	17	13:33	Fulmar			NW	1			
4	6	18	13:33	Fulmar			NW	1			
4	6	19	13:38	Storm Petrel			W	1			
4	6	20	13:38	Storm Petrel			E	1			Y

Wave hub seabird survey

Data Analysis

Ship Terramare
Observer RB / RK
Date 12/07/2005

	Species	Fulmar	Gannet	GBB Gull	Guillemot	Herring Gull	Kittiwake	LBB Gull	Lg Gull Sp	Manx Shearwater	Puffin	Razorbill	Shag	Storm Petrel
Transect 1	Sea		1		1	3				3				
	Fly													
	Length (km)	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52
	Area (km^2)	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16
	Density (birds / km^2)	0.00	0.32	0.00	0.44	1.33	0.00	0.00	0.00	1.24	0.00	0.00	0.00	0.00
Transect 2	Sea		1			1								
	Fly	1	1							1				4
	Length (km)	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03	10.03
	Area (km^2)	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01
	Density (birds / km^2)	0.33	0.66	0.00	0.00	0.47	0.00	0.00	0.00	0.33	0.00	0.00	0.00	1.33
Transect 3	Sea		12	2		101	1	5		1	1			5
	Fly		4											
	Length (km)	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25
	Area (km^2)	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78
	Density (birds / km^2)	0.00	5.77	1.01	0.00	50.95	0.50	2.52	0.00	0.47	0.54	0.00	0.00	2.70
Transect 4	Sea		3										1	
	Fly	2	1			1								2
	Length (km)	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67
	Area (km^2)	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
	Density (birds / km^2)	0.69	1.38	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.38	3.27
Transect 5	Sea		2			2								1
	Fly		1			1								1
	Length (km)	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80
	Area (km^2)	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94
	Density (birds / km^2)	0.00	1.02	0.00	0.00	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85
Transect 6	Sea		1											
	Fly													1
	Length (km)	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36
	Area (km^2)	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51
	Density (birds / km^2)	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
All	Sea	0	20	2	1	107	1	5	0	4	1	0	1	6
	Fly	3	7	0	0	2	0	0	0	1	0	0	0	8
	Length (km)	57.63	57.63	57.63	57.63	57.63	57.63	57.63	57.63	57.63	57.63	57.63	57.63	57.63
	Area (km^2)	17.29	17.29	17.29	17.29	17.29	17.29	17.29	17.29	17.29	17.29	17.29	17.29	17.29
	Density (birds / km^2)	**0.17**	**1.56**	**0.16**	**0.08**	**8.78**	**0.08**	**0.40**	**0.00**	**0.36**	**0.09**	**0.00**	**0.06**	**0.98**
Correction Factor		1.10	1.00	1.40	1.40	1.40	1.40	1.40	1.40	1.30	1.50	1.50	1.10	1.50

Survey 5 – August 2005

Wave hub seabird survey

Trip data

Date: **17/08/2005**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
5	12:14:00	Ross Bower / Richard Knott / Siri Frost	Strip Transect	90°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observers
MV Datchet	6.7	300	5	3

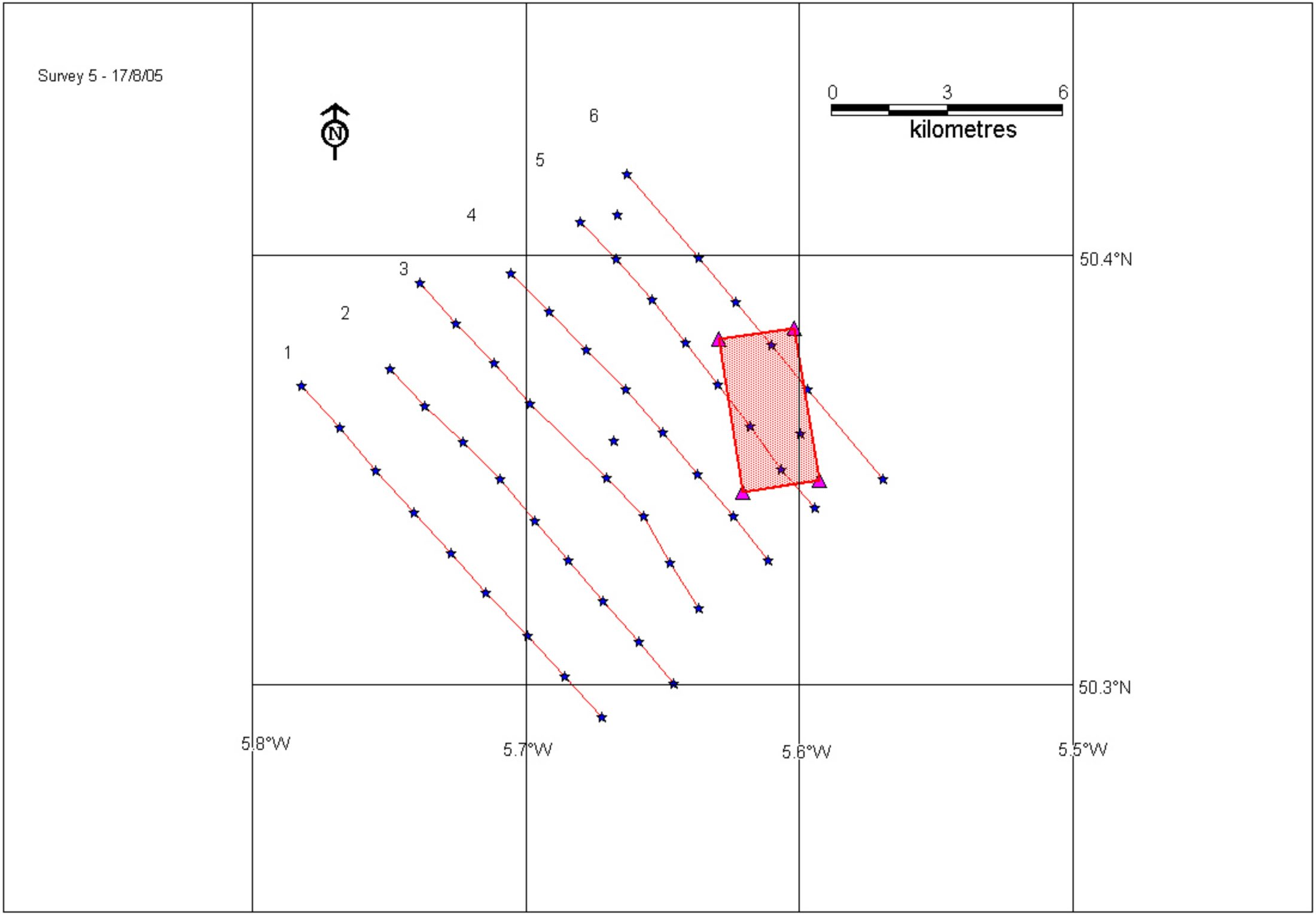
Environmental Data

Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Notes
12:14	S	2	Calm	<1	Good	0	no	

Wave hub seabird survey

Ship MV Datchet
Observer RB / RK / SF
Date 17/08/2005

Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments
5	1	12:14	50	17.55	5	40.34	320	9.4	
5	1	12:19	50	18.11	5	41.14	320	9.4	
5	1	12:24	50	18.68	5	41.97	319	9.4	
5	1	12:29	50	19.29	5	42.88			
5	1	12:34	50	19.83	5	43.64	320	9.5	
5	1	12:39	50	20.41	5	44.46			
5	1	12:44	50	21.00	5	45.29	318	9.5	
5	1	12:49	50	21.60	5	46.09	314	9.3	
5	1	12:54	50	22.19	5	46.92			
5	2	13:04	50	22.41	5	44.99	140	8.9	
5	2	13:09	50	21.90	5	44.21	133	9.2	
5	2	13:14	50	21.39	5	43.39	135	8.9	
5	2	13:19	50	20.87	5	42.56	142	8.7	
5	2	13:24	50	20.29	5	41.80	140	8.8	Basking sharks on both sides
5	2	13:29	50	19.73	5	41.07	139	8.9	
5	2	13:34	50	19.16	5	40.30	140	9	
5	2	13:39	50	18.59	5	39.53	141	9.3	
5	2	13:44	50	18.02	5	38.75			
5	3	13:52	50	19.07	5	38.20	322	9	
5	3	13:57	50	19.70	5	38.84	335	9.2	
5	3	14:02	50	20.36	5	39.43	331	9.1	Basking sharks on LHS
5	3	14:07	50	20.89	5	40.24	313	8.9	Basking sharks on both sides
5	3	14:12	50	21.42	5	40.07	318	9	
5	3	14:17	50	21.93	5	41.92	318	9	
5	3	14:22	50	22.50	5	42.71	318	9.3	
5	3	14:27	50	23.06	5	43.53	320	9.3	
5	3	14:32	50	23.63	5	44.34	316	9.2	
5	4	14:41	50	23.75	5	42.32	137	8.8	Harbour porpoise on LHS in t
5	4	14:46	50	23.22	5	41.50	134	9.1	
5	4	14:51	50	22.68	5	40.67	135	9.4	Basking sharks on both sides
5	4	14:56	50	22.13	5	39.82	138	9.2	Basking sharks on both sides
5	4	15:01	50	21.53	5	39.01	138	9.4	Basking sharks on both sides
5	4	15:06	50	20.95	5	38.23	139	9.4	
5	4	15:11	50	20.36	5	37.44	139	9.3	
5	4	15:16	50	19.74	5	36.68	140	9.2	
5	5	15:23	50	20.47	5	35.67	316	8.7	
5	5	15:28	50	21.01	5	36.41	328	8.9	
5	5	15:33	50	21.61	5	37.09	324	8.7	
5	5	15:38	50	22.20	5	37.79	325	8.8	
5	5	15:43	50	22.79	5	38.49	320	8.9	
5	5	15:48	50	23.38	5	39.24			
5	5	15:53	50	23.96	5	40.01	316	9	
5	5	15:58	50	24.48	5	40.80			
5	6	16:05	50	25.15	5	39.78	132	9.1	
5	6	16:10	50	24.58	5	39.99	140	9.3	
5	6	16:15	50	23.98	5	38.21	139	9.6	
5	6	16:20	50	23.35	5	37.39	142	10.1	
5	6	16:25	50	22.75	5	36.60	139	9.4	
5	6	16:30	50	22.14	5	35.81	142	9.6	
5	6	16:35	50	21.51	5	35.98	139	9.6	
5	6	16:40	50	20.87	5	34.18	143	9.5	


Survey 5 - 17/8/05
N
0
3
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kilometres
1
2
3
4
5
6
50.4°N
50.3°N
5.8°W
5.7°W
5.6°W
5.5°W

