

IMPRESS PELAGIA CRUISE 7-19 JUNE 2003

WEE BANKIE AREA (NORTH SEA)

CRUISE REPORT 64 PE 212

Cruise report Pelagia IMPRESS cruise

Participants in this cruise were

Kees Camphuysen (cruise leader)	ornithology
Santiago Gonzalez	scanfish
Martin Laan	scanfish, technician
Beth Scott (leader oceanogr. Team)	oceanography
Oliver Ross	oceanography
Damien Nixon	zooplankton
Jackie Smith	zooplankton, oceanography
Suzan van Lieshout	ornithology
Luc Meuwisse	ornithology
Philipp Schwemmer	ornithology
Nicole Sonntag	ornithology
Dennis de Boo	guest researcher, Aquasense

The work continued day and night for some instruments (ADCP, Simrad acoustics, occasionally scanfish), while CTD stations and ornithological observations were restricted to daylight hours. The scanfish team worked in shifts together with the oceanographers team, the ornithologists worked in 7hour shifts during daylight hours.

Cruise plan

The cruise plan was to sail from Peterhead on 7 June, to reach the northernmost of 8 transect perpendicular on the coast over the Wee Bankie/Marr Bank system and to complete at least 4 transects before two ' minisurveys ' were to be planned and performed. During the transects, the scanfish was operated at all time, while CTD stations (with bongonet samples for zooplankton) were worked at regular intervals along the transects. The scanfish was brought on board for each CTD station, the Simrad and the ADCP were used (not together) during steaming. Ornithological observations were planned for the entire daylight period (approx. 03:00-20:00 GMT), with special emphasis on seabird foraging behaviour and multi-species feeding frenzies. Following the mini-surveys, the remaining transects were to be completed.

Short diary

6/7 June 2003 Peterhead

Embarkation; change of crew and scientists, setting up equipment (CTD, Scanfish, Simrad Acoustics, ornitologists workspace, ADCP, bongonets and Aquasense set-up

A SST image of the northern North Sea is shown below, as produced 5 June 2003 (courtesy KNMI De Bilt)

