CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE
LOWESTOFT LABORATORY, LOWESTOFT, SUFFOLK NR33 0HT

2008 RESEARCH VESSEL PROGRAMME

PROGRAMME: RV CEFAS ENDEAVOUR: SURVEY 15

STAFF:

Part A	Part B
Fishing	
B Harley (SIC)	B Harley
S McCully (2IC)	S McCully
R Humphreys	R Humphreys
B Hatton	B Hatton
M Parker-Humphreys	R Forster
G Padda	L Cox
B Mulligan	N Hawkes

Environmental (5 August – 11 August (approx))
D Sivyer
F Coucerio (Portsmouth)
L Bristow (UEA)
R Helsby (Partrac)
Kevin Black (Partrac)

Plus 6 students from the University of Exeter
Bird and sea mammal observer (11 – 23 August)

FSP (3 September – 6 September
S Kupschus
A Locker

DURATION: Part A: 5 August – 23 August
Part B: 24 August – 7 September

LOCATION: North Sea

AIMS:

1. To carry out a groundfish survey of the North Sea as part of the ICES coordinated IBTS, using a standard GOV trawl in order to obtain information on:
   a) Distribution, size composition and abundance of all fish species caught.
   b) Age – length distribution of selected species.
   c) Distribution of fish in relation to their environment.
   d) Distribution of macrobenthos and anthropogenic debris.
   e) Surface and bottom temperature and salinity data using SAIV miniCTD.

f) Length weight & maturity information using individual fish measurements, in support of the EU Data Regulation.

2. Carry out water sampling for Caesium/Tritium for an internal Cefas contract (SLA21).

3. Collect pipefish samples for Benjamin Kurten, University of Newcastle

4. To recover the Lander at Oyster Grounds and Sean Gas Field sites.

5. To deploy in-situ flume at Oyster Grounds, Sean Gas Field and North Dogger site

6. To collect sediment process measurements at Oyster Grounds, Sean Gas Field and North Dogger

7. To collect net hauled zooplankton samples

8. To collect water samples via CTD rosette at various sites

NARRATIVE:
(All times GMT)

RV Cefas ENDEAVOUR sailed from Lowestoft at 1300h 5 August. Onboard, together with the normal compliment of 7 Cefas staff for the fisheries work, were 2 students from Exeter University, 5 scientists carrying out environmental aims and Remment ter Hofstede, chair of the IBTS Working Group, joining us as an observer. Before work on the primary stations commenced, a 'shakedown' tow was carried out to allow for the deployment of the gear, to check that all sensors were working correctly and to allow scientists and crew to familiarise themselves with their particular work areas. A standard station consisted of a cast with a CTD and a 10-litre Niskin bottle, followed by a 30-minute tow with the standard IBTS rigged GOV, with a miniCTD attached. On every station fisheries acoustic data were continuously collected at two operating frequencies (38kHz and 120kHz), using the Simrad EK60 split beam sounder. During the shakedown tow the Scanmar door sensors failed to give readings, however, both the headline, trawl speed and wing units worked fine and this was deemed a valid additional tow. The vessel steamed to the Sean Gas Field in order to start the environmental aims. That evening the flume was deployed, however some of the equipment on this failed to work. Also the first of the NIOZ core deployments was carried out. This work finished in time for the first prime station of the NSGFS to be fished at 0917h on the 6 August. Three successful GOV stations were fished before the environmental work continued at the Oyster Ground on the evening of 6 August. Again the flume was deployed and some CTD data was collected. At first light the first Lander was recovered before steaming to continue with the primary aim GOV stations. Two valid stations were fished on the 7 August before Cefas Endeavour returned to the Oyster ground to carrying out further environmental aims overnight. Several successful NIOZ core deployments were

carried out and once complete the vessel steamed to fish a further 3 valid GOV tows on 8 August, heading towards the Dogger Bank during the day. With the weather deteriorating further it was not possible to carry out any environmental work that evening, so the vessel steamed to Prime Station 25 to start work at first light on 9 August. Two valid GOV stations were fished during the day and that evening, with the weather moderating slightly, the NIOZ corer was deployed successfully before steaming southwards to prime station 15, ready to deploy the GOV the next morning. Twenty-four minutes into the first tow of the day, the vessel lost all propulsion and power to the winches. These functions were restored quickly and the gear was successfully recovered, undamaged and the tow was deemed valid. A further valid station was fished that day and the vessel then steamed southeast, returning to the Sean Gas Field to carry out the final evenings work on the environmental aims. Several core and water samples were successfully collected; however with the swell being over 2 meters and the wind against the tide, it was not possible to recover the final Lander. Once the aims were complete, the vessel steamed south to fish prime station 4, before heading for Lowestoft to drop off the environmental team, two students and Remment ter Hofstede, and collecting two more Exeter university students and Ciaran Cronin from Cork Ecology. Cefas Endeavour sailed from Lowestoft at 1900h and headed for prime station 1 ready to start at 0415h on 12 Aug. Three valid stations were fished, however the fourth of the day had to be dropped as the weather deteriorated severely and the gear could not be shot safely. The next morning the weather had moderated slightly and a further station was fished just after breakfast. The vessel steamed eastwards towards the next station on the Dutch coast but as we arrived the winds started to gust over 60 knots and the decision not to shoot was taken. With the forecast for the next two days giving south-westerly gales, the decision was made to steam back towards the UK coast to take advantage of the better forecast for that side of the North Sea. Over the next 3 days a further 10 valid prime stations were fished successfully with the vessel moving from the northeast coast of England out into the centre of the North Sea and out towards the Danish coast. With the weather continuing to be fair we were able to fish all of the stations in the German Bight, including the ones left earlier in the week and the vessel continued to fish through to the 19 August with no problems. On the first tow on the 19 August the wing sensors started to give erratic readings, as the area was notorious for damage the net was hauled after 20 minutes but no damage occurred and the tow was deemed to be a valid 20 minute haul. The next tow was shot and again the wing sensors gave erratic readings. The tow was fished for 30 minutes and no damage occurred but the wing sensors were swapped out and the sensor mounts were tightened. This seemed to solve the problem as the final two tows of the day produced very stable readings. Over the next 2 days a further 12 stations were fished successfully, with no problems. On the morning of 22 August, on the final tow of the first half of the survey, the normal tow of the survey at prime station 40 had to be moved as a vessel was working on DP on the tow. As the area has a reputation for damage, the decision to move the tow but only tow for 15 minutes was taken. This was fished without incident and the vessel docked into Aberdeen at 1300h to change staff ready to sail on the morning of the 24 August.