Wave hub seabird survey

Bird Records

Ship MV Datchet
Observer RB / RK / SF
Date 17/08/2005

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?
5	1	1	12:14	Shag			C			3			Y
5	1	2	12:19	Herring Gull	Imm			NE	1				
5	1	3	12:19	Gannet	Imm			NE	1				
5	1	4	12:24	Storm Petrel				NW	1				Y
5	1	5	12:24	Gannet	Imm		D			1			Y
5	1	6	12:24	Gannet	Imm			*	1				Y
5	1	7	12:24	Basking shark			C			7		6 more on LHS	
5	1	8	12:29	Gannet			E			1			
5	1	9	12:29	Gannet				*	1				
5	1	10	12:29	Gannet	Imm		E			1			
5	1	11	12:34	Fulmar				NE	1				
5	1	12	12:34	Gannet	Imm			*	1				
5	1	13	12:34	Storm Petrel				S	1				
5	1	14	12:34	Gannet			D			1			Y
5	1	15	12:34	Gannet				SW	1				
5	1	16	12:39	Basking shark			D			1			on LHS
5	1	17	12:39	Gannet			C			1			Y
5	1	18	12:39	Gannet				NE	1				Y
5	1	19	12:39	Gannet				NW	1			Plunge dive	
5	1	20	12:39	Gannet			D			1			Y
5	1	21	12:39	Gannet			E			1			
5	1	22	12:44	Gannet	Imm		A			1			Y
5	1	23	12:44	Gannet			B			1			Y
5	1	24	12:44	Fulmar				SE	1				
5	1	25	12:44	Gannet	Imm		C			1			Y
5	1	26	12:44	Gannet				NE	1			Plunge dive	Y
5	1	27	12:44	Gannet			E			1			
5	1	28	12:49	Gannet				NE	1				
5	1	29	12:49	Gannet	Imm		E			3			
5	1	30	12:49	Gannet	Imm			NE	1				
5	1	31	12:49	Fulmar				NE	1				Y
5	1	32	12:49	Fulmar				W	1				
5	1	33	12:49	Gannet	Imm			SE	1			Plunge dive	
5	2	1	13:04	Storm Petrel				S	1				
5	2	2	13:04	Gannet			C			1			Y
5	2	3	13:04	Gannet			D			1			Y
5	2	4	13:04	Manx Shearwater				S	1				
5	2	5	13:04	Gannet	Imm			N	1				
5	2	6	13:04	Gannet				SW	1				
5	2	7	13:04	Gannet			A			1			Y
5	2	8	13:09	Gannet				E	1				
5	2	9	13:09	Fulmar				NE	1				
5	2	10	13:09	Gannet			C			1			Y
5	2	11	13:09	Gannet			D			1			Y
5	2	12	13:09	Gannet			C			1			Y
5	2	13	13:09	Herring Gull	Imm		A			1			Y
5	2	14	13:09	Fulmar				N	1				Y
5	2	15	13:09	Gannet				NW	1				
5	2	16	13:14	Gannet			C			1			Y
5	2	17	13:14	Gannet	Imm			NW	1				
5	2	18	13:19	Basking shark			D			4		3 more on RHS	
5	2	19	13:19	Gannet			E			1			
5	2	20	13:19	Gannet				E	1			Plunge diving	Y
5	2	21	13:19	Gannet			D			1			Y
5	2	22	13:19	Gannet				SE	1				
5	2	23	13:24	Basking shark			E			2		4 more on RHS	
5	2	24	13:24	Gannet			E			1			
5	2	25	13:29	Storm Petrel				SW	1				Y
5	2	26	13:29	Storm Petrel				SW	1				
5	2	27	13:29	Gannet				W	1				
5	2	28	13:34	Manx Shearwater				NE	1				
5	2	29	13:34	Fulmar				NE	2				
5	2	30	13:34	Gannet			E			1			
5	2	31	13:34	Gannet			E			1			
5	2	32	13:34	Gannet	Imm		E			1			
5	2	33	13:39	Storm Petrel				W	1				
5	2	34	13:39	Storm Petrel				E	1				Y
5	2	35	13:39	Shag				SW	2				
5	3	1	13:52	Shag			A			1			Y
5	3	2	13:52	Fulmar			D			1			Y
5	3	3	13:52	Shag			D			1			Y
5	3	4	13:52	Gannet			C			1			Y
5	3	5	13:52	Gannet				SW	1				
5	3	6	13:57	Gannet	Imm			SE	1				Y
5	3	7	13:57	Fulmar				NW	2				Y
5	3	8	14:02	No birds									
5	3	9	14:07	Gannet			B			1			Y
5	3	10	14:07	Basking shark			C-D			6		on LHS	
5	3	11	14:07	Basking shark			A			1			Y
5	3	12	14:07	Basking shark			B			2			Y
5	3	13	14:07	Fulmar				NE	1				Y
5	3	14	14:07	Storm Petrel				SE	1				

5	3	15	14:12	Gannet	Imm		NW	1				
5	3	16	14:12	Fulmar			NW	1				
5	3	17	14:12	Gannet		A			1			Y
5	3	18	14:17	Gannet			NW	1				
5	3	19	14:17	Gannet			SW	1				
5	3	20	14:17	Gannet	Imm	E			1			
5	3	21	14:17	Gannet	Imm	E			1			
5	3	22	14:17	Gannet		A			1			Y
5	3	23	14:17	Gannet		D			1			Y
5	3	24	14:17	Gannet			NW	1				
5	3	25	14:17	Fulmar		D			1			Y
5	3	26	14:17	Gannet		E			1			
5	3	27	14:22	Gannet		C			1			Y
5	3	28	14:22	Gannet		E			1			
5	3	29	14:22	Storm Petrel			SW	1				
5	3	30	14:22	Storm Petrel			SW	1				
5	3	31	14:27	Gannet		D			2			Y
5	3	32	14:27	Gannet		D			1			Y
5	3	33	14:27	Storm Petrel			SW	1				
5	3	34	14:27	Gannet		E			2			
5	3	35	14:27	Gannet		A			1			Y
5	3	36	14:27	Gannet		B			1			Y
5	3	37	14:27	Gannet	Imm	B			1			Y
5	4	1	14:41	Gannet		C			1			Y
5	4	2	14:41	Harbour porpoise							on LHS	
5	4	3	14:41	Storm Petrel			E	2				
5	4	4	14:41	Storm Petrel			E	1				Y
5	4	5	14:41	Gannet			SW	1				
5	4	6	14:46	Gannet	Imm		E	1				Y
5	4	7	14:46	Gannet		C			1			Y
5	4	8	14:46	Storm Petrel			E	1				
5	4	9	14:46	Great Black-backed Gull			E	1				Y
5	4	10	14:51	Gannet			SE	1				
5	4	11	14:51	Basking shark		A			2			
5	4	12	14:51	Storm Petrel			E	1				
5	4	13	14:56	Basking shark					3		Both sides (4 on RHS)	
5	4	14	14:56	Gannet		B			1			Y
5	4	15	14:56	Gannet	Imm		SE	1				Y
5	4	16	14:56	Gannet	Imm		SE	1				Y
5	4	17	14:56	Herring Gull		E			1			
5	4	18	15:01	Storm Petrel			NE	1				Y
5	4	19	15:01	Basking shark		D			1		1 on RHS	
5	4	20	15:01	Sunfish							1 on RHS	
5	4	21	15:06	Gannet			NE	1				
5	4	22	15:06	Basking shark					1			Y
5	4	23	15:06	Harbour porpoise		A			2			Y
5	4	24	15:06	Shag			SE	1				
5	4	25	15:11	Storm Petrel			SW	1				
5	4	26	15:11	Basking shark					1			Y
5	4	27	15:11	Herring Gull	Imm	E			1			
5	4	28	15:11	Great Black-backed Gull			S	1				Y
5	5	1	15:23	Herring Gull	Imm		SE	1				Y
5	5	2	15:23	Fulmar			SE	1				
5	5	3	15:23	Fulmar			SW	1				Y
5	5	4	15:23	Gannet	Imm		NW	1				Y
5	5	5	15:28	Gannet		E			1			
5	5	6	15:28	Basking shark		E			2			
5	5	7	15:33	Fulmar			SE	1				
5	5	8	15:33	Fulmar			SW	1				
5	5	9	15:33	Basking shark					1		on LHS	
5	5	10	15:38	Great Black-backed Gull		E			1			
5	5	11	15:38	Basking shark					3		on LHS	
5	5	12	15:38	Herring Gull		E			1			
5	5	13	15:38	Basking shark					2		on LHS	
5	5	14	15:38	Gannet		D			1			Y
5	5	15	15:43	Unid. Dolphin		E			1		Large	
5	5	16	15:48	Gannet		B			1			Y
5	5	17	15:48	Gannet		C			1			Y
5	5	18	15:48	Fulmar			SE	1				
5	5	19	15:48	Gannet		B			1			Y
5	5	20	15:53	Harbour porpoise		E			1			
5	5	21	15:53	Herring Gull			NW	1				
5	5	22	15:53	Gannet		E			1			
5	5	23	15:53	Gannet	Imm		SE	1				
5	5	24	15:53	Storm Petrel			NW	6				
5	6	1	16:05	Gannet		E			1			
5	6	2	16:05	Great Black-backed Gull		E			1			
5	6	3	16:05	Gannet		E			1			
5	6	4	16:05	Gannet	Imm	D			1			Y
5	6	5	16:05	Basking shark		D			1			Y
5	6	6	16:10	Storm Petrel			NE	1				
5	6	7	16:10	Storm Petrel			SE	1				Y
5	6	8	16:10	Storm Petrel			NE	1				
5	6	9	16:10	Gannet	Imm		SE	1			Plunge diving	
5	6	10	16:10	Fulmar			NW	1				
5	6	11	16:10	Storm Petrel			SE	1				Y
5	6	12	16:10	Basking shark							1 on LHS	
5	6	13	16:10	Fulmar			NW	1				
5	6	14	16:10	Gannet			NW	1				
5	6	15	16:15	Gannet	Imm		S	1				Y
5	6	16	16:15	Storm Petrel			SW	1				

5	6	17	16:20	Gannet		E		1			
5	6	18	16:20	Storm Petrel			SE	1			
5	6	19	16:20	Gannet			SW	1			
5	6	20	16:25	Storm Petrel			S	2			
5	6	21	16:25	Basking shark		E		2			Y
5	6	22	16:25	Great Black-backed Gull		D		1			
5	6	23	16:25	Manx Shearwater			E	1			
5	6	24	16:25	Fulmar			W	1			
5	6	25	16:25	Gannet		E		1			
5	6	26	16:30	Gannet	Imm	E		1			
5	6	27	16:30	Fulmar		E		1			
5	6	28	16:30	Storm Petrel		SW		1			
5	6	29	16:35	Harbour porpoise						2 on RHS	
5	6	30	16:35	Gannet			SW	1			

Wave hub seabird survey

Data Analysis

Ship MV Datchet
Observer RB / RK / SF
Date 17/08/2005

	Species	Fulmar	Gannet	GBB Gull	Guillemot	Herring Gull	Kittiwake	LBB Gull	Lg Gull Sp	Manx Shearwater	Puffin	Razorbill	Shag	Storm Petrel
Transect 1	Sea		7										3	
	Fly	1	3											1
	Length (km)	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60
	Area (km^2)	3.48	3.48	3.48	3.48	3.48	3.48	3.48	3.48	3.48	3.48	3.48	3.48	3.48
	Density (birds / km^2)	0.29	2.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.29
Transect 2	Sea		8			1								
	Fly	1	1											2
	Length (km)	10.99	10.99	10.99	10.99	10.99	10.99	10.99	10.99	10.99	10.99	10.99	10.99	10.99
	Area (km^2)	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
	Density (birds / km^2)	0.30	2.73	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61
Transect 3	Sea	2	12										2	
	Fly	3	1											
	Length (km)	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19	11.19
	Area (km^2)	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36
	Density (birds / km^2)	1.55	3.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00
Transect 4	Sea		3											
	Fly		3	2										2
	Length (km)	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99
	Area (km^2)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	Density (birds / km^2)	0.00	2.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67
Transect 5	Sea		4											
	Fly	1	1			1								
	Length (km)	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60
	Area (km^2)	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88
	Density (birds / km^2)	0.35	1.74	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 6	Sea		1											
	Fly		1											2
	Length (km)	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33
	Area (km^2)	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
	Density (birds / km^2)	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65
All	Sea	2	35	0	0	1	0	0	0	0	0	0	5	0
	Fly	6	10	2	0	1	0	0	0	0	0	0	0	7
	Length (km)	63.70	63.70	63.70	63.70	63.70	63.70	63.70	63.70	63.70	63.70	63.70	63.70	63.70
	Area (km^2)	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11
	Density (birds / km^2)	**0.43**	**2.35**	**0.10**	**0.00**	**0.13**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.29**	**0.37**
Correction Factor		1.10	1.00	1.40	1.40	1.40	1.40	1.40	1.40	1.30	1.50	1.50	1.10	1.50

