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SURVEY OF FISH RESOURCES IN THE NORTH-EAST ATLANTIC

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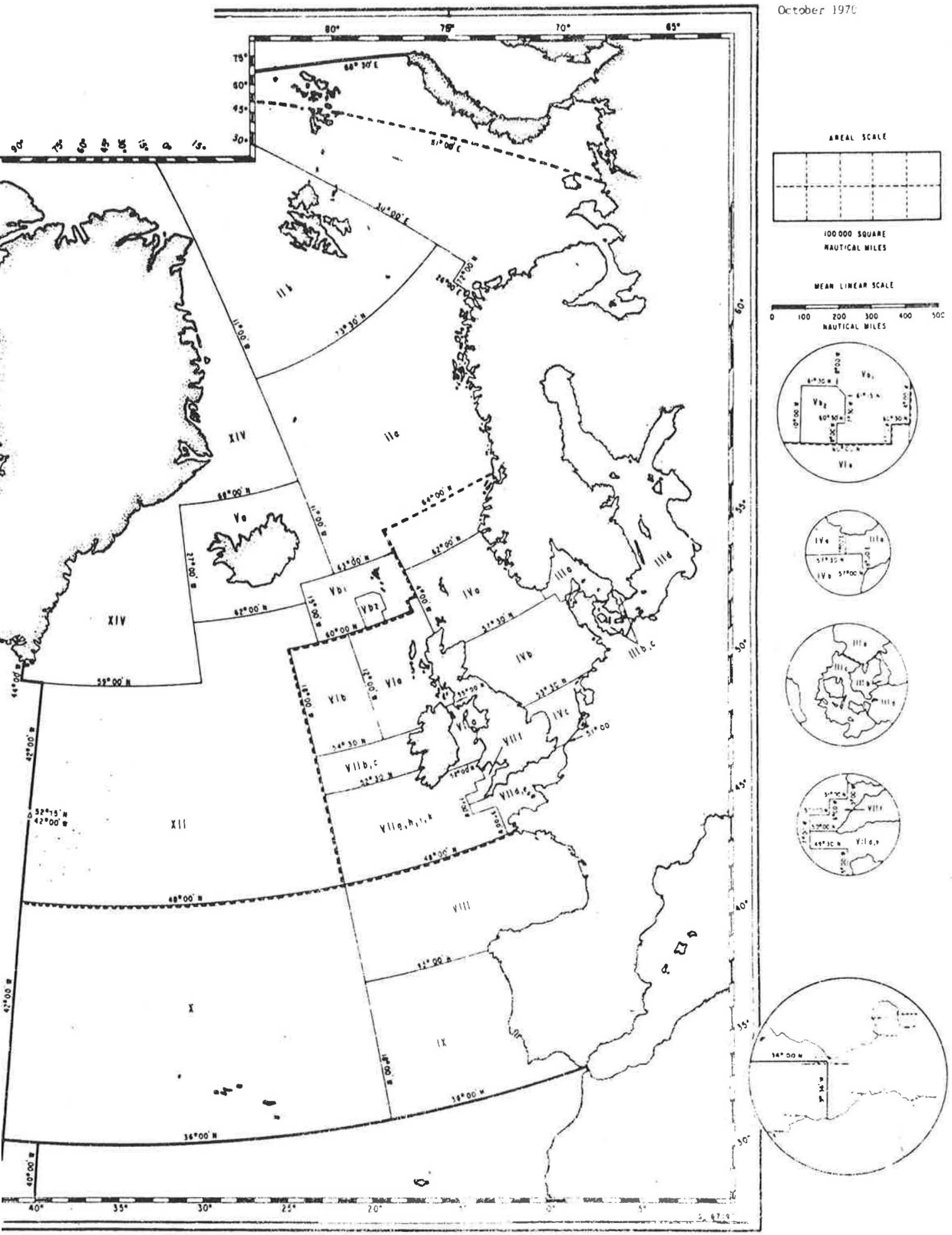

ICES and NEAFC Fishing Areas

SURVEY OF FISH RESOURCES IN THE NORTH-EAST ATLANTIC

A. INTRODUCTION

1. The International Council for the Exploration of the Sea (ICES) decided at its 60th Statutory Meeting in 1972 to produce a review of the fish resources within its area, the objective being to present for each of the important fish species a brief description of its life history, fishery and state of exploitation, for the benefit of those persons or authorities dealing with the political problems concerning exploitation, regulation and management of marine resources. The present Report has been produced by the Liaison Committee of ICES on the basis of contributions submitted by scientists from member countries, and joint scientific work carried under the Council's auspices. The Report has been prepared during 1973, and the paragraphs on fishery and state of exploitation of each stock are updated to the beginning of 1973, unless otherwise stated. The Report does not cover all species or stocks in the North-East Atlantic. Some have been omitted either because they are of minor or no importance to the fishery or because very little is known about them at present. Expansion of the Report may be considered when it is revised and updated.

2. Four Annexes are appended:

   1. Regulations in force in the North-East Atlantic as per 1 January 1974, as recommended by NEAFC.
   2. List of ICES Working Groups in 1973/74.
   3. List of ICES Working Group Reports relevant to the present Report and other References.
   4. List of scientists who contributed to the preparation of this Report.

B. THE ROLE OF ICES IN FISHERY MANAGEMENT IN THE NORTH-EAST ATLANTIC

1. The International Council for the Exploration of the Sea is an intergovernmental body which was founded in 1902 as a result of, firstly, a desire among European scientists to foster international cooperation in marine biology and hydrography in order to obtain a better understanding of the North Atlantic and its adjacent seas and, secondly, of a growing concern about the need to adopt regulatory measures in order to conserve North Sea fish stocks

in view of the marked increase in fishing effort that had recently come about with the development of the steam trawler. The subsequent history of the Council and its work have been described by Went (1972, 1973) and by Cushing (1972).

2. In 1937, largely as a result of discussions within ICES, ten European countries signed a convention on the protection of undersized fish, but the Second World War prevented its ratification. In 1946, again mainly as a result of ICES activity, this convention was replaced by an Overfishing Convention covering the North-East Atlantic and signed by most European countries. Following ratification of this second convention the Permanent Commission was formed in 1954, and in 1959 the North-East Atlantic Fisheries Convention was signed establishing NEAFC. Article 11 of this Convention states "In order that the recommendations made by the Commission for the conservation of the fish stocks shall be based so far as is practicable upon the results of scientific research and investigations, the Commission shall when possible seek the advice of the International Council for the Exploration of the Sea, and the cooperation of the Council in carrying out any investigations and, for this purpose make such joint arrangements as may be agreed with the International Council for the Exploration of the Sea, or make such other arrangements as it may think fit".

3. In order to provide such advice ICES established a Liaison Committee under the chairmanship of the person holding office as the Chairman of the Council's Consultative Committee. At the present time the Liaison Committee consists of the Chairmen of the following Area- and Subject-Committees:

Demersal Fish (Northern)
Demersal Fish (Southern)
Pelagic Fish (Northern)
Pelagic Fish (Southern)
Shellfish and Benthos
Anadromous and Catadromous
Statistics
Gear and Behaviour

They are joined by a number of coopted members (five at present) chosen on account of their individual knowledge of various fields of fisheries research, and the Council's Statistician acts as the Secretary of the Committee.

4. When giving advice to NEAFC the Liaison Committee acts on behalf of the Council. Its members, when they act as the Committee, are responsible to no body other than the Council. They cannot be under any national instructions or under instructions from any of the Council's Area- or Subject-Committees. The Liaison Committee may, if it finds it useful or desirable, institute certain working procedures in order to ensure that the advice which it gives to NEAFC is based on as broad as possible a consensus of opinion in the relevant field. This may include hearing the views of Area- and Subject-Committees before it decides upon the advice to be given. No Committee or Working Group of the Council can give direct advice to the Commission; it must pass its views to the Liaison Committee. If a Working Group meets after the Liaison Committee's meeting but before the Commission's meeting, the Chairman of the Liaison Committee may, if he feels it useful or desirable, inform the Commission about the Group's report and conclusions, but this does not represent an advice to the Commission until it has been specifically accepted as such by the Liaison Committee itself. The Committee is free to select from the reports and recommendations of Working Groups and Area- and Subject-Committees and from other sources such information as it wishes to transmit to the Commission. It may find it useful, as is often the case, to append certain Working Group reports to its own report to the Commission, but it is under no obligation to do so. It is free to draw its own conclusions from the material presented by a Working Group, or to accept wholly or partly the Group's conclusions. The only responsibility of the Liaison Committee is to see that whatever advice it passes on to the Commission is, to the best of its knowledge, scientifically sound and based upon sufficient and adequate information.

5. NEAFC usually holds its annual meeting early in May and makes specific requests to ICES for advice on particular fish stocks. These requests are considered at the Statutory Meeting of ICES in October and it is usual to establish a series of Working Group meetings in order to deal with them. A list of the Working Groups at present in existence is given in Annex 2 (p. 105). They total 39 and it can be seen that they cover all the main demersal and pelagic fisheries in the North-East Atlantic. Their meetings tend to take place round about the turn of the year in order to ensure that the most recent annual sets of statistics are available, and the Liaison Committee considers the reports coming from meetings and from the Statutory Meeting when it meets in February in order to prepare its Report for the next meeting of NEAFC. This Report has to be circulated by the Secretary of NEAFC so as to reach the Commissioners at least one month prior to their

annual meeting. It is published as an ICES Cooperative Research Report shortly after the meeting, and so the advice given by the Liaison Committee is made publicly available.

6. This timetable is tight and it is becoming ever tighter as NEAFC calls for advice concerning more and more stocks as they come under increasing fishing pressure. To give an example, as many as six Working Group meetings were held in the first few weeks of 1973 in order to allow the Liaison Committee to prepare its Report for the 11th Meeting of NEAFC in May 1973. The organization of this series of meetings is complicated by the fact that the International Commission for the Northwest Atlantic Fisheries (ICNAF) also holds a mid-term meeting in January, and that too seems to be increasing in length. The scientists from European countries taking part in the ICNAF meeting are the same as those participating in the meetings of the various ICES Working Groups and Committees. They are few in number and are operating at present with too great a work-load. It is hoped that this situation will be remedied to some extent by the joint discussions which are at present taking place between NEAFC, ICNAF and ICES and which are aimed at designing a better timetable. An increase in the number of stock assessment experts in the various national laboratories is also required and, in this respect, it should be noted that at the Special NEAFC Meeting at the Level of Ministers held in Moscow in December 1972 Ministers agreed on the importance of (a) extending the range and scope of fisheries research (b) an increase in cooperation and joint scientific programmes (c) an improvement in the supply of statistics by Member Countries.

7. ICES is a scientific forum for the exchange of information and ideas and for the promotion of investigations for the study of the sea, particularly those relating to living resources, as well as being the scientific advisory body to NEAFC. The first function allows fishery science to develop independently of the special requirements of NEAFC and hence to anticipate them to some extent. It also brings together both pure and applied scientists from a number of different disciplines and hence provides a multi-disciplinary approach to a number of problems, for example, those concerned with the biology and physics of fishery ecosystems and with the effects on fish stocks of environmental changes. Further, although ICES is an intergovernmental organization, it draws to its meetings experts from universities and research councils as well as from government fisheries laboratories, and it is thus very much an open forum at which both governmental and non-governmental views can be expressed.

8. Major topics of scientific discussions within ICES in recent years have been the dependence of recruitment on parent stock, the regulation of total fishing effort by the introduction of various kinds of quota systems, and the effects of marine pollution on fisheries. Recruitment failures have occurred in recent years in the Atlanto-Scandian and Downs stocks of herring in the Norwegian Sea and the North Sea respectively and in the Arcto-Norwegian cod stock in the Barents Sea. All these stocks had been under the pressure of heavy fishing before the failure occurred, and it was argued by some scientists that the latter was due to the low level of the spawning stock resulting from the fishing pressure. This concept of the dependence of the level of recruitment upon the level of the parent stock was in a sense unorthodox to most ICES scientists, in that their stock assessment has been based largely on the yield per recruit model of Beverton and Holt and the assumption of constant recruitment regardless of stock size. ICES therefore sponsored in 1968, jointly with ICNAF and FAO, a Symposium on the general problem of Stock and Recruitment. No general solution of the problem was forthcoming but its study and discussion have continued, and in the case of some stocks they have been made more complex because work in the hydrographic and meteorological fields have revealed another possible cause of recruitment failure in that marked fluctuations in the climates of the atmosphere and seas of Northwest Europe have been contemporaneous with the growth of fishing effort and the recruitment failure.

9. From the end of the Second World War until the early 1960s ICES was largely concerned with mesh regulation and minimum size limits as tools for fishery management. All the major demersal fisheries of the North-East Atlantic are now subject to this type of regulation. More recently a need has grown for the management of the major pelagic fisheries and for more effective measures with which to regulate demersal fisheries and, arising from discussions with ICES, NEAFC has now started to move towards a consideration of management whereby the total amount of fishing is controlled by means of quota systems. To date it has not been possible for the Commission to adopt these because all Member Countries have not yet approved the resolution adopted at its Eighth Meeting which grants it the power to issue recommendations to the Member Countries on the regulation of catch and fishing effort and their distribution between countries. However, in 1971 a close season was introduced for North Sea herring fishing following consideration of a report submitted by the ICES North Sea Herring Assessment Working Group, and Norway, Iceland and the USSR have held discussions outside the framework of the Commission in order to agree upon a quota system

for the Atlanto-Scandian herring stock. Similar discussions are preceeding between Norway, USSR and the United Kingdom with regard to the Arcto-Norwegian cod stock.

10. The introduction of quotas will call for an improvement of stock assessments. ICES has already pointed out to NEAFC that in order to achieve this it is essential to (a) improve greatly the coverage, accuracy and speed of reporting of national statistics (b) extend substantially the biological sampling programmes (the amount of such sampling carried out at present differs considerably between countries and is far from proportional to the quantity of fish caught by the individual countries) (c) augment the type of data used up till now in making assessments by other information in order to permit more accurate estimation of stock size and recruitment. With rapid changes in the fisheries and with the introduction of catch regulation, the comparability of the present abundance indices will become less and less precise. They are based on long established national patterns of fishing. Closed seasons, closed areas or quotas will disrupt these patterns, making it essential to obtain estimates of stock size independent of catch and effort data, for example, by means of acoustic surveys and tagging experiments. In this connection ICES, in collaboration with FAO and ICNAF, held a Symposium on Acoustic Methods in Fisheries Research in Bergen in June 1973.

11. Another essential requirement for management is a reliable estimate of future recruitment to the fishery. For some stocks this is already monitored by means of larval, 0-group and groundfish surveys. These surveys require high investments in time and effort by research vessels. Provisions must be made for considerable increase in such investments and for the expansion of international cooperation in these types of research activities if scientific management of the stocks is to become a reality. It will also be necessary to consider the exploitation of various stocks in relation to each other, in that the limitation of the fishery for one stock of a particular species may bring about increased exploitation of another stock elsewhere, either in the NEAFC area or outside it; in the ICNAF area for example. A start into the investigation of this problem has already been made by the Joint ICES/ICNAF Working Group on Cod Stocks in the North Atlantic. Furthermore, quota regulations on a particular species may lead to increased fishing on stocks of other species hitherto only lightly exploited, and hence give rise to a need for their management as well.

12. ICES has been actively engaged for some time in the study of marine pollution and its effects on the living resources of the sea. Studies of the pollution of the North Sea and Baltic Sea have been under way for

five years and the Council is at present conducting an International Study of the Pollution of the North Sea and its Effects on Living Resources and their Exploitation. Salient points in the Study are the determination of the levels of toxic substances in fish and shellfish in order to guard against risks to human health, and the mapping of the pattern of heavy metal pollution in the North Sea in order to see if there are "hot spots" which could be critical for commercial species of fish during the various stages in their life histories. ICES has also established an Advisory Committee on Marine Pollution for providing scientific advice on marine pollution and its effects on living resources and their exploitation to Member Governments and any intergovernmental body for the control of pollution which may request such advice. This Committee is analogous to the Liaison Committee. It is constituted in such a way as to provide the best possible scientific advice, and its members, when acting as the Committee, are responsible to no body but the Council. It consists of an independent Chairman, who during his term of office cannot act as a national representative to the Council, and of the Chairmen of the following Area- and Subject-Committees:

Hydrography
Fisheries Improvement
Plankton
Shellfish and Benthos
Anadromous and Catadromous Fish

and three coopted members chosen because of their individual knowledge of various aspects of marine pollution.

13. During the last two decades some striking changes have taken place in the landings from the North Sea fisheries, the present level being about double that in the early 1950s. These changes are due in part to increased fishing effort, but they have also been caused partly by the appearance of very large year classes of some species. Shifts in fishing patterns to new species, size categories and fishing grounds, and natural fluctuations in the marine environment may also have played a part which is not yet fully understood. In order to promote the investigation of this matter and to provide guidance for future ecological research and the better management of multi-species fisheries, ICES decided to hold a Symposium on the Changes in the North Sea Fish Stocks and their Causes, in the summer of 1975, and it has appointed a Planning Group for the Symposium which will identify the kinds of data concerning the fish and shellfish stocks and their environment (physical, chemical and biological) that will be required in order to provide a synoptic picture of the changes which have taken place since the Second World War. The Symposium will there-

fore be concerned to some extent with each of the main themes of ICES activity described above, in that it will deal with the interaction between species under varying degrees of exploitation, with the variations in recruitment in response to changes in stock size and in oceanographic and meteorological conditions, and with the effects, if any, of marine pollution.

C. NORTH-EAST ATLANTIC FISHERIES

14. The International Council for the Exploration of the Sea has compiled statistics on the North-East Atlantic fisheries since 1905. These data are recorded in the "Bulletin Statistique" of ICES, which forms the basis of the following description of trends and developments in the different fisheries. The ICES statistical area (frontispiece) is sub-divided into twelve sub-areas, some of which are further sub-divided into divisions and sub-divisions forming the basic area units for compilation of statistics. For regulatory purposes the NEAFC has sub-divided the North-East Atlantic into three regions (frontispiece, broken lines), which comprise the ICES statistical area with the exception of that part of Sub-area I which lies east of 51°00'E and Divisions IIIb, c and d. Figure 1 (p. 9) shows the area with depth contours for 100, 200, 500 and 1 000 metres.

15. The main trends in catches of more important species in the principal fishing areas over the last ten years' period are summarised in Tables 1-4. The tables, which are based on statistics published in ICES "Bulletin Statistique", show for each NEAFC region and for ICES Divisions IIIb, c and d outside the NEAFC area the nominal catch of all species combined, the catch in the main fishing areas of (a) demersal species (comprising flatfishes, codfishes, redfishes, gurnards, sandeels, etc.), (b) pelagic species (all marine fish species not included in the demersal fish group), and (c) each of the main species within the demersal and pelagic fish groups. Freshwater and anadromous species, shellfish and the catches by non-member countries are not included in these tables.

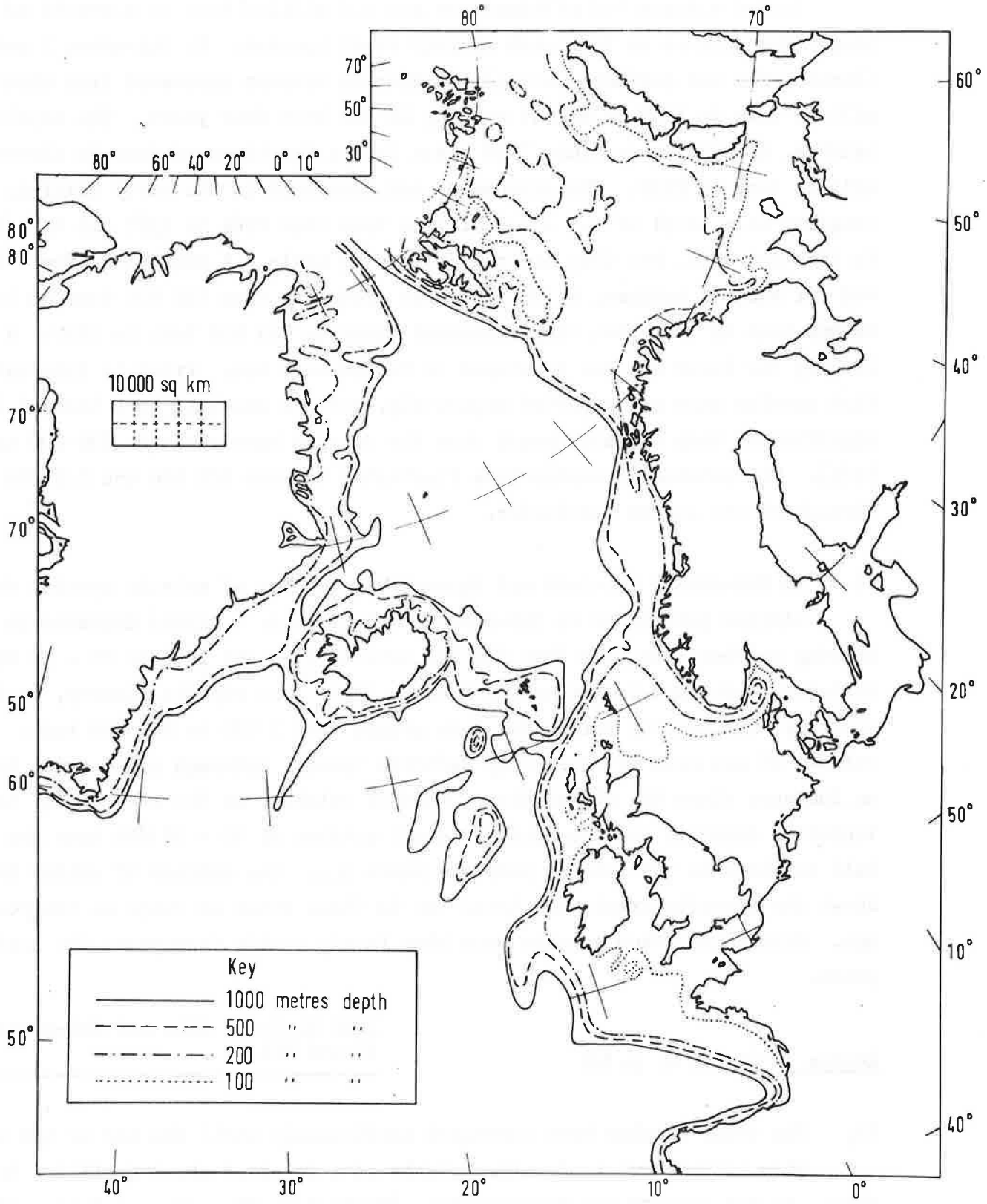

Figure 1. Map of the North-East Atlantic with area scale and depth contours.

Region 1 (Table 1, p.11) ICES Sub-areas I, II, V, XII and XIV

16. During the last ten years the total catch of fish in Region 1 has fluctuated between 3.4 million tons and 4.4 million tons as a result of very large fluctuations in the catch of individual species. In Sub-areas I and II (Barents Sea and northern Norway) the herring catches decreased from about 1.6 million tons in 1967 to almost nothing in the last four years. The capelin catches, however, have since 1964 risen from a few thousand tons to almost 1.6 million tons in 1972. The catches of cod decreased in the early sixties, remained at a level of 0.5 - 0.6 million tons from 1964 to 1967 and then increased in 1968 and 1969, but they are now decreasing again. A similar decrease is observed for haddock catches, which decreased gradually from 156 000 tons in 1968 to 80 000 tons in 1971, but they increased again to 187 000 tons in 1972. A new fishery for Polar cod has developed in the Barents Sea. Prior to 1969 catches of that species were not reported separately, but are known to have been of less significance than in later years when the catches have risen to 350 000 tons (in 1971). The catches of saithe have fluctuated between 100 000 and 240 000 tons throughout the period considered.

17. In Sub-area V (Iceland and Faroes) the catches of pelagic species show a similar pattern as in Sub-areas I and II, viz. a marked decrease in the herring catches from more than 600 000 tons in 1964 and 1965 to 20 - 30 000 tons in later years, and less than 500 tons in 1972. The capelin fishery, on the contrary, has gone up during the same period from 1 000 to 280 000 tons. The catches of cod have not shown any definite trends, although there tends to be an increase since the mid-sixties. Haddock catches, on the other hand, have tended to decrease and the present annual catches of 60 - 70 000 tons are only half as large as the catches made ten years ago. The catches of saithe have shown the opposite trend, now being two to three times as large as ten years ago. Catches of other species have been fairly stable throughout the last ten years.

Region 2 (Table 2, p. 12) ICES Division IIIa and Sub-areas IV, VI and VII

18. The total catches have increased continuously until the end of the sixties, when catches remained rather stable at a level of about 4 million tons a year. In Sub-area IV and Division IIIa (North Sea, Skagerak and Kattegat) the catch of herring, after a rise in the mid-sixties, decreased gradually from 1.1 million tons in 1968 to 0.7 million tons in 1972. Mackerel catches rose drastically to almost one million tons in 1967, but since then they have declined to 190 000 tons in 1972. Cod catches have almost tripled during the last ten years'

Table 1. Nominal Catch (in 000's metric tons) by Sub-areas and main species in NEAFC Region 1.

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
TOTAL NOMINAL CATCH IN REGION 1 *)	3 502	3 403	3 429	3 900	4 386	4 125	3 679	3 677	4 245	4 203	4 119
Sub-areas I and II (North-East Arctic)											
Pelagic Fish											
Herring	601	716	870	1 169	1 520	1 627	700	62	62	22	13
Capelin	4	35	20	222	389	408	538	680	1 314	1 392	1 593
Others	4	4	4	9	7	6	8	4	4	3	4
Total Pelagic Fish	609	755	894	1 400	1 916	2 041	1 246	746	1 380	1 417	1 610
Demersal Fish											
Cod	927	805	468	480	557	619	1 102	1 224	944	724	642
Haddock	184	145	87	106	130	95	156	146	85	80	187
Polar Cod	...	...	...	...	...	...	...	140	243	348	167
Saithe	121	149	198	186	203	181	110	133	236	224	207
Redfish	36	42	66	40	35	24	18	30	29	44	37
Flatfish	34	28	53	43	37	33	32	52	83	108	63
Others	75	52	64	59	56	52	56	60	74	80	58
Total Demersal Fish	1 377	1 221	936	914	1 018	1 004	1 474	1 785	1 694	1 608	1 361
Total Catch of all Species	1 986	1 976	1 830	2 314	2 934	3 045	2 720	2 531	3 074	3 025	2 971
Sub-area V (Iceland & Faroes)											
Pelagic Fish											
Herring	658	531	640	628	492	145	37	30	19	14	0
Capelin	...	1	9	50	125	97	78	171	192	183	277
Others	0	1	1	-	1	1	1	-	-	0	0
Total Pelagic Fish	658	533	650	678	618	243	116	201	211	197	277
Demersal Fish											
Cod	410	433	460	421	381	371	414	443	503	481	422
Haddock	147	131	118	117	79	73	69	70	66	66	56
Saithe	60	61	82	82	78	97	98	144	142	165	154
Redfish	77	93	103	120	110	100	103	88	80	84	81
Flatfish	26	24	23	28	26	41	33	38	33	29	23
Others	58	64	55	58	47	53	61	69	53	64	60
Total Demersal Fish	778	806	841	826	721	735	778	852	877	889	796
Total Catch of all Species	1 436	1 339	1 491	1 504	1 339	978	894	1 053	1 088	1 086	1 073
Sub-area XIV (East Greenland)											
Total Catch of all Species	46	63	81	58	80	60	40	50	40	63	49

*) Including non-teleost fish, unsorted and unidentified species.

Table 2. Nominal Catch (in 000's metric tons) by Sub-areas and main species in NEAFC Region 2.

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
TOTAL NOMINAL CATCH IN REGION 2*)	2 203	2 571	3 005	3 471	3 638	3 912	4 262	4 043	4 071	3 989	4 029
Sub-area IV and Div. IIIa (North Sea, Skagerak & Kattegat)											
Pelagic Fish											
Herring	795	965	1 206	1 469	1 191	1 069	1 139	838	834	735	715
Mackerel	79	73	115	208	530	931	821	739	322	243	188
Sprat	43	78	76	79	111	76	70	69	58	100	97
Others	17	10	7	14	9	10	7	9	19	36	11
Total Pelagic Fish	934	1 126	1 404	1 770	1 841	2 086	2 037	1 655	1 233	1 114	1 011
Demersal Fish											
Cod	114	129	136	194	235	270	303	212	239	339	368
Haddock	53	65	199	223	270	169	140	640	673	260	216
Whiting	91	117	113	125	175	122	174	216	195	126	123
Norway Pout	167	180	97	68	65	194	486	151	290	385	510
Saithe	...	30	58	73	90	76	102	109	172	213	209
Sandeel	140	184	132	141	180	209	201	115	195	404	366
Plaice	107	125	133	110	109	115	126	135	145	133	144
Other Flatfish	54	49	36	43	58	66	61	49	38	46	45
Others	55	34	46	53	42	39	33	35	27	32	36
Total Demersal Fish	781	913	950	1 030	1 224	1 260	1 626	1 662	1 974	1 938	2 017
Total Catch of all Species	1 715	2 039	2 354	2 800	3 065	3 346	3 663	3 317	3 207	3 052	3 028
Sub-areas VI and VII (west and south of British Isles)											
Pelagic Fish											
Herring	101	83	90	90	131	143	142	192	230	295	289
Mackerel	24	27	27	22	46	39	40	45	65	87	134
Sprat	4	4	7	8	5	4	8	8	14	9	13
Others	9	12	14	7	6	6	5	21	80	56	113
Total Pelagic Fish	138	126	138	127	188	192	195	266	389	447	549
Demersal Fish											
Cod	14	20	35	41	41	48	45	46	29	32	33
Haddock	14	10	44	43	41	29	25	33	41	54	58
Whiting	35	36	39	47	45	53	44	39	28	32	30
Hake **)	30	25	20	42	15	17	18	13	14	21	18
Flatfish	22	23	29	32	37	33	30	32	31	32	35
Others	52	48	48	74	40	50	60	86	77	99	106
Total Demersal Fish	167	162	215	279	219	230	222	249	220	270	280
Total Catch of all Species	305	288	353	406	407	422	417	515	609	717	829

*) Including non-teleost fishes, unsorted and unidentified species.

