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FRV *Clupea*

Cruise 0498C

REPORT

3-23 March 1998

Personnel

S P R Greenstreet	SSO (in charge)
F Armstrong	SO (19-23 March)
I M Gibb	SO
C J Doyle	SO (3-13 March)
S G Bowe	ASO
R Li	ASO (3-13 March)

Objectives

The abundance and distribution of piscivorous demersal fish species in a study area of the Firth of Forth was investigated by bottom trawl survey. Length composition and weight-length relationships of piscivorous demersal fish species were determined. Otoliths were taken to enable age composition and age-length keys to be determined. Stomach samples were collected to determine the diets of these fish predators. The abundance of sandeels in the sediment was assessed by grab sampling survey. Sandeels caught were measured and weighed to determine length composition and length-weight relationships, and otoliths were taken for age determination. Sediment samples were collected in order to investigate the relationship between sandeel density and sediment particle size distribution, and to improve the ground-truthing of RoxAnn based sediment maps. The effectiveness of grab sampling and dredging (done by RV *Bernicia*) as a means of estimating sandeel density in the sediments was compared at five pre-determined locations. Again the sandeels caught were measured and weighed and had otoliths collected, and samples of seabed sediment were retained. The abundance and distribution of clupeids and sandeels in the water column off the Firth of Forth was assessed by echo-integrator survey. Pelagic trawl sampling was used to assess the species and length composition of fish in the water column. Weight-length relationships were determined and otoliths were collected for age determination. Further RoxAnn data were collected to improve RoxAnn based seabed sediment maps of the study area. Spatial variation in the temperature and salinity profiles in the water column were assessed using a Seabird CTD sampler. The abundance and distribution of seabirds, seals, and cetaceans, were assessed using standard transect survey methods.

Out-turn days per project: 21 days C578

Narrative

The scientific equipment was loaded onto *Clupea* on 27 February. Scientific staff joined the ship on the morning of 3 March at Fraserburgh and the ship sailed at 1215 hours. *Clupea* reached the study area at 1930 hours and commenced grab sampling till 2300 hours, before anchoring off the Tay at 0030 hours.

The following day the demersal trawl fishing survey commenced. Five trawl samples, using a Jackson Rockhopper bottom trawl gear (BT158) with 10 mm cod-end mesh, were taken each day during day-light hours on 4, 6 and 7 March; on 5 March strong winds prevented fishing in the late afternoon and only three trawl stations were fished. On 8 March *Clupea* started work at mid-day. The last two demersal fishing stations were to be fished in the afternoon, before continuing with the night time grab sampling operations. However, the trawl gear was severely damaged on the first station, leading to these last two stations being abandoned. Scanmar gear fitted to the headline and wings of the trawl gear were recovered at the water surface. A total of 18 demersal trawl stations were sampled (Fig. 1). Before and after each trawling operation the day grab and the Seabird CTD samplers were deployed to obtain sediment samples for groundtruthing the RoxAnn data and to gather information on the water temperature and salinity profiles (Fig. 2).

Through the nights of 9 to 12 March *Clupea* continued the grab sampling survey. On the morning of 13 March *Clupea* sailed into Montrose for the half-landing. The demersal fishing gear was unloaded and replaced with pelagic fishing gear. The day-grab, which had been developing a cable fault, was replaced. Cathy Doyle and Rose Li left the vessel. *Clupea* left Montrose at 1500 hours on 14 March to resume grab sampling operations. However, the replacement grab was found to have problems so work was abandoned at 2400 hours and *Clupea* returned to Montrose to change it. The vessel sailed again at 1630 hours to continue grab sampling. During the nights of 15, 16, and 18 March the last grab survey stations were sampled and the five stations dredged by *Bernicia* were also intensively sampled. Gale force winds prevented work on the night of 17 March. A total of 268 stations were visited during the main grab survey (Fig. 3) and 236 grab samples were collected in the five areas dredged by *Bernicia* (Fig. 4). On completion of grab sampling operations *Clupea* sailed for Leith where she docked at 1030 hours on 19 March to allow crew and scientists to switch back to a day-time work regime. Eric Armstrong joined the vessel.