Sailing was delayed on 24 August due to a failure of the bow thruster. This was finally fixed and the vessel sailed at 1030h from Aberdeen and headed for prime station 52 off the northeast Scottish coast. Two tows were completed on the Sunday

and the vessel headed westward to start at prime station 51 the following day. Over the following three days a further 13 stations were successfully fished without incident. On the evening of 27 August the 1m ring net was deployed after the last station in order to collect plankton samples for the University of Exeter. On the first CTD cast on 28 August 6 carboys of low nutrient water were collected for the Cefas laboratory. That evening, the Endeavour crew changed over the otter trawl doors at my request as the wing spread over the last two days had been slightly more than expected, and an additional tow on prime station 70 was fished for comparison. This yielded very similar readings but it was decided to leave these new doors on for the remainder of the survey. On the last tow of the day on 29 August the starboard door caught on something on the bottom and payed out an additional 70 meters of warp. On recovery of the gear the starboard pennant for the door had parted and a large piece of prawn trawl net and tickler chains were wrapped in the starboard wing and ground gear. As a precaution the net was swapped out as it was possible that it could have been stretched out of its normal shape and there was no way to check this. The following day on the forth and final tow of the day the codend came up with a twist in it, this had the effect of choking off the codend to the fish and any fish that were in the net were well back down the sleeve. This tow had to be made invalid and fished again, this time without any problems. Seven more stations were fished over the next two days and the final station of the IBTS survey was hauled at 1829h on 1 September. The vessel then steamed overnight in order to meet up with the FV "Our Lass II", off the Yorkshire coast. During the day on 2 September the groundgear bags were rigged to the survey net in preparation to start the FSP comparative fishing survey on 3 September.

FSP survey narrative. On the evening of 2 September, Sven Kupschus was picked up by searider from Whitby in order to take part in the FSP comparative gear trials survey with the FV "Our Lass II". Arnold Locker was then picked up at 0700h the following morning and the vessel steamed up to grounds off Hartlepool to start the survey. The GOV was rigged with the ground gear bags and the low light camera was attached to the net for the first haul. The first haul yield some cod but the skipper of the FV "Our Lass" advised that we moved further offshore to Baymans Hole as the likelihood of there being more cod on the ground was higher. Three successful tows were carried out at Baymans Hole before dark that night. The following day we stayed in the vicinity of these grounds and on the second tow of the day we strayed onto hard ground and the net was hauled with significant damage, which took 5 hours to repair. Once the nets were repaired a further two tows were successfully fished. The following day a further 6 tows were fished in the same area and it was decided that the vessels would continue to fish around these grounds for the final day of the FSP survey. However, on attempting to shoot the net on the morning of 6 September, the ships net drum failed and it was not possible to fix the problem in time to continue fishing, so the survey ended and the vessel steamed towards Whitby to drop Arnold Locker off, before heading back to Lowestoft to dock at 1430h on 7 September. Results from this part of the survey will be presented in a further report at a later date.

RESULTS

Aim 1. A valid GOV trawl haul was successfully completed at all of the 75 primary station positions (Table 1). Also shown in Table 1 is the number of FSP stations

fished. There was also 1 invalid tow, which was repeated to obtain a valid sample. A SAIV miniCTD was used, attached to the starboard wing of the trawl to obtain temperature and salinity data. The survey started with GOV trawl number 11 but at prime station 64, trawl number 12 was used for the remainder of the survey. A chart indicating the position of each trawl station is attached (Figure 1). SCANMAR equipment was used to monitor headline height, wing width and door spread. Due to failure of the small SCANMAR door sensors no readings on door spread were available until after the mid survey break in Aberdeen. At each station, the catch of each species was weighed and all fish, or representative samples, were measured. Table 2 lists the species caught that are sampled for length and Table 3 ranks the top 15 species by weight compared with the last two year's survey. Samples of otoliths for age determination were taken as specified in standard instructions. Benthos and crustacea were identified to the species wherever possible and recorded as present. The resultant data were input to computer database using the Cefas Electronic Data Capture System. This data will be analysed at Cefas Lowestoft and will provide a major input to the ICES assessment of North Sea gadoids and pelagic species. Once checked and validated, all data will also be input to the ICES Datras database.

Surface and bottom salinity samples and a water column CTD profile were taken on all but one of the primary stations fished. These samples will be forwarded to EI in order that the CTD profile can be calibrated.

Species of note caught this year during the survey are *Raja batis, Hippoglossus hippoglossus, Brosme brosme* and a *Petromyzon marinus*

Figures 2-10 show distribution and relative abundance (kg per hour) of cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), whiting (*Melangius merlangus*), saithe (*Pollachius virens*), Norway pout (*Trisopterus esmarkii*), herring (*Clupea harengus*), mackerel (*Scomber scombrus*), sprat (*Sprattus sprattus*) and plaice (*Pleuronectes platessa)*, respectively, over the last 3 years. Although the total weight of cod caught has increased from last year (595kg in 2008, 530kg in 2007), the number of stations that cod were caught at has declined from 55 stations in 2007 to 48 stations in 2008. There was also a significant decline in the total weight of saithe and herring caught this year. In previous years, for saithe, the majority was caught in a single tow (Figure 5) and for herring the majority were caught over 3 tows (Figure 7), however this year these tows did not yield particularly high catches of these species. A significant increase has been seen in mackerel catches during this year's survey. In 2006 and 2007 the catches were just under 3t where as in 2008 the total catch of mackerel was nearly 6t, but again as this is a pelagic, schooling species, this increase can be attributed to one or two tows, with very high catch weights (Figure 8).

Table 1.

Gear	Valid	Additional	Invalid	Total
GOV (IBTS Standard gear)	75	1	1	77
Niskin Bottle + MiniCTD	74	0	0	74
FSP stations	13	0	1	14

Table 2. List of measured species caught during the survey and number of stations at which they were recorded.

Species	Stns	Species	Stns
Agonus cataphractus	14	*Micromesistius poutassou*	8
Alosa fallax	4	*Microstomus kitt*	57
Anarhichas lupus	4	*Molva molva*	10
Anguilla anguilla	1	*Mullus surmuletus*	10
Argentinidae	33	*Mustelus asterias*	4
Arnoglossus imperialis	1	*Mustelus mustelus*	2
Arnoglossus laterna	14	*Myoxocephalus scorpius*	3
Aspitrigla cuculus	4	*Myxine glutinosa*	8
Belone belone	2	*Nephrops norvegicus*	20
Brosme brosme	2	*Ommastrephes eblanae*	6
Buglossidium luteum	21	*Petromyzon marinus*	1
Callionymus lyra	42	*Platichthys flesus*	3
Callionymus maculatus	19	*Pleuronectes platessa*	59
Cancer pagurus	18	*Pollachius pollachius*	2
Clupea harengus	62	*Pollachius virens*	21
Enchelyopus cimbrius	12	*Raja batis*	1
Entelurus aequoreus	9	*Raja clavata*	4
Eutrigla gurnardus	68	*Raja montagui*	2
Gadiculus argenteus	8	*Raja naevus*	14
Gadus morhua	48	*Raja radiata*	33
Glyptocephalus cynoglossus	17	*Scomber scombrus*	61
Hippoglossoides platessoides	54	*Scophthalmus maximus*	10
Hippoglossus hippoglossus	5	*Scophthalmus rhombus*	2
Homarus gammarus	2	*Scyliorhinus canicula*	20
Hyperoplus lanceeolatus	14	*Sebastes marinus*	1
Lepidorhombus whiffiagonis	15	*Sebastes viviparus*	1
Limanda limanda	62	*Solea solea*	3
Loligo forbesi	18	*Spondyliosoma cantharus*	1
Loligo vulgaris	3	*Sprattus sprattus*	19
Lophius budegassa	1	*Squalus acanthias*	5
Lophius piscatorius	25	*Trachinus vipera*	17
Lumpenus lampretaeformis	5	*Trachurus trachurus*	32
Maurolicus muelleri	1	*Trigla lucerna*	10
Melanogrammus aeglefinus	52	*Trisopterus esmarki*	37
Merlangius merlangus	73	*Trisopterus luscus*	2
Merluccius merluccius	36	*Trisopterus minutus*	23
Microchirus variegatus	3	*Zeus faber*	5