**) The hake statistics are unreliable. Part of catch is reported by landing port and not by fishing area.

period to 370 000 tons in 1972. The same increasing tendency is demonstrated in the catch of saithe, while the catch of whiting, after a rise in the late sixties has fallen in 1972 to the same level as in the early sixties. Three species have shown remarkable fluctuations in terms of catches, viz. haddock, Norway pout and sandeel. The haddock catches in 1969 and 1970 suddenly rose to about 650 000 tons, which was four times higher than the catches before that time. However, the catch in 1972 decreased to 216 000 tons. The catches of Norway pout show two marked peaks: one of almost 500 000 tons in 1968 and another of more than 500 000 tons in 1972. The catches of sandeel in 1971, 400 000 tons, were the highest ever recorded. The catches of plaice, other flatfishes, and other species have been rather stable throughout the period. In Sub-areas VI and VII (west and south of the British Isles) the total catch rose from 300 000 tons in 1962 to more than 800 000 tons in 1972, largely due to the increase in the catches of herring, which went up from 100 000 tons in 1962 to 300 000 tons in 1971.

Region 3 (Table 3, p.14) — ICES Sub-areas VIII, IX and X

20. The total catches have remained at about a level of 800 000 tons from 1962 to 1971. A slight decrease in the catches of pilchards has been balanced by increasing catches of mackerel and horse mackerel. However, due to the inadequacy of statistics from Region 3, the figures given in Table 3 are only an indication of the main changes in fish production in that region.

The Baltic Fish Convention Area (Table 4, p.15) — ICES Divisions IIIb,c and d

21. The total catch in Divisions IIIb, c and d (Baltic Sea) has increased from about 450 000 tons to about 650 000 tons over the period 1962 to 1971, mainly due to increases in catches of cod in the late sixties and of sprat in the early seventies.

Table 3. Nominal Catch (in 000's metric tons) by main species in NEAFC Region 3.

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
TOTAL NOMINAL CATCH IN REGION 3 *)	789	794	890	899	811	824	780	766	785	838	891
Pelagic Fish											
Pilchard	228	220	252	225	215	199	164	151	136	184	173
Mackerel	31	27	29	56	44	56	43	49	82	46	42
Horse Mackerel	104	117	125	116	100	116	138	136	163	85	156
Others	173	148	181	226	162	162	126	117	107	80	141
Total Pelagic Fish	536	512	587	623	521	533	471	453	488	395	512
Demersal Fish											
Hake **)	92	102	105	75	89	98	89	83	100	38	71
Others	83	93	98	108	108	111	118	111	108	84	142
Total Demersal Fish	175	195	203	183	197	209	207	194	208	122	213
GRAND TOTAL ...	711	707	790	806	718	742	678	647	696	517	725

*) Including non-teleost fish, unsorted and unidentified species.

**) The hake statistics are unreliable. Part of catch is reported by landing port and not by fishing area.

Table 4. Nominal Catch (in 000's metric tons) by main species in Divisions IIIb, c and d - the Baltic, the Sound and the Belt Sea.

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Cod	146	147	128	128	159	168	184	179	175	150	175
Herring	177	215	216	215	233	267	316	276	274	293	283
Sprat	63	61	81	74	70	61	74	111	145	169	193
Others*	47	35	47	46	46	48	74	50	60	61	62
Total	433	458	472	463	508	544	622	616	654	673	713

*) Including non-teleost fish, unsorted and unidentified species.

D. REVIEW OF LIFE HISTORY, FISHERY AND STATE OF EXPLOITATION OF THE PRINCIPAL FISH AND SHELLFISH STOCKS WITHIN THE NEAFC AREA

D.1 Herring - General Life History

22. The herring, unlike most of the major food fishes, lays its eggs on the sea bed where they are attached to the substrate. It is selective in the choice of substrate, which may occur in very restricted areas. At spawning time large shoals of herring can be found close to these spawning areas. The main feeding takes place during a relatively short period in the early summer when the shoals are active in searching for preferred food organisms. During this period high levels of fat reserve are accumulated which mainly support the fish during the remainder of the year. The eggs hatch after 5 to 30 days depending upon water temperatures. The summer spawning herring lay more and smaller eggs than the winter spawning fish of the same size, and since the eggs are spawned in warmer water they hatch more quickly. The catches by countries for the years 1968 to 1972 are found on page 88.

D.1.1 Atlanto-Scandian Herring: Norwegian spring spawning herring — ICES Sub-areas I and II

D.1.1.1 Life history

23. The Atlanto-Scandian herring consists of three 'racial' units, Norwegian spring spawners, Icelandic spring spawners and Icelandic summer spawners. The Norwegian spring spawners form the largest of these. Its spawning grounds are situated mainly along the Norwegian coast. Since 1960 the spawning grounds off the Norwegian coast at about 63°N have been the most important ones; some spawning also occurs further north. In recent years, there has also been a spawning off the Faroe Islands. The Norwegian fjords, the Barents Sea and parts of the Norwegian Sea form the nursery area of the fish, while the feeding grounds are found off northeastern Iceland and near Spitsbergen. Maturation takes place at ages between 3 and 7 years. The individual fish may spawn many times during its life, and the spawning stock usually consists of many age groups. (See Figure 2, p.17).

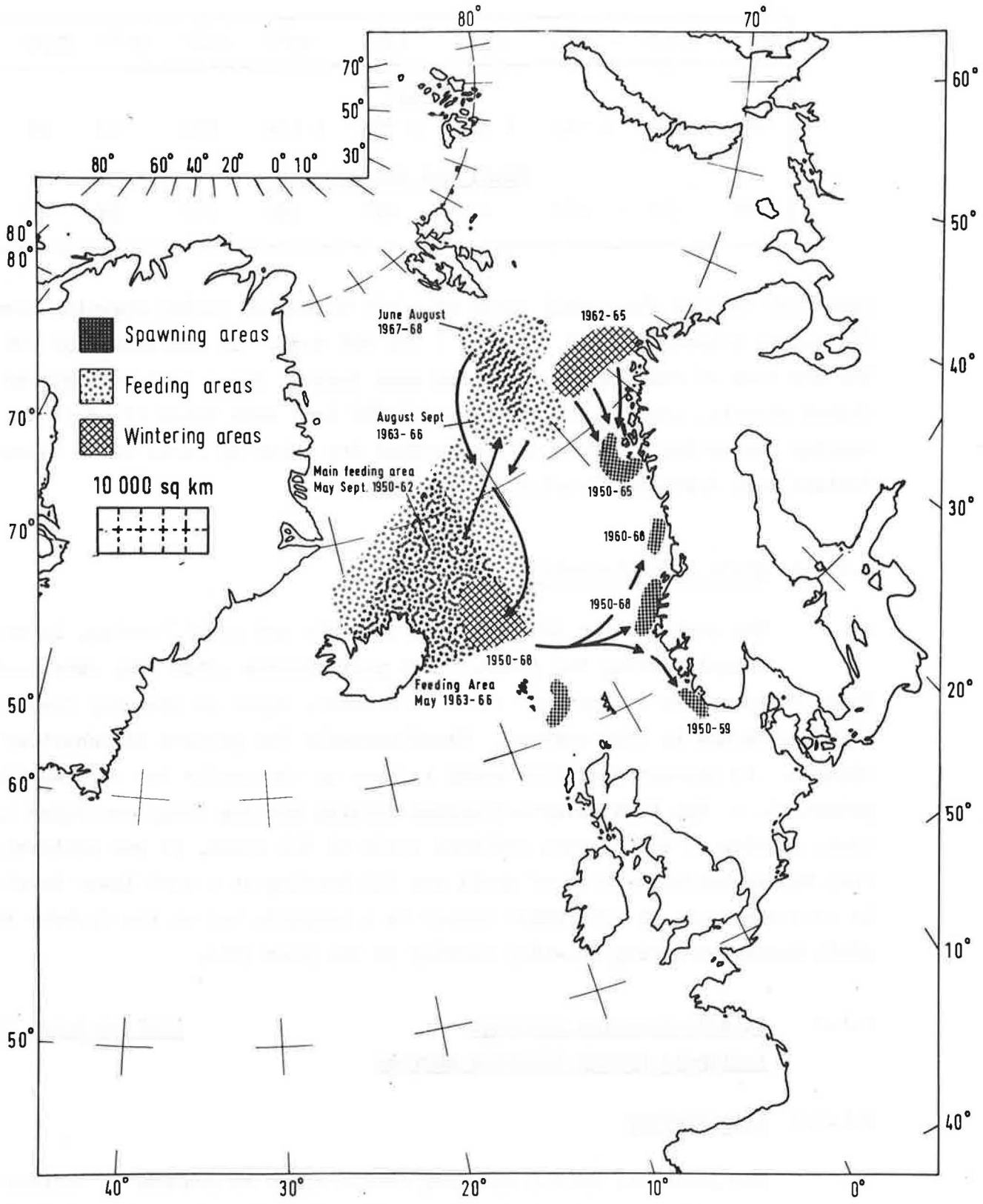

Figure 2. Atlanto-Scandian herring.

D.1.1.2 The fishery

24. From 1962 to 1971 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
				Adults					
551	671	1 118	1 326	1 724	1 132	273	24	21	16
				Small and Fat Herring					
297	314	164	222	249	546	439	44	40	7

From 1950 to 1967 the annual catch of adult Norwegian spring spawning herring fluctuated between 500 000 tons and 1 700 000 tons. In addition, 150 000 - 550 000 tons of small and fat herring were taken. Since 1967 the catches declined sharply, and in 1971 16 000 and 7 000 tons were taken of adult and juvenile herring respectively. Most of the catches are taken by purse seine (Norway, Iceland) and drifters (U.S.S.R.).

D.1.1.3 State of exploitation

25. The exploitation rate, both on juvenile and adult herring, increased sharply during the 1960s. Most year classes after 1961 were poor. These factors have brought the stock to a level, which is probably lower than at any time before in this century. Simultaneously the pattern of behaviour has changed. At present the stock seems to have an abnormally low reproductive potential. - The ICES Atlanto-Scandian Herring Working Group concluded in 1971 that, in view of the present critical state of the stock, it was advisable to keep the exploitation rate of small and fat herring at a much lower level than in recent years. In 1972 NEAFC agreed to a complete ban on the fishery for adult Norwegian spring spawning herring in the year 1974.

D.1.2 Atlanto-Scandian Herring: Icelandic Spring Spawning Herring — ICES Division Va

D.1.2.1 Life history

26. The Icelandic spring spawning stocks spawn on grounds in various localities off the Icelandic south and southwest coast, mainly in the 75 - 150 m depth range. The spawning takes place in March and early April. The nursery areas of the 0 and I groups are mainly in the fjords and inshore waters of NW, N and E Iceland. The feeding areas are mainly off

north and east Iceland, where the Icelandic spring spawners mix freely with Norwegian spring spawners during the summer, but the two stocks seem to segregate during the autumn. Maturation takes place at the age of 3-5 years. The spawning stock usually consists of several year classes.

D.1.2.2 The fishery

27. From 1962 to 1971 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
274	104	102	69	25	15	4	4	+	+

Until 1958 the annual catch of Icelandic spring spawners remained at about 80 000 tons. During the period 1959-64 the catch rose to above 100 000 tons with a peak year of 274 000 tons in 1962. Since 1965 the catches have declined drastically to less than 300 tons in 1971. Most of the catches were taken by Norwegian and Icelandic purse seiners, especially during the north and east coast summer season.

D.1.2.3 State of exploitation

28. The exploitation rate increased sharply during the early sixties. Thus, according to a cohort analysis the instantaneous fishing mortality coefficient (F) was about 0.1 during the period 1952-60 but rose sharply until 1965-67 when it reached 1.0 - 1.4. There can be no doubt that this increased rate of exploitation, as well as a series of poor year classes, was the cause of the sudden collapse of the stock.

D.1.3 Atlanto-Scandian Herring: Icelandic Summer Spawning Herring — ICES Division Va

D.1.3.1 Life history

29. The Icelandic summer spawning herring is the third stock belonging to the Atlanto-Scandian herring. The spawning grounds are usually in the same general areas as those of the Icelandic spring spawners but the spawning time is different i.e. in July and beginning of August. The nursery grounds are the same as for the spring spawners, whereas the adult feeding grounds are generally further south than those of the spring spawning stock. Maturation takes place at the age of 3-5 years and the spawning stock usually consists of several year classes.

D.1.3.2 The fishery

30. From 1962 to 1971 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
93	130	87	123	54	68	17	19	16	11

Until 1960 the annual catch of Icelandic summer spawners remained at around 30 000 tons. There was a sharp increase during the years 1961-63, and from 1963-6 the catches fluctuated around 100 000 tons. Since 1967 the catches have declined to about 11 000 tons in 1971. Most of the catches were taken off the south coast of Iceland during an all-year fishery which developed after the introduction of power block purse seining in 1960.

D.1.3.3 State of exploitation

31. The exploitation rate of the summer spawners was rather steady during the fifties but from 1962 onwards there was a sharp increase and during the years 1965-67 the instantaneous fishing mortality coefficient (F) reached 0.9 - 1.0. During the years 1968-70 the fishing mortality rate has decreased again to about 0.4 - 0.3.

D.1.2.4 State of regulation of the Icelandic herring stocks
and
D.1.3.4

32. In 1965 a unilateral minimum size regulation was enforced by Iceland forbidding fishing of herring of 23 cm and smaller. In 1968 the minimum size was increased to 25 cm. From 1968 to 1971 herring fisheries at Iceland was prohibited during the months February to August (inclusive), and maximum catch quotas were set at 50 000 - 25 000 tons. Due to the serious state of the Icelandic herring stock a total ban on herring fishing by Icelandic boats was enforce from 1 February 1972 to 1 September 1973.

D.1.4 Skagerak Herring ICES Division IIIa

D.1.4.1 Life history

33. The population of herring in the Skagerak is composed of a complex mixture of components of spring and autumn spawning stocks. The area is an overwintering ground for North Sea herring (Bank and Buchan stocks) and is a nursery area for North Sea juvenile herring. There are local spring spawning populations whose spawning grounds lie mainly within the Swedish archipelago. There is also a local autumn spawning population with highly fluctuating recruitment. Fish originating from the Kattegat (spring and autumn spawners)

also occur in the catches from the Skagerak. The data available are insufficient for following the detailed life histories of these Skagerak and Kattegat spawners.

D.1.4.2 The fishery

34. From 1962 to 1972 the reported catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
156	227	389	338	220	352	389	172	145	151	107

The totals may not reflect accurately the changes in catch from the area, partly because of the difficulties of allocating catches taken near the boundary line between the North Sea and Skagerak. It has not been possible to obtain any data on catch per unit effort, which could be used to study the changes in the fishery.

D.1.4.3 State of exploitation

35. Because of the mixed nature of the herring population it is difficult to generalize on the state of exploitation. As a major part of the catch is based on North Sea herring, the ICES North Sea Herring Assessment Working Group attempted to take these catches into its assessment of the North Sea stocks. However, this could not be achieved, due to the lack of biological samples, lack of accurate catch data, and, even doubt as to whether the recorded catches referred entirely to herring.

D.1.5 North Sea Herring ICES Sub-area IV

D.1.5.1 Life history

36. The North Sea herring population is probably one of the best documented fish populations. The main fished populations are the autumn and winter spawners. There are also a number of inshore spring spawning stocks in most coastal areas, which are of importance to some local communities for short periods of the year, but the catches are insignificant compared with the main North Sea stocks. In the northern North Sea, spring spawners are taken in the catches to the northwest of Orkney and Shetland and also to the northeast. In both areas they have averaged about 20% in the biological samples. These spring spawners are probably related to the spring spawners of the Atlantic shelf edge (Faroes, Norway and the Hebrides).

37. Larvae from the main autumn spawning grounds drift mostly into the central North Sea where the earliest spawned larvae enter the coastal waters of Denmark, Federal Republic of Germany and Netherlands in the following April/May. Some nursery areas also occur along the English and Scottish coasts. At about 15 cm the juvenile herring move out into deeper water in the eastern and northeastern North Sea and Skagerak, where they become exploited for reduction to fishmeal and oil (the Bløden industrial fishery). When the fish are about 2 years old and longer than 20 cm, they begin to mature and recruit fully to the adult spawning stocks as 3 year olds. At the present high level of fishing a year class is almost extinguished by the time the fish are 6 years old.

38. The North Sea herring population is generally recognized as being composed of three major stock units. The Buchan stock spawns in the northwestern North Sea off the Scottish coast in August and September. In recent years, however, major spawnings have also been observed to the west of Orkney and northeast of Shetland, but the relationship with the Buchan stock is not clear and their migration pattern is in doubt. The Bank stock spawns in September in the central North Sea off the English east coast and in former years around the Dogger Bank edges. Very few or no larvae have been caught on this latter ground in recent years. The Downs stock spawns in the Southern Bight and eastern English Channel in December to February.

D.1.5.2 The fishery

39. From 1962 to 1972 the catches (including catches in Divisions VIId and VIIe) were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
628	725	871	1 169	896	696	718	547	548	497	634

The fishery for adult herring was spread seasonally over the whole North Sea in former years. It commenced in the northwestern and western central North Sea in April, exploiting the shoals of Bank, Buchan and Downs herring in their feeding areas. It then followed the Buchan and Bank herring on to their spawning grounds in September and October. At this time the Southern Bight fishery commenced as the Downs herring migrated south to their spawning grounds in the eastern English Channel. With the overexploitation of the North Sea in the sixties the Southern Bight fishery has almost disappeared.

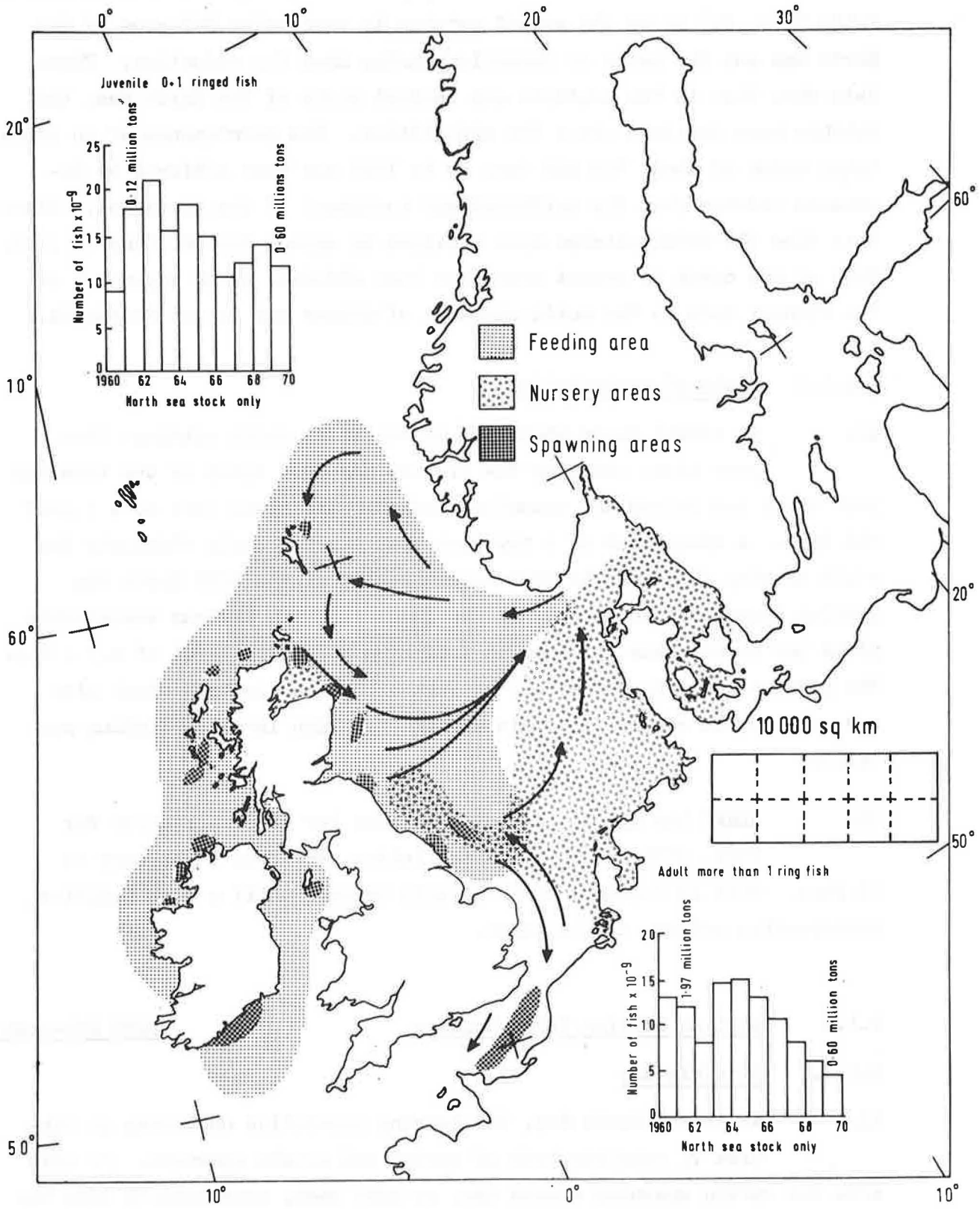

Figure 3. Herring - North Sea and Irish Sea.

40. As mentioned in connection with the two adjoining statistical Sub-area VI and Division IIIa, misallocation of the catches near the borders has occurred in the data published in "Bulletin Statistique". Table 5 (p. 25) gives the annual catches in each major Sub-area of the North Sea and the catch of juvenile herring used for reduction. These data show that in the southern and central parts of the North Sea, the catches have declined since the mid-fifties. The maintenance of an annual total catch of about 700 000 tons up to 1968 has been achieved by increased catches from the northeast and northwest of the North Sea. Since that time the total catches have declined to around 540 000 tons in 1972. Much of the catch in recent years has been obtained by an expansion of the fishery both to the north and west of Orkney and around Shetlands.

D.1.5.3 State of exploitation

41. In recent years about 70% of the total catch obtained from a year class entering the fishery has been taken by the time the year class has joined the spawning stock for the first time as a 3 year old fish. A succession of a few poor year classes could eliminate the adult herring fishery. The most recent report of the ICES North Sea Herring Assessment Working Group concluded that the maximum sustainable yield per recruit was obtained at a fishing mortality level of 0.3 - 0.4. The present level is 0.8 - 1.0. A further decline in both stock size and catch could result from maintenance of a high level of fishing mortality.

42. NEAFC has agreed to closed seasons for herring fishery for 1971, 1972 and 1973, in the latter year from 1 February to 15 June. This is regarded as an interim measure until a more positive conservation action can be taken.

D.1.6 West of British Isles Herring ICES Sub-area VI

D.1.6.1 Life history

43. As in the North Sea, the herring population occurring in Sub-area VI consists both of spring and autumn spawners. In this area the spring spawning stocks are, or have been, considerably more important in the fisheries than has been the case in the North Sea. Spring spawners have been estimated as comprising 20% of the Scottish and Norwegian biological samples, equivalent to a recent catch of about 46 000 tons. In the period 1920-39 various winter and spring herring fisheries occurred in the area specifically aimed at the exploitation of the spring

Table 5. Herring. Total catch (in 000's tons) in the areas of the North Sea and in the Skagerak.

Year	Area							Total
	Northwest	Northeast	Central	South	Industrial Fishery	Total North Sea	Skagerak	
1947	211.3	0.3	214.4	160.6	-	586.6	40.9*	627.5*
1948	169.4	1.9	168.0	162.5	0.3	502.1	54.9*	557.0*
1949	134.2	2.0	178.8	193.3	0.2	508.5	52.4*	560.9*
1950	125.1	1.6	181.3	178.3	5.4	491.7	51.3*	543.0*
1951	123.0	1.2	266.0	165.6	44.6	600.4	46.7*	647.1*
1952	168.4	6.6	203.1	236.1	50.2	664.4	61.1*	725.5*
1953	178.8	7.5	224.6	209.2	78.4	698.5	47.9*	746.4*
1954	168.0	4.3	218.4	276.9	95.3	762.9	99.1*	862.0*
1955	287.8	67.4	170.3	168.4	112.5	806.4	89.0	895.4
1956	194.5	79.1	163.9	134.0	103.7	675.2	82.0	757.2
1957	209.0	97.3	150.7	122.7	103.2	682.9	90.5	773.4
1958	164.7	98.2	156.1	92.6	158.9	670.5	131.0	801.5
1959	259.6	144.2	147.1	77.2	156.4	784.5	139.0	923.5
1960	101.1	264.0	166.3	64.9	99.9	696.2	75.8	772.0
1961	61.0	274.8	168.9	98.2	93.8	696.7	85.3	782.0
1962	37.6	291.8	143.3	54.7	100.4	627.8	104.2	732.0
1963	73.1	301.3	228.2	45.7	67.7	716.0	163.2	879.2
1964	66.1	444.0	187.9	56.6	116.6	871.2	309.8	1 181.0
1965	298.3	580.8	132.9	21.8	135.0	1 168.8	256.7	1 425.5
1966	278.6	424.0	114.1	11.6	67.2	895.5	144.7	1 040.2
1967	117.3	373.7	107.9	11.4	85.2	695.5	279.7	975.2
1968	286.7	256.8	57.8	9.6	106.9	717.8	280.0	997.8
1969	213.1	148.1	40.0	24.3	121.2	546.7	113.3	660.0
1970	312.6	21.3	111.7	27.1	74.8	547.5	70.5	618.0
1971	279.0	17.5	26.6	21.5	165.2	509.9	64.2	574.0

* Data include some Kattegat catches.

spawning stocks. Their catches fluctuated around 30 000 tons annually. Apart from the relatively small Clyde fishery there are no equivalent fisheries at the present time.

44. In pre-war years spring spawning occurred off northwest Ireland, in the Clyde estuary and off Butt of Lewis and Cape Wrath, but of these grounds it is known to take place now only in the first two localities. With the exception of the Clyde, these are also autumn spawning grounds. Peak spawning tends to take place in September.

45. From larval surveys, about five major autumn spawning localities can be distinguished. It is possible that each of these represents a separate stock unit or that some are simply diversities of spawning grounds within a single management unit (as is the case with the North Sea Bank stock). The distribution of larvae from these spawning grounds is in a general north-easterly direction into the Minches and to the shelf area to the north of Scotland and into the northwestern North Sea.

46. The nursery areas for the juvenile spring spawning herring are not well established, but are believed to be within the coastal waters of the north of Ireland and the Minches. The nursery areas of the Clyde herring are mainly within the Clyde estuary itself. In the case of the autumn spawning fish from Tory Island and off Barra Head, the nursery areas might also be expected to be in these coastal waters. Juvenile herring, thought to originate from spawning off the Hebrides and Cape Wrath, occur in the North Sea. In particular, young herring in the Moray Firth have biometrical characters differing from North Sea spawning stocks and similar to those from the north-west of Scotland. Herring tagged as I-groups in the ICES Bløden Tagging Experiment released in the eastern North Sea nave been recovered in the Scottish fisheries in the Minch and west of the Orkneys. As in the North Sea, recruitment of the autumn spawners to the fishery commences as 1-ringers, but full recruitment to the adult spawning stock is only complete as 3-ringers (4 year olds).

47. The migration patterns of the spring and autumn spawners are not fully known. Evidence from tagging experiments and from studies of biological characters suggests that the autumn spawned fish caught in the Minch by the Scottish fishery during the winter and those caught by other countries fishing west and north of the Hebrides in summer, are part of the same stock.

D.1.6.2 The fishery

48. From 1962 to 1972 the catches as recorded in "Bulletin Statistique" have been as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
64	54	70	66	93	103	100	126	158	226	189

A very rapid increase in catch from this area can be seen. The grounds fished by countries are, however, often very different. Thus the Scottish catch, which is the largest single national catch, comes mainly from the Minches; the trawl fisheries of the Federal Republic of Germany, Netherlands and Poland are mainly exploiting the area to the west of the Hebrides, and south to the Irish coast; the Irish catch is taken by inshore trawlers working in the area from Donegal Bay to Tory Island. The purse seine fisheries of Norway and Iceland are located near the eastern boundary (longitude 04°W) of the area. However, there is considerable doubt concerning the allocation of some of these catches between Sub-area VI and Division IVa in recent years.

49. The development of the purse seine fisheries in this area took place in 1970 and 1971. The ICES North Sea Herring Assessment Working Group investigated the breakdown of catches east and west of 04°W, using information from the members of the Working Group about their respective national fisheries. Comparing the "Bulletin Statistique" figures with those given to the Working Group, the Sub-area VI catch should be increased by about 33 000 tons in 1970 and 30 000 tons in 1971, due to a more rigorous examination of the information on fishing positions. The future development of the fisheries in Sub-area VI would be expected to follow the pattern of the 1970 and 1971 fisheries. The main Scottish catch, however, can be expected to be derived from the Minches, which have recently yielded about 100 000 tons. The Scandinavian purse seine fishery to the west of Orkney, yielding about 130 000 tons in recent years, would be expected to develop in this area and to extend westward towards the Hebrides. The trawl fisheries from the Federal Republic of Germany, Netherlands and Ireland, presently amounting to about 30 000 tons annually, would probably continue to develop in the area between St. Kilda and the Irish coast.

D.1.6.3 State of exploitation

50. The results of studies carried out so far suggest that the adult stock size in recent years has been in the range between 400 000 and 700 000 tons. Because of the recent large increase in the herring fishery in the area, NEAFC and the Council have stressed the need for increased investigations in this area so that better assessments of the state of the stocks and the need for their conservation can be made.

D.1.7 Celtic Sea Herring

51. The Celtic Sea may be defined as the area off the south coast of Ireland from Cork Harbour eastwards to the Tuskar Rock, and including the Smalls, Labadie and Jones' Bank to the south.

