

SEABIRD & MARINE MAMMAL SURVEY

F.R.V. SCOTIA 5-29 August 2008

For Cork Ecology

Survey Conducted by Adam Batty & Ray Eades



Report by Adam Batty

E-mail : adam_batty@yahoo.com

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INTRODUCTION

This survey was carried out onboard the fisheries research vessel (F.R.V.) Scotia, while she was engaged in the sampling of benthic fish stocks in the North Sea. Scotia operated a series of bottom trawls, at pre-determined, long running, sampling stations. Her area of operation was north from Aberdeen to Shetland, and east to approximately 4°E.

Seabird and Cetacean observations were carried out while steaming between fishing stations, not while trawling or hauling, when weather permitted. The survey was organized such that the first trawl of the day was made at first light. Processing of the fish was undertaken as soon as the nets were hauled and there was then constant discarding of processed fish while steaming between stations. There were almost always therefore a significant number of birds attracted to the stern of the vessel to scavenge. The purpose of the bird and cetacean survey was to update the existing ESAS (European Seabirds At Sea) data on seabird distributions in this general area. While concentrating on seabird observations, basic details of marine mammal observations were also recorded.

METHODS

Standard ESAS methods were used (Webb & Durinck 1992, Camphuysen & Garthe 2004), using two observers on board. This standard method involves the simultaneous operation of three separate, but linked, methodologies (Fig. 1) Surveying a 90° scan area, from bow to beam, on one side of the vessel (the side chosen is based on observation conditions). All birds seen at any time within this area are recorded. This data can be used to give indications of abundance and distribution, and allows for the recording of scarce and unusual species which are unlikely to appear in transect.

2) Surveying a band transect. A 300 metre wide transect, ahead of the vessel within the 90° survey area is operated. This strip is further divided into four sub-bands (A-D, band E>300m). Birds recorded on the water (or making contact with the water, e.g. feeding), at any point within this 300m area are recorded as being 'in transect'.

3) A 'snapshot' method is operated for flying birds. The area ahead of the ship, within the band transect, is surveyed instantaneously at set intervals (depending on vessels speed) for flying birds. For example if the vessel travels 300m per minute, the snapshot area will be 300m ahead, and an instantaneous count of flying birds will be made every minute. Birds recorded within the snapshot are recorded as being 'in transect'. Counts of birds 'in transect' (methods 2 & 3) allow for the determination of densities and distributions of seabirds. There was no surveying during the stationary periods, while shooting or hauling nets, or when trawling. Weather limitation is usually taken to be sea state 6 or over but these conditions were not experienced on the survey.

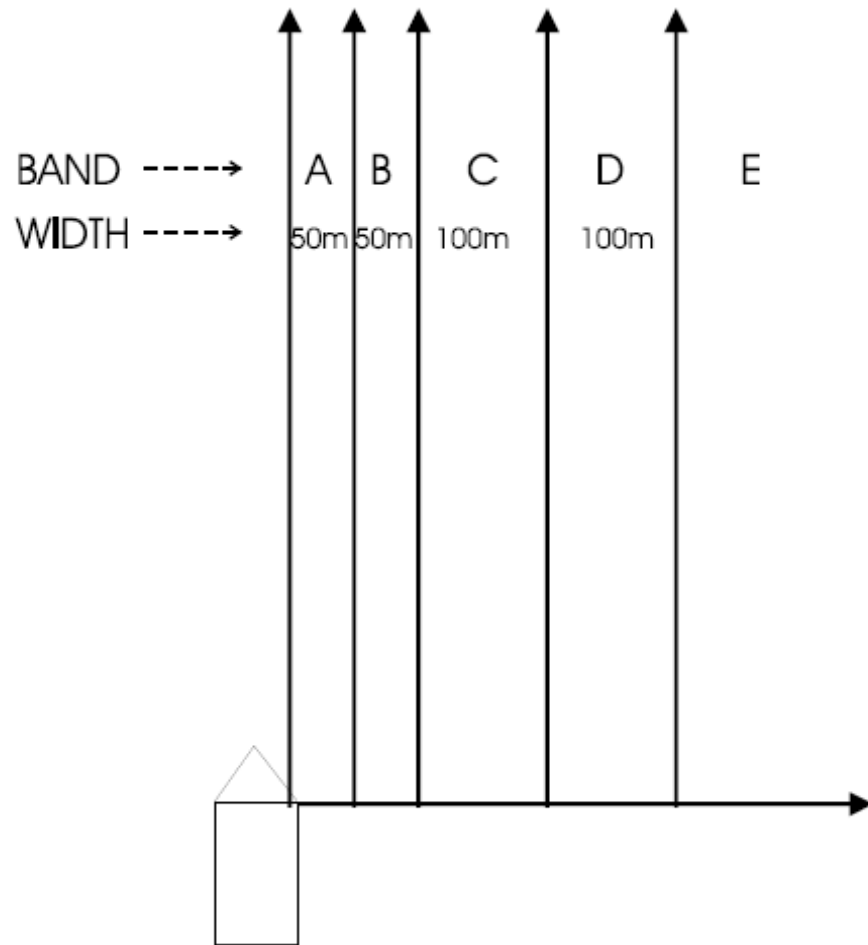


Figure 1: The 90° scan (recording) area with band transect subdivisions

Modifications to Methods

Surveying is usually performed using the naked eye, with binoculars used to check identifications or other details. Binoculars are also occasionally used to scan ahead of the vessel as an observers 'self-check' on observational efficiency during the survey.

