

R1/6

Not to be cited without prior reference to the Marine Laboratory, Aberdeen

FRV *Clupea*

Cruise 1199C

REPORT

1-19 July 1999

Personnel

S P R Greenstreet	(In charge)
P J Copland	(1-6 July)
I M Gibb	
H M F Emmerson	
F M Kennedy	(6-11 July)
E Bresnan	(6-11 July)

Cruise Objectives

To carry out an acoustic survey, backed up by pelagic trawling, to determine the biomass and distribution of pelagic fish in an area off the Forth of Forth which included the Wee Bankie and Marr Bank. To assess the abundance and distribution of seabirds in the area using standard transect census techniques. To record the location of all marine mammals observed at sea. To map seabed sediment type using the acoustic system RoxAnn. To determine spatial variation in the water temperature and salinity profile within the study area. To carry out a bottom trawl survey to determine the abundance, distribution and length composition of piscivorous demersal fish species and to collect stomach samples from these fish to determine spatial variation in their diet. To determine weight-length relationships for each fish predator species, and examine spatial variation in fish condition. To collect live 0-group haddock for experimental work at the laboratory. To carry out a night-time grab survey, over sediments previously determined as suitable sandeel habitat, to assess sandeel abundance and distribution. The sediment samples collected during this survey will be used to assess the Rox Ann derived sandeel habitat map.

Out-turn days per project: 19 days M07A

Narrative

The heavy scientific equipment was loaded onto *Clupea* on 28 June at Fraserburgh, and on the following day scientific staff went up to the vessel to set up the laboratory. Scientific staff joined the vessel on 1 July at 1000 hours and the ship sailed at 1130 hours. *Clupea* made straight for the southern end of the study area and anchored off Pease Bay. The following day acoustic and seabird/marine mammal survey commenced. Figure 1 shows the acoustic survey track steamed and indicates those sections of track where seabird and marine mammal survey was also undertaken. Concentrations of pelagic fish were sampled using an International Young Gadoid Trawl (PT154 with 6 mm cod-end) to determine species composition, length frequency distributions, length-weight relationships and samples of fish had their otoliths extracted to

determine age at length relationships. The positions of the trawl samples are also indicated on Figure 1.

All acoustic and seabird survey work was carried out between 0400 hours and 1500 hours; the time when sandeels were expected to be most active, and therefore most likely to be encountered in the water column rather than buried in the sediment. Instances where seabirds were seen to be carrying prey were recorded. Where possible, prey items were identified and their size estimated relative to the bird's bill length. All sightings of marine mammals at sea were recorded, whether as part of the seabird survey, or just simply opportunistic sightings. The species, number of individuals involved, time and position were noted.

Survey commenced at the southern most transect and worked north. On 3 July heavy rain prevented seabird survey over the eastern most 18NM of the transect immediately north of the Isle of May, however it was possible to repeat this section of transect at a later date. On 5 July thick fog prevented seabird survey over the whole of the northern most transect.

On completion of the acoustic and seabird survey track, in the afternoon of 5 July, the vessel steamed for Montrose to change scientific staff and to replace the pelagic fishing gear with a demersal rockhopper trawl (BT158 with 10 mm cod-end). Phil Copland left the vessel and Fiona Kennedy and Eileen Bresnan joined *Clupea*.

Clupea departed Montrose at 0400 hours on 7 July and three of the most easterly demersal fishing stations were sampled on route to anchorage off St Abbs. Over the following four days the remaining 16 demersal trawl stations shown in Figure 2 were fished by half hour trawls. Catch numbers and length frequency distributions (to the cm below) of all species were determined.

