A PROPOSED SUBDIVISION OF THE NORTH SEA FOR
BIOLOGICAL SAMPLING PURPOSES

by

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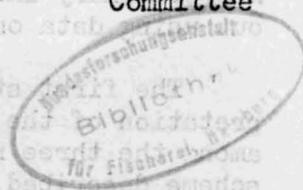
Abstract

A subdivision of the North Sea to be used for biological sampling of demersal fish species is proposed and some of the advantages of adopting such a system are described.

Introduction

Agreement has been reached by the participants at recent ICES North Sea Roundfish Working Group meetings on the establishment of areas in the North Sea to be used for biological sampling of cod, haddock and whiting. These areas are in good agreement with data obtained from tagging experiments, from hydrographic and plankton investigations, from parasitological data and from data on the occurrence of rare fish species (see Jones 1972 for a comprehensive review).

The areas proposed by the Working Group are shown in Figure 1; seven areas within the North Sea have been generally agreed, and it is suggested that these areas could also be used in the biological sampling programmes for all demersal species.

Desirability of an agreed set of sampling areas

It is hoped that, if such a system of sampling areas can be finally adopted, various problems which arise in the working up of basic data at Working Group meetings can be obviated. For example:

1) some nations only provide length frequency data for the landings of some species. These length frequencies have then to be broken down into age frequencies using age-length keys from other sources. In many cases, the geographical area from which the age-length key is derived is not the same as that for which the length frequency data have been compiled, and this could lead to inaccuracies in the estimation of the total number of fish landed at each age in each year. Since such data form the input for virtual population analysis (or other methods of estimation of mortality rates), errors could consequently arise in the estimation of mortality rates and/or the associated pattern of exploitation. Standardisation of areas should help to reduce this source of error.

Précis

Ce communiqué propose qu'une sous-division de la Mer du Nord soit utilisée pour l'échantillonage des espèces de poissons démersaux; certains avantages qui résultent d'une telle méthode sont décrits.

2) A further consideration is that by adopting an agreed set of sampling areas, it may be possible to reduce duplication of otolith reading effort. A preliminary investigation of this possibility has already been carried out using data on cod provided by England, the Netherlands and Scotland.

The first stage of the investigation was to ensure that the interpretation of the ages of individual fish by otolith reading is consistent among the three nations. This was done by means of the otolith exchange scheme described in the Appendix. It was found that very good agreement was achieved.

The second stage was to compare age-length keys for each of the three nations for trawl catches taken in the most northerly of the proposed sampling areas. Although provided on a quarterly basis, the numbers of otoliths in some age-length keys were very low (especially for the Netherlands data). Accordingly the age-length keys were combined to form an annual key for each country. Each of these keys was then transformed using the method of Armstrong and Nicholson (1973) and the results of this process are shown in Figure 2.

It can be seen from Figure 2 that, for each age group, the data for all countries lie within a well defined, discrete area. Furthermore, English and Scottish data for each age group generally lie in a much more restricted area than that occupied by data for all three nations. The implication of this is that all these countries appear to be estimating the same age-length key for the gear/area classification in question, and that the English and Scottish results in particular are in very good agreement (at least up to age group 5).

In situations like this, a joint sampling scheme involving two or more countries should save time and effort. Agreement on the areas used for biological sampling purposes is a first essential however, before this can be done effectively.

References

Armstrong, D.W. and   1973   An alternative method for preparing age-
  Nicholson, M.   length keys. ICES CM 1973/F:45.

Jones, R.   1972   The subdivision of demersal stock within
                                   the North Sea. ICES CM 1972/F:13.

Otolith Exchange Scheme

England, the Netherlands and Scotland each took a sample of otoliths from up to 50 cod from trawlers fishing in the most northerly of the proposed sampling areas. Each nation then read all the otoliths collected, recording their results for individual fish.

The percentage of individual fish for which the various nations recorded the same age is shown in Table 1 where it can be seen that percentage agreement ranged from 82 to 98.

The number of fish recorded at each age in each sample by each nation is shown in Table 2. The results in each case are in very good agreement. Chi-square tests on the results obtained from each sample indicate no significant differences at the 1% significance level.

