

dw

Library.

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD  
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1978 RESEARCH VESSEL PROGRAMME

REPORT: R.V. CIROLANA: CRUISE 7

(PROVISIONAL: Not to be quoted without prior reference to the author)

STAFF:

J G Pope (NIC)  
L Birkett (from 30 August)  
J H Nichols  
A R Child  
G A Sutton  
C J Humphreys  
B J Knights  
S Milligan  
D Palmer  
A Burfitt (to 30 August)  
W Fry (Luton)

DURATION:

Joined ship 1500 h 17 August

Left Grimsby 1715 h 17 August

Arrived Grimsby 1330 h 13 September

All times are Greenwich Mean Time

LOCALITY:

North Sea

AIMS:

1. To carry out a groundfish survey of the North Sea.
2. To obtain the length and age distribution of cod, whiting, haddock and plaice by ICES Working Group sampling area.
3. To examine fish stomachs, especially in respect of predation upon other fish.
4. To obtain data on the relation between gutted weight and whole weight in as many species of fish as possible (Bedford).
5. To collect and preserve fish hearts for ageing studies (Greer Walker).
6. To collect water samples and fish fillets for caesium studies (AEP 1).
7. To collect blood samples from saithe (Jamieson).
8. To collect mackerel samples (Lockwood).
9. To collect pycnogonids (Fry, Luton).
10. To collect specimens of larval fish for stomach content analysis (Harding).

Aims and Requests received too late for inclusion in cruise programme.

11. To collect euphausiids and edible crabs for genetic studies (Jamieson).
12. To collect muscle samples (Greer Walker).
13. To collect otoliths of blue whiting by depth strata (Pawson).
14. To collect otoliths of Norway pout by area strata (Pawson).
15. To collect fish food (Htun Han).
16. To collect specimens of commercial fish and typical species mixtures for use in fish identification courses (Blacker).
17. To collect display specimens of thornback ray and sandeel (British Museum).

#### NARRATIVE

R.V. CIROLANA departed from Grimsby at 1715 h 17 August 1978, the groundfish survey being commenced at 0800 h 18 August off the Tyne. The survey proceeded to stations off Eastern Scotland and thence to the northern North Sea. The typical daily pattern of work was three hauls at each of two primary stations. Advantage was taken of night steams to take water samples at grid points indicated by FRL. Work continued uninterrupted until 1800 h 24 August when a primary station had to be abandoned due to gale conditions. Passage was made to two water sampling points before dodging commenced at 0700 h 25 August. Work was resumed on the groundfish survey at 0800 h 26 August and proceeded without interruption until 1120 h 30 August when passage was made to Aberdeen to transfer scientific staff (Burfitt/Birkett) and to land the Fishing Skipper for compassionate leave. Following the transfer R.V. CIROLANA proceeded to the southern Norway Coast via a chain of water sampling stations and trawling was resumed at 1330 h 31 August.

Work was again suspended on 2 September, initially to join the search for a deckhand lost overboard by the Lowestoft trawler ST ROSE and later that day after one haul, due to a further worsening of weather conditions.

Work resumed at a hydrostation at 1125 h 4 September and continued until 0800 h on the 10th when gale conditions again interrupted trawling.

Work was resumed in the afternoon but gales again intervened on 11 September. Work was resumed at 0800 h 12 September and the survey completed at 2130 h. Passage was then made to the Humber. R.V. CIROLANA docked at 1330 h, 13 September.

A cruise track is appended (see chart 1). For clarity trawl station positions are shown on a second chart (chart 2) and Water and Plankton stations on a third chart. In all 121 trawl hauls (including 6 hauls invalid due to damage) were made, 10 plankton hauls were made and 56 water samples taken.

#### RESULTS

Aim 1. Apart from one station abandoned due to adverse weather condition all the standard ground fish survey stations were worked and at least two valid trawl hauls obtained at each (with one exception). The trawl stations are shown on chart 2.

At each station the weight of each fish species and that of commercially important shellfish species was recorded. The length distribution of each fish species present was obtained at each station.

The results of total weight and length measurement were recorded on special forms and then input into the HP2100A computer. These data were interrogated to provide

preliminary results. Validity checks were made routinely to check for discrepancies between weight and length distributions and where necessary to resolve these while the sampling was still fresh in people's minds.

