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

2007 RESEARCH VESSEL PROGRAMME

PROGRAMME: RV CEFAS ENDEAVOUR: SURVEY 16

STAFF:

Part A	Part B
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S McCully	S McCully
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	B Bland (Sweden)
	A Waugh (EA)

DURATION: Part A: 10 August – 25 August
Part B: 26 August – 9 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. To collect photographs and sections of ovaries from cod, whiting, haddock and saithe for the 'The workshop on Sexual Maturity Staging of Cod, Whiting, Haddock and Saithe (WKMSCWHS)'(R Bucholtz, DIFRES).

3. To carry out replicate day grabs for DECAMONITOR project at NMMP 446 in the Thames estuary for Philippe Bersuder.

4. To collect selected species for isotope analysis for PhD student Ben Kuerten, at 3 stations in the southern North Sea.

NARRATIVE:
(All times GMT)

RV Cefas ENDEAVOUR sailed from Lowestoft at 0645h 10 August. 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 miniCTD and a 10-litre Niskin bottle, followed by a 30-minute tow with the standard IBTS rigged GOV, also 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 this first tow the Scanmar sensors were giving inconsistent reading, so the net was hauled and checked. All net parameters looked correct so the net was redeployed. Ten minutes into the tow the net came fast. The fishing skipper hauled in and the net had been damaged, with the fishing line being completely parted from the groundgear. The decision was made to remove the net and attach a new GOV net (no.10) to the groundgear. Whilst doing so Cefas ENDEAVOUR sailed into the Thames estuary to carry out a day grab station for Philippe Bersuder, this being carried out in the evening of the 10 August. After successfully replacing the net and having completed the day grab, the vessel steamed overnight to prime station 1. Work commenced at 0445 with a miniCTD cast followed by the GOV tow. The second tow of the day had to be abandoned after erratic Scanmar readings, possibly due to tide and bottom conditions on the tow. Before the next station, the vessel was boarded by the Dutch coastguard for a routine inspection and once complete, the final tow of the day was carried out without incident. On 12 August deployment of the gear was delayed whilst a CCTV camera in the winch room was fixed. On shooting the gear the Scanmar readings were again erratic so the net was hauled, the wing sensors were tightened and the gear redeployed. Although the readings were better they continued to be outside the expected range, however the seabed was heavily ridged with sand waves and this could have contributed to the readings. The final tow of the day was fished across the tide, in deteriorating conditions and had to be reshot when the starboard centre and upper bridles were found to be crossed. The net was redeployed, fishing into the wind and tide, giving much more stable Scanmar readings. The following day continued to see the gear net geometry at the extreme edges of the acceptable values and in an attempt to rectify this 10 floats were moved along the net and 1 additional bottle was placed next to the miniCTD cage, to help stabilise the headline readings. On 14 August, during the first tow of the day, the Scanmar readings showed the net to be in an unlikely net geometry, so the net was hauled and checked over again. Nothing seemed to be wrong so the net was once again deployed. The Scanmar readings continued to be outside expected values, so the decision to swap out all of the Scanmar units was made. The gear was deployed after lunch and the Scanmar readings were within all acceptable

ranges. On the 15 August the weather had deteriorated, however 3 successful hauls were carried out, without incident.

