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IN CONFIDENCE: Not to be quoted without reference to the Laboratory

CRUISE REPORT

FRV Clupea

3-26 June 1975

Objectives

1. To carry out exploratory fishing for sprats in the areas north and west of Orkney.

2. To carry out an echointegrator survey of the area.

3. To carry out a limited plankton survey for sprat eggs and larvae.

4. To collect biological material for the investigation of maturation, fecundity and the incubation period of sprats.

5. To carry out trials using the digital scanning sonar.

Narrative

The "Clupea" sailed from Aberdeen at 1730 on 3 June and made a direct passage to Orkney. Owing to instability in the Decca Navigator equipment, a call was made to Kirkwall from 0800 to 1230 on 4 June. The rest of the day was spent searching for echotraces NW of Noup Head. The following day the ship worked to the west of the islands. A few echotraces were found and in one haul using the Clupea Mark III midwater trawl, a basket of dogfish and sandeels were caught. The net was badly torn, however, and the ship proceeded to Lyness at 1900 so the net could be stretched out on the quay for repair. On 6 June a further haul west of Hoy contained half a basket of sprats. Subsequently, a survey was carried out to the north and the ship tied up at Papa Westray at 2030. On 7 June, a passage was made to Kirkwall, docking at 1000.

Mr R E Craig joined the "Clupea" on 7 June.

In view of the difficulty in handling the large Mk III trawl, the net and otterboards were changed during the weekend. "Clupea" sailed at 0930 on 9 June. On the advice of Mr A Reid, skipper of the MFV "Bountiful", a course was set to the east, where sprat traces had been seen a fortnight previously. A few miles off Auskerry, echotraces were found which consisted of numerous small shoals near the bottom. The Gourock trawl towed for an hour within 1-2 fathoms of the sea bed caught 6½ baskets of large sprats. To search for larger concentrations, the ship sailed east then north past Fair Isle and tied up at Scalloway at 2200. Echotraces were widespread over this area. On 10 June, a course was made for the Fair Isle area where the largest concentration had been recorded. A haul was made in good echotraces but the net was completely torn out of the footrope and headline. The Mk III trawl was rigged for use and a telephone call was made to the Laboratory to send another Gourock trawl to Kirkwall. After some delay in sorting out the Mk III trawl, a haul was carried out at 1845 in good marks. Twelve baskets of sprats were caught, but probably an equal quantity escaped from a hole in the codend.

The ship then proceeded towards Auskerry and a haul made during darkness in diffuse traces resulted in a catch of six baskets of small whiting and one of sprats. The Clupea anchored in Deer Sound until 0900 on 11 June when a calibration was carried out with the echointegrator. Owing to the difficulties involved in shooting the Mk III trawl, the remainder of the week was spent in an echointegrator survey to the east and north of Orkney working through the night and tying up at Papa Westray at 1030 on 12 June. To carry out a further integrator calibration on 13 June the Clupea made for Veantrow Bay but, owing to the wind, moved to Inganess Bay. This was completed by 1145 and the ship docked in Kirkwall at 1230. Mr Craig left the ship that afternoon and Mr Whitehouse (Birmingham University) joined at 1230 on 16 June.

Departure on 16 June was delayed until the arrival of a hydrophone on the plane. Sailing at 1430, the Clupea made for Rackwick Bay, west of Hoy, to carry out tests on the digital scanning sonar. There was, however, too much tide and the ship tied up at Lyness for the night. The following day an echointegrator survey was carried out to the west and the ship proceeded to Loch Eriboll to anchor at 1530. The remainder of the day was spent testing the scanning sonar. On 18 June a haul using the Gourock trawl off the north coast contained one basket of sandeels. The net was badly torn and a survey was planned to end in Kirkwall at 2030 to land Mr Whitehouse. On 19 June the ship worked to the north and west of Noup Head, but there were so few signs of echotraces that a fault was suspected in the echosounder. The following day the Clupea worked between Auskerry and Fair Isle and again few echotraces were found. Two trawl hauls contained small quantities of sprats and sandeels. On 21 June, a haul was made east of Auskerry before docking in Kirkwall at 1100.

