

Friends of Cardigan Bay
Ceredigion Cetacean Survey 2004

Tywyn to Llanrhystud

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1. Introduction

Friends of Cardigan Bay (FoCB) were founded in 1989 as a conservation group and have initiated and developed a number of research programmes to further the protection and conservation of the marine environment of Cardigan Bay.

This is a report based on survey data collected during the summer of 2004 as part of an ongoing research programme funded by FoCB and Countryside Council for Wales (CCW). The boat-based surveys followed transects that have been monitored primarily for Bottlenose dolphin abundance and distribution by FoCB for a number of years. The transects covered an area from Sarn-y-Bwch (north of Tywyn) extending some 30+ km southward to a point just north of Llanrhystud, and a range of depths and marine features within an area approximately 0.5 km to 20 km from the shore (see Fig. 1, p.5).

2. Summary

Six days of surveys were undertaken and the cetacean species encountered during the survey included Bottlenose dolphins (*Tursiops truncatus*) and Harbour porpoises (*Phocoena phocoena*). Other species that were noted were Manx shearwater (*Puffinus puffinus*), Gannet (*Morus bassanus*), Grey Seal (*Halichoerus grypus*), Barrel or Root-mouth jellyfish (*Rhizostoma octopus*), By-the-wind sailor (*Velella velella*) and Moon jellyfish (*Aurelia aurita*).

In approximately 32 hours of 'on effort' survey time, 17 sightings were made, comprising 36 individual cetaceans: 19 Bottlenose dolphins, 10 Harbour porpoise and 2 unidentified cetaceans.

3. Aims

The aims of the survey were:

- To continue to record sightings data as part of the ongoing programme of research on the cetaceans of Cardigan Bay, conducted by various organisations and individuals, primarily FoCB, Greenpeace, Earthkind and R.S.P.B.
- To monitor the distribution of cetaceans of different age classes and their distribution across a variety of depths within the study site.

4. Methodology

The surveys took place aboard the 33” sloop, Celine. Diamond-shaped line transects that had been devised by WDCS after Hilby and Hammond (1989; IWC, 2000: as cited in Ryan, 2002) were followed over the course of three consecutive days in May 2004 and repeated on three consecutive days in July 2004. The transect design enabled the survey area to easily be re-surveyed and covered a variety of depths and marine features: from shallow coastal waters and sub-tidal reefs, to the deeper waters to the west of the bay.

Surveys were carried out in good weather (no precipitation or high winds) and in sea states of 2 or less. A sea-state of greater than 2 can reduce the chance of smaller cetaceans, such as Harbour porpoises from being observed as they can be obscured by the height of the waves.

The training of new volunteers was undertaken by experienced survey personnel (members of FoCB) at the start of each survey day, prior to leaving dock at Aberystwyth. Each survey was conducted under the guidance of an experienced observer. Watches were taken in 1-hour shifts by two observers, situated one on either side of the mast, scanning an area of 180° each, using 7x50 reticule binoculars. The remaining personnel recorded sightings and environmental data on the log sheets.

An environmental log was made (see Appendix 1) every 30 minutes, after a change of course and during an encounter with a cetacean. Environmental and additional factors that were recorded were as follows: Time, Observers initials, Latitude and Longitude, Course over ground (ship’s heading), Speed over ground, True depth (metres from

surface). Water temperature (°C), Sea state (Beaufort), Swell height (metres), Wind force (Beaufort), Wind direction, Cloud cover, Glare, Visibility, Precipitation, Craft present.

A sightings log was made (see Appendix 2) during every encounter with a cetacean. The information recorded was as follows: Date, Time at start of encounter, Time at end of encounter, Species (if positively identified), Total number of individuals, Number of adults, Number of juveniles, Number of calves, Bearing, Distance (metres), Initial direction of travel (degrees or general direction), Latitude and Longitude at start and at end of encounter, Associated wildlife, Behaviour, Reaction to craft.

‘Off-effort’ sightings (made when the survey vessel was not following a survey transect) were noted as such but recorded in as much detail as ‘on-effort’ sightings. No acoustic spot sampling surveys or photographic ID surveys were carried out.