Length-stratified (using the ICES stomach sampling size strata for fish greater than 12 cm in length) sub-samples of cod, whiting and haddock were remeasured (to the half cm below) and weighed to determine length-weight relationships (Fig. 3) and to establish body condition, their stomachs and intestines were removed for dietary and consumption rate analysis, and their livers and gonads were retained to determine gonado and hepato-somatic indices. Up to 40 fish per species and size stratum were examined and their feeding status assessed (feeding, regurgitated or not feeding) until 15 feeding fish had been encountered. Samples of herring, sprats and sandeels were also weighed to determine length weight relationships (Fig. 3) and otoliths were collected for age determination. A Seabird CTD sampler was deployed at each demersal fishing station (Fig. 4), immediately following each fishing operation, to gather information regarding spatial variation in the salinity and temperature profile through the water column.

After the last demersal station had been fished on 11 July, the station marked as C99/105 was revisited and fished twice for 10 minutes to collect live 0-group haddock. Approximately 300 fish were collected. After this *Clupea* steamed for Montrose, tying up at 1300 hours to allow Fiona Kennedy and Eileen Bresnan to leave the vessel. The live haddock were also offloaded.

Clupea remained in Montrose till 1800 hours on 12 July to allow for the change over from daytime working to a night time regime. Over the nights of 12 to 16 July a total of 206 grab stations were sampled (Fig. 5a). This work was carried out between the hours of 2030 and 0430, when light levels were lowest. Samples of the sediment were retained for particle size and chemical composition analysis. Four hundred and seventy nine sandeels were caught and these were measured and weighed and had their otoliths extracted for age determination. The highest

densities of sandeels were recorded on the Wee Bankie (Fig. 5b); densities on the Marr Bank appeared lower than in 1998.

During the afternoon and evening of 17 July a transect across the Wee Bankie at 56° 12.5'N was steamed and 18 CTD profiles were collected. This transect of CTD stations is also shown on Figure 4. When this transect was completed *Clupea* steamed for Fraserburgh where she arrived at 0830 hours on 18 July. The scientific equipment was offloaded and Marine Laboratory staff left the ship at 1030 hours on 19 July.

