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International Council for the Exploration of the Sea

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REPORT OF THE MEETING OF THE PLANNING GROUP FOR A SYMPOSIUM ON CAUSES OF CHANGES IN THE NORTH SEA FISH STOCKS

Ijmuiden, 20-21 August 1973

1. Introduction and terms of reference.

At its Statutory Meeting in 1972 the International Council for the Exploration of the Sea considered a proposal to hold a Symposium on the Causes of Changes in the North Sea Fish Stocks and passed the following resolution (C.Res.1972/2:1) :

a Symposium on the Causes of Changes in North Sea Fish Stocks should be organised by the Council, preferably in summer 1975. On the basis of selected individual contributions and of invited reviews by expert groups, the Symposium should provide a synoptic picture of the changes in the post-war period in most of the major exploited fish and shellfish populations of the North Sea (including Skagerrak). In particular the interaction between various species of fish should be considered as well as possible relationships with natural and man-made changes in the environment. The Symposium should provide guidance for future ecological research, as well as for better management of multi-species fisheries.

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It was decided that:

A Planning Group, chaired by Professor G. Hempel, will be established which, by consultation with other experts, would:

a) develop a detailed Prospectus for the Symposium,

 b) identify the kinds of data concerning the fish and shellfish stocks and their environment (physical, chemical and biological) that will be required.

The Report of the Planning Group will be considered by the Council at its next Statutory Meeting. "

• The following persons, elected as members of the Planning Group by nominations of the Chairmen of the Committees dealing with North Sea problems, were present at the meeting :

Prof. Dr.	G. Hempel	- Fed. Rep. Germany	(Chairman)
Dr. D. H.	Cushing	- United Kingdom	· .
Mr. H. W.	Hill	- United Kingdom	2
Prof. Dr.	P. Korringa	- Netherlands	
Mr. K. H.	Postuma	- Netherlands	•
Mr. J. F.	de Veen	- Netherlands	

Mr. R. Jones (United Kingdom) was unable to attend the meeting.

Mr. de Veen was nominated as rapporteur.

The Group, after some discussion, accepted the proposed agenda for the meeting.

2. Review of earlier Symposia.

The Planning Group reviewed briefly earlier attempts of ICES to relate changes in fish stocks with the environment and fisheries. Special reference was made to the Symposium on Fishery Hydrography (1951) as well as to the ICES Symposia on Marine Food Chains (1968) and on Recruitment (1970).

Recently a Symposium was held under the auspices of NATO dealing to some extent with the same topics as the proposed

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ICES Symposium. Professor Korringa briefly described the general outcome of the Aviemore meeting, which was intended as a compilation of what is known of the North Sea at present in a number of scientific disciplines indicating the gaps in our knowledge. In contrast to the Aviemore meeting the proposed ICES Symposium should aim at a synopsis of changes in the important fish stocks' of the North Sea and study possible causal relationships. Therefore the Planning Group proposed deleting the words "causes of" in the title of the Symposium.

3. Prospectus of the Symposium.

The Group discussed in detail the various topics which should be dealt with in the prospectus. A draft prospectus is given in Annex I.

It was felt that changes observed in fish stocks should be described in detail before trying to explain these changes in terms of biotic and abiotic factors.

Two possibilities emerged during the discussion viz. the selection of a small number of fish species in which changes in biological and fishery parameters should be studied thoroughly or a description of changes in as many species and stocks as available, consequently studying each in less detail.

It was decided that a <u>general description</u> of the overall changes in fishing effort, catch and species composition of the major fish species of the North Sea should be given along the lines worked out in the paper presented by Dr. Cole and Mr. Holden to the NATO meeting in Aviemore, but including a longer time period than in that paper. The intention here is to compare the state in the 1930's with the situation in the 1960's.

In addition, <u>detailed analyses</u> should be given on changes in biological parameters such as growth, age and length at first maturity, recruitment and stock density in a number of selected case studies on the best documented fish species.

Preceding these specific fish papers a general review paper on the hydrographic situation and observed changes in the North Sea should be presented as a general background for

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the discussion in later stages of the Symposium. The Group took note of the fact that in former times ICES did compile hydrographical information in the form of an atlas. The Symposium would benefit from an up to date version of this atlas. In addition a hydrographic paper dealing with changes in spring could be associated with changes in spawning intensity in a number of fish species.

Although few long term data exist that make it possible to give a reliable picture of overall changes in primary and planktonic secondary production it was felt that a review paper on aspects such as abundance and composition of plankton would be possible e.g. from data derived from Hardy plankton recorder surveys.

In spite of the importance of benthos, very little is known of its distribution and fluctuations over the whole area of the North Sea. Moreover, its pattern of distribution is very variable depending to a large extent on effects such as selective grazing etc. However, it should be possible to describe changes in a restricted area e.g. from German data.

As a representative for the shellfish species a historical review of the brown shrimp fisheries should be given.

As a point of reference to the papers dealing with the selected fish species a paper reviewing industrial fisheries should be prepared.