At each primary survey point fished, surface and bottom temperatures and salinity samples were taken by Nansen bottle casts except for two shoal stations fished in poor weather conditions.

Aim 2. Length distributions were obtained for all fish species at each trawl station. Stratified otolith samples were collected for cod, haddock and whiting for subareas defined by the ICES North Sea Roundfish Working Group.

Stratified samples of otoliths for plaice were collected from areas suggested by Dr Bannister. Additionally stratified samples of otoliths for saithe and lemon soles were collected for the roundfish areas and plaice areas respectively. The preliminary scientific report gives details of the number of otoliths in each length group in each area and their serial numbers.

In addition to these, small samples of otoliths were collected from the following species to archive against the possibility of future interest in them:

- |                   |                  |
|-------------------|------------------|
| 1. Ling           | 7. Pollack       |
| 2. Tusk           | 8. Poor cod      |
| 3. Megrin         | 9. Doversole     |
| 4. Long Rough Dab | 10. Witch        |
| 5. Dab            | 11. Monk         |
| 6. Gurnard (Grey) | 12. Pout whiting |

Aim 3. Samples stratified by length of 22 species of fish were analysed on board for their stomach contents. The contents of 2253 stomachs were identified and the total displacement volume, and that of the major prey organisms, were recorded.

Sampling was concentrated on both the more abundant fish and those most likely to be preying on fish. Of these major species whiting and coley were feeding extensively on fish with over 80% fish by volume in their stomachs, whilst fish composed 60 and 25% of the contents of cod and haddock stomachs, respectively. The major fish prey of these species were Norway pout, blue whiting, haddock and whiting in the northern North Sea with sandeels and dabs becoming more common in the stomachs of fish from further south.

Meganyctiphanes norvegica was an abundant food organism in parts of the northern North Sea and at times, saithe, cod and haddock were feeding almost exclusively on this euphausiid. When not feeding on either fish or euphausiid, cod fed mainly on small crabs, whiting and small benthic crustacea, whilst haddock depended heavily (50% by volume) on benthic animals in particular ophiuroids and echinoderms.

Of the other 18 species examined only three, lemon sole, Gadiculus and weaver, were found not eating fish at some time. The remainder all contained fish in excess of 55% by volume in their stomachs. The small numbers of pollack, Raja radiata, grey gurnard, tub gurnard, megrim, anglerfish, ling, hake and turbot examined, were found to be feeding almost exclusively on fish.

| Fish         | Number examined | Number feeding | Fish         | Number examined | Number feeding |
|--------------|-----------------|----------------|--------------|-----------------|----------------|
| Cod          | 660             | 544            | Hake         | 3               | 2              |
| Haddock      | 536             | 441            | Lemon Sole   | 32              | 32             |
| Coley        | 150             | 125            | Anglerfish   | 13              | 6              |
| Whiting      | 321             | 217            | Halibut      | 2               | 2              |
| R. radiata   | 24              | 22             | Ling         | 5               | 2              |
| Blue whiting | 59              | 48             | Grey gurnard | 144             | 91             |

| Fish        | Number examined | Number feeding | Fish           | Number examined | Number feeding |
|-------------|-----------------|----------------|----------------|-----------------|----------------|
| Pollack     | 13              | 3              | Megrim         | 26              | 16             |
| Plaice      | 56              | 40             | Poor cod       | 79              | 74             |
| Tub Gurnard | 23              | 21             | Long Rough Dab | 53              | 25             |
| Gadiculus   | 25              | 25             | Mackerel       | 10              | -              |
| Turbot      | 1               | 1              | Weaver         | 27              | 8              |

Aim 4. At no time in the survey was the sea state sufficiently calm to enable accurate weighing of individual fish to the tolerances requested. Consequently this aim was not attempted.

Aim 5. Fish hearts were taken for histological examination from five species. Whole redfish and plaice were frozen down over the total length range of the fish caught and returned to the laboratory.