In certain areas, where species such as divers and sea-duck are present, binoculars must be used with more regularity in order to detect these birds at distance, ahead of the vessel, before they fly off.

RESULTS

General Details

Height of eye was 10.6 metres, seated in observation boxes on the cofferdam deck. Count periods were 1 minute intervals throughout the survey. Vessel speed averaged about 8-10 knots while steaming between stations. A total of 175.68 hours of survey were performed.

One day of survey was lost due to the half-landing. Weather remained suitable throughout the survey so that no days were lost due to weather restrictions.

A total of 1,451.56 kilometres were travelled on survey, i.e. 435.47 km² of transect. The locations of the fishing stations and the approximate route taken between them illustrated below in Figure 2.

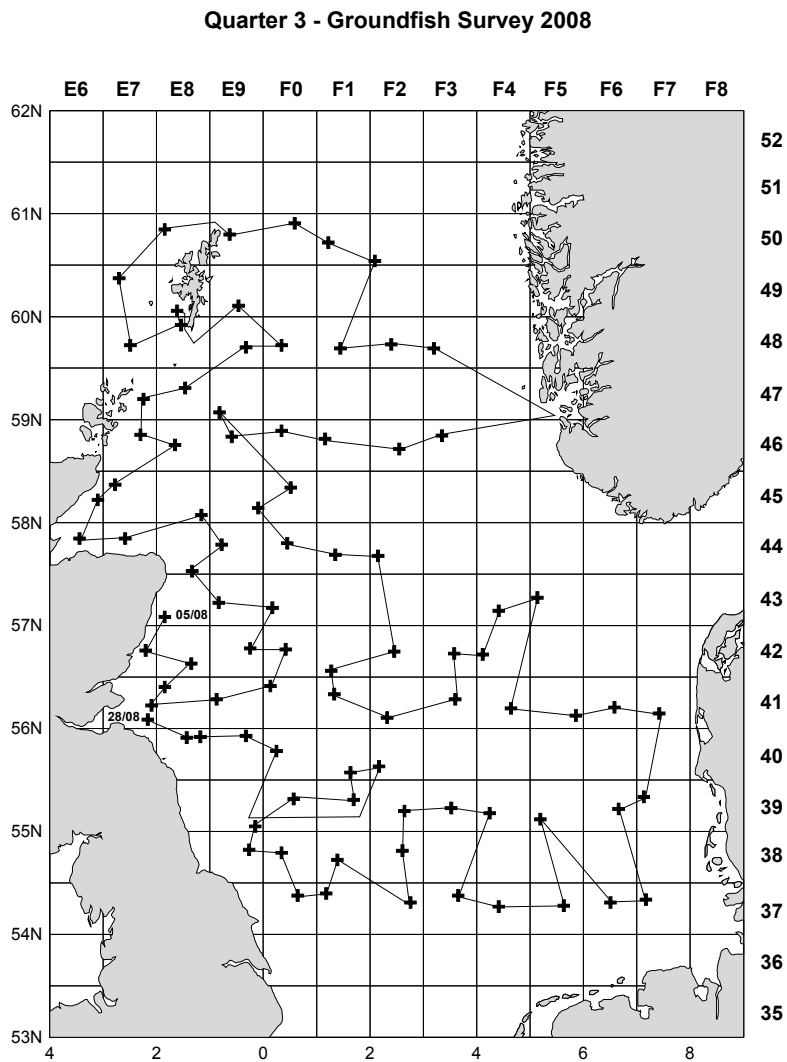


Figure 2 Position of fishing stations and approximate route

Daily Summary

5 August 2008

Weather: BFT 1, Sea state 1, Dry, Visibility Excellent
Fishing Station 43E8

Arrived at vessel. Checked equipment. Calibrated measuring sticks. Sailed from Aberdeen approx 1400 UTC. Safety Induction and familiarization until 1630 coinciding with first trawl at fishing station off Aberdeen. One hour of general observation while trawling and hauling to ascertain incidence of ship associated birds. Surveyed while steaming to second station location off Montrose for 1 hour 25 minutes. Sea state 1 and dry with excellent visibility good for survey. Large number of ship associates (100+ Gannets, 50+ Fulmar and 50+ Kittiwakes). Many birds seen approaching the boat.

3 Fulmar, 2 Manx Shearwater, 20 Gannet, 1 Great Skua, 2 Common Gulls, 1 Lesser Black-backed Gull, 2 Herring Gull, 128 Kittiwake, 18 Arctic Tern, 2 Common/ Arctic Tern, 42 Guillemot, 99 Razorbill, 3 Puffin were recorded on survey. Data entry completed but discovered that computer wouldn't recognize hand held GPS.