Appendix Table 1

Percentage agreement in age readings for individual fish

Netherlands Sample (49 otoliths)		English Sample (50 otoliths)		Scottish Sample (49 otoliths)	
Comparison	% Agreement	Comparison	% Agreement	Comparison	% Agreement
Netherlands-England	88	England-Netherlands	90	Scotland-England	94
Netherlands-Scotland	84	England-Scotland	90	Scotland-Netherlands	92
England-Scotland	82	Netherlands-Scotland	86	England-Netherlands	98

Appendix Table 2

Number of fish of each age in each sample

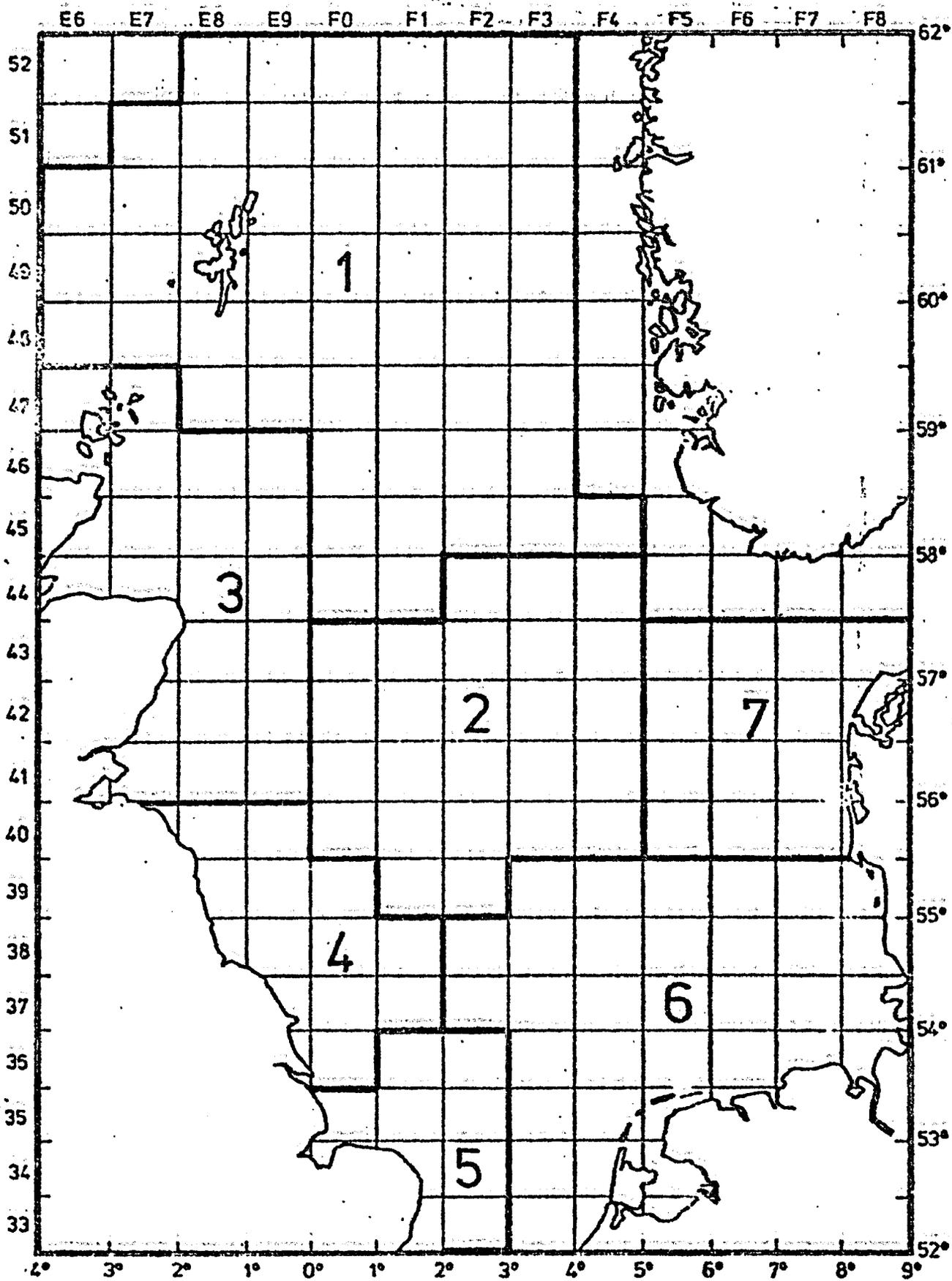|	Netherlands Sample			English Sample			Scottish Sample		
Read by Age	Netherlands	England	Scotland	Netherlands	England	Scotland	Netherlands	England	Scotland
2	9	9	9	13	13	13	12	9	10
3	21	18	22	12	12	12	9	12	11
4	5	8	6	7	7	8	16	16	16
5	6	7	5	5	5	6	6	5	4
6	3	2	2	7	6	4	3	4	5
7	1	2	4	3	4	4	1	-	-
8	2	2	-	2	2	2	2	3	2
9	1	1	-	1	1	1	-	-	1
10	1	-	-	-	-	-	-	-	-
11	-	-	1	-	-	-	-	-	-
Total	49	49	49	50	50	50	49	49	49