The following day the first 2 tows were fished without incident. On the last tow of the day, on a station notorious for damage, 26 minutes into the tow the port winch started to pay out and within 30 seconds 50 meters of warp had spooled out. The fishing skipper managed to react quickly and haul in. Thankfully, on retrieval, the only damage to the gear was the port side ground gear bobbin had parted, and as the net was otherwise intact, the station was deemed to be a valid 26-minute tow. On 17 August, on the first tow of the day, the kite fouled and tore a small hole in the square of the top of the net. The net was repaired and reshot. Due to concerns over the size of the catch, the net was hauled on 20 minutes and was valid. The next 2 tows were fished without incident. Over the following 2 days a further six tows were fished without incident in the east of the survey grid in Danish and Norwegian waters. On the morning of 20 August, 5 minutes into the first tow, at prime station 36, the Scanmar readings became erratic. The net was hauled, the Scanmar units were replaced and the net was redeployed, this time shooting from the opposite end of the tow. Twenty minutes into the tow, the Scanmar readings became erratic again, on the same spot as the original deployment. The net was hauled, no damage was found so a valid 20 minute tow was recorded. The final tow of the day saw 2 tonnes of herring (*Clupea harengus*) being caught, although there was nothing obvious on the sounder. On the afternoon of 22 August during the 2nd tow of the day, 4 tonnes of *Pollachius virens* (saithe) was caught. When the net surfaced the lazy deckie had parted, doing no other damage and it took approximately 1 hour to get the total catch on board. The remainder of the first half of the survey was successfully fished in fine weather and Cefas ENDEAVOUR docked in Aberdeen to change staff on the morning of 24 August.

With a change of staff and, with Barbara Bland from the National Board of Fisheries, Institute of Marine Research, Lysekil, Sweden and Adam Waugh from the Environment Agency joining us, the vessel sailed from Aberdeen late on 25 August to steam eastwards to recommence the survey at prime station 33 after breakfast on 26 August. In poor weather 3 stations were fished that day and the vessel then steamed 120 nm south overnight to start fishing on prime station 15 on the Dogger Bank the next morning. After carrying out the miniCTD cast, the trawl was deployed. Once the gear was on the bottom, the headline settled at 1m below the expected value. The gear was immediately hauled to check whether the ‘kite’ had fouled. Nothing obvious was seen to be wrong so the gear was redeployed; the headline remaining low. Once again the gear was hauled. On recovery it was noted that the starboard bridles were badly twisted. The crew uncoupled these and took these turns out by hand and then the net was shot again. This time the headline was as expected and the tow was successfully fished for 30 minutes. Fishing continued throughout 27 and 28 August, and we successfully completed a further 5 stations in fair weather, without incident. On the morning of 29 August, again on the first tow of the day, the net was hauled after 30 minutes, only to find that he codend liner had pushed through the codend knot, thus allowing fish to escape. There was no obvious reason for this, but the haul was deemed invalid and reshot. This tow was valid and we steamed east to fish on prime station 32. Having shot and hauled successfully it was noted that the codend bag was floating high on the surface, a sign of a large catch. After an hour the crew

successfully managed to get the codend onboard without incident, and the total catch was in excess of 2.5 tonnes, 2 tonnes of which was herring. However, during the tow the echo-sounder showed no evidence of herring marks. The final tow of the day was completed successfully and the Cefas Endeavour steamed north overnight to continue fishing off the eastern coast of Scotland. Four stations were fished on 30 August, with the third tow of the day having 2.4 tonnes of herring. On 31 August the weather deteriorated again with winds gusting 45 knots, however three tows were successfully fished.. At approximately 0600h on 1 September, Barbara Bland and Adam Waugh were set ashore in Aberdeen, by workboat. After breakfast, the vessel steamed to 12 nm south-east and continued the survey. During the tow a number of large marks were seen on the echo sounder, on hauling the gear over 2 tonnes of *Trisopterus esmarki* (Norway pout) and *Melanogrammus aeglefinus* (haddock) were caught. The vessel steamed north-west to prime station 51. Due to major damage on the usual tow last year, a new tow was fished. Due to problems whilst shooting and as we ran out of clear ground, the new tow had to be cut short to 20 minutes, to minimise the risk of damage. The following morning on prime station 66 another new tow was fished, and a full 30-minute tow was carried out with no damage. Over the next few days the weather deteriorated, and on 3 September, in order to minimise the risk of accident to the deck crew, the miniCTD and the wing end Scanmar units were removed whilst fishing the four stations that were completed that day. With the weather moderating, normal fishing practices resumed on 4 September and the remaining stations were completed in the north of the survey grid without incident. Having completed prime station 71 by mid morning on 6 September, the vessel steamed south to attempt prime station 2, one that had been abandoned during the first few days of the survey. At 1300h on 8 September, the final valid station of the survey was fished and Cefas ENDEAVOUR steamed back to Lowestoft to dock at 0830h on 9 September.