In addition to these review papers, contributed papers should be encouraged dealing with theoretical and observational aspects of species and environmental relationships, on inter and interspecific relations such as food competition, predator-prey relations, cannibalism, on association of changes in annual growth rate, larval and yearclass abundance between different species and stocks in parts of the North Sea. After the presentation and discussion of these papers a synopsis should be made of all the available information by establishing discussion groups e.g. for each aspect such as growth rate, recruitment and so on, and these discussion sessions should lead to a plenary session in which a number of hypotheses could be formulated. At this stage identification of future research needs would be possible.

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The Group decided that the North Sea should be treated as one unit unless e.g. in case studies area-breakdown is necessary for a detailed analysis of the observed changes. In the case of well established long term changes observed in areas adjacent to the North Sea and bearing a distinct relationship to it, observations from neighbouring areas such as the English Channel and the Kattegat may be presented.

Time-series considered should be at least of ten to fifteen years and extend back as long as possible.

The Planning Group by identifying topics for the Symposium implicitly considered the data needed and it will be for the authors of the invited review papers to seek the collaboration of other laboratories and of ICES Working Groups.

The following list of sessions and topics is suggested:

The <u>first day</u> should be allocated to general introductory papers on <u>hydrography</u> and <u>climatology</u>, review papers on <u>primary</u> and <u>zooplankton production</u>, <u>benthos</u>, the general introductory paper on <u>fish species</u> comparing the situation in the 1930's with that in the 1960's and review papers on the <u>larval and</u> juvenile phase and on industrial fisheries.

The <u>second</u> and <u>third days</u> should be allocated to <u>selected</u> <u>fish species</u> case studies and it is suggested that these should be <u>Herring</u>, <u>Cod</u>, <u>Haddock</u>, <u>Plaice</u>, <u>Sole</u> and <u>Brown Shrimp</u>.In addition, relevant observational papers on interrelations between species could be presented.

The <u>fourth day</u> should be devoted to <u>theoretical papers</u>, the synopsis and the preparation of recommendations to ICES.

A more detailed description of the contents of suggested invited review papers and proposed authors is given in Annex II.

The following time-table is suggested:

- a. Approval of the prospectus by the Council in October 1973.
- b. Suggested reviewers be invited after the Council's approval. October 1973.
- c. Publication of the prospectus and invitation of contributed papers in January 1974.
- d. Provisional application to contribute papers (with title) by end August 1974.
- e. Meeting of the Steering Committee by preference during the 1974 Council meeting.
- f. Submission of abstracts of accepted contributed papers in January 1975.
- g. Submission of full text of accepted papers eight weeks before the meeting which probably will be in July 1975 in Aarhus, Denmark.
- h. The Steering Committee to meet again one day in advance of the Symposium.

Draft Prospectus

INTERNATIONAL SYMPOSIUM ON THE CHANGES IN NORTH SEA FISH STOCKS (decision on date and place pending)

ANNEX I

The Symposium will be held under the auspices of the International Council for Exploration of the Sea.

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Purpose of the Symposium.

During the recent decade considerable changes took place in the North Sea fisheries, e.g. the collapse of herring fisheries in the Southern and Central North Sea and the dramatic increase in catches of gadoid fish, particularly haddock and cod. On a longer time scale further shifts in abundance and distribution of major fish stocks were recorded. On the other-hand the overall fishing yield of the North Sea changed less during the past 30 - 50 years, in spite of marked changes in fishing intensity and fishing methods. These phenomena call for ecological interpretation. Competitive interrelationships in the larval and early juvenile stages together with changes in their abiotic and biotic environment may determine year-class strength and of the initial growth and distribution. At the later juvenile as well as at the adult phase fishing and partly interspecific competition are the major factors.

Competition in terms of predator-prey relationships, cannibalism and competition for food and space are little known in the fish stocks of the North Sea both in the early life history and in the adult phase. Detailed knowledge on the indirect and direct effects of hydrographical factors is also lacking.

The Symposium should bring together information on changes in yield and species composition in the North Sea fish stocks (including shellfish). A synoptic description should be developed of changes in their abundance, year-class strength and growth rate in order to detect interrelations from year to year and on long-term basis between and within the major species of food fish and their environment.

The North Sea (including Skagerak) as considered in the Symposium is bounded by the Straits of Dover and $62^{\circ}N$ and $4^{\circ}W$. Long-term observations from neighbouring areas such as the English Channel and the Kattegat may be presented also.

Programme

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The tentative list of sessions is:

Invited reviews on hydrographical and climatological changes in the North Sea and on changes in primary and zooplankton production, in benthos and shellfish for which the brown shrimp will serve as a representative.

Invited reviews and contributed papers on changes in fishery and biological parameters of the major fishspecies in the North Sea and special case histories of the following species: Herring, Cod, Haddock, Plaice, Sole and Brown Shrimp.