5. Results

Fig. 1 Map showing transect waypoints and 'on-effort' cetacean sightings

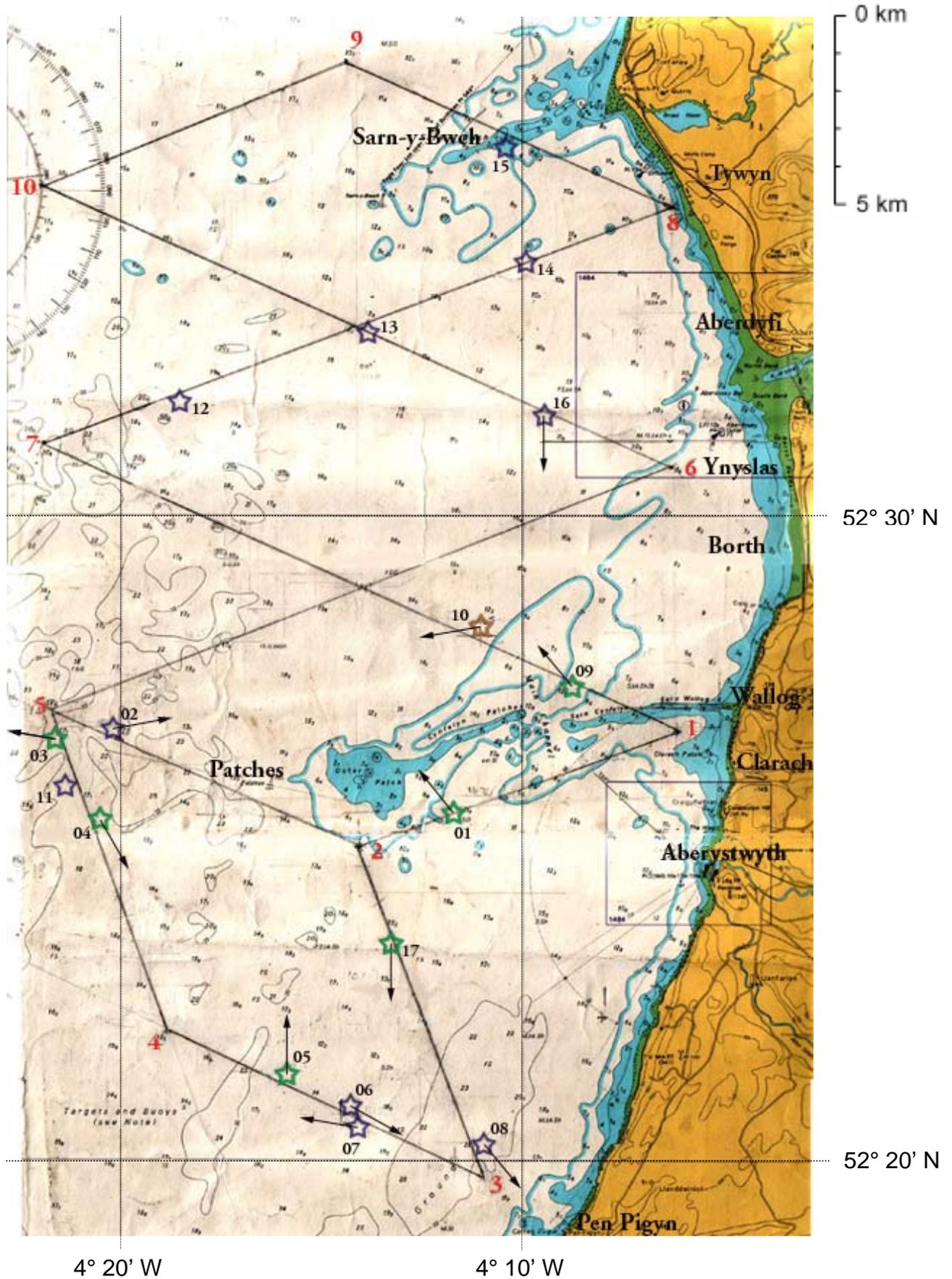


Fig. 2 Key to map (Fig. 1)

10	Way point number (start of transect)
	Bottlenose dolphin sighting
	Harbour porpoise sighting
	Unidentified cetacean sighting
	Initial direction of travel of cetaceans when first encountered
17	Sightings reference number

Notes: 1. Map reproduced from Admiralty chart no. 1972 (Cardigan Bay – central part).
 2. The map shows the distribution of cetacean sightings, based on the detailed observations noted on the ‘on-effort’ sightings log during the surveys (see Appendix 2 for details). The map shows the distance and bearing of each group of cetaceans from the boat, and the initial direction of travel of each group of cetaceans (when noted).

