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FRV *CLUPEA*

Cruise 1092C

REPORT

8-25 June 1992

Personnel

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Objectives

To carry out an echo-integrator survey to determine the biomass and distribution of sandeel and clupeid shoals in the Moray Firth and to determine fish species and size composition through trawl sampling. To assess fish predator numbers through demersal trawl sampling and to collect stomach samples for dietary and food consumption analysis. To determine the numbers and distribution of mammalian and avian predators using transect census methods and to collect observation data regarding diet. To determine spatial variation in water temperature and salinity and to assess the biomass and distribution of phytoplankton and zooplankton.

Narrative

The scientific equipment was loaded onto *Clupea* on 3 and 4 June. Scientific staff joined the ship on the morning of 8 June at Fraserburgh. The ship sailed at 1330. Acoustic survey work started on the morning of 9 June and was completed by the early afternoon of 16 June; the survey track is indicated in Figure 1A. Acoustic survey work was only carried out between 0500 and 1500 since outside this period sandeels would be mainly buried in the sea bed. The acoustic equipment was calibrated in the Cromarty Firth during the night of 11 June.

Concentrations of pelagic fish were sampled to determine species and size composition using a PT154 gadoid trawl fitted with a 10 mm cod-end and 6 mm cover; haul positions are indicated in Figure 1B. Otolith samples were collected on a statistical-rectangle basis and a sample of sandeels and sprats were weighed to determine length/weight relationships. The mornings of 17 and 18 June were spent repeatedly covering two areas where large pelagic fish concentrations had previously been located. Trawl samples were taken and the echosounding equipment was used to monitor fish movement within the water column and variation in shoal density.

While *Clupea* was carrying out acoustic survey work the density of seabirds, seals and bottlenose dolphins was assessed using standard survey methods; Figure 1C shows sections of the cruise track where top predator surveys were undertaken. In addition to these formal surveys, all casual sightings of seals and bottlenose dolphins were noted. Observations of guillemots carrying prey in their bills were used to determine their diet.

During the afternoons of 9-18 June, and on the morning of 19 June, hydrological and plankton samples were collected at a grid of stations (Fig. 1D). Samples to determine water temperatures, salinity and phytoplankton biomass, at the water surface and at a depth of 10 m, were collected using reverser bottles. Zooplankton samples were also taken using a Dutch Gulf III sampler, except where the water was too shallow (Fig. 1D triangles) or where time restrictions prevented sampling (Fig. 1D squares).

The half-landing was in Buckie from 19-20 June. The pelagic fishing gear was exchanged for demersal gear, a Jackson Rockhopper trawl (BT158) fitted with a 35 mm cod-end and 10 mm cover.

Clupea left Buckie at 0400 on 21 June and for the next three and a half days a series of demersal fish sampling stations was fished (Fig. 1E). The gear was towed for 30 minutes at each site and Scanmar equipment used to determine the area swept by the gear, so enabling estimates of fish density to be made. Catches were worked up using standard methods. Stomach samples were taken from potentially piscivorous species to allow diet and food consumption estimation.

The last sample station was fished on the morning of 24 June after which *Clupea* steamed back to Fraserburgh. The equipment was unloaded on the morning of 25 June and the scientists left the ship by 1130.

Results

The principle objectives of the cruise were to describe the pelagic part of the marine foodweb of the Inner Moray Firth and to quantify the movement of biomass and energy between the various components of the web.

The acoustic survey data have yet to be fully worked up. Initial appraisal of the echosounder printout suggests that the largest densities of pelagic fish occurred in the northern half of the area studied, along the Smith Bank.

Data on the numbers and distributions of seabird and fish predators were collected. Stomach samples taken from piscivorous fish species will allow estimation of the daily predation loading by piscivorous fish on their pelagic fish prey. Preliminary analysis of the seabird data indicated that approximately 150,000 seabirds used the area on a day to day basis. The two most abundant species were guillemots and kittiwakes with population estimates of 89,500 and 39,500 respectively. Observations of feeding guillemots indicated that over 99% of their diet consisted of sandeels. This implies that some 10 tonnes of sandeels were removed each day by guillemots alone from the Inner Moray Firth. Guillemots were most dense around the area of the Smith Bank where pelagic fish appeared to be most abundant.

Figure 2 shows the location of all seal (n=5) and bottlenose dolphin (n=54) sighting records (circle area is proportional to the number seen on each occasion). These predators appear to have mainly coastal distributions suggesting that most of their feeding activity takes place in these regions. The daily consumption of pelagic fish prey by these predators will be estimated.

The abundance and distribution of phytoplankton and zooplankton in the Inner Moray Firth will be determined and the influence of water temperature and salinity on plankton distribution will be examined. Any relationship between zooplankton distribution and the distribution of pelagic fish shoals will be investigated and the daily impact of pelagic fish on their zooplankton prey will be estimated.

