

Cruise Report

FRV "Explorer"

2 - 6 May 1977

Scientific Staff

A D McIntyre	SPSO
J M Davies	SSO
J C Gamble	SSO
L Massie	HSO
R Payne	HSO
C Bruce	(Torry Research Station)

Introduction

This cruise, not scheduled in the annual programme, was arranged at short notice in response to the Ekofisk blow-out as a joint study by the Marine Laboratory and Torry Research Station. The aim was to make observations on the contamination of water and fish in the area of the slick for comparison with conditions in the UK sector of the North Sea, and also to undertake limited experimental work to assess effects on marine life. In the interests of integrating our effort with other work in the area, stations in the Norwegian sector were positioned on a sampling grid proposed by Norway and used by the Norwegian vessels "Hjort" and "G O Sars" and by the MAFF vessel "Corella". However, in order to give the maximum opportunity for detailed sampling and experimental work, it was decided to operate from "Explorer" at a restricted number of stations.

Procedure

"Explorer" loaded at Aberdeen on the morning of Monday 2 May and left at 1500 hrs, heading for Ekofisk. A reference station some 50 miles WNW of the field was occupied at 0700 hrs the following day, after which the ship proceeded to the Norwegian sector.

A thin surface slick was first observed 19 miles NWxN of Ekofisk at 1900 hrs on 3 May. It was driven by 30 kn winds from the ESE and was in the form of long streamers of relatively smooth water up to one metre wide and several metres apart, but the streamers widened substantially as we progressed, until about 5 miles further eastward the slick was seen as an extensive mosaic. Its appearance varied with light and weather conditions, and in the rough seas and strong winds which prevailed it was difficult to estimate accurately the degree of cover, but traces of it were always in evidence during the next 1½ days.

In the following 36 hours "Explorer" operated in the "Ekofisk" area, laying sediment traps, making hydrographic observations, collecting samples of water and fish, and conducting experiments on micro-organisms, plankton and benthos. Working conditions were difficult, with easterly wind just short of gale force for much of the time, so that small boat operations were out of the question. The weather moderated late on 4 May, and when the sediment traps were lifted at first light on 5 May 19½ miles NExN from Ekofisk in variable winds and a relatively calm sea a substantial and continuous slick was evident, which on this occasion was clearly recognisable as oil. The last Ekofisk station, 19½ miles NWxN from the field, was occupied in continuing good weather at 0920 on the same day, close to the position where a slick had been first observed just over 36 hours earlier, but on this occasion no slick was seen.

The ship then headed for Aberdeen, working two additional reference stations en route. "Explorer" docked at 0400 hrs on 6 May.

Operations

The ships' track is indicated in Appendix 1, and the station list with comments in Appendix 2.

At station 1, the main reference position, specimens of six fish species (haddock, whiting, gurnard, lemon sole, plaice and mackerel) and one invertebrate (Modiolus) were kept and samples of microbes, plankton and benthos were taken for experiments to be conducted at Ekofisk. Water samples were also taken at six depths for hydrocarbon analyses.

At station 2, inside the slick, a string of 5 sediment traps were deployed at 2200 hrs on 3 May and in association with this rig a cage of mussels, collected at station 1, was suspended at 2m below the surface, a number of individuals having been kept back as controls. The rig was picked up 30 hrs later before we left the area.

After deploying the sediment traps and mussel cage, stations 2-8 were worked in the Ekofisk area. Water sampling was done at all stations, usually at six positions between surface and bottom.

Four one-hour trawl hauls were successfully completed, and selected specimens collected for hydrocarbon analysis and organoleptic tests. The catches were small, but haddock, whiting, gurnard, plaice and lemon sole were available from all hauls, and a smaller number of other fish and invertebrates were taken.

At two of the stations (3 and 6) serial sampling was done throughout the water column for temperature, salinity and chlorophyll to determine the depth of mixing, which, not surprisingly in view of the strong winds, extended almost to the bottom.

Experimental work, in addition to the mussel filtering, included studies of zooplankton feeding and of heterotrophic production by microbes. For the plankton studies, copepods were incubated for 20 hours on board ship in water (which was enriched with a diatom culture) collected outside the slick and at two positions below it. The heterotrophic experiments involved offering micro-organisms collected at the reference station and at two positions within the slick area, three selected hydrocarbon substrates and incubating for 24 hours. These ship board studies will be supplemented by experiments made ashore on fish larvae and benthos, using water collected from under the slick.