Coverage of the survey area was incomplete: the three survey days in both May and July covered transects between all way points except a section between waypoints 5 and 6. This was due in May to a diminishing tide and in July, to an increasing sea state reducing visibility. All other sections of the survey area were successfully surveyed in May and again in July.

Two species of cetaceans were observed during a total of approximately 32 hours of ‘on effort’ survey time: Bottlenose dolphin (*Tursiops truncatus*) and Harbour porpoise (*Phocoena phocoena*). A summary table follows:

Table 1 Summary of 'on-effort' cetacean sightings

	<i>Harbour porpoise</i>	<i>Bottlenose dolphin</i>	<i>Unidentified cetacean</i>	<i>Total cetaceans</i>
Number of sightings	10	6	1	17
Number of individuals	19	15	2	36
Number of adults	14	9	0	23
Number of juveniles	1	0	0	0
Number of calves	0	0	0	1
Unidentified age class	4	6	2	12
Minimum group number	1	1	2	1
Maximum group number	3	6	2	6

Table 1 shows that 19 Harbour porpoise and 15 Bottlenose dolphins were encountered during the survey. The maximum group size for Bottlenose dolphins (6) was greater than that of Harbour porpoises (3). Most of the cetacean individuals that were encountered were adults: no calves were observed and only one juvenile was identified. One third of sightings were not assigned an age class because the distance of cetaceans from the boat made this difficult.

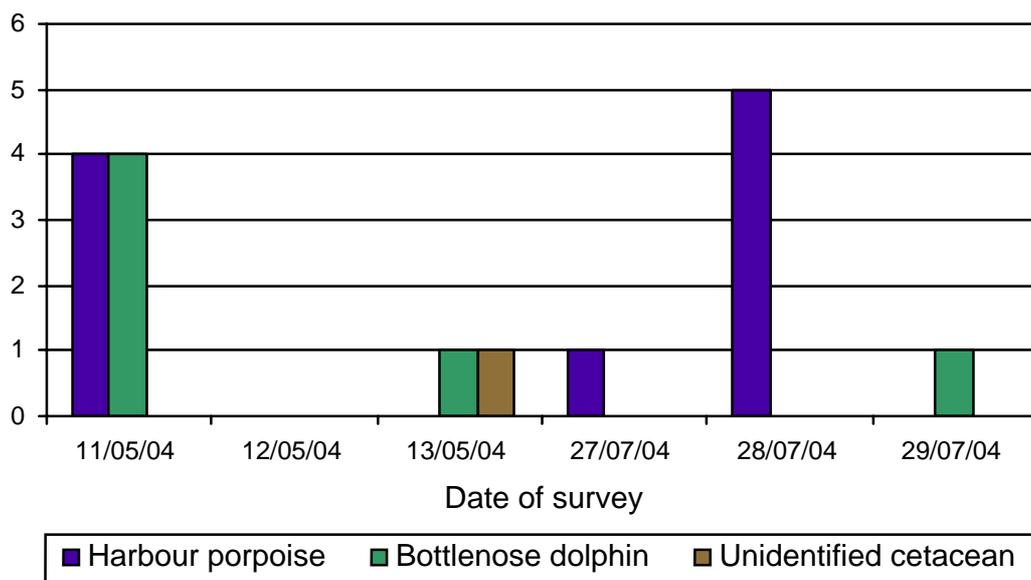
Fig. 3 Number of cetacean sightings per survey