D.1.7.1 Life history

52. The Celtic Sea population of herring are winter spawners (December-February). They congregate for spawning from October onwards in the inshore regions off the Irish coast, and in summer they are dispersed offshore. Since 1963, a change has taken place in the growth rate, resulting in an increase in the average length of all age groups which is of the order of 1 cm. This corresponds to an increase in weight per age of around 30%. The reasons for the change in the growth rate are unknown.

D.1.7.2 The fishery

53. The spawning concentrations of herring are the subject of an intensively exploited fishery from October to February, although from 1966 about 5 000 tons have been taken from the offshore areas (e.g. Labadie Bank) during the months from June to August. The winter fishery is carried out almost entirely by midwater trawl. Historically, however, this fishery has been characterised by rapid changes in the nature of the fishing gear (principally by the Irish fleet) since 1958, with ring netting and drift netting being replaced first by bottom trawls and later by midwater trawls as the method by which the greatest proportion of the total catch was taken each season. These changes were associated with an overall increase in effort (and in fishing mortality). Average total catches have increased from 20 000 tons per year in each of the periods 1957-61 and 1962-66 to 35 000 tons per year in 1967-71; the average catch per unit of effort has been calculated as 224, 295 and 205 kg/hour respectively during these three five-year periods.

D.1.7.3 State of exploitation

54. Currently, the fishery depends on 2- and 3-ringers (3 and 4 year old fish). The maximum sustainable yield, which is dependent on the continuation of recent high levels of recruitment, is estimated to be around 30 000 tons. Lack of scientific information makes it impossible to give an accurate forecast of developments in the stock.

D.2 Sprat

D.2.1 North Sea and Skagerak Sprat

ICES Sub-area IV and Division IIIa

D.2.1.1 Life history

55. The sprat is found in two main shelf areas: the East Atlantic and the Mediterranean. The limits of distribution to the north are the Faroe Islands and the Trondheim fjord. The sprat is found throughout the North Sea and the Skagerak, generally within the 100 m contour, and it is also found in the Baltic (with the exception of its innermost parts), to the west of the British Isles and along the European Atlantic coast. (See Figure 4, p.30).

56. During winter time the sprat occurs concentrated close to the coast, but during the summer it is scattered. The North Sea stock consists of sprat originating from a number of main spawning areas. Spawning takes place from March to July. Examples of spawning areas are the inner Skagerak, the German Bight, the Southern Bight and the Thames area, the Wash, and the Scottish east coast. Both eggs and larvae are pelagic. A considerable part of the Norwegian west coast sprat originates from drifting larvae born in the innermost part of the Skagerak. During the first period of growth the sprat keeps rather close to the coast and to the surface. When getting older it prefers the open sea. From the second period of growth onwards (second summer), the sprat may join the spawning population. There are great regional differences in growth. In some regions a length of 15 cm can be reached in three summers, whereas in other regions this length is never achieved.

D.2.1.2 The fishery

57. From 1962 to 1972 the catches in Division IIIa and Sub-area IV were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Division IIIa										
18	10	8	7	9	10	10	7	12	11	4
Sub-area IV										
31	68	68	72	102	67	61	60	46	89	92

The catches of sprat by countries for the years 1968 to 1972 are found on page 88.

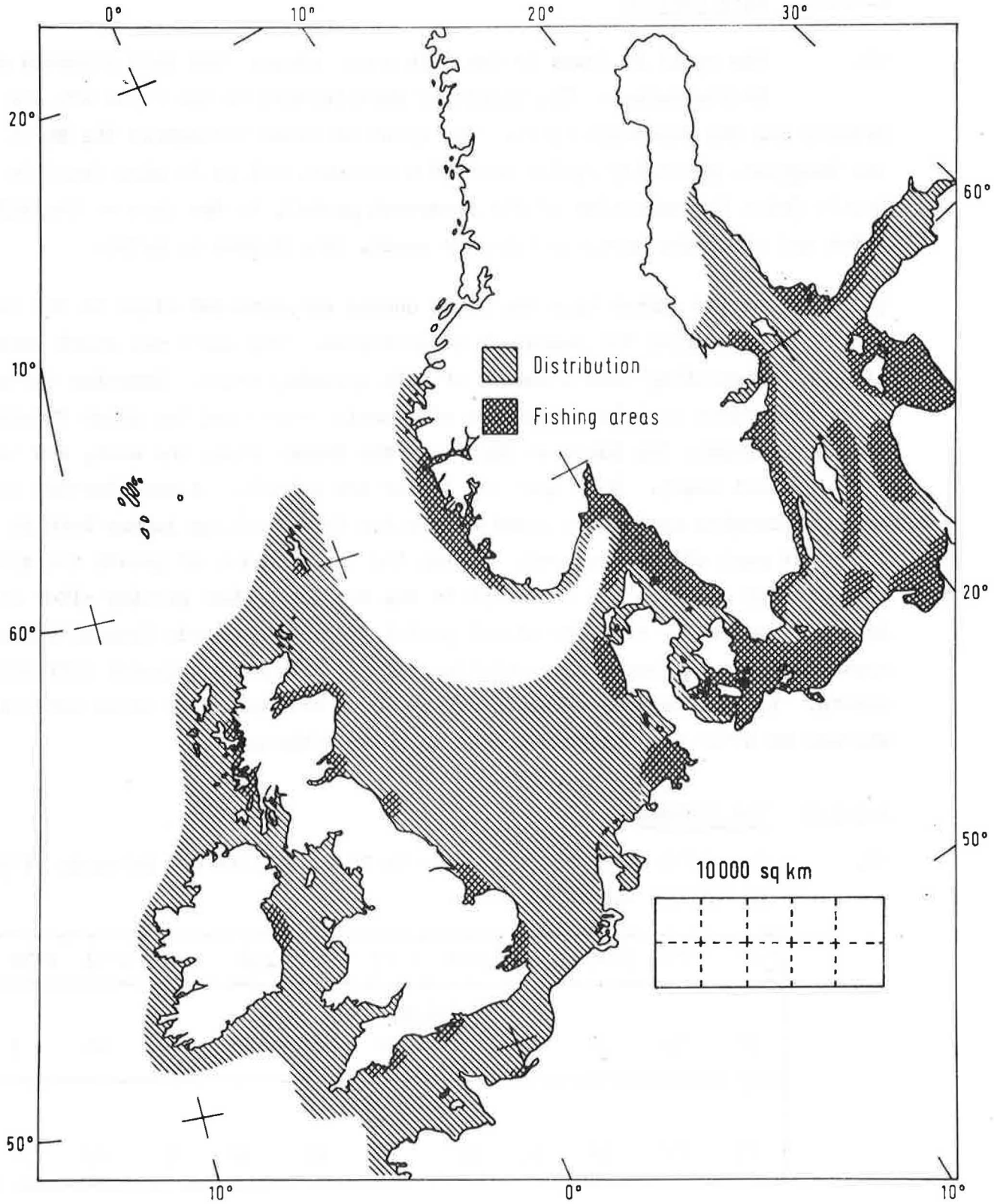

Figure 4. Sprat - distribution and fishing areas.

The reported annual catches during the last eleven years have fluctuated between 30 000 and 100 000 metric tons in Sub-area IV, and between 4 000 and 18 000 metric tons in Division IIIa. For Sub-area IV the figures are too low. It is estimated that for recent years 30 - 35 000 metric tons, which have been registered as young herring catches, must be added annually. All winter fisheries are based on overwintering concentrations; summer fisheries are mostly based on feeding shoals. The trawl fishery dominates, either bottom trawls or pelagic trawls (one boat or two boats) being used. There are very big year-to-year fluctuations in the strength of the year classes. In most sprat fisheries the first to the third period of growth form the major part of the catch.

D.2.1.3 State of exploitation

58. Due to the short age-span of the species, the wide fluctuations in year class strength and the lack of detailed knowledge of sprat biology (especially on the distinction between sprats of different origin), no general assessments of the effects of fishing on the exploited stocks have been made in recent years. The most detailed studies have been made on the sprat stocks in the Wash and in Division IIIa. The former constitutes a nursery stock from which the older sprats emigrate to the open sea; the latter provides recruits through larval drift to important coastal stocks along the Norwegian coast. At least in Division IIIa the strengths of year classes depend on hydrographical conditions and the sprat fishery is strongly influenced by the quality of the sprats and economic factors.

D.3 Capelin

D.3.1 Barents Sea Capelin ICES Sub-areas I and II

D.3.1.1 Life history

59. Capelin have seasonal distributions in the Barents Sea. During summer they are found in the northern part and prefer areas with temperatures below 3°C. During autumn pre-spawning capelin concentrate in the central part before moving towards the spawning grounds along northern Norway and the western part of the Murman coast. During late autumn young and adult capelin are often found in the same areas, while during the rest of the year young capelin are mainly distributed south of the adult stock. Capelin mature at an age of 3 or 4 years, with a length of 15-19 cm usually. Spawning takes place close to the coast, where the eggs are deposited at the bottom, at depths between 15 and 150 m. The main part of the spawning takes place in March and April. Most of the adult capelin die after spawning. (See Figure 5, p.33).

D.3.1.2 The fishery

60. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
4	36	20	231	401	421	514	700	1 355	1 436	1 593

The capelin are subjected to a winter fishery when the mature stock enters the coast to spawn, and a summer fishery on the feeding grounds. The yearly catch during the last eleven years' period is shown in the above table. Most catches are taken by purse seine, but during the spawning season pelagic trawls are also used. The capelin fishery has shown wide fluctuations, but there has been a steady increase both in effort and total catch. In 1972 the Norwegian winter fishery yielded nearly 1.6 million tons. A summer fishery for capelin was started in 1968. The catches ranged between 5 000 and 35 000 tons. This fishery has mainly taken place in the central and northwestern part of the Barents Sea. The catches of capelin by countries are listed on page 89.

D.3.1.3 State of exploitation

61. The stock size has been at a very high level during recent years and the increased rate of exploitation seems not to have influenced the recruitment. However, a stock with as short a life cycle as capelin will undergo extensive natural fluctuations, and if a low stock level is subjected to the present fishing effort, this may cause serious effects to the spawning stock.

D.3.1.4 National regulations

62. To protect the capelin during its best growth period, the Norwegian capelin fishery has been regulated by closing parts of the summer season in 1970-72. In 1972 the winter fishery also closed, after spawning had started. In addition, a minimum legal size of 12 cm was introduced in 1971, and this was changed to 13 cm in 1972. This measure protects the 1 and 2 year old fish.

D.3.2 Icelandic Capelin ICES Division Va

D.3.2.1 Life history

63. The spawning grounds of the Icelandic capelin are situated mainly along the south coast of Iceland. In some years considerable spawning takes place also along the west and north coasts. The spawning

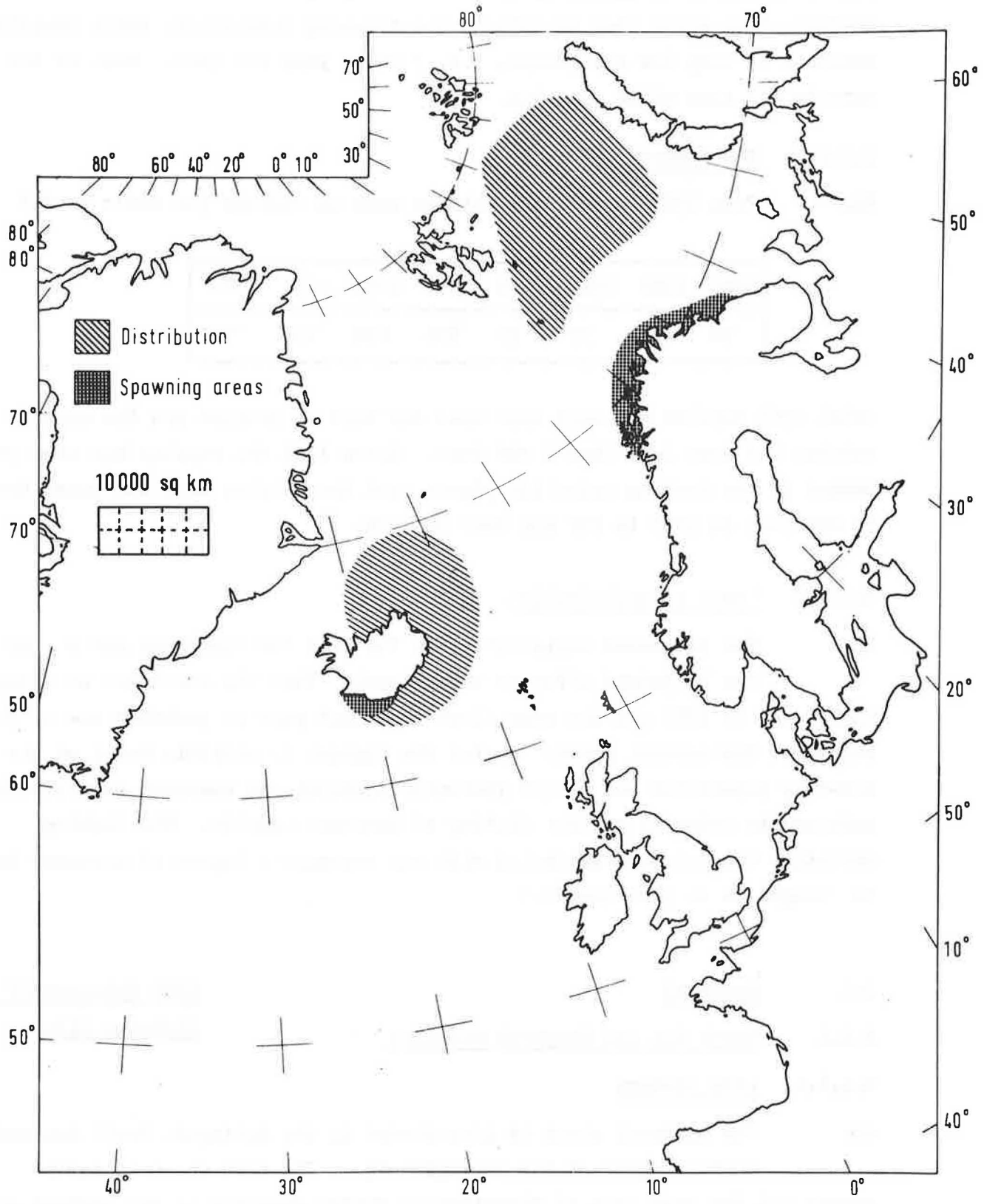

Figure 5. Capelin - distribution and spawning areas.

period is from mid-February to the beginning of April. The nursery grounds are widespread around Iceland but during their 2nd and 3rd year of life the capelin assemble as immatures in the cold East Icelandic Current north of Iceland, from where they recruit to the spawning population, which usually consists of very few age groups, i.e. 3 and 4 year old fish. Most of the capelin die soon after spawning.

D.3.2.2 The fishery

64. From 1965 to 1972 the catches were as follows (in 000's tons):

1965	1966	1967	1968	1969	1970	1971	1972
50	125	97	78	171	192	183	277

Until 1965 capelin had only been used for bait in Iceland and the annual catches had been less than 5 000 tons. Since 1965 the capelin has been processed in the herring reduction plants, and the catches have increased from 50 000 tons in 1965 to 277 000 tons in 1972.

D.3.2.3 State of exploitation

65. The increased exploitation in the last few years has not as far as can be judged affected recruitment. Thus the stock was at a very high level in 1972 and the year class from that year is probably one of the strongest for several years. So far the fishery is entirely based on the spawning population and strict Icelandic regional and seasonal regulations are enforced in order to prevent fishing of immature capelin. The fishing mortality has not been estimated with any reasonable degree of accuracy but it is thought to be less than 0.5

D.4 Mackerel — ICES Sub-area IV and Division IIIa

D.4.1 North Sea and Skagerak Mackerel

D.4.1.1 Life history

66. The mackerel stock is distributed in the Kattegat, North Sea and southern part of the Norwegian Sea. The fish spawn in early summer and the main area of distribution during spawning is the central and southeastern North Sea. Maturity occurs at an average length of about 32 cm, corresponding to 2 years of age. (See Figure 6, p. 35).

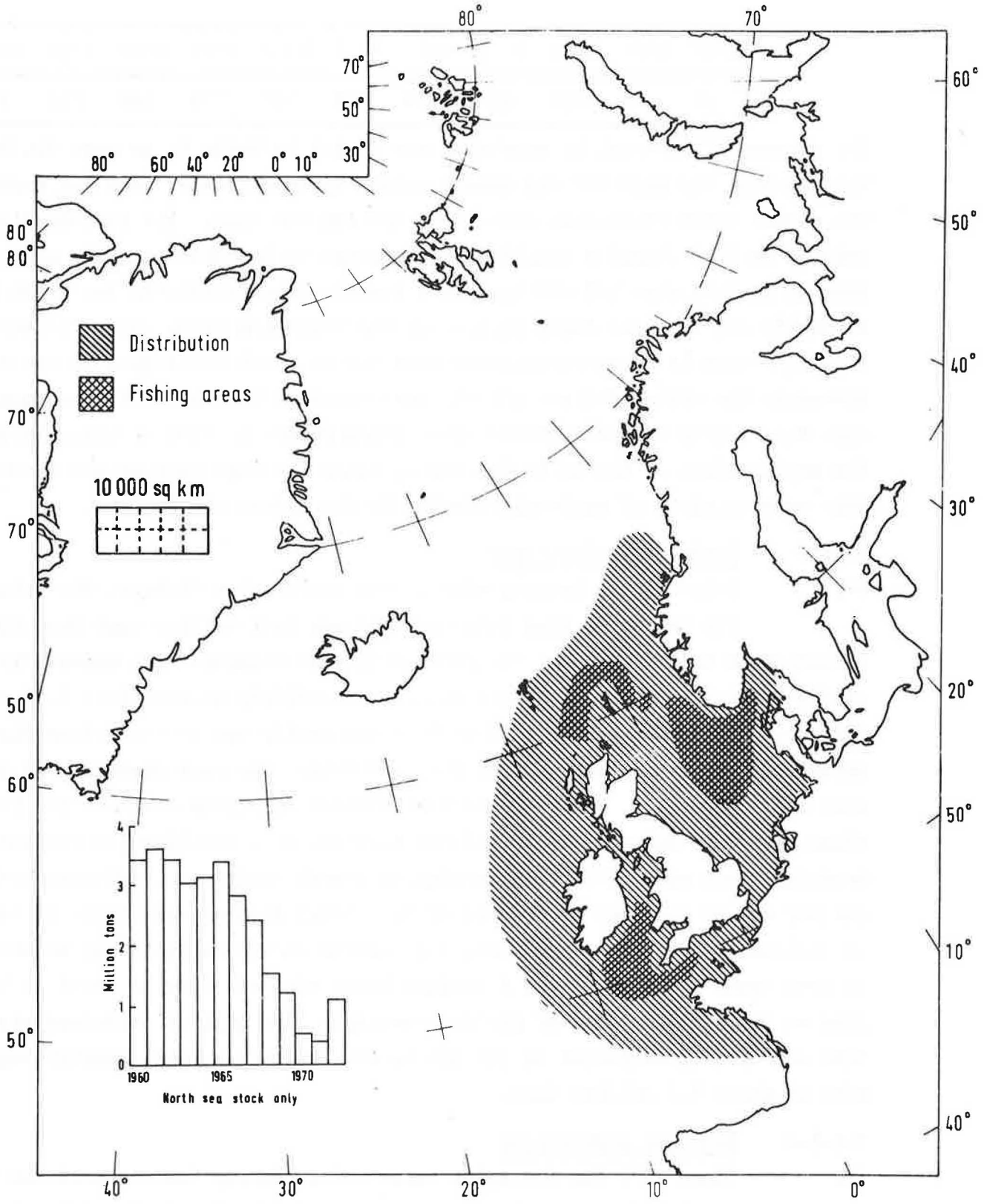

Figure 6. Mackerel - distribution and fishing areas.

D.4.1.2 The fishery

67. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
79	73	115	208	530	930	822	736	340	243	188

The catches of mackerel by countries are listed in Table 6, on page 89. Prior to the mid-60s, the mackerel was caught mainly by trawl, drift nets and hook and line The annual catch fluctuated between 60 and 100 000 tons. The introduction of purs seining in 1964 caused a considerable increase in the catches. The peak was reached in 1967 when 930 000 tons were landed. The relatively low catch in 1970-7 is partly due to regulations imposed on the Norwegian purse seine fishery. The pea fishing season is September-October when the mackerel congregate on the Reef off Egersund. The winter fishery off the west coast of Norway is of less importance to day. The fishery in the Shetland area during summer is also of minor importance to the exploitation of the North Sea stock, since the main part of the catches from this area consists of mackerel spawning in the waters off Ireland.

D.4.1.3 State of exploitation

68. Prior to the introduction of the purse seine fishery, the mature stock fluctuated in size between three and four million tons depending on the variation in the strength of the recruiting year classes. The annual fishing mortality was below 3% and the stock was correspondingly underexploited. The rapid decrease in stock size from 1965 to 1968 was partly due to the extraordinary low recruitment from the year classes 1963 and 1964. The year classes 1965 and 1966 were relatively good, but 1967 and 1968 yielded poor year classes. The 1969 year class, however, is very strong and has resulted in a considerable increase in the spawning stock since 1971. - According to recent studies of sustained yield, the maximum may be obtained at a level of 30% annual fishing mortality. If recruitment is influenced by the exploitation, the maximum sustained yield may be obtained at an even lower mortality rate. A minimum legal size of 30 cm is found to be justified at the optimum level of fishing mortality. The maximum sustained yield from this resource is estimated to 300 000 to 400 000 tons a year, maintaining a stock size of about 1.2 million tons.

D.4.1.4 National regulations

69. Since 1970 the Norwegian purse seine fishery for mackerel has been regulated on a national basis by a minimum legal size (30 cm), closed season (January-July), and by annual quotas in order to reduce the mortality rate. The aim of the regulation in 1971 and 1972 has been to rebuild the spawning stock to a level at which maximum sustained yield is expected (1.2 to 1.5 million tons). This goal has now been achieved, and the future

aim of a regulated fishing strategy should be to control the total fishing effort as well as its seasonal distribution to achieve the maximum sustainable yield.

D.5 Tuna — All ICES Areas

70. The bluefin tuna (Thunnus thynnus) and the albacore (Thunnus alalunga) are the only tuna species of commercial importance within the NEAFC region. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
				Bluefin Tuna						
18	11	8	11	7	5	4	8	5	5	3
				Albacore						
44	45	39	51	37	39	25	35	32	34	*)

*) Not available.

The bulk of the recent catches of both species originates from the NEAFC Region 3, but prior to 1963 about half of the bluefin tuna catches were taken by purse seiners in Norwegian coastal waters during summer. In NEAFC Region 3 the tunas are caught by traps and angling gears. - See Table 6, p.89.

71. The tunas are widely distributed and knowledge of stock structure and state of exploitation is very limited.

D.6 Blue Whiting — All ICES Areas

D.6.1 Life history

72. Blue whiting are distributed all over the Northeast Atlantic and adjacent areas in temperatures above 2°C. Spawning is recorded in the Ligurian Sea in January and off the coast of Portugal in February. A major component of the stock spawns on the edge of the Continental Shelf and on the slopes of oceanic banks to the west of the British Isles in March-April. Recent studies indicate a spawning migration to this area from the Norwegian Sea. The main nursery area is along the edge of the Continental Shelf. The fish spend 2-3 years here before they join the adult population, which is mainly found over deep waters outside the Continental Shelf. From its 3rd to its 9th year, blue whiting grow from about 25 to 32 cm.

D.6.2 The fishery

73. From 1964 to 1971 the catches were as follows (in 000's tons):

1964	1965	1966	1967	1968	1969	1970	1971
15	18	21	23	21	31	32	74*)

*) From FAO Yearbook of Fishery Statistics (1971).

At present blue whiting is fished in the Mediterranean by Spain and Italy, and in the Northeast Atlantic by Spain and U.S.S.R. The catches from the Northeast Atlantic by these countries (1964-71) are shown above. The increase during the last years is due to the U.S.S.R. fishery which started in 1967. In addition, a significant amount of the catches recorded as Norway pout in the North Sea is actually blue whiting. Samples from the Norwegian part of the Norway pout fishery indicate that about 30-40% of the landings consist of blue whiting. (See Table 6, p.89 giving catches by countries of Blue Whiting).

D.6.3 State of exploitation

74. Information is limited on the blue whiting resources in the NE Atlantic. Acoustic assessment of the spawning stock west of the British Isles in 1972 indicates the stock to be in the order of magnitude of up to 10 million tons.

D.7 Cod

75. General Life History

The cod (Gadus morhua L.) inhabits the Continental Shelf area along the coasts of the North Atlantic from Cape Cod (about 40°N) to Labrador on the American side and from the British Channel (about 50°N) to Greenland, Iceland, Spitsbergen and the eastern Barents Sea in the north and east of the North Atlantic. Compared with their total area of distribution the spawning area of the different stocks are relatively small.

76. The cod is one of the most fecund fish species; a female produces on an average about 2-3 million eggs per year, and during the spawning season in late winter and spring several thousands of eggs have been found under a surface area of one square metre on the spawning grounds. The pelagic eggs and larvae drift near the surface in the main current system to the feeding areas. The juvenile cod remain on these grounds until they have reached

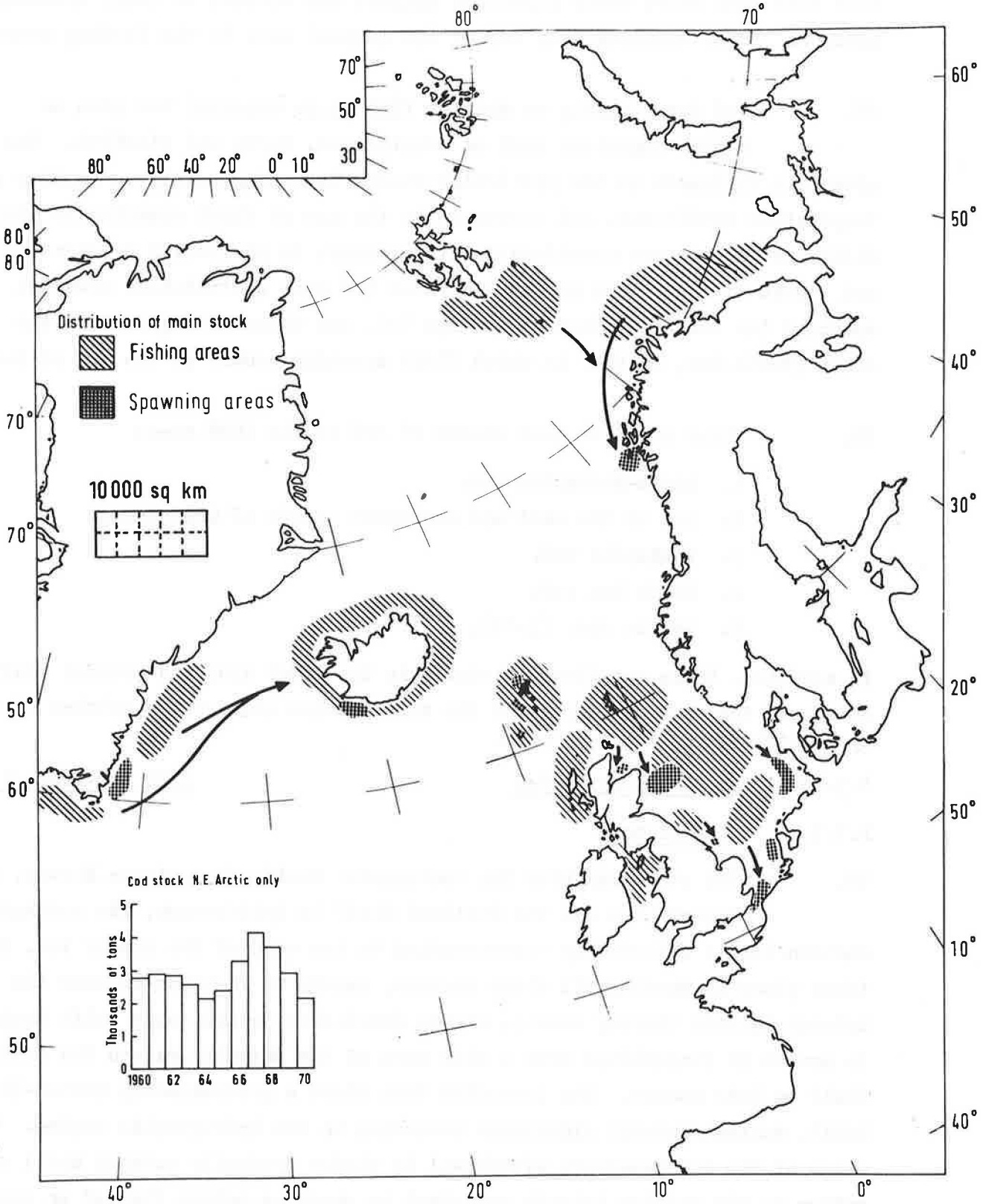

Figure 7. Cod - fishing and spawning areas.

the stage in which they are developing their gonads for first spawning. At this time they start their migration against the current to their spawning grounds. After spawning they follow the current back to the feeding areas.

77. Cod feeds mainly on smaller fish (e.g. capelin) but also on bottom organisms such as crustaceans, worms and starfish. The growth is different in the particular stocks depending mainly on feeding and temperature conditions, and consequently the age at first spawning is also different. There are considerable differences, in particular between the cod stocks living in the northern part of the main distribution area and spawning for the first time at the age 7-9, and those living more in the south (North Sea, Baltic) in which first spawning occurs at the age of 2-4.

78. There are five main stocks of cod in the ICES area:

1. Arcto-Norwegian cod.
2. Cod of the east and southwest coasts of Greenland.
3. Icelandic cod.
4. North Sea cod.
5. Baltic cod. (p.83).

In addition, there are five big stocks in the ICNAF area and several smaller ones near the southern border of the distribution area. - The catches of cod by countries are listed on p.90.