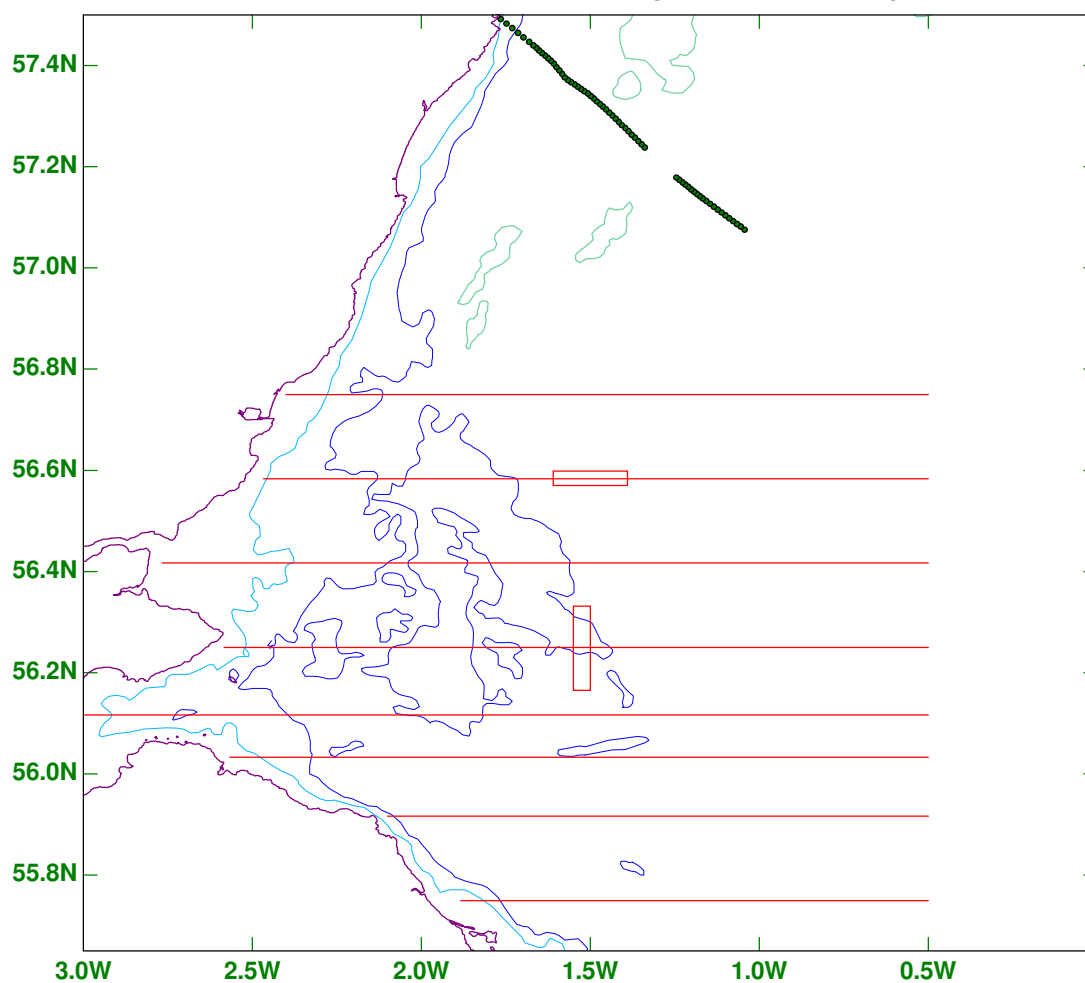
7 June 2003 Peterhead

Full instructions on MSFA theory and counting methods

Departure 14:00 GMT (15:00 local time). First test-runs and training top-predator team (immediately after departure), a test run with the CTD scheduled 17:30 GMT (18:30 local time) and a test run for the scanfish scheduled 18:00 GMT (19:00 local time). Observer effort seabird surveys 7 June: 17.1 km² surveyed, 56.9 km travelled, 5.3 hours on watch.

It has been observed, that apparently after a black-out on board the ship in Peterhead, the ship's time and date system is faulty. So, 7 June 2003 is logged by the ship's system as 7 July 2000. The bridge log was corrected manually after the first stations and casts, but for example the Aquaflow (and probably any other instrument not connected to GPS data) logged faulty dates and used faulty file names. The back-up Aquaflow files were manually corrected and stored on the IMPRESS area on the L-disk, but any so far undiscovered automatically logged files may store faulty dates. The ship's time/date system will not be reset before arrival on Texel.

7 June 2003 IMPRESS Pelagia seabird survey



Seabird surveys (serial 5-minute counts) on 7 June 2003 after leaving Peterhead harbour and study area (transect lines and mini-surveys) in the Wee Bankie/Marr Bank complex

