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FRV *Scotia*

Cruise 1503C

REPORT

4–22 October 2003

Personnel

P Fernandes	(SIC)
E Armstrong	
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D Reid	(4-12 October)
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D Beare	(13-22 October)

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 and maturity.
3. To conduct a towed O.P.C./C.T.D. survey of the Fladen area of the North sea during transit.

Out-turn days per project: MF01ta – 19 days

Narrative

Scientific staff joined the vessel at 09:00 on 4 October and the vessel departed at 10:15. A small meeting was held with all scientists to explain the objectives of the survey and to describe general operating procedures. The vessel proceeded to Scapa Flow where calibration of the four transducers was carried out starting at 00:05 on 5 October. The vessel then proceeded to the Fladen area of the North Sea, where a towed body, fitted with an OPC, CTD and plankton nets, was deployed to sample concentrations of copepods. The vessel then made passage through areas thought to contain mackerel (close to the 200 m contour) to confirm the location of high intensity strata for the survey. The first fishing trawl was carried out during this prospective passage route on 6 October. The survey commenced on 7 October at 02:15 at approximately 61°48'N 001°54'E. Transects progressed southward along lines of latitude, at spacings of 15 or 7.5 nautical miles (nmi) as planned; although transect design was altered slightly due to delays from gale force winds. The vessel docked into Lerwick harbour on 12 October for 24 hours to enable a change of personnel and to give staff their rest day in line

with working time directives. The survey resumed at 06:05 on 13 October. On 17 October the vessel headed back into Lerwick to pick up a pump for the third engine to enable fishing with the larger (PT170) net. The opportunity was taken to carry out a second calibration of all four frequencies in Sandwick Bay. On 18 October, the vessel rendezvoused with the Norwegian FRV *GO Sars* as planned and the two ships carried out an interlaced survey in the area close to the 200 m contour: transect spacing for each vessel was 15 nmi giving a combined spacing of 7.5 nmi. At the end of this, the two vessels undertook an intercalibration exercise starting at 18:20 on 20 October. This lasted for approximately 3 hours (30 nmi) with each vessel taking the lead alternatively on two occasions. The intercalibration was completed at 21:40 and the vessels then broke off to continue their respective surveys. FRV *Scotia* completed its survey shortly afterwards at 23:25 on 20 October. The vessel returned to Aberdeen on the morning of 22 October.

Results

The survey was completed and, despite encountering some poor weather, only a small amount of time was lost due to weather. The total mileage surveyed was approximately 2450 nmi. A total of approximately 70 GB of acoustic data was archived and copied to DVD; this corresponds to 981 acoustic log intervals of 15 minutes duration. Successful calibrations were carried out of the four acoustic frequencies (18, 38, 120 and 200 kHz): calibration accuracy of the principal integration frequency (38 kHz) was within 0.05 dB (ICES recommends accuracy to be within 0.5 dB). Echo traces from mackerel were distinguished on the basis of the difference in acoustic return between the 38 and 200 kHz frequencies, using the latest version of the FRS mackerel identification algorithm, which was displayed in real time (assisting the direction of ground truth trawl hauls).

As expected, most of the mackerel were detected close to the border between EU and Norwegian waters, towards the east of the survey area around Viking Bank. Ground truth identification of the mackerel echotraces proved far more successful than in the previous (2002) survey: both the PT170 and PT160 (with the larger doors) were able to catch large quantities of mackerel. Of the 19 trawl hauls carried out, mackerel were caught in 15, giving a raised total of 16 569 kg. On two occasions, echo traces thought to be mackerel were fished on with rod and line for comparative purposes – these were logged as separate biological samples. 4732 mackerel were measured for length and 886 mackerel were sampled for weight, sex, maturity and otoliths. Other fish caught include herring (3816 lengths measured from a raised total of 17 246 kg), saithe (118 lengths), haddock (31 lengths), silversides and a variety of small gadoids. No cod were caught.

The deployment and recovery of the trawls passed, in most cases, without incident and no trawls were damaged. However, significant problems were encountered with deployment and recovery of the netsonde transducer: the cable was often damaged due to abrasion or parting from the transducer head. It is recommended that some action be taken to establish more robust procedures; perhaps in consultation with engineers from the Scottish pelagic fleet who operate an identical system on even larger trawls without such problems.

Three tows of the multisampling towed body were successfully completed in the Fladen area. The towed body was fitted with an optical plankton counter, seabird CTD, pup nets and a Scanmar depth monitor. The tows were carried out to a depth of 130 metres at a speed of 5.5 knots. Plankton samples taken by the 200 μ and 95 μ pup nets were preserved in formalin and were returned to the laboratory for analysis. The ships thermosalinograph could not be made to work fully; only sea surface temperature was logged throughout the cruise. Some

hydrographic data were obtained from the deployment of a CTD unit: a total of 12 casts were taken.

Overall, the survey proved very satisfactory. Considerable numbers of large mackerel schools were detected, and most of these were successfully ground truthed with pelagic trawls. 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 *GO Sars* was carried out successfully. A full stock estimate and survey report will now be prepared for submission to the ICES Planning Group for Aerial and Acoustic Surveys for Mackerel (PGAAM) in February 2003. Thanks are due to both the crew of the FRV *Scotia* and the scientific staff for a successful cruise.

P G Fernandes
11 November 2003

Seen in draft: P Barrat, OIC *Scotia*