

REPORT OF THE MEETING OF THE WORKING GROUP FOR  
THE STUDY OF POLLUTION OF THE NORTH SEA

Charlottenlund, 28-29 June 1972

<u>Contents</u>	<u>Page</u>
Report of the Meeting of the Working Group for the Study of Pollution of the North Sea .....	1
Annex I: List of Participants .....	4
Annex II: Agenda .....	5
Annex III: Progress Sheet on Base-Line Study 1972 .....	6
Annex IV: Progress Sheet on Replies to Questionnaire on Inputs	7
Annex V: National Programmes of Pollution Research in the North Sea .....	8
A. Denmark .....	8
B. Norway .....	8
C. Sweden .....	10
D. United Kingdom .....	14
Annex VI: Recommendations, Suggestions and Matters arising from the Meeting of the Working Group .....	20

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Report of the Meeting of the Working Group for the Study of Pollution  
of the North Sea, Charlottenlund, 28-29 June 1972

The meeting was chaired by Mr A J Lee (United Kingdom) and was attended by representatives of the ICES countries around the North Sea (Annex I). Dr G Topping (United Kingdom) was appointed Rapporteur.

The Chairman opened the meeting by asking for comments on the Draft Agenda, circulated previously to all representatives. He informed the Group that although no official representatives had been sent by the working groups referred to in Item 10 of the Agenda, these groups were adequately represented by a number of people at this meeting. The Draft Agenda was formally adopted, with the addition of an item under 10(c) concerning the role of IOSS in pollution studies (Annex II).

After the appointment of Dr Topping as Rapporteur, the Chairman asked the General Secretary for his comments on Item 3 of the Agenda. Mr Tambs-Lyche informed the meeting that the members of the Working Group had been nominated by the various countries participating in the Study and were drawn from fisheries research laboratories, environmental protection boards etc. There was as yet no official Danish member but Mr Jacobsen was representing Danish interests on this occasion.

A copy of the terms of reference of the Working Group as laid down at the last Council Meeting was then circulated for comments together with a number of other reference papers. These included sections of the draft report of the ICES/SCOR Working Group for the Study of Pollution of the Baltic, a copy of relevant IOC resolutions and a copy of the IDOE Brookhaven Report. The Chairman informed the meeting that Dr Topping had been present at the Brookhaven meeting and would answer any relevant questions on this Report. At this point the Chairman thought it would be useful if the General Secretary gave a brief description of the proposed ICES Advisory Committee on Marine Pollution. The General Secretary described how the new committee would play its role as an advisory body on marine pollution research and he concluded by saying that it would be seeking information from the present Working Group, and others. The terms of reference of the Working Group were thought to be sufficiently broad enough for this.

Dr J Portmann (United Kingdom) was then called upon to report on the Baseline Study referred to in Item 5 of the Agenda. After reviewing the terms of reference of this Study Group (ICES, C.M.1971/E:35) he went on to give a brief report on the progress made to date in collecting and analysing the necessary fish and shellfish samples. A copy of the table outlining the progress of the various laboratories was then circulated for reference (Annex III, and Doc. C.M.1972/E:18, Supplement 2). In view of the lack of a complete response to his recent questionnaire requesting progress information, he asked the relevant countries for a verbal report. It soon became apparent from the individual reports and subsequent discussion that a number of the participants had experienced considerable difficulties in collecting the required number of specified samples. A number of questions were also raised regarding (a) the necessity to adhere to the selected year classes (b) sample contamination. It was obvious from the discussion that a detailed analysis of the Base-Line analytical Programme would eventually be necessary and that the work of this Study Group was not advanced enough for anything but a progress report to be made at the Council Meeting in September (Annex VI).

The Chairman then called upon Dr P Jones (UK) to summarise the progress on the heavy metal studies in the waters and sediments of the North Sea run jointly by UK, Netherlands and Belgium (Item 6). Dr Jones gave a brief report of the joint work including the results of the intercalibration studies. He indicated that a report on this study might well be available for the 1973 ICES Meeting. Additional detailed information on these studies was presented by Prof I Elskens (Belgium) with particular reference to the Belgian heavy metal model for the

North Sea. Once again considerable discussion took place on analytical techniques, intercalibration etc. This added weight to the Chairman's initial suggestion that analysts should hold separate meetings in their various laboratories on these specialist topics (Annex VI).

In the absence of Mr P Wood (UK) the Chairman called upon Dr Portmann to open the discussion on Item 7 concerning the Questionnaire on Inputs of Pollutants by giving an account of the progress made to date. A paper by Dr Portmann containing a summary of the progress was circulated for reference (Annex IV). He had to report an incomplete response to the Questionnaire. Considering the importance of this study the Chairman felt that participating countries should make every effort to ensure that as much information as possible was handed to Dr Portmann in order to ensure that at least a progress report was made to the Council Meeting in September, in order to allow it to inform the inter-governmental group meeting in October to develop the Oslo Convention on Dumping from Ships, if that should be desired. (See Annex VI and C.M.1972/E:18, Supplement 1).

The Chairman then opened the discussion of Item 8 (national programmes of research for 1972/73) by outlining the National Programme for the UK. This was followed by a report from each of the countries' representatives. With one exception, Denmark, all countries reported on some form of North Sea pollution programme for these years, although few attempts had been made to coordinate work within the various countries. Because of the interest expressed in marine food chain studies in Scotland, Dr Topping gave a brief report on this and other associated studies and promised to produce a brief summary of this work, which he would include with the copies of the other countries' national programmes (Annex V). The Chairman concluded the discussion on this item of the Agenda by stating that, despite difficulties of organization, finance and qualified manpower, the marine pollution programmes at national level were quite substantial.

The discussion on Item 9 of the Agenda was opened by the Chairman who stated that a Symposium on the Physical Processes Responsible for the Dispersal of Pollutants in the Sea with Special Reference to the Nearshore Zone was to be held in Aarhus in one week's time. The General Secretary informed the meeting that the response to this Symposium had been worldwide, some 140 persons would be attending and 55 papers had been submitted. He also informed the meeting that the Plankton Committee's reply to the question on eutrophication of the North Sea had been that this problem was likely to be more important in relation to the Baltic area rather than the North Sea. Regarding the use of marine mammals as indicators of pollution, he informed the meeting that there had been an encouraging response to this item in the Marine Mammals Committee in the form of a number of papers.

