

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

CRUISE REPORT

FRS "SCOTIA"

23 April - 2 June 1970

OBJECTIVES

The objectives of the cruise, which was in two parts, were (i) a trawl survey of the shelf area of the northern North Sea and associated environmental sampling and (ii) an environmental survey of the Norwegian Deep.

NARRATIVE

During Part I priority was given to the trawling stations, while during Part II the main emphasis was on the Norwegian Deep environmental stations, although major gaps in the trawl survey were also filled in during Part II.

"Scotia" left Aberdeen in very unsettled weather at midday on the 23 April and proceeded to the station in the Buchan Deep, which was completed that evening. No work was possible during the next day, and in the five days that followed only six more stations were occupied in the most sheltered positions off Orkney and Shetland. "Scotia" docked at Lerwick on 30 April where Mr Burns handed over charge to Mr Hislop.

"Scotia" sailed from Lerwick at 1020 on Friday 1 May, but due to a heavy swell no work was possible and "Scotia" anchored in the Wick of Gruting at 1550 hours. Conditions had improved by the following morning and the ship weighed anchor at 0715 hours and proceeded to station 59, at 60°36'N 00°44'E, which was occupied that afternoon. "Scotia" then worked southwards and completed eleven more stations, the last being in the Moray Firth on 5 May.

A heavy south-east swell made further work outside the Moray Firth impossible and, as a leak had developed in a fresh water tank, "Scotia" proceeded towards Leith where she docked at 1020 hours on 7 May. Some of the samples were unloaded and later that day the scientific staff returned to Aberdeen.

The scientific staff for Part II joined "Scotia" at Leith on Wednesday 13 May and the ship sailed that night at 1800 hours, proceeding north east to station 65, at 57°02'N 00°55'W. The latter station was occupied at 0914 on 14 May and "Scotia" then worked eastwards towards the Skagerak. The survey continued uninterrupted by weather conditions until the afternoon of Wednesday 20 May when adverse sea conditions developed. In view of this and illness on board, "Scotia" proceeded to Bergen where she docked at 0845 on Thursday 21st.

During 21 and 22 May visits were made to the Bergen Laboratory and to the new research vessel "G.O. Sars". It had been hoped to depart from Bergen early on 23 May, but with the arrival of gale force winds on Friday night departure was delayed until 1630 hours on 23 May. The survey was resumed at 2200 hours the same day and, apart for a short period of adverse weather during the night of 24/25 May, continued until late on 30 May when "Scotia" proceeded to Aberdeen where she docked at 1000 hours on 31 May.

As noted earlier there was illness on the ship. At some time or other this affected most people on board, and the Captain and his crew must be thanked for the way in which they carried on to give us the excellent coverage which was obtained.

RESULTS

Hydrography and Chemistry

During the period 23 April to 5 May surface temperatures in the north-western North Sea ranged from less than 6°C on the eastern boundary of the area, to above 7° east of Shetland and in the inner Moray Firth. By the latter half of May, virtually all the surface temperatures in the north-western North Sea had increased to over 7.5° with temperatures of over 8°C towards the Moray Firth. A tongue of over 8°C also extended south about 2°E while over the Norwegian Deeps temperatures ranged from less than 7° along the coast to just under 8° on the eastern boundary.

Surface salinity during 23 April to 5 May ranged from over 35.3‰ east of Shetland to less than 35.0‰ near the north-east Scottish coast. During the second part of the survey (14-30 May) surface salinity in general showed an east to west gradient with values about 30.0‰ along the Norwegian Coast and values of about 35.3‰ in the north western North Sea.

Phosphate and nitrate samples were also obtained from surface and bottom at all stations.

Chlorophyll a and zooplankton dry weight

Surface chlorophyll a showed an irregular distribution during both Part I and Part II of the cruise. In the north-western North Sea during Part I values ranged from 0.1 to 5.0 mg/m^3 , the average being 0.8 mg/m^3 , while during Part II values ranged from 0.3 to 14.1 mg/m^3 for the greater part of the northern North Sea. At that time, average values were 1.2 mg/m^3 for the north western North Sea and 1.9 mg/m^3 for the central northern North Sea and Norwegian Deeps area.

The zooplankton standing crop was investigated using both the old technique of formalin preserved Gulf III samples, and the techniques of deep frozen samples. The latter samples are to be analysed by Torry Research Station not only for zooplankton dry weight but for protein, fats etc. The formalin preserved samples obtained during the period 23 April to 5 May suggested high zooplankton standing stocks east of approximately the prime meridian. During Part II of the cruise these high values were found to extend in certain areas to the Norwegian Coast and with many values greater than $10\text{ g dry weight/100 m}^3$ (and even greater than $30\text{ dry weight/100 m}^3$ south of 58°N) the standing stock during this survey is the highest that has been encountered since these surveys started in 1960.

A number of samples were also taken with a 1 metre (60) net for T.R.S., and the usual multi-depth indicator sampling was completed for SMBA, Edinburgh.

Sampling with WP3 nets indicated an area rich in siphonophores (Physophora hydrostatica) from the Fladen area north-east towards the Norwegian Coast. From this area southwards Calanus was abundant, while north of this area Calanus, although still important was less abundant. The Norwegian Deeps area was characterised by the presence of Tima bairdii while the north western North Sea was associated with small copepods, fish eggs and larvae and Pleurobrachia all in rather small numbers.

Phytoplankton sampling with a standard net was confined to the Scottish coastal region, the most noteworthy feature being a Phaeocystis bloom off the north-east coast.

TRAWLING

Haddock of the 1969 year class were found throughout the whole area surveyed but occurred in greatest numbers (> 200 fish per hour) in the region enclosed by Latitudes 59°00'N, 61°00'N and Longitudes 01°00'E and 03°00'E. Most of the older haddock taken consisted of fish of the very strong 1967 year class. Although these fish were caught at every station the largest catches (> 2,000 fish/hour) were made in the vicinity of Orkney. These fish showed a very extended size distribution, their lengths ranging from 19 to 44 cm. Older fish were scarce.

Whiting were only taken in small numbers in all areas, and 1+ fish were confined almost entirely to the Moray Firth stations. It would appear from the catch rates that both the 1968 and 1969 year classes are poor.

T. esmarkii were found mainly in the north central area and in the southern part of the northern area. The numbers of this species caught were comparatively small, >1,000 fish being taken on one occasion only.

TAGGING

A total of 57 plaice, 48 cod and 7 whiting were tagged throughout the cruise.

MISCELLANEOUS

Collections of stomachs of common dab and long rough dab were made for Mr Armstrong. Haddock stomachs were preserved for Mr Jones.

ECHOSOUNDING

The echosounder was operated throughout the cruise.

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8 October 1970