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Status of Fisheries and Research Carried out in Subarea 1 and off East Greenland in 1973

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I. Pertinent Documents

The following Research Reports by ICNAF member countries contain information on fisheries and/or research carried out in Subarea 1 and off East Greenland in 1973 (1974 Summ.Doc. No. in brackets): Denmark (30), France (22), Federal Republic of Germany (33), German Democratic Republic (36), Norway (24), Portugal (29), Spain (27), USSR (26) and the UK (31). Also Res.Doc. 74/53 (sand eel), 74/67 (plankton), 74/74 (hydrography), 74/86 (cod assessment) and 74/88 (Spanish by-catches) contain information on research carried out in the Subarea in 1973.

Work on salmon has been reported to the ICES/ICNAF Joint Working Party on North Atlantic Salmon (Summ.Doc. 74/17) and work on seals will be reported to Panel A. Documents containing information on salmon or seals solely are, therefore, not listed here and such work is omitted from this summary.

II. Status of the Fisheries

A. Subarea 1

Table 1 gives the nominal catches by species or group of species for the last six years. Table 2 shows for the same years total catches and catches of cod by countries.

Table 1. Nominal catches from Subarea 1 (thousands of metric tons) by principal species (excluding mammals)(figures from ICNAF Statistical Bulletin and Summ.Doc. 74/38).

	1968	1969	1970	1971	1972	1973
All species	419	236	146	150	139	104
Cod	394	215	113	121	111	63
Redfish	9	5	5	3	3	3
Grenadiers	+	+	6	4	3	4
Greenland halibut	2	2	2	4	4	7
Salmon	1	2	2	3	2	2
Shrimps	6	7	9	9	9	13
Other species	7	5	9	6	7	12

Table 2. Nominal catches from Subarea 1 (thousands of metric tons) by countries. Only countries with more than 1000 tons total catch in one of the years are shown separately (figures from ICNAF Statistical Bulletin and Summ.Doc. 74/38).

	All species (excluding mammals)						Cod					
	1968	1969	1970	1971	1972	1973	1968	1969	1970	1971	1972	1973
Denmark (F)	46	19	8	17	11	6	46	18	8	16	10	4
Denmark (G)	33	38	37	37	41	41	21	24	20	19	23	18
France	47	25	5	4	6	+	47	25	5	4	6	+
F.R. Germany	145	83	45	43	20	9	133	79	41	41	17	6
German D.R.	29	10	5	3	+	3	28	10	2	3	+	-
Norway	52	19	7	8	33	18	51	18	6	6	32	15
Portugal	33	16	9	6	8	8	33	16	9	6	8	8
Spain	22	24	19	23	13	10	22	24	19	22	13	10
USSR	2	+	8	5	4	6	2	+	1	+	1	+
UK	10	1	4	3	1	1	10	1	3	2	1	+
Total	419	236	146	150	139	104	394	215	113	121	111	63

Total nominal catch in 1973 decreased from 139,000 tons in 1972 to 104,000 tons. The decline was due to a further drastic decline in catches of cod not counterbalanced by an increase in catches of some other species. The catch of cod is now only about 15% of the level in the peak period in the mid-1960's, and whereas cod formerly accounted for more than 90% of the total catch it now accounts for only 60% of the total catch.

Catches of species other than cod have remained rather stable compared to 1972 or shown some increase, especially pronounced for shrimps, which now account for about 13% of the total catch in the Subarea.

As shown in Table 2 the changes in catches over the last years have varied greatly between countries. Most countries, especially, of course, those with formerly high catches have had an abrupt decline in their fisheries (e.g. F.R. Germany, German D.R., Portugal, France and Denmark (F)). The decline is less pronounced for Spain. Norway had an abrupt decline from 1968 to 1971, increased catches remarkably in 1972 but has not maintained this relatively high level in 1973. The only country with a steady or even increasing total catch is Denmark (G), but it will be seen from Table 2 that this has been possible only by increasing the fisheries for species other than cod. However, also for cod Denmark (G) is the only country with a rather steady catch level, but this has been possible only by the development of a fleet of modern stern trawlers to supply the Greenland fishing industries.

