Indexed AR 06

R1/6

In Confidence - not to be quoted with reference to the Laboratory

FRV "Clupea" 13CR85 MB

Cruise 13/85

REPORT

29 November - 17 December 1985

Personnel

J A Gauld	HSO	
R Priestley	SSO	
A D McIntosh	HSO	(29 November - 13 December)
C W Shand	SO	
J R Hutcheon	SO	

Objectives

1 To investigate the distribution and the biology of the lesser sandeel Ammodytes marinus L. at Shetland.

2 To study the winter behaviour of A. marinus.

3 To monitor hydrocarbon residues in Sullom Voe.

Narrative

The start of the cruise was delayed for 24 hours to allow refit work to be completed. "Clupea" sailed from Aberdeen at 1315 on 29/11 and proceeded to the west of Shetland to fish for Chlamys operularis. Monitoring for hydrocarbon residues was carried out in Sullom Voe on 2/12 when 14 sediment and 6 grab stations were sampled, in addition 4 benthic cages, each containing 10 live Chlamys were deployed off the diffuser outlet pipe. The cages were recovered one week later on 9/12. All Chlamys and sediment samples were returned deep frozen to Aberdeen on 13/12 with Mr McIntosh when he left the vessel.

The remainder of the cruise was devoted to sandeel investigations, up to 15/12 at Shetland and on 16/12 off Lossiemouth. At Shetland a total of 16 inshore grounds were studied using a dredge and/or trawl; off Lossiemouth one ground was studied using a trawl only. Dredge and trawl hauls were monitored using the Laboratory's RCV and TV camera on the more extensive fishing grounds as and when weather permitted. The RCV was temporarily out of commission over 9-11/12 due to a break in the umbilical cable. This was repaired on 12/12 when the vessel called at Lerwick.

"Clupea" put into Buckie on the afternoon of 17/12. All scientific gear was offloaded on 18/12 and Laboratory staff returned to Aberdeen. During the cruise 2 days were lost due to adverse weather conditions.

Results

1 Distribution and biology of *Ammodytes marinus*

Distribution

A. marinus was found only on established sandeel fishing grounds. None were present in one dredge and one trawl haul made in deep water (>90 m) off Bressay and at Balta respectively. Catch rates throughout the Shetland area were low. The difference in catches between the 2 sampling gears used indicated that the dredge was the better and more reliable sampling tool, the respective catch rates for the Shetland grounds were:

	Number of hauls	Mean number of sandeels/haul	Mean number of sandeels/hour
Dredge	25	76	130
Trawl	7	56	94

- trawl hauls exclude one large haul of 2032 specimens in Sands Voe, NW Shetland. In addition one of 4 hauls off Lossiemouth contained 3000 sandeels.

Sampling

For each fishing ground, data on length frequency, age, feeding and maturity for up to 10 fish per 0.5 cm length group were collected. All otoliths were read during the cruise. Length frequency distributions of fish taken by dredge and trawl were similar on individual fishing grounds but between fishing grounds length distributions differed widely.

Maturity

At Shetland observations on age and length at first maturity showed that 19% of 0-group were mature and would spawn at the end of their first year. The smallest mature fish was a male measuring only 95 mm. Males tended to mature at a smaller size than females, and also tended to be at a more advanced stage of maturity than females. Observations off Lossiemouth indicated that maturation in this area was more advanced than at Shetland.

Fecundity

Samples of mature gonads were preserved in a variety of media and returned to the Laboratory for fecundity estimations.

Fish weights

In both the Shetland and Lossiemouth areas weight-length relationships were calculated and samples were collected for lipid analysis at Aberdeen.

Predation

The food of *A. marinus* was investigated by examination of stomachs from each fishing area. Food, in the form of small euphausiids, was found only in a few small immature specimens taken at Foula. Predation on *A. marinus* was investigated by examination of stomach contents of other fish species. Sandeels were found in small numbers in only 7 of the 21 species caught.

2 Behaviour observations

Observations using the RCV were made on 19 of the 30 dredge hauls and on 7 of the 16 trawl hauls completed during the cruise. Direct observations permitted alterations to be made to the sampling gear (trawl and dredge) which improved their sampling efficiency. A total of 12 video tapes were retained for analysis in the Laboratory plus approximately 300 still photographs, half of which were in colour.

Sandeel behaviour

At Shetland no sandeels were observed free-swimming in front of the dredge but specimens were observed escaping laterally from the dense sand clouds created by the dredge teeth. Similarly with the trawl, no free-swimming sandeels were observed in front of the fishing line but specimens were observed to rise from the sand in front of the ground gear, particularly when a tickler chain was attached. Free-swimming sandeels were observed during one haul off Lossiemouth but it was not possible to determine whether these fish were free-swimming or had left the sand due to the action of the trawl doors or sweeps.