The "Clupea" sailed at 0845 on 23 June, proceeding towards Fair Isle to search for sprat concentrations. Little sign of echotraces was found and after one unsuccessful trawl haul, an echosounder survey was carried out to Sandwick Bay, Shetland, where the ship tied up at 2145.

A further calibration indicated that the echointegrator was far less sensitive than previously and the survey on 24 June was carried out using the ship's sounder alone. There were still very few echotraces and so the integrator was again installed. On 25 June a survey was planned back to Aberdeen, where the ship docked at 0730 the next day.

Echointegrator survey

The survey during the first two weeks of the cruise gave fairly complete coverage of the area around Orkney. Densities of fish in midwater were relatively low to the west and north of the islands, whereas generally higher levels were found to the east and especially north west of Fair Isle. Very low levels were recorded in most inshore areas around the Orkneys.

Three calibrations were carried out, indicating that the sensitivity of the equipment dropped by a factor of about 6 during the third week of the cruise. The subsequent survey is therefore less reliable, but in general indicated that fish densities were highest to the east of Orkney. Although not yet traced, the fault appears to lie in the echosounder.

Trawling

For the first part of the survey, the Clupea Mk III midwater trawl was used with a 20mm codend. Owing to the considerable difficulty involved in handling the net the second part of the survey was carried out using the Gourock midwater trawl with 10mm knotless codend. This net, which was designed for a smaller vessel, however, seemed insufficiently strong for "Clupea's" towing power and some net damage occurred on almost every haul. In consequence, only 11 successful hauls were made during the cruise.

Two hauls made west of Orkney contained small quantities of dogfish, up to half a basket of sprats and a few sandeels. The sprats ranged in length from 7.5-14.5 cm, with a mode at 9cm. The sandeels were from 11.5-19cm long. A haul made along the north coast of Scotland contained one basket of sandeels ranging in length from 9.5-17cm.

East of Orkney, four hauls were made west of Fair Isle and four east or southeast of Auskerry. The former contained up to 12½ baskets of large sprats, a few small whiting, and in one haul very close to the sea bed almost a basket of small sandeels. Further south, the trawl hauls contained up to 6½ baskets of sprats, and one haul at night contained 6½ baskets of small whiting. In the area east of Orkney the midwater echotraces thus appeared during daylight to be caused by large sprats with some sandeels.

Most of the sprats caught during the cruise were close to spawning, but few were ripe and running and artificial fertilisation was not possible. A sample of ovaries were preserved in formalin for fecundity determination and gonads were fixed in Bouin's fixative for histological examination.

A sample of whole sprats was also preserved for parasitological examination. A quantity of sprats were frozen for assessment by Torry Research Station and analysis in the Marine Laboratory.

In general, echotraces attributable to sprats were found over a very large area, especially east of Orkney, but nowhere in dense concentrations. The maximum catch-rate achieved, allowing for loss of fish during hauling, was about 0.8 tons/hour.

Digital Scanning Sonar

The digital sonar was set up and checked during passage to Loch Eriboll. Experiments were carried out with the ship anchored in 20 fathoms of water using the rubber boat to move the targets. Tests using a transmitting hydrophone, a transponder and a weighted fishing float were carried out successfully. The results of these tests indicated that the equipment was functioning properly and giving as good a performance as could be expected. Conclusions are that this sonar is best suited to work with transponders but that for any useful work it would require mounting on a rotatable stalk.

Plankton Survey

Owing to the fact that the gantry was not installed, no plankton hauls were made

Indicator samples were taken when possible for the Oceanographic Laboratory, Edinburgh.

R S Bailey
August 1975

Seen in draft by G Geddes.