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In Confidence: Not to be quoted without reference to the Laboratory

CRUISE REPORT

FRS "SCARBA"

6 - 30 AUGUST 1971

OBJECTIVES

The objectives of the cruise were:

1. To complete the midwater trawling survey for 0-group gadoids in the north-western North Sea begun on the previous cruise, and to repeat sampling at a number of widely spaced points within the survey area.
2. To investigate diurnal variation in the availability of small gadoids in midwater and on the sea bed.
3. To investigate the food and diurnal variation in the feeding rates of 0-group gadoids, clupeids and sandeels.
4. To obtain live fish for aquarium experiments.
5. To investigate the planktonic environment of the pelagic phase of gadoids.
6. To make some hydrographic observations at selected stations.

NARRATIVE

"Scarba" sailed from Aberdeen at 1300 on 6 August 1971. During the following six days the eastern part of the midwater trawling survey was completed, with a short break due to bad weather from 2030 on 9 August to 0830 on 10 August. On 12 August, the ship headed for an area off the Out Skerries where concentrations of 0-group haddock were found in July. Only salps were caught in this area, however, and "Scarba" proceeded to rectangle E18b where the period from 2000 on 12 August to 0800 on 14 August was spent trawling in reasonable concentrations of both haddock and Norway pout. With the onset of strong winds the ship hove to from 0900, and at 1800 on 14 August proceeded to a sheltered position east of the Orkneys. The remainder of the first part of the cruise was spent trawling east of the Orkneys and in the Moray Firth. The ship docked in Aberdeen at 1000 on 17 August.

After refuelling "Scarba" left Aberdeen at 1600 on 19 August and proceeded north-eastwards towards the Fladen ground. The period from 1600 on 20 August to 1600 on 21 August was spent trawling on the Fladen Ground where two hauls were made on the bottom with the Young Fish Trawl. Owing to the high density of medusae in this area, the ship then moved to the northeast.

At 1830 on 22 August a message was received, via Wick Radio, from the "Nova Helsing", a Danish trawler that had lost the use of her rudder. As a result of an incorrect position, this ship was not located until 2400 hours and was then towed into Lerwick at 0900 on 23 August. After trawling again among salps east of Shetland, "Scarba" returned to rectangle E18b and a further period from C830 on 24 August to 0500 on 25 August was spent trawling there. In deteriorating weather, a course was set for Dutch Bank, but after a single haul the "Scarba" headed for shelter, and remained in Inganess Bay, Orkney, from 0800 on 26 August to 0700 the next day. In the continuing strong winds trawling was confined to areas off the Orkneys and in the Moray Firth sheltered from the prevailing south-westerly winds, though a number of trawl hauls were made 30 miles northeast of Kinnaird Head on 28 and 29 August. After releasing drift cards off Collieston, the ship docked in Aberdeen at 0630 on 30 August.

RESULTS

1. Midwater Trawling Survey

A total of 77 one-hour hauls were made using the "Scarba" Young Fish Trawl in conjunction with a Furuno headline transducer. Throughout the cruise 0-group gadoids were caught in midwater, principally at night. Norway pout were caught in the largest numbers, the highest catch being over 10,000 fish southeast of Shetland. Good catches were also made northeast of Kinnaird Head, but none were caught east of Orkney or in the Moray Firth.

Haddock were caught in the same areas as Norway pout, the maximum being 1800 per hour. Whiting were caught mainly south of $58^{\circ}30'N$, the maximum being 260 fish. Very few 0-group cod or saithe were caught in midwater, though two catches of 18 and 30 of the former species were made on the seabed. Blue whiting, believed to be 1-group, were caught in 14 hauls in the central North Sea, the maximum being 240 per hour.

In general the length measurements of haddock, Norway pout and possibly whiting, showed decreasing size from the Buchan coast to the north and east. Samples of Norway pout, haddock, whiting and sprats were frozen for determination of weight-length relationships.

In addition to 0-group gadoids, a number of other species were caught in midwater. Squalus acanthias were caught in small numbers (maximum 54) mainly in the central part of the North Sea and appeared to remain in midwater at all times of the day. Clupeid larvae and flatfish larvae were frequently found in the meshes of the codend, and samples have been brought back for identification. Sprats from $3\frac{1}{2}$ - 8 cm in length were recorded in a number of hauls and in the southern part of the Moray Firth this species predominated, the largest catch being $3\frac{1}{2}$ baskets per hour.

2. Diurnal Variation in Catches

Over considerable parts of the survey area, echo-traces in the form of small plumes rose from the sea-bed around dusk and descended at dawn. Towing the net through these traces resulted in catches of Norway pout and haddock, with occasionally blue whiting and whiting.

The catches of Norwaypout in midwater were restricted to the hours of darkness, while small numbers were caught on the sea-bed during both day and night. Haddock were also caught in midwater mainly at night, though four daylight hauls contained small numbers. Blue whiting were caught in midwater only at night, but there was little evidence of diurnal changes in the midwater availability of whiting.

3. Food and Feeding

From most hauls, samples of 0-group gadoids and clupeids were preserved in formalin for later detailed examination of stomach contents. In addition the stomach contents of larger fish were preserved, and particularly those of Squalus acanthias caught in midwater. A cursory examination suggests that full stomachs occurred mostly at night, with only well-digested remains during the day.

4. Live specimens of 0-group haddock, whiting and Norwaypout were brought back for the Laboratory and the White Fish Authority.
5. The macroplankton in the trawl from each haul was identified and counted. The disc diameters of Scyphomedusae were measured and samples were brought back to the Laboratory. Aurelia aurita occurred widely south of 59°N, with the greatest concentrations in the Moray Firth and off the Buchan coast. Cyanea lamarcki was also commonest in the latter area, while Cyanea capillata was most abundant in the area around the Fladen Ground. Other common medusae were Cosmetira and Aqueorea, both of which were commonest east of the Orkneys, as was the ctenophore Pleurobrachia. Salps (Salpa fusiformis) were almost confined to the areas northwest of Shetland (south to 60°15'N) and in the approaches to the Orkney-Shetland Channel.

A Dutch Gulf III was towed once in every statistical square, on a total of 34 occasions. In addition, three standard net hauls were made around the Buchan coast.

6. In each statistical square surface and bottom temperatures were recorded using a FN bottle, seawater samples were taken for salinity determination, and a bathythermograph profile was obtained.

R S BAILEY
17 September 1971