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FRV *Clupea*

Cruise 1596C

REPORT

3-21 October 1996

Personnel

S P R Greenstreet	HSO (in charge)
F Armstrong	SO
M A Bell	SO
J MacMillan	ASO

Objectives

To carry out an echo-integrator survey to determine the biomass and distribution of pelagic fish in the Moray Firth. Trawling was carried out in areas with high densities of pelagic fish in order to determine fish species and size composition, weight-length relationships and to collect samples of herring, sprat and sandeels for subsequent diet analysis in the laboratory. To determine the numbers and distribution of mammalian and avian predators using transect census methods. To determine spatial variation in water temperature and salinity depth profiles using a CTD recorder and to collect water samples for nutrient, chlorophyll and radio isotope analysis. To determine spatial variation in zooplankton density using Dutch Gulf III and Methot net samplers.

Out-turn days per project: 9.5 days GAC1; 9.5 days HAB1

Narrative

The scientific equipment was loaded onto *Clupea* on 1 October. Scientific staff joined the ship on the morning of 3 October at Fraserburgh and the ship sailed at 1445 hours.

Acoustic and top predator survey work was carried out during daylight hours (between 0700 and 1900 hours) when weather conditions were most suitable; the survey track is shown in Figure 1. Approximately half of the acoustic track was covered prior to the half landing. The density of seabirds, seals and cetaceans was assessed using standard survey methods; Figure 2 shows the sections of cruise track where these top predators surveys were undertaken. In addition to these formal surveys, all casual sightings of seals and cetaceans were noted.

Concentrations of pelagic fish were sampled using an International Young Gadoid Pelagic trawl (PT154) with 6 mm mesh size cod-end. The distribution of these hauls is shown in Figure 3. Samples of fish from each haul were measured to determine length frequency distributions following standard procedures. Otolith samples were collected from herring, sprats and sandeels and fish were weighed to determine length weight relationships.

Samples of 10 sandeels, herring and sprat per 5 mm length category from each haul were retained for diet analysis. Samples of sandeels were also retained for radio isotope analysis.

When weather conditions were not so favourable a total of 50 stations were visited and sampled using a CTD sampler to obtain water temperature and salinity profiles (Fig. 4). At the same time reverser bottles were deployed at three depths, the sea surface, 10 m deep and close to the seabed, to obtain samples for nutrient, chlorophyll and radio isotope analysis. The Dutch Gulf III sampler was deployed when leaving each station to collect samples of small bodied zooplankton, except for the station in the Cromarty Firth where the water was too shallow. This work was completed prior to the half landing.

Clupea steamed into Inverness for the half landing at 1230 hours on 12 October and sailed again at 1330 hours the following day. During the afternoon and evening of 13 October an attempt was made to calibrate the acoustic integration equipment whilst at anchor off Chanonry Point near the mouth of the Inverness Firth. However, wind, tides and interference from fish made this impossible.

Following the half landing the remainder of the acoustic and top predator survey track was completed. During poorer weather 25 of the hydrographic/plankton stations were revisited and a Methot net deployed to obtain samples of the larger bodied zooplankton (Fig. 5).

Bad weather on 19 October resulted in *Clupea* having to seek shelter in Spey Bay between 0800 and 1500 hours. This meant that detailed CTD work in the deeper water area, where pelagic fish were most abundant had to be abandoned. However, one intensive CTD transect was sampled during the afternoon of 20 October, immediately prior to the vessel's return to Fraserburgh.

Clupea returned to Fraserburgh during the evening of 20 October. The scientific equipment was offloaded and scientific staff left the ship on the morning of 21 October.

S P R Greenstreet
12 November 1996

Seen in draft: A Simpson OIC

Fig. 1: Start locations of Acoustic Survey 5 minute record periods.