On the question of collaboration in marine pollution studies with other interested groups, the Chairman asked the General Secretary to open the discussion on this important subject. He reported that the first meeting of the ICES/SCOR Working Group on Pollution of the Baltic had been well attended and that in his opinion the meeting was very successful. The group had agreed to meet again to draw up a more detailed plan for their own base-line study once they had received the progress report from the North Sea Group, i.e. the present Group. He also pointed out that the ICES/SCOR Baltic Group had already drawn on the experience of the present Group to date in establishing the necessary monitoring parameters. It was felt that the existing hydrographic studies in the Baltic area would have to be supplemented by a more detailed programme in the Skagerak etc., and that this might include the use of the regular ferry services there as a sampling platform. He concluded by saying that North Sea hydrographers should be encouraged to take part in this programme. The question of interchange of reference samples between the North Sea and Baltic Groups, together with the adoption of standard units for analytical programmes, was then raised, but after a discussion the Chairman stated that the latter subject

should be dealt with by the ICES Working Group on Marine Data Management. He concluded this item by suggesting that the North Sea Group should be officially represented at the next meeting of the Baltic Group.

Previous discussions had already been broached on sub-section (c) of Item 10 and so further discussion of this item was limited to how best IGOSS could serve member countries of ICES in the pollution field.

Dr R Lange (WHO consultant) was then called upon to give an account of WHO's involvement in marine pollution studies. After a brief report, which included a discussion of WHO's terms of reference for these studies, he concluded by saying that he felt that cooperation with ICES in some fields of work would be of mutual interest and that he would make this point in his forthcoming report (see Annex VI), including the question of the need for more information in the field of fish pathology and the possible involvement of medical scientists in marine pollution studies.

As the question of publication of reports, referred to in Item 11, had already been dealt with earlier, the Chairman concluded the meeting by giving a summary on the progress of the Working Group. Despite some setbacks he considered that a substantial amount of ground had been covered and he felt that the next meeting of the Group should follow as closely as possible the meeting of the analysts in January or February 1973 (see Annex VI).

LIST OF PARTICIPANTS

in the

Meeting of the Working Group for an International Study of the Pollution  
of the North Sea and its Effects on Living Resources and their Exploitation

Charlottenlund, 28-29 June 1972

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A G E N D A

Meeting of the Working Group for the Study of Pollution  
of the North Sea

Charlottenlund, 28-29 June 1972

1. Adoption of the Agenda.
2. Appointment of Rapporteur.
3. Composition of Working Group.
4. Terms of Reference of Working Group.
5. Progress with North Sea Fish and Shellfish Base-Line Study 1972.
6. Progress with Studies of Heavy Metals in (a) North Sea Water Masses (U.K., Netherlands, Belgium), (b) North Sea Sediments.
7. Replies to Questionnaire to Determine Sources of Input of Pollutants to North Sea.
8. Consideration of National Programmes of Research into North Sea Pollution Problems 1972-73.
9. Requests to ICES Standing Committees for Advice on North Sea Pollution Problems (a) Hydrography, (b) Plankton and (c) Marine Mammals.
10. Collaboration with:
  - (a) ICES/SCOR Working Group on Pollution of the Baltic.
  - (b) Working Groups concerned with International Studies of the Pollution of the Mediterranean + OECD.
  - (c) Intergovernmental Oceanographic Commission (Global Investigations of Pollution in the Marine Environment), incl. IGOSS.
  - (d) World Health Organization.
11. Publication of Report of Working Group.
12. Any Other Business.

SUMMARY OF PROGRESS ON BASE-LINE ANALYSIS PROGRAMME at JULY 30, 1972

Participating Country	Number of Laboratories	Species and number of samples collected where known	Sampled at suggested time	Year class collected 1968 Cod and Plaice 1969 Herring	State of Analysis		Comments
					Metals	Organo-chlorines	
NORWAY	Several. All work co-ordinated by one Central Laboratory	7 Mussels 5 Shrimps 10 Cod 13 Herring 6 Plaice	Not all	Doubtful	In Progress	About to start	Difficulties in sampling correct year class and in obtaining shrimps or plaice. Also doing oil in sea water
SWEDEN	2	3 Plaice 4 Cod 4 Herring	Yes	1968 Plaice 1968 Cod 1969, 1970 and 71 Herring	Complete. Results supplied to Co-ordinator	Partially completed	Also being analysed for aliphatic hydrocarbons. No information on shrimp or mussel samples having been collected.
DENMARK	1	Mussels Shrimps	Yes	Correct sizes	Analysis for Mercury in progress	No analyses will be done	
GERMANY	2	Mussels Shrimps Cod Plaice	Yes	?	In progress for Fe Mn Cu & Zn only	In progress	Unable to collect herring due to close season
IRELANDS	4	At least 2 Mussels 1 Shrimp 1 Herring 1 Cod 9 Plaice	Yes	Shrimps and mussels size suggested Cod 1967 Plaice 3 samples 1967, 1968 & 1969 year classes. Herring 1968 year class.	Mercury total and organic completed for samples listed. Results supplied to Co-ordinator.	Organo-chlorine analyses complete for samples listed. Results supplied to Co-ordinator.	Data on samples collected only available for 3 Laboratories. One probably collected independently. Difficulties in collecting correct year class of Cod and Herring.
BELGIUM	4 groups of Laboratories operating through one Co-ordinator.	Cod Herring Plaice Mussels Shrimps	Not all samples for which data supplied.	Not all samples	Mercury results complete and supplied to Co-ordinator.	Method being developed by 1 Laboratory.	The Belgian network programme involves monthly sampling and data supplied is not confined to requested sampling period.
FRANCE	1	6 Mussel 1 Shrimp 2 Cod 1 Plaice 1 Herring	Yes in most instances.	Yes	Mercury results complete and supplied to Co-ordinator.	In Progress	
SCOTLAND	2	Mussels Shrimp Cod Herring Plaice	Yes  No	1967 Cod and Plaice 1968 Herring 1968 Cod and Plaice 1969 Herring	Complete  In Progress	Almost complete  Not started	Some difficulty in collecting shrimp.
ENGLAND	1	6 Plaice 4 Cod 4 Herring 10 Mussel 4 Shrimp	Yes	1968 Cod and Plaice 1969 Herring	Complete In Progress	In Progress	Difficulty experienced in collecting correct sized shrimp and mussels.

