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FRV *Clupea*

Cruise 0900C

REPORT

13 June - 3 July 2000

Personnel

S P R Greenstreet	(In charge)
F Armstrong	(13-19 June)
I M Gibb	
H M Emmerson	
F Kennedy	(19-24 June)
S Hay	(19-24 June and 2-3 July)
B Scott	University staff (13-19 June)

Cruise Objectives

To carry out an acoustic survey to determine the biomass and distribution of pelagic fish in an area off the Firth of Forth, which included the Wee Bankie and Marr Bank. Species composition and length frequency distributions of fish present in the major marks detected during the acoustic survey to be determined by pelagic trawling. Population age structure of the pelagic fish to be determined through otolith analysis.

To assess the abundance and distribution of seabirds in the area using standard transect census techniques. The location of all marine mammals observed at sea during this transect survey to be recorded.

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 by CTD dips.

To carry out a bottom trawl survey to determine the abundance, distribution, length composition and length-weight relationships of piscivorous demersal fish species in the study area. Spatial variation in fish condition to be examined and compared with previous cruises. Spatial variation in their diet and food consumption rates to be determined from analysis of stomach samples taken from length-stratified sub-samples of each catch. Age structure of the piscivorous demersal fish populations to be determined by otolith analysis.

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 RoxAnn derived sandeel habitat map.

Out-turn days per project: 21 days MF0463

Narrative

Most of the scientific and fishing equipment was loaded on at Fraserburgh on 7 June. The equipment required for the start of the cruise was set up in the laboratory.

Poor weather prevented the vessel sailing during the day, so scientists joined the vessel at Fraserburgh at 1930 hours on 13 June. The vessel then sailed at 0200 hours on 14 June, making for the eastern end of the most northerly acoustic/seabird/RoxAnn survey transect. This transect was then steamed between 1115 hours and 1455 hours. No time was available for trawling on this day. Over the following five days the track shown in Figure 1 was surveyed. This figure shows the mid-point of each five-minute survey period. All acoustic/seabird survey took place between the hours of 0400 hours and 1600 hours when sandeels could be expected to be most active in the water column. Seabirds and marine mammals were surveyed simultaneously with the acoustic survey using standard transect census techniques. Figure 1 shows the five-minute periods where these data were collected. Additional track steamed outside this period, whilst the vessel was steaming to and from anchorages, or between survey transects, was also included in the RoxAnn survey track (Fig. 2). A radio transmitter, identical to those used by ITE collaborators working on the Isle of May to study the feeding behaviour of seabirds breeding at the colony, was attached to the vessel so that the transmitting range of the tags could be assessed.

Heavy concentrations of fish were sampled using an International Young Gadoid trawl (PT154) with a 6 mm cod-end at the positions indicated in Figure 1. The numbers of fish of each species in these catches was determined and length frequency data collected. Samples of fish were weighed to determine length-weight relationships and otoliths were collected to determine population age structures. A quantity of sandeels was kept alive in a tank for use by the Sea Mammal Research Unit at St Andrews in experiments related to grey seal foraging.

During this first part of the cruise a mini-logger was attached to the acoustic towed body, set to record water temperature every minute. Thus data were collected allowing spatial variation in water temperature at a depth of 5 m to be mapped. The SEABIRD 19 CTD sampler was deployed whenever the opportunity presented itself so that full water temperature and salinity profile data could be gathered. In addition, whilst the vessel was underway carrying out the acoustic/seabird/RoxAnn survey, expendable bathy-thermographs (XBTs) were deployed. The positions of these CTD casts and XBT deployments are indicated in Figure 3. These opportunistic hydrography data were collected with the aim of building up a small data set, collected at the same locations, but over a two to three week period. This could then be used to investigate the temporal stability of any water column temperature and salinity structuring, and examine the impact of any tidal or weather events.

Acoustic/seabird/RoxAnn survey ceased at 0945 hours on 19 June and *Clupea* sailed for Montrose where she arrived at 1330 hours. The pelagic fishing gear was offloaded and replaced by the demersal gear, a Jackson Rockhopper trawl (BT158) with a 10 mm cod-end. Eric Armstrong and Beth Scott left the vessel and Steve Hay and Fiona Kennedy joined *Clupea*.

Clupea departed Montrose at 0300 hours on 20 June to commence the demersal fishing survey and the CTD survey. The three most easterly stations were fished on route to anchorage at St Abbs. A further 16 demersal stations were sampled over the following four days (Fig. 4). Estimates of the total number at length (per cm) of each species in each catch were determined by measuring all the individuals caught in each trawl sample, or in a sub-sample of known proportion (by volume) of the catch. In the latter case, all larger individuals of the three piscivorous species, cod, haddock and whiting, were always measured. Length stratified sub-

samples of the three piscivorous species were then remeasured (to the ½ cm) and weighed (to 0.2 g) to determine weight-length relationships. These fish were then dissected to determine their feeding status and stomach, intestines, liver and gonad samples were removed from fish classified as 'recently feeding' or 'not feeding'. These will be analysed on return to the laboratory to determine diet and food consumption rates, body condition and hepato- and gonado-somatic indices.

The CTD sampler was deployed at each demersal fishing station as well as at additional stations evenly spaced between the fishing stations (Fig. 5). The mini-logger and Lowestoft data tags were attached to the CTD for cross-calibration. By 1230 hours on 24 June all the fishing and CTD work was completed and *Clupea* sailed to Montrose for the half-landing.