Clupea sailed out of Leith at 0600 hours on 20 March to commence acoustic and top predator survey work. This was carried out during daylight hours (between 0630 and 1815 hours) on 20 and 21 March and the final transect was covered during the morning of 22 March. The acoustic survey track is shown in Figure 5 and locations where top predator census was carried out are indicated. In addition to the formal top predator survey, all casual sightings of seals and cetaceans were also noted. Concentrations of pelagic fish were sampled using an International Young Gadoid Pelagic trawl (PT154) with 6 mm mesh size cod-end (Fig. 5). Additional species and length composition data for herring and sprat were available from nine of the demersal trawl samples (Fig. 5).

Survey work was completed by 0920 hours on 22 March and *Clupea* sailed for Peterhead where she docked at 1530 hours. The scientific equipment was off-loaded and scientific staff left the ship on the morning of 23 March.

S P R Greenstreet
16 April 1998

Seen in draft: A Simpson, OIC

Figure 1. Demersal fishing stations fished in March 1998. The gear was damaged on station 23 and no sample was obtained.

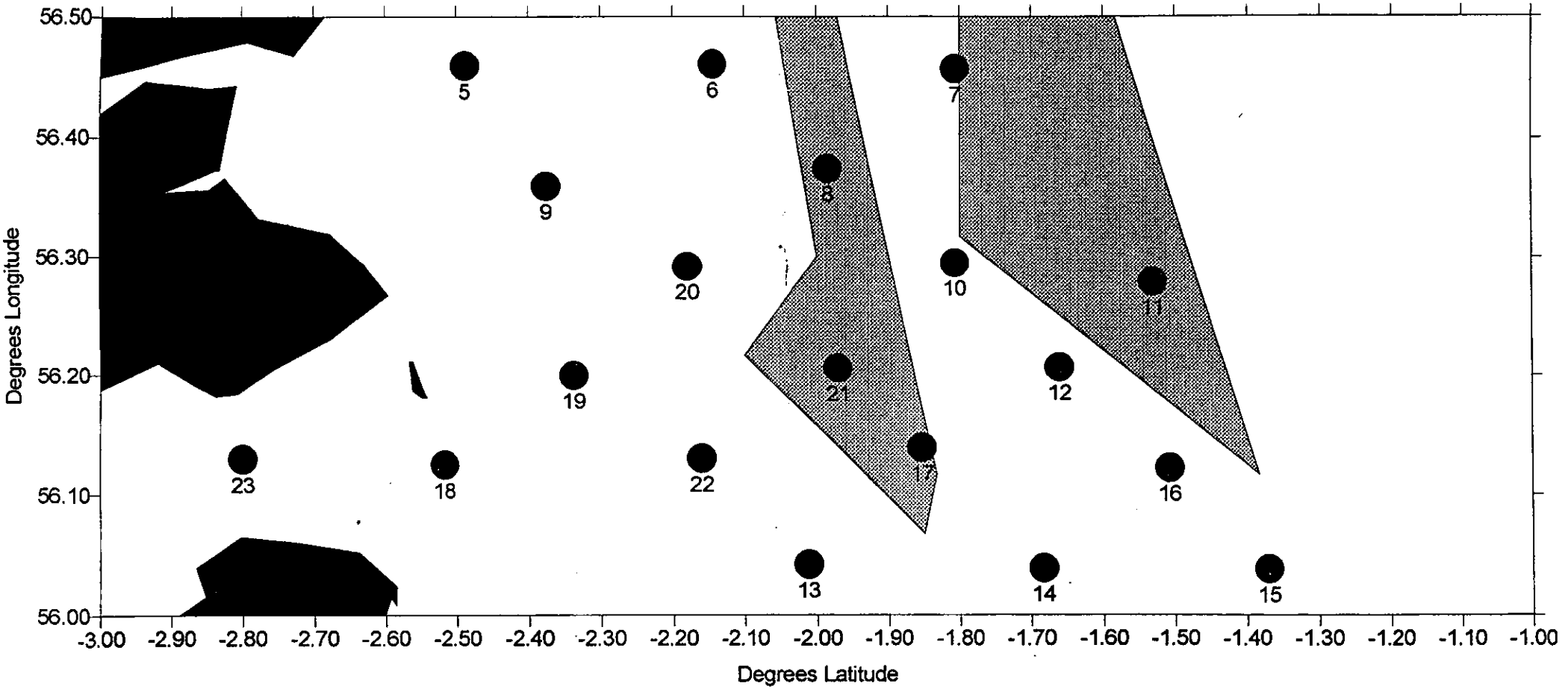

Figure 2. Positions of grab samples and CTD deployments associated with each demersal fishing station. (squares are grab sample locations and diamonds indicate CTD deployments)

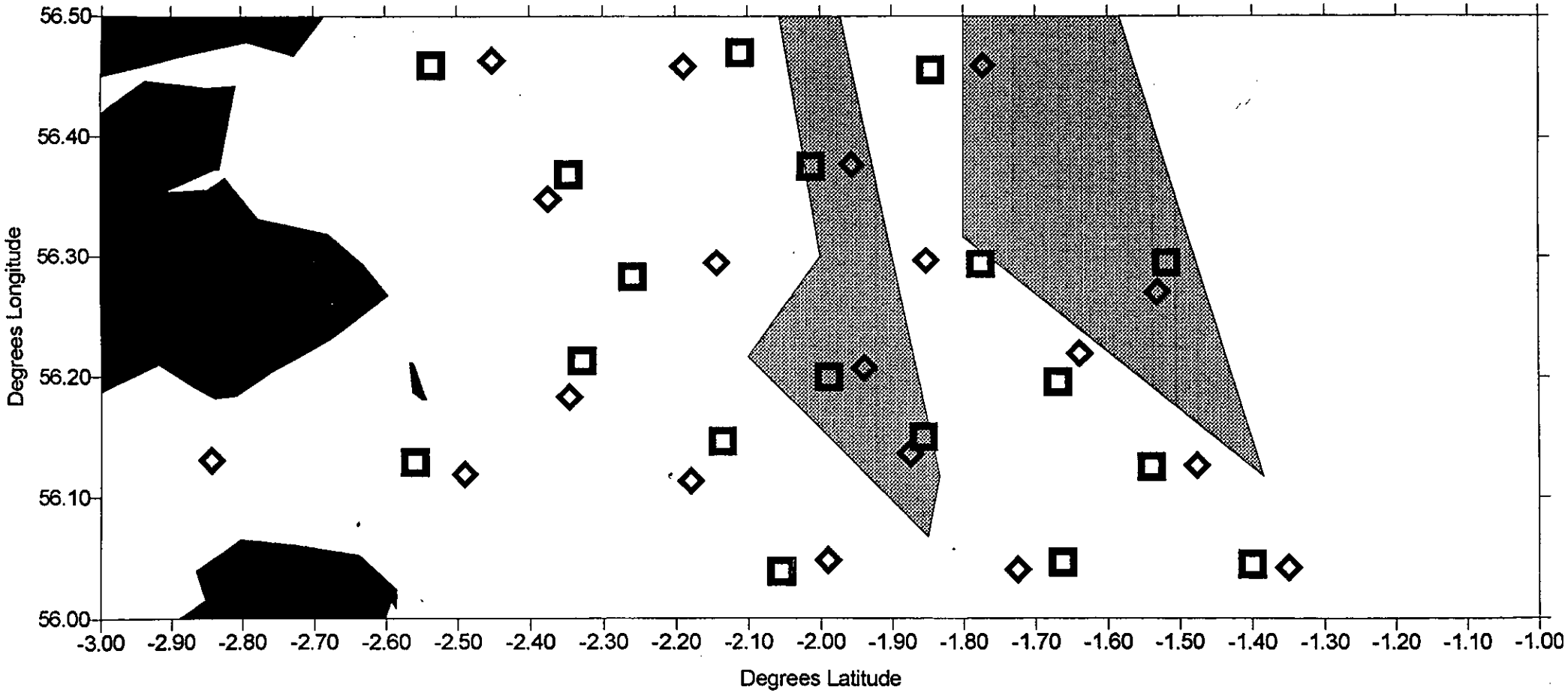

Figure 3. Positions of grab stations in main grab survey.