Survey 6 – September 2005

Wave hub seabird survey

Trip data

Date: **21/09/2005**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
6	06:30:00	Ross Bower / Gemma O'Connor	Strip Transect	90°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observers
MV Datchet	6.7	300	5	3

Environmental Data

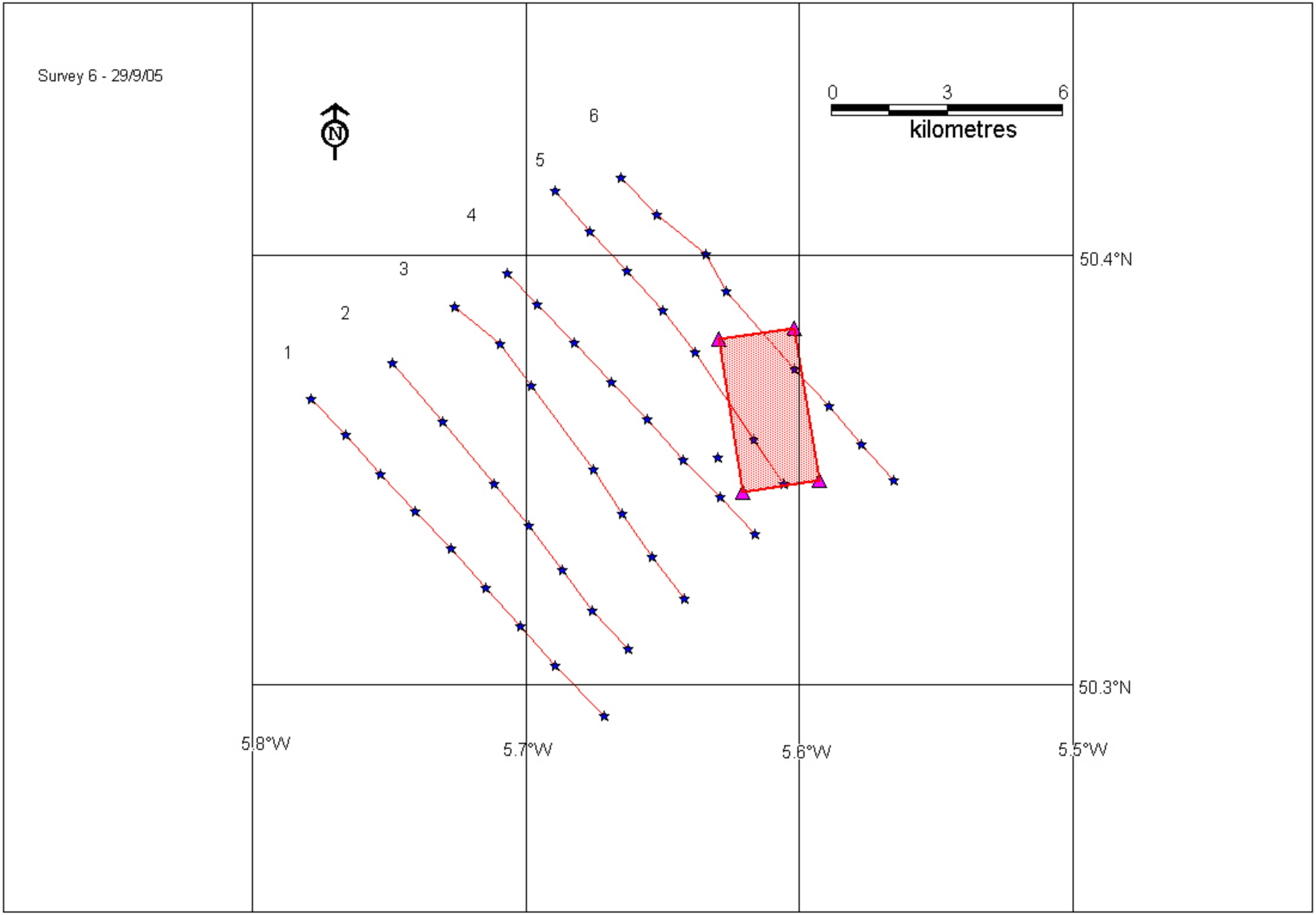
Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Notes
06:15	SW	3-4	3-4	1m	Excellent	3/8	no	

Wave hub seabird survey

Navigation Data

Ship MV Datchet
Observer RB/GOC
Date 21/09/2005

Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments
6	1	06:30	50	17.56	5	40.28	308	9.2	
6	1	06:35	50	18.26	5	41.36	325	8.6	
6	1	06:40	50	18.82	5	42.12	320	8.4	
6	1	06:45	50	19.35	5	42.88	326	9.1	
6	1	06:50	50	19.90	5	43.64	316	8.6	
6	1	06:55	50	20.42	5	44.42	313	9.0	
6	1	07:00	50	20.95	5	45.19	318	8.5	
6	1	07:05	50	21.49	5	45.96	325	8.6	
6	1	07:10	50	22.00	5	46.72	316	8.5	
6	2	07:18	50	22.50	5	44.92	135	9.0	
6	2	07:23							
6	2	07:28	50	21.68	5	43.82	143	9.0	
6	2	07:33	50	20.81	5	42.69	144	9.0	
6	2	07:38	50	20.22	5	41.95	138	8.8	
6	2	07:43	50	19.60	5	41.21	146	9.0	
6	2	07:48	50	19.04	5	40.54	147	8.6	
6	2	07:53	50	18.49	5	39.77	147	8.6	
6	3	08:03	50	19.20	5	38.53	327	8.8	
6	3	08:08	50	19.79	5	39.23	325	8.7	
6	3	08:13	50	20.39	5	39.89	334	8.9	
6	3	08:18	50	21.01	5	40.52	320	8.9	
6	3	08:23							
6	3	08:28	50	22.19	5	41.89	330	8.9	
6	3	08:33	50	22.77	5	42.56	316	8.6	
6	3	08:38	50	23.29	5	43.56	318	8.5	
6	4	08:43	50	23.75	5	42.40	140	8.7	
6	4	08:48	50	23.32	5	41.75	136	9.0	
6	4	08:53	50	22.78	5	40.93	134	8.9	
6	4	08:58	50	22.24	5	40.12	137	8.9	
6	4	09:03	50	21.71	5	39.34	139	8.7	
6	4	09:08	50	21.15	5	38.54	138	8.9	
6	4	09:13	50	20.62	5	37.75	132	8.9	
6	4	09:18	50	20.10	5	36.97	143	9.0	
6	5	09:30	50	20.81	5	36.34	323	9.0	
6	5	09:35	50	21.43	5	37.00	330	9.0	
6	5	09:40	50	21.18	5	37.78	327	9.0	
6	5	09:45	50	22.65	5	38.28	315	8.8	
6	5	09:50	50	23.23	5	38.99	327	8.9	
6	5	09:55	50	23.79	5	39.78	317	9.3	
6	5	10:00	50	24.35	5	40.59	321	8.9	
6	5	10:05	50	24.91	5	41.37	313	9.3	
6	6	10:14	50	25.10	5	39.92	133	9.0	
6	6	10:19	50	24.57	5	39.13	141	8.5	
6	6	10:24	50	24.03	5	38.05	136	8.7	
6	6	10:29	50	23.50	5	37.60	138	8.7	
6	6	10:39	50	22.42	5	36.11	143	8.9	
6	6	10:44	50	21.89	5	35.36	139	8.5	
6	6	10:49	50	21.37	5	34.63	140	7.9	
6	6	10:54	50	20.86	5	33.92	141	7.6	


Survey 6 - 29/9/05
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5.7°W
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5.5°W

Wave hub seabird survey

Bird Records

Ship MV Datchet
Observer RB/GOC
Date 21/09/2005

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?
6	1	1	06:30	Gannet				NE	1				
6	1	2	06:30	Gannet				S	1				
6	1	3	06:30	Gannet				NW	1				
6	1	4	06:35	No Birds									
6	1	5	06:40	Gannet	Imm			E	1			}	
6	1	6	06:40	Gannet				E	2			}	
6	1	7	06:45	Gannet				W	1				
6	1	8	06:45	Gannet				W	1				
6	1	9	06:45	Manx Shearwater				SW	1				
6	1	10	06:50	Herring Gull	Imm			NW	1	1			
6	1	11	06:50	Lesser Black-backed Gull				NW	1				
6	1	12	06:55	No Birds									
6	1	13	07:00	Herring Gull	Imm			NW	1				Y
6	1	14	07:00	Fulmar				E	1				
6	1	15	07:00	Fulmar				E	1				Y
6	1	16	07:00	Gannet				W	1				
6	1	17	07:00	Fulmar				SW	1				Y
6	1	18	07:00	Gannet				W	1				
6	1	19	07:05	Herring Gull	Imm			W	1				
6	1	20	07:05	Herring Gull	Imm			0	1				
6	1	21	07:05	Fulmar				W	1				
6	1	22	07:05	Sandwich Tern				SW	c.30				
6	2	1	07:18	No birds									
6	2	2	07:23	No birds									
6	2	3	07:28	Manx Shearwater				W	1				
6	2	4	07:28	Gannet		B				1			Y
6	2	5	07:33	Gannet				N	1				Y
6	2	6	07:33	Gannet				NE	2				
6	2	7	07:38	Auk sp.				SW	2				
6	2	8	07:38	Gannet	Imm			NW	1			}	
6	2	9	07:38	Gannet				NW	2			}	
6	2	10	07:38	Gannet				0		1	Y	Plunge diving	Y
6	2	11	07:43	Gannet				N	1				
6	2	12	07:43	Gannet				W	1				
6	2	13	07:48	No birds									
6	3	1	08:03	No birds									
6	3	2	08:08	Gannet				W	1				
6	3	3	08:08	Herring Gull	Imm			NW	1				
6	3	4	08:13	Great Black-backed Gull				SE	1				
6	3	5	08:13	Gannet	Imm			E	1			}	
6	3	6	08:13	Gannet				E	3			}	
6	3	7	08:13	Herring Gull	Imm			W	1				Y
6	3	8	08:13	Herring Gull	Imm			SW	1				
6	3	9	08:13	Herring Gull	Imm			S	4				
6	3	10	08:18	Gannet				SW	2				
6	3	11	08:18	Herring Gull	Imm			N	3				
6	3	12	08:18	Herring Gull				S	1				
6	3	13	08:23	No birds									
6	3	14	08:28	Gannet				NW	1				
6	3	15	08:33	Gannet				NE	1				
6	4	1	08:43	Sandwich Tern				W	c.20				
6	4	2	08:48	Herring Gull	Imm	C				1	Y		Y
6	4	3	08:53	No birds				NE	1				
6	4	4	08:58	Herring Gull	Imm								Y
6	4	5	09:03	No birds									
6	4	6	09:08	No birds									
6	4	7	09:13	No birds									
6	5	1	09:30	No birds									
6	5	2	09:35	Fulmar				W	1				
6	5	3	09:35	Gannet	Imm			NE	1				
6	5	4	09:40	Gannet									
6	5	5	09:45	No birds									
6	5	6	09:50	No birds									
6	5	7	09:55	No birds									
6	5	8	10:00	No birds									
6	6	1	10:14	Guillemot				NW	1				
6	6	2	10:19	Storm Petrel				S	1				Y
6	6	3	10:19	Gannet				NE	1				
6	6	4	10:19	Gannet				N	1				Y
6	6	5	10:24	Herring Gull	Imm			S	1				
6	6	6	10:24	Herring Gull	Imm			W	1				
6	6	7	10:29	Gannet		E				1			
6	6	8	10:34	No birds									
6	6	9	10:39	Great Black-backed Gull				NE	1				
6	6	10	10:44	Sandwich Tern				SW	6				
6	6	11	10:49	No birds									