RESULTS

Aim 1. A valid GOV trawl haul was successfully completed at all of the 75 primary station positions (Table 1). There were also 4 invalid tows, all of which were 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 trawl number 11 but at the shakedown tow, this gear was damaged beyond repair at sea, and trawl number 10 was used for the rest of the standard 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. At each station, the catch of each species was weighed and all fish, or representative samples, were measured. Tables 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 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 *Trigloporus lastoviza, Raja fullonica, Hippoglossus hippoglossus, Galeus melastomus* and *Capros aper*.

Figure 2 shows distribution and relative abundance (kg per hour) of cod (*Gadus morhua*), haddock, whiting (*Melangius merlangus*) and saithe and Figure 3 shows distribution and relative abundance of Norway pout, herring, mackerel (*Scomber scombrus*) and sprat (*Sprattus sprattus*).

Table 1.

Gear	Valid	Additional	Invalid	Total
GOV (IBTS Standard gear)	75	0	4	79
Day grab	10	0	0	10
Niskin Bottle + MiniCTD	75	0	0	75

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	21	*Microstomus kitt*	55
Alosa fallax	2	*Molva molva*	11
Ammodytes tobianus	2	*Mullus surmuletus*	19
Anarhichas lupus	2	*Mustelus asterias*	4
Argentinidae	32	*Myoxocephalus scorpius*	8
Arnoglossus laterna	19	*Myxine glutinosa*	10
Aspitrigla cuculus	2	*Nephrops norvegicus*	17
Belone belone	1	*Ommastrephes saggittatus*	2
Buglossidium luteum	22	*Pholis gunnellus*	1
Callionymus lyra	39	*Phrynorhombus norvegius*	1
Callionymus maculatus	21	*Phycis blennoides*	1
Cancer pagurus	25	*Platichthys flesus*	3
Capros aper	1	*Pleuronectes platessa*	59
Ciliata septentrionalis	1	*Pollachius pollachius*	3
Clupea harengus	54	*Pollachius virens*	24
Enchelyopus cimbrius	13	*Raja clavata*	2
Engraulis encrasicolus	4	*Raja fullonica*	2
Entelurus aequoreus	42	*Raja montagui*	3
Eutrigla gurnardus	66	*Raja naevus*	12
Gadiculus argenteus	11	*Raja radiata*	38
Gadus morhua	55	*Sardina pilchardus*	1
Galeorhinus galeus	3	*Scomber scombrus*	59
Galeus melastomus	2	*Scophthalmus maximus*	10
Glyptocephalus cynoglossus	22	*Scophthalmus rhombus*	4
Hippoglossoides platessoides	53	*Scyliorhinus canicula*	17

Hippoglossus hippoglossus	4	*Scyliorhinus stellaris*	2
Homarus gammarus	2	*Sebastes viviparus*	2
Hyperoplus lanceeolatus	13	*Solea solea*	7
Lepidorhombus boscii	1	*Spondyliosoma cantharus*	1
Lepidorhombus whiffiagonis	16	*Sprattus sprattus*	13
Limanda limanda	65	*Squalus acanthias*	5
Loligo forbesi	20	*Syngnathus acus*	1
Lophius budegassa	1	*Trachinus vipera*	14
Lophius piscatorius	25	*Trachurus trachurus*	41
Lumpenus lampretaeformis	4	*Trigla lucerna*	13
Maurolicus muelleri	1	*Trigloporus lastoviza*	1
Melanogrammus aeglefinus	56	*Trisopterus esmarki*	39
Merlangius merlangus	74	*Trisopterus luscus*	6
Merluccius merluccius	33	*Trisopterus minutus*	25
Microchirus variegatus	2	*Zeus faber*	4
Micromesistius poutassou	7		