Simon Greenstreet
19 July 1999

Seen in draft: OIC, FRV *Clupea*

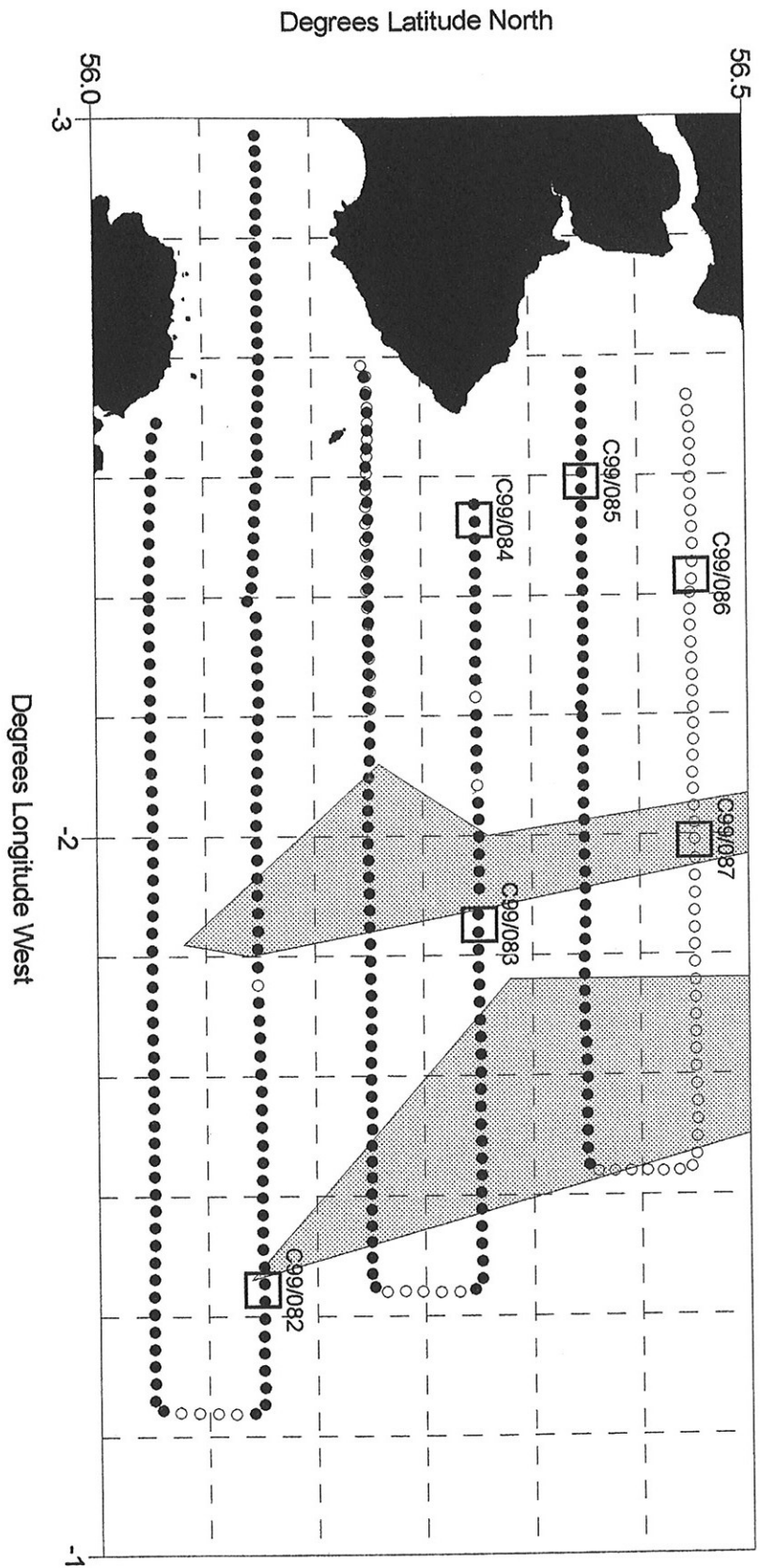


Fig. 1: Acoustic survey track steamed in July 1999, showing mid-point locations of five minute survey periods. Filled points indicate sample periods where seabird survey was also undertaken. Pelagic haul positions are indicated by square symbols and haul number is given.

Fig. 2: Chart showing locations of the 19 demersal trawl stations sampled in July 1999.