D.7.1 Arcto-Norwegian Cod — ICES Sub-areas I and II

D.7.1.1 Life history

79. The stock inhabits the Continental Shelf off northern Norway, the Barents Sea and the Svalbard Shelf to Spitsbergen, its northern and eastern limits effectively corresponding to the edge of the summer ice. Spawning takes place in March-April close inshore, mainly in Vestfjorden near the Lofoten Islands (Norway coast), whence developing pelagic eggs drift downstream to arrive as fingerlings over a wide area of the Barents Sea and the Svalbard Shelf by late summer. The juveniles then adopt a predominantly bottom-living habit, making seasonal migrations according to the hydrographic regime. The range of the southwesterly withdrawal in winter gradually extends until cod return to the Lofoten Islands and start to spawn as mature fish at an age of 7-8 years. Most of the post-spawning cod return to the Barents Sea. Exchange with other cod stocks is negligible. These cod average 10 kg at 10 years of age, but may exceed 15 kg if they fulfill the potential lifespan of 25 years or more.

80. Norwegian coastal waters are also inhabited by a miscellaneous group of coastal cod which are taxonomically different from Arcto-Norwegian cod and regarded as being genetically distinct, although cod from northern coastal stocks intermingle and spawn with the offshore cod during the spawning migration.

D.7.1.2 The fishery

81. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
910	778	437	445	483	573	1 074	1 191	877	724	642

An inshore net and line fishery has existed in northern Norway throughout recorded history, though fluctuations in productivity indicate an important long-term climatic influence on the stock. Offshore trawling started to develop at the end of the 19th century and has continued (with occasional interruption) to rise, reaching a peak in the early 1960s. The countries primarily concerned in the fishery have been Norway, U.S.S.R., U.K. and the Federal Republic of Germany, with less significant participation by other European countries. The fishery has two main components, an offshore fishery conducted throughout the year in Sub-area I and Division IIb for cod 3 years old and older, and a predominantly Norwegian spring fishery in Division IIa, to some extent for cod on the spawning migration along the Norway coast, but mainly concentrated on the spawning ground. The offshore fishery is carried out primarily by trawlers, but the fishery on the spawning cod is predominantly by inshore vessels, fishing set nets, long lines, hand lines and Danish seines. The proportion of the total catch taken by each group varies according to changes in stock structure. The total catch itself has varied between 0.4 and 1.4 million tons, the stable average being about 0.8 million tons. The Norwegian catch of coastal cod north of 62°N amounts to about 40 000 tons per year.

82. Norway has imposed regulations on the types of gear that may be used in certain areas within its exclusive fishery limit.

D.7.1.3 State of exploitation

83. The stock was fully exploited by 1955, but fishing continued to increase until 1963 when a proportion of the fishing effort of all countries was redeployed, primarily on grounds in the northwest Atlantic. The combination of reduced fishing and poor recruitment led to poor catches through the mid-1960s until a recovery took place in 1967/68. Fishing effort rose then to the 1968 level, giving catches in excess of 1 million tons. However, the

recovery was confined to two very strong year classes only, which have been succeeded in turn by a further period of poor recruitment. As a result, both catch and fishing effort have declined once more to a level which would not be excessive in a well balanced stock. However, now (1972) the fishable stock is relatively weak and there is concern that recruitment may continue to be predominantly below average. A well balanced Arcto-Norwegian stock would have a biomass of 4-5 million tons of 3 year olds and older cod, with an annual recruitment of 1 000 million 3 year olds. It, and the Labrador/northern Newfoundland stock, are potentially the largest cod stocks in the North Atlantic. Negotiations are in progress on regulations that will promote a recovery of the total stock and ensure a stable regime of exploitation.

D.7.2 East Greenland Cod — ICES Sub-area XIV, ICNAF Divisions 1E and 1F

D.7.2.1 Life history

84. The spawning grounds of the East Greenland cod are situated along the east coast of Greenland between Walloebank (60°N) and Dohrnbank (65°30'N). After spawning the cod migrate back to the feeding areas off the southeast and southwest coasts of Greenland. The fry also drifts into the feeding areas and here the fish stay until the first maturation begins at an age of about 8 years. The spawning migration starts in late autumn, and spawning takes place in spring. On average 75% of the East Greenland cod spawn on the spawning grounds off the East Greenland coast, and 25% migrate to spawn on the grounds off the Icelandic coast, together with Icelandic cod.

85. The East Greenland cod live mainly under the influence of the cold East Greenland current, and its growth rate is therefore smaller than that of the Icelandic stock. The mean length of East Greenland cod at the age of 7 years is about 10% less than the corresponding length for the Icelandic cod.

D.7.2.2 The fishery

86. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
108	130	116	82	90	111	131	90	72	62	27*)

*) Sub-area XIV only.

The exploitation of the East Greenland cod takes place in the feeding area as well as on the spawning grounds. In the last decade, catches have fluctuated between 82 000 tons and 131 000 tons, the highest being in 1968, with a following

decline to 62 000 tons in 1971. The recent declining trend in catches is the result of reduced fishing effort due to severe ice conditions and of the low level of recruitment since 1964.

D.7.2.3 State of exploitation

87. The present fishing mortality rate in the East Greenland cod is about 30%.

D.7.3 Icelandic Cod ICES Division Va

D.7.3.1 Life history

88. Outside the spawning season the Icelandic cod inhabits mainly the waters along the north coast of Iceland. Concentrations of 0-group cod have been found very close to the shore, whereas fish 2 years old and older live at some distance from the coast in deeper waters. In spring the maturing cod of about 6 years and older migrate round the northwest corner of Iceland and go southward to the spawning grounds which are located near the southwest corner of the island. From its 2nd to its 13th year of life, the Icelandic cod grow from 0.5 to 8.0 kg. More than 50% of this increase in weight is reached before the cod is 5 years old. No migration of adult cod from Iceland to Greenland has been observed during the last decades, but migration of mature cod from West Greenland to East Greenland and Iceland is known to take place. This migration may fluctuate between years and year classes, but generally it takes place from an age of 7-8 years onwards. An average proportion of 25% of these and older age groups migrate to Iceland.

D.7.3.2 The fishery

89. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
386	402	429	394	367	345	381	406	471	453	399

The fishery for cod at Iceland can be divided into two components:
Spawning fishery: a fishery in the spring off the southwest corner of Iceland mostly for spawning cod carried out by Icelandic vessels exclusively. This fishery, which accounts for about 46% of the total catch of cod in the Icelandic waters, is based mainly on the spawning stock of cod of Icelandic origin, but supported by a component of mature cod immigrating from Greenland waters. The proportion of these immigrants differs from year to year and may have a substantial influence on the results of this fishery.

Non-spawning fishery: a general fishery for cod around the whole Icelandic coast at all times of the year. This fishery is mostly for immature cod and is prosecuted mainly by U.K., German (F.R.) and Icelandic vessels. Immigrants from Greenland, which survive from the spawning fishery, appear to stay at Iceland and are at least partly available to capture in the non-spawning fishery.

87. During the period 1964 to 1967 the combined catch of cod in the spawning and non-spawning fisheries at Iceland declined, reaching 345 000 tons in 1967. Since 1968 part of the strong 1961, 1962 and 1963 year classes, which originated at Greenland, migrated to Iceland and raised the catch to a level of 471 000 tons in 1970.

D.7.3.3 State of exploitation

88. Assessments undertaken by the Council in 1970 indicate that an increase in fishing mortality would not result in a further increase in the yield per recruit; therefore this stock can be considered as being fully exploited.

D.7.4 North Sea Cod ICES Sub-area IV

D.7.4.1 Life history

89. At least three principal cod stocks have so far been distinguished in the North Sea (excluding the Skagerak). These correspond broadly with the distribution of water masses and their associated currents, one stock covering the whole area south of the Dogger Bank (lat. 54°N) and two lying north of this Bank, one in the central North Sea (becoming less abundant north of 58°N) and the other being a much smaller loosely-knit assemblage of stocklets in U.K. coastal waters. Spawning occurs in each stock area in January-February, but the times and areas are very diffuse and the subsequent drifts of spawning products are not well known. Cod fingerlings occur in coastal and offshore waters, and it is not yet certain whether young cod subsequently recruit to the stock where they originated. North Sea cod mature as 3-5 year old fish and are almost fully grown at six years, when they weigh up to 10 kg. They grow more rapidly and mature earlier than Arctic cod; they also have a shorter lifespan.

D.7.4.2 The fishery

90. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
90	106	122	179	220	250	285	199	225	320	346

Cod are exploited throughout the North Sea, principally by European vessels using otter trawls, and to a lesser extent Danish seines. Lining for cod is almost wholly restricted to inshore areas. Cod fishing can be found over the whole stock area during the course of the year, but the preferred grounds vary with season and their proximity to home ports of the different fleets. Catches have increased since the 1950s to reach a level of 346 000 tons in 1972.

D.7.4.3 State of exploitation

91. The level of exploitation tends to be highest on the localised coastal stocks, but the large offshore resources are also fully exploited at a level which has remained fairly stable since 1960. No sustained increase in catch is expected from any further increase in fishing, but because of their rapid growth, North Sea cod do reach commercial size in their second year, and in principle, the long-term yield per recruit could be improved by an increase in mesh size beyond the present minimum of 80 mm (manila). Although fully exploited at a stable level, catches have improved to all-time record levels during the last decade owing to increased recruitment, which is estimated to have reached 200 million 2 year olds per year class in the mid-1960s. This is believed to be more closely associated with climatic and environmental conditions than with any effect of fishing, and there is no certainty that this level of productivity will be maintained.

D.7.5 Faroese Cod ICES Division Vb

D.7.5.1 Life history

92. There are two separate cod stocks in the Faroe area, one inhabiting the Continental Shelf around the islands, and one living on the Faroe Bank to the southwest of the Faroes. These two stocks are usually treated together. The following mainly goes for the Shelf stock. The most important spawning area lies to the north of the Faroes. In this area the cod gather in late winter, and the main spawning takes place in March. The spawning area is near to the 100 m isobath, but the depth differs somewhat in different years. The pelagic eggs and larvae drift with the prevailing anticyclonic eddy around the isles. In July-August, cod of 4-5 cm are found in inshore and coastal areas, where they remain rather stationary during their first years of life. As pre-spawners they undertake more extensive feeding migrations all over the Shelf, and from their fourth year some of them join the mature stock, although the

main part matures at five years of age. After spawning the post-spawners start feeding migration and spread all over the Shelf. Growth is fast. The Faroe Bank cod reaches 70 cm in three years, and the Shelf cod 50 cm.

D.7.5.2 The fishery

93. From 1962 to 1971 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
24	24	25	27	23	27	34	38	32	28

The main fisheries are the long line fishery with small vessels, by the local Faroese fishermen, and the fishery of the British trawler fleet. Both fishing fleets exploit the spawning concentrations in late winter and spring and the feeding post-spawners and immatures for the rest of the year. The catches have fluctuated between 23 000 and 38 000 tons during the last decade, the average catch being 28 000 tons. Since 1969 catches have decreased. Peak catches registered in "Bulletin Statistique" are 45 000 tons in the years 1924 and 1927. There are no biomass estimates at hand, but the catch/effort data from the Faroese long line fishery have been used as indices of stock density. They show that the stock density is at present on a level of about half the level in the years just after the war.

D.7.5.3 State of exploitation

94. Calculations of the eumetric yield curve have shown that at the present level of effort and corresponding fishing mortality, the mesh size in current use (105 mm, modern materials) is too small to render a maximum yield per recruit. An increase in mesh size would be to the benefit of the stock and would lead to increased yield per recruit. The increase should be to about 200 mm, but this conflicts with the wish to get an optimal situation in the haddock stock, fished by the same vessels.

D.8 Haddock

General life history

95. The haddock (Melanogrammus aeglefinus L.) is a Continental Shelf species of the northeast and northwest Atlantic. Its distribution is similar to that of the cod, except that in the very cold most northerly part of the North Atlantic haddock occurs only occasionally and not in great quantities. On the American side of the North Atlantic haddock stocks are

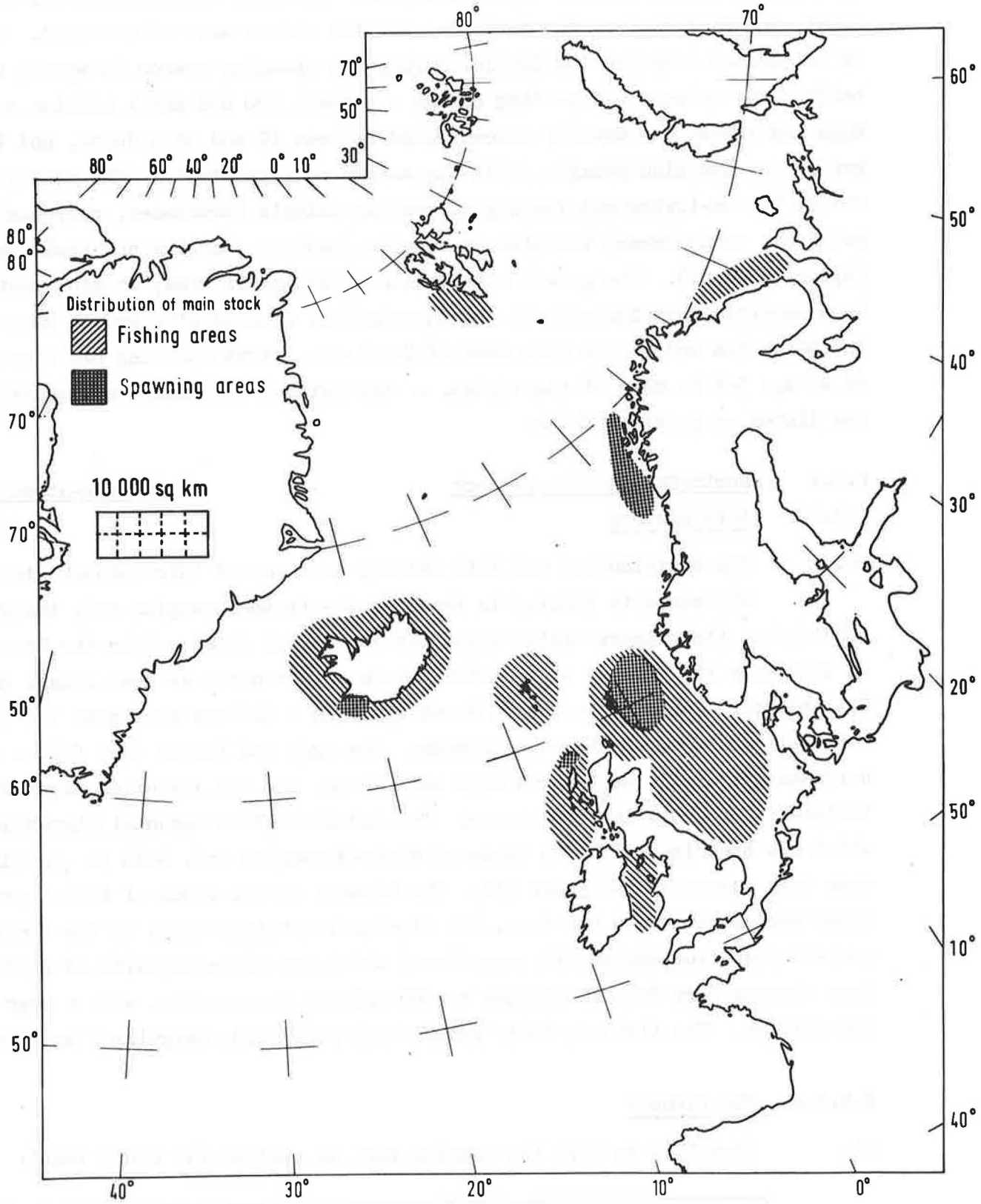

Figure 8. Haddock - fishing and spawning areas.

found between Cape Cod and Newfoundland (40-50°N). In the North-East Atlantic the haddock stocks inhabit the waters round Iceland, the area off the Norwegian coast, the Barents Sea, the North Sea and the waters west of Scotland. There is no haddock stock in the Baltic. During the spawning season in spring a female haddock may release - depending on age - between 100 000 and 1 million eggs. Eggs and larvae are usually concentrated between 10 and 40 m depth, and the 0-group fish are also pelagic until the autumn cooling starts. The adults are mainly bottom-living and feeding on benthic animals (crustacea, polychaetes, molluscs, echinoderms) but also on capelin, sandeel, herring and their eggs (spawny haddock). The growth rate varies according to area; rapid growth has been reported from Iceland and the Barents Sea, whereas slow growth occurs in the North Sea and in the area west of Scotland. First spawning has been observed at age 3-6 in most of the stocks. - The catches of haddock by countries are listed on p. 90, Table 6.

D.8.1 North-East Arctic Haddock ICES Sub-areas I and II

D.8.1.1 Life history

96. The distribution and life history patterns of this haddock stock are in all respects similar to those of the Arcto-Norwegian cod, though the haddock has its primary distribution off the Norway coast and in the Barents Sea, so that only the fringes of the stock reach as far north as Bear Island and Spitsbergen. Spawning occurs in March-April in a diffuse area over the Continental Shelf south of the Lofoten Islands. The eggs and larvae then follow the same northeasterly drift as the cod eggs and larvae, and the juveniles adopt the bottom-living habit in late summer. The haddock follow seasonal migration pattern which are broadly similar to those of Arcto-Norwegian cod, both as juveniles and when they mature as 5-6 years old. The biomass of the stock of fish 3 years and older varies about 300 000 tons, the fluctuation being caused by the considerable year-to-year fluctuations in recruitment which are characteristic of haddock. Year classes vary from 10 million to 400 million 3 year olds, with a mean at 200 million. The fish are fully grown at 10 years old, weighing 5 kg live weight.

D.8.1.2 The fishery

97. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
188	147	99	118	161	136	182	131	87	80	187

Since its distribution is so similar to that of cod, the North-East Arctic haddock is exploited in conjunction with it, except that in the absence of a well-defined

spawning area there is no intensive fishery for spawning haddock as there is for cod. Nevertheless, being the smaller of the two resources, the haddock fishery has tended to follow developments in the cod fishery.

D.8.1.3 State of exploitation

98. The haddock resource has been fully exploited for many years, and catches have remained stable except for fluctuations reflecting the varying strength of year classes already referred to. The improvement in the cod fishery in 1968-70 also led to increased exploitation of the haddock and this did reach a level which would have been biologically undesirable if maintained over a long period of years. However, it is expected that it has now been reduced again, as the cod fishery has declined.The normal high variation in year class strength of haddock has so far concealed any evidence of long-term trend in recruitment and, though the adult stock is at present weak, the stock of juvenile haddock is at least average. The state of this stock is also being considered in negotiations to achieve a stable regime of exploitation.

D.8.2 Icelandic Haddock ICES Division Va

D.8.2.1 Life history

99. The Icelandic stock of haddock is an isolated population mainly distributed in shallow waters all around the coast. The spawning grounds are in the warm water area along the south and west coasts of the island, with the main spawning area between the Vestmann Islands and the Snæfellsnes peninsula. Spawning takes place in spring with the peak in April. The 0-group haddock is mainly distributed along the west and north coasts. The main nursery grounds (1-2 years old) are in shallow waters along the south and west coasts, but older haddock are also in this area. At the age of 3 to 5 years they recruit to the adult spawning stock.

D.8.2.2 The fishery

100. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
120	102	99	99	60	60	51	47	44	46	39

Haddock is caught by different gears like hand lines and Danish seines, but mainly by trawl, long line and gill net. The high catches at the beginning of the 60s were well above any sustainable long-term yield and were due to the

strong year classes of 1956 and 1957. During the last decade the haddock landings have decreased steadily from 120 000 tons in 1962 to 39 000 tons in 1972 mainly due to lack of good recruitment. The decline in the British catches in recent years is due to the decrease in British effort in the period 1967-69, but the increase in British effort in 1970 and 1971 to the high 1965 level did not increase the British catches, and this seems to be in accordance with the low stock abundance. During the period 1967-71 the Icelandic fishing effort increased and this has kept the catches at a rather steady level, although much lower than the 1962-65 average. 0-group surveys during the last three years indicate that the 1970 and 1971 year classes are rather promising. It is therefore expected that catches will rise again.

D.8.2.3 State of exploitation

101. The last assessments undertaken by ICES Northwestern Working Group in 1970 indicated that a further increase in fishing mortality will not lead to increased yield, so this stock is fully exploited. Some increase in catches is possible by using larger mesh size.

D.8.2.4 State of regulation

102. Faxa Bay, one of the haddock nursery areas, has been closed to trawling and Danish seining all the year since 1970. In recent years big shrimp fisheries have developed in Icelandic waters. In some areas and some seasons considerable quantities of 0-, 1- and 2-group haddock have been caught as by-catch in these fisheries. In such cases these areas have been closed to trawling in order to protect the young haddock.

D.8.3 North Sea Haddock ICES Sub-area IV

D.8.3.1 Life history

103. Haddock occur in all parts of Sub-area IV in depths ranging mainly from 50-200 m. During the last 50 years there has been a change in the relative distribution of haddock in the North Sea, haddock previously being more abundant in the southern North Sea than they are today. North of a line drawn from Newcastle in England to Egersund in Norway the stock has remained much the same. South of this line there has been a decline in the stock, with the result that only a very small percentage of the North Sea landings now come from Division IVc. It is most unlikely that the North Sea haddock population consists of only one stock, but lines of demarcation have not yet been agreed.

104. The juveniles are pelagic and the adults are demersal, the transition from one stage to the other takes place mainly between 6 and 18 months of age. North Sea haddock first mature at 2 or 3 years of age and at a length of about 28 cm. By their 5th birthday they attain a length of 38-45 cm, depending on what part of the North Sea they happen to grow up in.

D.8.3.2 The fishery

105. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
52	59	199	222	269	167	139	639	672	258	213

The North Sea fishery is mainly carried out by seine and trawl. Annual landings have mainly fluctuated between 60 000 and 200 000 tons. In the last decade, however, landings have increased due to the occurrence of outstanding year classes in 1962 and 1967, which have increased landings substantially above the average level (to 672 000 tons in 1970). In the long term, a decline in the landings to nearer the average level seems a reasonable expectation.

D.8.3.3 State of exploitation

106. At present the mean age of first exploitation for haddock is about 2 years. An increase in mesh size would be expected to increase the yield per recruit, small long-term gains being predicted for an increase in mesh size to about 85 mm (manila). A reduction in effort ought to increase the yield per recruit, although the gains expected in this way might be quite small.

D.8.4 Faroese Haddock ICES Division Vb

D.8.4.1 Life history

107. The most important spawning area for the Faroese haddock is to the north and northwest of the islands. The life history is in most respects similar to that of the Faroese cod (see D.7.5, p.45), but the 0-group haddock 4-5 cm long occupies areas of greater depth, when they go from the pelagic to the demersal phase, and they are not found in the coastal and inshore areas. During its entire life the haddock is found on softer bottom than the cod. The growth is fast; it attains a length of 55 cm in its 5th year. Maturity is reached at an age of 2-3 years.

D.8.4.2 The fishery

108. From 1962 to 1971 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
27	28	20	17	19	13	18	23	21	19

The fishery follows the same pattern as the cod fishery, and the stock is fished by the same fishing fleets as the cod. The total catch in the last decade fluctuated between 13 000 tons and 28 000 tons. The 28 000 tons were taken in 1963 and is the biggest annual catch recorded in the "Bulletin Statistique". The average catch for the last decade is 20 000 tons. Estimates of stock density indices from long line catch/effort data show that the stock is at a fairly high level at present, especially when comparing with the early 60s.

D.8.4.3 State of exploitation

109. Calculations of eumetric yield have shown that the stock would benefit and the yield per recruit would increase, if the mesh size is increased to about 150 mm.

D.9 Whiting

D.9.1 North Sea Whiting ICES Sub-area IV

D.9.1.1 Life history

110. Whiting are caught all over the North Sea within the 200 m line. However most of the landings come from Divisions IVa and IVb. The total population is believed to consist of more than one stock, and the Dogger Bank has been cited as a possible region of demarcation. Other lines of demarcation are thought to exist but have not yet been precisely defined. The 0-group is pelagic and is widely distributed both inshore and offshore, mainly within the 100 m line. The adults are captured demersally, but are known to be pelagic for a proportion of their time. Whiting mature at 2-3 years of age, and by their 5th birthday attain a length of about 36 cm.

D.9.1.2 The fishery

111. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
69	99	92	107	155	91	145	199	182	112	109

Whiting are caught by trawl and seine, and until recently, annual landings have fluctuated mainly between 20 000 tons and 80 000 tons. From 1962 to 1969,

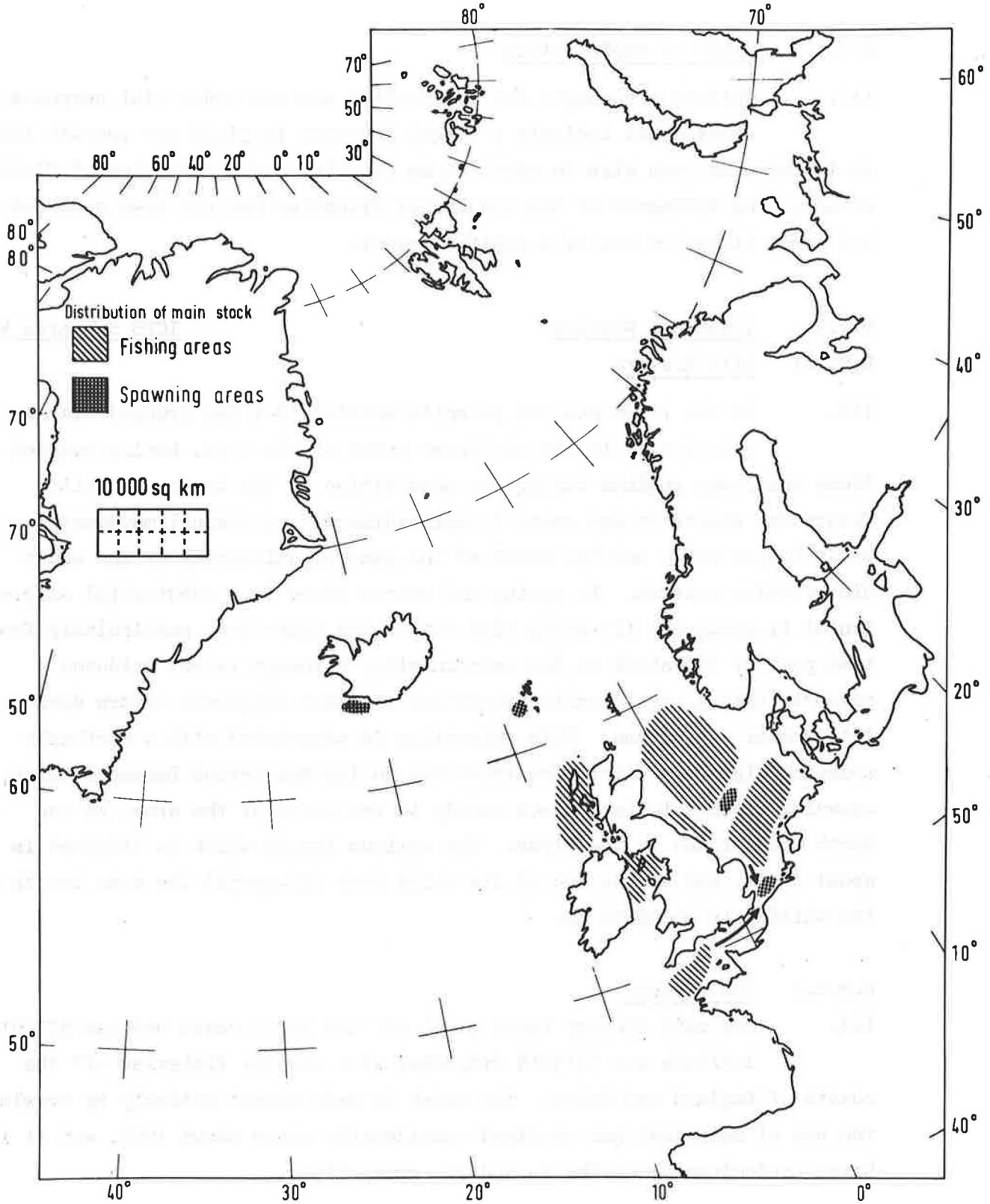

Figure 9. Whiting - fishing and spawning areas.

however, landings increased from 69 000 tons to 200 000 tons. Catches of whiting by countries are listed on p.95, Table 6.

D.9.1.3 State of exploitation

112. Whiting are caught for consumption and for industrial purposes. Assessments indicate a slight increase in yield per recruit for an increase in mesh size to about 85 mm (manila) and a reduction of fishing effort. The influence of the industrial fisheries has not been assessed, but these fisheries are of a limited extent.

D.9.2 Irish Sea Whiting ICES Sub-area VII

D.9.2.1 Life history

113. In the Irish Sea the juvenile whiting (0-I age groups) remain principally in the shallower parts of the area, having reached these shallower regions during the acquisition of the demersal habit. Maturation starts in age group I, coinciding with a gradual movement towards deeper water and the onset of the general uniformity of the adult distribution pattern. In spring and summer there is a substantial emigration of II-group and III-group fish out of the Irish Sea, particularly from that part of the stock on the western side, although recent evidence suggests that a considerable proportion of these emigrants return during late summer and autumn. This emigration is associated with a northerly spawning migration within the Irish Sea during the period December-March; spawning appears to take place mainly to the north of the area, in the North Channel and in the Clyde. The maximum length which is attained is about 48 cm, and at the end of its third year (II-group) the mean length of the whiting is about 36 cm.

D.9.2.2 The fishery

114. The main fishery takes place off the Irish coast between 53°20'N latitude and 54°30'N latitude, with smaller fisheries off the coasts of England and Wales. The catch is made almost entirely by trawlers; the use of seine net has declined considerably since about 1963, and it is based predominantly on the I- and II -group fish.