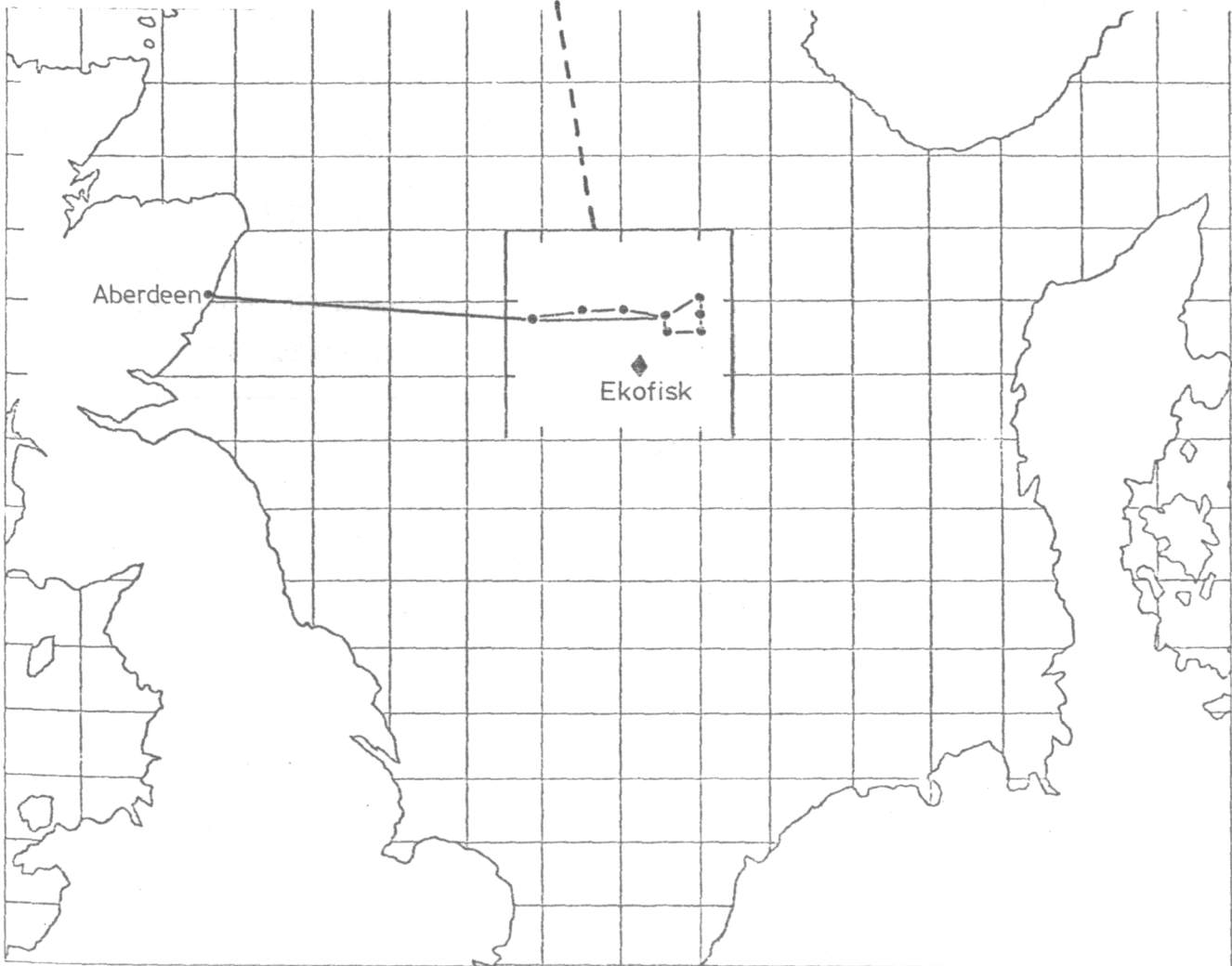
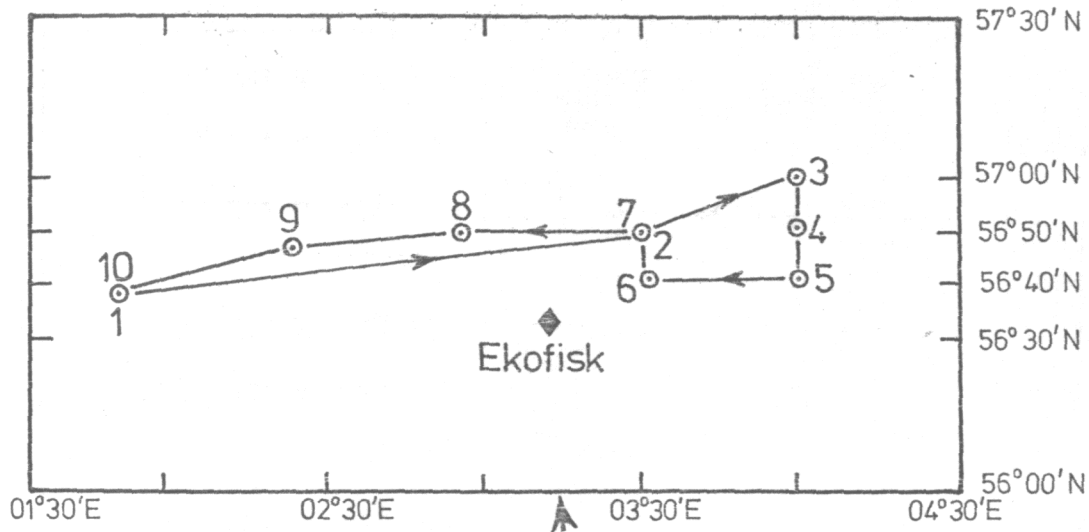
A programme of quantitative observations on sea birds had been prepared, and during the period within the slick, a close watch was kept. However, when it became apparent that the several species observed were alighting on and leaving the sea surface and generally behaving in an apparently normal manner, no specific counts were made.