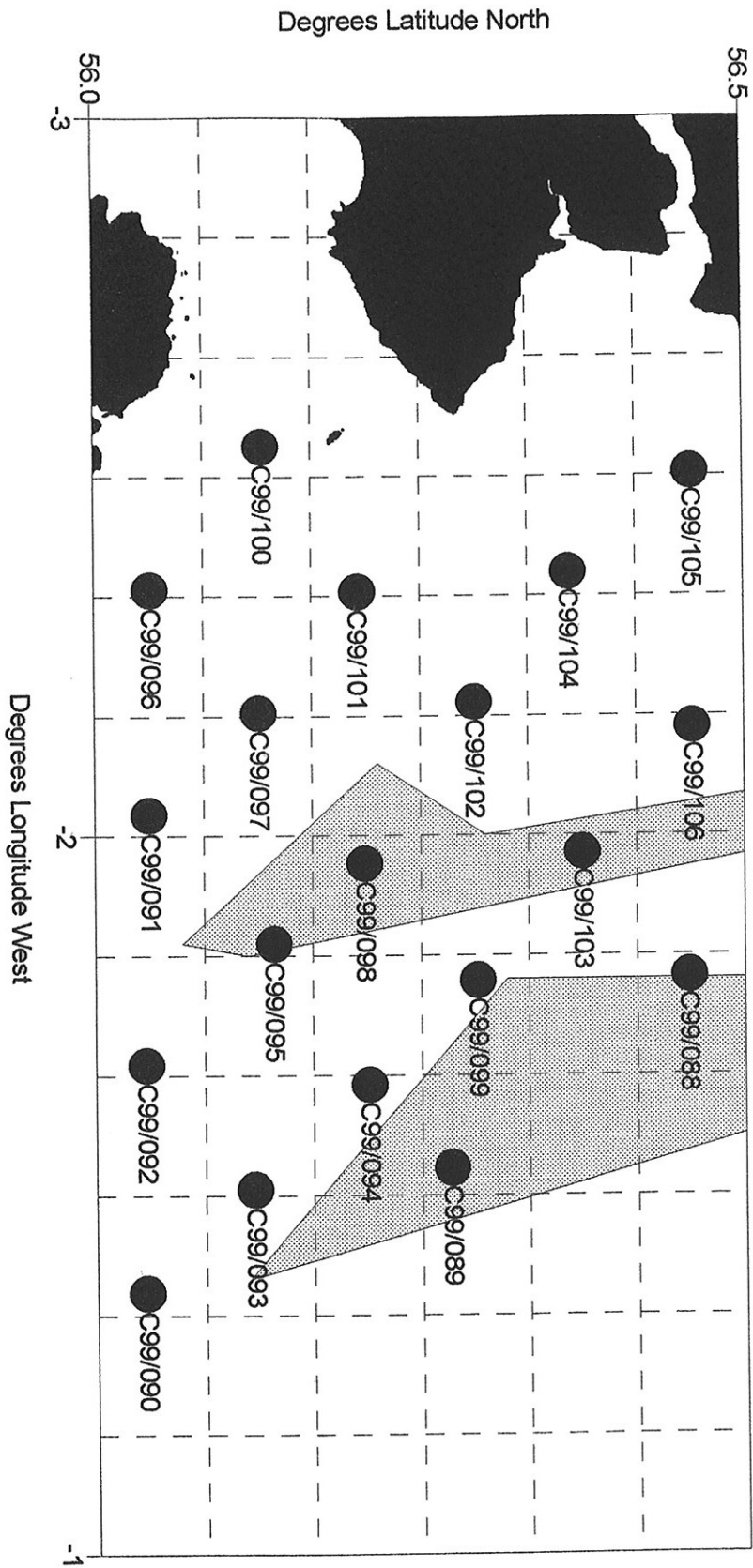


Fig. 3. Length-weight relationships for sandeels, sprats, herring, whiting, haddock and cod caught in the acoustic pelagic and demersal groundfish surveys in the Firth of Forth study area in July 1999.