Aim 6. To collect water samples and fish fillets for caesium studies (AEP 1). Water samples were taken at 48 pre-selected sites along the cruise track in order to continue the monitoring programme of radio-caesium levels in the North Sea. Sites were chosen at intersections of  $1^{\circ}$  of longitude and  $\frac{1}{2}^{\circ}$  of latitude. Almost without exception sites were sampled at night, thus ensuring maximum vessel utilization between trawl stations. Chart 3 shows the position of all water stations and also indicates the 5 sites along the  $57^{\circ}$  degree parallel of latitude chosen for both surface and bottom sampling using Niskin bottles attached to the hydrographic wire to provide the 50 litres of water required for analysis. In all cases the water sample was filtered and passed through an A.S.G. ion exchange resin to extract radio-caesium prior to subsequent processing at FRL.

Plankton was collected at four stations using the "Bongo" nets together with 25 litres sea water for the analysis of Paladium at FRL. Fish muscle and skin samples were taken for caesium studies from predominant species caught within 12 preselected fishing areas.

Aim 7. This aim was deleted before the start of the cruise in consultation with Dr Jamieson.

Aim 8. This aim was deleted before the start of the cruise in consultation with Dr Lockwood.

Aim 9. To collect Pycnogonids.

i. Pycnogonids of two genera and four species were identified at 25 trawl stations.

ii. Specimens of two species were maintained alive on board, in containers on the cooling block. The other specimens were preserved for morphological and histological studies.

iii. Benthos samples from the 25 pycnogonid-successful stations were preserved and/or frozen for later analysis.

iv. Benthos samples were taken from 20 other trawl stations for subsequent microscopic examination for small pycnogonids.

v. The benthos brought on deck with each haul was photographed.

vi. An underwater camera was used on 10 trawl stations (see other matters).

Aim 10. Ten tows, at seven positions over the survey grid, were made with the 'Bongo' plankton sampling net. At each station the catch from one of the two nets was fixed in formalin for subsequent analysis of the larval fish stomach contents. Fish larvae in good condition were taken at all the sampling positions. The net was successfully operated at a towing speed of four knots over the starboard side using the cargo winch and derrick, but only in calm weather conditions.

Aim 11. Samples of three euphausiid species were collected using a 'Bongo' net. They were identified as Thysanoessa raschii, Thysanoessa inermis and Meganyctiphanes norvegica and were stored in individual tubes in liquid nitrogen.

Edible crabs were collected in the trawl off the Danish coast and on the Dogger Bank. Males of this species Cancer pagurus were frozen.

Aim 12. Muscle samples were taken from haddock (48-52 cm) and plaice (48-52 cm) which showed signs of activity. Further duplicate samples were taken from plaice by selecting five individuals from each of five length ranges for males and females. All muscle samples were stored below -20°C in buffered glycerol. In addition carcasses of plaice were frozen for the length range sample.

Aim 13. Otoliths of blue whiting were to be collected, five per half centimetre length group, by depth strata. Otoliths were collected from two depth bands, a total of 112 otoliths being collected.

Aim 14. Otoliths of Norway pout were to be collected, five per half centimetre length group, by area. Otoliths were taken from fish from four of the six areas, a total of 308 otoliths were taken.

Aim 15. 30 boxes of mixed small gadoids and 9 boxes of sandeels were collected.

Aim 16. Various collections of species and species mixtures were frozen for Mr Blacker.

Aim 17. A sandeel specimen was frozen but thornback ray were scarce and in all cases too marked to be suitable.

#### OTHER MATTERS

1. The Thermograph was run throughout the cruise.

2. A preliminary scientific report containing detailed results of the cruise was prepared at sea. This contains details of otoliths collected, length distributions, stomach content analysis, catch rates by area etc. It is intended as a concise summary of the cruise results which is hoped will make the kinds of data available from the cruise apparent to anybody wishing to use them.

3. Herring samples were taken when available.

4. The HP2100A computer was run continually throughout the cruise. It gave trouble-free and most valuable service.

5. The underwater camera was used extensively throughout the cruise, attached to the headrope of the trawl. The purpose of the camera use is to obtain a comprehensive pictorial survey of the grounds fished throughout the groundfish survey. Forty-one black and white films and 36 colour films were exposed underwater. The black and white films were developed on board. The colour films are returned to Lowestoft for processing. Twenty-three black and white films had enough potentially useful frames to be kept for later analysis. Mechanical defects (primarily wind on; secondarily flash connection failure) rendered the other film useless. A similar success rate is anticipated for the colour films. If the pictorial survey is to be continued then mechanically more reliable apparatus will be required.