06 August 2008

Weather: NE 3 Sea state 3, Visibility Moderate to Excellent.
Fishing Stations 42E7, 42E8, 41E8, 41E7

Second station was trawled at c 0530. Sooty shearwater seen off back of boat plus arctic terns. Surveyed while steaming due east to station 3 for 3hours. Rain and NE winds BFT 3. Number of ship associates drastically reduced as headed further east. Surveyed while steaming SW for 2 hours to station 4 (due east of Dundee) and 1 hour to station 5 (Wee Bankie) from port side. Steamed due East towards station 6 at 8.5 knots, surveyed from starboard side due to strengthening NE winds and rain. This side afforded poorer visibility due to more central position of starboard box presence of davit and also pallets obscuring view. Requested relocation of pallets. Binoculars used frequently to check detection rate but rain made this inconclusive. Rafts of auks picked up intermittently at lower frequency than before but considered likely to be a genuine effect of moving further offshore away from wee bankie. Survey terminated due to rapidly fading light.

11 Fulmar, 166 Gannets, 8 Kittiwake, 27 Arctic Terns, 193 Guillemot, 45 Razorbill, 136 Puffin.
1 Grey Seal.
Golden Plover and Sanderling were recorded on passage.

07 August 2008

Weather: Wind had picked up to c 30kts from NE and sea state now 5 but no rain.
Fishing Stations 41E9, 41F0, 42F0, 42E9

Surveyed for 3 hours from starboard side while steaming slightly North of East at 10.5 kts to station 7. Pallets still obscuring view off beam.

485 Fulmar (including a flock of 400 sat on water), 1 Sooty Shearwater, 39 Gannets, 5 Great Skua, 8 Common and 1 Black-headed Gull, 7 Lesser Black-backed Gulls, 1 Herring Gull, 7 Great Black-backed Gulls, 7 Kittiwakes, 27 Guillemot and 26 Puffin. Sooty shearwater was also recorded off the back of the boat in the morning. Minke whale was recorded c 100m from boat between station 8 and 9. Several fulmars were noted feeding on jellyfish.

08 August 2008

Weather: Northerly BFT6 sea state 5 Visibility excellent throughout.

Fishing Stations 43F0, 43E9, 44E8, 44E9, 45E8 Moray Firth

Survey 48 Fulmar, 3 Sooty Shearwater, 1 Manx Shearwater, 1 Storm Petrel, 70 Gannet, 2 Arctic Skua, 3 Great Skua, 2 Common Gull, 1 Lesser Black-backed Gull, 4 Great Black-backed Gull, 168 Kittiwake, 73 Arctic Tern, 220 Guillemots, 1 Razorbill, 23 Puffin, 1 Minke whale.

09 August

Weather: North westerly veering westerly 4 sea state 4 dropping to 3 by afternoon. Visibility mostly excellent deteriorated around noon.

Fishing Stations 44E7, 44E6, 45E6, East of Orkney.

28 Fulmar, 37 Gannets, 1 Arctic Skua, 5 Great Skuas, 5 Common Gull, 4 Great Black-backed Gull, 22 Kittiwake, 15 Arctic Terns, 15 Guillemots, 14 Razorbills, 19 Puffins were recorded.

Approximately 60 gannets, 40 fulmars and 3 great skuas were following the boat after the first trawl.

10 August

Weather: Predominantly Northerly 2, Sea state 1 in morning, Variable and very light for a time before turning North west building to BFT 4 sea state 3 then dropping. Visibility poor at times.

Fishing Stations 45E7, 46E8, 46E7, 47E7, North Orkney

96 Fulmar, 5 Storm Petrels, 17 Gannets, 14 Great Skua, 3 Kittiwake, 4 Arctic Terns, 2 Razorbills, 36 Puffin. Migrants recorded; 2 Knot, 1 Black tailed Godwit, 1 Tufted Duck

11 August

Weather: North westerly 3, sea state 2-3, Visibility generally excellent temporarily moderate to good.

Fishing Stations 47E8, 48E9, 48F0, 49E9

137 Fulmar, 1 Sooty Shearwater, 1 Manx Shearwater, 6 Storm Petrel, 35 Gannets, 14 Great Skuas, 1 Common Gull, 1 Lesser Black backed Gull, 5 Great Black-backed Gulls, 19 Kittiwake, 1 Common Tern, 1 Arctic Tern, 10 Guillemot and 60 Puffin.

12 August

Weather: Easterly 2-3, Sea state 2-3 Visibility excellent throughout

Fishing Stations 48E8, 49E8, 48E7, 49E7, 50E8

69 Fulmar, 1 Sooty Shearwater, 18 Storm petrel (6 in transect), 17 Gannets, 1 Grey Phalarope, 18 Great Skua, 5 Kittiwake, 3 Guillemot, 120 Puffin. 1 Grey Seal and 2 Minke Whale.

Golden Plover and Turnstone were recorded on migration.

13 August

Weather: Northeasterly 4 to 5 dropping to 2 in afternoon. Sea state 5 dropping to 2 Visibility excellent throughout.

Fishing Stations 50E9, 50F0, 50F1, 50F2

460 Fulmar (53 in transect), 4 Storm Petrel, 12 Gannet, 9 Great Skua, 1 Common Gull, 2 Great Black-backed Gull, 1 Arctic Tern, 57 Guillemot, 3 Puffin, 1 Harbour Porpoise.

14 August

Weather: Northerly 4, Sea state 3, Visibility excellent throughout.