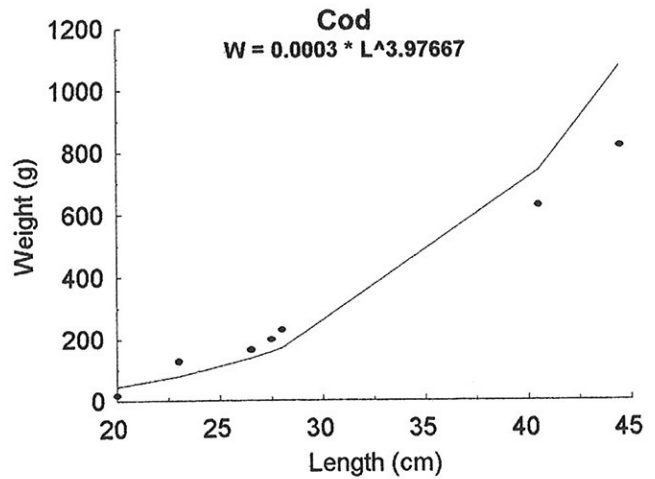
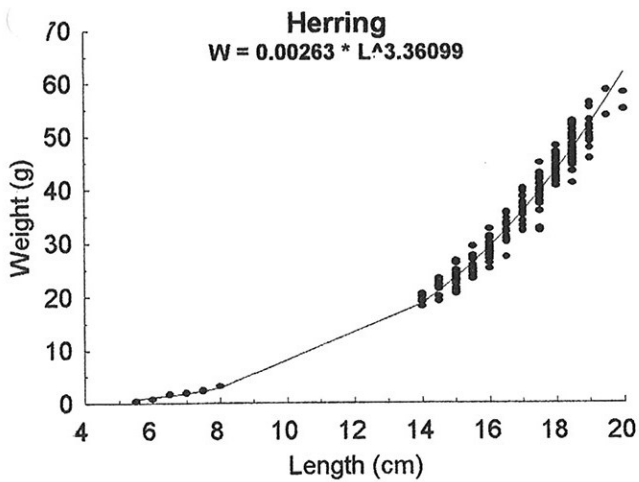
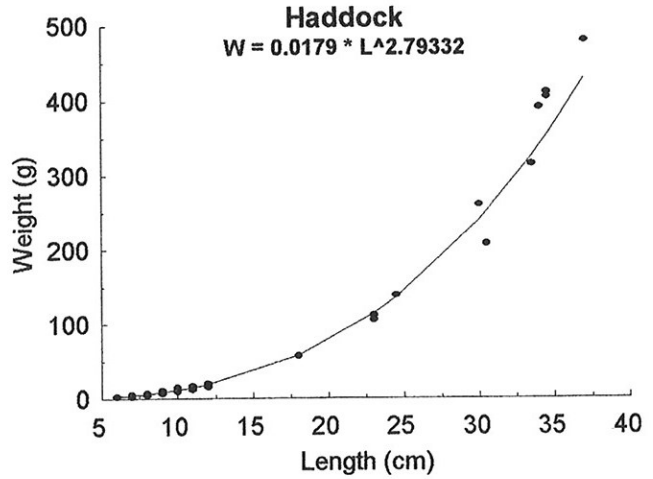
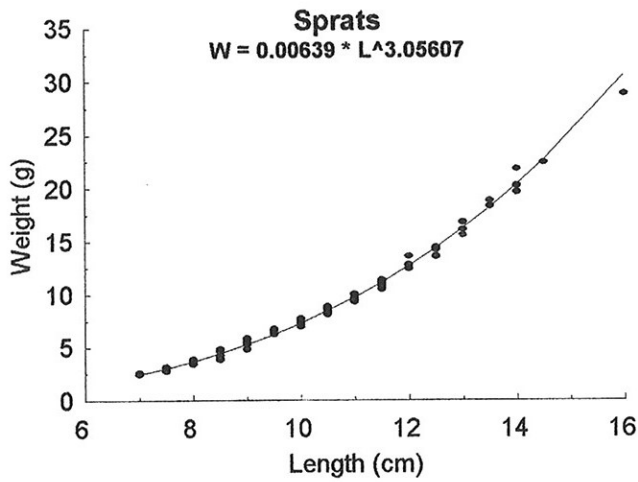
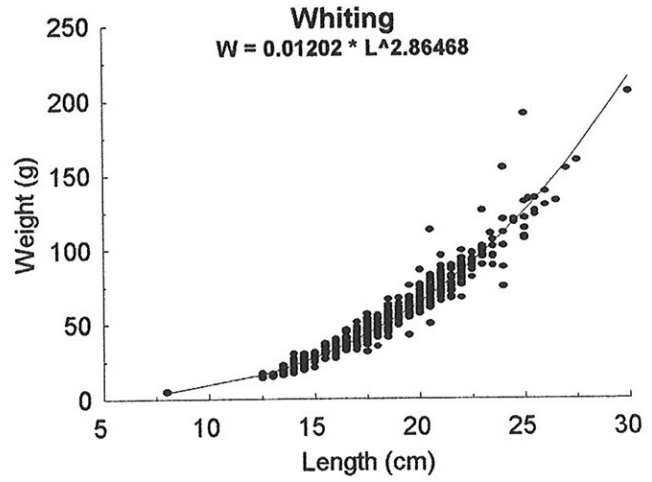
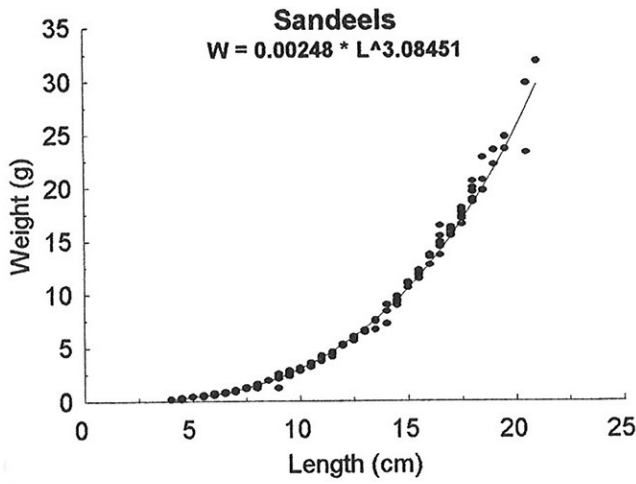


