International Council for the
Exploration of the Sea

C.M.1992/G:14
Demersal Fish Committee

REPORT OF THE STUDY GROUP ON REDFISH STOCKS

Copenhagen, 13-15 May 1992

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CONTENTS

1 INTRODUCTION

1.1 Participants

See Appendix.

1.2 Terms of Reference

At the 79th ICES Statutory Meeting in La Rochelle in 1991, the Council adopted the following resolution:

(C.Res. 1991/2:18)

The Study Group on Redfish Stocks (Chairman: Dr J Magnússon, Iceland) will meet at ICES Headquarters from 13-15 May 1992 to:

a. coordinate national research programmes on the oceanic-type *S. mentella* in the Irminger Sea and adjacent waters;

b. provide and discuss new information on the stock identification of the same stock;

c. submit a written report on the progress to the Demersal Fish Committee at the 1992 Statutory Meeting.

1.3 Background

At the ICES Statutory Meeting in the Hague 1989, the Council decided to establish a Study Group on Oceanic-Type *Sebastes mentella* (C.Res.1989/2:9). The Study Group met in Reykjavik 21-23 February 1990 (Anon. 1990).

In the terms of reference for that Study Group there were several subject matters referring to other stocks of redfish than the oceanic-type *S. mentella*. At the Statutory Meeting in 1990, the Study Group was renamed "Study Group on Redfish Stocks". According to C.Res.1990/2:12, the Study Group should work by correspondence in 1991 and report to the North Western and to the Arctic Fisheries Working Groups. Reports were submitted to the respective working groups (Magnússon 1991a,b, WG Doc.)

One of the terms of reference for the Study Group on Redfish Stocks was an attempt to coordinate ongoing national research programmes on redfish in 1991. Iceland and Russia had planned acoustic surveys on the oceanic-type *S. mentella* in the Irminger Sea in 1991. An attempt was made to coordinate these surveys. Unfortunately, planned coordination failed because of unforeseen circumstances.

Iceland and Russia decided - bilaterally - to conduct an acoustic survey in 1992. It was at that time hoped that more nations would participate.

At the Statutory Meeting in 1991, the Demersal Fish Committee emphasized the need of increased research on the oceanic-type *S. mentella*, and recommended to the Council that the Study Group on Redfish Stocks should meet in 1992 with terms of reference related to the oceanic-type *S. mentella* only.

1.4 Naming of the two *S. mentella* types.

In the past there have been some inconsistencies in the naming of the two types of *S. mentella*. Names as common, true, proper, ordinary, deep-sea, bottom living, traditional *S. mentella* vs oceanic-type, pelagic *S. mentella* and pelagic redfish have been used indiscriminately. For clarification the Study Group recommends that the names deep-sea *S. mentella* and oceanic *S. mentella* should be used in the future.

2 JOINT ICELANDIC - RUSSIAN ACOUSTIC SURVEY IN 1992

In 1992, for the first time, a joint acoustic survey will be carried out in the Irminger Sea by Russia and Iceland, on the oceanic *S. mentella*.

The research vessels engaged in this survey are:

1. R/V F. Nansen, Russia, 24 May to 18 July;
2. R/V Bjarni Saemundsson, Iceland, 15 June to 7 July.

It is planned that the vessels should meet for intercalibration during the survey. The two parties will meet in Reykjavik, Iceland after completing the surveys and discuss the results and prepare a paper for the forthcoming Statutory Meeting.

The intention is to cover the area as set out in the attached map (Figure 1).

The priority task of the surveys is to obtain an acoustic estimate of the oceanic *S. mentella* in the Irminger Sea. Besides, it was decided to carry out some deep sea hauls (>500 m.d.) in order to verify the presence of the deep-sea *S. mentella* and its distribution.

The following biological and hydrographical observations will be made:

- Target strength.
- Standard biological sampling of the fish.
- Sampling of scales and otoliths for comparative studies.
- Frequency of the parasite *Sphyrion lumpi*.

- Observations on the stomach content.
- Zooplankton sampling with bongo nets.
- Temperature and salinity.

Further on, samples will be collected for biochemical (genetic), meristic and morphometric research for both types of *S. mentella*.