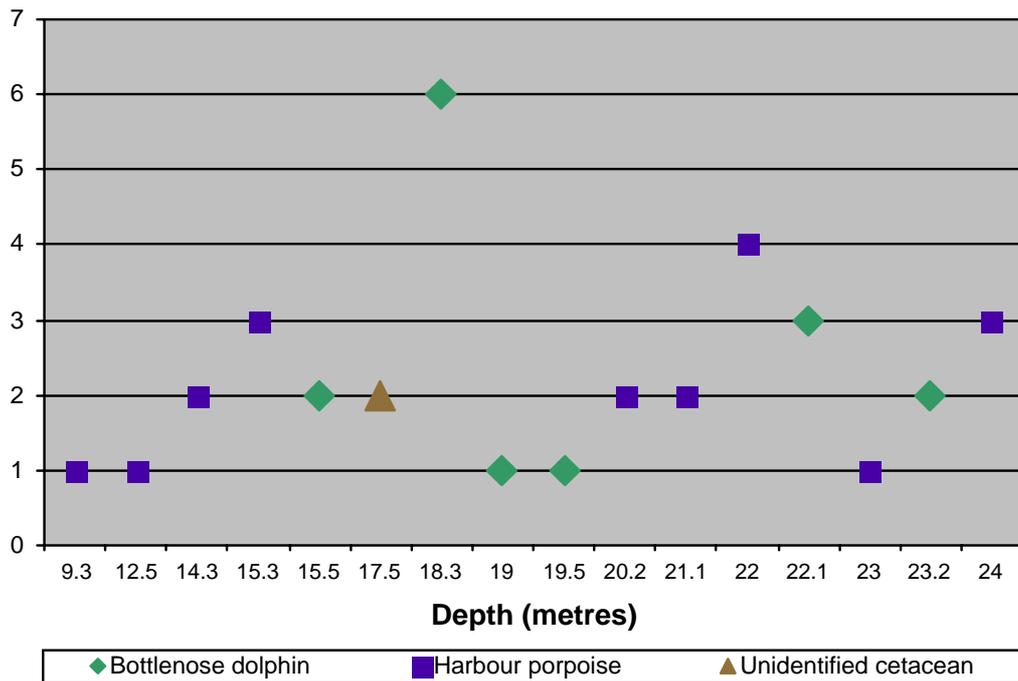
Figure 3 above shows that Harbour porpoises were observed on only two occasions during the May surveys, the remainder of sightings being those of Bottlenose dolphins. However, during the July surveys, most of the sightings were of Harbour porpoises and Bottlenose dolphins were observed on only one occasion.

The map (Fig. 1) shows that Bottlenose dolphins were not observed north of Borth and that Harbour porpoises were observed throughout the survey area. This may suggest that the distribution of Bottlenose dolphins is less than that of the Harbour porpoise within the survey area.

Table 2 Summary of 'off-effort' cetacean sightings

	<i>Harbour porpoise</i>	<i>Bottlenose dolphin</i>	<i>Total cetaceans</i>
Number of sightings	2	1	3
Number of individuals	5	2	7
Number of adults	1	2	3
Number of juveniles	0	0	0
Number of calves	0	0	0
Unidentified age class	4	0	4
Minimum group number	1	2	1
Maximum group number	4	2	4

These sightings were made whilst leaving/returning to dock in Aberystwyth and the individuals were therefore only a short distance from the shore. Again, when it was possible to assign the individuals sighted to an age class, only adults were identified. These sightings were made in some of the shallower waters covered by the survey area. Figure 4 below shows the depths that were recorded for each 'on-effort' sighting that was made, and the species and number of individuals that were encountered:

Fig. 4 'On-effort' cetacean sightings versus Depth

This graph shows that the range of depths used by Harbour porpoises was greater than the range of depths used by Bottlenose dolphins. Harbour porpoises were found between 9.3 and 24.0 metres depth (range = 14.7 metres): from the relatively shallow waters of Sarn-y-Bwch (Ref. No. **15** on the map, Fig. 1) to the deeper waters to the west of the survey area (Ref. No. **02** on the map, Fig. 1). Bottlenose dolphins were found between 15.5 and 23.2 metres depth (range = 7.7 metres).