Wave hub seabird survey

Data Analysis

Ship MV Datchet
Observer RB/GOC
Date 21/09/2005

	Species	Fulmar	Gannet	GBB Gull	Guillemot	Herring Gull	Kittiwake	LBB Gull	Lg Gull Sp	Manx Shearwater	Puffin	Razorbill	Shag	Storm Petrel
Transect 1	Sea													
	Fly	2				1								
	Length (km)	11.22	11.22	11.22	11.22	11.22	11.22	11.22	11.22	11.22	11.22	11.22	11.22	11.22
	Area (km^2)	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37
	Density (birds / km^2)	0.59	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 2	Sea		1											
	Fly		2											
	Length (km)	9.61	9.61	9.61	9.61	9.61	9.61	9.61	9.61	9.61	9.61	9.61	9.61	9.61
	Area (km^2)	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88
	Density (birds / km^2)	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 3	Sea													
	Fly					1								
	Length (km)	9.68	9.68	9.68	9.68	9.68	9.68	9.68	9.68	9.68	9.68	9.68	9.68	9.68
	Area (km^2)	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
	Density (birds / km^2)	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 4	Sea					1								
	Fly					1								
	Length (km)	9.33	9.33	9.33	9.33	9.33	9.33	9.33	9.33	9.33	9.33	9.33	9.33	9.33
	Area (km^2)	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80
	Density (birds / km^2)	0.00	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 5	Sea													
	Fly													
	Length (km)	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67	9.67
	Area (km^2)	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90
	Density (birds / km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 6	Sea													
	Fly		1											1
	Length (km)	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64
	Area (km^2)	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19
	Density (birds / km^2)	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31
All	Sea	0	1	0	0	1	0	0	0	0	0	0	0	0
	Fly	2	3	0	0	3	0	0	0	0	0	0	0	1
	Length (km)	60.15	60.15	60.15	60.15	60.15	60.15	60.15	60.15	60.15	60.15	60.15	60.15	60.15
	Area (km^2)	18.05	18.05	18.05	18.05	18.05	18.05	18.05	18.05	18.05	18.05	18.05	18.05	18.05
	Density (birds / km^2)	**0.11**	**0.22**	**0.00**	**0.00**	**0.24**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.06**
Correction Factor		1.10	1.00	1.40	1.40	1.40	1.40	1.40	1.40	1.30	1.50	1.50	1.10	1.50

Surveys 7 & 8 – November 2005

Wave hub seabird survey

Trip data

Date: **18/11/2005**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
7	08:25	Ross Bower / Siri Frost	Strip Transect	90°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observers
Pamela P	5	300	5	2

Environmental Data

Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Sun strength	Sun Direction	Notes
08:25	SE	5	4-5	2m	Excellent	8/8	no			Survey abandoned after transect 1 due to poor conditions

Wave hub seabird survey

Trip data

Date: **23/11/2005**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
8	09:00:00	Ross Bower / Siri Frost	Strip Transect	90°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observers
Pamela P	5	300	5	2

Environmental Data

Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Sun strength	Sun Direction	Notes
09:00	ESE	3	2	<1M	Excellent	0/8	no			

Wave hub seabird survey

Navigation Data

Ship Pamela P
Observer RB/SF
Date 18/11/2005

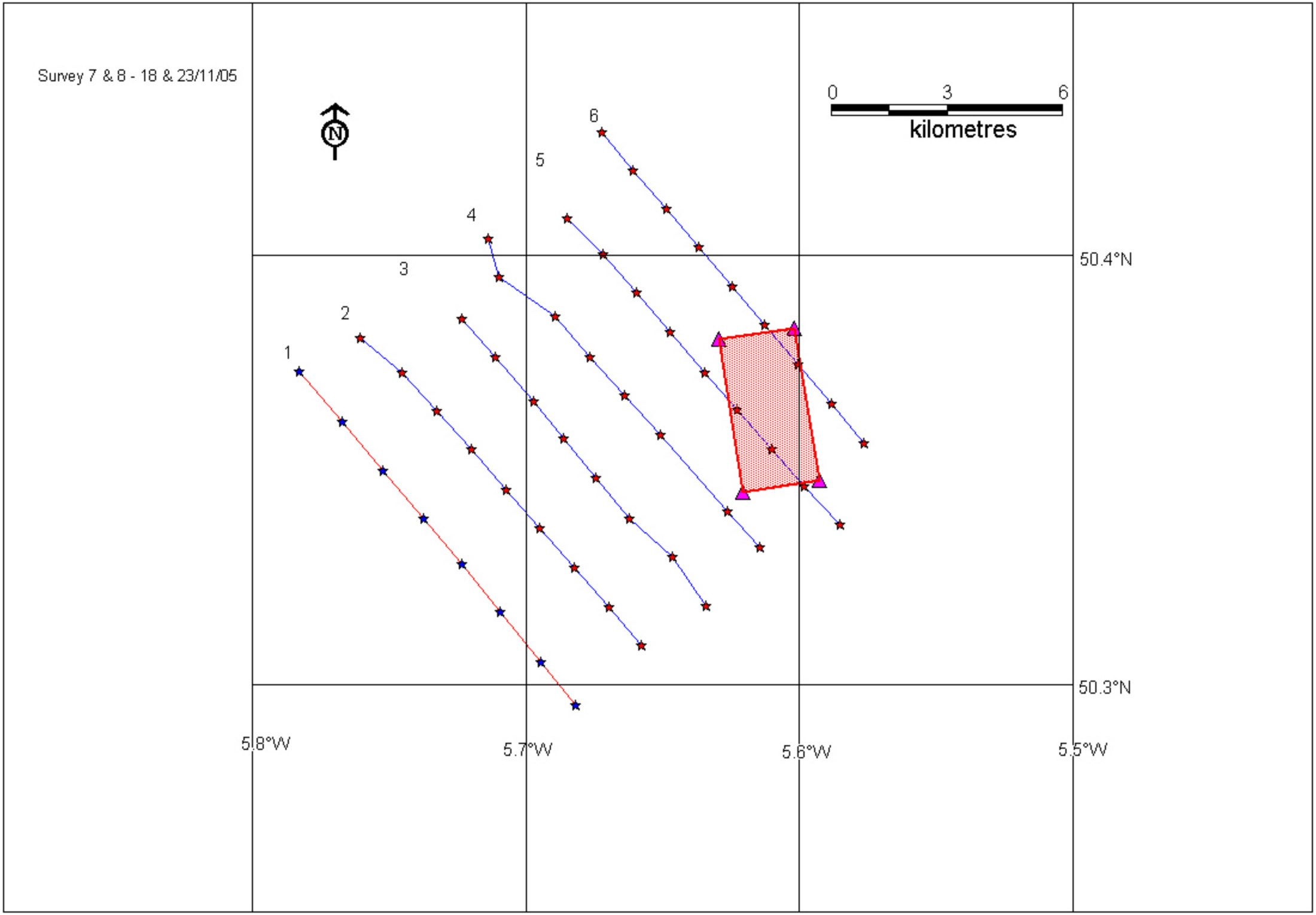
Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments
7	1	08:25	50	17.71	5	40.91	320	8.9	
7	1	08:30	50	18.32	5	41.68	328	11.3	
7	1	08:35	50	19.02	5	42.57	324	9.3	
7	1	08:40	50	19.68	5	43.42	320	10.3	
7	1	08:45	50	20.33	5	44.25	316	11.4	
7	1	08:50	50	20.99	5	45.14	319	9.9	
7	1	08:55	50	21.68	5	46.03	330	9.8	
7	1	09:00	50	22.38	5	46.99	330		

Wave hub seabird survey

Navigation Data

Ship Pamela P
Observer RB/SF
Date 23/11/2005

Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments
8	2	09:09	50	18.55	5	39.47	318	8.9	
8	2	09:14	50	19.09	5	40.18	320	8.6	
8	2	09:19	50	19.64	5	40.93	316	8.9	
8	2	09:24	50	20.19	5	41.70	325	9.3	
8	2	09:29	50	20.73	5	42.43	319	8.9	
8	2	09:34	50	21.29	5	43.19	327	8.5	
8	2	09:39	50	21.83	5	43.96	319	8.9	
8	2	09:44	50	22.37	5	44.72	316	8.9	
8	2	09:49	50	22.85	5	45.63	310	9.0	
8	3	10:00	50	23.12	5	43.40	140	8.5	
8	3	10:05	50	22.58	5	42.68	142	9.0	
8	3	10:10	50	21.96	5	41.84	143	9.2	Fishing vessel @ 500m
8	3	10:15	50	21.45	5	41.17	134	8.7	
8	3	10:20	50	20.89	5	40.47	144	8.6	Fishing vessel @ 300m
8	3	10:25	50	20.33	5	39.74	140	8.6	
				19.78					Tanker approaching transect. Increased speed for 3
8	3	10:30	50		5	38.79	142	9.1	minutes.
8	3	10:35	50	19.10	5	38.06	121	8.9	
8	4	10:45	50	19.92	5	36.87	313	8.8	
8	4	10:50	50	20.43	5	37.57	320	8.5	Fishing vessel @ 300m on RI
8	4	10:55	50	30.98	5	38.33	320	8.5	
8	4	11:00	50	21.50	5	39.05	309	8.5	
8	4	11:05	50	22.05	5	39.85	321	8.5	
8	4	11:10	50	22.59	5	40.59	317	9.0	
8	4	11:15	50	23.15	5	41.36	314	8.6	
8	4	11:20	50	23.71	5	42.59	314	8.9	
8	4	11:25	50	24.24	5	42.84	315	8.5	
8	5	11:36	50	24.53	5	41.10	135	8.1	
8	5	11:41	50	24.03	5	40.32	141	8.8	
8	5	11:46	50	23.49	5	39.58	143	8.5	
8	5	11:51	50	22.93	5	38.84	140	8.5	
8	5	11:56	50	22.37	5	38.07	138	8.8	
8	5	12:01	50	21.85	5	37.37	142	8.7	
8	5	12:06	50	21.29	5	36.62	140	8.6	Fishing vessel @ 300m on LH
8	5	12:11	50	20.77	5	35.89	139	8.5	
8	5	12:16	50	20.24	5	35.11	136	8.5	
8	6	12:26	50	21.38	5	34.59	314	8.8	
8	6	12:31	50	21.93	5	35.31	315	8.6	
8	6	12:36	50	22.48	5	36.04	313	8.8	
8	6	12:41	50	23.03	5	36.76	322	8.8	
8	6	12:46	50	23.58	5	37.47	323	8.6	
8	6	12:51	50	24.13	5	38.20	316	8.3	
8	6	12:56	50	24.66	5	38.93	316	8.6	
8	6	13:01	50	25.20	5	39.65	322	8.4	
8	6	13:06	50	25.74	5	40.34	318	8.6	


Survey 7 & 8 - 18 & 23/11/05
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5.7°W
5.6°W
5.5°W