Table 3. Top 15 species by weight compared with the last two year's surveys

Species common name	Scientific name	2008 weight (kg)	2007 weight (kg)	2006 weight (kg)
Mackerel	*Scomber scombrus*	5860.274	2730.282	2887.207
Whiting	*Merlangius merlangus*	3530.802	2496.269	1849.026
Dab	*Limanda limanda*	3159.940	5193.865	4110.781
Herring	*Clupea harengus*	2668.001	9365.861	7232.222
Haddock	*Melanogrammus aeglefinus*	2276.911	3688.231	2857.630
Sprat	*Sprattus sprattus*	1983.870	334.755	1032.529
Norway Pout	*Trisopterus esmarkii*	1485.302	1734.222	1968.145
Horse Mackerel	*Trachurus trachurus*	908.818	1199.281	1254.689
Saithe	*Pollachius virens*	811.436	4694.575	2806.417
Grey Gurnard	*Eutrigla gurnardus*	742.686	1389.313	670.34
Cod	*Gadus morhua*	594.468	530.331	312.741
Plaice	*Pleuronectes platessa*	392.701	776.000	437.284
Hake	*Merluccius merluccius*	297.422	155.673	82.962
Long Rough Dab	*Hippoglossoides platessoides*	265.039	389.476	420.435
Blue Whiting	*Micromesistius poutasou*	193.740	23.475	145.554

A total of 7400 biological samples were taken for the primary target species (Table 4). In addition, a total of 193 samples were also taken from elasmobranchs captured during the survey.

Table 4.

Species	**Number of samples taken**
Whiting	1237
Plaice	1232
Haddock	1179
Herring	1142
Sprat	478
Dab	412
Mackerel	402
Norway Pout	398
Cod	378
Saithe	271
Lemon Sole	221
Monkfish	34
Turbot	13
Brill	2
Black-Bellied Anglerfish	1
R. radiata	117
R. neavus	44
R. clavata	27
R. montagui	4
R. batis	1

Aim 2. 36 of the 37 sites for caesium and tritium were sampled.

Aim 3. 19 *Entelurus aequoreus (*Snake pipefish) were frozen to satisfy a request by Ben Kuerten, Newcastle University.

Aims 4, 5, 6 and 8. These aims were carried out by the environmental team and a report on these will be issued separately.

Aim 7. Two casts with the 1m ring net were carried out to collect deep water zooplankton for Exeter University.

Additional aims.

(i) As part of a Cefas project to identify problems with maturity staging at sea during the 3rd quarter, a number of GSI samples were taken from female cod and haddock. The table below shows the number of the fish taken for each species. For each sample the fish was measured, weighed whole, and then weighed gutted and then the gonads weighed. A photograph of the gonads in-situ was taken and then a section was taken from the gonad for histological sampling back in the laboratory.

Table 5.

Species	Cod	Haddock
Number taken	71	67

(ii) Fin clips were taken from a number of elasmobranch species, for genetic sampling. The table below gives the number taken for each species.

Table 6.

Species	Number taken
Raja radiata	2
Raja clavata	24
Raja montagui	4
Raja neavus	36
Raja batis	1

(iii) As part of an on-going program within Cefas, 4 *Mustelus asterias* and 2 *Mustelus mustelus* were tagged with conventional disc tags and released.

Special thanks are given to the officers and crew of Cefas ENDEAVOUR and the scientists for their positive and significant contribution to the successful completion of the survey. Special thanks are also given to the Skipper and crew of FV "Our Lass II" and Arnold Locker, for their help in the work carried out for the FSP survey.

B Harley
30 September 2008

Initialled: S Kupschus

DISTRIBUTION:

Basic list +

B Harley	R Humphreys
S McCully	B Mulligan
L Cox	R Forster
M Parker-Humphreys	B Hatton
S Kupschus	R Wilson, Exeter Uni.
N Hawkes	D Sivyer
A Locker	J Locker

Figure 1.
Station positions CEFAS Endeavour 15/08.