Table 3 Behaviour of cetaceans in relation to the survey vessel

	<i>Harbour porpoise</i>	<i>Bottlenose dolphin</i>	<i>Unidentified cetaceans</i>	<i>Total cetaceans</i>
Positive reaction	0	2	0	2
No reaction	7	2	0	9
Negative reaction	2	0	0	2
Unknown reaction	1	2	1	4

Reactions of cetaceans to the survey vessel were noted during sightings, the definition of a 'reaction' being a change from the initial direction of travel to one of 'avoiding' or 'approaching' the survey vessel. Table 3 above shows that, of the four reactions that were recorded, the two positive reactions (i.e. approaching the vessel)

where those of Bottlenose dolphins and the two negative reactions (i.e. actively avoiding the vessel) were those of Harbour porpoises.

6. Conclusions

These surveys were extremely well attended, showing the high level of volunteer interest in participating in this research programme run by FoCB. Given the narrow window of opportunity in which to conduct these surveys (due in no small part to below-average summer that was experienced), it is pleasing that almost all transects were completed and repeated, and that new volunteers were given training and experience.

However, it was disappointing not to have observed more juveniles and calves of either species. It is particularly difficult to get close to groups of Harbour porpoise but it is even less likely that a group of porpoise nursing young would risk approaching a vessel. Also, even a sea state of '1' may result in a wave height that could obscure calves from view.

The most notable difference between the May and the July surveys was that the majority of sightings in May were of Bottlenose dolphins, and the majority of sightings in July were of Harbour porpoises. This could simply be a coincidence due to lack of survey effort – more intensive seasonal surveys would give a better picture of the distribution of both species within the survey area at different times of year.

The map (Fig. 1) suggested a difference in the distribution of species within the survey area, in that Bottlenose dolphins were less widely distributed than Harbour porpoises. Figure 4 showed a similar pattern in species distribution related to depth, in that Harbour porpoise used a greater range of depths than Bottlenose dolphins, but this could again be a coincidence rather than being indicative of a preference exhibited by a species.

There were four occasions where the species sighted had a reaction to the survey vessel (by changing their initial direction of travel). It is known that Harbour porpoise are timid and easily scared by noise (Corbett and Southern, 1977) and this was demonstrated on the two instances where pods of porpoise actively avoided the survey

vessel (see Table 3). Studies such as those conducted by Simmonds (2000) and Constantine *et al* (2004) have found that cetaceans have an adverse reaction to being approached by recreational vessels. With the growth of marine tourism, it is important to have enforceable, practical codes of conduct in order to protect cetaceans from harassment and disturbance by users of recreational boats, jet-skis and other vessels, particularly during the breeding season.

7. Acknowledgements

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9. Appendices

Appendix 1 Environmental log taken during the surveys

Date	Time	Latitude (N)	Longitude (W)	COG (course over ground)	SOG (speed over ground)	Depth (metres)	Water temperature (degrees C)	Sea State	Swell Height (metres)	Wind Force	Wind Direction	Cloud (octas)	Glare	Visibility	Precipitation	Craft present (MV = motorised vessel) (MFV = motorised fishing vessel) (SV = sailinh vessel)	Reference number
11/05/04	12.50	52°25'37"	04°11'56"	259	4.7	19.5	-	3	0.0	3	NW	8	0	poor/moderate	none	none	01
11/05/04	13.58	52°26'67"	04°20'43"	300	5.5	24.0	-	1	0.4	1	NW	8	0	moderate	none	1 MV	02
11/05/04	14.15	52°26'26"	04°21'34"	165	5.3	23.2	-	1	0.0	1	NW	8	0	good	none	none	03
11/05/04	14.25	52°24'56"	04°20'32"	169	5.5	22.1	-	1	0.0	1	NW	8	0	good	none	none	04
11/05/04	15.30	52°21'11"	04°15'53"	127	5.7	19.0	-	1	0.2	2	NW	8	0	good	none	none	05
11/05/04	15.44	52°20'36"	04°13'16"	122	6.6	22.0	-	1	0.2	2	NW	8	0	good	none	none	06
11/05/04	15.46	52°20'36"	04°13'16"	122	6.6	22.0	-	1	0.0	1	NW	8	0	good	none	none	07
11/05/04	16.02	52°19'97"	04°10'96"	348	6.2	23.0	-	1	0.0	1	NW	8	0	good	none	none	08
13/05/04	8.30	52°27'32"	04°08'54"	304	5.5	15.5	10	2	0.2	2	NW	8	0	poor	none	none	09
13/05/04	8.50	52°28'13"	04°11'39"	300	5.7	17.5	10	2	0.2	2	NW	8	0	moderate	none	none	10
27/07/04	16.53	52°26'31"	04°21'47"	349	6.1	20.2	16	2	0.2	2	NW	6	0	good	none	none	11
28/07/04	11.30	52°31'70"	04°19'89"	082	5.5	21.1	16	1	0.0	2	S	8	0	good	none	none	12
28/07/04	12.11	52°32'98"	04°14'06"	075	5.8	14.3	16	1	0.0	2	S	8	0	good	none	3 MV	13
28/07/04	12.42	52°33'95"	04°09'75"	076	5.6	12.5	18	1	0.0	2	S	8	0	good	none	3 MFV	14
28/07/04	13.40	52°26'08"	04°10'43"	317	5.4	9.3	15	1	0.0	2	SW	8	0	good	light drizzle	3 MFV	15
28/07/04	16.40	52°31'70"	04°09'26"	119	5.8	15.3	16	2	0.0	2	N	7	1	good	none	1 SV, 2 MV	16
29/07/04	11.45	52°23'80"	04°13'72"	350	5.8	18.3	17	2	0.0	2	S	7	0	good	none	2 MV	17

