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## CRUISE REPORT

FRS SCARBA

20 May - 29 June 1971

## OBJECTIVES -

Northern North Sea fish and environmental survey.

"Scarba" sailed from Aberdeen on 20 May 1971. The cruise was divided into two parts. During Part I the fishing and environmental stations in the western half of the survey area were worked, followed in Part II by those in the eastern half. "Scarba" spent  $1\frac{1}{2}$  days at Lerwick during Part I and called at Stavanger, during Part II for repairs to a deck trawling bollard. In all, 4 working days were lost during the cruise due to adverse weather, and one for repairs to the Decca navigator.

Of the 106 trawl and environmental stations on the joint programme, two trawls were omitted on account of bad ground, and two others that at first were bypassed on account of weather, and later proved to be out of reach.

## HYDROGRAPHY

In all 106 hydrographic stations were worked, covering the whole of the northern North Sea and the continental shelf west of Orkney up to the  $5^{\circ}\text{W}$  longitude. The western half of the area was sampled at the end of May and beginning of June, and the eastern half during the last 15 days of June.

Surface temperatures showed the  $9^{\circ}\text{C}$  isotherm running N-S through the western half of the area, and the  $10^{\circ}$  and  $11^{\circ}\text{C}$  isotherms running in the same direction in the eastern half. All three isotherms had the same shape given to them in the provisional means published by ICES for these two months.

Salinities showed that towards the end of June, the usual westwards spread of low salinity water ( $<34.99\text{‰}$ ) of Baltic origin, had crossed the  $1^{\circ}\text{E}$  meridian at one point. Oceanic water entering the North Sea north of Flugga had a salinity of  $35.32\text{‰}$ , and that entering through the Fair Isle gap  $35.27\text{‰}$ . Coastal water, with a salinity range from  $34.37$  to  $34.99\text{‰}$  had filled the North Coast, Moray Firth and the Aberdeenshire coastal area to a width of 40 miles.

The principal nutrients, phosphate and nitrate showed, for most areas, the usual late spring and early summer depletion, down to  $0.20 \mu\text{g-at. Pand}$   $1.00 \mu\text{g-at. N}$ . In oceanic water east of Flugga and north of the Butt of Lewis, where a strong thermocline had not yet developed, values up to  $0.60 \mu\text{g-at}$  for phosphate and  $5.40$  for nitrate were recorded.

Four batches of drift envelopes were liberated at the stated times, 8 miles off the mouth of the river Ythan, on behalf of the Deutsches Hydrographisches Institut (Hamburg).

## PLANKTON

Duplicate hauls were made at all stations with the Gulf III sampler. One set of samples was preserved in formalin and the other deep frozen for dry weight estimation. Multidepth samplers (5 in number) were also worked at all stations for the Oceanographic Laboratory, Edinburgh (IMER), for whom additional single depth plankton samples were also taken between 6pm and 6am. Water samples for chlorophyll estimation were also taken at all stations.

A formalin preservation experiment requiring nearly 2 litres of copepod plankton (taken in a 1m silk net) was conducted 60 miles east of Lerwick on 3 June.

Standard net hauls taken in the Moray Firth and off the Aberdeenshire coast to monitor toxic phytoplankton, showed that none of these species was present.

East of 2°E the standing stock of zooplankton was vary variable ranging from <5 to 100 ml settled volume per Gulf III haul, the richest samples occurring in patches over the Norwegian Deep. The main components of the samples were Calanus, Thysanoessa inermis and Meganycitiphanes norvegica. The richest samples were obtained in the central part of the survey area with volumes ranging from 50 to 100 ml, and in rectangles F18 and 19 up to 120 ml. These samples were again composed mainly of Calanus and Euphansiids. Samples taken from the Moray Firth and the shallower water near the Scottish coast were generally smaller and consisted mainly of the smaller copepods and larvae of bottom invertebrates.

## TRAWLING

The Vinge trawl fitted with a small mesh codend (of mesh size 33 mm) was used throughout the cruise. Sixty two, one-hour hauls were made, the catches from which varied from 1 basket to 30 baskets, the average being 5 baskets per haul. Catches to the west of the prime meridian were on average larger than to the east of it.

Haddock occurred in all hauls and made up the bulk of the catch in most of them. The best catches came from three areas - the Fair Isle gap, the outer edge of the Moray Firth and off the Aberdeenshire coast. Here catches up to 3000 individuals in 3 size ranges 15-24, 25-35, 36-50 cm were recorded, the largest numbers being of the smallest range. East of the prime meridian, catches were less than 200 per haul, mostly in the smallest size range. The best catch of mature haddock (858 fish) was made 40 miles west of Orkney.

Catches of whiting were small in all areas. The best catch of 708 fish (21-40 cm) was taken east of Orkney.

Apart from one large catch of 198 large fish (mostly in the length range 70-100 cm) cod were caught in small numbers in a number of hauls over the survey area.

The most prominent flat fish were long rough and common dabs. The former occurred in varying numbers in all trawls within the northern North Sea and at one position west of Orkney, while common dabs were absent from many hauls east of the prime meridian. The largest catches of common dabs were taken between Orkney and Fair Isle where two hauls yielded 251 and 304 fish (9-29 cm).

Lemon sole were taken in very small numbers except from the Dog Hole, outer

Moray Firth, east of Orkney and east of Unst (Shetland) where 78, 139, 97 and 56 respectively (13-41 cm) were caught. Plaice were caught in only small numbers over most of the survey area, the largest catches (12 fish) being taken in the Moray Firth (17-29 cm), east of Orkney (31-51 cm) and north of Loch Eriboll (31-44 cm). Megrin occurred in hauls north of latitude 59°N, the best catch of 18 fish (25-56 cm) being taken 30 miles east of Muckle Flugga.

An aggregate of 169 herring were caught in a haul 5 miles off May Island, and 207, 173 and 222 (20-29 cm) in three hauls on the SE boundary of the Fladen ground. In the same haul off May Island 576 sprat (6-16 cm) were taken and in a haul in Moray Firth 294 (6-12 cm) were recorded.

T esmarkii was the only industrial species taken in substantial quantities. The main concentrations were located in the wedge of oceanic water lying to east and SE of Shetland and Fair Isle and stretching eastwards to the Fladen grounds. Eleven trawls in this area yielded the best catches from 808 to 4502 fish in the size range 11-21 cm. A large catch of very small 0-group T esmarkii (about 4 cm) was also taken at position 59°17'N 3°00'E in the north eastern North Sea.

In 45 of the hauls, seven different varieties of skate were taken at an average of 3 per haul, together with one haul east of Orkney, where 37 skate were recorded, 30 being R. Montagui (20-49 cm) and 7 R. Naevus (19-33 cm). While R. montagui was taken in only one other haul over the North Coast, R. naevus occurred frequently in hauls west of 1°W long. In contrast, R. radiata (6-30 cm) occurred in hauls east of 1°W. One specimen of R. circularis (59 cm) was captured east of Flugga, and two R. brachyura (51 and 66 cm) off the North Coast. R. clavata (26-69 cm) was confined to hauls in the Moray Firth and off the Aberdeenshire coast, while R. batis the largest species measured, (34-93 cm), was found mostly in the central area of the northern North Sea. As regards shell fish, the best catch of Nephrops (2937 individuals 17-50 mm) was made in the Moray Firth and of Pandalus, (1200 individuals) on the Fladen grounds.

#### POLLUTION SAMPLING

Fish, plankton and bottom mud were collected from four specified localities in the North Sea for metals and pesticide estimation.

R B BURNS  
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