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

Species common name	Scientific name	2007 weight (kg)	2006 weight (kg)	2005 weight (kg)
Herring	*Clupea harengus*	9365.861	7232.222	3377.525
Dab	*Limanda limanda*	5193.865	4110.781	5545.580
Saithe	*Pollachius virens*	4694.575	2806.417	1705.120
Haddock	*Melanogrammus aeglefinus*	3688.231	2857.630	3572.871
Mackerel	*Scomber scombrus*	2730.282	2887.207	1434.116
Whiting	*Merlangius merlangus*	2496.269	1849.026	3329.122
Norway Pout	*Trisopterus esmarkii*	1734.222	1968.145	1074.437
Grey Gurnard	*Eutrigla gurnardus*	1389.313	670.34	1017.598
Horse Mackerel	*Trachurus trachurus*	1199.281	1254.689	2476.885
Plaice	*Pleuronectes platessa*	776.000	437.284	780.813
Cod	*Gadus morhua*	530.331	312.741	167.149
Long Rough Dab	*Hippoglossoides platessoides*	389.476	420.435	298.075
Sprat	*Sprattus sprattus*	334.755	1032.529	1376.445
Lemon Sole	*Microstomus kitt*	292.125	188.378	239.578
Starry Ray	*Raja radiata*	191.741	129.366	122.391

A total of 6795 biological samples were taken for the primary target species (Table 4). In addition, a total of 290 samples were also taken from elasmobranchs captured during the survey.

Table 4.

Species	**Number of samples taken**
Cod	514
Dab	394
Haddock	1099
Herring	852
Lemon Sole	245
Mackerel	341
Norway pout	370
Plaice	910
Saithe	355
Sprat	308
Turbot	12
Whiting	1351
R. clavata	6
R. radiata	242
R. montagui	6
R. neavus	34
R. fullonica	2

Aim 2. 104 samples were taken for 'The workshop on Sexual Maturity Staging of Cod, Whiting, Haddock and Saithe (WKMSCWHS)'. Table 5 gives the breakdown by species of those samples taken.

Table 5.

Species	Number of samples taken
Cod	29
Whiting	28
Haddock	23
Saithe	24

Aim 3. 10 successful grabs were completed (Table 1) and the resultant samples were frozen to be return to the laboratory for analysis.

Aim 4. 10 bags of samples from the 3 sites requested by Ben Kuerten, were taken along with *Entelurus aequoreus (*Snake pipefish) from a further 28 stations.

Additional Aims:

4 bags of O-group cod were frozen for FRS, Aberdeen.

The following table lists six elasmobranch fish tagged as part of an ongoing programme onboard Cefas RV surveys (station 14 was invalid for assessment purposes).

Capture station	Species	Tag No.	Length(mm)	Weight	sex	Maturity (if identifiable)	Additional Comments
14	*Scyliorhinus stellaris*	808801	710		F		
14	*Scyliorhinus stellaris*	808802	880		M	C	
14	*Raja clavata*	808803	470		F		Wing width (mm) = 320
56	*Scyliorhinus stellaris*	808804	920	4260	F		
92	*Squalus acanthias*	808805	115	7080	F		
113	*Squalus acanthias*	808806	700	1470	M	B	

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.

B Harley
25 September 2007

Initialed: R Millner

DISTRIBUTION:

Basic list +

B Harley	R Humphreys
S McCully	L Clancy
J Smith	R Millner
L Cox	J Keable
E Lane	M Eade
B Hatton	

Figure 1.

Station positions CEFAS Endeavour 16/07.