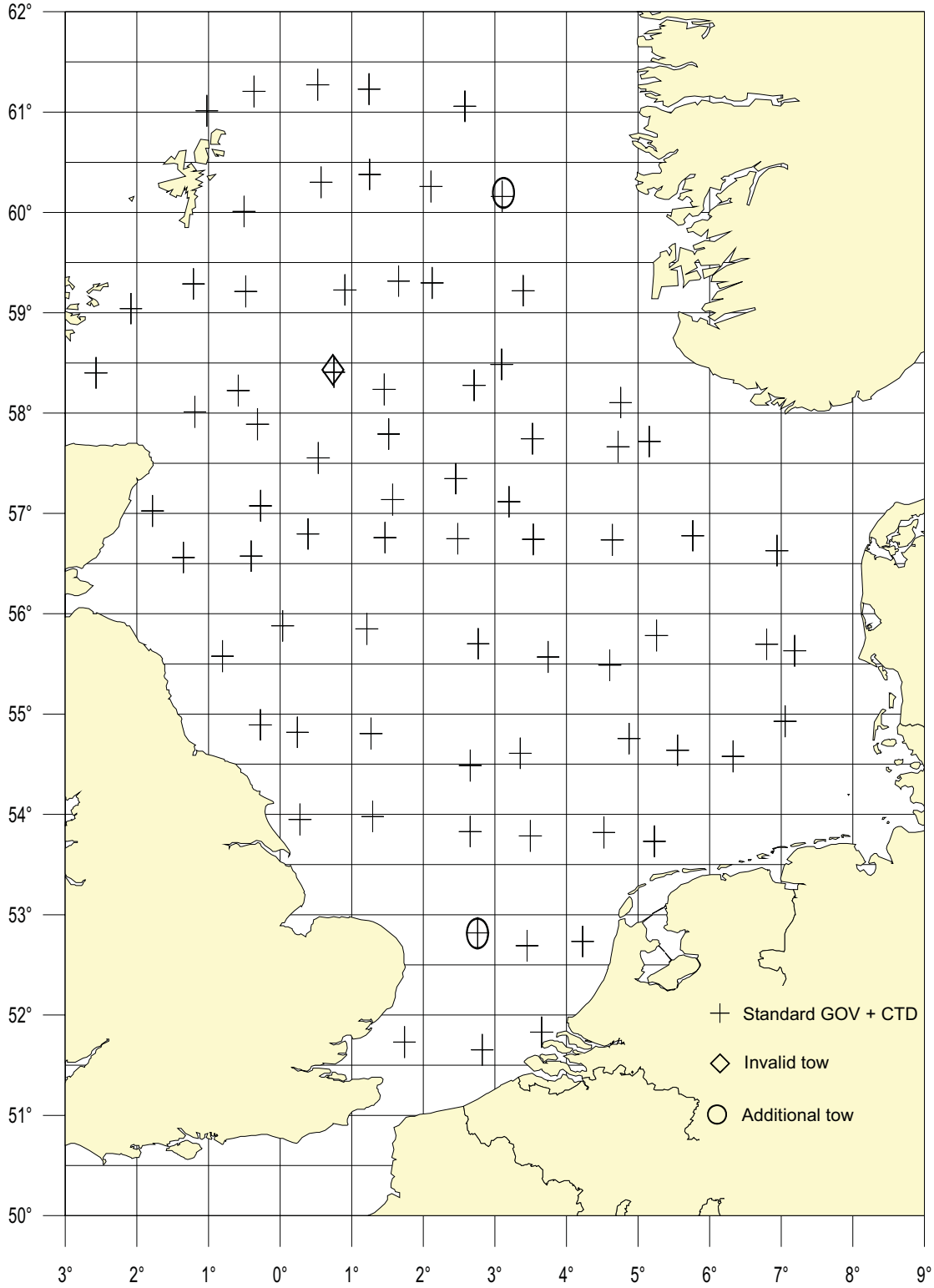
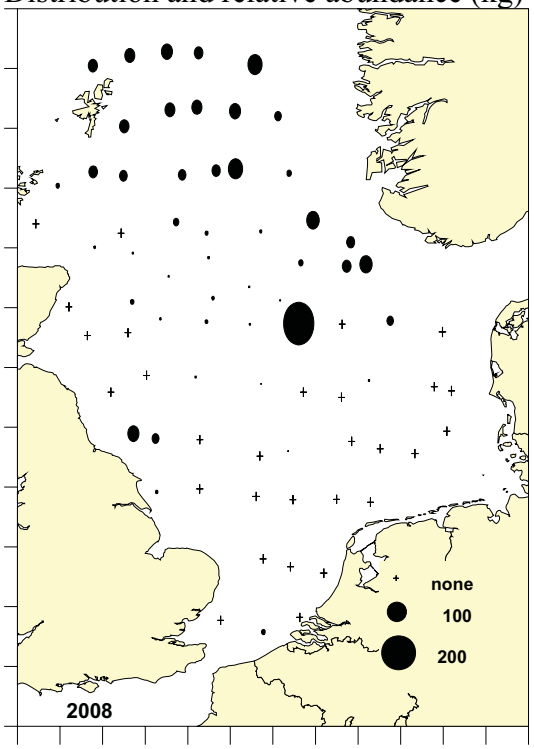
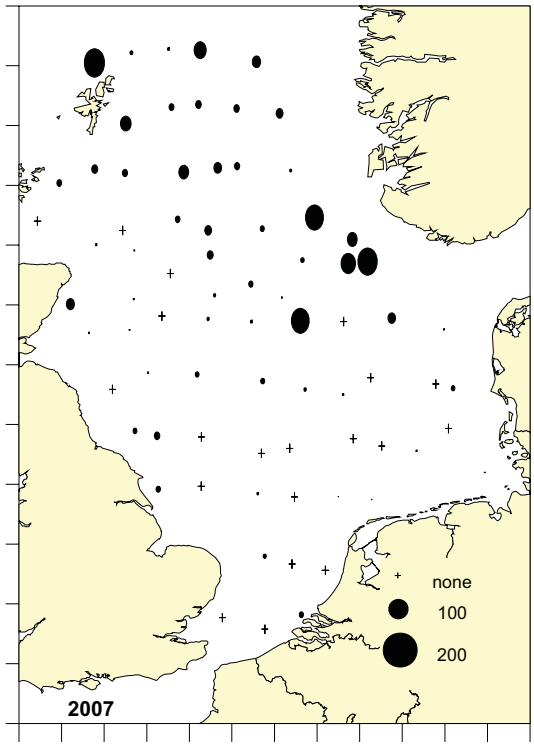


Figure 2.
Distribution and relative abundance (kg) of cod for 2006 to 2008.





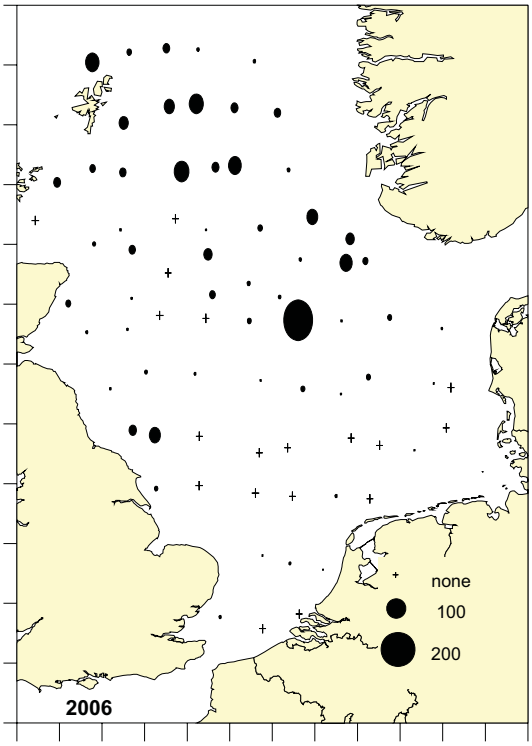
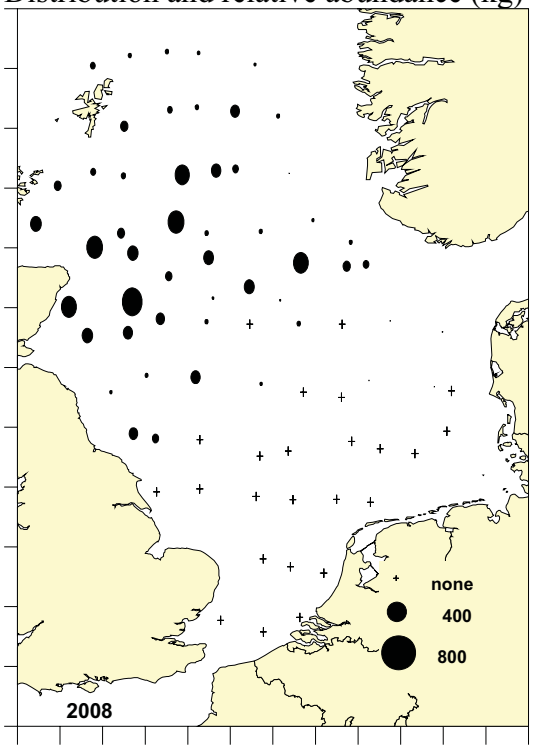
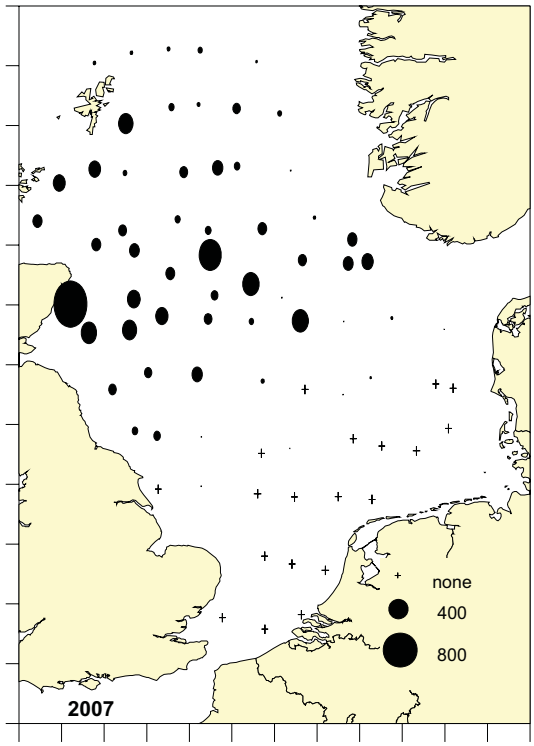