Sandeel fishing grounds

On the sandeel fishing grounds the bottom substrate was found to be a mixture of sand and shell fragments. A general similarity in topography was common to all grounds, ranging from smooth and flat areas to areas of ridges. The larger ridges formed series of long straight furrows which measured approximately 0.3 m high at invervals of 1-1.2 m and were similar to a ploughed field.

3 Hydrocarbon residues

Samples of substrate and of Chlamys were returned to the Laboratory for analysis and assessment in association with the long term monitoring of the marine environment at Sullom Voe.

4 Ad hoc

Radio caesium monitoring : water sampling for radio caesium monitoring were collected at Fair Isle on 17 12 85 and off Buckie on 18 12 85.

Parasitological sampling : samples of haddock and lemon sole were collected for study at the Laboratory.

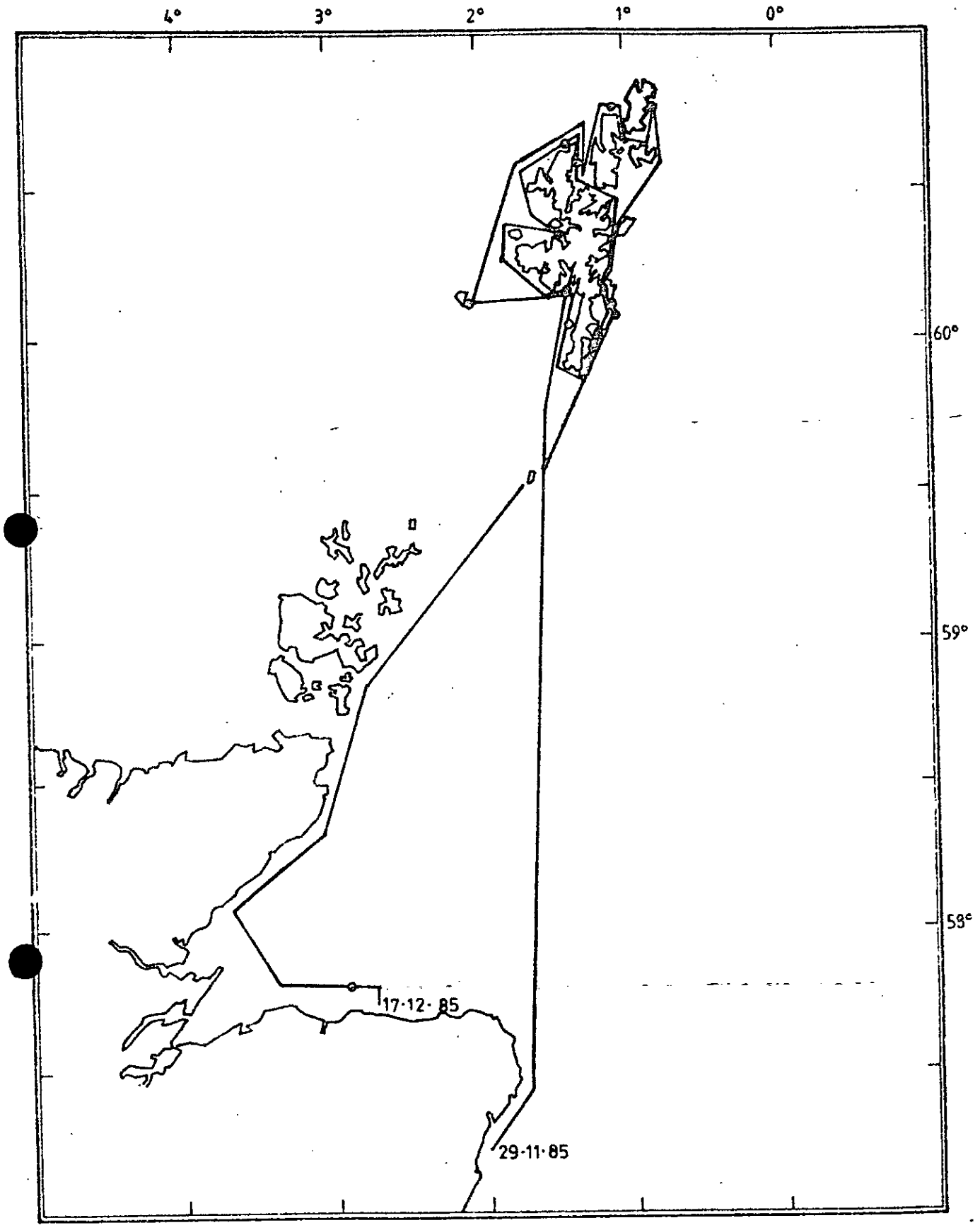
Norway pout sampling : one sample of Noway pout was collected for MAFF's Lowestoft laboratory.