The major cod fishing countries (Denmark (G), Fed. Rep. Germany and Norway) report that catch per effort has decreased by about 30% from 1972 to 1973. Except for Denmark (G) there seems also to have been a general decreasing fishing activity for cod in the Subarea.

The Portuguese catch is taken nearly exclusively by gillnets and so is a considerable part of the Norwegian catch and also a part of the Danish catch. This fishery exploits rather bigger and older fish than the trawl fishery does.

B. East Greenland

Nominal catches from waters off East Greenland in the last six years are shown in Table 3.

Table 3. Nominal catches from East Greenland waters (thousand metric tons) (figures from Summ.Docs. 73/33 and 74/33).

	Total						Cod						Redfish					
	68	69	70	71	72	73	68	69	70	71	72	73	68	69	70	71	72	73
F.R. Germany	26	41	31	44	30	14	10	14	14	29	22	9	15	25	16	14	7	4
Iceland	13	9	7	-	-	-	7	4	5	-	-	-	6	4	1	-	-	-
Others	1	1	1	1	1	+	1	1	1	1	1	+	+	+	+	+	+	+
Total	40	51	39	45	31	14	18	19	20	30	23	9	21	29	17	14	7	4

As will be seen from the table, total catch off East Greenland in 1973 is only half of that in 1972. The catch of redfish is the lowest recorded since this fishery started in 1955. The effort in 1973 was only little above half of that in 1972. Catch per day for cod decreased somewhat and increased slightly for redfish but total catch per day in the German fishery is the lowest recorded.

The decline in catches of cod reflects the decrease in the spawning stock off East Greenland, partly due to some migration of mature cod to Icelandic waters and partly due to the present low recruitment to the stock.

For the Fed. Rep. Germany the fishery off East Greenland is higher than its catch in Subarea 1 which was also the case (for the first time) in 1972.

III. Research Work

Research work concerning Subarea 1 in 1973 is reported by Denmark, Fed. Rep. Germany, German Dem. Rep., Portugal, Spain, USSR and the UK.

A. Hydrography

(Denmark, Fed. Rep. Germany, USSR and UK)

Hydrographic studies have been carried out in all divisions but with the best coverage in Div. 1D (section cross the Fylla Bank).

The cold conditions prevalent since 1969 in West Greenland waters persisted in late winter and spring of 1973 and water temperatures were still very low in May in the upper 100 meters in the Fylla Bank area. However, in June and August relatively high temperatures were found over the bank, and the polar component of the West Greenland Current was apparently weak during the summer as no negative temperatures were found off the western slope of the Fylla Bank. On the other hand temperatures in the deep water (deeper than 300 meters) did not reach a level of more than between 3° and 4°C in August so that the Irminger component of the West Greenland Current seems to have been relatively cold. An inflow of warmer Irminger water was noted in October in the deep water west of the Fylla Bank, but the strength of the Irminger component at the end of 1973 was less than at the same time in 1972.

USSR reports that in the northern part of the subarea (Store Hellefiske Bank, Div. 1B) temperatures in September were rather much lower than observed in the period 1962-67. In November-December, the Fed. Rep. Germany reports temperatures over the southern part of this division to be more than 1°C warmer than in 1972. Generally some improvement seems to have occurred in the upper water layers in summer and autumn. The 5-years running mean of sea surface temperature anomalies has decreased to the level obtained in the cold period before the cod period began around 1920.

B. Ice observations

(Denmark, Redbook 1973, Part II, p. 39 by Fed. Rep. Germany)

After the rather severe ice years 1969-72, 1973 has shown more normal ice conditions off West Greenland. Polar ice did not pass north of Frederikshåb (62°N). Some polar ice reappeared in the southernmost part of Julianhåb Bay (Div. 1F) in September and covered the whole bay through October but was absent again in November.