Figure 3.
Distribution and relative abundance (kg) of haddock for 2006 to 2008.





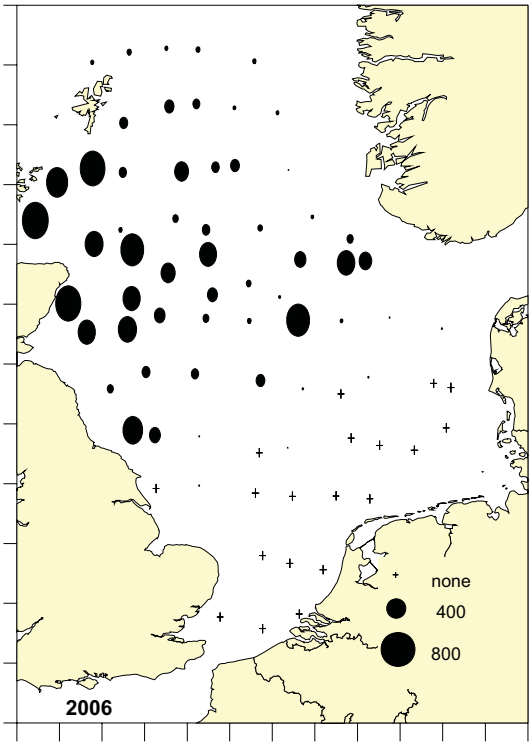
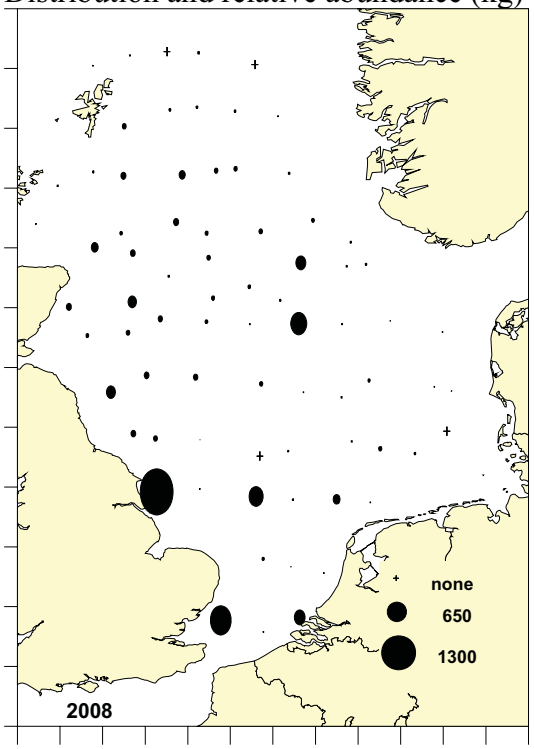
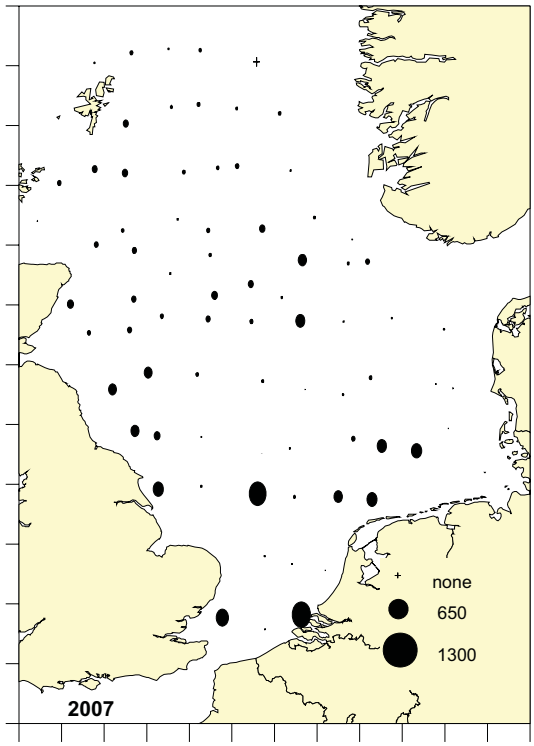


Figure 4.
Distribution and relative abundance (kg) of whiting for 2006 to 2008.





