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**REPORT**FRV *Scotia*

Cruise 0800S Part II (Testing and Training Cruise)

30 May - 8 June 2000

**Personnel**

P Fernandes (In charge)

F Armstrong

P Copland

I Gibb

D C Moore

J Dunn

C Stewart

**Objectives**

1. To carry out deployment trials with the multicorer and large box corer.
2. To carry out deployment and recovery training with the ARIES sampler to reduce future damage to instrumentation.
3. To undertake training with the monkfish trawl at a variety of tension settings.
4. To carry out efficiency trials of the new sandeel dredge.
5. To install software on the Simrad SF950 sonar and to run acceptance tests on this unit.
6. To deploy the Reson Seabat 6012 multibeam sonar on the drop keel.
7. To undertake a variety of trials and tests of the full complement of existing acoustic equipment on FRV *Scotia*.
8. To check for interference between the RDI ADCP, the Furuno Doppler current profiler and the individual items of Simrad acoustic equipment.
9. To calibrate all three EK500 transducers (38, 120 and 200 kHz) and the 18 kHz EA500 transducer.
10. To conduct a small-scale survey of sandeels on the Fair Isle Bank.
11. To collect multifrequency data (at four frequencies) and multibeam sonar data on sandeels to investigate the possibility of automatic species identification.
12. To investigate the emergent behaviour of sandeels.
13. To use the pelagic trawl and 1.8 m Methot net to identify acoustic targets.

**Narrative**

Installation and testing of most of equipment was carried out from 30-31 May inclusive whilst the vessel was alongside Aberdeen harbour. A Simrad engineer arrived on the morning of Wednesday 31 May to debug software on the Simrad SF950 sonar. Once all known software problems had been fixed acceptance trials were conducted on the evening of Thursday 1 June. FRV *Scotia* departed Aberdeen at 2200 GMT the same night.

The vessel made for a suitable site in Aberdeen Bay (in 30 m depth of water beyond major traffic lanes) for the first set of trials. In the early hours of Friday morning, the large box corer and ARIES sampler were then deployed and recovered successfully. Scientific staff (Moore, Dunn and Stewart) were then transported ashore in the ship's launch. Training on the monkfish trawl was conducted immediately afterwards in Aberdeen Bay. The vessel then proceeded to Scapa Flow arriving at 1800 GMT. Calibrations of the 38,

120 and 200 kHz EK500 and 18 kHz EA500 transducers then took place on the evening of Friday and into Saturday afternoon. Following these, a test of the integrity of the Simrad ethernet network was carried out.

The vessel then proceeded to conduct a survey of the area between Fair Isle and the Orkney Islands on Sunday 3 June. CTD casts and reversing water bottle samples were taken to map the hydrography of the region and for calibration of the CTD probe. During the survey, interference tests of the full complement of acoustic equipment were carried out using the new Simrad Synchronisation Unit (SSU). During hours of darkness the vessel broke off from the survey to run comparative tests of sandeel dredges. The survey resumed during daylight hours with numerous attempts at trawling thwarted due to problems with the netsonde cable and/or trawl orientation. These trawl deployments did, however, provide a good opportunity to evaluate the new 'dynema' trawl bridles and backstraps which proved to work extremely well.

After a further set of dredge deployments in the early hours of Tuesday morning, a small-scale survey of the area immediately east of Fair Isle was initiated. This survey was continued throughout the remainder of the cruise to study various aspects of sandeel biology relevant to acoustic surveying for the species (emergent behaviour; differential acoustic frequency response; vertical & horizontal distribution and the relationship to substrate). Further equipment trials were conducted as and when appropriate during the survey. The survey was completed at 1700 GMT on Wednesday 7 June whereupon the vessel returned to Aberdeen arriving at 0530 GMT on Thursday 8 June.

## Results

1. Deployment trials with the large box corer were carried out. These proved successful after slight adjustments were made to the closing mechanism. The multicorer was assembled in the area adjacent to the hydrographic hangar proving that it can be handled in that workspace.
2. Deployment and recovery training was successfully carried out with the ARIES sampler. Four deployments were made from the stern ramp.
3. Trawling and recovery tests and training with the monkfish trawl at a variety of tension settings were carried out (four deployments).
4. Trials of the new sand eel dredge (incorporating a hood and a sprung tooth bar) were carried out to assess its efficiency against the older version (no hood and a fixed tooth bar). A total of 11 deployments established beyond reasonable doubt that the new dredge consistently caught more sandeels.
5. Software on the Simrad SF950 sonar was installed and acceptance tests were run on this unit. The unit is operational, however, there are a number of outstanding problems, such as: i) a faulty transducer deployment and recovery mechanism (the unit had to be lowered manually, which is an awkward and laborious process); ii) the navigation input to the system frequently ceased to register; iii) evaluation of the data collection software was impossible in the absence of sufficient documentation.
6. The Reson Seabat 6012 multibeam sonar was deployed successfully on the drop keel. Some slight noise was evident in the uppermost 5 m from sound presumably reflected from the hull.
7. The full complement of existing acoustic equipment on FRV *Scotia* was monitored to establish which combinations of instruments would produce acoustic interference; this amounted to a test of the new SSU. All three frequencies (38, 120 & 200 kHz) of the EK500 (scientific echosounder), the 18 kHz EA500 (hydrographic echosounder), the 95 kHz EM950 (swathe bathymetry multibeam sonar) and the 95 kHz SF950 (fish school detection multibeam sonar) can be operated simultaneously without interfering with each other. However, at 120 and 200 kHz the bottom echo is affected by the SF950, particularly at 90° tilt; this will have implications for Roxann (bottom discrimination software) which will soon be operating at 120 kHz in addition to 38 kHz. The

addition of the 24 kHz SR240 (fishing multibeam omnidirectional sonar) causes interference on the EA500 and the EK500 (all frequencies). Synchronisation tests were also carried out with HiPAP unit which did not cause any significant interference.

8. Interference between the RDI ADCP, the Furuno Doppler current profiler and the individual items of Simrad acoustic equipment was examined. The ADCP, in particular, causes significant interference because of its multipulse triggering. The Furuno is able to operate without interfering significantly with most systems.
9. All three EK500 transducers (38, 120 and 200 kHz) and the 18 kHz EA500 transducer were calibrated successfully.
10. A survey of the area between the Orkney Islands and Fair Isle Bank was conducted to establish the location of sandeel concentrations. Following this, a further smaller scale survey took place in the area immediately east of Fair Isle.
11. Multifrequency data (at four frequencies) were collected throughout the cruise and selective multibeam sonar data were also collected. Numerous sandeel echotraces were detected in the area immediately east of Fair Isle; these will be analysed to investigate the possibility of automatic species identification.
12. The acoustic data collected during throughout the 24 hour period during the survey will be examined to investigate the emergent behaviour of sandeels.
13. Acoustic targets were identified using the pelagic trawls PT160 (six hauls) and PT154 (two hauls) and the 1.8 m Methot net (two hauls). Sandeels were caught in seven trawl hauls, and were abundant in five of these. Trawling operations were significantly encumbered by the fragile nature of the netsonde cable which required repair on five occasions. The 1.8 m Methot net was effective for sampling larger planktonic fractions (jellyfish and ctenophores) but proved unable to catch sandeels.
14. A total of 30 CTD casts and water bottles were taken to examine the hydrography of the surveyed areas and to provide sufficient data for calibration of the CTD. Water bottles were also taken for calibration of the thermosalinograph mounted in the hydrographic hangar.

P G Fernandes  
8 June 2000

Seen in draft: R Walton, Master, FRV *Scotia*