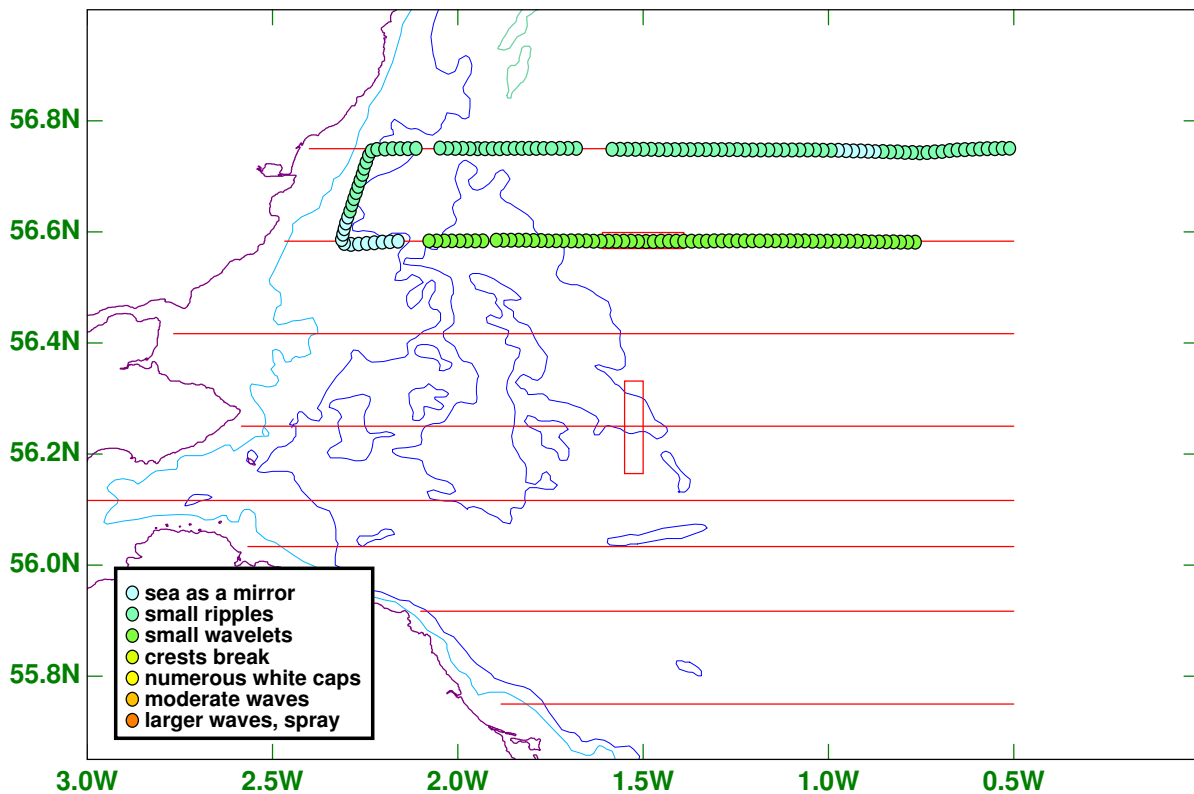
7 June 2003

Euring	Soort	Species	Scientific name	Number recorded
220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	69
460	Noordse Pijlstormvogel	Manx Shearwater	<i>Puffinus puffinus</i>	2
520	Stormvogeltje	European Storm Petrel	<i>Hydrobates pelagicus</i>	1
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	143
800	Kuifaalscholver	European Shag	<i>Phalacrocorax aristotelis</i>	32
4700	Bontbekplevier	Ringed Plover	<i>Charadrius hiaticula</i>	3
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	2
5920	Zilvermeeuw	Herring Gull	<i>Larus argentatus</i>	10
6000	Grote Mantelmeeuw	Great Black-backed Gull	<i>Larus marinus</i>	1
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	275
6160	Noordse Stern	Arctic Tern	<i>Sterna paradisaea</i>	2
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	356
6360	Alk	Razorbill	<i>Alca torda</i>	30
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	57
6655	Postduif	Feral Pigeon	<i>Columba 'domestica'</i>	1

8 June 2003 Transects 1-2

Started and completed transect one (east to west) with two CTD and bongo stations, using scanfish continuously and with permanent ornithological observations (except at stationary stations). An early morning encounter with White-beaked Dolphins made the scanfish produce a bottom-alarm and the device to pop up at the surface. One dolphin is supposed to have a headache. Ten miles to the south, the second transects was nearly completed (west to east), also with two CTD and bongo stations. The ship was set afloat to commence early morning of 9 June right where the surveys needed to be discontinued because of poor light. Observer effort seabird surveys 8 June: 62.6 km² surveyed, 208.7 km travelled, 13.9 hours on watch.

8 June 2003 IMPRESS Pelagia seabird survey



Seabird surveys (individual 5-minute periods) and seastate, 8 June 2003

Light winds during most of the day, southerly, with partial to complete overcast and a spell of rain in the morning. Calm to very calm seas made viewing conditions excellent and working on board a pleasure for all. Where the oceanography produced modestly clear patterns over the bank system, the avifauna could be subdivided into regimes: offshore (east of the bank system), with Northern Fulmar and Northern Gannet predominating, bank system with more variable conditions, but including huge multi-species feeding frenzies and areas where bottom feeders occurred, but where surface feeders were absent, and nearshore waters with little feeding and frequent colony-flights. Scanfish worked all day and produced excellent results; Simrad (acoustics) was standby during the day and logged well, CTD and bongo-netting, including the zooplankton analysis, all worked without problems and produced excellent results. For aquasense, where the water sampling should be most valuable during passages of certain satellites, the weather was unfavourable, but the equipment was tested and apparently found in good shape.

8 June 2003

Euring	Soort	Species	Scientific name	Number recorded
20	Roodkeelduiker	Red-throated Diver	<i>Gavia stellata</i>	1

220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	1351
460	Noordse Pijlstormvogel	Manx Shearwater	<i>Puffinus puffinus</i>	4
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	1513
1860	Wilde Eend	Mallard	<i>Anas platyrhynchos</i>	2
2130	Zwarte Zeeëend	Common Scoter	<i>Melanitta nigra</i>	19
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	13
5920	Zilvermeeuw	Herring Gull	<i>Larus argentatus</i>	45
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	849
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	2383
6360	Alk	Razorbill	<i>Alca torda</i>	261
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	176
6655	Postduif	Feral Pigeon	<i>Columba ' domestica'</i>	4
22260	Dwergvinvis	Minke Whale	<i>Balaenoptera acutorostrata</i>	11
23110	dolfijn	unidentified dolphin	<i>dolphin</i>	12
23270	Witsnuitdolfijn	White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	32
23510	Bruinvis	Harbour Porpoise	<i>Phocoena phocoena</i>	45
24310	ongedetermineerde zeehond	unidentified seal	<i>unidentified pinniped</i>	1
24320	Grijze Zeehond	Grey Seal	<i>Halichoerus grypus</i>	25

9 June 2003 Transects 3-4

A rather windy night compared to the previous day (4-5B), but fair conditions in the morning with WSW 4B. Initially cloudy, but nearly clear blue skies later in the morning. Excellent visibility for monkey deck observations and a sea with numerous white-caps. Variable wind speeds during most of the day, initially WSW, gradually backing S and SE, with sunny spells and overcast only in the evening. Observer effort seabird surveys 9 June: 57.9 km² surveyed, 192.9 km travelled, 13.3 hours on watch.