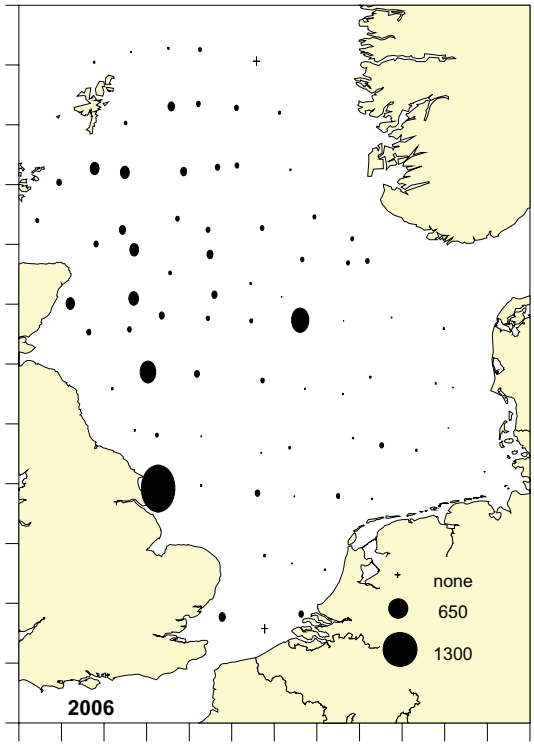
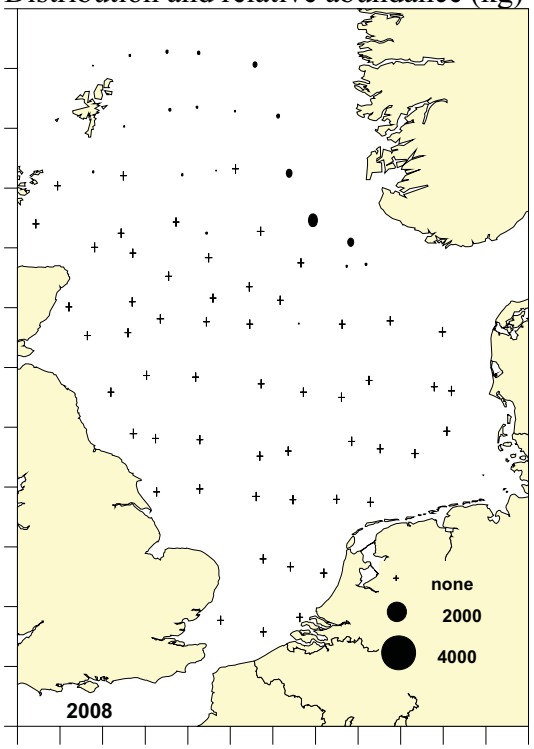
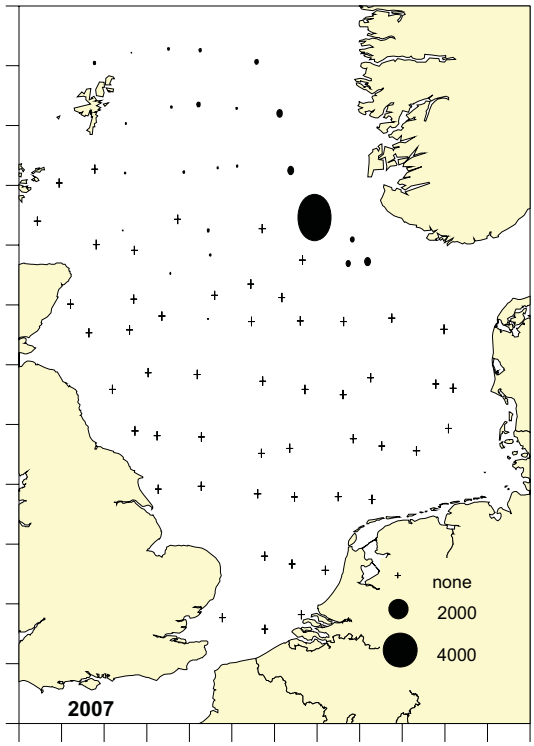


Figure 5.
Distribution and relative abundance (kg) of saithe for 2006 to 2008.





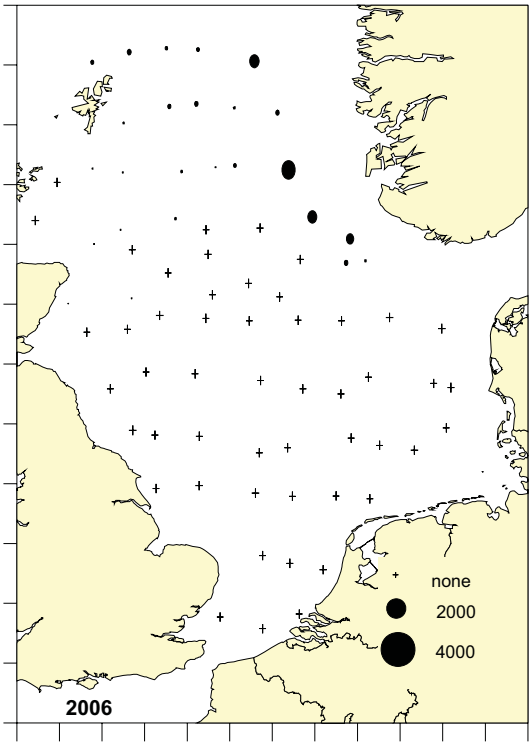
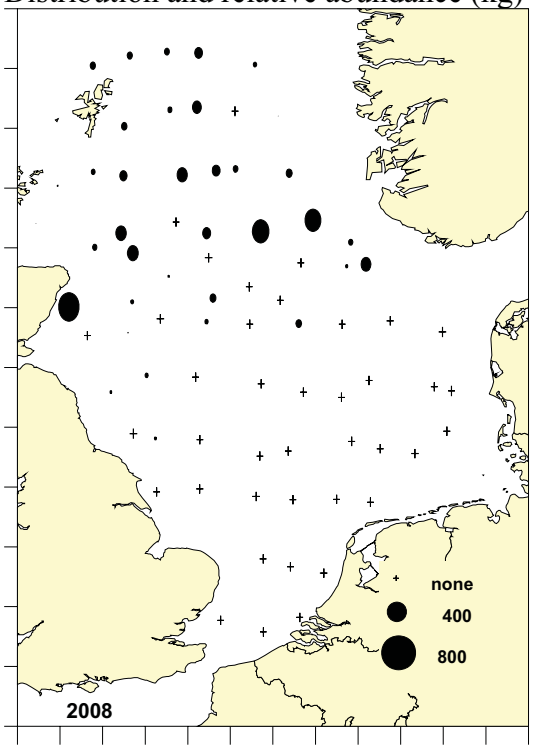
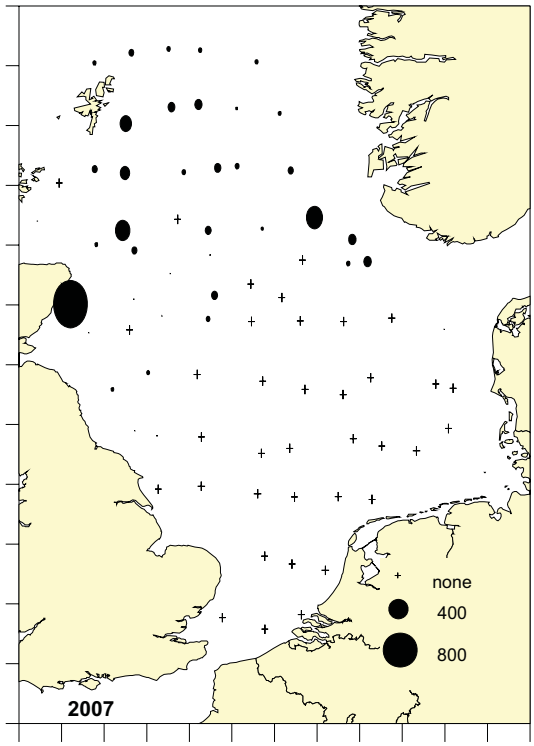


Figure 6.
Distribution and relative abundance (kg) of Norway pout for 2006 to 2008.