Fishing Stations 48F1, 48F2, 48F3 then steamed southwest towards Stavanger

535 Fulmar (69 in transect), 3 Sooty Shearwater, 2 Gannet, 1 Arctic Skua, 5 Great Skua, 1 Lesser Black-backed Gull, 4 Herring Gull, 30 Great Black-backed Gull, 4 Kittiwake, 4 Guillemot.

15 August

Half landing in Stavanger

16 August

Weather: South westerly 1, Seastate 0-1 until late afternoon. Swung South Easterly building to 3 Sea state 3 by evening. Visibility excellent throughout.

Fishing Stations: Steamed west from Stavanger to 46F3 and 46F2

154 Fulmar, 8 Gannet, 1 Cormorant, 1 Shag, 6 Great Skua, 2 Little Gull, 35 Lesser Black-backed Gull, 7 Great Black-backed Gull, 71 Guillemot.

Golden plover plus an unidentified passerine were recorded on passage

17 August

Weather: South Easterly 3-4 Sea state 3-4 Visibility excellent throughout.

Fishing Stations 46F1, 46F0, 46E9, 47E9

2 Fulmar, 2 Sooty Shearwater, 5 Storm Petrel, 8 Gannet, 5 Great Skua, 1 Little Gull, 3 Lesser Black-backed Gull, 2 Great Black-backed Gull. 4 Kittiwake, 1 Guillemot.

3 White beaked Dolphin bow riding for several minutes.

One Meadow pipit was recorded on passage.

18 August

Weather: Easterly veering South Easterly 2-3, Sea state 3 dropping to 2. Visibility excellent throughout.

Fishing Stations 45F0, 45E9, 44F0, 44F1, 44F2

44 Fulmar, 21 Gannet, 1 Arctic Skua, 4 Great Skua, 1 Lesser Black-backed Gull, 3 Great Black-backed Gull, 27 Guillemot.

Three Turnstone and 5 Golden Plover were recorded on passage.

19 August

Weather: Mainly South Easterly 2, Sea state 2, Visibility excellent at start becoming moderate or good.

Fishing Stations 42F2, 42F1, 41F1, 41F2

5 Fulmar, 63 Gannet, 3 Black headed Gull, 1 Common Gull, 5 Lesser Black-backed Gull, 1 Herring Gull, 5 Great Black-backed Gull, 1 Kittiwake, 7 Guillemot. 15 Atlantic White sided Dolphins were recorded. Several were breaching and porpoising.

An unusual warbler was recorded on deck. A square ended tail gave the impression of a brown Hippolais warbler but the bird was eventually considered to be a Reed warbler with a severely abraded tail. A dunlin was also recorded circling the boat.

20 August

Weather: South Westerly 2 veering North Westerly 3 before backing Westerly 2. Sea state 2-3. Visibility excellent throughout.

Fishing Stations 41F3, 42F3, 42F4, 43F4, 43F5

30 Fulmar, 22 Gannet, 3 Great Skua, 4 Lesser Black-backed Gull, 1 Herring Gull, 2 Great Black-backed Gull, 2 Guillemot.

A kestrel was recorded perching on the boat.

21 August

Weather: Southerly 1 veering Southwesterly 2, Sea state 1 to 2. Visibility excellent throughout.

Fishing Stations 41F4, 41F5, 41F6, 41F7

33 Fulmar, 1 Manx Shearwater, 1 Gannet, 3 Great Skua, 1 Common Gull, 19 Lesser Black-backed Gull, 3 Great Black-backed Gull, 5 Kittiwake, 64 Guillemot.

A wheatear and a meadow pipit were recorded.

22 August

Weather: South westerly 1 to 2, Sea state 1 to 2, 3 later. Visibility variable from moderate to excellent.

Fishing Stations 39F7, 39F6, 37F7, 37F6

2 Fulmar, 7 Gannet, 1 Pomarine Skua, 1 Arctic Skua, 3 Great Skua, 2 Little Gull, 1 Common Gull, 20 Lesser Black-backed Gull, 5 Great Black-backed Gull, 3 Kittiwake, 9 Common Tern.

One golden plover was recorded on passage.

23 August

Weather: North Easterly 1 backing Northerly and increasing to 4 before dropping to 2 by evening. Sea state increased from 2 to 4 and then receded to 2. Visibility excellent throughout.

Fishing Stations 39F5, 37F5, 37F4, 37F3

48 Fulmar, 2 Sooty Shearwater, 14 Gannet, 6 Common Gull, 3 Lesser Black-backed Gull, 13 Great Black-backed Gull, 6 Kittiwake, 5 Common Tern, 262 Guillemot (138 in transect)

Two white wagtails were on board.

24 August

Weather: Southerly 2 increasing to 5 veering South westerly 4 in afternoon. Sea state 3 increasing to 5 before dropping back to 3. Visibility mainly excellent but deteriorated in middle of day moderate to poor

Fishing Stations 39F4, 39F3, 39F2, 38F2, 37F2

11 Fulmar, 12 Gannet, 2 Common Scoter, 2 Arctic tern, 1 Great Skua, 7 Black headed Gull, 2 Common Gull, 27 Lesser Black-backed Gull, 1 Great Black-backed Gull, 14 Kittiwake, 10 Guillemot.