SUMMARY OF REPLIES TO QUESTIONNAIRE ON INPUTS AT 30TH JUNE 1972

Participating Country	Overall reply received	Reply to Section A	Reply to Section B	Reply to Section C	Reply to Section D	Reply to Section E
NORWAY	Promised for August	-	-	-	-	-
SWEDEN	YES	6 Areas. Replies to Questions 1 & 3-7. Reply to Question 6 includes metal data. Replies include some data for river inputs	Replies given for Questions 1-4	Map provided with explanatory text	Details provided of past dumping 1965-1968. None known at present. No future dumps of harmful material	Details of programme and published data provided. Metals SO <sub>2</sub> and soot being determined
DENMARK	YES	3 Areas. Replies to Questions 1-5, 7 and 8. Reply to Question 6 is restricted to BOD	Reply states little heavy industry all discharges via sewers and included in Section A	Map provided	No registered dumping. No unauthorised dumping known	Details of programme to measure SO <sub>2</sub> and pH of rainfall
GERMANY	YES	6 Areas. Replies on basis of 5 of these areas to Questions 1-5 and 7. Reply to Question 6 is restricted to BOD, COD, N & P	Data provided for Bremen city only	Map provided	Details provided for 2 dumping areas. No unauthorised dumping known	No information available
NETHERLANDS	Promised by August	-	-	-	-	-
BELGIUM	YES	Replies on whole coastline basis to Questions 1-5, 7 & 8 for both direct and indirect discharges. Reply to Question 6 restricted to BOD, COD, N & P	No direct industrial discharges	Map provided	Details provided on 5 dumps approved and 3 unapproved regular dumps	Details given of dust fall-out over West Flanders region
FRANCE	YES	Reply on single area basis Boulogne to Belgian border, Questions 1-5 & 7. Reply to Question 6 restricted to BOD & COD & reply to Question 5 not complete	Replies to Questions 1-3 but reply to Question 2 is not in standard units requested. Partial reply to Question 4	Map provided with brief explanatory text	Details of dumpings from one harbour	Details given of programme to measure variety of inorganic pollutants including pH SO <sub>4</sub> - Cl - nitrate <sup>4</sup> phosphate and dust
ENGLAND	YES	13 Areas. Replies to Questions 1-5, 7 & 8. Reply to Question 6 restricted to BOD, COD, N & P	Replies to Questions 1-3. Partial reply to Question 4	Map provided	Details provided of dumpings in 5 areas. No unauthorised dumpings known	Details of programme on metals sampling which includes stations in N Sea. Will eventually include o/c's
SCOTLAND	YES	Reply on basis of one area only to Questions 1-5, 7 & 8. Reply to Question 6 restricted to BOD	Replies to Questions 1-3 and partial reply to Question 4	Map outline provided with text	Details provided of dumping activities past and present and proposals for 3 sewage sludges	Details given of programme to measure metals and SO <sub>2</sub>



NATIONAL PROGRAMMES OF POLLUTION RESEARCH IN THE NORTH SEA

- A. Denmark
  - B. Norway
  - C. Sweden
  - D. United Kingdom.
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A. DENMARK

Due to lacking analytical facilities the Danish Institute for Fishery and Marine Research has not been able to participate in the base-line study 1972.

Since no change in the present situation seems apparent, for the time being no plans of a national programme of research into North Sea pollution problems have been formed.

Sponsored by the Department of Health, the Danish Isotopecenter has performed Hg-determinations on Squalus acanthias, herring, mussels and shrimps from the North Sea. The samples were analysed by means of neutron activation analysis.

29 June 1972  
Vøgg H Jacobsen

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B. NORWAY

Pollution Studies 1972/73

1. Halogenated hydrocarbons in sea water, plankton and fish in Norwegian fishing areas.

a) Chlorinated aliphatic hydrocarbons (Norwegian/Swedish joint Group).

This programme, which is an integrated part of the ICES base-line studies 1971/72 has continued. Surveys made in 1971/72 on sea water samples from the North and Barents Seas revealed a complete change in occurrence and distribution of these pollutants as compared with the 1970 report. Water samples at the permanent section Norway-Shetland showed from zero to trace quantities of these compounds. The fish analyses have not yet been completed.

The programme will continue through 1972, and includes mass-spectrometric identification of the different components in waste material originated in the vinyl chloride production, as well as biotests. Deduced from the results obtained during surveys of 1972, the future observations will be reconsidered this fall.

b) Halogenated aromatic hydrocarbons. Gaschromatographic measurements of chlorinated pesticides and PCB's in the collected samples for the North Sea base-line study have been started.

In addition, the distribution of compounds in organisms from fjords and coastal waters is planned for 1972/73.

## 2. Oil

- a) Wind drift and surface currents around the Ekofisk fields in the North Sea. Regular introduction of plastic envelopes was made during 1971/72 and is supposed to continue also in 1972/73.
- b) Monitoring of hydrocarbons from oil in a permanent section Bergen-Shetland  
Measurements of oil components are made in sea water samples from three depths (0-10-50 m) obtained approximately once a month. The programme will continue in 1972/73, and will be expanded to include organisms.
- c) Mass-spectrometric identification of sea water soluble components of different North Sea oils and from different commercially available dispersants. The programme was started in April 1972 and will continue through 1973.
- d) Experimental studies of effects of sea water soluble aromatic oil components on marine organisms. Studies have been started on the effects on phytoplankton and will be expanded to include zooplankton and premature stages of selected organisms.

## 3. Heavy Metals

The measurements of heavy metals (Hg and Cd) are now carried out on commercial products of fish and shellfish by the Control Laboratory within the Directorate of Fisheries. The results are currently reported to the Institute of Marine Research for the study of distribution of heavy metals within the marine environment.

## 4. Pollution from Different Industries

The identification of different waste components from dominating Norwegian industries are being studied, using gaschromatography + mass-spectrometry. Marine toxicological studies of occurring components will be carried out from the fall 1972.

## 5. General State of the Coastal Waters, and Long-Term Influence of Pollution

Regular observations are made in selected regions of:

- a) primary production indices,
- b) particle concentration,
- c) nutrients.

The programme for 1973 also includes measurements of dissolved and particulate organic matter. The observations are planned with 4 permanent sections to cover the coastal area between eastern Skagerak and 62°N.

## 6. Fish pathology

Field observations of fish pathology along the coast are carried out and coordinated with special studies at other laboratories. Abnormalities observed during 1971 in the livers of cod and saithe in the southern Norwegian waters are still under observation.

## 7. Recording of Contents in Recaptured Waste Containers

Components in the waste of containers brought ashore by fishermen are currently analysed. The results are recorded for future risk evaluation when the containers eventually disintegrate.

8. The "Health"-Condition of Selected Fjords

Special studies of selected fjords are carried out applying gradient studies of suspected pollutants together with primary production indices and laboratory biotests of the water.