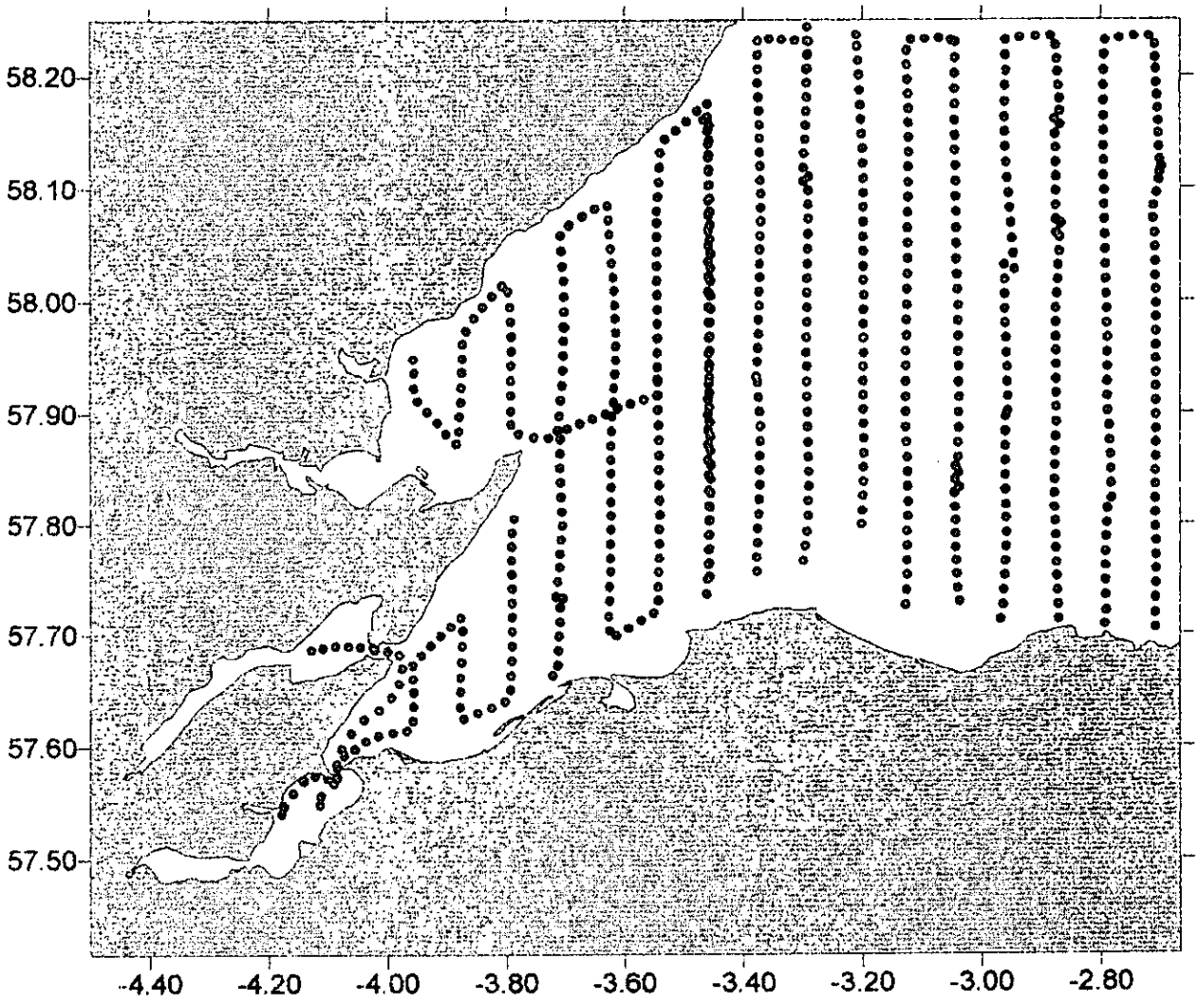

Fig. 2: Mid-point locations of 5 minute seabird survey samples.