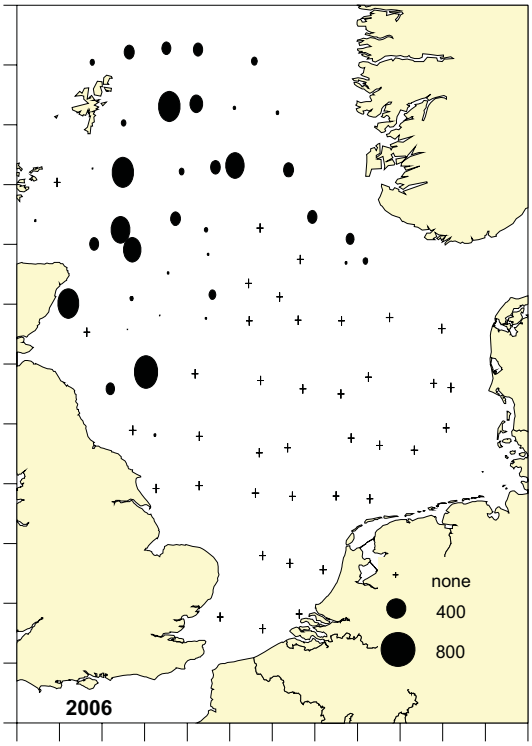
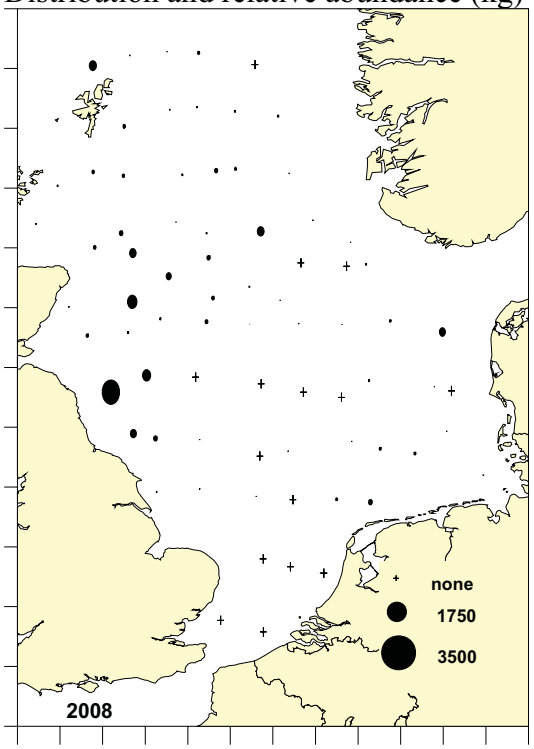
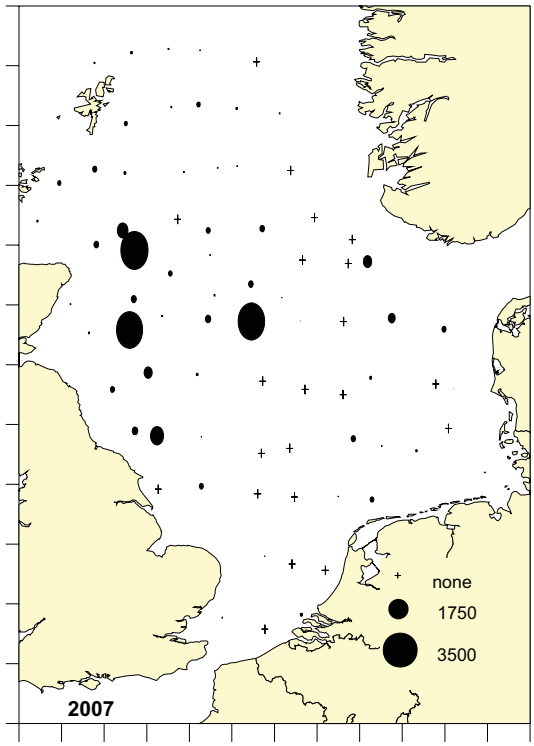


Figure 7.
Distribution and relative abundance (kg) of herring for 2006 to 2008.





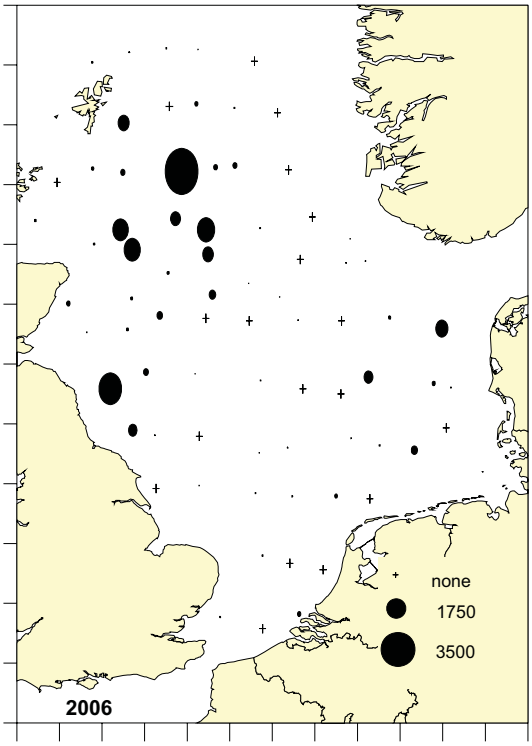
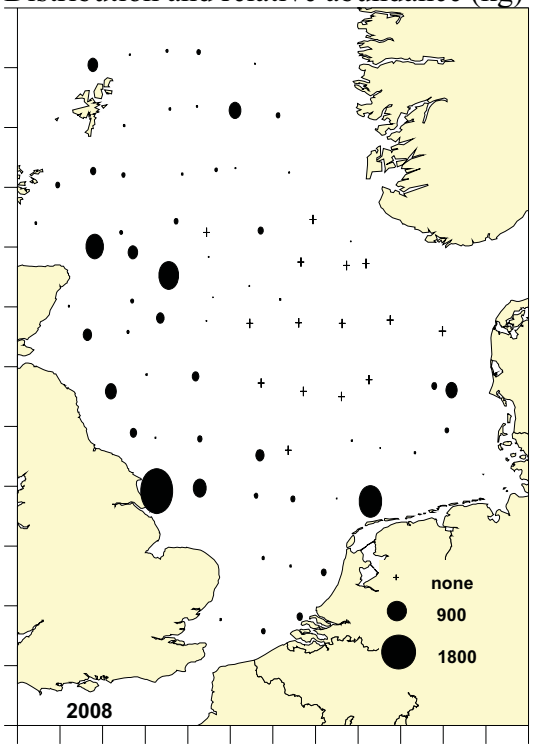
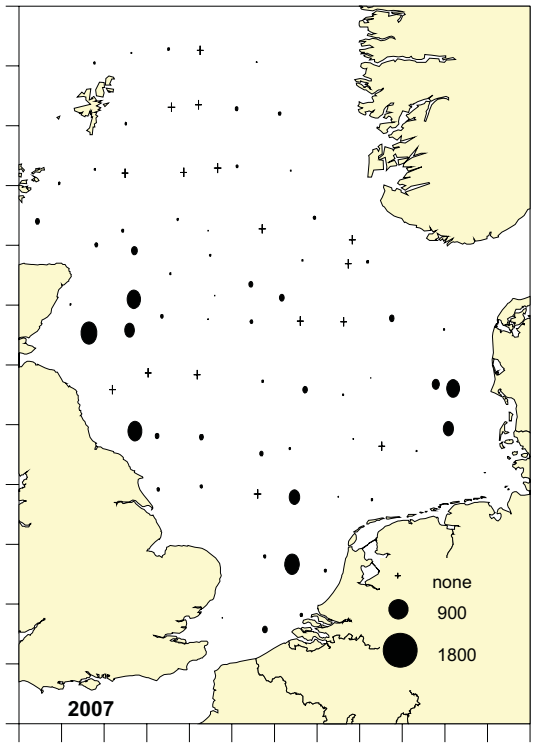