Institute of Marine Research  
Bergen, Norway.

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C. SWEDEN

Swedish Investigations on Marine Pollution in the  
Skagerak-Kattegat Area

The majority of this work has been carried out over the last few years and it is expected to continue for the next few years. A brief summary of the work on the Swedish west coast is given below.

1. Regional investigations

1.1 Hydrography

The Fishery Board has established a network of hydrographic stations (see Figure 1) which is sampled 4-6 times a year.

Basic measurements at these stations consist of temperature, density, oxygen, nitrogen, phosphorus and light penetration.

1.2 River Mouth Surveys

The National Environment Protection Board and the County Councils of Göteborg and Halmstad have set up monthly surveys in the mouths of the most important rivers in Sweden in order to assess the pollution status of these rivers. Temperature, conductivity, pH, colour, turbidity, oxygen, permanganate value, nitrogen, phosphorus, coliform and some metals are measured on a regular basis. It is hoped that this work will be expanded to include the monitoring of some pesticides.

1.3 Bacteriology

Local and regional health authorities are sampling the near shore waters at a number of places along the coast for coliform bacteria.

1.4 Marine Biology

The Kristineberg Zoological Station has established 6 fixed "diagnostic stations" along the coast (Figure 2), where the composition of the fauna and flora on marked bottom surfaces is followed at regular observations. The aim is, among other things, to establish possible pollution effects.

1.5 Fishery Biology

The Fishery Board carries out regional surveys of different fish and shellfish species. In this connection attention is drawn also to the possible influence of pollution on stock sizes and species distribution.

1.6 Pesticides and Heavy Metals

1.6.1 DDT, PCB and mercury content in fish is investigated in samples from both coastal and open sea areas. The investigations are carried out by the Fishery Board, the National Museum for Natural History and the National Environment Protection Board and they are connected with similar investigations in the Baltic.

- 1.6.2 Outside the above-mentioned programme the content of toxic substances (e.g. dieldrine, lindane, cadmium and mercury) in living and self-dead animals is studied at different localities along the coast by several institutes, e.g. the State Veterinary Board.
- 1.6.3 The Marine Geological Laboratory of the University of Göteborg carries out a rather extensive survey of the content of heavy metals in sediments from different parts of the coast and the open sea.

### 1.7 Øresund Investigations

Since 1955 a joint Danish-Swedish Committee has carried out an extensive survey of the Øresund at the entrance to the Baltic. The investigation programme includes hydrography (incl. water chemistry and toxicology), sedimentology, bacteriology, marine biology, fishery biology and measurements of the discharge of sewage and industrial waste waters. Several institutes in Denmark and Sweden are involved in these operations.

## 2. Local Field Investigations (see Figure 2)

Hydrographic, bacteriological and marine biological investigations have also been carried out at a number of polluted fjords and other inshore areas, in some cases these studies have been linked with specific pollution problems. The areas involved are Idefjord, on the border between Sweden and Norway, the Brofjord, the Gullmarfjord, the Stenungsund area, the estuary off Göteborg, the Kungsbackafjord, the Värö-Ringhals area and some other smaller areas.

Several State Boards and University Institutes are engaged in this work, the intensity of which depends on the area involved.

## 3. Experimental Investigations

- 3.1 Experiments to assess the effects of different surface active agents and some oil dispersants on fish and shellfish have been established at the Kristineberg Zoological Station.
- 3.2 Some bio-assays with rainbow trout in dispersed cages have been carried out by the National Environment Protection Board in the archipelago of Göteborg and in the Øresund in order to study survival and uptake of certain toxic substances, especially mercury compounds.

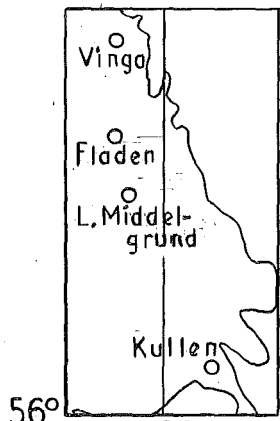
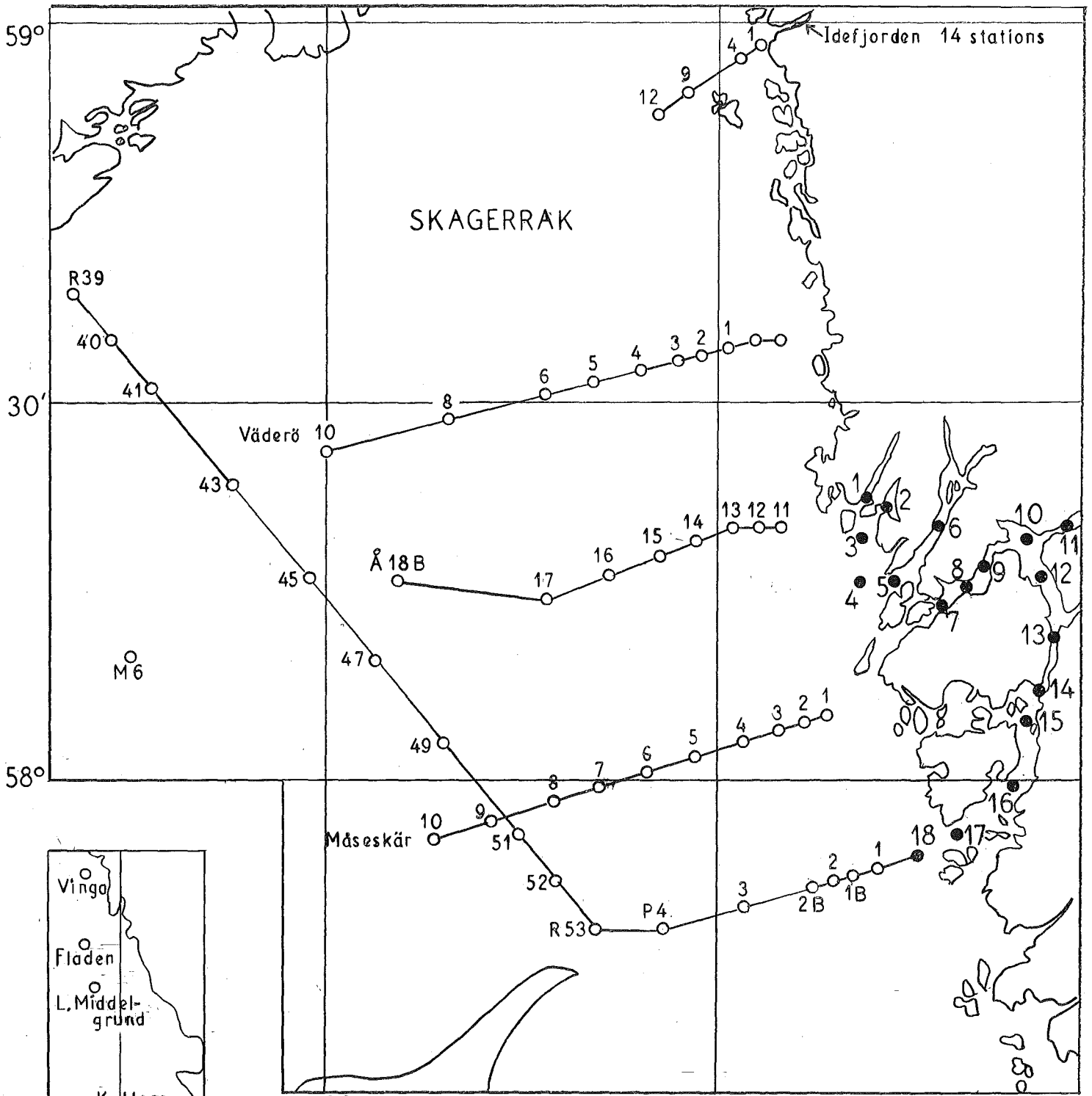
## 4. International Cooperation