Figure 1   Proposed International Sampling Areas
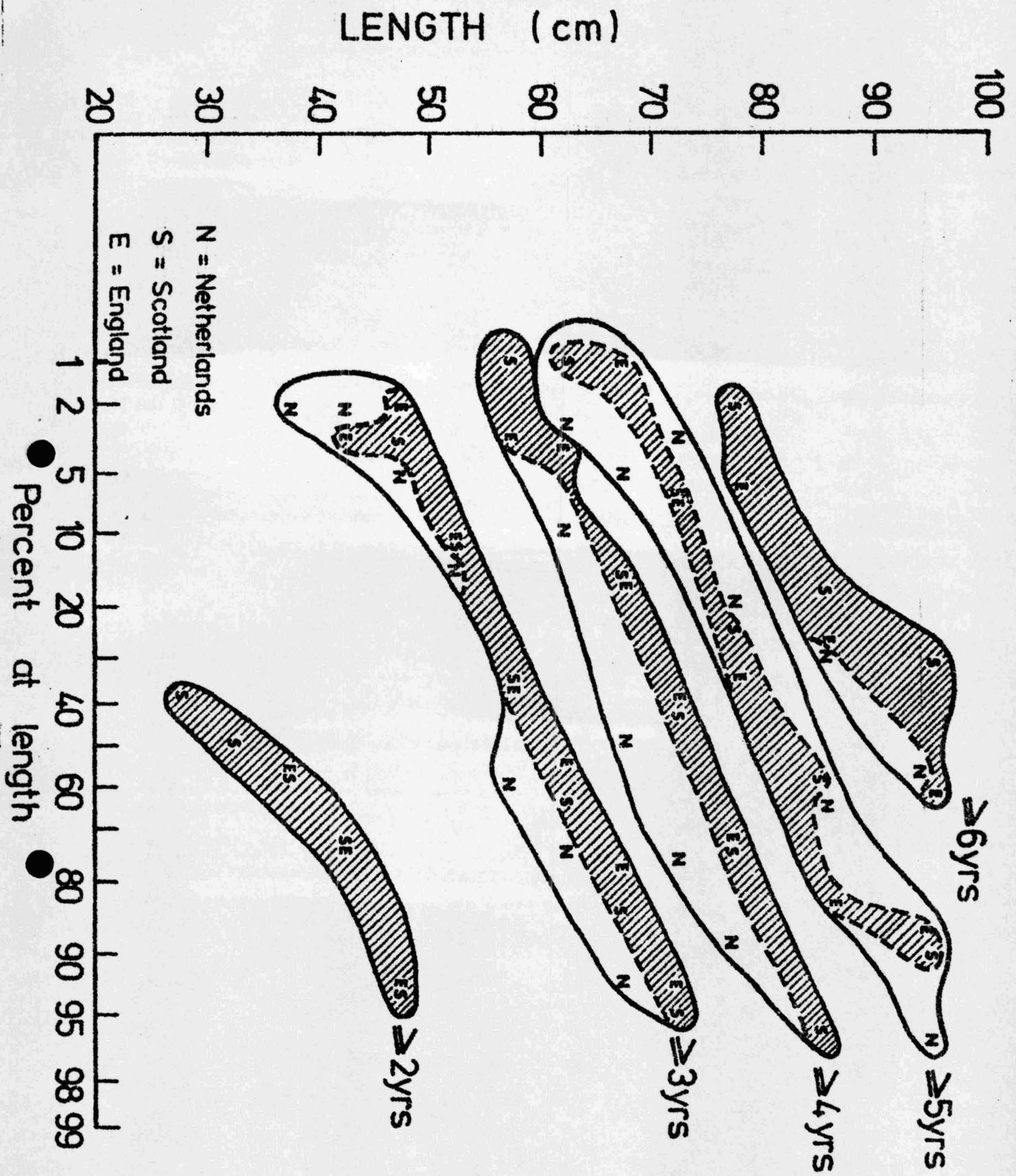For Demersal Fish.

Figure 2   English, Netherland and Scottish Age-Length
Keys (Shaded areas include data for England
and Scotland only).