A juvenile male kestrel was on board.

25 August

Weather: South westerly dropping to 3 by afternoon. Sea state predominately 3 to 4. Visibility excellent throughout.

Fishing Stations 38F1, 37F1, 37F0, 38F0, 38E9,

8 Fulmar, 29 Gannet, 1 Lesser Black-backed Gull, 83 Kittiwake, 1 Common tern and 1 Common/Arctic Tern, 35 Guillemot, 1 Razorbill, 1 Puffin.

One feral pigeon was seen on board

26 August

Weather: South Westerly 4 backing Southerly 3, Sea state 2 to 3. Visibility excellent becoming good in evening.

Fishing Stations 39E9, 39F0, 39F1,40F1, 40F2

10 Fulmar, 2 Sooty Shearwater, 19 Gannet, 3 Great Skua, 1 Black-headed Gull, 5 Lesser Black-backed Gull, 5 Great Black-backed Gull, 3 Kittiwake, 1 Common Tern, 1Guillemot.

27 August

Weather: South Westerly 4 veering Westerly 4 to 5 dropping to 3 by late afternoon. Sea state 3 to 4 briefly 5 around midday. Visibility good to excellent.

Fishing Stations 40F0, 40E9, 40E8

15 Fulmar, 1 Manx shearwater, 45 Gannet, 1 Lesser Black-backed Gull, 1 Great Black-backed Gull, 1 Kittiwake, 4 Guillemot, 1 Puffin

28 August

Weather: South Westerly 3 veering Westerly 4. Sea state 2 to 4. Visibility excellent throughout.

Fishing Stations: Two extra fishing stations in 40E8 and 41E8. Sailed slowly North to Aberdeen but as no GPS data was being collected survey concluded mid afternoon.

1 Fulmar, 258 Gannet, 2 Little Gull, 1 Common Gull, 1 Kittiwake, 2 Arctic Tern, 22 Guillemot, 25 Puffin.

One goldcrest, 2 redshank, 4 swallows and 7 meadow pipits were recorded on passage.

Date	F	GU	GX	KI	PU	RA	AE	LB	NX	GB	TM	CM	CN	OT	BH	HG	AC	LU	MX	SA	CX	CA	PL	PK
05-08-2008	3	42	20	128	3	99	18	1	1				2			2			2					
06-08-2008	11	193	166	8	136	45	27																	
07-08-2008	485	27	39	7	26			7	5	7		8		1	1	1								
08-08-2008	48	222	70	168	23	1	73	1	3	4	1	2		3				2		1				
09-08-2008	28	15	37	22	19	14	15		5	4		5						1						
10-08-2008	96		17	3	36	2	4		14		5													
11-08-2008	137	10	35	19	60		2	1	14	5	6	1		1						1				
12-08-2008	69	3	17	5	120				18		18			1									1	
13-08-2008	460	57	12		3		1		9	2	4	1												
14-08-2008	535	4	2	4				1	5	30				3		4	1							
16-08-2008	154	71	8					35	6	7								2		2		1		
17-08-2008	2	1	8	4				3	5	2	5			2				1						
18-08-2008	44	27	21					1	4	3							1							
19-08-2008	5	7	63	1				5		5		1			3	1								
20-08-2008	30	2	22					4	3	2						1								
21-08-2008	33	64	9	5				19	3	3		1								1				
22-08-2008	2		7	3				20	3	5		1	9					1	2					1
23-08-2008	48	262	14	6				3		13		6	5	2										
24-08-2008	11	10	12	14				27		1		2			7		2				2			
25-08-2008	8	35	29	83	1	1		1					1											
26-08-2008	10	1	19	3				5	3	5			1	2	1									
27-08-2008	15	4	45	1	1			1		1										1				
28-08-2008	1	22	258	1	25		2					1						2						
	2235	1079	930	485	453	162	142	135	101	99	39	31	16	15	12	9	8	7	6	2	2	1	1	1

Table1 Daily totals of species recorded. on survey displayed in order of abundance¹.

¹ BTO codes are used throughout

Species Accounts

Seabirds

Fulmar *Fulmarus glacialis*

Recorded on every survey day and the most numerous bird recorded with 2235 records (913 in transect). Fulmar was also the most persistent ship associate benefitting greatly from the discards generated from the trawling activities. Immediately after hauling in and while discarding was underway virtually all the associates would stay at the back of the boat. A fairly cautious approach was adopted in recording fulmars to attempt to obtain the most reliable measure of numbers. Birds on the water, especially those sleeping or feeding on e.g. jellyfish were almost always considered. Judgment was required however when many ship associates were flying ahead and landing apparently waiting for the ship to catch up. Assumed “new” birds flying to join the boat through the survey quadrant were also counted although this was impossible to judge if birds were loosely circling the boat. On several occasions as many as 600 birds were noted circling the boat e.g. when discarding had ceased and the boat was steaming to the next trawl station. If this was a particularly prolonged period then the circling birds could be observed undertaking ever increasing circles up to the limit of visibility before returning to the boat apparently to check if trawling had recommenced. This made recording an accurate number of fulmar (representative of the densities that would have been present assuming no attraction to the boat) particularly difficult. This was also further compounded when encountering other fishing vessels and there was interchange between ship associates from both boats.