- 4.1.1 Norway and Sweden are collaborating in an investigation to assess the fate of wastes containing aliphatic hydrocarbons from polyvinyl-manufacturing, dumped in the North Sea and Norwegian Sea, among others from industries in Sweden.
- 4.1.2 Norway and Sweden also co-operate concerning the pollution problems in the Idefjord (cf 2).
- 4.2.1 The joint Danish-Swedish investigation in the Øresund has been mentioned above (cf. 1.7).
- 4.2.2 It is intended to start a Danish-Norwegian-Swedish cooperative research in the Skagerak-Kattegat area.

## 5. Miscellaneous

A Joint Group has been established by the County Councils of Göteborg and Halmstad, the Fishery Board and the National Environment Protection Board with the aim to make a total survey of the pollution conditions at the Swedish west coast. It is also intended that the Group shall suggest plans for the future use of different coastal areas and initiate necessary investigations - planning at a larger scale is also being carried out by Governmental bodies in Stockholm.

FIGURE 1



- |   |                         |    |                   |
|---|-------------------------|----|-------------------|
| 1 | Åbyfjorden              | 10 | Havstensfjorden   |
| 2 | Brofjorden              | 11 | Byfjorden         |
| 3 | Malmø drag              | 12 | Björningarna      |
| 4 | Smedjepricken           | 13 | Dokosvik          |
| 5 | Gullmar tröskel         | 14 | Halsa nabbe       |
| 6 | Gullmarsfjorden Alsbäck | 15 | Asköfjorden       |
| 7 | Koljöfjorden            | 16 | Hakefjorden       |
| 8 | Borgilafjorden          | 17 | Astolfjorden      |
| 9 | Kalvöfjorden            | 18 | Marstrandsfjorden |

Swedish sections ○ and Fjordstations ● in the Skagerrak.

(Some sections and stations are only worked occasionally).