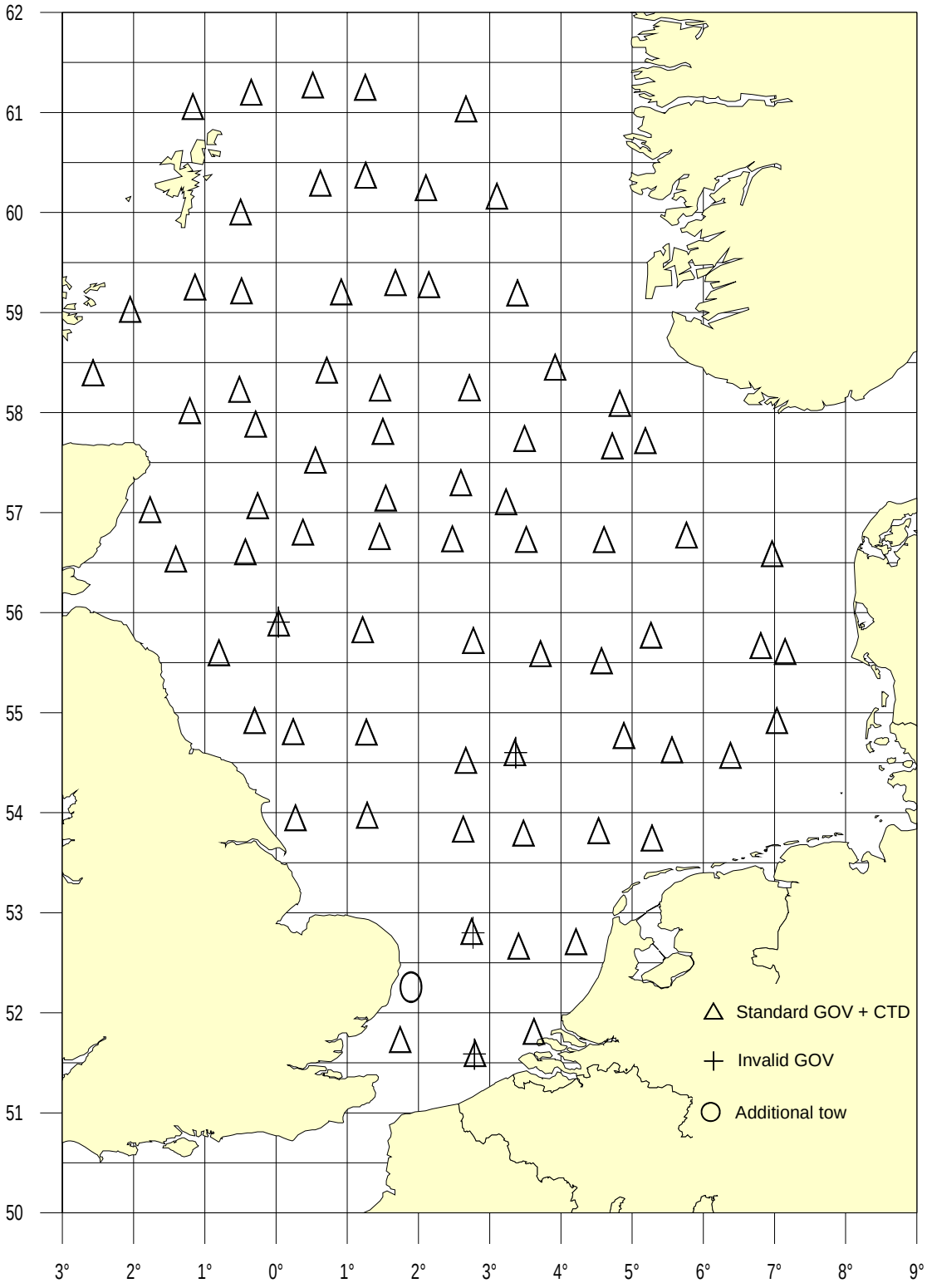

Figure 2.
Distribution and relative abundance (kg) of cod, haddock, whiting and saithe.