3 STOCK IDENTIFICATION

The oceanic *S. mentella* in the Irminger Sea is assessed as a separate stock by the North Western Working Group. Although morphological characteristics of both stocks of *S. mentella* closely resemble each other, the Study Group on Oceanic-Type *Sebastes mentella* has given a variety of criteria to differentiate between them in the Irminger Sea/Iceland/East Greenland area (Anon. 1990).

Since then, certain research effort has been conducted to the separation of these stocks. In a Working Document (Nedreaas *et al.* 1992) redfish sampled in Icelandic and Greenlandic waters were analyzed for biochemical genetic variation by means of electrophoresis. For the oceanic *S. mentella*, this investigation resulted in no polymorphism in either of the enzymes and an overall picture identical to what has been found for *S. mentella* collected from other areas (Nedreaas & Naevdal 1991). However, firstly a closer grid of sampling is needed covering the whole area of the distribution and secondly new characteristics, for example analyses of mitochondrial -and nuclear DNA should be incorporated. A similar approach using electrophoresis to distinguish between *S. mentella* and *S. marinus* in Greenlandic waters has been used by Rehbein (1991) and it is planned to apply this method to the oceanic *S. mentella*, too. Morphometric and meristic studies have revealed no significant difference between the stocks. However, this might be due to limited sampling not representative for the stocks (Nagel, *et al.* 1991a). Further morphometric and meristic studies have been conducted by the Fisheries Laboratory of the Faroes. Results were not available at the meeting of the Study Group but will be presented at the 1992 Statutory Meeting. Spain is planning to intensify ongoing research related to the stock separation of different redfish species, taking into consideration also the oceanic *S. mentella*.

In view of the research effort presently conducted, the Study Group recommends to summarize and review all available information on historical morphometric and meristic studies in order to coordinate ongoing activities and to select a set of most promising characteristics to analyse.

Furthermore, it has to be checked, which characteristics enable a correct classification of age 0 and 1 redfish as shown for *S. mentella*, *S. marinus* and *S. viviparus* by Magnusson (1981). This would allow an identification of the different nursery areas and is essentially needed as basis of future recruitment studies to confirm the present hypothesis on the life cycle of the oceanic *S. mentella*.

Since 1983, it is known that in the eastern part of the Irminger Sea the "spawning" oceanic *S. mentella* and deep-sea *S. mentella* horizontally overlap, but differ in depth (Magnusson, 1983). The Icelandic acoustic survey on the oceanic *S. mentella* (Magnusson *et al.*, WG document) carried out in the Irminger Sea conducted after "spawning" in June 1991 revealed a wider range of distribution of the deep-sea *S. mentella* in the Irminger Sea than previously assumed. However, the vertical distribution was separated. Highest concentrations of oceanic *S. mentella* were found in depths of 100 to 200 m, whereas the deep-sea *S. mentella* was caught below 500 m depth.

Time and area of copulation of *S. mentella* should be looked upon as a possibility to differentiate between oceanic *S. mentella* and the deep sea *S. mentella*.

The Study Group concludes, that the international coordinated surveys planned for June/July 1992 (see Section 2) are urgently needed to clarify the stock distributions by covering a more extended area.

4 ASSESSMENT

Acoustic assessments have been carried out by the USSR since 1981 and by Iceland since 1990. Based on the progress in the performance of these surveys the Study Group is still of the opinion, that acoustics for the time being is the most appropriate method of assessing the stock of oceanic *S. mentella* if not conducted during the "spawning" time.

However, the distribution area of the entire stock is not very well defined and as the areas covered in the acoustic surveys made by Russia and Iceland have so far not been the same, it is difficult to use the results directly for assessment purposes. Lack of intercalibration and of agreement on a standard procedure have also made comparisons of results difficult.

The attempts at this year's Study Group Meeting to extend the area covered and coordinate and join the Russian and Icelandic surveys in 1992 will surely cope with some of the difficulties (see section 2). However, because of the immense area to cover it is strongly recommended that other nations participate in these surveys in the future.

The Study Group emphasized, that the knowledge of the oceanic *S. mentella* stock with regard to distribution and migrations is still poor, especially with regard to the

autumn and winter seasons. In this context the Group pointed out that these periods of the year, e.g., the time of copulation, could be of importance for an acoustic assessment of the stock. It was recommended to carry out research along these lines.