Wave hub seabird survey

Bird Records

Ship Pamela P
Observer RB/SF
Date 18/11/2005

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?
6	1	1	08:25	Balearic Shearwater				E	1				
6	1	2		Kittiwake				E	1				
6	1	3		Kittiwake				NE	1				
6	1	4		Kittiwake				NE	1				
6	1	5	08:30	Fulmar				SW	2				
6	1	6		Gannet				E	1				
6	1	7	08:35	Fulmar				NE	2				
6	1	8		Kittiwake				SW	1				
6	1	9	08:40	Kittiwake				SW	1				
6	1	10		Fulmar				SW	1				
6	1	11		Gannet	Imm			NW	1				
6	1	12		Gannet				NW	1				
6	1	13		Gannet				NE	1				
6	1	14	08:45	Gannet				NE	2				Y
6	1	15		Herring Gull	Imm			NW	1				Y
6	1	16	08:50	Kittiwake				NE	1				
6	1	17		Gannet				N	1				
6	1	18		Kittiwake				0	2				
6	1	19		Kittiwake				0	1				Y
6	1	20		Fulmar				SW	1				
6	1	21		Kittiwake	Imm			NE	1				
6	1	22	08:55	Gannet				N	1				
6	1	23		Fulmar				SW	1				Y
6	1	24		Fulmar				NE	1				

Wave hub seabird survey

Ship Pamela P
Observer RB/SF
Date 23/11/2005

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?
8	2	1	09:09	Herring Gull				E	1				
8	2	2	09:09	Guillemot				SE	1				
8	2	3	09:09	Gannet	Imm		B			1			Y
8	2	4	09:09	Kittiwake				SE	2				
8	2	5	09:14	Kittiwake				SE	1				
8	2	6	09:19	Auk sp				NE	1				
8	2	7	09:24	No birds									
8	2	8	09:29	Guillemot				E	2				
8	2	9	09:29	Gull sp				SE	1				
8	2	10	09:34	Gannet				SW	1				Y
8	2	11	09:34	Guillemot				NE	2				Y
8	2	12	09:39	Gannet				W	1				
8	2	13	09:39	Guillemot				NE	1				
8	2	14	09:44	Guillemot			C			1			Y
8	2	15	09:44	Guillemot				N	1				
8	2	16	09:44	Gannet				SW	1				Y
8	2	17	09:44	Guillemot			E			2			
8	2	18	09:44	Gannet			E			1			
8	2	19	09:44	Guillemot				SW	1				
8	3	1	10:00	Fulmar				NE	1				Y
8	3	2	10:00	Gannet				SW	1				
8	3	3	10:05	Herring Gull				NE	1				Y
8	3	4	10:05	Guillemot			D			1			Y
8	3	5	10:10	Lesser Black-backed Gull			D			1			Y
8	3	6	10:15	No birds									
8	3	7	10:20	Kittiwake				N	1				
8	3	8	10:20	Guillemot				E	1				Y
8	3	9	10:20	Great Black-backed Gull				N	1				Y
8	3	10	10:20	Gannet				SW	1				
8	3	11	10:25	Great Black-backed Gull				SE	1				Y
8	4	1	10:45	Herring Gull				W	3				
8	4	2	10:45	Herring Gull				W	2				Y
8	4	3	10:50	Kittiwake				0	1				
8	4	4	10:55	Gannet				SW	1				
8	4	5	11:00	No birds									
8	4	6	11:05	Auk sp				SW	2				
8	4	7	11:10	Gannet				SW	1				
8	4	8	11:10	Guillemot			D			1			Y
8	4	9	11:15	Gannet				SW	1				
8	4	10	11:15	Skylark				E	1				
8	4	11	11:15	Gannet				SW	1				Y
8	4	12	11:20	No birds									
8	5	1	11:36	Gannet				W	1				
8	5	2	11:36	Gannet				NW	1				
8	5	3	11:41	No birds									
8	5	4	11:46	Guillemot				SW	1				
8	5	5	11:46	Gannet				W	1				
8	5	6	11:51	Auk sp				SW	1				
8	5	7	11:56	Guillemot			C			1			Y
8	5	8	12:01	Gannet				NE	1				
8	5	9	12:01	Herring Gull				E	1				
8	5	10	12:01	Gannet				SW	1				
8	5	11	12:06	Guillemot				W	1				
8	5	12	12:06	Gannet				W	4				
8	5	13	12:06	Guillemot				SE	3				
8	5	14	12:11	Auk sp				NE	2				
8	6	1	12:26	Gannet				SW	1				
8	6	2	12:31	Guillemot			D			2			Y
8	6	3	12:31	Auk sp				SE	1				
8	6	4	12:36	Gannet				SW	1				
8	6	5	12:41	Gannet				E	1				
8	6	6	12:41	Gannet				E	1				Y
8	6	7	12:41	Auk sp				NE	1				
8	6	8	12:46	Gannet				S	1				
8	6	9	12:46	Guillemot				NE	2				
8	6	10	12:51	Gannet				SW	1				
8	6	11	12:56	Gannet			D			1			Y
8	6	12	12:56	Gannet				S	1				
8	6	13	12:56	Gannet				O	1			Plunge dive	
8	6	14	12:56	Gannet				W	3				
8	6	15	13:01	Gannet			A			1			Y
8	6	16	13:01	Gannet			C			1			Y
8	6	17	13:01	Gannet			E			3			
8	6	18	13:01	Gannet			E			4			
8	6	19	13:01	Gannet			E			1		Plunge dive	
8	6	20	13:01	Gannet			E			6			

Wave hub seabird survey

Data Analysis

Ship Pamela P
Observer RB/SF
Date 18+23/11/2005

	Species	Fulmar	Gannet	GBB Gull	Guillemot	Herring Gull	Kittiwake	LBB Gull	Lg Gull Sp	Manx Shearwater	Puffin	Razorbill	Shag	Storm Petrel
Transect 1	Sea													
	Fly	1	2			1	1							
	Length (km)	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25
	Area (km^2)	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38
	Density (birds / km^2)	0.30	0.59	0.00	0.00	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 2	Sea		1		1									
	Fly		2		2									
	Length (km)	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81
	Area (km^2)	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24
	Density (birds / km^2)	0.00	0.93	0.00	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 3	Sea				1			1						
	Fly	1		2	1	1								
	Length (km)	9.79	9.79	9.79	9.79	9.79	9.79	9.79	9.79	9.79	9.79	9.79	9.79	9.79
	Area (km^2)	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94
	Density (birds / km^2)	0.34	0.00	0.68	0.82	0.34	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00
Transect 4	Sea				1									
	Fly		1			2								
	Length (km)	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81
	Area (km^2)	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24
	Density (birds / km^2)	0.00	0.31	0.00	0.43	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 5	Sea				1									
	Fly													
	Length (km)	10.65	10.65	10.65	10.65	10.65	10.65	10.65	10.65	10.65	10.65	10.65	10.65	10.65
	Area (km^2)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
	Density (birds / km^2)	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 6	Sea		3		1									
	Fly		1											
	Length (km)	10.56	10.56	10.56	10.56	10.56	10.56	10.56	10.56	10.56	10.56	10.56	10.56	10.56
	Area (km^2)	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17
	Density (birds / km^2)	0.00	1.26	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	Sea	0	4	0	5	0	0	1	0	0	0	0	0	0
	Fly	2	6	2	3	4	1	0	0	0	0	0	0	0
	Length (km)	63.87	63.87	63.87	63.87	63.87	63.87	63.87	63.87	63.87	63.87	63.87	63.87	63.87
	Area (km^2)	19.16	19.16	19.16	19.16	19.16	19.16	19.16	19.16	19.16	19.16	19.16	19.16	19.16
	Density (birds / km^2)	**0.10**	**0.52**	**0.10**	**0.52**	**0.21**	**0.05**	**0.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Correction Factor		1.10	1.00	1.40	1.40	1.40	1.40	1.40	1.40	1.30	1.50	1.50	1.10	1.50

Survey 9 – December 2005

Wave hub seabird survey

Trip data

Date: **19/12/2005**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
9	08:44:00	Ross Bower / Siri Frost	Strip Transect	90°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observers
Pamela P	5	300	5	2

Environmental Data

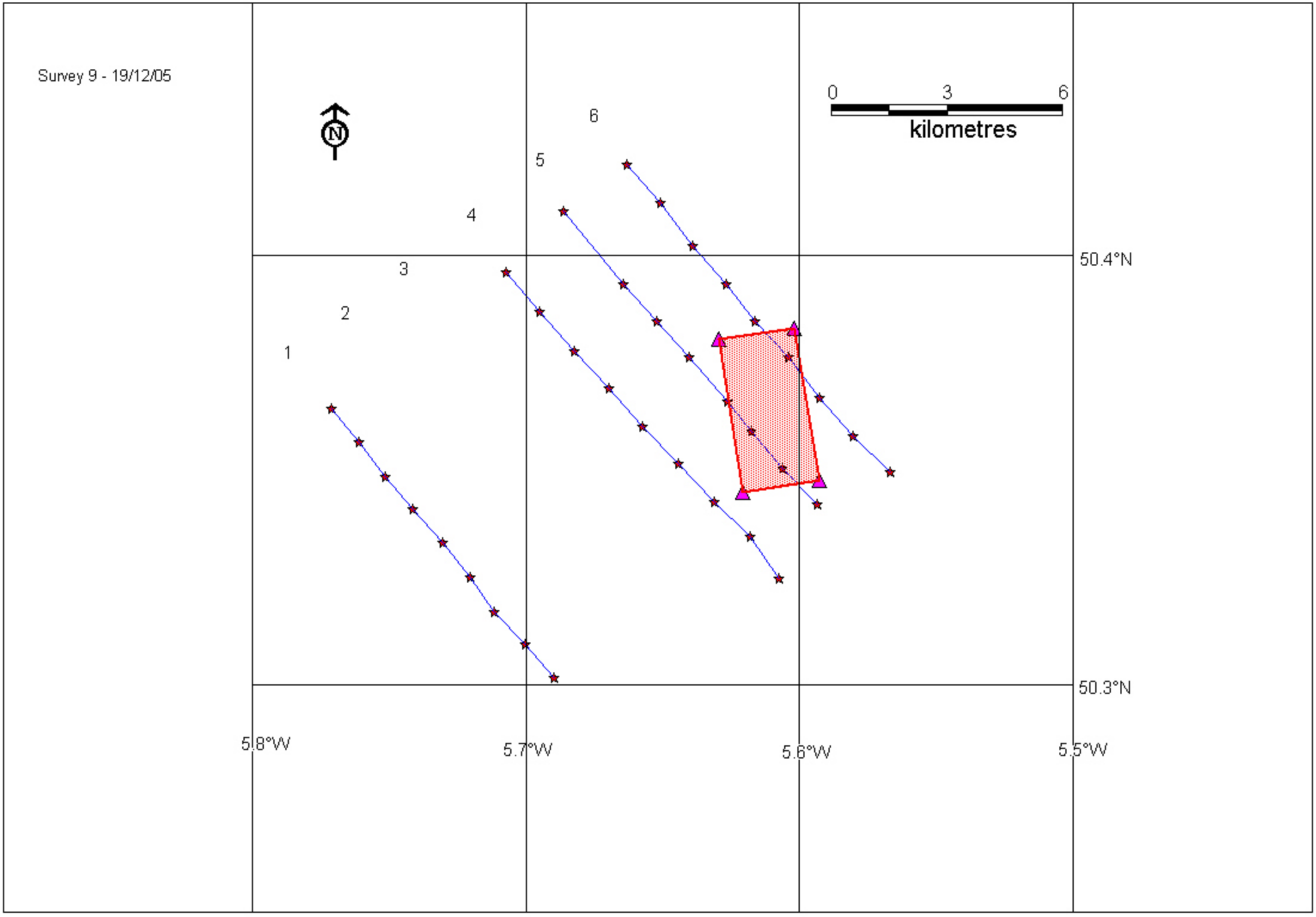
Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Sun strength	Sun Direction	Notes
10:33	W	3-4	4	1-2m	Excellent	4	no			