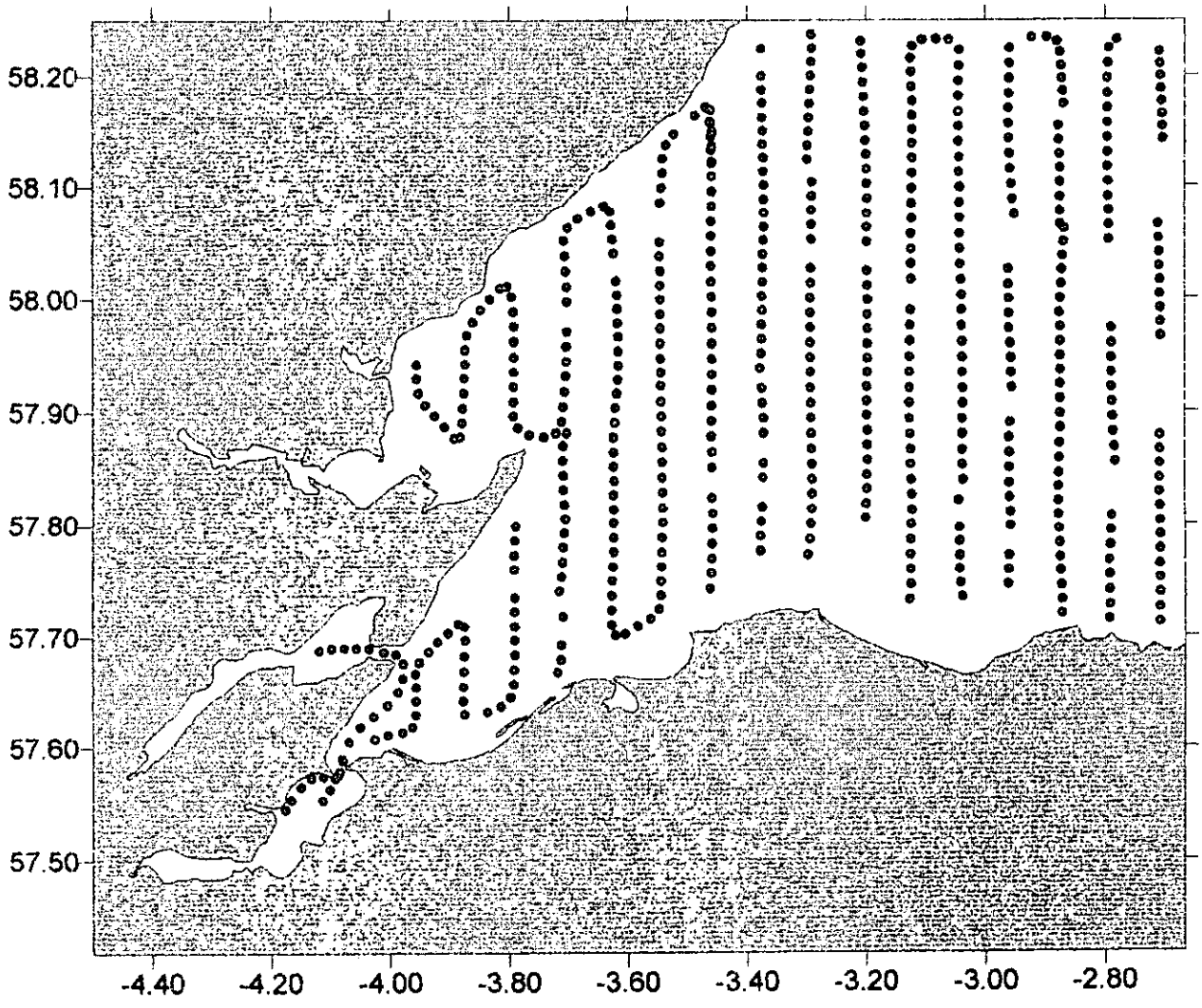

Fig. 3: Pelagic trawl locations.