Environmental studies : sea surface and bottom temperature and salinity measurements were made at 9 sites around Shetland.

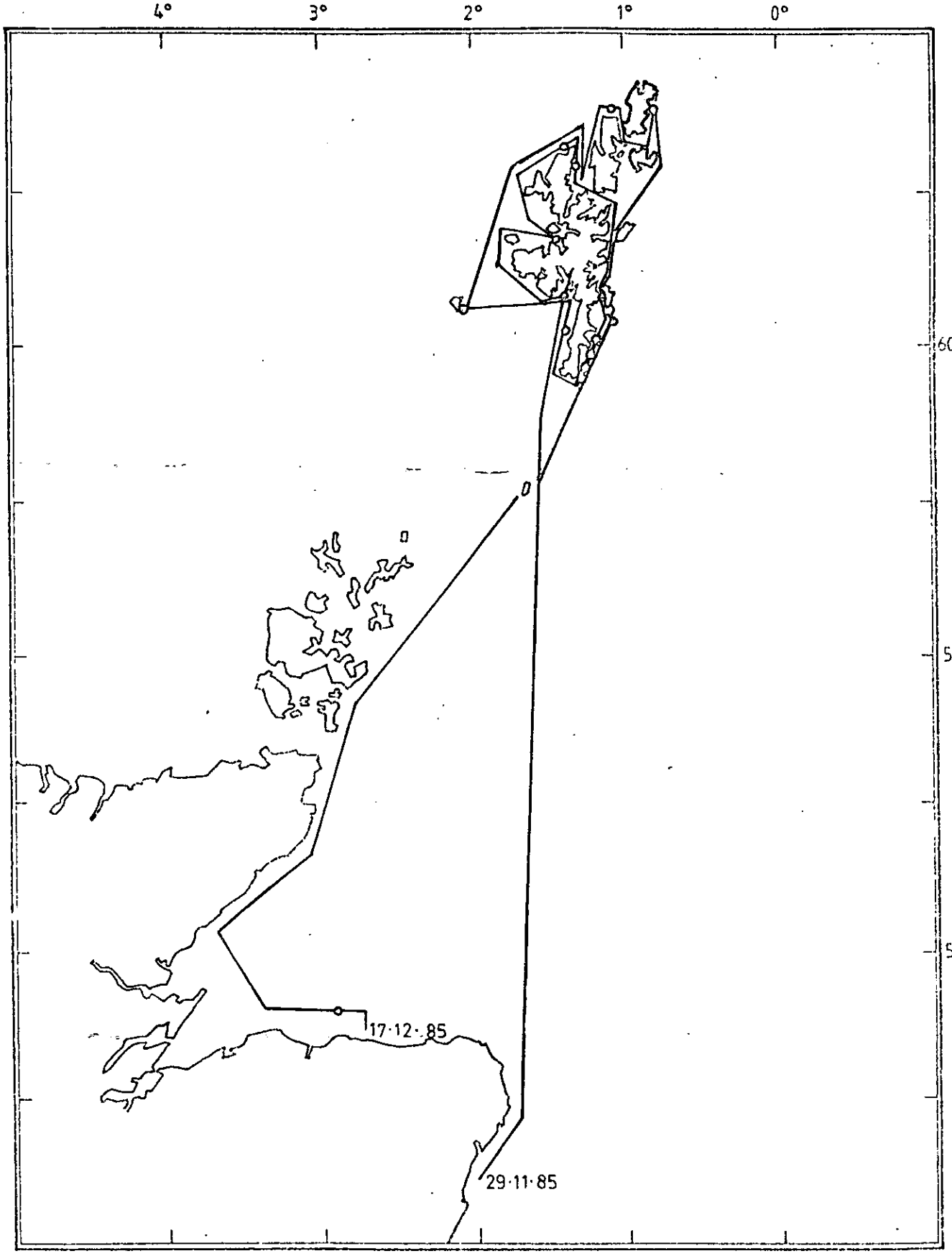
Fish feed : samples of A. marinus were frozen for use in dietary studies in live fish at the Laboratory.

J A Gauld **Seen in draft**

27 January 1986



FRV CLUPEA 29 NOV – 17 DEC 13 CR85



FRV CLUPEA 29 NOV – 17 DEC 13 CR85