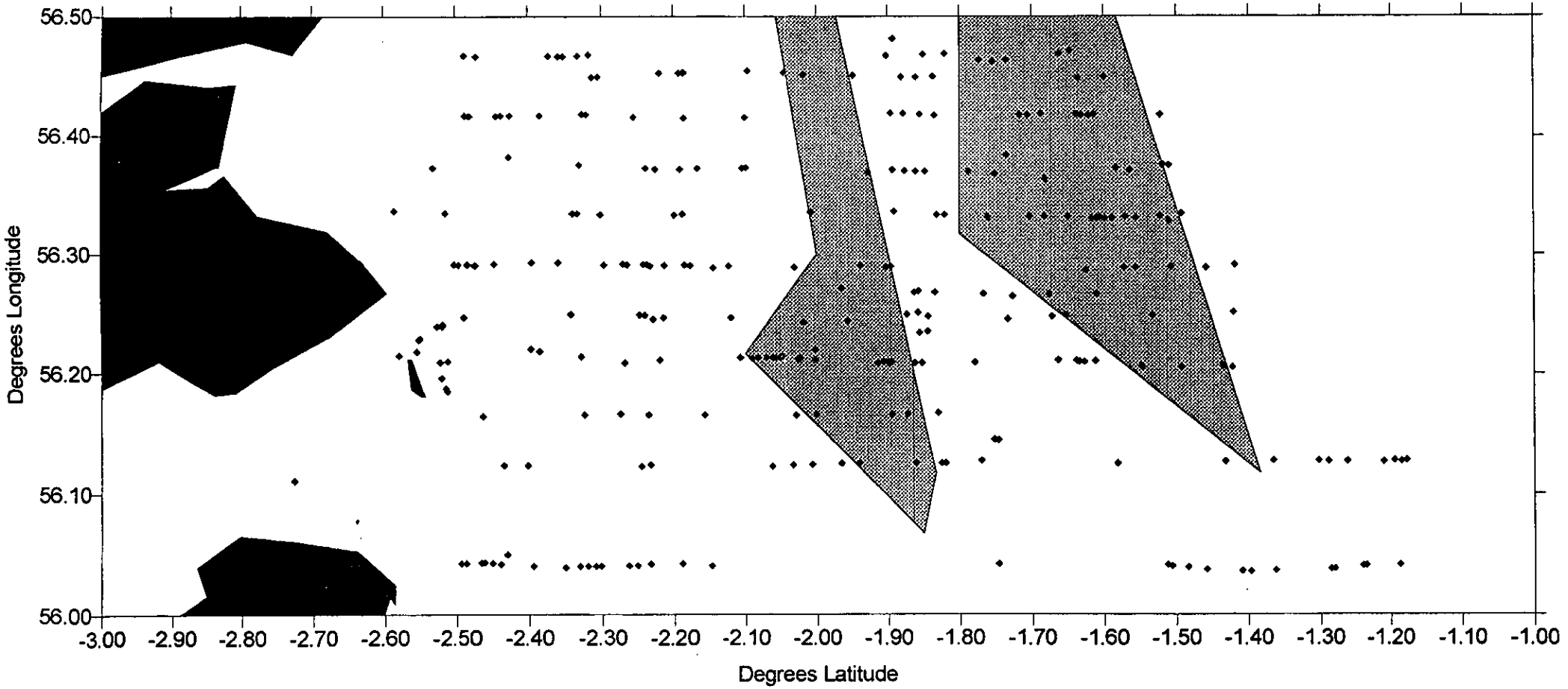

Figure 4. Locations of areas dredged by "Bernicia" where intensive grab sampling was also carried out. Labels indicate ranked sandeel densities observed in dredge samples collected by "Dana" in April 1997.