- III Theoretical and observational contributed papers on predator-prey relations, competition in the larval, juvenile and adult phase, and on association of changes in growth rate, year-class strength or larval abundance.
- IV A Synopsis of the information presented during the lectures and discussions in order to try to formulate some hypotheses explaining the major trends in fish stock changes observed.

Contributions and procedure of the Symposium.

In addition to a number of invited review papers on the subjects mentioned in the programme, papers can be presented dealing with theoretical and observational aspects of inter and interspecific relationships including predator-prey relations, competition in the larval, juvenile and adult phase. Each speaker of a contributed paper will have aobut 30 minutes and since abstracts of the papers will be available beforehand it is expected that a major part of this time can be used for discussion. To each invited review paper 60 minutes are allocated (including discussion).

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Papers may be submitted and presented in English or French following the normal practice of ICES.

The author should provide an abstract not exceeding 200 words in one of these languages. The abstracts will be made available at or before the Symposium in English, French, Spanish and Russian.

The selection of papers to be presented at the Symposium will be made by the Organizing Committee on the basis of manuscripts or full outlines submitted to its chairman before September 1974.

All papers presented at the meeting together with a report on the discussions, conclusions and recommendations will be published.

Organizing Committee

All who are interested in this Symposium should contact one of the following persons as soon as possible

(decision on membership pending).

Applications to contribute papers (with title) should be in the hands of the chairman of the Organizing Committee by end August 1974.

Accomodation

Accommodation will be available in student hostels and a local hotel in Aarhus. Further information can be obtained from Mr. Tambs-Lyche, Secretary-General, International Council for the Exploration of the Sea, Charlottenlund Slot, Charlottenlund, Denmark.

A detailed programme of the Symposium will be available by end October 1974.

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Description of the contents of suggested invited review papers and proposed authors.

1. General fish paper by Mr. M. Holden, Lowestoft.

A comparison of the character of the fishery, (total catch and species composition in the North Sea with possible estimates of abundance) in the thirties and in the sixties.

2. General hydrographical paper by Mr. H. W. Hill, Lowestoft.

A general description of the watermasses and hydrographical parameters in the North Sea at the present time and their changes during the last decades. The paper should also include long term changes in the North Atlantic as far as they affect the North Sea indicating interrelations between climatological factors, plankton and fish stocks.

3. Plankton paper by Dr. A. Longhurst,

This paper should describe long term changes and year to year variations in abundance and composition of zooplankton and its seasonal variations as related to ocean climate, indicating possible effects on fish stocks.

- 4. Paper on the transport of larval stages of major fish stocks by Dr. D. Schnack, Kiel and Mr. J. F. de Veen, Ijmuiden. A description of the spawning grounds and seasons of major fish species and brown shrimp in winter and spring and the transport of the pelagic stages to the nursery grounds as related to hydrography and plankton with respect to recruitment.
- 5. Hydrographical paper on the situation in spring in the area dealt with under 4.4. by Dr. D. Kohnke, Hamburg. A description of long term changes and short term fluctua-

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tions in meteorological and hydrographical patterns in the spring spawning season in the North Sea. The paper should be written in close contact with the paper on larvae and on plankton production.

6. Benthos paper by Prof. S. Gerlach, Bremerhaven and Mr. A. D. McIntyre, Aberdeen

Review of the present state of knowledge of the distribution and abundance of macrobenthos in the North Sea and its variability and long term changes with possible effects on fish stocks.

7. <u>Industrial fisheries paper by Dr. J. J. Zijlstra, Texel</u>. To describe the development of the industrial fisheries

in the North Sea and its possible effects on the dynamics of major fish stocks for human consumption.

8. The case study, papers for a number of fish species and the brown shrimp.

To describe long term changes in the distribution and vital parameters (particularly recruitment and parent stocks, growth and mortality at all stages of the life history as far as possible) in order to set the stage for a discussion on the possible causes of the changes both natural and man made.

- 8.1. Herring by Mr. A.C. Burd, Lowestoft and/or Mr. K. H. Postuma, Ijmuiden and/or Mr. P. Madsen, Copenhagen
- 8.2. Haddock by Mr. R. Jones, Aberdeen
- 8.3. Cod by Mr. N. Daan, Ijmuiden
- 8.4. Plaice by Dr. R. C. A. Bannister, Lowestoft
- 8.5. Sole by Mr. J. F. de Veen, Ijmuiden
- 8.6. Brown Shrimp by Prof. Dr. K. Tiews, Hamburg and/or Dr. R. Boddeke, Ijmuiden.

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9. A review paper on the dynamics of the juvenile stock in the nurseries by Dr. G. Rauck, Hamburg and Mr. J. Steele, Aberdeen.

To describe the present state of knowledge on the dynamics of the juvenile population in the nursery grounds.

The Planning Group took note of the activities of various groups attempting to produce models of the North Sea ecosystem, parts of these activities, in particular those related to the topics of this Symposium, should be taken into account on finalizing the programme for this Symposium. Papers on competition during early life history and in the adult phase should be encouraged among others.