Seabird surveys (individual 5-minute periods) and seastate, 9 June 2003

Four CTD/bongo stations were scheduled, two of which coincided with satellite passing to accommodate the water sampling needs of Aquasense. All stations completed without problems. After completing the transect near St Andrews Bay, a southeasterly course was followed towards transect 4 and the first part of that transect was completed in deteriorating weather conditions. Visual observations were discontinued near sunset in a heavy shower just off the Isle of May.

Seabird abundance varied, while substantial feeding frenzies were not encountered anywhere during our crossing of the bank system. Near the western end of transect 3, adult Puffins were seen with beakloads of rather large sandeels (as walrus tusks hanging on either side of the bill) and many of these were seen transporting prey towards the Isle of May. In the inner parts (nearer St Andrews Bay), Puffins were more numerous, but prey loads were not obvious and many Puffins were accompanied by prospecting (kleptoparasitic) Herring Gulls. While steaming away from the Isle of May again, the sandeel 'transporters' were again intercepted on their way 'home' suggesting that these prey were caught in a rather localised area to the NE of the Isle of May. Near the west ends of the transect and near the Isle of May, large flocks of Northern Gannets were plunge diving with a typical "fish shoal" behaviour (assembling in the air and hammering into the sea on a very small spot all together, to take off again, re-assemble, and dive en masse again and again and again).

9 June 2003

Euring	Soort	Species	Scientific name	Number recorded
220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	181
460	Noordse Pijlstormvogel	Manx Shearwater	<i>Puffinus puffinus</i>	10
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	1488
800	Kuifaalscholver	European Shag	<i>Phalacrocorax aristotelis</i>	1
2210	Middelste Zaagbek	Red-breasted Merganser	<i>Mergus serrator</i>	2

5900	Stormmeeuw	Common Gull	<i>Larus canus</i>	4
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	20
5920	Zilvermeeuw	Herring Gull	<i>Larus argentatus</i>	156
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	328
6160	Noordse Stern	Arctic Tern	<i>Sterna paradisaea</i>	18
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	1050
6360	Alk	Razorbill	<i>Alca torda</i>	57
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	1275
22260	Dwergvinis	Minke Whale	<i>Balaenoptera acutorostrata</i>	6
23270	Witsnuitdolfijn	White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	26
23510	Bruinvis	Harbour Porpoise	<i>Phocoena phocoena</i>	18
24320	Grijze Zeehond	Grey Seal	<i>Halichoerus grypus</i>	142
28000	zandspiering bal	sandeel ball	<i>Ammodytes spp.</i>	1

10 June 2003 Transect 4-5

Rather strong southeasterly winds (5-6B) and complete overcast in the morning. The programme comprised a CTD station at the very start of the day, followed by short boats of steaming interrupted by (5) further CTD stations while crossing the proposed mini-survey areas. One CTD station was cancelled because the scurfish was considered too vulnerable to be hoisted out frequently. The Aquasense sample was taken with a bucket during steaming on that location.

Seabird surveys (individual 5-minute periods) and seastate, 10 June 2003

Transect 4 was surveyed completely by the ornithologists, but the conditions were poor, giving this transect a high priority to be redone; even higher than the 8th transect to be surveyed for the first time.

Transect 4 was completed and the offshore (eastern) end of transect 5 was surveyed during improving weather conditions. Northern Gannets and White-beaked Dolphins dominated the scene. Clear skies and sun during late afternoon and in the evening, with a wind veering to S and SWS, 3-4B. Surveys discontinued around 20:00 GMT. Observer effort seabird surveys 10 June: 53.0 km² surveyed, 176.7 km travelled, 12.9 hours on watch.