FIGURE 2



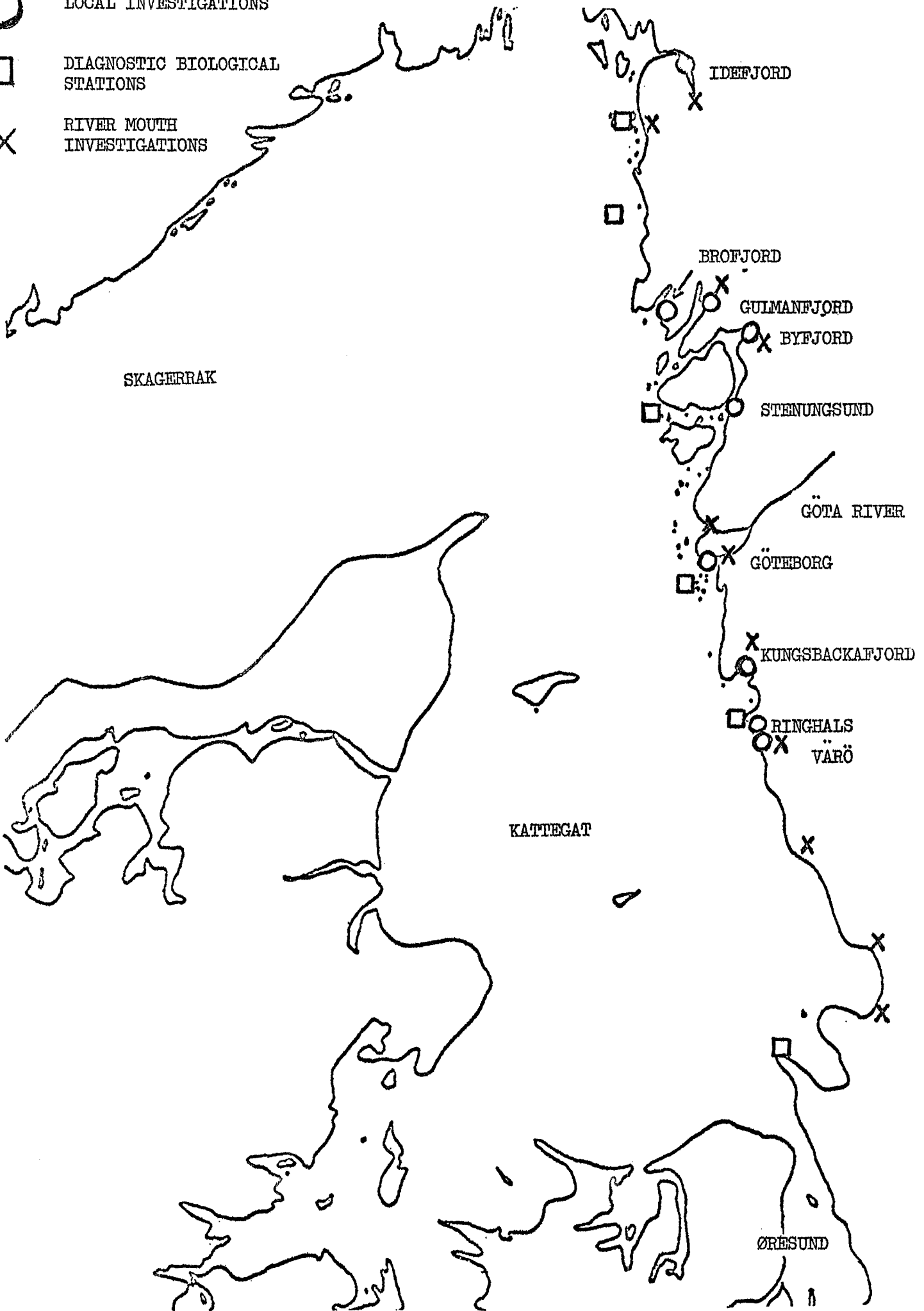
LOCAL INVESTIGATIONS



DIAGNOSTIC BIOLOGICAL STATIONS



RIVER MOUTH INVESTIGATIONS



SKAGERRAK

IDEFJORD

BROFJORD

GULMANFJORD

BYFJORD

STENUNGSUND

GÖTA RIVER

GÖTEBORG

KUNGSBACKAFJORD

RINGHALS

VARÖ

KATTEGAT

ØRESUND

D. UNITED KINGDOM

1. UK national programme of pollution studies in North Sea 1972-3

1. Participation in Fish and Shellfish Base Line Study 1972
2. Study of heavy metals in (a) water masses (b) sediments
3. Study of transfer of (a) heavy metals (b) PCBs and  $\Sigma$  DDT from atmosphere to sea
4. Monitoring of pesticide residues and heavy metals in fish and shellfish
5. Monitoring of mussel toxicity along northeast coasts
6. Study of effects of sewage disposal in the Thames Estuary, off the Tyne, in the Wash and along the north Norfolk coast
7. Study of a major discharge of a pollutant into the Humber to develop techniques for assessing toxicity of effluents in the field
8. Study of effects of potash wastes disposal in Whitby area including study of effects of effluent containing mineral suspended waste upon crab and lobster stocks
9. Study of effects of solid waste disposal from proposed Channel Tunnel construction project
10. Studies of (a) PCBs and  $\Sigma$  DDT (b) hydrocarbons in the water, sediments and the marine food chain
11. Study of effects on fisheries of marine gravel extraction in southern North Sea.

A.J. Lee  
19 June 1972

2. Report on the Ministry of Agriculture, Fisheries and Food studies of heavy metals in the North Sea Water Masses

A pilot survey of heavy metals in sea water, suspended matter and biological material within British coastal waters has been made by the Lowestoft Fisheries Radiobiology Laboratory (Preston *et al*: British Isles coastal waters: the concentration of selected heavy metals in sea water, suspended matter and biological indicators - a pilot survey. Environ. Pollut., 3, 69-82, 1972). Off the North Sea coast of Britain, this investigation measured Zn, Fe, Mn, Cu, Ni, Pb, Ag, and Cd in mussels, Fucus and sea water.

During 1971 another survey was inaugurated, concentrating on the southern North Sea and extending from the English to the continental coast. The station positions are shown in the figure. The aim of this investigation was to detect possible coastal localities of heavy metal discharge, to measure the levels in the offshore "oceanic origin" water and to establish

general baseline values for future studies. The grid was surveyed during May-June 1971 and again during February 1972. Surface samples were collected by means of a plastic bucket and near bottom water was pumped up through an all plastic system. Samples were filtered through a 0.22 micron millipore membrane. The filtrates were deep frozen prior to analysis and the particulate matter was stored on the membranes in plastic containers. All samples are to be analysed for Cd, Cu, Ni, Mn and Zn by atomic absorption spectrophotometry. The results of the 1971 survey are already available and the table summarises the range of values found.

	<u>Dissolved</u>	<u>Particulate*</u>
Cu	0.3 - 3.0 µg/l	0.1 - 8.9 µg/l
Zn	0.8 - 12.0 "	3.9 - 25.5 "
Mn	0.3 - 15.9 "	0.1 - 50.2 "
Ni	0.3 - 5.4 "	0.1 - 1.4 "
Cd	0.0 - 1.6 "	0.0 - 0.4 "

\* The particulate fraction is designated as that part which was leached from the filters by boiling with 0.1N HCl and 100 volume H<sub>2</sub>O<sub>2</sub>.

The distribution of the dissolved metals, with the exception of cadmium shows some inshore-offshore gradients, with the higher values occurring near the coastline. This relationship was most clearly defined on the Thames Estuary - Hook of Holland section.

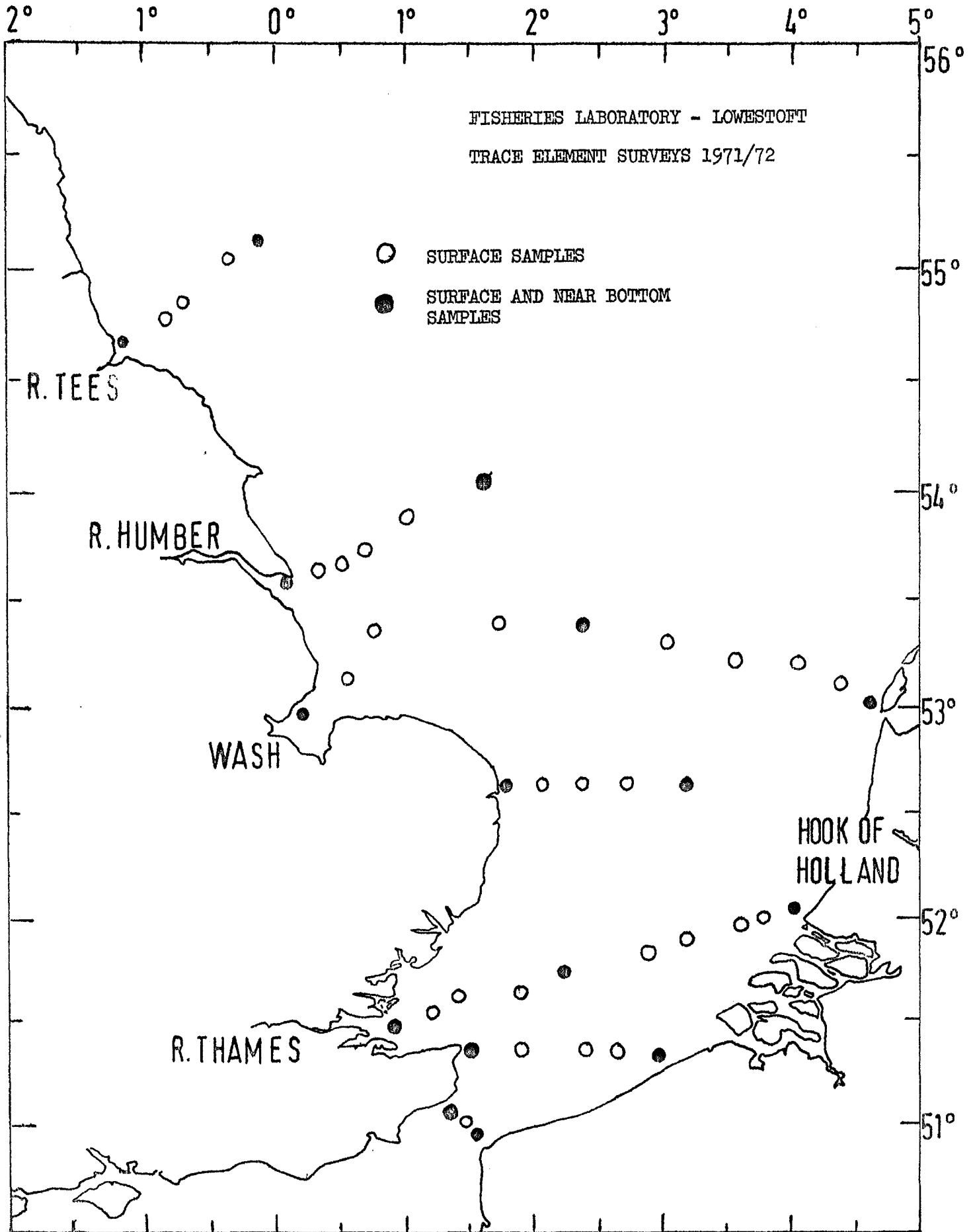
A preliminary look at the particulate values indicate no clear relationship between the dissolved and the particulate fraction of each sample. Moreover, with the exception of manganese, the particulate values did not show any obvious inshore-offshore gradients.