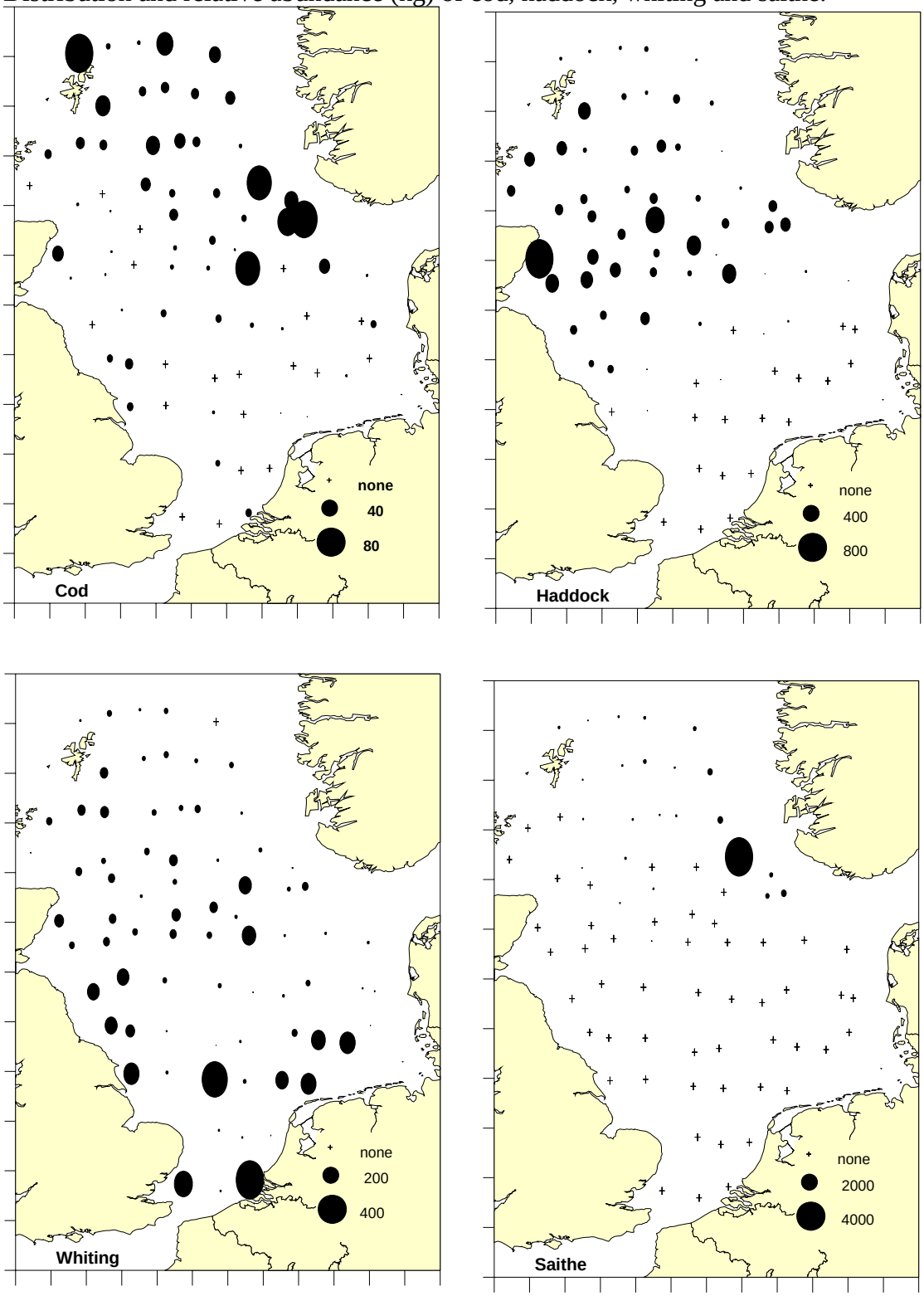

Figure 3.
Distribution and relative abundance (kg) of Norway pout, herring, mackerel and sprat.