10 June 2003

Euring	Soort	Species	Scientific name	Number recorded
220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	170
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	925
5410	Wulp	Curlew	<i>Numenius arquata</i>	7
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	9
6000	Grote Mantelmeeuw	Great Black-backed Gull	<i>Larus marinus</i>	2
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	174
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	309
6360	Alk	Razorbill	<i>Alca torda</i>	32
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	113
22260	Dwergvinis	Minke Whale	<i>Balaenoptera acutorostrata</i>	1
23270	Witsnuitdolfijn	White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	57
24320	Grijze Zeehond	Grey Seal	<i>Halichoerus grypus</i>	3

11 June 2003 Transect 4, 5 and Firth of Forth (including circumnavigation of Bass Rock)

Given the strong winds on 10 June, the excellent weather forecast for 11 June and the need to have a proper (ornithol.) sample, the 4th transect was picked up again at 1°W and redone by steaming westward towards the Firth of Forth. Gentle southwesterly winds (3B) and clear visibility and blue skies in the morning. Surveys continued until the end of transect 4,

after which the ship surveyed (without scanfish) towards the beginning of transect 5 at 3°W. From there, surveyed commenced in an easterly direction, still without scanfish. A short interruption at 2°40'W was to circumnavigate the Bass Rock and to admire that colony as a little break in the continuous work. Immediately following this cruise, transect 5 was resumed, but now with the scanfish in operation. Observer effort seabird surveys 11 June: 54.6 km² surveyed, 182.1 km travelled, 11.8 hours on watch.

Seabird surveys (individual 5-minute periods) and seastate, 11 June 2003

Two CTD stations were worked in the evening. Winds that were WSW 3-4B decreased in the evening and the sky became only partly clouded. Within the Firth of Forth, small feeding frenzies were encountered with Kittiwakes joining Puffins (and with Northern Gannets as scroungers). Gannets were seen feeding on fish shoals, and gannets were frequently seen catching seaweeds as nest material. Shags were encountered in flight and feeding to the northwest of Isle of May and between the island and the mainland coast.

11 June 2003

Euring	Soort	Species	Scientific name	Number recorded
220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	47
460	Noordse Pijlstormvogel	Manx Shearwater	<i>Puffinus puffinus</i>	6
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	1740
720	Aalscholver	Great Cormorant	<i>Phalacrocorax carbo</i>	5
800	Kuifaalscholver	European Shag	<i>Phalacrocorax aristotelis</i>	162
4700	Bontbekplevier	Ringed Plover	<i>Charadrius hiaticula</i>	1
5690	Grote Jager	Great Skua	<i>Stercorarius skua</i>	1
5820	Kokmeeuw	Black-headed Gull	<i>Larus ridibundus</i>	1
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	33
5920	Zilvermeeuw	Herring Gull	<i>Larus argentatus</i>	81
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	525
6150	Visdief	Common Tern	<i>Sterna hirundo</i>	4
6160	Noordse Stern	Arctic Tern	<i>Sterna paradisaea</i>	13
6169	Visdief / Noordse Stern	Common / Arctic tern	<i>S. hirundo</i> / <i>S. paradisaea</i>	2
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	1264
6345	Alk / Zeekoet	Common Guillemot / Razorbill	<i>Alca torda</i> / <i>Uria aalge</i>	26
6360	Alk	Razorbill	<i>Alca torda</i>	78
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	2286
15820	Spreeuw	Starling	<i>Sturnus vulgaris</i>	10
21010	walvis	Whale	<i>whale</i>	1
22260	Dwergvinis	Minke Whale	<i>Balaenoptera acutorostrata</i>	4
23270	Witsnuitdolfijn	White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	6
23510	Bruinvis	Harbour Porpoise	<i>Phocoena phocoena</i>	11
24320	Grijze Zeehond	Grey Seal	<i>Halichoerus grypus</i>	2
28000	zandspiering bal	sandeel ball	<i>Ammodytes spp.</i>	2

Based on bird observations and oceanography, it is clear that the initially chosen locations for mini surveys would provide the data required. Therefore, the westernmost minisurvey was shifted to 1°30'W centred at the 4th transect line (56°15'N), and the easternmost will be shifted to further the north, to be decided later. The work plan was adjusted so that surveys would commence on Thursday 12 June at the 5th transect around 1°W, steaming westwards towards 2°W, after which the ship would move to the minisurvey location and start that 25hr programme around noon.

12 June 2003 Transect 5 and start first mini-survey

Early morning start at 1°W along the 5th transect, working westward with ornithological observations and scanfish simultaneously. SW breeze, 2-4 B (variable) and complete overcast make this a rather dull day. Occasional light showers. Near 2°W, surface dipping Black-legged Kittiwakes dominate the scene, pecking up prey that is impossible to see and that has been coded as 'tiny prey' (30). Some Kittiwakes associate with small groups of Puffins, just as on 11 June in the same general area, but most feed independently. After completion of transect 5, the mini-survey area was reached just before noon (shiptime) and the mini-survey was started as planned (2 hr, 5 min transects up and down; approx. 1 hr, 2.5 minutes each run). Rain and overcast at first, but clear skies and moderate breeze during most of the evening. Ornithological observations were continued until approx. 20:30GMT (21:30 shiptime). Observer effort seabird surveys 12 June: 63.7 km² surveyed, 212.3 km travelled, 14.2 hours on watch.