115. Landings from the Irish Sea as a whole averaged 14 000 tons during the years 1963-67, and 10 000 tons for the period 1968-72. Substantial quantities are caught as by-catch in the Nephrops fishery (see Section D.20.2, p.78). which has increased in importance, relative to the whiting fishery, since the mid-1960s. About 800 tons of whiting are caught annually in the industrial fishery.

116. Since 1965, the NEAFC Recommendation 2(A) has been in force, which permits vessels based on and landing their catches in ports in part of the Irish Sea to use, for the purpose of catching whiting, nets with a minimum mesh size of 60 mm (the minimum mesh size permitted elsewhere in the area is 70 mm). This Recommendation is valid until 31 December 1975.

D.9.2.3 State of exploitation

117. Assessments indicate that at the present level of mortality, the yield per recruit is near the maximum.

D.10 Norway Pout

D.10.1 North Sea Norway Pout ICES Sub-area IV

D.10.1.1 Life history

118. Norway pout are generally abundant only in the northern half of the North Sea (north of 57°). Within this area they are most abundant in depths ranging from 100 to 200 m. Spawning occurs over much of the area, but mainly in the area to the east of Shetland and Orkney. Fish normally spawn for the first time as 2 years old and 90% of the spawners normally belong to this age group. The minimum size for spawning is 13-14 cm and, under exceptional conditions of low density and rapid growth, spawning may be mostly by 1 year old fish. The maximum recorded age of Norway pout in the North Sea is 4 years, this fish attaining a maximum length of 20-21 cm.

D.10.1.2 The fishery

119. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
157	167	83	59	53	180	469	135	274	359	493

Fishing for Norway pout is conducted mainly for fish meal, using a small-meshed bottom trawl with a light ground rope. Landings are mainly of 1 and 2 year old fish, with 1 year olds predominating. The landings are therefore very susceptible to fluctuations due to variation in the strength of individual year classes. In the last ten years recorded landings have fluctuated between 53 000 tons and 493 000 tons, although it should be noted that the recorded landings are not necessarily exact, because of the lack of adequate sampling of mixed catches. Because of the dependence of this fishery on the strength of individual year classes, it is not possible to predict what landings might be in future years.

Catches by countries are listed on p.91.

D.10.1.3 State of exploitation

120. An assessment of the North Sea stock suggests that it is being fully exploited and that the rate of exploitation is close to the optimum level.

D.11 Saithe (Coalfish)

121. Saithe are distributed over almost the whole of ICES area with the exception of Sub-areas IX, X and XII. Although the important fisheries can be defined, it is not possible to delimit the stocks very clearly. Saithe is a very migratory fish. There is evidence that some mixing occurs between stocks at least in some years, and this complicates the assessments of exploitation rates. A Working Group met in April 1973, and again in February 1974, to update all assessments. Saithe is at present not a protected (Recommendation 4) species in the NEAFC area and there is no minimum size limit. Catches of saithe by countries are listed on p. 91.

D.11.1 North-East Arctic Saithe ICES Sub-areas I and II

D.11.1.1 Life history

122. The fish mature for the first time at a length of about 65-70 cm when they are about 6 years old. There is an annual migration from the northern grounds to spawn off western Norway, particularly on Svinøy and Halten Banks, and also on Viking Bank (Division IVa). The pelagic eggs and fry from Svinøy and Halten are carried northeastwards along the coast of Norway and as the young fish grow they invade the fjords and coastal areas. The northward drift may exceptionally carry the 0-group fish as far as Spitsbergen. As the fish grow they gradually move into deeper water. The young fish may be exploited in the fjords and coastal areas by Norwegian purse seiners and as they move into deeper water they recruit to the offshore fishery. Tagging experiments have provided evidence of substantial emigration from this area to Iceland, Faroes and north of Britain. There is no evidence of large-scale immigration to the Norway coast from other areas.

D.11.1.2 The fishery

123. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
120	148	197	185	202	180	110	133	235	224	207

Catches for the last 11 years are given above. Over this period landings ranged from 110 000 tons (1968) to 235 000 tons (1970). Catches have probably

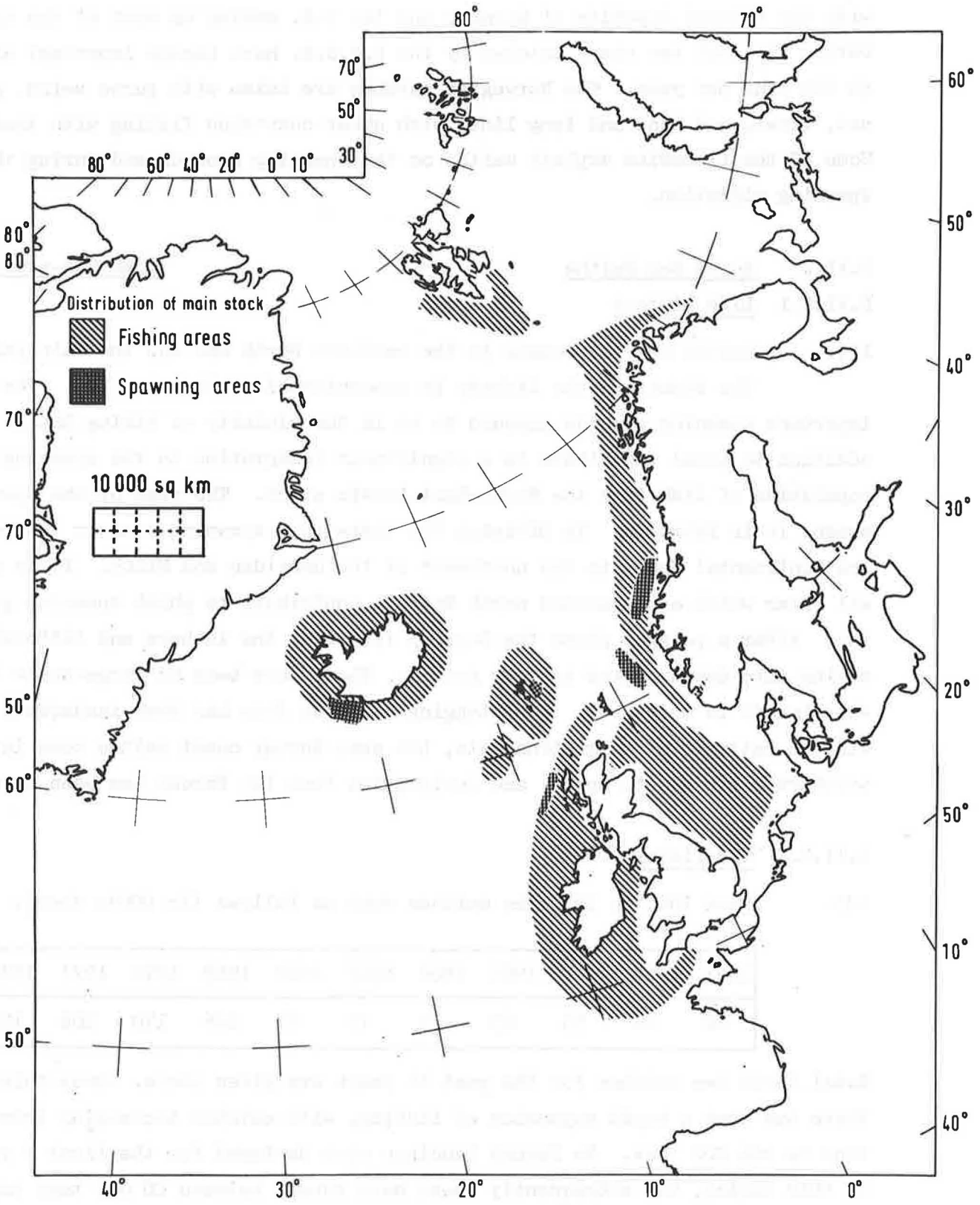

Figure 10. Saithe - fishing and spawning areas.

been dependent more on the strength of recruiting year classes than on variations in the amount of fishing. Up to 1970 about 85% of the catch was taken by Norway, with the Federal Republic of Germany and the U.K. making up most of the balance. During the last two years catches by the U.S.S.R. have become important at about 40 000 tons per year. The Norwegian catches are taken with purse seine, gill net, trawl, and hand and long line, with other countries fishing with trawlers. Some of the fisheries exploit saithe on the spawning grounds and during the spawning migration.

D.11.2 North Sea Saithe ICES Sub-area IV

D.11.2.1 Life history

124. Saithe are not common in the southern North Sea and the main part of the stock and the fishery is concentrated in Division IVa. The most important spawning grounds appears to be in the vicinity of Viking Bank. In addition to local fish there is a significant immigration to the spawning population of fish from the North-East Arctic stock. The peak of the spawning season is in February. In Division VIa there is a spawning area on the edge of the Continental Shelf to the northwest of the Hebrides and Minch. It is not at all clear which areas around north Britain contribute to which spawning population. After a pelagic phase the 0-group fish seek the inshore and littoral areas, moving into deeper water as they grow up. There have been no large-scale tagging experiments in this area. What tagging has been done has been inadequate to provide an estimate of emigration rate, but some Norway coast saithe come into the northern North Sea to spawn, and immigration from the Faroes has been recorded.

D.11.2.2 The fishery

125. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
22	28	55	69	87	73	97	106	170	206	199

Total North Sea catches for the past 11 years are given above. Over this period there has been a rapid expansion of fishing, with catches increasing from 22 000 tons to 206 000 tons. No French landings were declared for the first 2 years of this series, but subsequently these have ranged between 20 000 tons and 40 000 tons. The main increase in catches has been due to increased participation by U.S.S.R., whose catches increased from nil in 1965 to 110 000 tons in 1971. Other nations taking important quantities are the Netherlands, Norway and the U.K. Most of the catch is taken by trawlers.

D.11.3 Icelandic Saithe — ICES Division Va

D.11.3.1 Life history

126. Saithe are to be found all around the coast of Iceland. The main spawning area is to the southwest of Iceland where the mature fish gather to spawn in the early spring. Pelagic eggs and fry are distributed by the current system clockwise around the island, with the young seeking the inshore areas at the end of the pelagic phase. The young fish move into deeper water as they grow up. Substantial immigration to Iceland from Norway and the Faroes has been recorded in tagging experiments. Recaptures away from Iceland accounted for less than 1% of total recaptures of saithe tagged at Iceland.

D.11.3.2 The fishery

127. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
50	48	60	60	52	76	78	116	113	134	108

Catches at Iceland since 1962 are given above, and over this period the catch has more than doubled. The main catches are taken by Icelandic, German and British trawlers and there are also Icelandic inshore fisheries with purse seines and lines. There is an Icelandic small-boat purse seine fishery on the north coast during the summer months, exploiting shoals of younger fish mainly of ages between 3 and 5 years. The greatest part of the increase in catch has been due to increased fishing by Icelandic vessels, and their part of the catch has increased from 13 000 tons to 62 000 tons.

D.11.4 Faroese Saithe — ICES Division Vb

D.11.4.1 Life history

128. Saithe are known to spawn on the banks on the east side of the Faroe Plateau and there is probably some spawning on the Faroe Bank. Spawning takes place in early spring and by June the young fish reach the inshore and littoral areas where they spend the early part of their lives. Tagging experiments have shown that there is a considerable interchange of adult fish with other areas, particularly immigration from the Norway coast and emigration to Iceland (Division Va) and north of Britain (Divisions IVa and VIa). It is also possible that saithe migrating from the Norway coast to Iceland pass through the Faroese area.

D.11.4.2 The fishery

129. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
10	13	22	22	25	21	20	27	29	31	47

Catches during the last 11 years have increased from 10 000 to 47 000 tons. The main countries fishing saithe at the Faroes are the Faroes, France, Federal Republic of Germany and U.K. German fishing has been rather variable, but catches by the other main countries have been steadily increasing. The majority of the catch is taken by trawlers, but the main part of the Faroese catch is taken with hand lines from small boats during the summer months.

D.11.5 State of Exploitation - All Saithe Stocks

130. Generally speaking, the young saithe inhabit the inshore areas and are not available to capture, although some of the purse seine fisheries are an exception. Very few saithe are caught below an age of 3 years. There has been an overall increase in saithe catches in the ICES area from 235 000 tons in 1962 to 627 000 tons in 1971. In recent years there has been a series of year classes which have been of above average strength. The ICES Saithe (Coalfish) Working Group has carried out an assessment in April 1973 and has reached the following provisional conclusions:

131. The Group concluded that the saithe stocks were moderately exploited. With the possible exception of the North Sea, in none of the fisheries have catch rates been declining as catches have been increasing. Until recently, fishing effort in the various fisheries appears to have been relatively stable with only short-term fluctuations. At Faroe, however, there appears to have been a long-term trend of increasing fishing effort. In recent years the data indicate an increasing amount of fishing in the North Sea and in the trawl fisheries on the Norwegian coast. Estimates of fishing mortality so far available are in reasonable agreement with the trends in estimated fishing effort. Mortality rates have generally been relatively low but have been increasing in the Faroe area and in recent years in the North Sea.

D.12 Polar Cod

D.12.1 Barents Sea - Polar Cod ICES Sub-area I

D.12.1.1 Life history

132. Polar cod is a high-Arctic, circumpolar species. It is divided into several populations, but only the one inhabiting the Barents Sea is of any commercial importance. The Barents Sea population spawns

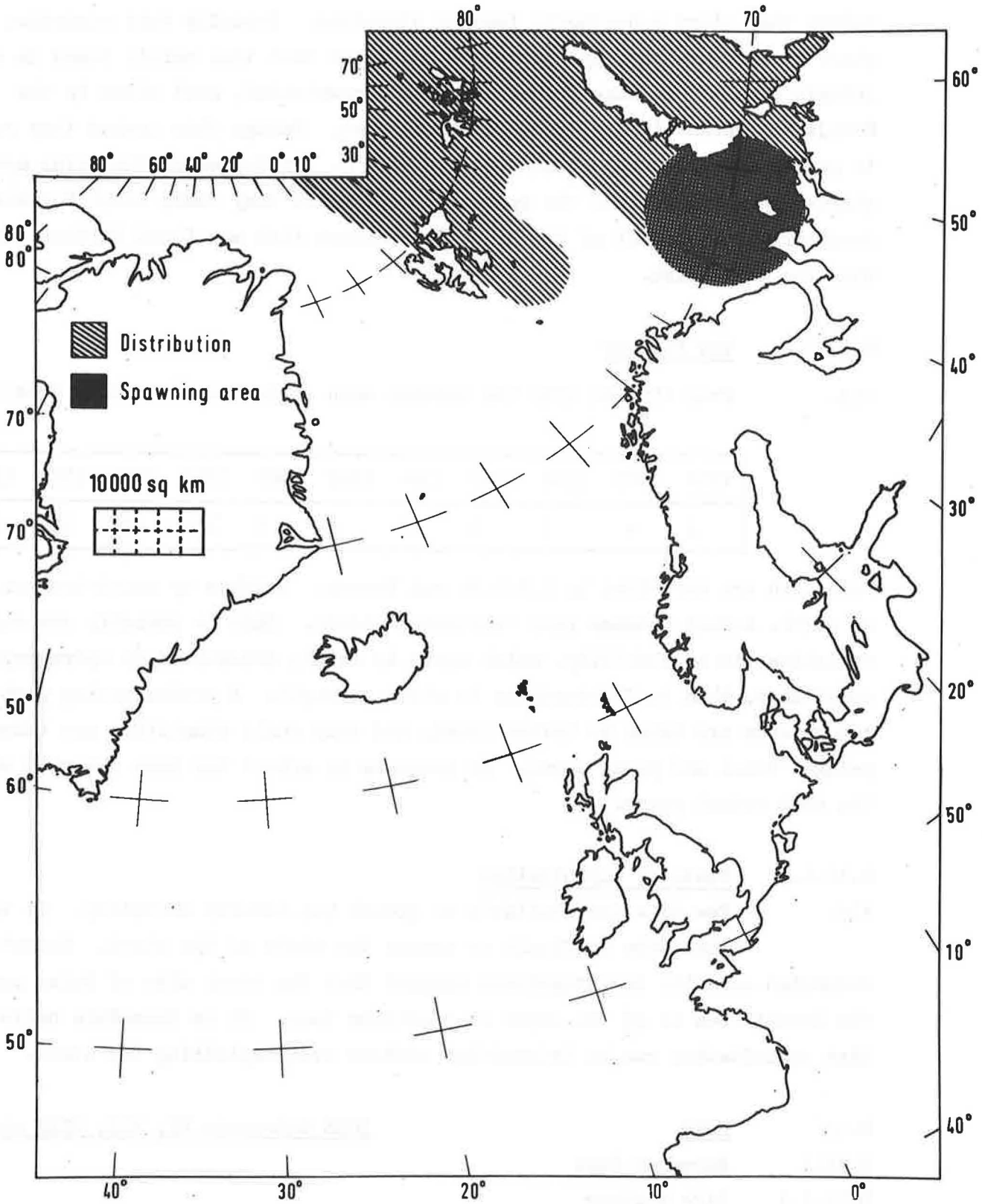

Figure 11. Polar Cod - distribution and spawning area.

in December-February in the southeastern part of the Barents Sea, where the water temperature near the sea-bed is about 2°C. After spawning they stay for some time in the spawning area and possibly move a little towards the west before they start a northerly feeding migration. Normally this migration takes place during May-June, and the Polar cod is at that time mainly found in small pelagic shoals. In August they are more concentrated, most often in the Novaja Zemlyabank-Admiralitäts-Halbinsel area. During this period they seem to prefer temperatures between -1° and -1.7°C. In September the Polar cod starts migrating towards the spawning area, which they reach about November-December. During most of the year the immature fish are found further south than the adult fish.

D.12.1.2 The fishery

133. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
3	+	3	3	3	6	6	134	244	348	167

Polar cod are exploited by U.S.S.R. and Norway. Catches by countries are listed on p. 92. Annual catches have fluctuated widely. This is probably due more to variations in availability, which again is mainly determined by hydrographical conditions, than to fluctuations in stock strength. A predominating part of the catches are taken by bottom trawl, and only small quantities are taken by pelagic trawl and purse seine. An increase in effort has been observed during the most recent years.

D.12.1.3 State of exploitation

134. Few data are available on growth and natural mortality. It is therefore difficult to assess the state of the stock. Recent Norwegian acoustic investigations suggest that the stock size of Polar cod in the Barents Sea is of the order of 5 million tons. It is therefore believed that exploitation can be intensified without over-exploiting the stock.

D.13 Hake ICES Sub-areas VI, VII, VIII and IX

D.13.1 European Hake

D.13.1.1 Life history

135. The European hake is distributed in the North-East Atlantic from Iceland to North Africa. It is a deep-water species which spawns near to the 200 m depth curve along the European coast. The eggs are pelagic and the larvae have a short pelagic life. The young fish recruit to the fishery at the age of 1 to 4 years.

D.13.1.2 The fishery

136. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
90	91	84	74	63	72	70	62	77	58	89

Fishing for hake is carried out by trawl, mainly in the spawning areas. Hake is mainly fished by France, Spain, Portugal and U.K. Catches by countries are listed on p.92.The annual catches have declined from about 100 000 tons in the early sixties to about 70 000 tons in the late sixties, while the effort has increased during the same period.

D.13.1.3 State of exploitation

137. An assessment carried out by ICES in 1973 indicated that the overall effect of an increase in mesh size to 65 mm in the hake fishery in NEAFC Region 3 would result in a long-term gain of about 7%.

D.14 Plaice

D.14.1 North Sea Plaice ICES Sub-area IV

D.14.1.1 Life history

138. The main component of the North-East Atlantic plaice population is distributed in the central and southern part of the North Sea. Minor stocks are found in the Baltic, the Kattegat, the waters west of the British Isles, at Iceland and in the Barents Sea. Catches by countries are listed on p.92.The North Sea stock consists of four spawning sub-populations which spawn during the winter at a few fairly well-defined areas. The young fish spend the first one to two years of their life in the shallow water close to the coast. The main nursery ground is the Wadden Sea inside the islands bordering the Danish, German and Dutch North Sea coasts. (See Figure 12, p.64). As they grow, the plaice move out into deeper water, and at the age of three to five years they join the adult spawning populations. From their third to their tenth year the plaice grow from about 25 to 45 cm.

D.4.1.2 The fishery

139. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
88	107	110	96	100	109	111	121	129	114	123

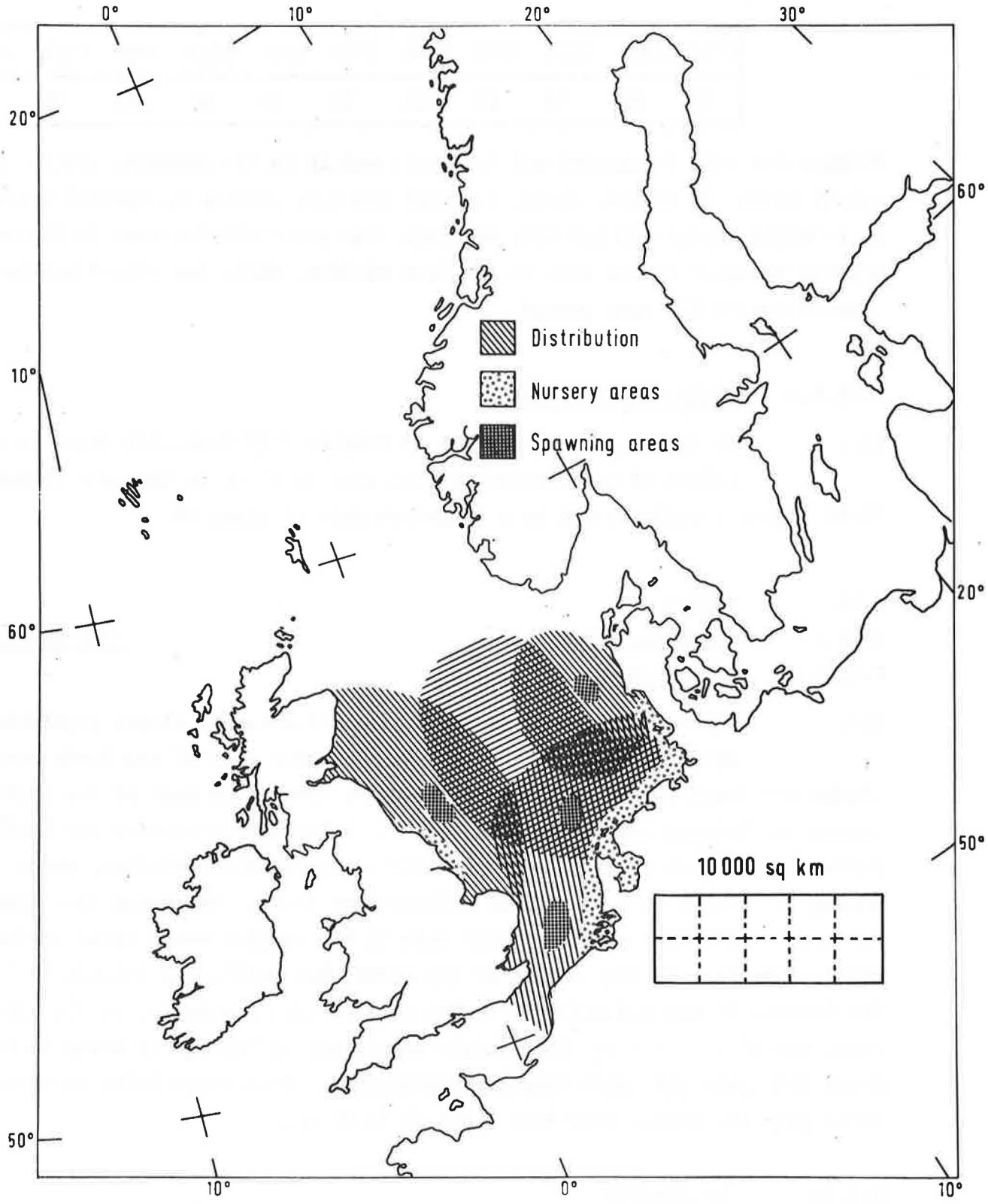

Figure 12. North Sea Plaice - distribution, nursery and spawning areas.

2 - 2.5 million plaice recruit annually to the commercial fishery at an age of three to five years. Up to the age of two years, however, plaice are caught in considerable quantities as by-catch of the shrimp fisheries in coastal zones of the continent. The North Sea plaice fishery is carried out by otter trawl, beam trawl (mainly by the Netherlands) and Danish seine (mainly by Denmark). The annual catches during the last 11 years have fluctuated between 90 000 and 130 000 metric tons. The increase from 1965 to 1970 is partly due to the recruitment to the fishery of a strong 1963 year class and partly due to a gradual increase in the fishing capacity of the Dutch fleet by replacing the otter trawl with the beam trawl and improving the efficiency of the beam trawl. Due to lack of new strong year classes the immediate prospect up to 1974 is a fall in the catch rate towards the 1962-65 level with catches of about 100 000 metric tons at the present level of fishing effort.

D.14.1.3 State of exploitation

140. An assessment undertaken by the Council in 1968 indicated that the exploitation of the North Sea plaice was at a satisfactory level with regard to the obtained yield per recruit, the fishery prior to the mid-sixties being mainly carried out on grounds where large fish predominate. In a recent study the Council has noted that the effects of the latest years' increase in beam trawl effort in coastal areas have led to increased catches of young plaice which are being discarded in large quantities. It has also noted an increasing market preference for small plaice for fillets. In view of this development, the Council has informed NEAFC that it might be desirable to consider safeguarding the stocks of small plaice. To stabilise the fishery at its present maximum level and to protect the stock from the effects of diversion of effort from elsewhere the Council in 1973 recommended to NEAFC a total allowable catch of 115 000 tons for 1974. The Council are continuing the studies of the North Sea plaice stock to consider in particular the effects of the increased effort exerted by beam trawlers, the effects of a possible increase in the minimum size of plaice and to investigate, if possible, the mortality rate of discarded fish.

D.15 Sole

D.15.1 North Sea Sole ICES Sub-area IV

D.15.1.1 Life history

141. The main component of the North-East Atlantic sole population is distributed in the North Sea south of 57°N. A smaller stock is found in the Kattegat. The North Sea sole stock consists of a number of separate spawning sub-populations which spawn in the waters close to the coasts of Denmark, Federal

Republic of Germany and the Netherlands. Spawning takes place in spring, when the fish migrate to spawning grounds from the overwintering area in the central part of the southern North Sea. The eggs are pelagic. The young fish spend the first one or two years in the shallow water close to the coast. The main nursery ground is the Wadden Sea inside the islands bordering the Danish, German and Dutch North Sea coasts. Recruitment to the adult stock takes place when the fish is about 2 years old. From its 2nd to its 10th year the sole grows from about 20 cm to about 40 cm.

D.15.1.2 The fishery

142. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
27	26	11	17	32	22	29	28	20	24	21

The North Sea sole fishery is carried out by beam trawl (Belgium and the Netherlands), otter trawl (Belgium, Denmark, England, Federal Republic of Germany and the Netherlands) and by gill nets (Denmark). Catches by countries are listed on p. 93. The stock size has fluctuated considerably due to very great variations in the strength of recruiting year classes. The total catch in the late sixties amounted to about 30 000 metric tons. The increase in yield since the mid-sixties is due to the recruitment of the very strong 1963 year class and to a rapid increase in the size and efficiency of the Dutch beam trawler fleet. In later years the Dutch catches have formed nearly 80% of the total international landings compared with 58% in 1960/62. In the early seventies the catches were declining in spite of the still increasing effort.

D.15.1.3 State of exploitation

143. The latest assessments carried out by the Council in 1973 show that if recruitment remains constant at the level existing prior to 1971, then the catch and the stock size for the next years are going to decrease, unless fishing effort is reduced immediately to a level of 40% of the present value. In that case the stock size could be kept constant, while the catches would drop to about half their present level. If the fishing effort is reduced by a smaller amount both stock size and catch will decline. In 1973 the Council recommended to NEAFC that a total allowable catch for 1974 should be implemented as soon as possible in order to prevent a further rapid decline of the stock.

D.15.2 Irish Sea Sole — ICES Division VIIa

D.15.2.1 Life history

144. The Irish Sea sole population is mainly concentrated in the area between 53°30' and 54°30'N from the west coast of England to 05°00'W. During the winter the fish are widely dispersed, mainly over the western part of this area. In April-May there is an inshore spawning migration. Dispersal starts about mid-summer. The life history of the young fish is similar to that in the North Sea except that the estuaries of the rivers on the English west coast provide the nursery grounds. This is the slowest growing population of soles and the maximum size reached is also slightly less than that by soles of other stocks.

D.15.2.2 The fishery

145. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
0.6	0.5	1.6	1.6	0.8	0.8	0.9	1.3	1.4	1.6	1.2

The Irish Sea sole fishery is carried out by beam trawlers (Belgium and the Netherlands and to a small extent England and Ireland) and by otter trawlers (Belgium, England and the Netherlands). Between 1951 and 1963 annual landings varied between 451 tons and 922 tons, caught mainly by British trawlers. Belgium trawlers started to fish intensively in the Irish Sea in 1964, mainly because catch rates were at a low level in that year, and total landings rose. Although they fell again in 1966 they rose subsequently to their maximum recorded level in 1971. The increase in landings resulted mainly from a change to beam trawling by the Belgian fleet and the start of the Dutch fishery in 1970. In 1971 these two countries caught 81% of the sole landings from the Irish Sea.

D.15.2.3 State of exploitation

146. It is estimated that the local mortality rate on the stock lies between 0.3 and 0.5 (26-39% a year), at which levels the stock is almost fully exploited, and that the maximum sustainable yield from the stock is 13 000 tons a year. As year class size does not vary as much as in the North Sea the total allowable catch for any year is likely to approximate the maximum sustainable yield.

D.15.3 Bristol Channel Sole — ICES Division VIIf

D.15.3.1 Life history

147. This stock is distributed throughout the Bristol Channel. Its life history is similar to that of the other stocks, except that it spawns

earlier, in February and March, off Minhead, Devon. The growth rate of the soles of this stock is faster than that of either the North Sea or Irish Sea soles and the maximum size recorded is slightly larger than for the two stocks.