The survey period with the most confident estimate of genuine fulmar numbers was made on the 16th after departing Stavanger and steaming without having already trawled earlier that day. This was further helped by the excellent viewing conditions and mirror calm sea state so birds flying ahead and landing could be reliably detected. In 464 minutes of survey on the 16th 154 fulmars were recorded 98 of which were in transect. In contrast perhaps the least meaningful record of fulmars was obtained the following day on the 17th when the numbers of associates noted was estimated at over 200 after the first trawl and estimated as over 400 by the end of the day. However, only 2 fulmars were considered as not associates and recorded for the survey. It is therefore possible that “genuine” fulmars were actually under recorded due to the problem of distinguishing ship associates.

Guillemot *Uria aalge*

The second most abundant species recorded and one without the problems of associating with fishing boats. A total of 1079 birds were recorded, 803 in transect. Guillemot was recorded on all but two survey days although recorded only in single figures on seven days. Three days accounted for over 60 percent of the records :193 on the 6th in the outer firth of forth, 222 on the 8th in the Moray firth and perhaps more surprisingly 262 (135 in transect) in the space of 45 minutes on the 23rd near Puzzle Hole in Dutch waters. 374 birds could be reliably aged 100 of which were juveniles.

Gannet *Morus bassanus*

Gannet was recorded every day, with a total of 930 recorded, 293 in transect. Although a common associate when fishing and discarding Gannet was not as problematic as fulmar in terms of distinguishing associated birds. Forty five percent of all birds were recorded on the two days in the outer Firth of Forth near the Bass Rock colony. Over 100 gannets were following the boat after the dawn trawl in the vicinity of Hermaness on 13th. 900 birds were aged accurately 813 (90.3%) of

which were adults. Age classes 3 and 4 were the commonest immature classes recorded (23 and 39 respectively). Two birds fledged this year were seen towards the end of the survey.

Kittiwake *Rissa tridactyla*

A total of 485 Kittiwake were recorded (193 in transect) on 19 survey days although recorded in single figures on 13 of those days. Another persistent ship-associate that would regularly settled on board the vessel itself. Over 60% were recorded on the 5th (128) and 8th (168) in the vicinity of the Aberdeenshire coast. A further 83 (17%) were recorded on the 25th along the western edge of Dogger Bank. 368 birds (76%) were aged; 317 (86%) of those were adults, 45 (12.2%) were first year birds and 6 (1.6%) were 2nd calendar year birds suggesting that some colonies were partially successfully this breeding season.

Puffin *Fratercula arctica*

A total of 453 puffin were recorded on 11 survey days with 305 in transect. 136 (30%) were recorded on the 6th in the outer firth of forth and 120 (26.5%) on the 12th around Shetland. All were recorded to the west of longitude 002 E. 367 birds (81%) were aged; 331 (90%) were adults. Of the 36 juveniles recorded 50% were recorded in the outer Firth of Forth. No juveniles were recorded from the waters around Shetland. Suggesting the Isle of May colony was more successful than the Shetland colonies.

Razorbill *Alca torda*

The next most numerous species with 162 recorded from 6 days of survey. All excepting 1 group of 20 birds were in transect. The vast majority of razorbills were recorded on the 5th with 99 (61%) and 6th with 45 (27.7%) off the east coast of Scotland. Only 67 birds (41%) were aged 44 adults and 23 juveniles almost all of which were in family groups. Like puffin all razorbills were recorded to the west of longitude 002 E.

Arctic Tern *Sterna paradisica*

Also recorded only to the west of longitude 002 E, a total of 142 Arctic Terns were recorded 65 in transect. Over 50% (73) were recorded on the 8th in the area off the Aberdeenshire coast. A further 42% were recorded from the areas closest to the east coast of Scotland from the Firth of Forth to the Moray Firth on the 5th (18) 6th (27) and 9th (15). Only 37 birds were aged 5 of which were Juveniles. Interestingly only 8 birds were recorded flying in a direction with a southerly component.

Lesser Black Backed Gull *Larus fuscus*

Recorded on 17 survey days this species was recorded more regularly in the eastern waters. Of a total of 135 birds recorded, 26 of which were in transect, 113 (84%) were to the east of 002 E predominantly off the Norwegian and Danish coasts. The vast majority of birds were of dark backed races probably *intermedius*. Lesser Blacked-backed Gull was another regularly recorded ship associate with up to 60 regularly following and often landing on the boat but associates were generally easily distinguished.

Great Skua *Stercorarius skua*

Great skua was recorded on 16 days and was widely distributed across the survey area. A total of 101 birds were recorded on survey 33 of which were in transect though the bulk were no doubt attracted to the boat or birds associated with it. Great skua was regularly recorded scavenging behind the ship and a peak count of 60 was counted sat around the boat on the morning of the 12th prior to hauling while in sight of Shetland. The highest record during survey was also on the 12th. Very few instances

of kleptoparasitism were recorded most foraging Great Skuas were seen scavenging discards directly and it is likely to benefit greatly from trawler discards.