S P R Greenstreet
1 October 1992

Figure 1A: Acoustic survey track: June 1992.

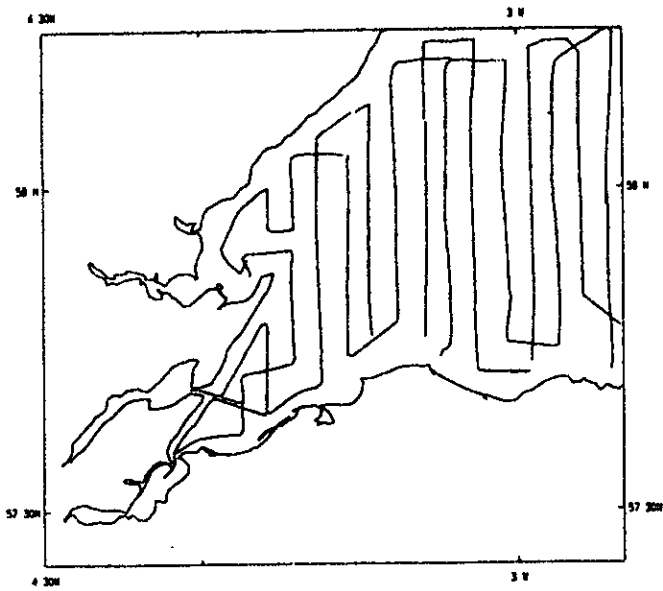


Figure 1B: Pelagic fish sampling sites: June 1992.

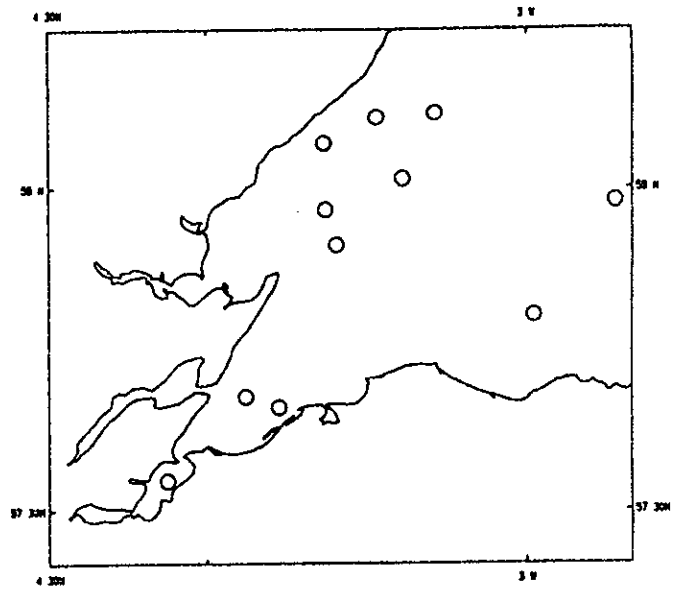


Figure 1C: Seabird survey track: June 1992.

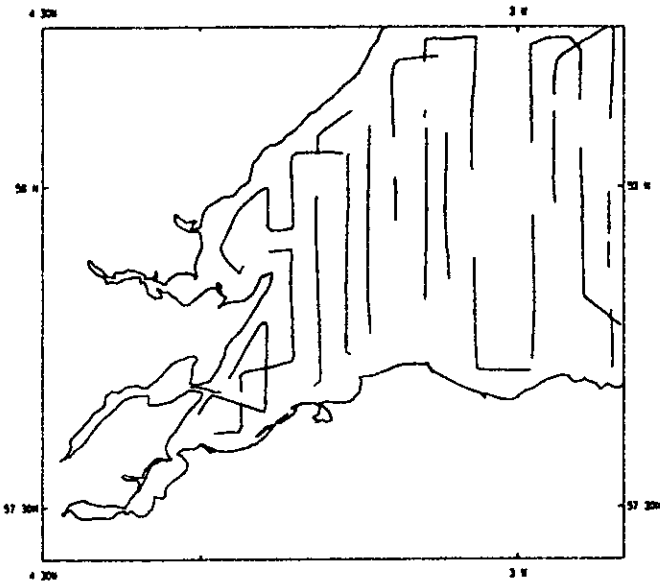


Figure 1D: Hydro and Plankton sampling stations: June 1992.