Wave hub seabird survey

Navigation Data

Ship Pamela P
Observer RB/SF
Date 19/12/2005

Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments
9	1	08:44	50		5			7.5	
9	1	08:49	50	18.10	5	41.39	324	7.5	
9	1	08:54	50	18.56	5	42.01	324	7.5	
9	1	08:59	50	19.01	5	42.69	324	7.5	
9	1	09:04	50	19.51	5	43.23	324	7.6	
9	1	09:09	50	19.99	5	43.83	313	8.3	
9	1	09:14	50	20.45	5	44.48	306	7.3	
9	1	09:19	50	20.91	5	45.08	328	7.7	
9	1	09:24	50	21.40	5	45.67	324	7.5	
9	1	09:29	50	21.86	5	46.27	324	7.5	
9	6	10:27	50	25.28	5	39.79	124	7.9	
9	6	10:32	50	24.74	5	39.06	160	9.4	
9	6	10:37	50	24.14	5	38.35	134	9.2	
9	6	10:42	50	23.60	5	37.62	137	8.4	
9	6	10:47	50	23.09	5	36.99	141	8.5	
9	6	10:52	50	22.58	5	36.24	146	8.3	
9	6	10:57	50	22.02	5	35.57	140	8.3	
9	6	11:02	50	21.48	5	34.83	139	8.4	
9	6	11:07	50	20.98	5	34.00	145	9.3	
9	5	11:18	50	20.53	5	35.62	309	10.0	
9	5	11:23	50	21.03	5	36.37	320	8.4	
9	5	11:28	50	21.55	5	37.06	316	8.0	
9	5	11:33	50	21.97	5	37.59	032	8.6	
9	5	11:38	50	22.58	5	38.43	317	8.7	
9	5	11:43	50	23.09	5	39.14	294	9.0	
9	5	11:48	50	23.60	5	39.86	318	7.7	
9	5	11:53							
9	5	11:58	50	24.63	5	41.17	314	7.9	
9	4	12:08	50	23.78	5	42.43	127	9.1	
9	4	12:13	50	23.22	5	41.70	139	9.4	
9	4	12:18	50	22.67	5	40.95	140	7.5	
9	4	12:23	50	22.15	5	40.18	144	7.8	
9	4	12:28	50	21.61	5	39.45	140	8.5	
9	4	12:33	50	21.09	5	38.67	140	8.2	
9	4	12:38	50	20.55	5	37.86	138	8.0	
9	4	12:43	50	20.08	5	37.08	138	8.9	
9	4	12:48	50	19.49	5	36.44	136	8.6	


Survey 9 - 19/12/05
N
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kilometres
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5
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50.4°N
50.3°N
5.8°W
5.7°W
5.6°W
5.5°W

Wave hub seabird survey

Bird Records

Ship Pamela P
Observer RB/SF
Date 19/12/2005

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?
9	1	1	08:44	No birds									
9	1	2	08:49	Auk sp				SE	1				
9	1	3	08:54	No birds									
9	1	4	08:59	Guillemot				NE	4				
9	1	5	08:59	Fulmar				NE	1				
9	1	6	09:04	Fulmar				NE	1				
9	1	7	09:04	Auk sp				N	5				
9	1	8	09:09	No birds									
9	1	9	09:14	Kittiwake				NW	1				
9	1	10	09:14	Auk sp				SW	3				
9	1	11	09:14	Kittiwake				N	1				
9	1	12	09:14	Gull sp				N	1				
9	1	13	09:14	Gannet				N	1				
9	1	14	09:19	Fulmar				NE	1				
9	1	15	09:19	Guillemot				NW	8				
9	1	16	09:24	No birds									
9	1	17	09:29	No birds									
9	6	1	10:27	Gannet				NW	3				
9	6	2	10:27	Fulmar				NW	1				
9	6	3	10:32	Gannet	E					3			
9	6	4	10:32	Auk sp				SW	1				Y
9	6	5	10:32	Fulmar				SW	1				Y
9	6	6	10:37	Fulmar				W	1				
9	6	7	10:37	Fulmar				NW	1				
9	6	8	10:37	Guillemot				SW	1				
9	6	9	10:37	Auk sp				W	2				Y
9	6	10	10:42	Fulmar				NW	1				
9	6	11	10:47	Fulmar				NE	1				
9	6	12	10:47	Fulmar				SE	1				
9	6	13	10:47	Auk sp				N	1				
9	6	14	10:52	Guillemot				SE	1				
9	6	15	10:52	Herring Gull				NW	1				
9	6	16	10:52	Fulmar				NE	1				Y
9	6	17	10:52	Kittiwake				NW	1				Y
9	6	18	10:57	No birds									
9	6	19	11:02	Herring Gull				SW	1				
9	5	1	11:18	Guillemot				SW	1				
9	5	2	11:23	Auk sp				NE	1				
9	5	3	11:23	Guillemot				NE	1				
9	5	4	11:28	No birds									
9	5	5	11:33	Fulmar				NE	1				
9	5	6	11:33	Common dolphin								2 on RHS	
9	5	7	11:38	No birds									
9	5	8	11:43	Gannet				NE	1				Y
9	5	9	11:43	Herring Gull				NE	2				
9	5	10	11:48	Kittiwake				NE	1				
9	5	11	11:53	Gannet	E					1			
9	5	12	11:53	Gannet	E					1			
9	4	1	12:08	Gannet				NW	1				
9	4	2	12:08	Herring Gull				W	1				
9	4	3	12:08	Fulmar				NE	1				
9	4	4	12:13	Guillemot	B					1			Y
9	4	5	12:13	Fulmar				NE	1				
9	4	6	12:18	Gannet				SW	1				
9	4	7	12:23	Gannet				W	1				
9	4	8	12:23	Kittiwake				SW	1				
9	4	9	12:28	No birds									
9	4	10	12:33	No birds									
9	4	11	12:38	No birds									
9	4	12	12:43	No birds									

Wave hub seabird survey

Data Analysis

Ship Pamela P
Observer RB/SF
Date 19/12/2005

	Species	Auk Sp	Fulmar	Gannet	GBB Gull	Guillemot	Herring Gull	Kittiwake	LBB Gull	Lg Gull Sp	Manx Shearwater	Puffin	Razorbill	Shag	Storm Petrel
Transect 1	Sea														
	Fly														
	Length (km)	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06	9.06
	Area (km^2)	2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72	2.72
	Density (birds / km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 4	Sea					1									
	Fly														
	Length (km)	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.67
	Area (km^2)	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
	Density (birds / km^2)	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 5	Sea														
	Fly			1											
	Length (km)	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04	10.04
	Area (km^2)	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01
	Density (birds / km^2)	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transect 6	Sea														
	Fly	3	2					1							
	Length (km)	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52	10.52
	Area (km^2)	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16
	Density (birds / km^2)	0.95	0.63	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	Sea	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Fly	3	2	1	0	0	0	1	0	0	0	0	0	0	0
	Length (km)	40.29	40.29	40.29	40.29	40.29	40.29	40.29	40.29	40.29	40.29	40.29	40.29	40.29	40.29
	Area (km^2)	12.09	12.09	12.09	12.09	12.09	12.09	12.09	12.09	12.09	12.09	12.09	12.09	12.09	12.09
	Density (birds / km^2)	**0.25**	**0.17**	**0.08**	**0.00**	**0.12**	**0.00**	**0.08**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Correction Factor		1.5	1.10	1.00	1.40	1.40	1.40	1.40	1.40	1.40	1.30	1.50	1.50	1.10	1.50

Survey 10 – January 2006

Wave hub seabird survey

Trip data

Date: **31/01/2006**

Trip key	Start time (GMT)	Observer	Method	Angle of view	Species counted	Base activity	Notes
10	13:23:00	Ross Bower / Siri Frost	Strip Transect	90°	all	steaming	

Base name	Height of eye (m)	Transect width (m)	Duration (mins)	No. observers
MV Datchet	5m	300	5	2

Environmental Data

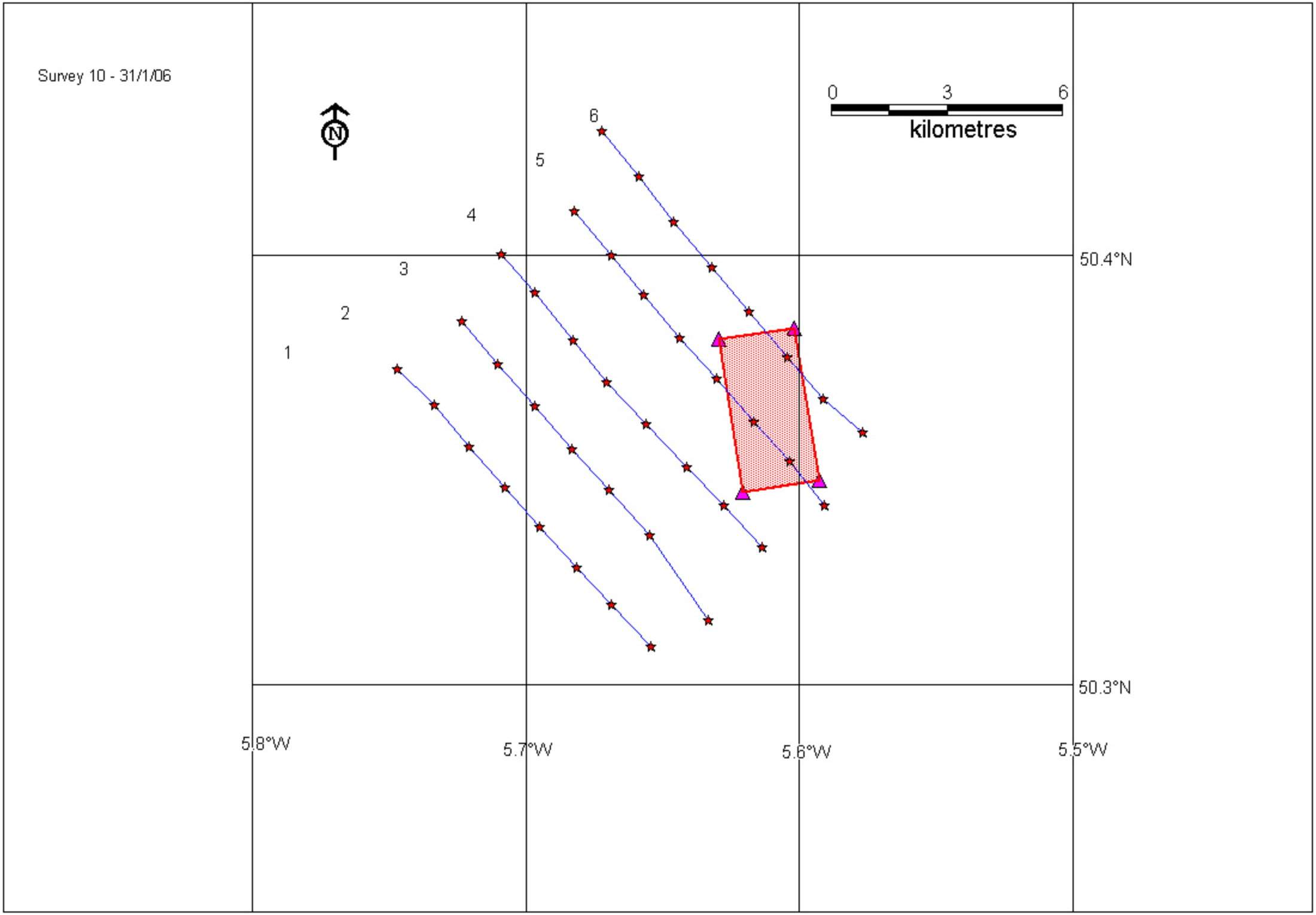
Time (GMT)	Wind direction	Wind force (B'fort)	Sea state	Swell height	Visibility	Cloud	Rain	Notes
13:23	NE	3	3	1m	Excellent	8/8	no	