Also the west ice has been rather normal reaching the West Greenland coast at lat. 66°N in January. South of 66°N formations of pancake ice were observed on several places in the winter 1972-73.

C. Other environmental studies

Denmark has initiated environmental studies in the Umanak area (Div. 1A, inshore) as part of the environmental control with a newly-established lead and zinc mine. Observations have especially been concerned with chemical analysis of the sea water, measurement of the currents and analysis of the benthic animal communities.

D. Plankton

(Denmark, UK)

The Continuous Plankton Recorder Surveys operated from the Oceanographic Laboratory, Edinburgh, on commercial vessels covered 1417 miles in Subarea 1 in 1973 (1000 miles less than in 1972). The phytoplankton production was lower in all months of 1973 than the monthly mean for the 1959-72 period but the peak in spring occurred at the normal time of the year. Total numbers of copepods were slightly above the 1959-72 average in April-July and slightly below the average in the remainder part of the year. Redfish larvae were unusually abundant in July.

Danish samples showed the plankton volume on the Fylla Bank section to be the lowest but one year since 1961.

E. Cod

(Denmark, Fed. Rep. Germany, Portugal, Spain, USSR and UK)

1. Eggs and larvae

Danish plankton surveys showed cod larvae to be as scarce as in 1972. Although temperatures in the upper water layers increased in the summer compared to the preceding cold years since 1969, the number of cod larvae does not give support to the hope that the 1973 year-class will be more than modest.

2. Young fish (age-groups I, II and III)

Groundfish surveys conducted by the Fed. Rep. Germany and the UK revealed only small quantities of pre-recruit cod. The Danish standard stations for trawling also showed very limited numbers of young cod compared to earlier years.

Information on discards and industrial fish (Summ.Doc. 74/16) shows that the discarding has been insignificant, and also in the Greenland pound net fishery the number of pre-recruit cod has been small.

On the other hand observations on board Spanish pair trawlers in the period August-November in Div. 1B, 1C and 1D showed their catches to contain up to 18% by number of 3-year-old cod (year-class 1970), especially in Div. 1C in August, but less in Div. 1D (up to 4%).

3. Composition of commercial catches

Length and age composition of commercial catches reported by Denmark and the Fed. Rep. Germany clearly demonstrates that their trawl fisheries in 1973 have been extremely dependent upon the 1968 year-class which in some samples constitutes about 90% of the sample. Also the inshore pound net catches have, to a large extent, consisted of the 1968 year-class. This year-class seems to be rather evenly distributed in the Subarea.

The Spanish pair trawlers' catches taken mainly in the last half of the year and in Div. 1B-1D also show a strong influence of the 1968 year-class which in terms of weight probably makes up the greatest part of their catch. However, contradictory to the Danish and German trawlers, the Spanish trawlers' catches also contain many fish of the 1969 year-class, especially in Div. 1B and 1C where the 1969 year-class accounts for as much as 37-45% by number of the catch, whereas in Div. 1D the 1968 year-class predominates by up to 62% of the catch.

The gillnet fishery sampled by Portugal and Denmark exploits much bigger and older fish than the trawlers do. The mean length of fish in the Portuguese samples is as much as 80-83 cm, and the catches taken primarily in Div. 1B-1D consist mainly of 7- and 8-year-olds (year-classes 1966 and 1965 respectively) whereas a Danish sample from Div. 1F contains mainly 9- and 10-year-olds (year-classes 1964 and 1963 respectively). The 1968 year-class is only to a limited extent recruited to the gillnet fishery in 1973 but will presumably make up a much bigger part of the gillnet catches in 1974 and 1975.

Off East Greenland the 1964 and 1963 year-classes dominated in the German catches by 34 and 31% respectively, while the formerly predominant 1961 year-class seems to be disappearing, partly due to fishing and natural mortality but also due to emigration to Icelandic waters. To what extent the 1968 year-class will contribute to the spawning stock off East Greenland in 1975 and following year is now known, but it seems likely that some part of the year-class will undertake spawning migration from Subarea 1 to East Greenland.