Figure 8.
Distribution and relative abundance (kg) of mackerel for 2006 to 2008.





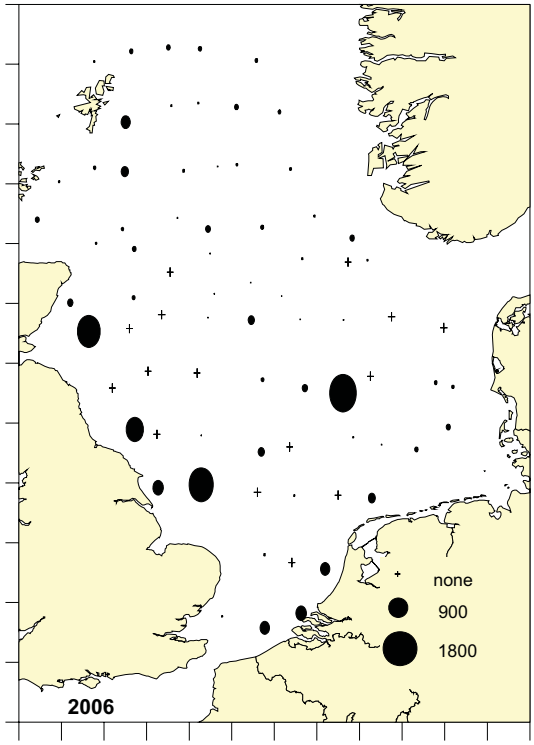
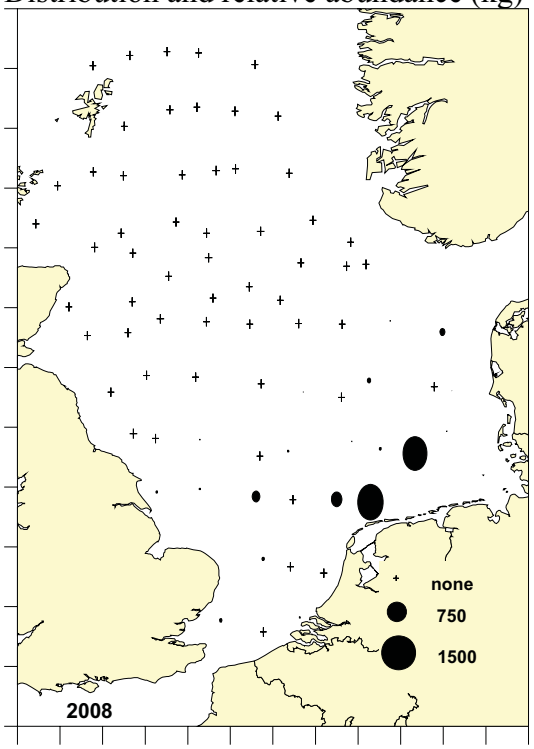
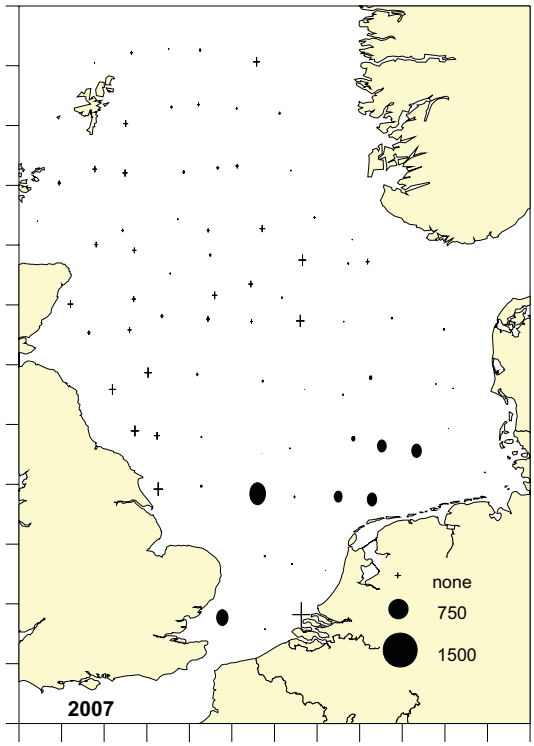


Figure 9.
Distribution and relative abundance (kg) of sprat for 2006 to 2008.





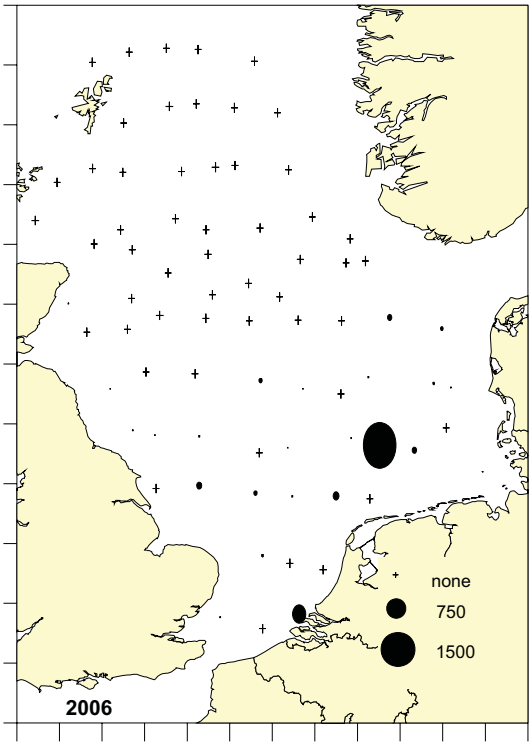


Figure 10.
Distribution and relative abundance (kg) of plaice for 2006 to 2008.