Wave hub seabird survey

Navigation Data

Ship MV Datchet
Observer RB / SF
Date 31/01/2006

Trip key	Transect no.	Time	Lat N (deg)	Lat N (min)	Long W (deg)	Long W (min)	Course	Speed (knots)	Comments
10	6	13:23	50	21.53	5	34.62	323	9.7	
10	6	13:28	50	21.99	5	35.48	323	9.7	
10	6	13:33	50	22.59	5	36.28	321	9.9	
10	6	13:38	50	23.22	5	37.11	324	10.0	
10	6	13:43	50	23.84	5	37.93	324	10.1	
10	6	13:48	50	24.48	5	38.75	320	9.9	
10	6	13:53	50	25.12	5	39.53	320	9.9	
10	6	13:58	50	25.75	5	40.35	323	10.0	
10	5	14:08	50	24.63	5	40.93	139	9.1	
10	5	14:13	50	24.01	5	40.14	140	9.5	
10	5	14:18	50	23.46	5	39.41	139	9.3	
10	5	14:23	50	22.86	5	38.62	143	9.2	
10	5	14:28	50	22.29	5	37.83	136	9.3	
10	5	14:33	50	21.68	5	37.00	140	9.0	
10	5	14:38	50	21.13	5	36.21	141	9.2	
10	5	14:43	50	20.51	5	35.46	144	9.3	
10	4	14:54	50	19.92	5	36.83	316	9.3	
10	4	14:59	50	20.50	5	37.66	318	9.3	
10	4	15:04	50	21.04	5	38.47	312	9.0	
10	4	15:09	50	21.65	5	39.36	318	9.3	
10	4	15:14	50	22.24	5	40.22	316	9.4	
10	4	15:19	50	22.82	5	40.98	316	9.6	
10	4	15:24	50	23.49	5	41.81	319	9.2	
10	4	15:29	50	24.03	5	42.55	312	9.4	
10	3	15:40	50	23.09	5	43.42	136	9.3	
10	3	15:45	50	22.49	5	42.61	136	9.5	
10	3	15:50	50	21.90	5	41.82	139	9.3	
10	3	15:55	50	21.29	5	40.99	138	9.7	
10	3	16:00	50	20.73	5	40.19	139	9.6	
10	3	16:05	50	20.09	5	39.30	139	9.6	
10	3	16:10	50		5				tanker passing across bow
10	3	16:15	50	18.90	5	37.99			
10	2	16:26	50	18.53	5	39.27	313	9.0	
10	2	16:31	50	19.11	5	40.12	318	9.4	
10	2	16:36	50	19.63	5	40.90	323	9.0	light beginning to fail
10	2	16:41	50	20.21	5	41.69	320	8.8	
10	2	16:46	50	20.76	5	42.47	322	9.2	
10	2	16:51	50	21.33	5	43.24	320	8.8	
10	2	16:56	50	21.91	5	44.00	313	8.5	
10	2	17:01	50	22.41	5	44.82	315	8.6	


Survey 10 - 31/1/06
N
0
3
6
kilometres
1
2
3
4
5
6
50.4°N
50.3°N
5.8°W
5.7°W
5.6°W
5.5°W

Wave hub seabird survey

Bird Records

Ship MV Datchet
Observer RB/SF
Date 31/01/2006

Trip key	Transect no.	Ref	Time	Spp	Age	Plu	Dist	Dirn	Fly	Sea	Feed	Notes	In transect?
10	2	1	16:26	Gannet				NE	1				
10	2	2	16:26	Gannet				SW	1				
10	2	3	16:26	Gannet				W	2				
10	2	4	16:26	Gannet				SW	1				
10	2	5	16:26	Gannet				SW	5				
10	2	6	16:26	Gannet				SW	2				
10	2	7	16:26	Gannet				SW	3				
10	2	8	16:31	Herring Gull				S	1				
10	2	9	16:31	Gannet				SW	1				
10	2	10	16:31	Herring Gull				O	1				
10	2	11	16:31	Razorbill			A			1			Y
10	2	12	16:31	Gannet				W	2				
10	2	13	16:31	Gannet				W	2				
10	2	14	16:31	Guillemot			B			1			Y
10	2	15	16:31	Gannet				SW	2				
10	2	16	16:31	Gannet				SW	1				Y
10	2	17	16:31	Fulmar			C			1			Y
10	2	18	16:31	Gannet				SW	1				
10	2	19	16:31	Auk sp.				SW	16				Y
10	2	20	16:31	Guillemot			A			1			Y
10	2	21	16:31	Gannet				SW	1				
10	2	22	16:31	Auk sp.				SW	25			c.25	
10	2	23	16:36	Gannet				SW	2				
10	2	24	16:36	Auk sp.				SW	3				
10	2	25	16:36	Gannet				SW	3				
10	2	26	16:36	Gannet				SW	1				Y
10	2	27	16:36	Fulmar				SW	1				
10	2	28	16:36	Razorbill			B			1			Y
10	2	29	16:36	Gannet				SW	3				Y
10	2	30	16:36	Herring Gull				SW	1				
10	2	31	16:36	Gannet				SW	1				
10	2	32	16:36	Gannet				SW	3				
10	2	33	16:36	Gannet				SW	2				Y
10	2	34	16:36	Gannet				SW	1				Y
10	2	35	16:36	Gannet				SW	1				
10	2	36	16:36	Auk sp.				W	4				
10	2	37	16:36	Gannet				W	1				Y
10	2	38	16:36	Gannet				SW	1				
10	2	39	16:36	Gannet				W	1				Y
10	2	40	16:41	Gannet			C			1			Y
10	2	41	16:41	Razorbill			B			1			Y
10	2	42	16:41	Auk sp.				S	9				
10	2	43	16:41	Gannet				SW	2				
10	2	44	16:41	Gannet			D			1			Y
10	2	45	16:41	Gannet			A			2			Y
10	2	46	16:41	Gannet				SW	1				
10	2	47	16:41	Razorbill				SW	1				
10	2	48	16:41	Herring Gull				SW	1				Y
10	2	49	16:41	Gannet			E			1			
10	2	50	16:41	Auk sp.			D			4			Y
10	2	51	16:41	Gannet			D			1			Y
10	2	52	16:46	Razorbill			C			3			Y
10	2	53	16:46	Gannet			D			1			Y
10	2	54	16:46	Gannet				SW	1				
10	2	55	16:46	Herring Gull				O	3				
10	2	56	16:46	Gannet				W	1				
10	2	57	16:46	Gannet				NW	1				
10	2	58	16:46	Gannet				S	2				
10	2	59	16:46	Gannet				W	1				
10	2	60	16:46	Herring Gull				NE	10				
10	2	61	16:46	Auk sp.			A			4			Y
10	2	62	16:46	Razorbill				NE	1				
10	2	63	16:46	Razorbill			A			1			Y
10	2	64	16:46	Razorbill			B			5			Y
10	2	65	16:51	Kittiwake			B			3			Y
10	2	66	16:51	Gannet				W	1				
10	2	67	16:51	Gannet				W	1				
10	2	68	16:51	Great Black-backed Gull				E	1				
10	2	69	16:51	Gannet				W	1				
10	2	70	16:51	Gannet			D			1			Y
10	2	71	16:51	Gannet				SW	1				
10	2	72	16:51	Kittiwake				E	1				
10	2	73	16:56	Auk sp.				N	1				
10	2	74	16:56	Gannet				W	2				
10	2	75	16:56	Kittiwake				SW	1				
10	2	76	16:56	Gannet				SW	2				
10	3	1	15:40	Razorbill			A			4			Y
10	3	2	15:40	Razorbill				S	1				
10	3	3	15:40	GM			A			1			Y
10	3	4	15:40	Kittiwake				SE	1				Y
10	3	5	15:40	Gannet				NW	1				
10	3	6	15:40	Gannet				SW	1				
10	3	7	15:40	Gannet				SW	1				Y

10	3	8	15:40	Gannet	D			1			Y
10	3	9	15:40	Razorbill	B			2			Y
10	3	10	15:40	Kittiwake		S	1				
10	3	11	15:45	Gannet		SW	1				
10	3	12	15:45	Guillemot	C			1			Y
10	3	13	15:45	Gannet	D			1			Y
10	3	14	15:45	Gannet		NW	1				
10	3	15	15:45	Guillemot	C			1			Y
10	3	16	15:45	Gannet		W	2				Y
10	3	17	15:45	Razorbill	A			5			Y
10	3	18	15:45	Gannet	E			2			
10	3	19	15:45	Gannet		SW	1				
10	3	20	15:45	Gannet		W	2				
10	3	21	15:45	Gannet		W	2				
10	3	22	15:50	Gannet		W	1				
10	3	23	15:50	Gannet		SW	1				
10	3	24	15:55	Gannet		O	1				Y
10	3	25	15:55	Kittiwake		O	2				Y
10	3	26	15:55	Gannet		O	1				
10	3	27	15:55	Guillemot		W	2				
10	3	28	15:55	Guillemot	B			2			Y
10	3	29	15:55	Auk sp.		N	1				Y
10	3	30	15:55	Guillemot		NW	1				Y
10	3	31	16:00	Gannet		N	1				
10	3	32	16:00	Kittiwake		SW	1				
10	3	33	16:00	Guillemot		NW	1				
10	3	34	16:00	Kittiwake		SE	1				
10	3	35	16:00	Guillemot	B			3			Y
10	3	36	16:00	Gannet		N	1				
10	3	37	16:00	Gannet		NE	1				
10	3	38	16:05	Razorbill	B			3			Y
10	3	39	16:05	Gannet		SE	1				Y
10	3	40	16:05	Guillemot	A			2			Y
10	3	41	16:05	Guillemot	C			2			Y
10	3	42	16:05	Auk sp.		NW	4				
10	3	43	16:05	Guillemot		SW	2				
10	3	44	16:05	Guillemot		SW	20		C.20		
10	3	45	16:05	Gannet		SE	1				
10	3	46	16:05	Herring Gull		SE	1				
10	3	47	16:05	Guillemot	A			2			Y
10	3	48	16:05	Gannet		E	1				
10	3	49	16:10	Gannet		SW	6				
10	3	50	16:10	Gannet	D			1			Y
10	3	51	16:10	Auk sp.		SW	12				
10	3	52	16:10	Guillemot	A			1			Y
10	3	53	16:10	Razorbill	C			6			Y
10	3	54	16:10	Guillemot		SW		4			Y
10	4	1	14:54	Gannet		SW	2				
10	4	2	14:54	Gannet		SW	6				
10	4	3	14:54	Gannet		W	1				
10	4	4	14:54	Gannet		SW	1				Y
10	4	5	14:54	Razorbill		W	1				
10	4	6	14:54	Guillemot		W	4				
10	4	7	14:54	Guillemot		N	1				Y
10	4	8	14:54	Gannet		W	1				
10	4	9	14:59	Kittiwake		SE	1				
10	4	10	14:59	Gannet		SE	1				
10	4	11	14:59	Auk sp.		W	1				
10	4	12	14:59	Gannet		W	2				Y
10	4	13	14:59	Gannet		W	3				
10	4	14	14:59	Gannet	C			2			Y
10	4	15	14:59	Gannet		W	1				
10	4	16	14:59	Gannet		SW	1				
10	4	17	14:59	Gannet		SW	2				
10	4	18	14:59	Herring Gull		N	3				
10	4	19	14:59	Herring Gull		NE	1				
10	4	20	14:59	Gannet	B			1			Y
10	4	21	14:59	Gannet	D			2			Y
10	4	22	14:59	Gannet	C			1			Y
10	4	23	14:59	Gannet	D			1			Y
10	4	24	15:04	Guillemot	B			2			Y
10	4	25	15:04	Gannet		W	2				
10	4	26	15:04	Gannet		W	1				
10	4	27	15:04	Gannet		NW	1				
10	4	28	15:04	Guillemot	A			1			Y
10	4	29	15:04	Gannet		NW	1				
10	4	30	15:04	Auk sp.	A			1			Y
10	4	31	15:04	Kittiwake		W	1				Y
10	4	32	15:04	Gannet		W	1				
10	4	33	15:04	Gannet	C			1			Y
10	4	34	15:04	Gannet		W	1				Y
10	4	35	15:04	Gannet		W	1				
10	4	36	15:04	Gannet	E			1			
10	4	37	15:04	Gannet	B			1			Y
10	4	38	15:04	Gannet		NW	1				
10	4	39	15:04	Gannet		NW	1				
10	4	40	15:04	Kittiwake		NW	1				Y
10	4	41	15:09	Gannet		NW	2				
10	4	42	15:09	Guillemot	B			1			Y
10	4	43	15:09	Gannet		W	2				Y
10	4	44	15:09	Kittiwake		NE	1				
10	4	45	15:09	Gannet		W	2				
10	4	46	15:09	Kittiwake		NE	1				