Appendix 2 Sightings log taken during the surveys

Reference number	Date	Start time of encounter	End time of encounter	Species	Number of individuals	Adults	Juveniles	Calves	Bearing (degrees)	Distance (metres)	Initial direction of travel (degrees)	Latitude (N)	Longitude (W)	Associated wildlife	Behaviour	Reaction to craft	Comments
01	11/05/04	12.50	12.50	BN	1	1			254	300	320	52°25'37"	04°11'56"	none	travelling	none	brief sighting
02	11/05/04	13.58	14.00	HP	3	3			320	200	080	52°26'67"	04°20'43"	sheerwaters/gannets	travelling	none	
03	11/05/04	14.15	14.16	BN	2	2			220	200	280	52°26'26"	04°21'34"	none	travelling	none	brief sighting
04	11/05/04	14.25	14.40	BN	3	3			100	150	150	52°24'56"	04°20'32"	?	bow riding	positive	came towards boat
05	11/05/04	15.30	15.31	BN	1	1			325	400	0	52°21'11"	04°15'53"	?	travelling	?	brief sighting
06	11/05/04	15.44	15.45	HP	2	2			030	150	120	52°20'36"	04°13'16"	none	travelling	none	brief sighting
07	11/05/04	15.46	15.46	HP	2	2			170	150	280	52°20'36"	04°13'16"	none	travelling	none	separate to Ref. 06
08	11/05/04	16.02	16.02	HP	1	1			080	250	140	52°19'97"	04°10'96"	none	travelling	none	
09	13/05/04	8.30	8.37	BN	2	2			280	500	320	52°27'32"	04°08'54"	?	travelling	positive	came towards boat
10	13/05/04	8.50	8.51	U	2	2	?		340	500	260	52°28'13"	04°11'39"	?	travelling	?	brief sighting
11	27/07/04	16.53	16.55	HP	2	2			200	400	?	52°26'31"	04°21'47"	?	?	none	brief sighting
12	28/07/04	11.30	11.35	HP	2	2			110	250	?	52°31'70"	04°19'89"	gannets	foraging	negative	avoided boat
13	28/07/04	12.11	12.16	HP	2	2	?		120	200	?	52°32'98"	04°14'06"	?	foraging	none	crossed path of boat
14	28/07/04	12.42	12.46	HP	1	1	?		?	300	?	52°33'95"	04°09'75"	?	?	none	brief sighting
15	28/07/04	13.40	?	HP	1	1	?		120	200	?	52°26'08"	04°10'43"	?	?	?	brief sighting
16	28/07/04	16.40	16.45	HP	3	2	1		170	170	S	52°31'70"	04°09'26"	?	?	negative	avoided boat
17	29/07/04	11.45	11.48	BN	6	6	?		170	800	S	52°23'80"	04°13'72"	gannets	travelling	?	