Great Black-backed Gull *Larus marinus*

Recorded on 17 days the pattern of distribution and abundance widely mirrored that of Great Skua. A total of 99 birds were recorded on survey (14 in transect) though over 100 birds were noted associated with the boat on the 12th. It is possible that most birds recorded were at least loosely associated with the boat. 63 birds were aged 35 of which were adults, 16 were first calendar year birds, and 4 were second calendar year birds. .

Storm Petrel *Hydrobates pelagicus*

Thirty-nine Storm Petrels were recorded, 8 in transect. On the 12th 18 (46%) were recorded around Shetland. Detectability of this species is generally greatly influenced by weather conditions however only 3 birds were recorded in sea states of 1 or less. The majority were recorded in sea state 3. Storm petrels are often recorded just before sunset but on this survey they were recorded at all times of day and showed no particular diurnal bias.

Less common seabird species

Gulls

Four other gulls were recorded at lower densities: Common Gull *Larus canus*, Black-headed Gull *Larus ridibundus*, Herring Gull *Larus argentatus* and Little Gull *Larus minutus*. Common Gull was the most frequently recorded of these with 31 (3 in transect) seen on 12 days. All birds were aged with 19 adults, 11 1st calendar year birds and 1 aged as immature. All birds were seen either singly or in pairs and this species regularly associated with the vessel. A total of 12 Black-headed Gulls (2 in transect) were recorded on 4 days, 3 were adults, 4 were 2nd calendar year birds and 5 were aged as immature. Nine Herring Gulls were recorded on 4 days, 5 were aged all of which were adults and all were at least loosely associated with the ship. None were identified to race. The 7 little gulls (4 in transect) recorded on 4 days were comprised of 3 adults and 4 first calendar year birds.

Skuas

Eight Arctic Skuas *Stercorarius parasiticus* and one Pomarine Skua *Stercorarius pomarinus* were recorded none of which were in transect.

Common Tern *Sterna hirundo*

Seventeen Common terns were recorded (3 in transect) on 5 survey days. Nine were recorded on the 22nd in German waters.

Shearwaters

Two shearwater species were recorded; 15 Sooty Shearwater *Puffinus griseus* on 8 survey days (4 in transect) and 6 Manx Shearwater *Puffinus puffinus* on 5 survey days (1 in transect). Sooty Shearwater was also regularly noted at first light at the back of the vessel and was likely to be attracted to the boat for foraging.

Two Shag *Phalacrocorax aristotelis* and 1 Cormorant *Phalacrocorax carbo* were recorded on the 16th a short distance from the coast close to Stavanger. Neither was in transect.

Two male Common Scoter *Melanitta nigra* were recorded on the evening of the 24th in Dutch waters flying west.

One Grey Phalarope *Phalaropus fulicarius* was recorded flying North-west on the 12th west of Shetland.

Other Bird Species

Sixteen species of landbird were recorded on migration including 7 wader species and 6 passerines as shown in Table 2 below.

Date	Time	Species	Number	Direction	Closest Position
06-08-2008	14:31	Golden Plover	1	west	56 24 N 001 19W
06-08-2008	14:53	Sanderling	1	south	56 18N 002 02W
10-08-2008	17:56	Black tailed Godwit	1	north	59 10N 002 15W
10-08-2008	07:35	Knot	2	south east	58 30N 002 20W
10-08-2008	17:58	Tufted Duck	1	north	59 10N 002 15W
12-08-2008	13:46	Golden Plover	1	east	60 12N 002 40W
12-08-2008	14:05	Turnstone	1		60 12N 002 40W
16-08-2008	12:12	Golden Plover	1	south east	50 03N 004 22W
16-08-2008	12:23	passerine species	1	south east	50 03N 004 22W
17-08-2008	07:02	Meadow Pipit	1	west	58 50N 000 45E
18-08-2008	17:32	Golden Plover	5	south west	57 41N 001 35E
18-08-2008	16:44	Turnstone	3	south	57 41N 001 24E
19-08-2008		Dunlin	1	circled boat	56 09N 002 37E
19-08-2008	08:24	Reed Warbler	1	on board	56 38N 001 43E
20-08-2008	07:59	Kestrel	1	on board	56 41N 003 32E
21-08-2008	17:37	Meadow Pipit	1	on board	56 03N 007 21E
21-08-2008	17:12	Wheatear	1	circled boat	56 07N 007 21E
22-08-2008	15:08	Golden Plover	1	south west	54 19N 006 55E
23-08-2008	09:06	White wagtail	2	on board	54 24N 005 39E
24-08-2008	08:07	Kestrel	1	on board	55 13N 003 34E
26-08-2008	14:35	Feral Pigeon	1		
28-08-2008	05:50	Goldcrest	1	on board	
28-08-2008	11:23	Meadow Pipit	4	north west	56 18N 002 08W
28-08-2008	12:50	Meadow Pipit	3	west	56 37N 002 08W
28-08-2008	07:42	Redshank	2	south west	56 03N 001 52E
28-08-2008	06:24	Swallow	3	south west	55 58N 001 29E
28-08-2008	11:06	Swallow	1	west	56 18N 002 08W

Table 2 Record of landbirds recorded on survey.

Marine Mammals

Cetacea (Whales/Dolphins/Porpoises)

Minke Whale *Balaenoptera acutorostrata*

Four minke whales were recorded. One on the 7th, 1 on the 8th and 2 together on the 12th to the west of Shetland.