John G Pope  
27 September 1978

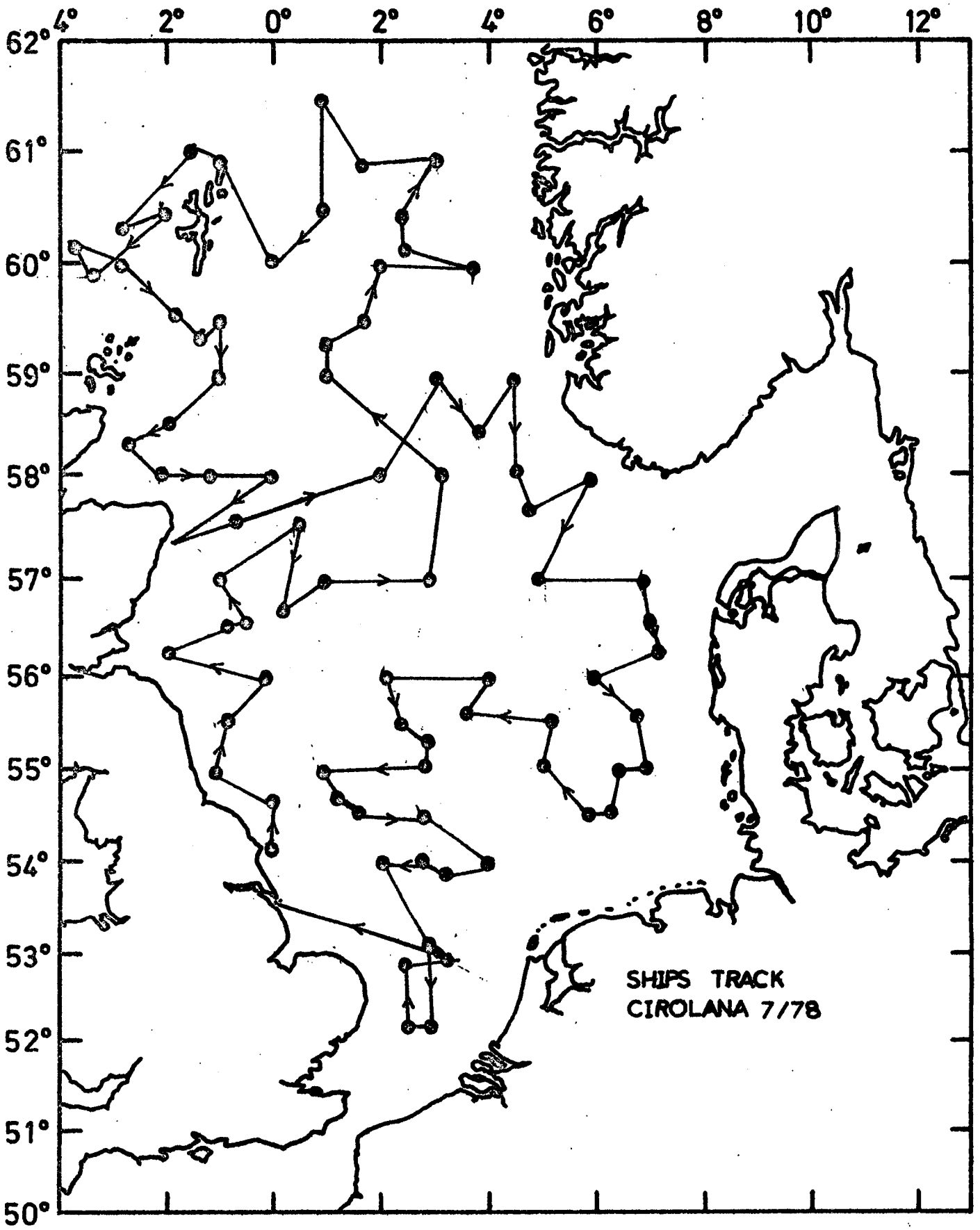
SEEN IN DRAFT: TF  
EWP

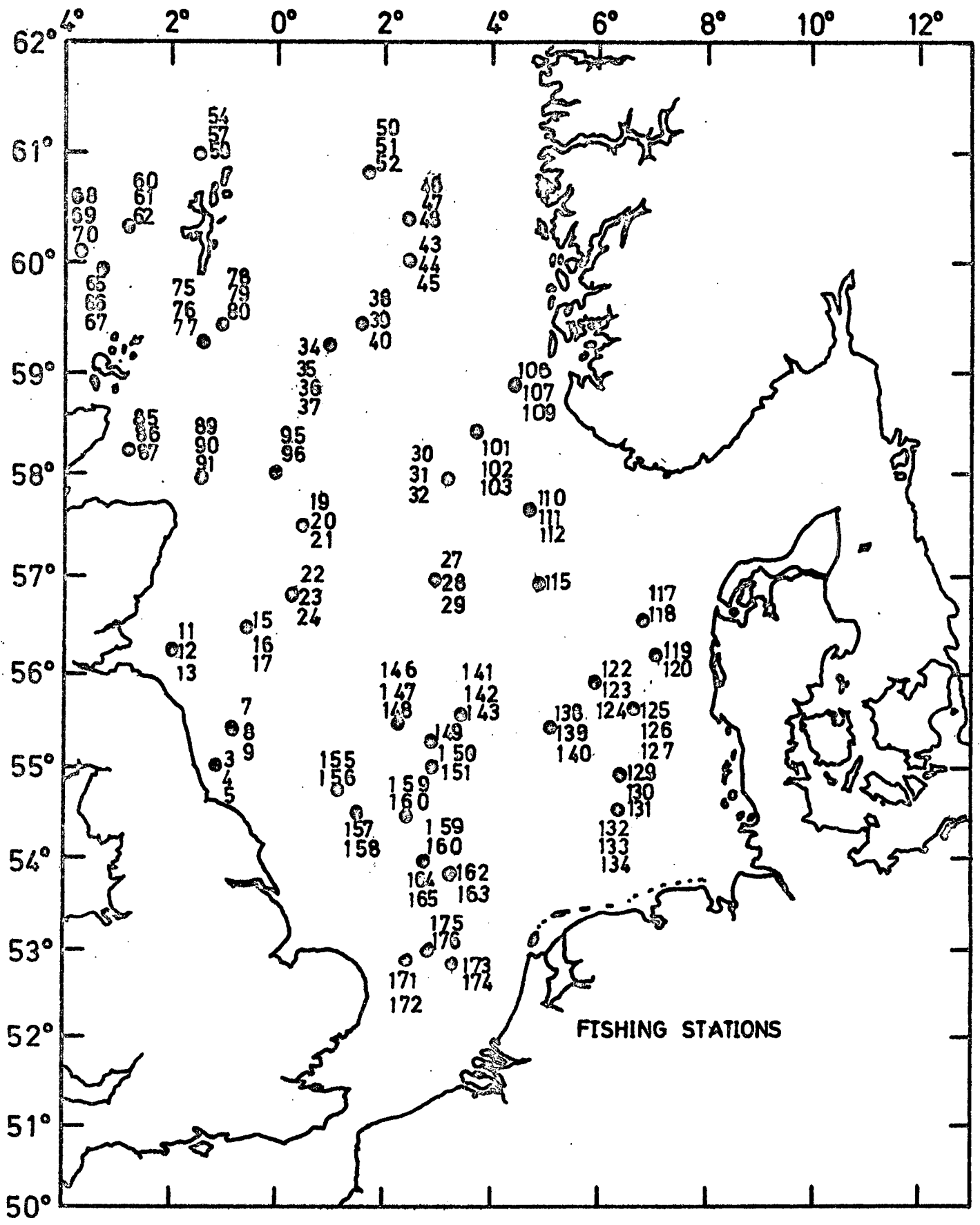
INITIALLED: AJL

DISTRIBUTION:

Basic List

J G Pope  
L Birkett  
J H Nichols  
A R Child  
G A Sutton  
C J Humphreys  
B J Knights  
S Milligan  
D Palmer  
A Burfitt  
W Fry (Luton)





FISHING STATIONS