Seabird surveys (individual 5-minute periods) and seastate, 12 June 2003

12 June 2003

Euring	Soort	Species	Scientific name	Number recorded
220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	72
460	Noordse Pijlstormvogel	Manx Shearwater	<i>Puffinus puffinus</i>	3
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	791
2130	Zwarte Zeeëend	Common Scoter	<i>Melanitta nigra</i>	13
5790	Vorkstaartmeeuw	Sabine's Gull	<i>Larus sabini</i>	2
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	58
5920	Zilvermeeuw	Herring Gull	<i>Larus argentatus</i>	80
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	4002
6110	Grote Stern	Sandwich Tern	<i>Sterna sandvicensis</i>	1
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	1191
6360	Alk	Razorbill	<i>Alca torda</i>	21
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	763
7950	Gierzwaluw	Swift	<i>Apus apus</i>	2
22260	Dwergvinis	Minke Whale	<i>Balaenoptera acutorostrata</i>	22
23270	Witsnuitdolfijn	White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	10
23510	Bruinvis	Harbour Porpoise	<i>Phocoena phocoena</i>	18
24320	Grijze Zeehond	Grey Seal	<i>Halichoerus grypus</i>	56

13 June 2003 completion first mini-survey, planning and start second mini-survey

Early morning start while still working on the first minisurvey, with 2hr 5 min loops organised smoothly by the crew. Partly cloudy sky with spells of bright sunshine, moderate breeze and clear visibility. No significant disturbance in the scanfish survey. Scanfish was taken out between the two mini-surveys for servicing. Observer effort seabird surveys 13 June: 71.5 km² surveyed, 238.3 km travelled, 15.9 hours on watch.

Seabird surveys (individual 5-minute periods) and seastate, 13 June 2003

Black-legged Kittiwakes and some Lesser Black-backed Gulls assembled on the ship over night and during most of the day. A sample of droppings of Kittiwakes and a regurgitated fish bolus of the Lesser Black-backed Gulls was collected in the morning. The Kittiwake droppings appeared to be packed with 0-group sandeels (and 1 piece of whiting otolith). The LBBG bolus contained nearly fresh sandeels which were identified as 1-group sandeels. An accurate measurement of the length of these was not possible due to digestion, but the total length of these 1-group sandeels was well over 100mm. A sample of the 0-group sandeel otoliths and one 1-group otolith have been collected for later reference: #Pel2003MINI01

Damien Nixon examined the remainder of the sample for potential zooplankton remains. Apart from tiny bivalve broods, none were discovered. The broods are considered prey of the sandeels themselves (see earlier study Guillemot stomach contents, Camphuysen 2001)

Started second min-survey further north in the evening under good conditions, moderate westerly breeze and partly clouded sky. Numerous cetaceans and large feeding frenzies of Kittiwakes and Gannets suggested that the frontal zone was indeed hit by the survey. Foraging activity and precise locations of feeding frenzies varied during the first runs of the surveys, indicating rapid shifts in the spatial patterns of prey availability. The area was within reach of breeding Guillemots, certainly from colonies to the NW of the study area. Large flocks of Bass Rock Gannets were encountered also.

13 June 2003

Euring	Soort	Species	Scientific name	Number recorded
220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	98
460	Noordse Pijlstormvogel	Manx Shearwater	<i>Puffinus puffinus</i>	3
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	786
1220	Blauwe Reiger	Grey Heron	<i>Ardea cinerea</i>	2
5900	Stormmeeuw	Common Gull	<i>Larus canus</i>	1
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	16
5920	Zilvermeeuw	Herring Gull	<i>Larus argentatus</i>	7
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	2177
6150	Visdief	Common Tern	<i>Sterna hirundo</i>	2
6160	Noordse Stern	Arctic Tern	<i>Sterna paradisaea</i>	1
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	2056
6345	Alk / Zeekoet	Common Guillemot / Razorbill	<i>Alca torda / Uria aalge</i>	7
6360	Alk	Razorbill	<i>Alca torda</i>	40
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	388
21010	walvis	Whale	<i>whale</i>	3
22260	Dwergvinvis	Minke Whale	<i>Balaenoptera acutorostrata</i>	33
23110	dolfijn	unidentified dolphin	<i>dolphin</i>	1
23270	Witsnuitdolfijn	White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	7
23510	Bruinvis	Harbour Porpoise	<i>Phocoena phocoena</i>	69
24320	Grijze Zeehond	Grey Seal	<i>Halichoerus grypus</i>	31

14 June 2003 completion second mini-survey, planning and start third mini-survey

Early morning start while still working in the second mini-survey, east of the banks. Flat calm conditions during the greater part of the day with partly clouded sky and excellent to fair visibility. Very large numbers of cetaceans, numerous seabirds and a fair number of feeding frenzies were encountered. It was decided that a third mini-survey should be held in the same general area, but again working N-S rather than E-W, before the southerly transects were to be picked up again and to finish the study area completely. Observer effort seabird surveys 14 June: 72.9 km² surveyed, 243.1 km travelled, 16.5 hours on watch.

