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In Confidence Not to be quoted without reference to the laboratory

FRV SCOTIA
Cruise 7/83

REPORT
6-26 July 1983

OBJECTIVES

1. To carry out an echointegration and mid-water trawling survey of herring in the Orkney-Shetland area and adjacent areas as part of an ICES-coordinated survey.
2. To undertake in situ measurements of herring target strength using a dual-beam transducer.
3. To collect data on individual weights of herring for establishing a length/weight relationship.
4. To collect herring ovaries for fecundity studies.
5. To collect herring pyloric caeca for parasitological investigations.
6. To collect mackerel stomachs for scientists involved in the ICES Fish Stomach project.
7. To collect water samples for radio-caesium monitoring.
8. Additional objective - to collect herring tissue samples in liquid nitrogen for electrophoretic examination.

NARRATIVE

After a 24 hour delay during which trials were carried out on a new crane on the after platform, "Scotia" sailed from Aberdeen at 1300 on 7 July. Passing close to the Pentland Firth to collect a water sample, a course was set for Ingness Bay, Orkneys, to carry out an echointegrator calibration.

The first part of the integrator survey was begun at 1000 on 8 July in the statistical rectangle north of the Orkneys to investigate the possibility of early spawning of herring. From 0400 on 10 July to 1000 on 11 July "Scotia" surveyed the area to the west of the Orkneys and then moved to the west coast of Shetland. From 1330-1600 scientists from the Dutch vessel "Tridens" also taking part in the survey visited "Scotia" by rubber boat to compare interpretation of echo-traces. The survey then continued southwards until 2230 on 15 July. The remainder of the first half of the cruise was spent in the area southeast of Shetland where commercial purse-seiners had been catching herring. A second calibration was carried out south of Fetlar from 2030-2400 on 16 July and "Scotia" docked in Lerwick for the half-landing at 0830 on 18 July. Mr S T Forbes joined the vessel on 18 July.

After a 24 hour delay for engine repairs, "Scotia" sailed at 0900 on 20 July and worked inshore off southeast Shetland. The following day, by arrangement with scientists on board the Norwegian research vessel "G O Sars", a grid at $2\frac{1}{2}$ mile intervals was carried out in a 15x15 mile area east of Shetland for comparative purposes. During the night "Scotia" moved north to the area north-east of Shetland and 22 July was spent trawling in the area east of Shetland before a final calibration was made in Levenwick Bay from 1830-2200.

During the night a passage was made to the Caithness coast and the following day a grid at 5-mile intervals was carried out. On 24 July the survey was extended offshore and ended at 1030 on 25 July before docking in Aberdeen at 1600.

During the survey, daily radio contact was made with either "Tridens" or "G O Sars" for communication and discussion of results.

RESULTS

1. Echointegration and midwater trawling survey

Throughout the cruise, echointegration was carried out between 0400 and 2230 hours BST when fish echotraces were generally separable from plankton traces. The survey was carried out at a speed of 10-11 knots and integrator readings were recorded every half an hour. A total of 31 midwater trawl hauls using the "Scotia" pelagic sampling trawl (PT160) with a 20mm mesh codend were made as required to identify echotraces. The cruise track and position of trawl hauls are shown on the attached figure.

Some herring were caught in 20 hauls, although samples exceeded 10kg in only 14 of these. To the east of Shetland, large adult herring (29-34cm) were caught, although the large shoals recorded on the echosounder proved very difficult to catch in this area. In other areas the catches were of smaller herring with modal length groups of 17cm, 20-21cm and 27-28cm. The samples of large herring east of Shetland were mostly in stages III-IV on 13 July and stages IV-V on 22 July. The widespread distribution of immature 1-ring herring was in marked contrast to that recorded on the 1982 survey.

Most catches of herring were made by trawling in areas with rather distinct "plume" traces on the echosounder. Other types of traces sampled appeared to contain 0-group Norway pout which were meshed in the funnel of the trawl, whiting and mackerel. In one area southeast of Fair Isle, distinctive rather diffuse traces were shown to be caused by pearlides Maurolicus muelleri.

Concentrations of fish identified as herring were recorded east of Shetland, in a large area south of Fair Isle, northwest of the Orkneys and southwest of Shetland. There was little evidence of concentration west and northwest of Shetland or in the area south of Shetland to north of the Orkneys.

During the survey, surface temperature, salinity and fluorescence were recorded continuously and 71 water samples taken for calibration of salinity and measurement of chlorophyll concentration.

Trials were carried out of the 120kHz Simrad echosounder, but interference in the system prevented its routine use. The source of the interference was traced during the last few days of the cruise and this system is now operational.

2. In situ target strength measurements

Trials were carried out with the dual beam transducer on four occasions during the second half of the cruise. After a technical fault had been diagnosed and repaired, a set of observations on scattered echotraces was made at night on 24 July south of Fair Isle. Although these traces were not positively identified by trawling, they occurred in the area where 1-ring herring had been caught earlier the same day.

3. Weight data

Weights of individual herring were obtained using an electronic balance interfaced to a microcomputer. Samples were weighed from seven trawl hauls.

4. Herring ovaries

A total of 115 ovaries were collected in Gilson's fluid for fecundity determination.

5. Herring pyloric caeca

Two hundred and eighty seven pyloric caeca were collected for examination for parasite tags.

6. Mackerel stomachs

Approximately 70 mackerel stomachs were preserved in formalin for the ICES project.

7. Radio-caesium water samples

Three samples were taken off Aberdeen, Pentland Firth and Fair Isle, respectively.

8. Herring tissue sampling

Sixty liver and white muscle tissue samples were frozen in liquid nitrogen for genetic studies from west of Orkney and Fair Isle.

9. Acoustic data acquisition

Initial trials with a magnetic tape data archiving system were carried out and data from one metre depth samples were recorded over three 24 hour periods.

seen in draft
I C McLeod

R S Bailey
12 September 1983