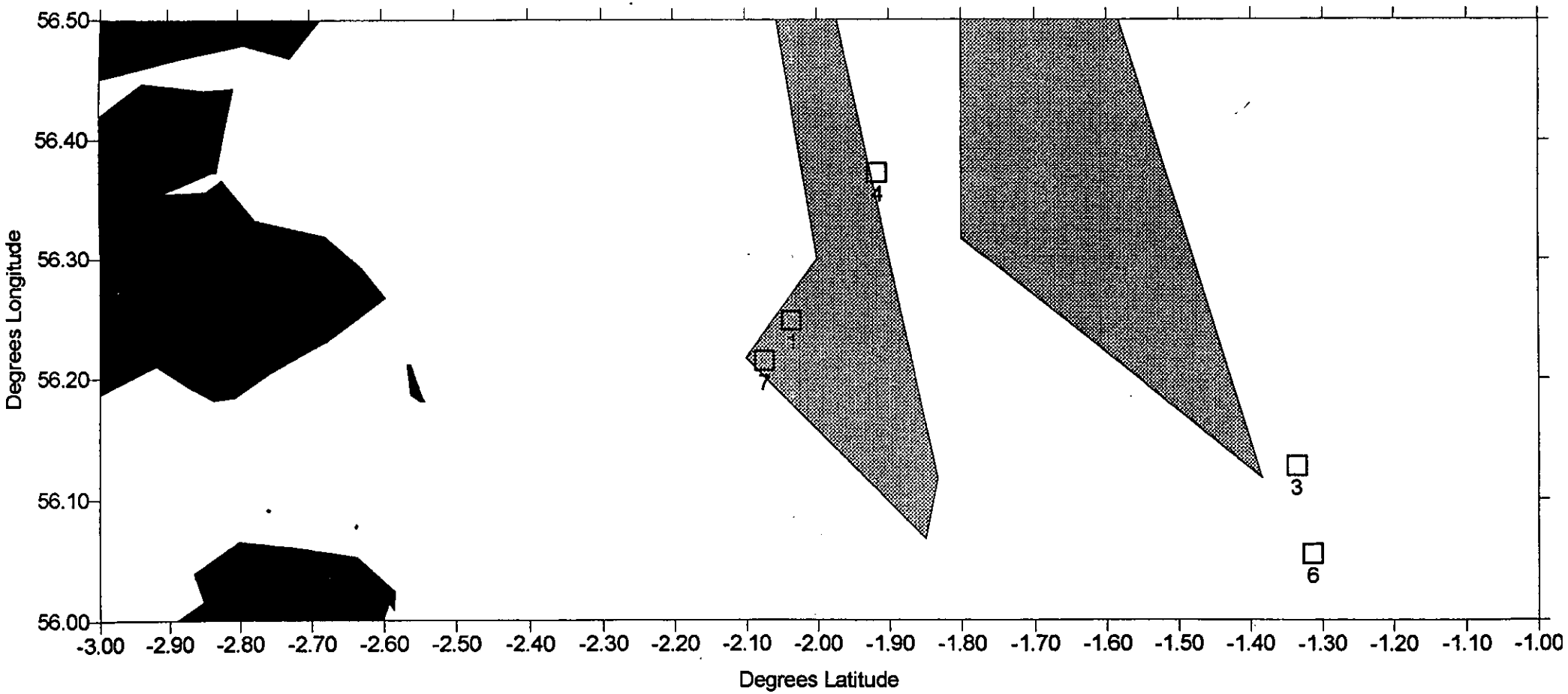

Figure 5. Acoustic and top predator survey track (circles show mid point of 5 min survey periods, filled circles indicate periods where seabird and marine mammal survey was undertaken). Positions of pelagic trawl samples (squares) and demersal trawl stations where clupeid data were recorded (triangles) are indicated, labels give haul numbers.