When the chemical analyses are complete and the experimental data evaluated a full report will be prepared. Thanks are due to Mr Vartdal of the Fisheries Directorate, Bergen who undertook to look after the authorisation of our work in the Norwegian sector, and to MAFF, Burnham for relaying to us the form of the Norwegian station grid and the extent of the "Corella" survey. During the cruise regular attempts were made to contact Norwegian ships, but these were unsuccessful. Finally, appreciation is expressed of the willing manner in which "Explorers" officers and crew undertook the additional spell of duty which this cruise involved.

A D McIntyre
6 May 1977

Seen in draft - J Ross

APPENDIX 1



APPENDIX 2

Stn No.	Position	Time Date	Depth	Wind direction and speed	Sampling and notes*
1	56° 44' N 01° 47' E	0700 3 May	85 m	E, 23 kn	T, WS, WB, M
-	56° 51' N 02° 58½' E	1900 3 May	-	E, 37 kn	slick first noted
2	56° 50' N 03° 28' E	2200 3 May	59 m	ESE, 30 kn	T, deployed sediment traps and set mussel experiment
3	57° 00' N 04° 00' E	0800 4 May	59 m	E, 27 kn	T, WS, WB, H, M
4	56° 50' N 04° 00' E	1320 4 May	53 m	E, 15 kn	T, WS, WB
5	56° 40' N 04° 00' E	1835 4 May	65 m	E, 10 kn	WS
6	56° 40' N 03° 30' E	2030 4 May	59 m	Var., 5 kn	T, WS, WB, H, M
7	56° 50' N 03° 28' E	0400 5 May	59 m	Var., 5 kn	WS, picked up traps, collected water for shore experiments.
8	56° 49½' N 02° 56' E	0920 5 May	-	Var., 5 kn	WS, No slick obvious
9	56° 47' N 02° 23' E	1130 5 May	-	Var., 1 kn	WS
10	56° 44' N 01° 47' E	1400 5 May	-	Var., 3 kn	WS

* T = trawl WS = surface water sample (1 m) H = hydrostation (T/S)
WD = subsurface water sample, 5 depths 5 m - bottom M = microbiology