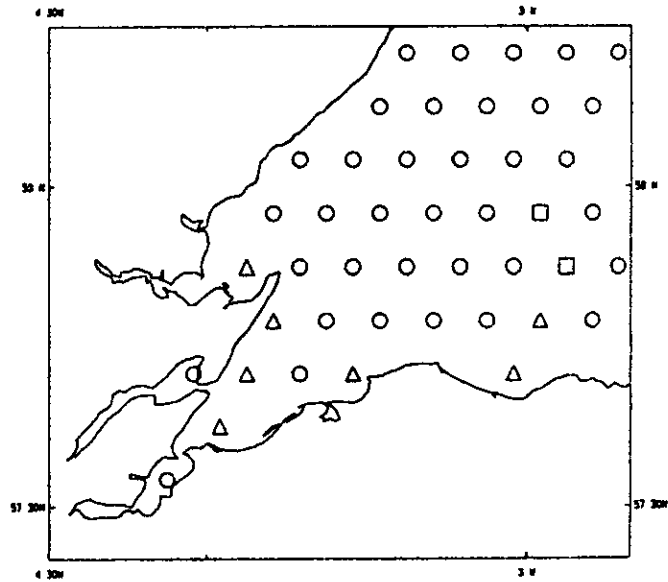


Figure 1E: Demersal fishing stations: June 1992.

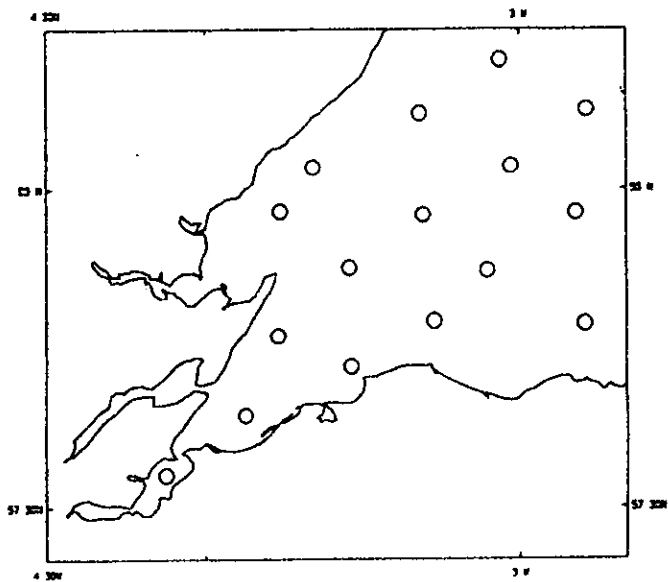


Figure 2A: Bottlenose dolphin sightings: June 1992.

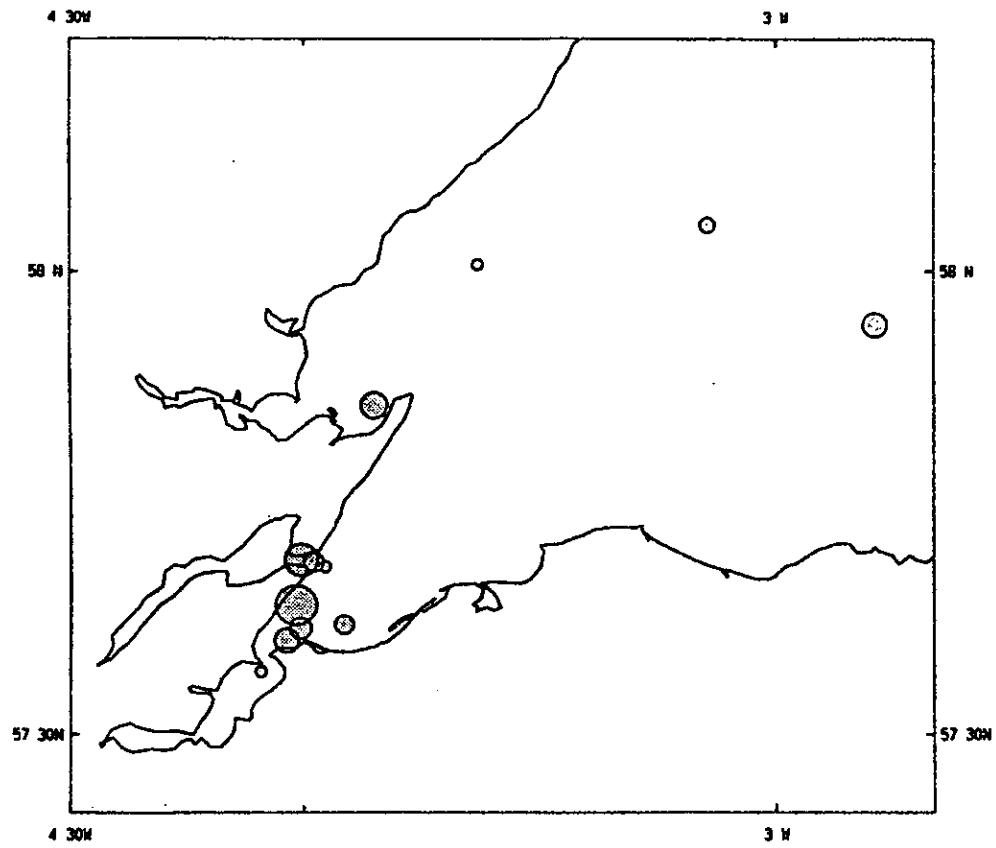


Figure 2B: Common seal sightings: June 1992.