D.15.3.2 The fishery

148. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
0.6	0.3	0.6	0.6	0.4	0.7	0.6	0.7	0.8	0.7	0.6

The fishery is carried out mainly by Belgian beam trawlers and Belgian and Welsh otter trawlers. Landings have risen almost uninterruptedly from 342 tons in 1959 to 790 tons in 1970, mainly as a result of increased fishing intensity by Belgian vessels. Originally these were otter trawlers but are now almost entirely beam trawlers. In 1970 Belgian landings formed 68% of the total international catch from this stock.

D.15.3.3 State of exploitation

149. It is estimated that the total mortality rate for this stock lies between 0.27 and 0.34 (24-29%), at which levels the stock is almost fully exploited. The maximum sustainable yield approximates to 670 tons a year, but as there is more variation in year class size than in the Irish Sea sole stock, but less than that in the North Sea stock, the total allowable catch is likely to vary from year to year.

D.16 Sandeels

D.16.1 North Sea Sandeel ICES Sub-area IV

D.16.1.1 Life history

150. Five species of sandeels are found in the North Sea, but only one, Ammodytes marinus, is of economical significance. The following information refers only to this species. For distribution and fishing areas see Figure 13, p.69.

151. The sandeel is confined to sandy bottoms and fishable concentrations are typically found along the edges of banks and the crests of submarine ridges. The main distribution is within the 40 m line, and high densities coincide with the presence of relatively high tidal current velocities. Spawning takes place in December and the pelagic larvae, hatched from demersal eggs, are found in the plankton during the following 4-5 months.

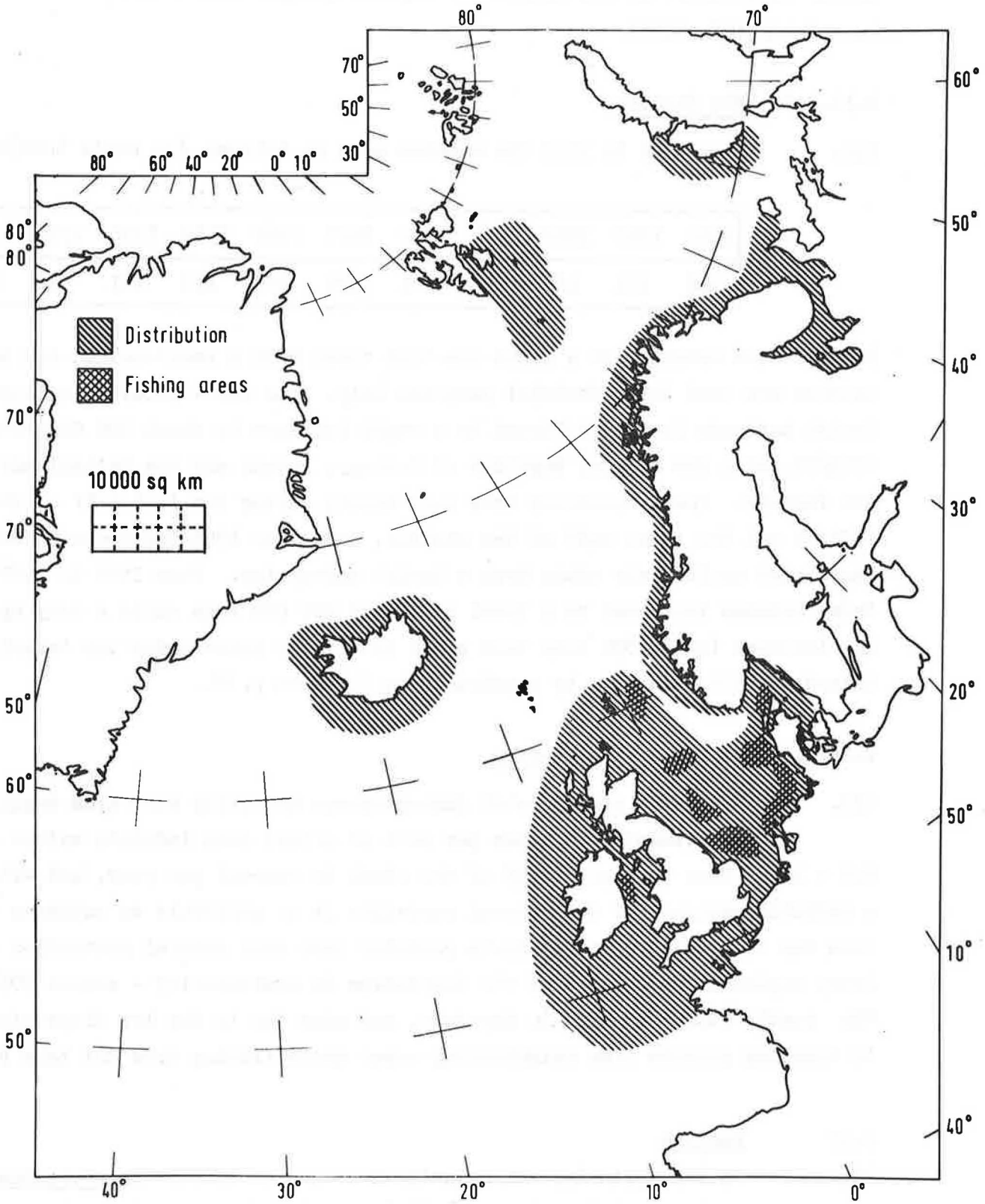

Figure 13. Sandeel - distribution and fishing areas.

There are no certain indications of extensive migrations nor of special nursery grounds. The sandeel spends an appreciable part of its life burrowed in the bottom substrate. It is, however, a typical pelagic feeder and a food competitor to herring and sprat.

D.16.1.2 The fishery

152. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
110	162	129	131	161	189	194	113	191	382	358

Sandeels are caught with a light one-boat trawl with a small-meshed cod end. The catches are used for industrial purposes only. The first landings arrived in Danish harbours in 1952 followed by a rapid increase to about 100 000 tons in 1956/57, when the Federal Republic of Germany, Norway and the Netherlands joined the fishery. These countries took part mainly during the last half of the fifties and the first half of the sixties, and since 1966 the sandeel fishery has almost exclusively again been a Danish enterprise. From 1956 to 1970 the total catches increased to a level of almost 200 000 tons while a very spectacular increase to 382 000 tons took place in 1971, a level which was largely sustained in 1972. Catches by countries are found on p. 93.

D.16.1.3 State of exploitation

153. Estimates of the total instantaneous mortality rate from tagging experiments and catch per unit of effort data indicate values of 0.8 - 1.3. Thus perhaps 60-75% of the stock is removed per year, but without a reliable estimate of the natural mortality it is difficult to estimate the loss due to fishing. The sandeels probably have some natural protection against heavy exploitation because of the limitation in availability - almost 90% of the yearly catch is taken in May-June, and also due to the low dispersion rate to trawling grounds from neighbouring areas where fishing does not take place.

D.17 Redfish

154. In the North-Eastern Atlantic two species of redfish (Sebastes marinus and Sebastes mentella) are of high commercial value and subject to exploitation. S. mentella is usually found in deeper waters than S. marinus. The species are not separated in the landings and they will be dealt with here under the common name of "Redfish". (See also Figure 14, p.71).

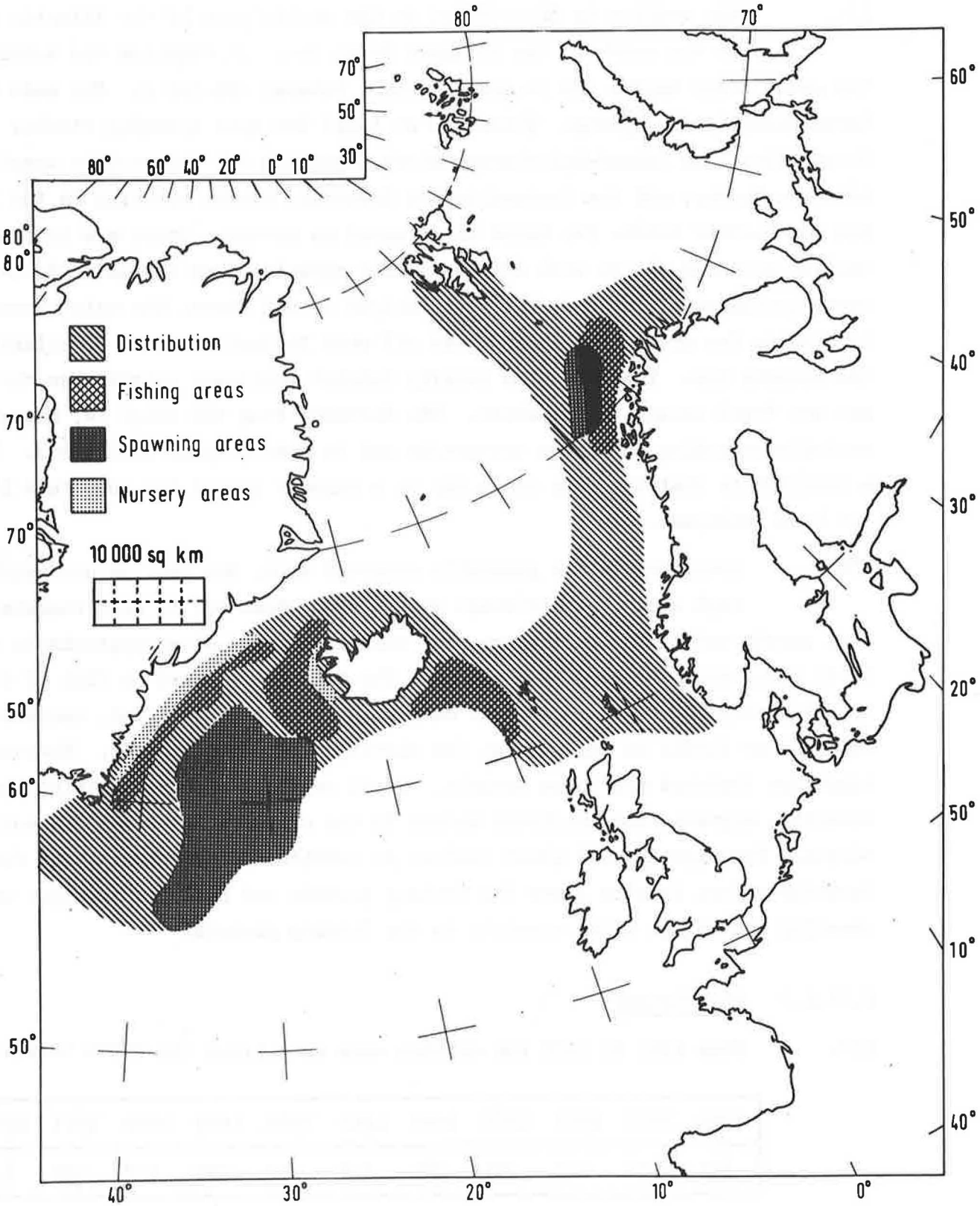

Figure 14. Redfish - distribution, fishing, spawning and nursery areas.

D.17.1 North-East Arctic Redfish — ICES Sub-areas I, II, V and XIV

D.17.1.1 Life history

155. The redfish is distributed in the Arctic part of the Atlantic extending in the south to the northern North Sea. It inhabits the waters over the great ocean depths and is most abundant between 200-500 m. The main spawning takes place during spring. There are at least two main spawning stocks: the Barents Sea-Bear Island-Spitsbergen stock, spawning off the western coast of northern Norway, and the Icelandic-East Greenland stock, spawning in the Irminger Sea and farther south. The brood is released as larvae. There are indications of smaller spawning stocks with somewhat later spawning than the main stocks in the ocean southwest of Iceland, but their origin is not known. The main nursery ground located so far are in the shelf areas off west Iceland and East Greenland and in the Barents Sea. The juveniles usually inhabit shallower waters than the adults and are found closer to the shore. The distance from the shore is, however, very variable according to bottom topography and to hydrographic conditions. There is a possibility that the open ocean may be a nursery ground too, but this has not yet been confirmed.

156. According to the generally accepted view, the redfish can reach a very high age. The different stocks seem, however, to have somewhat different growth rates. The redfish reaches sexual maturity at an approximate age of 10-15 years and at a size of 30-40 cm. The fishery is based on fish of 9 to approximately 40 years of age, but mainly on 12-30 year old fish, measuring 35-50 cm. Rather little is known about the migration of adult redfish. However, some migration features are known roughly. Small redfish, when approaching sexual maturity, migrate from shallower waters to the offshore banks and the continental slopes. The migration of adult redfish is conditioned by spawning and feeding. Sexually mature females leave the feeding grounds and head for the open ocean for spawning and return after spawning to the feeding grounds.

D.17.1.2 The fishery

157. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
141	172	211	201	168	157	144	149	127	149	131

The main areas of exploitation are on the offshore banks and on the continental slopes off East Greenland from Cape Farewell to Dohrn Bank, off the Icelandic coast, on the Iceland-Faroes Ridge, off the northern Norway coast, at Bear Island and in the Barents Sea. The annual catches (catches by countries are listed on p.93) during the last 11 years (1962-1972) have fluctuated between

127 000 and 211 000 metric tons; the average annual catch being 162 000 tons. The largest catches are from the Icelandic Area (Division Va) with an average catch of 92 000 tons for the 10-year period 1962-71, or approximately 57% of the total catch in the ICES area. This is followed by East Greenland (Sub-area XIV) with approximately 18%, Norwegian coast (Division IIa) with approximately 10%, Spitsbergen-Bear Island (Division IIb) with approximately 6% and Barents Sea (Sub-area I) with approximately 6%.

158. The Federal Republic of Germany takes by far the largest catch of redfish in the ICES area, 57% on average of the total catch for the 10-year period 1962-71. It is followed by Iceland with 16%, U.S.S.R. with 12%, U.K. with 8% and Norway with 4%. During this 10-year period the best catches were obtained during 1964. Although redfish seemed to be relatively abundant in all the main fishing areas, the catches in the Barents Sea and off East Greenland were exceptionally high that year.

159. The decline in redfish catches during the following years resulted in a minimum catch of 127 000 tons in 1970. The steady decline in the fishery has been most pronounced in the case of the Federal Republic of Germany. The Icelandic catch has remained relatively steady, while the U.S.S.R. catch has fluctuated between 45 000 tons (1964) and 6 000 tons (1968).

D.17.1.3 State of exploitation

160. The redfish fishery has almost exclusively been with the bottom trawl. During the last few years, however, some fishing has been carried out with the mid-water trawl. Although some redfish are taken with other gears, such as long line, the quantity is negligible. The total catches have decreased by almost 25% from 1964 to 1971. A comparison of the catches in the principal fishing areas shows that the fluctuations are relatively high in Sub-area I and Divisions IIa and IIb. In Division Va the catches seem to be stable.

161. During the last few years the number of days' fishing by trawlers of the Federal Republic of Germany has declined but more effective and larger trawlers are now used. With the entry into the fishery of Polish and U.S.S.R. trawlers effort may have increased. The decline in the fishery is more probably due to the decreasing availability of redfish on the conventional grounds than to a decrease in effort.

162. There are no NEAFC regulations on the redfish fishery. In Iceland the industry accepts only fish weighing 500 g, or more, which corresponds to fish larger than 30 cm.

D.18 Horse Mackerel

D.18.1 Bay of Biscay Horse Mackerel ICES Sub-area VIII

D.18.1.1 Life history

163. Two species occur in Sub-area VIII: Trachurus mediterraneus and Trachurus trachurus; the latter is the most abundant and it is presumably this species which forms the basis of the fisheries, although there is no species breakdown in the statistics. From the distribution of eggs and larvae spawning appears to take place along the entire length of the Continental Shelf o the French coast, to a depth of 200 m, extending north into the Celtic Sea. Peak spawning occurs in May. The maximum recorded age is 13 years, but the bulk of th exploited population comprises the first 5 or 6 age groups. It is not known whether there is interchange between horse mackerel in Sub-area VIII and adjacent areas.

D.18.1.2 The fishery

164. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
47	48	52	49	43	48	56	81	95	26	81

Landings by countries (see p. 94) show that it is almost exclusively a Spanish fishery, with a small contribution from France since 1968. Landings have shown an upward trend since 1968, except for 1971, largely due to increased Spanish lan ings. Most of the remainder of the landings from the ICES area comes from off the coast of Portugal and, in 1970, from the south of Ireland.

D.19 Salmon

D.19.1 Atlantic Salmon NEAFC Area

D.19.1.1 Life history

165. The Atlantic salmon (Salmo salar) is an anadromous species, which spawns and spends its juvenile life history phase up to the "smolt" stage in fresh water, and its subsequent adolescent growth phase in the sea. Its spawning and nursery grounds are widely distributed in river systems running into the sea in the NEAFC Area in the following countries, in order of their salmon catches: U.K., Ireland, Norway, U.S.S.R. (northwestern coast), Iceland, France (Atlantic coast), Sweden (west coast) and Spain (Atlantic coast). Further spawning stocks occur in rivers along the Atlantic sea-board of Canada and USA (northern states), in one river on the west coast of Greenland and in rivers running into the Baltic: these stocks are distinct from the population occurring in rivers entering the NEAFC Area, which is probably itself composed of a number of distinct stocks. Catches by countries are listed in Table 6, p.94.

166. The juvenile, life history phase in fresh water lasts between one and six years (but mostly between two and four), following which the salmon migrate to sea as smolts. They then spend one or more years at sea, during which rapid growth takes place before they return to fresh water (usually their parent river) to spawn. Those returning after one year at sea are termed "grilse", and those returning after more than one year are termed "salmon" (two or more sea-winter fish). Post-spawning mortality is high but a small proportion of the post-spawners known as "kelts" survive and return to the sea for a further period before re-entering fresh water to spawn again. These previous spawners, however, constitute only a very small part of each spawning stock, the major part of which is composed of first time spawners (maiden fish) either grilse or salmon.

167. Knowledge of the distribution, migration and ecology of Atlantic salmon during their sea-phase is incomplete, but relevant features can be summarised as follows:

(a) The sea-phase is one of rapid growth; the weight of salmon returning to fresh water as grilse after one year at sea ranges mostly between 2 and 5 kg, and those returning as two or more sea-winter fish mostly exceed 4-5 kg in weight.

(b) Little information is available on the sea distribution and movements of the salmon during their first year of sea life. It is likely that they are widely distributed in the northeast Atlantic, with a distributional range probably up to at least 500 miles from their native rivers (it is known from tag recaptures that the distributional range of fish originating from and returning to British and Irish rivers as grilse extends to at least as far as the Faroes, and those returning to Norwegian and U.S.S.R. rivers are distributed in the Norwegian Sea to a distance of at least 100 miles seawards).

(c) The distribution of salmon in their second and third sea years (i.e. those returning to home waters as two or more sea-winter fish) extends further from their native rivers than during the first year. Those returning to Norwegian and U.S.S.R. rivers are known to be widely distributed in the Norwegian Sea (to as far north as at least 72°N latitude), while those returning to the other major salmon producing European countries (U.K., Ireland, Iceland, France and Spain) extend to the Labrador Sea and Davis Strait, where they mix with salmon of the same sea age

from Canada and USA. There is probably only a small degree of overlap between the distributions of the Norway-U.S.S.R. stocks and the other European salmon stocks during this sea phase.

D.19.1.2 The fishery

168. Prior to the 1960s the fisheries (commercial and sport) for Atlantic salmon in the NEAFC area were conducted only in "home waters" (i.e. their native freshwater systems and adjacent coastal waters) but during the 1960s additional major fisheries developed in the open sea remote from home waters; one fishery prosecuted by set gill net and drift net started during the early 1960s off the west coast of Greenland (Subarea 1 of ICNAF Convention Area), and another, prosecuted by long line, started in the mid-1960s in the Norwegian Sea. The West Greenland fishery, taking place between August and November, exploits the mixed population of salmon of European and North American origin, which return to home waters as two or more sea-winter fish (see previous Section). The Norwegian Sea fishery exploits between March and July the population of the same age returning to Norwegian and U.S.S.R. rivers, although up to 15-20% of the catch towards the end of the season consist of one-sea-winter fish, some or all of which might, if not caught, return to home waters as grilse. This means that any direct effects that these fisheries may have on home waters stocks and fishery yield will be mostly on their salmon (two-or-more sea-winter fish) component. During the period 1960-71 the catch taken by the West Greenland fishery increased from 60 to 2 600 tons, while between 1965 and 1970 that taken by the Norwegian Sea fishery grew to 950 tons. It decreased to approximately 500 tons in 1971 following the implementation of a closed season/area regulation. During the same decade the catches of grilse and salmon combined in the European home water fisheries for Atlantic salmon ranged from about 5 000 tons (1961) to 7 500 tons (1967). In most of the major salmon producing countries catches increased significantly between 1960 and 1968, but they tended to decrease thereafter.

D.19.1.3 State of exploitation

169. Although the information available on the biology and population dynamics of the salmon in the open sea is far from complete, the ICES/ICNAF Joint Working Party on North Atlantic Salmon has concluded from its assessments, details of which are given in the published reports of the Working Party (ICES Cooperative Research Reports, Nos. 8, 12, 24 and 35), that (a) the open sea fisheries have probably resulted in an increase in the total (open sea plus home waters) catches of the component of the stocks which return to home waters as two-or-more sea-winter fish; (b) they have caused a reduction in the total weight of this component of the stock returning to home waters. For the Norwegian Sea long line fishery the magnitude of this reduction for

salmon returning to Norwegian and U.S.S.R. rivers was estimated to be approximately the same as the long line catch (which in 1969-70 was 800-900 metric tons), and for the West Greenland fishery in the years 1969-71, when the catch was over 2 000 tons, to lie in the range 1 100 - 2 700 metric tons for salmon returning to North American and European rivers combined. Since the available evidence suggests that the exploited stock at West Greenland in recent years was composed of salmon of North American and European origin in approximately equal proportions, the reduction would be more or less equally divided between them. These estimates of losses refer to the direct effects of the open sea fisheries on the year classes of salmon in the exploited stocks; they take no account of the possible effects of any reduction in spawning stock size, resulting from the open sea fishery, on future smolt production.

D.19.1.4 Fishery regulations

170. Regulations of varying degrees of severity aimed at the conservation and management of salmon resources have been in force in waters under national jurisdiction in countries in the NEAFC area for many years. Following resolutions adopted by NEAFC at its meetings in 1970 and 1971, comprehensive regulations are now also in force for the open sea fisheries in the Convention area. They embrace:

(a) a closed season for salmon fishing outside national fishery limits in Regions 1 and 2 of the Convention Area between 1 July and 5 May.

(b) closed areas to salmon fishing outside national fishery limits in the Norwegian Sea and around the British Isles.

(c) minimum mesh and hook sizes, and salmon retention sizes.

(d) prohibition of the use of trawl nets, monofilament nets and trolls in the catching of salmon.

The effectiveness of these regulations in restricting open sea salmon fishing in the NEAFC area is reflected in the large decrease in catch taken by the long line fishery in the Norwegian Sea in 1971, when it fell to approximately half the 1969 and 1970 levels.

171. Comparable regulations applying to the open sea salmon fisheries in the Northwest Atlantic were adopted by ICNAF at its meetings in 1970 and 1972. The latest set of measures, adopted at the ICNAF meeting in 1972, coming into force in 1973, prescribe a phased reduction up to 1976, followed by a ban on all salmon fishing outside national fishery limits in the ICNAF area, and a limitation of catches within fishery limits off the west coast of Greenland to 1 100 metric tons.

D.20 Norway Lobster

ICES Sub-areas III, IV, V, VI, VII and VIII

D.20.1 Life history

172. The Norway lobster occurs mainly in European waters where it has a very wide distribution. The main areas of commercial exploitation are France, U.K., Iceland, Spain, Ireland and Denmark in that order of weight of landings. Norway lobsters occur in depths from 20 to 500 m, invariably on soft mud in which they excavate holes. They emerge to forage mainly in subdued light and particularly at dusk and dawn. Associated with their wide distribution Norway lobsters show considerable variation in their breeding cycle. A female attains first maturity around 18-26 mm carapace length. The frequency of spawning also varies between latitudes, but in the main exploited stocks mature females spawn annually. Female Norway lobsters when carrying eggs largely disappear from the catch, and consequently the sex ratio varies seasonally. In general, spawning occurs from August to October. Hatching occurs from February to May. There are three pelagic larval stages. Settlement occurs in the fourth or fifth stage when the Norway lobster assumes a form similar to that of the adult. Opinions vary as to the rate of growth. Data based mainly on aquarium rearing experiments have indicated that the female Norway lobster at first maturity may be between 2 and 4 years old. After maturity females grow more slowly than males and large Norway lobsters are therefore invariably males. Norway lobsters do not undertake extensive migrations, and therefore each area, where the bottom is suitable for Norway lobsters, can be regarded as supporting an independent post-settlement stock.

D.20.2 The fishery

173. Catches by countries are listed on p. 94. - In most areas Norway lobsters constitute a by-catch in the fishery for white fish species. Th constitute the main species of capture for some inshore vessels from France, U.K. Spain, Ireland and Denmark. In such fisheries they are typically taken by a light trawl. A 70 mm minimum mesh size is enforced in most U.K. waters and a minimum legal landing size around 40 mm carapace length applies in the Scandinavian countries. In many countries the fishery has expanded over recent years, resulting in a decrease in average size of Norway lobster taken in the fishery. Norway lobsters cannot be aged and no satisfactory method of tagging them has as yet been found. Estimations of recruitment and mortalities are therefore inexact. There is, however, general agreement among workers on Norway lobsters that the current levels of exploitation in the main fishing areas pose problems of conservation.

D.21 Deep Sea Shrimp (Pandalus borealis) ICES Sub-areas I and IV and Divisions IIa, IIIa and Va

D.21.1 Life history

174. The deep sea shrimp has a wide discontinuous distribution, occurring both in the northern Atlantic Ocean as well as in the northern Pacific Ocean. It occurs primarily at depths from 100 to 500 m, and prefers even, soft and muddy bottom. Normally the small shrimps predominate at shallower depths, the large at greater depths. The species' temperature range is normally 2-8°C, and rather high salinity, as a rule 33-35 ‰, is required. However, immature specimens can be found in waters with lower salinity and higher temperature than adults.

175. The deep sea shrimp is a protandric hermaphrodite, i.e. all or most individuals first become males and then later in life become females, but some individuals seem to develop directly as "primary females". The development period varies widely between areas and is related to temperature, sex reversal occurring among $2\frac{1}{2}$ year olds in the Skagerak and the North Sea but among 5 year olds at Spitsbergen and in other Arctic areas. Between these extremes there is a gradual variation in the duration of development. In summer the ovaries of the females mature, and later in summer or in the autumn (dependent upon water temperature in the area of distribution), the eggs are spawned and adhere to the legs of the tail. The eggs are then carried by the females over the entire winter until hatching in the spring. The pelagic larvae spend the following summer months in the upper water layers before they settle on the bottom in the autumn.

D.21.2 The fishery

176. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
21	22	19	20	16	17	17	17	19	22	21

Besides the fisheries in the ICES area there are also an important Pandalus fishery in the ICNAF area at West Greenland and off Canada and USA. The Norwegian fishery is the oldest, dating from 1898, followed by the Swedish in 1903. The Danish was developed in 1931, and the Icelandic in 1936, followed by the Federal Republic of Germany in 1966, Scotland in 1970, and the Netherlands in 1971. The Norwegian fishery began in the Oslo fjord, but is at present carried out in the Skagerak (Division IIIa), in inshore waters as far as Finmark, and in the Barents Sea (Sub-areas II and I). The Swedish catch is mainly taken in the Skagerak (Division IIIa), but about 20% is taken in

the northern North Sea. The Danish fishery began in the Kattegat and Skagerak (Division IIIa) and later expanded into the North Sea (Division IVa). In 1960 it was pursued on the Fladen Ground (Division IVa) whence the largest quantities are now landed. The Icelandic fishery is local and confined to some fjords on the northwest, north and east coasts. The German and the Scottish fisheries are carried out in the Farn Deep (Division IVb) and on the Fladen Ground (Division IVa the Dutch fishery is primarily in the Farn Deep. - Catches by countries are listed on p. 95.

177. The fishing boats are cutters, mostly between 20 and 100 GRT; the gear includes a variety of small-meshed otter trawls of various designs, but principally side trawls. By inter-Scandinavian law a minimum mesh size of 34 mm internal stretched mesh has been in force in Denmark, Norway and Sweden since 1953

178. Besides the shrimp catches, very large by-catches of several fish species are taken. By-catches from experimental fishing are generally much larger than those from commercial landings,which would suggest that considerable quantities of by-catch are discarded by commercial vessels. By-catches measured by Danish, German and Swedish biologists amounted to 58-95% of the total catch by weight.

D.21.3 State of exploitation

179. The data available are insufficient for estimating the state of exploitation of the stocks. However, at the first meeting of the ICES Working Group on Pandalus borealis, held in May 1972, it was felt that a decreasing trend in the Danish catches on the Fladen Ground during the last few years might be a result of heavy exploitation and, therefore, the Working Group decided that a firs attempt to assess this stock and the Skagerak stock should be undertaken.