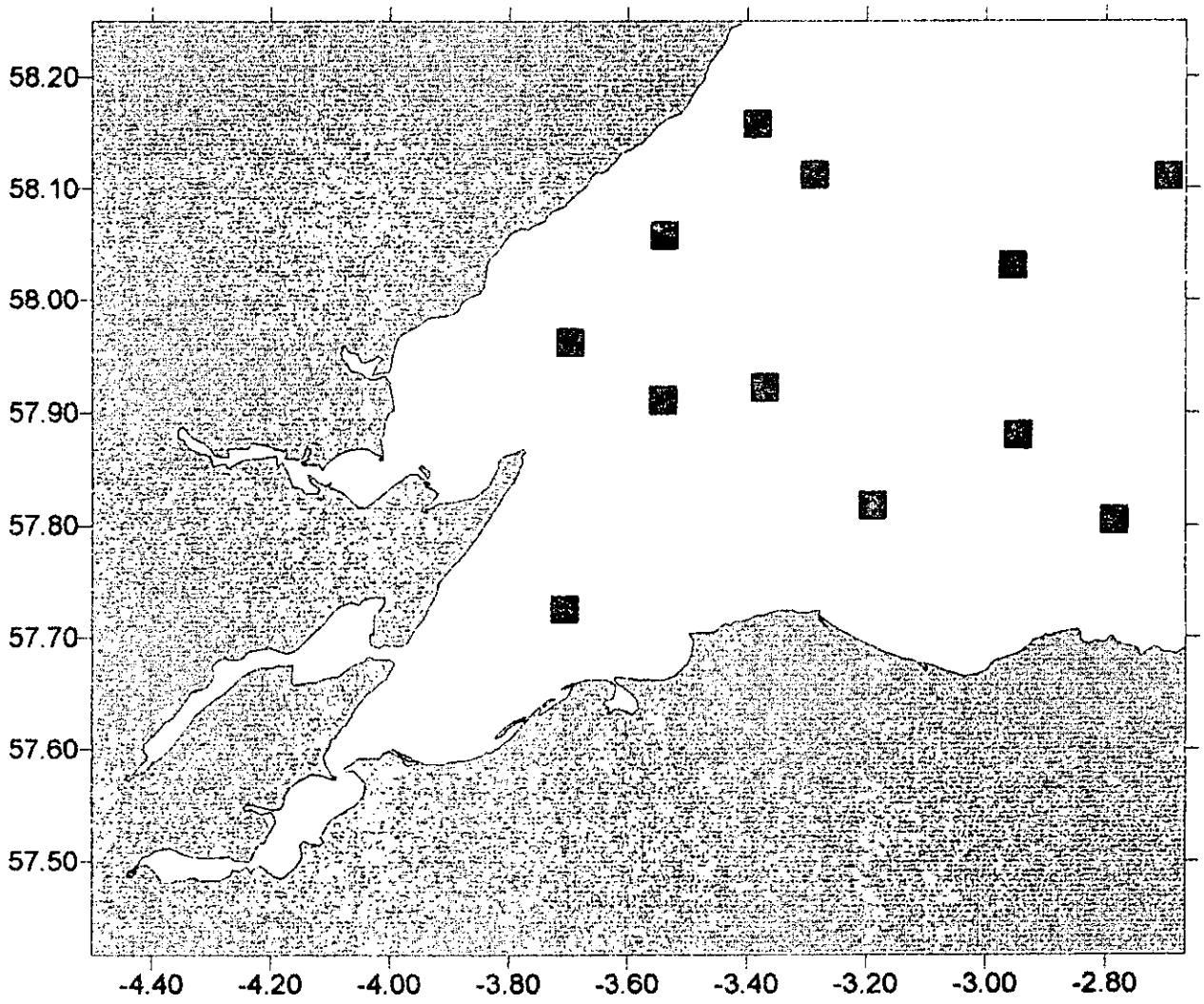

Fig. 4: Hydro stations; CTD, nutrient, chlorophyll and radio isotope samples, and Gulf III tow start locations (except for open diamond in Cromarty Firth where no Gulf III was deployed).