Seabird surveys (individual 5-minute periods) and seastate, 14 June 2003

The Marine Lab's *Clupea* was working in the same general area during most of the morning, apparently doing concurrent bird observations.

Black-legged Kittiwakes assembled on the ship in the morning. A sample of droppings of Kittiwakes was collected in the afternoon. The Kittiwake droppings appeared to contain 0-group sandeels. The 0-group sandeel otoliths have been collected for later reference: #Pel2003MINI02.

Damien Nixon examined the remainder of the sample for potential zooplankton remains. Apart from tiny bivalve broods, remains of copepods were detected. As with the bivalve broods, these copepods were potentially prey of the sandeels picked up and ingested by the gulls.

Numbers of cetaceans seen were overwhelming. Minke Whales and Harbour Porpoises were abundant and although the circular transect would automatically produce re-sightings of animals spotted before, it is clear that either species occurs with at least hundreds of individuals in the general area. The spatial patterns shifted over time and it was obvious that the animals moved through the area (probably SE \diamond NW in case of the Minke Whales). In late afternoon, sightings were relatively sparse.

14 June 2003

Euring	Soort	Species	Scientific name	Number recorded
220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	112
460	Noordse Pijlstormvogel	Manx Shearwater	<i>Puffinus puffinus</i>	6
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	993
5690	Grote Jager	Great Skua	<i>Stercorarius skua</i>	1
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	21
5920	Zilvermeeuw	Herring Gull	<i>Larus argentatus</i>	182
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	2363
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	4694
6345	Alk / Zeekoet	Common Guillemot / Razorbill	<i>Alca torda / Uria aalge</i>	7
6360	Alk	Razorbill	<i>Alca torda</i>	95
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	112
6655	Postduif	Feral Pigeon	<i>Columba ' domestica'</i>	12
6840	Turkse Tortel	Collared Dove	<i>Streptopelia decaocto</i>	1
16660	Kruisbek	Crossbill	<i>Loxia curvirostra</i>	1
22260	Dwergvinvis	Minke Whale	<i>Balaenoptera acutorostrata</i>	243
23270	Witsnuitdolfijn	White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	3
23280	Witflankdolfijn	Atlantic White-sided Dolphin	<i>Lagenorhynchus acutus</i>	3
23510	Bruinvis	Harbour Porpoise	<i>Phocoena phocoena</i>	550
24320	Grijze Zeehond	Grey Seal	<i>Halichoerus grypus</i>	41

15 June 2003 completion third mini-survey

Early morning start while still working in the third mini-survey, east of the banks. Calm conditions and sunny weather during the greater part of the day and excellent to fair visibility, but with partly clouded sky and some rain in the morning. Large numbers of cetaceans, numerous seabirds and a fair number of feeding frenzies were encountered. It was obvious that the northernmost part of the third minisurvey was most productive for Minke Whales. After a long siesta, there was also little foraging activity during the evening. Observer effort seabird surveys 15 June: 76.9 km² surveyed, 256.3 km travelled, 17.3 hours on watch.

Seabird surveys (individual 5-minute periods) and seastate, 15 June 2003

Black-legged Kittiwakes assembled on the ship, together with numerous Herring Gulls and some Lesser Black-backed Gulls. A sample of droppings of Kittiwakes was collected in the evening. The Kittiwake droppings contained 0-group sandeels only. The 0-group sandeel otoliths have been collected for later reference: #Pe12003MINI03

Damien Nixon examined the remainder of the sample for potential zooplankton remains. Apart from tiny bivalve broods, remains of copepods were detected. As with the bivalve broods, these copepods were potentially prey of the sandeels picked up and ingested by the gulls.