E. REVIEW OF LIFE HISTORY, FISHERY AND STATE OF EXPLOITATION OF PRINCIPAL STOCKS IN THE BALTIC (ICES DIVISIONS IIIb, c and d)

E.1 Baltic Herring — ICES Divisions IIIb,c and d

E.1.1 Life history

180. Both autumn- and spring spawning herring occur throughout the Belt Seas and the Baltic. Spring herring spawn along the coasts in fjords, bays and in the skerries. Favourite areas for the reproduction of autumn spawners are regions exposed to the influence of the open sea, their places not being known exactly. During their first year of life the young herring becomes gradually distributed in the sea. Maturity is reached at an age of 2-3 years. Adult

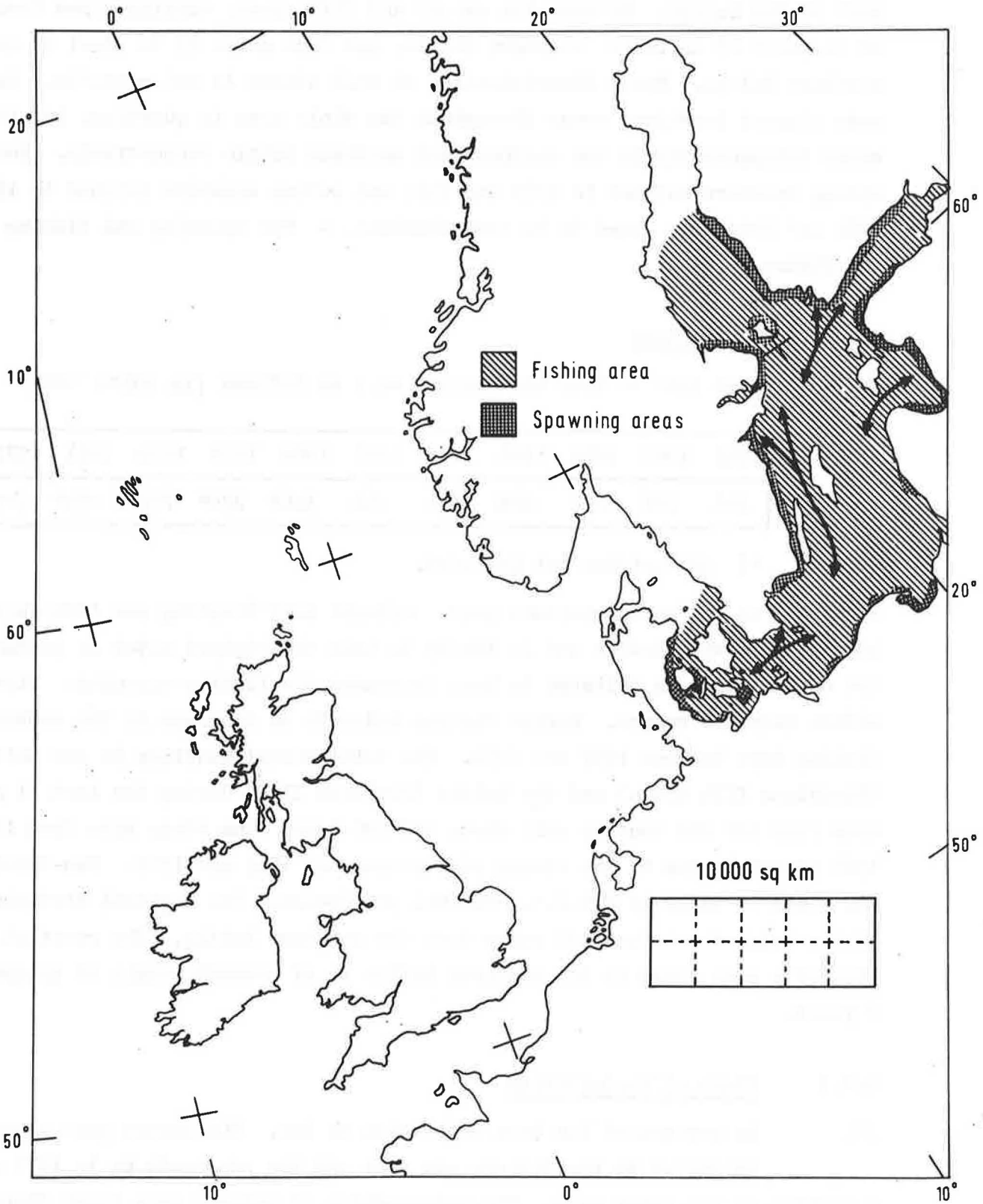

Figure 15. Baltic Herring - Fishing and spawning areas.

herring, spawning in the skerries of the east coast of Sweden, migrate to their feeding places in the southern Baltic, as do spring spawners from the island of Rügen. Herring from the Gulf of Bothnia keep separate from them in the northern part of the Baltic. Between its second and fifth year, herring grows from about 20 to about 25 cm in the southern Baltic, and from about 13 to about 17 cm in the northern Baltic. Exact discrimination of unit stocks is not possible. Good year classes sometimes occur throughout the whole area in question, but they also occur independently in the southern and northern Baltic respectively. Recently spring spawners hatched in 1959 and 1967 and autumn spawners hatched in 1960, 1961 and 1964 were found to be very abundant. - For spawning and fishing areas see Figure 15, p.81.

E.1.2 The fishery

181. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
186	226	226	226	251	310	316*	276*	274*	293*	283*

*) DDR catches not included.

The trawl is the most important gear. Pelagic pair trawling was introduced at the beginning of the sixties and is likely to take the highest catch at present. The use of this gear is believed to have increased the fishing capacity. Fishing effort data are scarce. Polish figures indicate an increase in the number of fishing days between 1957 and 1962. The total annual landings in the Belt Sea (Divisions IIIb and c) and the Baltic (Division IIId) during the last 11 years rose from 180 000 tons to well above 300 000 tons. The steep rise from 1965 to 1968 is mainly due to the strong year classes of 1964 and 1967. Two-thirds of the yield is taken by U.S.S.R., Finland and Sweden. The regional distribution of the catch shows that 53% comes from the northern Baltic. The greatest proportion of a year class in the southern Baltic is at present caught at an age of 2 years.

E.1.3 State of exploitation

182. No assessment has been undertaken so far. The recent year classes recruited to the fishery are weak and the prognosis up to 1973 is a decline in the catch rate. The introduction of pelagic pair trawl fishing tends to increase the exploitation of 0-group and I-group herring.

E.2 Baltic Sprat — ICES Divisions IIIb, c and d

E.2.1 Life history

183. The sprat is found all over the Baltic. However, it is very rare in the Bothnian Bay. In the Bothnian Sea and in the Gulf of Finland it is found in the eastern parts. In the Baltic proper the sprat is most abundant in its eastern and southern parts. During the winter the sprat is found in coastal regions where it keeps close to the bottom. From April onwards the over-wintering coastal sprat migrates to the open sea, and the sprat from the Gotland area migrates to the south. This movement is accompanied by spawning, which is most intensive in May and June. During the summer the sprat is scattered throughout the Baltic. It is then feeding and has a high fat content by the end of the autumn. The catches of the Baltic sprat contain up to ten year classes. In coastal areas 2-3 year old sprat are most numerous.

E.2.2 The fishery

184. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
63	69	96	85	71	62	74	111	145	169	193

The annual catches during the last 11 years fluctuated between 62 000 and 193 000 metric tons in Divisions IIIb-d. For the German Democratic Republic there are figures only for a few years. The most important fishing nations are the U.S.S.R., Poland and the German Democratic Republic. Nations not bordering the Baltic do not fish in this sea. All sprat fished are reported to be used for human consumption. Until the 1950s the sprat was fished rather close to the coast, with beach seines, gill nets and bottom trawls. After these years the pelagic trawl was introduced in the fishery in the open Baltic. The remarkable recent increase in the catches is connected with the use of modern fishing gear on hitherto unexploited shoals of sprat, mainly consisting of older individuals.

E.2.3 State of exploitation

185. No stock assessments have been made.

E.3 Baltic Cod — ICES Divisions IIIb, c and d

E.3.1 Life history

186. With the exception of the inner regions of the Bothnian Gulf and the Gulf of Finland, cod is spread throughout the Belts and the Baltic with the density gradually decreasing in the northern Baltic. Spawning takes place in

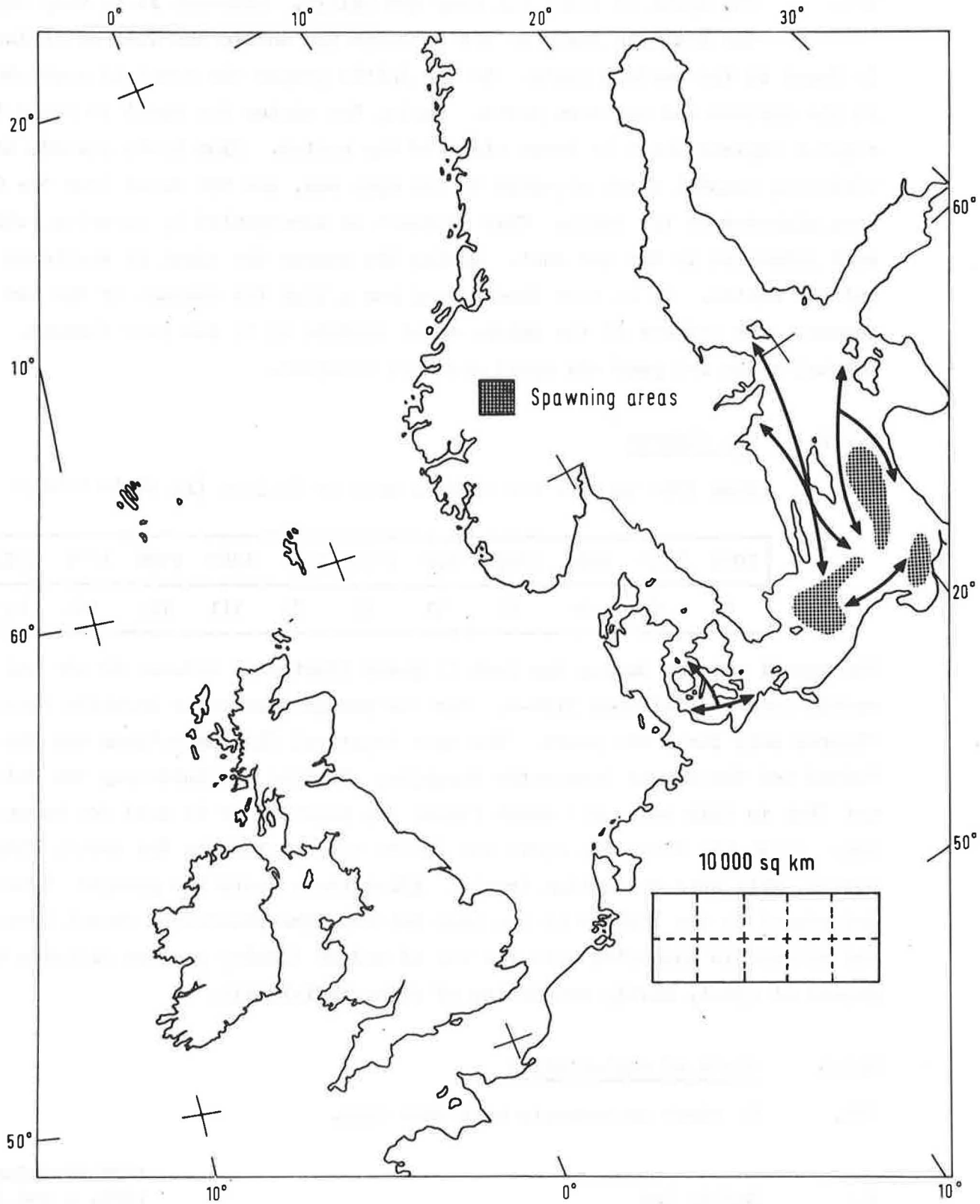

Figure 16. Baltic Cod - spawning areas.

deep basins. The main areas of egg distribution are the Bornholm basin and the southern Gotland basin, with the highest density being reported from Bornholm. However, the eggs are distributed over a much larger area in the Gotland basin. The peak of spawning is in March in the Belts and from May to July in the Baltic. The young fish spend their first years of life in shallow waters and at the edges of the deep basins. During the juvenile period they also migrate to more northerly regions. Maturity is first reached at an age of two, but mainly at three. From its second to its seventh year Baltic cod grows from about 30 cm to about 70 cm, and Belt Sea cod from about 30 cm to about 85 cm. The year classes 1964, 1966 and 1969 have been shown to be very abundant, whereas the 1970 year class is thought to be extremely weak. (See Figure 16, p.84 for spawning areas of Baltic cod).

E.3.2 The fishery

187. From 1962 to 1972 the catches were as follows (in 000's tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
146	147	128	128	159	168	184	179	175	150	175

The average age of the catch is at present between 3-4 years. Most cod are recruited to the fishery at an age of 2 years. The otter trawl has been the main gear for a long time. In periods with a deficit of oxygen in the water near the sea-bed, cod keep clear of the ground, and during these particular years the otter trawl has recently been largely replaced by the pelagic pair trawl. During the last ten years the annual catches have fluctuated between 130 000 and 185 000 tons with the highest share being taken in the southern Baltic. No increase in nominal effort was observed between 1965 and 1970, but an increase in fishing power, partly because of stronger engines and partly because of the use of pelagic pair trawls, was noted. The rise in the landings between 1965 and 1968 is, therefore, likely to be due not only to the very good year classes 1964 and 1966, but also to a greater effective effort. The immediate prospect is a decrease in the catch per effort as the forthcoming 1970 year class seems to be extremely poor.

E.3.3 State of exploitation

188. At present the lack of data prevents reliable assessment from being made. The available information suggests, however, that neither is the fishing effort too low, nor is the average age at entry to the fishery too high, to allow the optimum yield to be obtained.

ICES Divisions IIIb, c and d

E.4 Baltic Salmon

E.4.1 Life history

189. Salmon inhabiting the Baltic originate from Swedish, Finnish and Soviet rivers. At present very few salmon spawn in Polish rivers. More than two-thirds of the total population is produced in northern Swedish rivers and about one-third of the total smolt production is reared artificially in Sweden. On an average, the young fish stay for 2-3 years in the rivers. Most of the smolts leave the Gulf of Bothnia in order to feed in the open sea of the Baltic proper. However, salmon of the Finnish and Riga Gulfs apparently do not leave these areas and they form separate stocks. The main food item is sprat. From smoltification to the end of the third year in the sea, salmon grow from 15 cm (20 g) to about 95 cm (8 500 g). Maturing fish leave the feeding grounds in spring and head for their home rivers where they spawn in late autumn.

E.4.2 The fishery

190. From 1962 to 1972 the catches were as follows ('000 tons):

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
2.8	2.6	3.7	3.4	2.9	3.2	3.5	2.9	2.6	2.1	2.2

During the last 11 years the total catches in the Baltic (Division IIId) have fluctuated between 2 100 and 3 700 tons. The main component of this fishery is carried out offshore with drift nets and, to a lesser extent, with long lines. Offshore vessels mainly operate in the southern and northern Baltic. Denmark, exclusively engaged in a high seas fishery, takes 54% of the total catch and 72% of the offshore catch. The offshore fishery developed in the mid-forties: its nominal effort gradually rose until the beginning of the sixties and fluctuated around that level thereafter. No general trend in the catch per unit effort was observed between 1957 and 1968. However, the construction of the drift nets was improved in about 1967, which suggests an increase in efficiency. The total catch levelled off after 1968 and this is also suggested for the offshore yield. The future prospects are not known, though natural fluctuations in stock size will be smoothed by the fairly high proportion of artificially reared smolts.

E.4.3 State of exploitation

191. An assessment for the years 1957-63 suggested that 850 000 salmon of age A.1* were recruited to the fishery each year, and that 1.1 million salmon were present in the exploited phase. It was also estimated

*) Salmon that have spent 1 year in the sea.

at that time that a slight increase in age at entry to the offshore fishery would result (in terms of value) in an additional income of about 30-40% for the coastal and river fishery, with probably no change for the high seas fishery. A more recent assessment suggested that fishing was at a satisfactory level with regard to effort. However, an increase in mesh size from 80 mm to about 90 mm (bar length), corresponding to a rise in age at entry to the fishery from 1.5 years to 2.2 years, would result in a 15% higher offshore catch (in weight) and a greater escapement.

E.4.4 State of regulation

192. The fishery is regulated by a Convention signed by Denmark, the Federal Republic of Germany, Poland and Sweden. A minimum size of 60 cm, a minimum mesh size of 80 mm (bar length) and a hook opening of 19 mm between point and shank is practised. Closed seasons in summer and winter, as well as a ban on trawling, are intended to come into force shortly.

Table 6. Annual Catches (in tons) of principal species 1968-1972, by countries.(- means no catch reported).

HERRING	1968	1969	1970	1971	1972
Belgium	135	472	780	681	1 338
Denmark	418 478	318 432	253 983	332 325	357 906
Faroe Islands	69 939	44 980	75 007	66 500	60 653
Finland	60 561	56 534	51 925	58 388	54 448
France	22 777	27 088	24 409	23 509	29 940
Germany F.R.	61 881	83 316	74 908	29 029	22 318
Iceland	141 528	44 108	51 369	61 415	41 684
Ireland	22 970	34 658	42 664	31 249	47 844
Netherlands	41 517	47 894	57 741	53 394	56 208
Norway	704 800	188 167	285 097	236 544	156 051
Poland	56 103	49 746	56 307	47 889	50 981
Sweden	217 432	185 770	172 538	127 903	120 019
UK (Engl. & Wales)	9 834	11 009	14 553	20 999	7 724
UK (Isle of Man)	3 365	5 217	10 119	10 994	12 011
UK (N. Ireland)	943	752	4 354	3 719	4 073
UK (Scotland)	83 778	111 962	126 714	132 881	137 943
U.S.S.R.	421 153	194 102	128 144	133 778	139 902
Total	2 337 194	1 404 207	1 430 612	1 371 197	1 301 043

SPRAT	1968	1969	1970	1971	1972
Belgium	402	421	550	130	123
Denmark	8 233	4 911	8 926	33 815	20 156
Finland	-	1 118	1 265	994	972
France	1 695	1 485	2 188	1 453	1 697
Germany F.R.	17 786	6 690	7 793	5 193	1 951
Ireland	1 428	2 358	5 476	5 536	5 845
Netherlands	1 047	1 841	1 518	1 085	611
Norway	8 445	16 021	13 655	9 277	18 585
Poland	14 746	17 308	20 171	31 855	38 876
Portugal	-	405	-	-	-
Spain	325	384	177	-	1 552
Sweden	4 744	4 019	5 463	6 167	5 769
UK (Engl. & Wales)	11 123	9 987	17 799	27 934	23 179
UK (Scotland)	30 297	37 292	18 527	23 439	38 597
U.S.S.R.	55 050	90 525	120 478	135 007	152 300
Total	155 321	194 765	223 986	281 885	310 213

ctd.

Table 6 (ctd)

CAPELIN	1968	1969	1970	1971	1972
Iceland	78 166	171 009	191 763	182 882	276 969
Norway	522 171	678 935	1 301 014	1 371 154	1 555 716
U.S.S.R.	15 434	525	13 057	20 832	37 004
Total	615 771	850 469	1 505 834	1 574 868	1 869 689

MACKERELS	1968	1969	1970	1971	1972
Belgium	79	158	32	87	130
Denmark	9 983	10 938	26 839	17 615	2 044
Faroe Islands	-	3 080	2 134	3 603	7 551
France	39 580	42 958	48 771	41 939	41 876
Germany F.R.	1 991	1 594	1 011	666	472
Iceland	352	612	1 582	735	750
Ireland	2 164	1 615	1 055	3 107	4 592
Netherlands	8 583	9 369	6 784	8 782	10 602
Norway	779 108	683 045	278 771	202 562	160 229
Poland	3 147	2 161	6 259	10 963	13 463
Portugal	10 212	21 400	39 265	-	-
Spain	28 026	24 005	34 418	37 573	31 416
Sweden	11 802	10 833	4 427	3 169	4 750
UK(Engl. & Wales)	2 641	2 727	3 409	4 816	6 956
UK (N.Ireland)	151	279	243	315	57
UK (Scotland)	1 125	641	962	1 423	1 811
U.S.S.R.	6 094	18 670	14 296	39 109	77 707
Total	905 038	834 085	470 258	376 464	364 406

BLUEFIN TUNA	1968	1969	1970	1971	1972
Denmark	8	1	-	1	0
France	705	636	880	820	893
Germany F.R.	0	-	1	2	0
Norway	682	812	162	568	94
Portugal	120	705	-	-	-
Spain	2 820	6 005	4 274	3 197	1 540
Sweden	-	-	4	3	-
Total	4 335	8 159	5 321	4 591	2 527

ALBACORE	1968	1969	1970	1971	1972
France	-	9 348	6 577	9 830	9 790
Portugal	877	3 243	2 150	-	-
Spain	23 590	22 108	23 516	24 149	18 576
Total	24 467	34 699	32 243	33 979	28 366

BLUE WHITING	1968	1969	1970	1971	1972
Spain	20 756	16 933	10 267	...	19 917
U.S.S.R.	129	14 321	21 590	63 721	13 233
Total	20 885	31 254	31 857	63 721	33 150

ctd.

Table 6 (ctd)

COD	1968	1969	1970	1971	1972
Belgium	28 122	17 190	12 198	23 757	24 510
Denmark	107 390	94 431	96 760	133 404	153 261
Faroe Islands	18 022	47 723	45 842	27 319	25 809
Finland	70	58	70	3	8
France	37 691	30 255	74 703	74 689	43 384
Germany F.R.	86 879	72 343[a]	88 295	124 879	100 459
Greenland	628	627	501	533	279
Iceland	234 317	286 153	308 336	254 905	228 549
Ireland	3 494	3 159	3 246	4 035	3 313
Netherlands	31 365	19 805	25 262	46 868	47 765
Norway	279 195	378 669	413 536	457 135	430 592
Poland	64 184	68 928	76 487	56 754	58 926
Portugal	-	-	-	-	5
Spain	531	368	222	216	762
Sweden	31 231	25 057	22 589	22 007	22 531
UK (Engl. & Wales)	330 769	389 050	352 101	301 651	273 890
UK (N. Ireland)	1 401	1 390	1 268	1 114	1 524
UK (Scotland)	69 059	60 429	54 633	57 418	73 650
U.S.S.R.	740 349	627 218	334 754	171 033	177 209
Total	2 064 697	2 122 853	1 910 803	1 757 720	1 666 426

a) Includes miscellaneous products.

HADDOCK	1968	1969	1970	1971	1972
Belgium	2 091	5 820	4 925	2 328	2 609
Denmark	39 557	317 498	159 086	33 144	37 674
Faroe Islands	7 028	11 144	12 957	11 295	9 029
France	10 990	15 248	17 425	17 608	21 505
Germany F.R.	6 923	6 616	8 857	5 976	6.415
Iceland	34 024	35 036	31 833	32 377	29 252
Ireland	1 199	2 466	3 649	5 642	5 619
Netherlands	7 717	13 404	8 509	7 087	5 458
Norway	62 290	65 190	38 537	47 592	48 040
Poland	17	4	-	62	1 471
Spain	13	72	-	3	2 223
Sweden	5 770	5 108	8 704	5 857	5 305
UK (Engl. & Wales)	66 157	64 977	50 838	45 042	49 728
UK (N. Ireland)	114	226	182	81	74
UK (Scotland)	89 191	99 826	150 567	161 661	129 355
U.S.S.R.	57 400	246 787	368 602	83 267	163 386
Total	390 481	889 422	864 671	459 022	517 143

ctd.

Table 6 (ctd)

WHITING	1968	1969	1970	1971	1972
Belgium	5 296	3 969	4 123	3 032	3 204
Denmark	87 988	159 913	116 706	70 938	65 809
Faroe Islands	-	-	-	150	-
France	48 024	46 881	40 385	32 988	34 240
Germany F.R.	770	605	411	248	469
Iceland	362	368	232	332	307
Ireland	5 961	5 533	4 414	3 966	4 451
Netherlands	13 471	15 305	10 219	6 478	8 056
Norway	83	68	67	52	71
Poland	-	-	-	2	-
Sweden	1 502	1 092	822	619	598
UK (Engl. & Wales)	6 840	5 269	5 360	5 866	5 357
UK (N. Ireland)	3 548	2 391	1 314	1 899	1 976
UK (Scotland)	40 700	30 154	28 225	38 392	34 739
U.S.S.R.	10 756	5 509	14 332	541	744
Total	225 301	277 057	226 610	165 503	160 021

NORWAY POUT	1968	1969	1970	1971	1972
Belgium	157	153	393	357	417
Denmark	428 342	68 419	157 501	204 657	277 050
Faroe Islands	-	19 582	32 018	47 238	56 778
Germany F.R.	-	-	-	0	8
Iceland	-	886	2 890	3 030	40
Norway	65 313	81 142	115 840	143 371	179 262
Sweden	-	-	-	-	6 786
UK (N. Ireland)	6	1	242	1	4
UK (Scotland)	-	-	-	1 743	4 769
Total	493 818	170 183	308 884	400 397	525 114

SAITHE	1968	1969	1970	1971	1972
Belgium	3 311	4 221	4 258	3 593	2 477
Denmark	7 838	5 623	17 629	14 228	19 333
Faroe Islands	2 730	4 976	6 177	7 932	6 794
France	52 933	59 474	68 676	82 250	87 121
Germany F.R.	36 092	53 540	60 055	60 463	67 994
Iceland	38 032	53 998	63 906	60 178	59 951
Netherlands	17 199	18 501	20 969	18 329	13 287
Norway	105 324	123 677	164 455	145 522	167 501
Poland	44	-	-	6 139	1 453
Spain	-	-	-	13 156	13 138
Sweden	8 213	4 322	1 921	4 523	3 899
UK (Engl. & Wales)	35 380	39 784	35 924	40 982	30 221
UK (N. Ireland)	225	451	623	407	362
UK (Scotland)	14 249	13 837	21 715	19 787	24 407
U.S.S.R.	11 495	32 953	111 612	149 774	101 328
Total	333 065	415 357	577 920	627 263	599 266

ctd.

POLAR COD	1968	1969	1970	1971	1972
Norway	-	17 761	8 947	16 484	388
U.S.S.R.	2 195	116 547	234 409	331 576	166 377
Total	2 195	134 308	243 356	348 060	166 765

HAKE	1968	1969	1970	1971	1972
Belgium	172	213	200	153	182
Denmark	842	1 086	918	1 169	1 406
France	23 019	21 641	25 615	23 532	21 809
Germany F.R.	129	90	150	134	163
Ireland	83	83	55	42	56
Netherlands	252	112	122	208	132
Norway	501	615	798	850	713
Portugal	7 194	6 642	9 261	8 043	8 653
Spain	69 688	65 660	76 103	24 840	73 368
Sweden	...a)	...a)	423	296	347
UK (Engl. & Wales)	2 735	2 036	1 494	888	840
UK (N. Ireland)	183	174	181	200	214
UK (Scotland)	2 563	2 253	1 620	1 699	1 864
U.S.S.R.	-	-	62	395	300
Total	107 361	100 605	117 002	62 449	110 047

a) Hake included with 692 tons of "Various Gadiforms" for 1968, and with 426 tons of "Various Gadiforms" for 1969.

PLAICE	1968	1969	1970	1971	1972
Belgium	6 131	5 022	5 220	5 756	6 130
Denmark	52 186	53 662	51 745	45 375	47 921
Faroe Islands	102	192	380	187	150
France	5 576	5 210	4 791	5 002	4 701
Germany F.R.	5 591	5 383	5 775	3 486	4 555
Iceland	6 144	10 764	8 117	7 179	5 129
Ireland	2 279	2 042	1 737	1 732	1 476
Netherlands	33 236	39 420	46 094	44 563	52 113
Norway	722	860	825	533	582
Portugal	26	25	-	-	-
Sweden	1 022	986	757	695	704
UK (Engl. & Wales)	40 096	40 281	43 513	44 404	40 673
UK (N. Ireland)	244	238	196	151	150
UK (Scotland)	7 362	6 397	6 000	5 392	4 355
Total	160 717	170 482	175 150	164 455	168 639

ctd.

SOLE	1968	1969	1970	1971	1972
Belgium	4 641	4 026	4 170	4 259	3 094
Denmark	1 882	1 104	719	1 438	1 048
France	3 433	3 837	3 863	4 357	3 716
Germany F.R.	1 154	702	323	609	270
Ireland	164	185	186	173	216
Netherlands	25 175	22 035	16 260	19 329	18 191
Portugal	879	835	777	965	944
Spain	1 288	1 721	2 377	3 604	3 681
Sweden	...[a]	-	16	14	14
UK (Engl. & Wales)	1 987	1 838	1 448	1 347	1 345
UK (N. Ireland)	10	17	24	40	40
UK (Scotland)	-	-	9	14	22
Total	40 613	36 300	30 172	36 149	32 581

a) Sole included in 182 tons of "Various Pleuronectiforms".

SANDEEL	1968	1969	1970	1971	1972
Denmark	200 608	114 352	190 980	393 218	336 888
Germany F.R.	-	32	-	99	1
Norway	613	154	630	2 106	18 788
Sweden	-	-	-	-	8 847
UK (Engl. & Wales)	-	-	3 579	8 279	2 010
Total	201 221	114 538	195 189	403 702	366 534

REDFISHES	1968	1969	1970	1971	1972
Belgium	4 120	3 361	2 204	2 800	2 533
Faroe Islands	3	13	60	35	18
Germany F.R.	89 927	89 086[b]	69 564	69 047	56 984
Iceland	30 243	28 227	24 808	31 498	32 463
Netherlands	-	35	9	3	2
Norway	4 100	3 938	3 857	4 695	6 796
Poland	-	5 973	5 326	2 861	1 611
Sweden	-	-	-	-	2
UK (Engl. & Wales)	8 828	7 413	7 326	7 465	7 982
UK (Scotland)	166	145	219	165	217
U.S.S.R.	6 286	10 418	13 137	29 941	22 700
Total	143 673	148 609	126 510	148 510	131 308

b) Including miscellaneous products.

ctd.