When the results of the 1972 survey are available it is hoped that any seasonal fluctuations will be apparent.

Future investigations will be planned on the results of the above survey. It is proposed, however, that during 1973 a winter and summer survey will be made in the "British Sector" of the North Sea and will possibly extend into the English Channel. The sampling will be planned to give intensive cover of those inshore regions liable to heavy metal contamination from territorial sources.

P.G.W. Jones





3. Report on the Natural Environmental Research Council/Ministry of Agriculture, Fisheries and Food Study of North Sea Sediments

The Institute of Geological Sciences (NERC) are currently surveying the distribution of certain heavy metals in recent North Sea sediments.

During February 1972, the IGS collected surface sediment samples off the English Coast (Fig,p.18) from the MAFF research vessel surveying the distribution of heavy metals in the North Sea water masses. This joint project was aimed at possibly correlating the heavy metal content of the sediments with that of the overlying water mass.

The inner line of sediment stations was located on the 10 fathom contour and the outer line was near the 20 fathom contour. In addition, the inner Silver, Sole and Coal pits were sampled and five hauls were made between the pier heads at the entrance to the river Tyne. This grid supplemented an earlier survey by the IGS sampling the 5 fathom contour.

The samples were collected by means of a cone dredge and were deep frozen prior to analysis. The heavy metals analysed by atomic absorption spectrophotometry were Hg, Cu, Pb, Zn and Mn.

The detailed results of this survey are not yet available, but the table shows the range of concentrations encountered:

Cu	5	-	55 ppm
Pb	1	-	120 ppm
Zn	10	-	120 ppm
Mn	20	-	1100 ppm
Hg	0.005	-	0.2 ppm

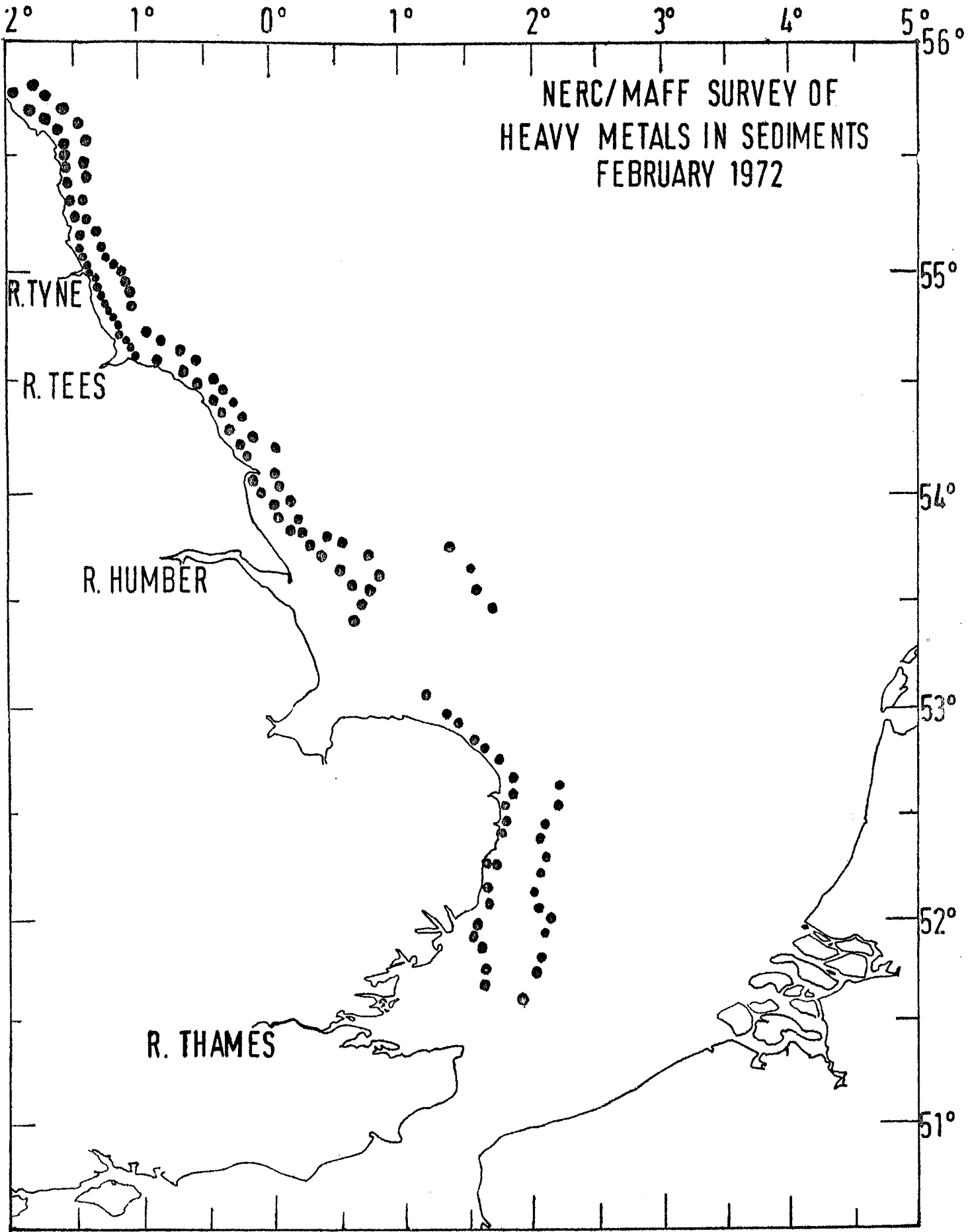
A preliminary examination of the data show that the concentration of metal was related to the particle size of the sample. Those samples containing a high percentage of fine grain material also contained the highest concentration of metal. Sediments from near the entrance to rivers often showed relatively high metal contents, but such samples also had a high silt content. Samples from within the entrance to the river Tyne showed low levels of heavy metal, but consisted of coarse grain material. It therefore appears that the heavy metal content of surface sediment is related more directly to its particle size rather than the concentration of the metal in the overlying water mass.

