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FRV *Scotia*

Cruise 1502S

REPORT

10-26 October 2002

Personnel

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Objectives

1. To conduct an acoustic survey to estimate the abundance and distribution of mackerel in the northern North Sea (ICES division IVa).

2. To obtain samples of mackerel for biological analysis, including age, length, weight, sex, maturity and ichthyophonus infection.

Out-turn days per project: MF01ta – 17 days

Narrative

Scientific staff joined the vessel at 1100 hours on 10 October and the vessel departed at 1540 hours. A small meeting was held with all scientists and crew taking a navigational watch, to explain the objectives of the survey and to describe general operating procedures. The vessel then proceeded to Loch Eriboll where calibration of the four transducers was attempted starting at 0800 hours on 11 October: high winds prevented the exercise from being carried out successfully. Problems with the scientific echosounder were encountered and rectified using ships spares. The survey commenced in poor weather, north of the Minch, at 2022 hours on 11 October. Zig-zag transects at various spacings were adopted crossing the continental slope, progressing towards the north of Shetland. At this stage, the survey was severely hampered by gale force winds and the transect design was altered as a result. On reaching the northerly limit of the survey area, the weather improved and transects progressed southward along lines of latitude, at spacings of 30 or 15 nautical miles (n.mi.) as planned. The first fishing trawl was carried out on 14 October on the most northerly transect. On 16 October, the vessel made contact with the Norwegian FRV *G.O. Sars* as planned and the two ships carried out an interlaced survey in the Norwegian sector: transect spacing for each vessel was 30 n.mi. giving a combined effective spacing of 15 n.mi. When this was complete, the two vessels undertook an intercalibration exercise passing over areas where mackerel had been detected in the interlaced survey area. This lasted for approximately 115 n.mi. with each vessel taking the lead alternatively on three occasions. The intercalibration was completed at 2300 hours and the vessels then broke off to continue their respective surveys, with FRV *Scotia* surveying the UK area, east of Shetland. On 21 October, good weather provided an opportunity to calibrate the

echosounders and this was carried out successfully in a calm bay south of Fetlar. After dropping off a crew member, the vessel resumed surveying at 1534 hours on 21 October. Storm force winds caused the vessel to suspend the survey at 1800 hours on 22 October to seek shelter in the approaches to Lerwick harbour. The survey resumed at 2130 hours on 23 October and was completed on 24 October at 2230 hours. The vessel returned to Aberdeen on the evening of 25 October.

Results

The survey was completed and, despite encountering some very high winds, only a small amount of time was lost due to weather. The total mileage surveyed was approximately 2130 n.mi. with 851 acoustic log intervals recorded. Successful calibrations were carried out of the three principal acoustic frequencies (38, 120 and 200 kHz); the 18 kHz was also calibrated although it is difficult to assess how accurately this was done at this stage. Echo traces from mackerel were distinguished on the basis of the difference in the acoustic return between the 38 and 200 kHz frequencies. Most of the mackerel were detected close to the border between EU and Norwegian waters, in the centre of the survey area, south of Viking Bank. Positive identification of the mackerel echotraces proved difficult. Of the 16 trawl hauls carried out, mackerel were caught on only one occasion – when mixed with herring close to the bottom. It is quite clear that the PT160 is not able to sample mackerel in midwater. Fortunately, the crew of the *Scotia* were able to supply hooks, feathers, rod and hand lines. On four occasions, echo traces thought to be mackerel were fished on with this gear and in all cases reasonable quantities of mackerel were caught. In total, 201 of 222 mackerel were sampled for weight, sex, maturity and otoliths; of these, 168 were obtained by hook and hand line. It is clear that future surveys will need to consider alternative methods for sampling mackerel. The PT160 had no such problems catching other fish: over 10,000 herring were caught and 1,973 were measured for length.

All three of the PT160 trawls were damaged. In all cases, the headline was parted from the top panel of the net. It is possible that the poor weather may have contributed to this but it is likely that insufficient control of the netsonde cable may also have contributed. On at least one occasion, the tension between the netsonde wire and the net was seen to be extremely high. On that occasion a Scanmar unit, attached to the headline, was severely damaged: no satisfactory explanation as to how this occurred has been put forward, but involvement of the steel netsonde mounting bar is suspected. Recovery procedures of the pelagic net need to be reviewed in the light of these observations. At the very least, it is suggested that the steel netsonde wire be switched to the port side winch to avoid unnecessary carriage of the wire above the deck. It is also suggested that an alternative to the netsonde bar be sought.

The ships thermosalingraph could not be made to work. However, some hydrographic data were obtained from the deployment of expendable bathythermographs. Some problems were also encountered with regard to backing up the significant volumes of acoustic data: these were solved by networking the data analysis PC. Such difficulties point to inadequate pre-cruise preparation, partly related to the inexperience associated with this particular cruise, but in no small part, also related to the rapid turnaround time of the vessel.

Overall, the survey proved satisfactory. Considerable numbers of large mackerel schools were detected, and although ground truthing was problematic, some of these were identified using rod and line. The mackerel were contained within the survey area and there was no evidence of significant numbers of mixed schools (herring and mackerel). The interlaced survey and intercalibration with the *G.O. Sars* was carried out successfully. If a solution to the problem of catching mackerel can be sought (e.g. using the larger PT170 pelagic trawl), it seems, at this preliminary stage, that an acoustic survey for mackerel may be viable. This will need to be confirmed once the full stock estimate and survey report has been prepared for submission to the ICES Planning Group for Aerial and Acoustic Surveys for Mackerel

(PGAAM) in March 2003. Thanks are due to both the crew of the FRV *Scotia* and the scientific staff for making the best of the adverse conditions and sampling difficulties.

P G Fernandes
8 November 2002

Seen in draft: P Ramsay, OIC *Scotia*