Table 6 (ctd)

HORSE MACKEREL	1968	1969	1970	1971	1972
Belgium	37	37	34	41	77
Denmark	4	-	-	-	-
France	1 830	2 479	2 802	3 039	3 603
Germany F.R.	1 238	1 096	966	395	4
Netherlands	37	24	190	186	175
Norway	-	-	7 404	23 173	6 381
Poland	2 330	420	1 192	627	2 081
Portugal	74 894	48 677	62 767	57 414	63 054
Spain	62 326	85 781	98 418	26 167	82 247
UK (Engl. & Wales)	104	111	123	149	241
U.S.S.R.	-	13 320	74 952	57 049	107 753
Total	142 800	151 945	248 848	168 240	265 616

ATLANTIC SALMON	1968	1969	1970	1971	1972
Denmark	2 255	2 022	1 831	1 204	1 231
Faroe Islands	-	-	-	-	10
Finland	513[a]	495[a]	450[a]	401[a]	456[b]
France	-	-	-	6	11
Germany F.R.	214[a]	153[a]	158[a]	99[a]	112
Greenland	-	-	0	10	-
Iceland	148	133	224	204	224
Ireland	1 413	1 727	1 787	1 494	1 803
Netherlands	-	-	-	-	2
Norway	1 562	1 278	1 000	1 207[a]	1 642
Poland	140[a]	85[a]	70[a]	58	87
Portugal	1	0	1	1	1
Sweden	673	515	583	416	434
UK (Engl. & Wales)	282	375	529	426	442
UK (N. Ireland)	295	267	298	213	210
UK (Scotland)	1 297	1 723	1 029	1 145	1 435
U.S.S.R.	978	530	568	624	558
Total	9 771	9 303	8 528	7 508	8 658

a) Including trouts and chars. b) Including abt. 8% sea trout.

NORWAY LOBSTER	1968	1969	1970	1971	1972
Belgium	456	468	479	378	299
Denmark	1 737	1 176	1 244	1 233	2 096
Faroe Islands	23	23	-	38	31
France	8 311	11 227	10 022	9 025	9 581
Germany F.R.	65	29	6	3	2
Iceland	2 489	3 512	4 026	4 657	4 321
Ireland	1 493	1 372	2 019	1 775	1 823
Norway	84	74	18	52	29
Portugal	246	261	210	-	-
Spain	4 047	4 237	3 234	-	3 759
Sweden	-	431	336	373	468
UK (Engl. & Wales)	983	859	612	1 044	948
UK (N. Ireland)	1 915	2 663	2 809	2 920	3 997
UK (Scotland)	7 203	8 189	8 179	9 029	10 780
Total	29 052	34 521	33 194	30 527	38 134

ctd.

Table 6 (ctd)

DEEP SEA SHRIMPS	1968	1969	1970	1971	1972
Denmark	5 175	5 434	4 217	4 432	3 221
Germany F.R.	41	0	-	33	-
Iceland	2 451	3 276	4 510	6 326	5 291
Norway	7 201	6 353	7 597	7 773	9 111
Spain	-	-	-	-	1 941
Sweden	2 025	1 822	2 740	2 906	2 524
UK (Engl. & Wales)	-	-	14	-	1 128
UK (Scotland)	-	-	100	438	-
Total	16 893	16 885	19 178	21 908	23 216

ANNEX 1

NORTH-EAST ATLANTIC FISHERIES CONVENTION

List of Recommendations

(This list includes all current Recommendations agreed by the Commission up to and including the Eleventh Meeting (1973), and shows the period of validity of each of them).

RECOMMENDATION (1)

Mesh of Nets

(This Recommendation is in effect at the time of going to press, and is of indefinite duration).

No vessel shall carry on board or use any trawl, Danish seine or similar net towed or hauled through the sea which has in any part meshes of dimensions smaller than the minimum size specified in this recommendation. The minimum sizes shall be such that when the mesh is stretched diagonally lengthwise of the net a flat gauge 2 mm thick of the appropriate width shall pass through it easily when the net is wet. The appropriate width of gauge in relation to any type of net in any part of the Convention area shall be as follows:

Part of Convention Area	Type of Net	Appropriate Width
(a) Waters in Region 1	Seine net	110 mm
	Such part of any trawl net as is made of cotton, hemp, polyamide fibres or polyester fibres.	120 mm
	Such part of any trawl net as is made of any other material	130 mm
(b) Other waters north of 48° north	Seine net, or such part of any trawl net as is made of single twine and contains no manila or sisal	70 mm
	Such part of any trawl net as is made of double twine and contains no manila or sisal	75 mm
	Such part of any trawl net as is made of manila or sisal	80 mm
(c) Waters south of 48° north	Seine net, or such part of any trawl net as is made of single twine and contains no manila or sisal	60 mm
	Such part of any trawl net as is made of double twine and contains no manila or sisal	65 mm
	Such part of any trawl net as is made of manila or sisal	70 mm

RECOMMENDATION (2)

Mixed Fisheries

(This Recommendation is in effect at the time of going to press, and is of indefinite duration)

Notwithstanding Recommendation 1 vessels fishing for mackerel, clupeoid fishes, sand eels (Ammodytes), Norway pout (Gadus esmarkii), smelts, eels, great weevers (Trachinus draco), capelin (Mallotus villosus), blue whiting (Gadus poutassou), horse mackerel (Trachurus trachurus), Polar cod (Boreogadus saida), shrimps, prawns, nephrops or molluscs, saury (Scombresox saurus)

or

for Dicologlossa (or Dicologlossa)cuneata in the area contained within a line joining the following points:

(i)	46°16'N	-	01°36'W	whaling lighthouse
(ii)	46°05'N	-	01°44'W	
(iii)	45°40'N		01°34'W	
(iv)	44°40'N	-	01°34'W	

and then due to the coast,

may carry on board and use nets having meshes of dimensions smaller than those therein specified; except that this recommendation shall not apply to vessels fishing for horse mackerel and blue whiting in Region 3 or for blue whiting in that part of Region 2 south of 52°30'N and west of 7°W; provided that

(a) any fishing instrument used by such vessels for the capture of any of the descriptions of fish specified in this recommendation shall not be used for the purpose of catching other descriptions of fish;

(b) no vessel shall carry on board or use any net having in the cod end meshes of dimensions between 50 mm (irrespective of the material used) and those specified in Recommendation 1 in the area defined in paragraph (b) of that recommendation except those waters east of a line drawn from Hanstholm to Lindesnes and in the area specified in Recommendation 2(A).

RECOMMENDATION 2 (A)

Irish Sea Whiting

(This Recommendation is in effect at the time of going to press, and expires on 31st December 1975)

Until 31st December 1975, vessels based on and landing their catches in ports in the area in the Irish Sea between parallels 54°30' and 53° north latitude, and west of 5°15' west longitude may carry on board and use for the purpose of catching whiting nets not having in any part meshes of less than 60 mm notwithstanding Recommendations 1 and 2(b).

RECOMMENDATION (3)

Attachments to Nets

(This Recommendation is in effect at the time of going to press, and paragraph (a) is of indefinite duration. Paragraph (b) expires on 31st December 1975)

(a) No vessel shall use any device by means of which the mesh in any part of a fishing net to which Recommendation 1 applies is obstructed or otherwise in effect diminished, provided that it shall not be unlawful to attach to the underside of the cod end of a trawl net any canvas, netting, or other material, for the purpose of preventing or reducing wear or tear.

(b) Until 31st December, 1975, the Governments of Contracting States may, notwithstanding sub-paragraph (a) above authorise for trawl nets to which paragraph (a) of Recommendation 1 applies the attachment of chafers or covers to the upper side of the cod ends of trawl nets for the purpose of preventing wear or tear, subject to such chafers or covers complying with one of the following specifications:-

1. A piece of netting having in all its parts meshes the dimensions of which when measured wet are not less than those of the meshes of the net to which it is attached and provided that

   (i) it is fastened to the cod end only along its forward and lateral edges

   (ii) its width is at least one and a half times the width of the part of the cod end which is covered by it (such width being measured at right angles to the long axis of the cod end) and

   (iii) if there is a splitting strop, it extends no more than four meshes forward of the splitting strop and ends not less than four meshes forward of the cod line mesh, or

   if there is no splitting strop, it extends no more than one third of the length of the cod end measured from not less than four meshes in front of the cod line mesh.

2. Pieces of netting, having in all their parts, meshes the dimensions of which when measured wet are not less than those of the meshes of the net to which they are attached and provided that each piece of netting is:-

   (i) fastened by its forward edge only across the cod end at right angles to its long axis

   (ii) of a width of at least the width of the cod end (such width being measured at right angles to the long axis of the cod end at the point of attachment) and,

   (iii) is not more than 10 meshes long; and the aggregate length of all the pieces of netting so attached does not exceed two thirds of the length of the cod end.

3. A piece of netting, made of the same material as the cod end, having in all its parts a mesh twice the mesh size of the cod end when measured wet and fastened to the cod end along the forward, lateral and rear edges only of the netting in such a way that each mesh of the netting coincides with four meshes of the cod end.

RECOMMENDATION (4)

Undersized Fish

(This Recommendation is in effect at the time of going to press, and is of indefinite duration)

Sea fish of the descriptions specified in this recommendation which are caught in any area defined in Recommendation 1 and which are of a size, measured from the tip of the snout to the end of the tail fin, smaller than the minimum size specified for each description in relation to that area shall be treated as undersized; such undersized fish shall not be retained on board any vessel except for the purpose of transplantation to other fishing grounds, but shall be returned immediately to the sea; and shall not be landed, and if below the minimum sizes specified in relation to the area defined in paragraph (b) of that recommendation shall not be sold, exposed or offered for sale in the territory of a contracting state, whether they are whole or have had their heads or any other parts removed;

	Minimum Size (cm) for areas described in Recommendation 1		
	Area (a) (i) and (ii)	Area (b)	Area (c)
Cod (*Gadus morhua*)	34	30	
Haddock (*Melanogrammus aeglefinus*)	31	27	
Hake (*Merluccius merluccius*)	30	30	30
Plaice(*Pleuronectes platessa*)	25	25	
Witch (*Glyptocephalus cynoglossus*)	28	28	
Lemon Sole (*Microstomus kitt*).....	25	25	
Sole (*Solea solea*).....	24	24	24
Turbot (*Scophthalmus maximus*)	30	30	
Brill (*Scophthalmus rhombus*)	30	30	
Megrim (*Lepidorhombus whiff*).....	25	25	
Whiting (*Merlangius merlangus*)....	23	23	
Dab (*Limanda limanda*)	15	15	

RECOMMENDATION (5)

Industrial Landings

(This Recommendation is in effect at the time of going to press, and expires on 1st January 1975).

Notwithstanding Recommendation 4 and until 1st January 1975, 10 per cent by weight of each total landing or part thereof from the fisheries specified in Recommendation 2 which is not intended for human consumption in the form of fish may consist of undersized fish of the descriptions specified in Recommendation 4; and whiting between 20 cm and 23 cm in length shall not be treated as undersized for this purpose.

RECOMMENDATION (6)

Skagerak and Kattegat

(This Recommendation is in effect at the time of going to press, and expires on 1st January 1980).

Notwithstanding Recommendations 1 and 4, and until 1st January, 1980, vessels of bhp not exceeding 150 fishing for whiting east of a line drawn from Hanstholm to Lindesnes may use nets having meshes of dimensions smaller than those specified in Recommendation 1, and may land undersized whiting without restriction as to quantity, provided that such landings shall not include fish of the other descriptions specified in Recommendation 4.

RECOMMENDATION (7)

High Seas Fishery for Salmon

(This Recommendation is in effect at the time of going to press, and is subject to review as shown in the final paragraph)

Fishing for salmon shall be regulated by the following measures:-

1. Closed Season

   In Regions 1 and 2 of the Convention Area, outside national fishery limits, fishing for salmon shall be prohibited from July 1st to May 5th, both dates inclusive.

   Where salmon occurs within the national fishery limits of Contracting States, those States shall prescribe annual closed seasons during which fishing for salmon shall be prohibited.

2. Minimum Size

   No salmon of a size less than 60 cm, measured from the tip of the snout to the end of the tail fin shall be retained on board, but shall be returned immediately to the sea.

3. Mesh of Nets

   Drift nets, anchored nets and seines used for fishing of salmon shall have a minimum mesh size of 160 mm. The mesh size is to be measured in accordance with the mesh regulations already in force under Recommendation (1).

4. Other Measures for the Regulation of Fishing Gear

In the fishery for salmon

a) any hooks used shall have a gape of not less than 1.9 cm;

b) the leader attaching the hook to the line shall have a minimum strength comparable to 0.6 monofil nylon;

c) the use of any trawl net, any monofilament net, or any troll shall be prohibited.

5. Closed Areas

Fishing for salmon in the Convention Area, outside national fishery limits, shall be prohibited

a) east of longitude 0° between latitudes 63°N and 68°N

b) east of longitude 22°E

c) in Region 2 south of latitude 62°N between longitude 2°E and longitude 11°W, and

d) in ICES statistical area Va.

The regulations under 2, 3 and 4 shall apply within the whole Convention Area, but outside the national fishery limits.

This regulation for salmon fisheries shall be subject to review by the Commission from time to time or in any case if substantial changes occur in the catches of salmon on the high seas or in home waters, or in the fish stocks.

RECOMMENDATION (7)(A)

High Seas Fishery for Salmon

(This Recommendation comes into force on 1st January, 1976 and is of indefinite duration)

Fishing for salmon in the Convention Area outside national fishery limits shall be prohibited as from 1st January, 1976.

RECOMMENDATION (8)

North Sea Herring

(This Recommendation is in effect at the time of going to press and expires on 15th June, 1974)

1. In the period beginning on 1st February 1974 and ending on 15th June 1974 fishing for herring (Clupea harengus) shall be prohibited in the North Sea and Skagerak.

2. If, before 1st January 1974 the competent authority of a Contracting State notifies the Commission that in order to avoid special difficulties a quantity of herring not exceeding 2 500 tons in 1974 and used for human consumption or bait should be exempted from the provisions of this Recommendation, then:

(a) those provisions shall be modified to the extent of the quantity so notified in their application to nationals of that Contracting State.

(b) the competent authority of the Contracting State shall report to the Commission on the steps it has taken or proposes to take to ensure that the exemption granted in this paragraph is not abused.

(c) the Commission shall inform all Contracting States of the exemptions, notified on behalf of any Contracting State.

3. For the purposes of this Recommendation the North Sea and Skagerak means all Convention waters in the area bounded on the north by 62°N latitude, on the west by longitude 4°W from its junction with 62°N latitude to the Scottish coast and in the English Channel 1°W and on the east by the line drawn from Skagen to Pater Noster Lighthouse.

4. Notwithstanding paragraph 1 above, 10% weight of each landing of fish may consist of herring.

5. Notwithstanding the above, and taking account of the special constitutional status of the Faroe Islands, Faroese fishermen shall have the right to catch 2 500 tons in 1974 in the North Sea and Skagerak for human consumption or bait in the closed periods, additional to the quantities allowed to Denmark under this Recommendation.

6. (a) Notwithstanding the provisions in paragraphs 1, 2 and 5 of this Recommendation a Contracting State shall have the right as far as 1974 is concerned to catch herring for human consumption or bait in the period 1st February to 31st March up to a limit of its catch for those purposes in those months in any of the years 1969 to 1972. If the right is exercised the amount of 2 500 tons exempted in the paragraphs 2 and 5 shall be reduced to 1 250 tons for the remaining period of the closed season.

(b) The Commission should, before 1st January 1974 be notified by the competent authority of a Contracting State about the exemption alternative chosen by that State.

7. Being aware that the above regulation does not amount to the reduction of fishing mortality which seems necessary for the recovery of the stocks within a reasonable time, the Commission resolves to consider the introduction of further reductions of fishing intensity in the following years. In such further discussions it shall also seek to achieve the best possible equality of sacrifice for each country. The Commission requests member countries to consider restrictions they would be willing to introduce and to inform the Commission in this respect not later than one month before the Tenth Meeting.

RECOMMENDATION (9)

Atlanto-Scandian Herring

(This Recommendation is in effect at the time of going to press, and expires on 31st December, 1974)

The fishing for Atlanto-Scandian herring in 1974 shall be regulated by the following measures:-

1. The fishing for herring is prohibited in those parts of the Convention Area which corresponds to the ICES statistical areas I, II and Vb.

2. Notwithstanding the provision in 1 above a Contracting State may exempt a quantity of herring for human consumption or bait corresponding to 20% of its catch of small and fat herring in these areas in 1969.

3. The fishery on the local early summer spawning herring in coastal Faroese waters shall not be affected by this regulation.

4. The competent authority of a Contracting State shall notify the Commission of any exemption which the Contracting State makes under 2. above and of the steps which the competent authority has taken or proposes to take to ensure that the exemption is not abused.

5. The Commission shall inform all Contracting States of the exemptions notified on behalf of any Contracting State.

RECOMMENDATION (10)

Use of Purse-seines for Herring in the Celtic Sea

(This Recommendation is in effect at the time of going to press and is of indefinite duration)

The use of purse-seines for the capture of herring in the Celtic Sea (i.e. within the area bounded by 5° and 9°W longitude and 49° and 52°30'N latitude) shall be prohibited.

RECOMMENDATION (11)

Mackerel caught for Industrial Purposes

(This Recommendation is in effect at the time of going to press and is of indefinite duration)

1. In ICES statistical areas IIIa and IV it is prohibited to fish for industrial purposes mackerel of a size smaller than 30 cm measured from the tip of the snout to the end of the tail fin.

2. Notwithstanding the provision in 1 above landings of mackerel for industrial purposes may consist of 20% by weight of undersized mackerel.

RECOMMENDATION (12)

Supply of Catch Statistics to ICES

(This Recommendation is in effect at the time of going to press and is of indefinite duration)

1. Each member country should make available to the ICES Secretariat not later than 1st February in each year its nominal catch data for the previous calendar year. The data should be broken down by species and ICES sub-areas and should include information on the following species:

   Herring, mackerel, capelin, sprat, cod, haddock, whiting, saithe, Norway pout, hake, plaice, sole, sandeel and redfish.

2. The data should be given on a standard form to be produced by ICES and distributed by the Commission's Secretariat to Commissioners, who should take the necessary steps to see that the required statistics are submitted to ICES by 1st February.

3. If a country cannot produce its final data before 1st February, then preliminary estimates of the annual catches should be submitted and the way in which these have been derived should be stated.

4. ICES should specify at its annual statutory meeting any more detailed statistics (e.g. data broken down by months) which it requires in order to make assessments for particular stocks in time for the next meeting of the Commission. Member countries should then supply these by following the procedures set out in paragraphs 2 and 3 above.

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ANNEX 2

WORKING GROUPS OF THE INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

1973/74

(The Committee through which they report are in brackets)

Working Group on Data Collection and Processing in Fish Capture Research (Gear and Behaviour Committee)

Working Group on Standardisation of Scientific Methods for Comparing Catching Performance of Different Fishing Gear (Gear and Behaviour Committee)

Working Group on Research on Sound and Vibrations in Relation to Fish Capture (Gear and Behaviour Committee)

Working Group on Research on Engineering Aspects of Fishing Gear, Vessels and Equipment (Gear and Behaviour Committee)

Working Group on Reaction of Fish to Fishing Operations (Gear and Behaviour Committee)

Working Group on Marine Data Management (Hydrography Committee)

Working Group for Co-ordinating the Collection of Oceanographic Data from Ocean Weather Stations A, I, J, K and M (Hydrography Committee)

Working Group on the Co-ordination of Hydrographic Investigations in the North Sea (Hydrography Committee)

Working Group on the Co-ordination of Hydrographic Investigations in the Baltic (Hydrography Committee)

Working Group on Chemical Analysis of Sea Water (Hydrography Committee)

Working Group on the "Overflow" Expedition 1973 (Hydrography Committee)

Working Group on Eventual Establishment of an ICES ADP System for Fishery Statistics (Statistics Committee)

Coordinating Working Party for Atlantic Fishery Statistics*(Statistics Committee)

Working Group for an International Study of the Pollution of the North Sea and its Effects on Living Resources and their Exploitation (Fisheries Improvement Committee)

ICES/SCOR Working Group on the Study of Pollution of the Baltic (Fisheries Improvement Committee)

Working Group on the Introduction of Non-Indigenous Marine Organisms (Fisheries Improvement Committee)

Working Group on the Effects on Fisheries of Marine Sand and Gravel Extraction (Fisheries Improvement Committee)

North-East Arctic Fisheries Working Group (Demersal Fish (Northern) Committee)

North-Western Working Group (Demersal Fish (Northern) Committee)

North Sea Flatfish Working Group (Demersal Fish (Northern) Committee)

North Sea Roundfish Working Group (Demersal Fish (Northern) Committee)

Working Group on Assessment of Demersal Stocks in the Baltic (Demersal Fish (Northern) Committee)

The Saithe (Coalfish) Working Group (Demersal Fish (Northern) Committee)

Working Group on Irish Sea Whiting (Demersal Fish (Northern) Committee)

Working Group on Fish Stocks at the Faroes (Demersal Fish (Northern) Committee)

Joint ICES/ICNAF Working Group on Cod Stocks in the North Atlantic (Demersal Fish (Northern) Committee

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*) with FAO, ICNAF, ICCAT and ICSEAF

Working Group on the Assessment of the Stocks of Hake (Demersal Fish (Northern) and (Southern) Committees)

Working Group on North Sea Herring Larval Surveys (Pelagic Fish (Northern) Committee)

Working Group on North Sea Young Herring Surveys (Pelagic Fish (Northern) Committee)

Atlanto-Scandian Herring Working Group (Pelagic Fish (Northern) Committee)

Working Group on the Bløden Tagging Experiment (Pelagic Fish (Northern) Committee

Herring Assessment Working Group for the Area south of 62°N (Pelagic Fish (Northern) Committee)

Working Group on Pelagic Stocks in the Baltic (Pelagic Fish (Northern) Committee)

The Mackerel Working Group (Pelagic Fish (Northern) Committee)

The Bluefin Tuna Working Group (Pelagic Fish (Southern) Committee)

Working Group to Co-ordinate Fish Eggs Surveys in ICES Sub-Areas VII, VIII and IX (Pelagic Fish (Southern) Committee)

Working Group on Assessment of Pandalus Stocks (Shellfish and Benthos Committee)

The Baltic Salmon Working Group (Anadromous and Catadromous Fish Committee)

ICES/ICNAF Joint Working Party on North Atlantic Salmon (Anadromous and Catadromous Fish Committee)

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ANNEX 3

ICES WORKING GROUP REPORTS RELEVANT TO THE PRESENT REPORT, AND OTHER REFERENCES

I. Cooperative Research Reports

a) Liaison Committee Reports

These were for the years 1963 to 1971 inclusive published as Cooperative Research Reports, Series B. From 1972 they have been published as follows:

Coop.Res.Rep., No.31	Report of the Liaison Committee of ICES to the North-East Atlantic Fisheries Commission 1972.
Coop.Res.Rep., No.36	Report of the Liaison Committee of ICES to the North-East Atlantic Fisheries Commission 1973.

b) Other Reports

Coop.Res.Rep., Ser.A, No.1	The Northwestern Working Group (1962).
Coop.Res.Rep., Ser.A, No.2	The Mesh Selection Working Group (1964).
Coop.Res.Rep., Ser.A, No.3	The 1962 Iceland Trawl Mesh Selection Working Group (1965).
Coop.Res.Rep., Ser.A, No.4	The North Sea Herring (1965).
Coop.Res.Rep., Ser.A, No.5	The Working Group on Sole (1965).
Coop.Res.Rep., Ser.A, No.6	The Coalfish Working Group (1965).
Coop.Res.Rep., Ser.A, No.8	Report of the ICES/ICNAF Joint Working Party on North Atlantic Salmon, 1966 (1967).
Coop.Res.Rep., Ser.A, No.9	Report of the Working Group on Assessment of Demersal Species in the North Sea (1969).
Coop.Res.Rep., Ser.A, No.10	Report of the Northwestern Working Group, 1968 (1969).
Coop.Res.Rep., Ser.A, No.11	Report of the Working Group on the Establishment of an International Herring Research Scheme (1969).
Coop.Res.Rep., Ser.A, No.12	Report of the ICES/ICNAF Joint Working Party on North Atlantic Salmon (1969).
Coop.Res.Rep., Ser.A, No.14	Report of the North Sea Young Herring Working Group (1969).
Coop.Res.Rep., Ser.A, No.16	Reports of the North-East Arctic Fisheries Working Group: Copenhagen 4-14 December 1967 and Copenhagen 13-17 January 1969 (1970).
Coop.Res.Rep., Ser.A, No.17	Report of the Working Group on Atlanto-Scandian Herring, Copenhagen 21-25 April 1969 (1970).
Coop.Res.Rep., Ser.A, No.18	Report on the International 0-Group Surveys in the Barents Sea (1970).

Coop.Res.Rep., Ser.A, No.19	Report on International Surveys of Herring Larvae in the North Sea in 1967 and 1968 (1970).
Coop.Res.Rep., Ser.A, No.21	Report on the State of Herring Stocks around Iceland and Northwest of Scotland - December 1969 (1971).
Coop.Res.Rep., Ser.A, No.22	Reports on Investigations on Herring Larvae 1968-1970 (1971).
Coop.Res.Rep., Ser.A, No.23	Fourth Report of the Bluefin Tuna Working Group (1971)*
Coop.Res.Rep., Ser.A, No.24	Third Report of the ICES/ICNAF Joint Working Party on North Atlantic Salmon, December 1970 (1971).
Coop.Res.Rep., Ser.A, No.25	Report of the ICES/ICNAF Working Group on Selectivity Analysis (1971).
Coop.Res.Rep., Ser.A, No.26	Report of the North Sea Herring Assessment Working Group (1971).
Coop.Res.Rep., Ser.A, No.27	The Pandalus and Nephrops fisheries of the ICES and ICNAF Areas (1971).
Coop.Res.Rep., Ser.A, No.28	Report on the International Surveys of Herring Larvae in the North Sea and Adjacent Waters in 1970-1971 (1972).
Coop.Res.Rep., Ser.A, No.30	Report of the Meeting of the Working Group on Atlanto-Scandian Herring, Copenhagen 12-13 January 1971 (1972).
Coop.Res.Rep., No.32	Report of the Working Group on the Introduction of Non-Indigenous Marine Organisms (1972).
Coop.Res.Rep., No.33	Report of the ICES/ICNAF Working Group on Cod Stocks in the North Atlantic (1973).
Coop.Res.Rep., No.34	Report on Surveys of Herring Larvae in the North Sea and Adjacent Waters, 1971-1972 (1973).
Coop.Res.Rep., No.35	Fourth Report of the ICES/ICNAF Working Party on North Atlantic Salmon (1973).

II. Reports of Working Groups from the years 1972 and 1973, which have not, or not yet, been published as Cooperative Research Reports

(The coding refers to ICES meeting documents)

1972

C.M.1972/F:2	Report of the North Sea Flatfish Working Group, Charlottenlund, 4-7 January 1972.
C.M.1972/F:3	Report of the 10th Meeting of the North-East Arctic Fisheries Working Group, Charlottenlund, 8-11 February 1972.

*) The three first reports of this Working Group were published as "Statistical News Letters" No. 20 (1964); No.26 (1966) and No.38 (1968).

C.M.1972/F:5 Report of the Meeting of the Working Group on Assessment of Demersal Stocks in the Baltic, Gdynia, 21-26 February 1972.

C.M.1972/F:35 Progress Report of the North Sea Roundfish Working Group.

C.M.1972/H:2 Interim Report of the North Sea Herring Assessment Working Group, Charlottenlund 24-28 January 1972.

C.M.1973/H:13 Report of the North Sea Herring Assessment Working Group, Charlottenlund, 13-22 June 1972.

C.M.1972/J:2 Report of the Bluefin Tuna Working Group. Observations on the size composition of Bluefin Tuna catches from 1971.

C.M.1972/K:6 Report of the First Meeting of the ICES Working Group on Pandalus borealis.

1973

C.M.1973/E:5 Report of the ICES Working Group on the Introduction of Non-Indigenous Marine Organisms (London, 26-28 June 1973).

C.M.1973/F:2 Report of the Working Group on Irish Sea Whiting.

C.M.1973/F:3 Report of the North-East Arctic Fisheries Working Group.

C.M.1973/F:6 Report of the Working Group for Assessment of Demersal Stocks in the Baltic.

C.M.1973/F:10 Report of the Saithe (Coalfish) Working Group.

C.M.1973/F:12 Report of the Roundfish Working Group 1973.

C.M.1973/F:18 Report of the North Sea Flatfish Working Group, IJmuiden 28-31 August 1973.

C.M.1973/F:27 Report of the North Sea Flatfish Working Group, Charlottenlund 22-26 January 1973.

C.M.1973/G:2 Report of the Working Group on the Assessment of the Stocks of Hake.

C.M.1973/H:2 Report of the Working Group on Celtic Sea Herring Assessment.

C.M.1973/H:10 Preliminary Report of the ICES Working Group on the Bløden Tagging Experiment, 27/6 - 3/7 1973.

C.M.1973/H:27 Report of the North Sea Herring Assessment Working Group, 3-7 September 1973.

C.M.1973/J:4 Report of the Bluefin Tuna Working Group. Observations on the size composition of the Bluefin Tuna catches from 1972.

C.M.1973/K:2 Report of the Meeting of the Working Group on Assessment of Pandalus borealis stocks, 12-15 March 1973.

C.M.1973/M:5 Report of the ICES/ICNAF Joint Working Party on North Atlantic Salmon, Copenhagen, 19-23 March 1973.

III. Other References

Cushing, D.H., 1972. A history of some of the International Fisheries Commissions. Proc. R. Soc. Edinb.(B), 73, 361-390.

Went, A.E.J., 1972. The history of the International Council for the Exploration of the Sea. Proc. R. Soc. Edinb.(B), 73, 351-360.

Went, A.E.J., 1973. Seventy Years Agrowing. A History of the International Council for the Exploration of the Sea 1902-1972. Rapp. P.-v.Réun., Cons.int.Explor.Mer, 165, 252 pp.

ANNEX 4

SCIENTISTS WHO CONTRIBUTED TO THE PREPARATION OF THE PRESENT REPORT

This Survey of Fish Resources in the North-East Atlantic was compiled under the supervision of the Liaison Committee of ICES, at a time when Mr A J Lee was its Chairman, and Mr J Møller Christensen its Secretary. The major part of the coordination and editing of the volume was done by them.

The charts have been drawn at the Fisheries Laboratory, Lowestoft.

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