Fig 4. Chart showing CTD stations. Filled circles show main CTD grid, open circles show extra CTD transect.

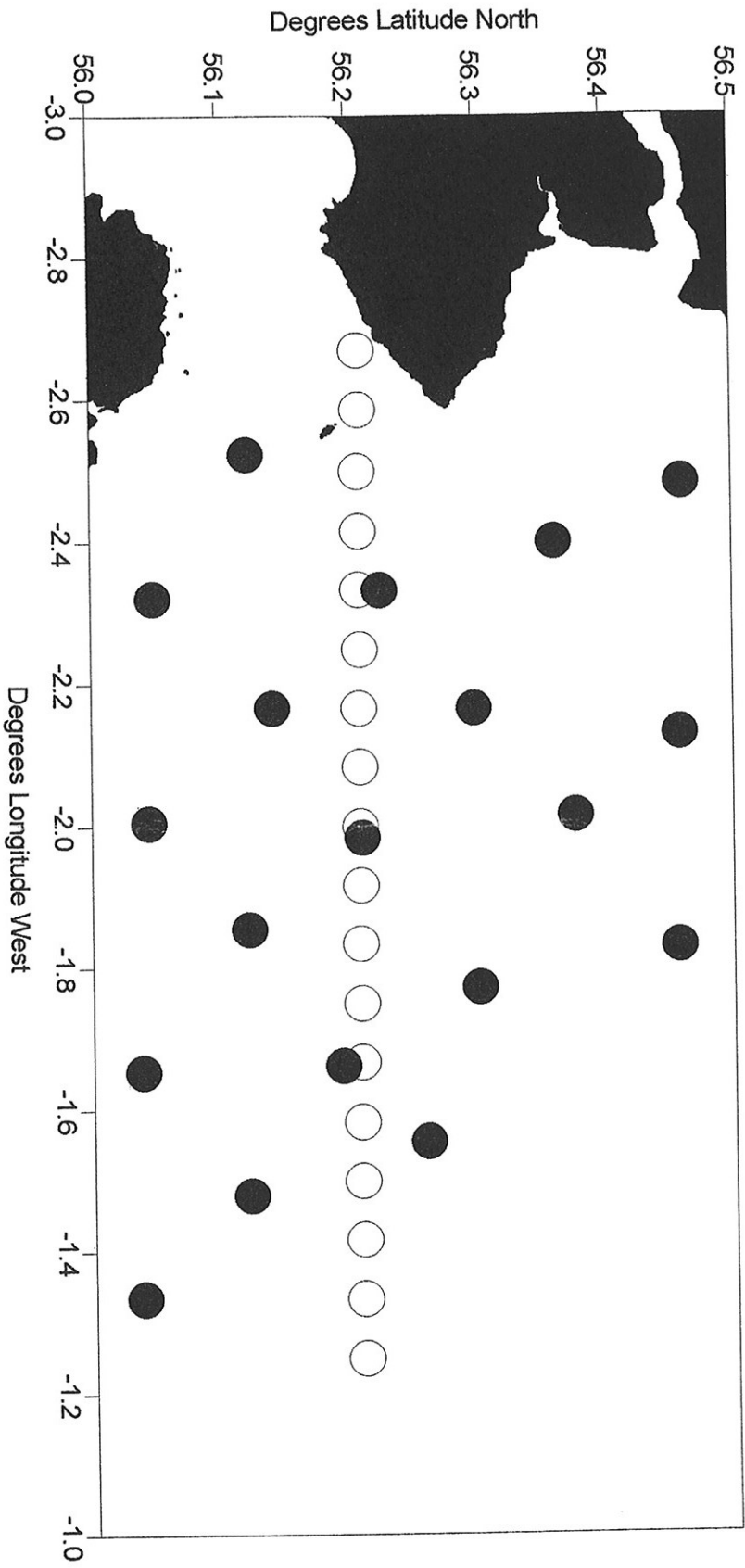


Fig.5a: Chart showing locations of the 206 grab survey stations sampled in July 1999.