At approximately 1800 hours on 25 June *Clupea* left Montrose to commence the nocturnal grab sampling. A total of 313 stations were sampled over the following seven nights (Fig. 6). Over the course of the grab and dredge sampling a further four CTD samples were obtained at locations sampled previously, thereby extending the sampling period as far as possible at these sites (see Fig. 3). During the latter part of the seventh night, 1-2 July, three dredge stations on the Wee Bankie were sampled to obtain sufficient samples for population age structure determination. *Clupea* then returned to Montrose.

Shortly after midday on 2 July *Clupea* set off to carry out hydrographic and plankton sampling at 14 stations along a transect off Stonehaven. CTD data were collected at each station and a variety of plankton and water bottle sampling was carried out at pre-determined stations. This sampling was completed by 2100 hours and *Clupea* then steamed for Fraserburgh. The following morning the scientific equipment was offloaded and the scientists left the vessel at approximately 1030 hours.

Simon Greenstreet
19 December 2000

Seen in draft: A Simpson, OIC

Figure 4. Location of demersal trawl stations.

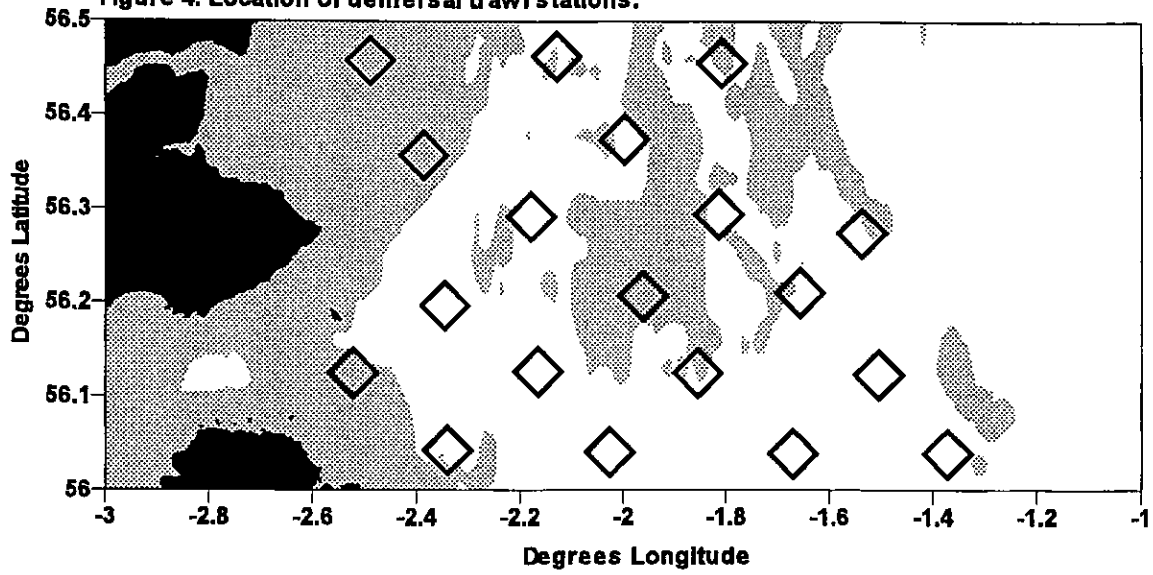


Figure 5. Main CTD stations grid, sampled during demersal fishing.

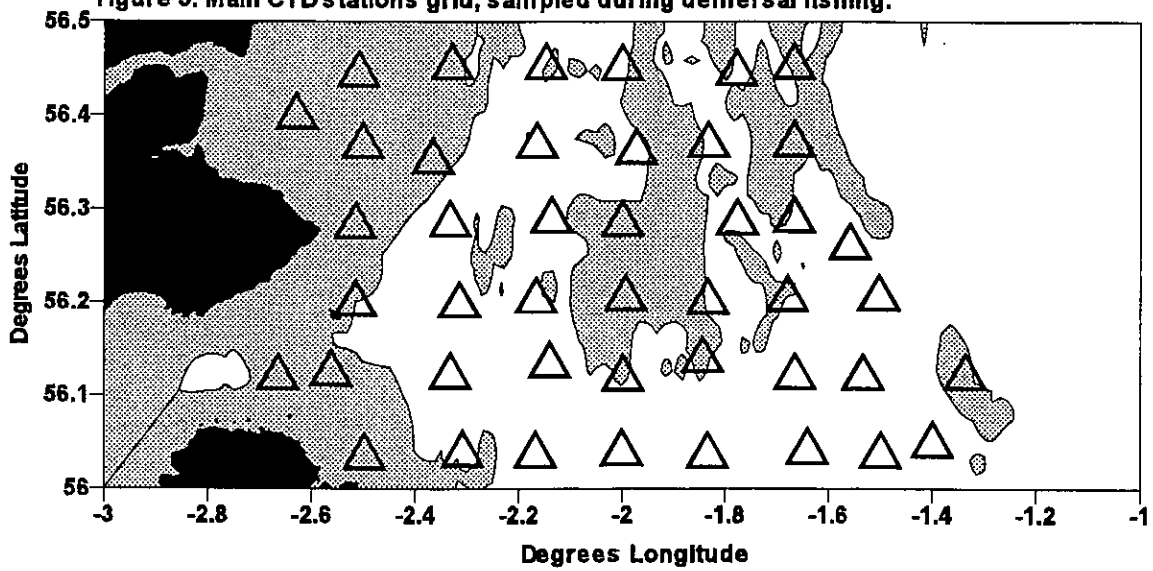


Figure 6. Nocturnal grab survey stations (circles) and dredge stations (grey lines).