The 1991 Russian acoustic survey estimated the stock biomass to be at about 400,000 tonnes whereas the 1991 Icelandic survey estimated the biomass to about 525,000 tonnes. Simulations based on this stock levels and historical catches indicate, that a TAC of 100,000 - 150,000 tonnes may reduce the stock to very low levels during the next 10 years. A TAC of about 50,000 tonnes will result in only a slight reduction from current levels (see the 1992 North-Western Working Group Report for more details).

5 OTHER RESEARCH

5.1 Age reading

The Study Group on Oceanic-Type *Sebastes mentella* (Anon.1990) recommended that the age determination method should be carefully analyzed and the usual staining method should be applied to scales from fish species where the age reading of scales/otoliths is considered to yield reliable results, e.g., for cod and haddock.

Analyses have been done using cod samples taken from the West-Greenland area, and cod and haddock samples from the Faroes, and the results were presented to the Group. The scale and otolith age was read from 150 fish with an age range of 5-9 years. The agreement achieved was promising since only in a few samples a difference of one year between otolith and scale age occurred, mainly due to the last growth zone which did not show up very clearly on the edge of the scale. The Group felt that such exercises could be helpful in solving ageing problems in redfish and other species where the age readings are not very reliable.

A Workshop on Age Determination of Redfish was held in Murmansk (Russia) 26-30 August 1991 (Anon. 1991). Recommendations for how to proceed in order to harmonize the international age readings for management purposes were given. The Study Group did not discuss the biological or methodological difficulties in the age reading of redfish.

However, it is very important that the progress will continue towards a correct method and interpretation of the age in order to make reliable assessments of the redfish species in general. The next workshop on Age Determination on Redfish will be held in Germany in 1993

It is of vital importance that countries involved in the redfish fisheries and with expertice in redfish ageing can meet.

5.2 Biological research on the ectoparasite *Sphyrion lumpi*

Oceanic *S. mentella* infested by *Sphyrion lumpi* is a problem for the commercial fishery. Recent research on this parasite is described in two Working Documents presented to the Study Group. A Workshop on *Sphyrion lumpi* was held in Güstrow, Germany, 3-5 October 1989. Other research on this topic has been made, e.g. Bakay (1988) and Nagel *et al.* (1991b). In order to reveal the biology of this parasite and its connection to *S. mentella* in the North Atlantic in general, better coordination of the international *Sphyrion lumpi* research is needed.

5.3 O-group redfish off West Greenland

During the meeting it was stated that little new information exist on the hypothesis of the life cycle of *S. mentella*, as described in the report of the Study Group on the Oceanic-Type *Sebastes mentella*. However, in this context a Working Document (Wieland, 1992) on the distribution of O-group redfish off West Greenland was presented, which might indicate a drift of O-group redfish to northerly regions off West Greenland (Nuuk - Sisimiut). Future research on this topic is planned by the Federal Republic of Germany. It should be tried to distinguish between the species and the two types of *S. mentella*, as far as possible (see Section 3).

6 RECOMMENDATIONS FOR FURTHER RESEARCH

1. It is recommended to use the following names for the two types of *Sebastes mentella:*

   i. Oceanic *S.mentella*
   ii. Deep-sea *S.mentella*

2. In addition to Iceland and Russia, other countries having interests in the oceanic *S.mentella* fishery should participate in the acoustic surveys so that the tremendous distribution area of oceanic *S.mentella* could be covered simultaneously.

3. Research surveys in autumn/early winter (e.g., the time of copulation) should be promoted to find out how and where the oceanic *S.mentella* are distributed at that time of the year. All research surveys need to have access to the entire distribution area.

4. Biochemical (genetic), meristic and morphometric research on oceanic and deep-sea *S.mentella* should continue and the results, including those from historical studies, should be summarized. This research should aim at finding objective and diagnostic criteria for distinguishing between the two types of *S.mentella*. It is important that the characteristics also enable a correct classification of 0- and 1-group redfish.

5. The Study Group will encourage scientists to continue doing research on age reading as a basis for VPA assessment, and present the results to the planned Age Reading Workshop on Redfish in 1993.