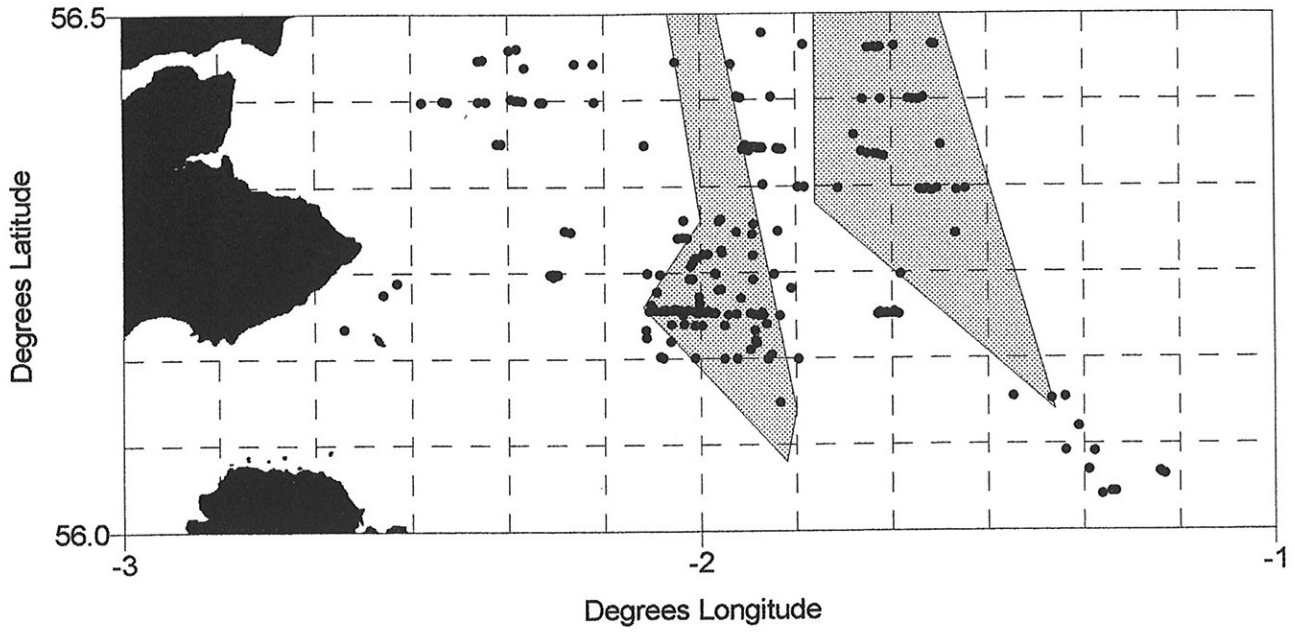


Fig. 5b: Spatial variation in the density of sandeels at the 206 grab survey stations sampled in July 1999. Maximum density is 320 sandeels per square metre.