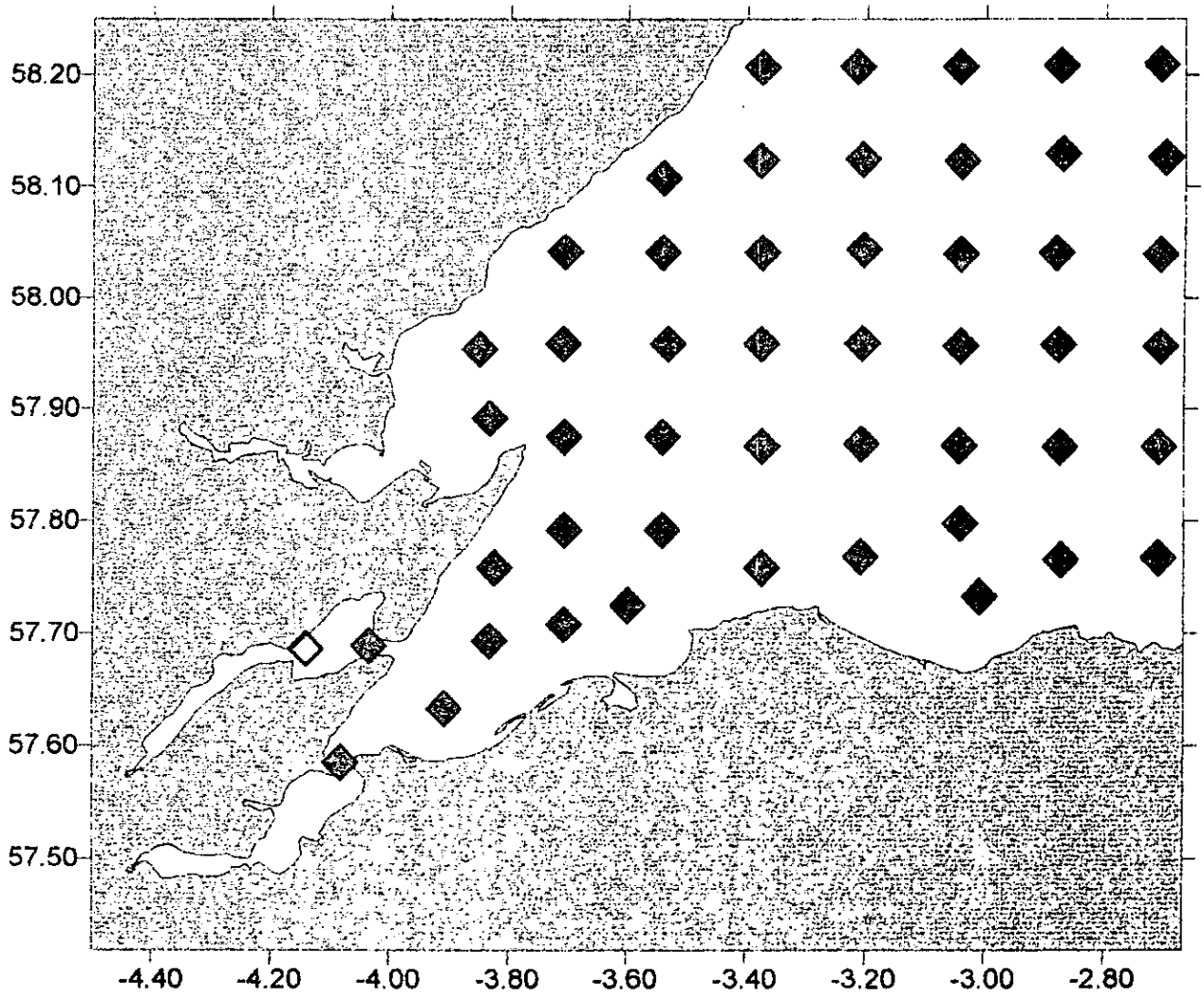

Fig. 5: Methot net tow start locations.