6. Further research on defining the nursery areas of the oceanic *S. mentella* should be promoted.

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APPENDIX

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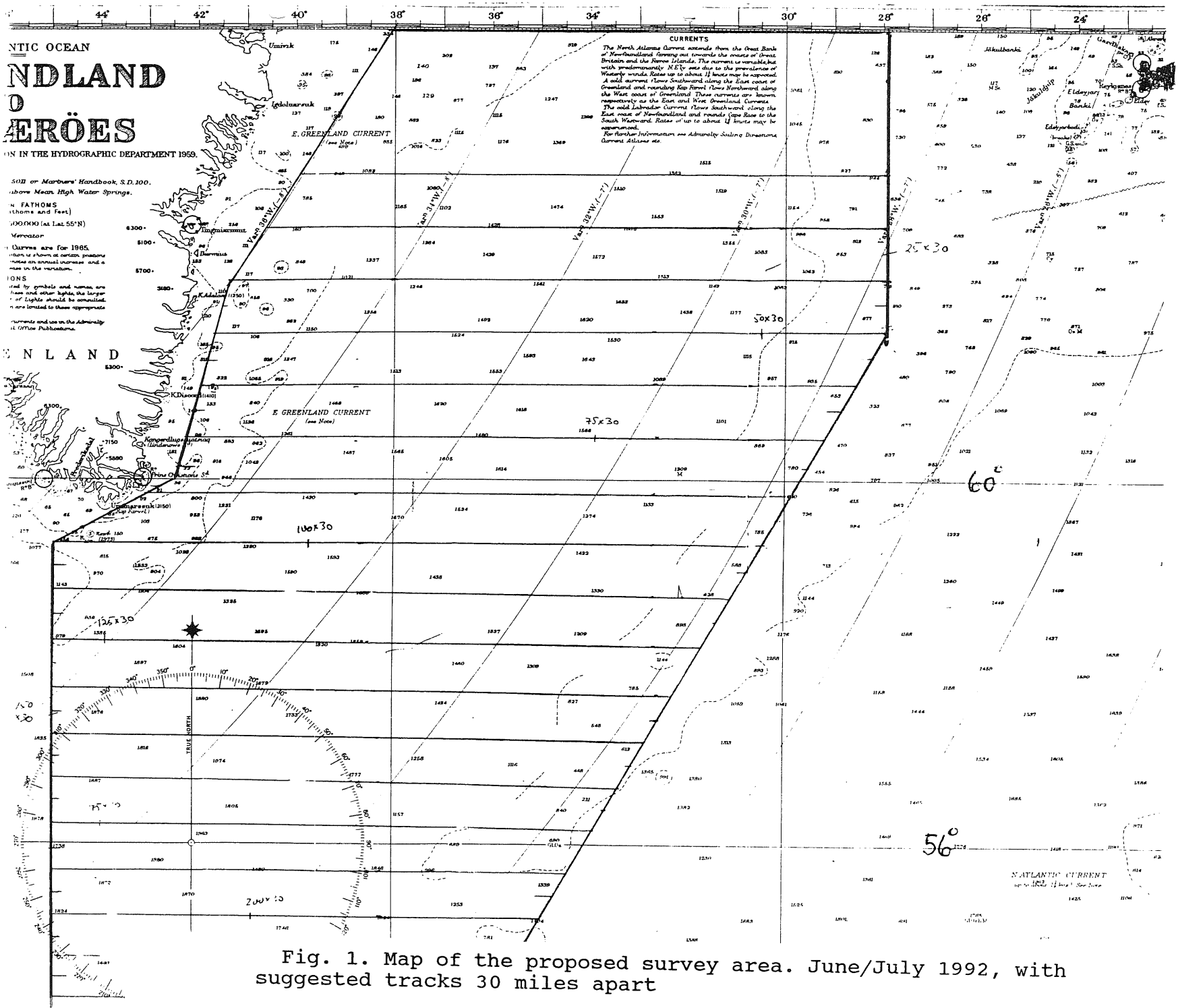

Fig. 1. Map of the proposed survey area. June/July 1992, with suggested tracks 30 miles apart