P.G.W. Jones

4. Marine food chain studies in Scotland

(conducted by Marine Laboratory, Aberdeen)

For some years the staff of the Marine Laboratory, Aberdeen have been conducting extensive studies on marine food chains at their field station, Poolewe, Loch Ewe, W. Coast of Scotland. These studies have been broadly divided into field investigations and tank experiments. The former consisted of (a) detailed studies of the relationship between production (growth and survival) of 0-group plaice and their food supplies in a sandy bay (b) investigation of the energy flow budget from photosynthesis, through zooplankton to benthos in a mud ecosystem. The latter consisted of studies in simulated sea water ecosystems of the Tellina tenuis - 0-group plaice food link.



More recently the tank experiments have been extended to assess long-term effects of sublethal amounts of pollutants on the Tellina tenuis - 0-group plaice food chain and to look at the distribution of a known quantity of pollutant in the tank ecosystem: initial experiments (1970) were carried out using copper as the pollutant; in 1971 the study was expanded to include inorganic mercury and DDT and in 1972 it is hoped to look at the short and long-term synergistic effects of nutrient enrichment in combination with levels of copper, mercury and PCB's. (Part of this work will be done in collaboration with the Freshwater Fisheries Laboratory, Pitlochry, Scotland). Additional pollution studies have included the effects of low levels of pollutants (e.g. mercury) on the sand interstitial fauna located in large sand columns, and studies have commenced on both

- (a) the uptake and effects of low concentration of toxic pollutants (copper in the initial experiments in 1972) on the development, survival and growth of herring eggs and larvae from the Firth of Clyde, and
- (b) uptake by fish and zooplankton of non-volatile hydrocarbons from crude oil residues, its metabolism by them and the long-term effects of low concentration on them.

This work is being conducted as a joint project with the staff of Torry Research Station, MAFF, Aberdeen.

G.Topping  
August, 1972

Recommendations made by the Working Group for the Study  
of Pollution of the North Sea

Agenda Item 5

1. For those countries which have not yet completed their mussel collection programme it was agreed that they may report their results in terms of organic matter as well as in terms of wet weight.
2. Papers on analytical techniques, methodology and analytical data (not included in the Base-Line Study) should be forwarded to the Council for consideration by the Fisheries Improvement Committee at the 1972 Meeting of the Council.
3. Members of the Group should dispatch as much information as soon as possible to the Coordinator of the Base-Line Study 1972 (Dr Portmann) in order that a summary report can be presented to the 1972 Council Meeting.
4. The analysts involved in the Base-Line Study should meet in January or February 1973 in Charlottenlund in order to discuss analytical techniques and the results of the Base-Line Study prior to the next Meeting of this Working Group.
5. Any decision concerning the adoption of this present sampling as a regular monitoring programme should not be made until the adequacies of the analytical techniques, sampling etc. have been assessed.

Agenda Item 6

1. A report on the Belgian sediment and water studies etc. should be presented to the 1972 Council Meeting and the Chairman of the Consultative Committee should decide at which session it should be presented.
2. Countries involved in this type of study in the North Sea should be encouraged to allow their analysts to visit other members' laboratories to see at first-hand the methodology etc. used.

Agenda Item 7

1. Countries should endeavour to reply to the Questionnaire on Inputs in as full a manner as possible and a report on the input of pollutants into the North Sea should then be prepared and made available for publication as soon as possible.
2. In the light of the relevance of this report to the Oslo Convention on Dumping from Ships, it was agreed that countries should at least provide sufficient information to allow a summary of Section D to be forwarded to the preparatory meeting of the Convention signatories in Hamburg in October, if that should be desired.
3. A progress report on the Survey of Inputs should be made available for the 1972 Council Meeting.
4. It was agreed to send the Baltic Group a progress report on the survey because it might save them considerable time and effort in the organization of their own questionnaire.
5. More work should be encouraged on the problems of locating sources of pollutants, in particular organochlorines and lead, and of measuring their loads in various sections of the marine environment and atmosphere.

Agenda Item 8

Only a few countries appear to have a coordinated programme of marine pollution studies for the North Sea. It was agreed that more countries should be encouraged to coordinate nationally the efforts in this area.

Agenda Item 9

The Hydrography Committee should again be consulted for their advice on the best method of measuring and/or assessing the inputs of pollutants to the North Sea from rivers, fjords, estuaries etc.

Agenda Item 10

1. The Chairman of the Group should keep contact with the ICES/SCOR Working Group on the Study of Pollution of the Baltic with regard to mutual problems and interests.
2. The reference standards used by the Group for the North Sea Base-Line Study 1972 should be made available to the Baltic Group.
3. The Working Group on Marine Data Management should be asked to consider the reservations of some members of the Group, who are involved in the analytical work, concerning the adoption of certain of the units proposed for reporting data on pollutants.

4. Members of the Group should consider the role of IGOSS with reference to their pollution research programmes and inform the Chairman of the Fisheries Improvement Committee accordingly.
5. Cooperation should be encouraged between WHO and ICES on matters relating to marine pollution.

Agenda Item 12

1. The accumulation of pollutants through the marine food chain and their possible effects on human consumption is an important field of research. More work on these problems should be initiated.
2. The next meeting of the Working Group should take place at the end of March 1973 at Charlottenlund.