15 June 2003

Euring	Soort	Species	Scientific name	Number recorded
220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	454

460	Noordse Pijlstormvogel	Manx Shearwater	<i>Puffinus puffinus</i>	10
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	1044
5690	Grote Jager	Great Skua	<i>Stercorarius skua</i>	3
5900	Stormmeeuw	Common Gull	<i>Larus canus</i>	1
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	38
5920	Zilvermeeuw	Herring Gull	<i>Larus argentatus</i>	438
6000	Grote Mantelmeeuw	Great Black-backed Gull	<i>Larus marinus</i>	1
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	2925
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	700
6360	Alk	Razorbill	<i>Alca torda</i>	42
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	83
6655	Postduif	Feral Pigeon	<i>Columba ' domestica'</i>	2
7950	Gierzwaluw	Swift	<i>Apus apus</i>	7
15820	Spreeuw	Starling	<i>Sturnus vulgaris</i>	1
22260	Dwergvinis	Minke Whale	<i>Balaenoptera acutorostrata</i>	88
23250	Gewone Dolfijn	Common Dolphin	<i>Delphinus delphis</i>	108
23270	Witsnuitdolfijn	White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	3
23510	Bruinvis	Harbour Porpoise	<i>Phocoena phocoena</i>	189
24320	Grijze Zeehond	Grey Seal	<i>Halichoerus grypus</i>	3

16 June 2003 Transect 6 and start transect 7

Calm weather (seastate 1 and 0) and clear visibility at first, but wind picking up later in the afternoon. Off St Abb's head, seabird observations were hindered by winds such that (given the surplus of survey time) it was decided to double that part of the transects on 18 June 2003. Large feeding frenzies were observed including numerous Gannets dive-bombing fish shoals. Unusually, Minke Whales and auks (Guillemots and Razorbills) were seen to join these frenzies, suggesting that any drives of prey under water were done by predatory fish rather than by seabirds or marine mammals, detected by Gannets, and subsequently shared by other predators. The transects intercepted the flyway of Gannets to and from the Bass (direction Dogger Bank). Off St Abb's Head, numerous Guillemots were seen to fly into the seabird colonies, mostly with fish (non-sandeels predominantly). Observer effort seabird surveys 16 June: 56.8 km² surveyed, 189.2 km travelled, 12.8 hours on watch.

Seabird surveys (individual 5-minute periods) and seastate, 16 June 2003

16 June 2003

Euring	Soort	Species	Scientific name	Number recorded
220	Noordse Stormvogel	Northern Fulmar	<i>Fulmarus glacialis</i>	131
460	Noordse Pijlstormvogel	Manx Shearwater	<i>Puffinus puffinus</i>	12
710	Jan van Gent	Northern Gannet	<i>Sula bassana</i>	1911
5910	Kleine Mantelmeeuw	Lesser Black-backed Gull	<i>Larus fuscus</i>	17
5920	Zilvermeeuw	Herring Gull	<i>Larus argentatus</i>	136
6000	Grote Mantelmeeuw	Great Black-backed Gull	<i>Larus marinus</i>	1
6020	Drieteenmeeuw	Black-legged Kittiwake	<i>Rissa tridactyla</i>	574
6110	Grote Stern	Sandwich Tern	<i>Sterna sandvicensis</i>	3
6160	Noordse Stern	Arctic Tern	<i>Sterna paradisaea</i>	1
6340	Zeekoet	Guillemot	<i>Uria aalge</i>	4511
6345	Alk / Zeekoet	Common Guillemot / Razorbill	<i>Alca torda / Uria aalge</i>	12
6360	Alk	Razorbill	<i>Alca torda</i>	80
6540	Papegaaiduiker	Atlantic Puffin	<i>Fratercula arctica</i>	165
7950	Gierzwaluw	Swift	<i>Apus apus</i>	26
22260	Dwergvinis	Minke Whale	<i>Balaenoptera acutorostrata</i>	13

23270	Witsnuitdolfijn	White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	22
23280	Witflankdolfijn	Atlantic White-sided Dolphin	<i>Lagenorhynchus acutus</i>	3
23510	Bruinvis	Harbour Porpoise	<i>Phocoena phocoena</i>	14
24320	Grijze Zeehond	Grey Seal	<i>Halichoerus grypus</i>	32

17 June 2003 Transect 8 and completion transect 8

Surveys commenced at the east end of the 8th transects, hence on the southeasternmost extreme of the study area. Dull weather and rather strong winds (seastate) with rain at first, and very low seabird densities.

Seabird surveys (individual 5-minute periods) and seastate, 17 June 2003

18 June 2003 Homeward bound, science meeting

Seabird surveys (individual 5-minute periods) and seastate, 18 June 2003

Seabird observations summarised

Table 1. Observer effort during the survey (ornithological observations from monkey platform).

		Area surveyed	Distance travelled during surveys	Hours on watch
7	June	17.1	56.9	5.3
8	June	62.6	208.7	13.9
9	June	57.9	192.9	13.3
10	June	53.0	176.7	12.9
11	June	54.6	182.1	11.8
12	June	63.7	212.3	14.2
13	June	71.5	238.3	15.9
14	June	72.9	243.1	16.5
15	June	76.9	256.3	17.3
16	June	56.8	189.2	12.8
17	June			
18	June			
19	June			