The Subarea 1 spawning stock is at present very low. It may increase temporarily in 1975-76 when the 1968 year-class is likely to reach its maximum spawning potential, but due to the expected poor year-classes after 1968 the spawning potential is expected to decrease again after 1975-76.

4. Tagging

Denmark tagged 182 cod in Div. 1D.

5. Other studies on cod

Studies of the stage of maturity and on age at first maturity were carried out by Portugal. Age at first maturity seems to vary between 6 and 8 years.

6. By-catch in the fishery for cod

Spain has made observations on the by-catches of pair trawlers fishing for cod in Div. 1C and 1D in August and September. Wolffishes and American plaice were the most important species followed by sand eel, capelin, Greenland cod, halibut and redfish. Samples for length distribution were taken of halibut, Greenland cod, American plaice and sand eel.

F. Roundnose grenadier

(German Dem. Rep.)

Length measurements of 6762 specimens and age determination of 300 specimens from Div. 1C showed mean length to be 59 cm and ages to range from 9 to 24 years with ages 14-19 as the most predominant.

G. Greenland halibut

(Denmark, German Dem. Rep., USSR)

The USSR conducted a series of trawl hauls in a depth of 620-640 m in the western part of Div. 1C. Size composition of the catches showed males to be rather smaller than females (mean lengths 57 and 75 cm respectively). The Greenland halibut in these catches fed on fish such as grenadiers, redfish, juveniles of its own and cephalopods.

The German Dem. Rep. reports that in Div. 1B the predominant length groups were 40-55 cm and in Div. 1C 43-55 cm.

Denmark tagged 175 specimens in Div. 1A and sampled lengths and weight.

H. American plaice

(Denmark, Fed. Rep. Germany, Spain, USSR)

Danish research vessel catches were analyzed for lengths, weights, sex and age, and 49 specimens were tagged in Div. 1D. Spanish by-catches of American plaice were sampled (length composition). Samples by Fed. Rep. Germany have also been submitted to ICNAF.

The USSR observed pre-spawning and spawning concentrations of American plaice in Div. 1C in February, March and April. After spawning in April these concentrations spread again. The USSR scientists have not seen such concentrations in the subarea before and suggest that extreme cooling in the northern part of the Subarea favoured the tendency to concentrate here.

Length composition of the USSR catches shows males to be smaller than females, mean length for males being 25-27 cm, for females about 36 cm. The male:female ratio ranged from 1:9 in February over 1:2 in March to 1:1.6 in April.

I. Other groundfish

(Denmark, Fed. Rep. Germany, Spain, USSR, UK)

Spain sampled lengths of by-catches of *Gadus ogac* and redfish. Also Fed. Rep. Germany has submitted samples of *Gadus ogac*. Denmark, Fed. Rep. Germany, USSR and the UK have conducted trawl surveys but no detailed information on groundfish other than those already mentioned in earlier paragraphs is given.

J. Capelin

Denmark conducted experimental pelagic trawling in Div. 1C inshore in April-May and in November.

K. Sand eel

(Spain, USSR)

Spain reports length composition of by-catch of sand eel, and the USSR found that sand eel at West Greenland had a slower growth rate than sand eel in Subarea 3. Fish of ages 5 and 6 were predominant (Res.Doc. 74/53).

L. Salmon

(Denmark)

Experimental fishing in waters between Iceland and East Greenland was conducted for comparison of stock density with that at West Greenland. Further tagging survival experiments were conducted at West Greenland.

M. Crustaceans

(Denmark)

Further investigations on the distribution of *Pandalus borealis* were conducted in Div. 1A and 1F. Routine sampling of shrimps was made on other grounds. Fishing experiments for crab (*Chionoecetes opilio*) took place in Div. 1D inshore.

N. Seals

Danish research on seals in the subarea is reported to Panel A in Summ.Doc. 74/30 and Res.Doc. 74/85.