White-beaked Dolphin *Lagenorhynchus albirostris*

Three individuals were seen bow riding on the 17th for around 10 minutes.

Atlantic White-sided Dolphin *Lagenorhynchus acutus*

Fifteen individuals were recorded on the 19th apparently hunting. Many were breaching clear of the water, and porpoising. A large number of gannets were associated with them.

Pinnipedia (Seals)

Grey Seal *Halichoerus grypus*

A female was recorded on the 6th and a male on the 12th.

DISCUSSION

General

The range and number of species encountered was in line with expectations with generally low numbers (excluding ship associates) encountered. Highest densities were recorded in areas close to the East coast of Scotland particularly off the outer Firth of Forth, Moray Firth and North East Aberdeenshire.

Ship Associates & Discarding Fish

As previously described in the report of the Seabird and Marine Mammal Survey from the F.R.V Scotia 1-22 February 2008 (Cronin 2008) due to the nature of the vessels work (fishing), some severe problems were encountered with seabirds associating with the vessel. Based on the experience of that survey as reported it was decided not to recommend retaining discards but to have a steady continual discarding regime which had the effect of retaining the vast majority of ship associates at the stern of the boat. This was not always possible when e.g. little was caught in the nets or when there was a particularly long steam between fishing stations. In this situation the scenario described in the earlier report and in the fulmar report above was the norm. This entailed most, if not all birds that had been scavenging at the rear of the boat to commence circling around the vessel often involving several hundreds of birds. As the length of time without anything to scavenge increased the looser the flock became so that birds (particularly Fulmar) would have fanned out up to the limits of visibility yet still be maintaining a loose association with the vessel. Previously scavenging birds could also be seen flying ahead and landing on the water presumably to rest and digest the food while enabling them to keep in reach of the vessel when it recommenced trawling. In these situations the ability to detect birds that would have been normally present rather than attracted to the boat was virtually impossible.

Given that the current North Sea Fulmar, Gannet, Great Skua, Kittiwake and other gull populations seems to be so dependant on scavenging discards from fishing activities and the distribution at sea is so closely tied to fishing vessels and given there is much uncertainty in the future of fishing and fishing practices (e.g. policies on discarding) that could significantly affect the fulmar population a different methodology could arguably be employed to gain much more useful data particularly for fulmars when surveying from fishing vessels. Certainly the ESAS methodology is very limited in its ability to provide a meaningful picture of fulmar numbers when surveying from fishing boats. It was for this reason that a note of ship associates was taken and is displayed in Appendix A, although this recording was not done in a systematic way rather it was undertaken to illustrate the fact that numbers recorded for the survey were sometimes greatly at odds with numbers actually present as associates. On future surveys from fishing vessels some standardized methodology for recording associates might be usefully employed and appropriate statistical tests applied to monitor numbers of birds associating with the vessel. For instance a snapshot count using radial bands every 30mins may be useful.

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Appendix A – Species associating with the Ship & Discarding Fish

Date	Time	GX	KI	F.	NX	GB	LB	CM	HG	OT	BH
05-08-2008	19:00	100+	50+								
09-08-2008	06:30	c60		c40	3+						
11-08-2008	07:00				c8						
11-08-2008	12:00				10+						
11-08-2008	15:00			100+							
12-08-2008	08:00	c20		200+	60+	100+					
12-08-2008	09:00			c300							
12-08-2008	10:00			less							
12-08-2008	12:00	c20	c20	c100	c30	c50					
13-08-2008	06:30	100+		50+	10+						
13-08-2008	11:30	c40		250+	8						
13-08-2008	15:00			600+							
13-08-2008	15:30			c100							
14-08-2008	06:00			c50							
14-08-2008	07:00	3		c100	2						
14-08-2008	10:30			60+							
14-08-2008	14:15			60+							
14-08-2008	14:30			c200		4					
14-08-2008	14:40			c600							
16-08-2008	16:40	c20		c500	2	5	30	3			
17-08-2008	06:15	2		200+	2			1			
17-08-2008	07:30	10									
17-08-2008	10:00	2		200+	4						
17-08-2008	10:40	6		300+	6						
17-08-2008	16:45	c20		c400	5						
18-08-2008	06:15	15		c60	5						
18-08-2008	09:30	c60		c60			2		1		
19-08-2008	14:12						1				
19-08-2008	14:55						3				
20-08-2008	12:02				1	2	1				
20-08-2008	16:49	4		10		4	2	1	2		
21-08-2008	06:29						40				
21-08-2008	12:17			6			12				
22-08-2008	06:08					3	8				
22-08-2008	06:18		2			5	21				
22-08-2008	09:55						50				
22-08-2008	14:25		6			2	25				
23-08-2008	06:00		c10	10		10	50				
23-08-2008	07:15						60				
23-08-2008	08:30		8			10	60	2		1	
24-08-2008	06:45		5	1			15	1			1
25-08-2008	06:10	2									
26-08-2008	06:20	100	15	50		5	10				
26-08-2008	10:50	30		40							
26-08-2008	11:15	30		60							1
26-08-2008	14:55	20	2	20	1	2					
26-08-2008	17:20	2		20		2					