10	4	47	15:09	Kittiwake	imm			NW	1			
10	4	48	15:14	Gannet				NW	1			
10	4	49	15:14	Auk sp.				NW	2			
10	4	50	15:14	Gannet				NW	2			
10	4	51	15:14	Razorbill		B				8		Y
10	4	52	15:14	Razorbill		A			3			Y
10	4	53	15:14	Herring Gull	imm			N	1			
10	4	54	15:14	Kittiwake				W	1			Y
10	4	55	15:14	Gannet				N	1			Y
10	4	56	15:14	Gannet				W	1			
10	4	57	15:14	Gannet		C				1		Y
10	4	58	15:14	Razorbill		C				1		Y
10	4	59	15:14	Gannet				SW	2			
10	4	60	15:19	Gannet		B				1		Y
10	4	61	15:19	Herring Gull		D				1		Y
10	4	62	15:19	Guillemot		B				1		Y
10	4	63	15:19	Guillemot		C				2		Y
10	4	64	15:19	Razorbill		C				3		Y
10	4	65	15:19	Gannet		D				1		Y
10	4	66	15:19	Guillemot		A				4		Y
10	4	67	15:19	Razorbill		C				4		Y
10	4	68	15:19	Guillemot		A				1		Y
10	4	69	15:19	Gannet				SW	1			
10	4	70	15:19	Gannet				SW	1			Y
10	4	71	15:19	Guillemot				NW	3			
10	4	72	15:19	Gannet				NW	1			Y
10	4	73	15:19	Guillemot				NW	1			
10	4	74	15:24	Gannet				NW	1			
10	4	75	15:24	Gannet		B				2		Y
10	4	76	15:24	Razorbill		C				3		Y
10	4	77	15:24	Gannet				NW	1			Y
10	4	78	15:24	Gannet		D				1		Y
10	4	79	15:24	Gannet				NW	1			
10	4	80	15:24	Guillemot		C				3		Y
10	4	81	15:24	Razorbill		D				4		Y
10	4	82	15:24	Guillemot		D				4		Y
10	4	83	15:24	Gannet		C				1		Y
10	5	1	14:08	Gannet				SW	5			
10	5	2	14:08	Fulmar				W	1			
10	5	3	14:08	Gannet				S	1			
10	5	4	14:08	Gannet				SW	1			
10	5	5	14:08	Gannet				SW	1			
10	5	6	14:08	Guillemot		B				1		Y
10	5	7	14:08	Razorbill		B				4		Y
10	5	8	14:08	Great Black-backed Gull		A				2		Y
10	5	9	14:08	Gannet				SE		1		Y
10	5	10	14:13	Gannet				W	2			
10	5	11	14:13	Kittiwake				SW	2			
10	5	12	14:13	Gannet				W	1			
10	5	13	14:13	Auk sp.		D				2		Y
10	5	14	14:13	Gannet				SW	1			
10	5	15	14:13	Gannet		D				1		Y
10	5	16	14:13	Guillemot		B				1		Y
10	5	17	14:13	Gannet				W	1			
10	5	18	14:18	Guillemot		D				3		Y
10	5	19	14:18	Gannet				NW	1			
10	5	20	14:18	Guillemot		C				2		Y
10	5	21	14:23	Kittiwake				W	1			
10	5	22	14:23	GM		B				1		Y
10	5	23	14:23	Gannet				W	1			Y
10	5	24	14:23	Kittiwake				S	1			
10	5	25	14:23	Kittiwake				O	1			
10	5	26	14:28	Gannet				SW	1			
10	5	27	14:28	Fulmar				NW	1			Y
10	5	28	14:28	Gannet				W	1			
10	5	29	14:28	Guillemot				NE	1			Y
10	5	30	14:28	Gannet				SW	3			
10	5	31	14:28	Gannet				S	1			
10	5	32	14:28	Gannet				SW	1			
10	5	33	14:33	Guillemot		B				2		Y
10	5	34	14:33	Guillemot		A				1		Y
10	5	35	14:33	Kittiwake				S	1			
10	5	36	14:33	Guillemot		A				1		Y
10	5	37	14:33	Gannet				SW	1			
10	5	38	14:38	Herring Gull				NW	1			Y
10	5	39	14:38	Gannet				SE	1			
10	5	40	14:38	Kittiwake				NW	1			
10	5	41	14:38	Gannet				E	1			
10	5	42	14:38	Herring Gull				NW	1			
10	6	1	13:23	Great Black-backed Gull		E				1		
10	6	2	13:23	Gannet				W	1			
10	6	3	13:23	Gannet				NW	1			
10	6	4	13:23	Gannet				NW	5			
10	6	5	13:28	Razorbill		A				1		Y
10	6	6	13:28	Gannet				NW	1			
10	6	7	13:28	Guillemot		A				3		Y
10	6	8	13:28	Herring Gull				NE	1			Y
10	6	9	13:28	Gannet				W	1			
10	6	10	13:28	Gannet				W	2			
10	6	11	13:28	Gannet				W	1			
10	6	12	13:28	Kittiwake	IMM			E	1			
10	6	13	13:28	Gannet				W	2			

10	6	14	13:28	Gannet			W	1		
10	6	15	13:28	Razorbill		B			6	Y
10	6	16	13:33	Auk sp			NW	1		
10	6	17	13:33	Auk sp			NW	4		
10	6	18	13:38	Kittiwake			NW	1		Y (Landed in transect)
10	6	19	13:38	Auk sp			W	1		
10	6	20	13:38	Razorbill		B			4	Y
10	6	21	13:38	Gannet			NW	2		
10	6	22	13:38	Gannet			NE	1		
10	6	23	13:38	Herring Gull			E	1		
10	6	24	13:38	Herring Gull			NE	4		
10	6	25	13:38	Gannet			NE	1		Y
10	6	26	13:43	Herring Gull			NE	1		
10	6	27	13:43	Gannet			NE	1		
10	6	28	13:43	Guillemot		B			2	Y
10	6	29	13:43	Kittiwake			N	1		
10	6	30	13:43	Gannet			NE	1		
10	6	31	13:43	Great Black-backed Gull			SE	1		
10	6	32	13:43	Gannet			NW	1		
10	6	33	13:43	Gannet			W	1		Y
10	6	34	13:43	Gannet		C			1	Y
10	6	35	13:43	Great Black-backed Gull		C			1	Y
10	6	36	13:43	Herring Gull			SE	1		
10	6	37	13:43	Gannet			SW	1		
10	6	38	13:48	Gannet			SW	1		
10	6	39	13:48	Gannet		D			1	Y
10	6	40	13:48	Razorbill		A			3	Y
10	6	41	13:48	Gannet		C			1	
10	6	42	13:48	Razorbill			W	2		Y
10	6	43	13:48	Gannet		A			1	Y
10	6	44	13:48	Gannet		B			1	Y
10	6	45	13:48	Gannet		C			1	Y
10	6	46	13:48	Gannet		D			1	Y
10	6	47	13:48	Gannet		D			1	Y
10	6	48	13:48	Gannet		D			1	Y
10	6	49	13:48	Herring Gull	IMM		NW	1		
10	6	50	13:53	Guillemot			SE	1		
10	6	51	13:53	Gannet			SW	1		
10	6	52	13:53	Razorbill		C			3	Y
10	6	53	13:53	Gannet			W	1		Y
10	6	54	13:53	Gull sp			NW	1		
10	6	55	13:53	Guillemot		B			1	Y

Wave hub seabird survey

Data Analysis

Ship MV Datchet
Observer RB/SF
Date 31/01/2006

	Species	Auk Sp.	Fulmar	Gannet	GBB Gull	Guillemot	Herring Gull	Kittiwake	LBB Gull	Lg Gull Sp	Manx Shearwater	Puffin	Razorbill	Shag	Storm Petrel
Transect 2	Sea	8	1	7		2		1					12		
	Fly	16		10			1								
	Length (km)	9.74	9.74	9.74	9.74	9.74	9.74	9.74	9.74	9.74	9.74	9.74	9.74	9.74	9.74
	Area (km^2)	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92
	Density (birds / km^2)	9.58	0.38	5.82	0.00	0.96	0.34	0.48	0.00	0.00	0.00	0.00	6.16	0.00	0.00
Transect 3	Sea			3		15							20		
	Fly	1		5		5		3							
	Length (km)	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09	10.09
	Area (km^2)	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
	Density (birds / km^2)	0.33	0.00	2.64	0.00	8.59	0.00	0.99	0.00	0.00	0.00	0.00	9.91	0.00	0.00
Transect 4	Sea	1		16		19	1						26		
	Fly			10		1		3							
	Length (km)	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19
	Area (km^2)	3.06	3.06	3.06	3.06	3.06	3.06	3.06	3.06	3.06	3.06	3.06	3.06	3.06	3.06
	Density (birds / km^2)	0.49	0.00	8.51	0.00	9.03	0.46	0.98	0.00	0.00	0.00	0.00	12.76	0.00	0.00
Transect 5	Sea	1		1	2	12							4		
	Fly		1	2		1	1								
	Length (km)	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01
	Area (km^2)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	Density (birds / km^2)	0.50	0.33	1.00	0.93	5.93	0.33	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
Transect 6	Sea			8	1	6							17		
	Fly			3			1	1					2		
	Length (km)	10.36	10.36	10.36	10.36	10.36	10.36	10.36	10.36	10.36	10.36	10.36	10.36	10.36	10.36
	Area (km^2)	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11	3.11
	Density (birds / km^2)	0.00	0.00	3.54	0.45	2.70	0.32	0.32	0.00	0.00	0.00	0.00	8.85	0.00	0.00
All	Sea	10	1	35	3	54	1	1	0	0	0	0	79	0	0
	Fly	17	1	30	0	7	3	7	0	0	0	0	2	0	0
	Length (km)	50.39	50.39	50.39	50.39	50.39	50.39	50.39	50.39	50.39	50.39	50.39	50.39	50.39	50.39
	Area (km^2)	15.12	15.12	15.12	15.12	15.12	15.12	15.12	15.12	15.12	15.12	15.12	15.12	15.12	15.12
	Density (birds / km^2)	**2.12**	**0.14**	**4.30**	**0.28**	**5.46**	**0.29**	**0.56**	**0.00**	**0.00**	**0.00**	**0.00**	**7.97**	**0.00**	**0.00**
Correction Factor		1.5	1.10	1.00	1.40	1.40	1.40	1.40	1.40	1.40	1.30	1.50	1.50	1.10	1.50