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Denmark (Greenland) Research Report for 1981

edited by

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This report contains information on the fisheries by Greenland vessels and on research carried out by Greenland Fisheries Investigations (Grønlands Fiskeriundersøgelser) in the NAFO Area and at East Greenland (ICES Subarea XIV) in 1981. Such work, which is of minor direct importance to NAFO (e.g. much of the land-based environmental work) will only be very briefly mentioned although this kind of work is a major and increasing part of the institute's work.

Various colleagues in the institute have contributed to the report. The hydrographic research has been reported, and to a great extent carried out, by Mr. Erik Buch (Institute of Physical Oceanography, University of Copenhagen).

SUBAREA 0

Detailed statistics for the shrimp fishery was not available at the time when this report was written, but fishing by Greenland vessels in this area may not have occurred in 1981. No specific fisheries research acitivity to be reported. Aerial observations on occurrence of marine mammals in the waters between Baffin Island and Greenland were made in March/April in collaboration with Canadian scientists as part of the research undertaken to analyse possible environmental effects of the Arctic Pilot Project.

SUBAREA 1

A. STATUS OF THE FISHERIES

1. General trends

Final statistics for the fisheries in 1981 were not yet available when this report was written, except for the eight large trawlers operated by the Royal Greenland Trade Department (KGH). However, with the possible exceptance of the inshore shrimp fishery (which is not under the quota regulation) the provisional catches given in Table 1 for 1981 are likely to be very close to the final figures.

¹ The Institute moved from Charlottenlund to Copenhagen in 1981. The new address is:

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Species	Nom. catch 1981 (provisional) tons	Percentage change from 1980
Cod	51,820	13
Greenland cod	3,430	-39
Redfish	520	-57
Wolffishes	3,240	-19
Grenadiers	30	-100
Greenland halibut	4,960 .	-8
Halibut	605	106
Capelin	275	-2
Atlantic salmon	1,264	6
Arctic char	120	-47
Lumpsucker*	935	-47
Herring	7	17
Industrial fish and fish not specified	160	-24
Shrimp	36,000	3
Total (rounded)	103,400	2

Table 1. Nominal catches by Greenland vessels in Subarea 1, 1981 (provisional figures), and the relative changes from 1980 to 1981

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* converted from landings of roe by factor 3.31.

The total nominal catch was at the same level as that in 1980, however, with some changes between the two years for some of the major species. The landings of cod increased by 13%. Shrimp catches are likely to have increased somewhat. Thus, about 85% of the catch in 1981 was composed of the two major species cod and shrimp,

The major part of the offshore finfish catches were taken in Div. 1C and 1D, whereas Div. 1E and 1F were the major divisions for the inshore cod fishery. Div. 1A and 1B remain by far the most important for the shrimp fishery and Div. 1A for the fishery of Greenland halibut.

2. Cod

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a) The fisheries

The nominal catch by Greenland vessels was about 13% higher than in 1980. The larger trawlers' catch doubled to 13,300 tons although their effort was only about 3/4 of that in 1980. Thus, their catch per unit effort increased considerably.

The inshore fishery remained at the 37-38,000 tons level achieved in 1980 with the major part

of the catches taken in Div. 1E and 1F.

No cod fishing by trawlers took place in Div. 1B in contrast to 1980. For both years, the effort by trawlers in Div. 1F was negligible.

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b) Forecast for 1982-83

The important year-class 1973 is now found mainly in Div. 1E and 1F but has been fished much and also migrated to East Greenland, and Iceland. It is, therefore, likely that catches in Div. 1F will decrease in 1982-83. In the more northern divisions, year-class 1977 seems to take over the important role of year-class 1973. Also year-class 1979 may show up in the inshore catches in Div. 1C and 1E in 1982-83. The fishery is thus expected to be concentrated in Div. 1C and 1E with medium sized fish of the 1977 year-class predominating, in Div. 1E possibly also with large fish of older year-classes, including the 1973 year-class.

Further details on the cod stock and the fisheries are found in NAFO SCR Doc. 80/VI/50 (revised).

3. Shrimp

a) The fisheries

Although complete statistics for the shrimp fishery in 1981 is not yet available, it is likely that the catch increased somewhat as compared to 1980. This is due mainly to the offshore fishery.

The offshore fishery was again concentrated in Div. 1B, but areas in Div. 1A seems to be more and more attractive for the fleet.

b) Forecast for 1982

The status of the stock on the offshore shrimp grounds was assessed by the NAFO Working Group on Shrimp in November 1981 (NAFO Scientific Council Reports, 1981: 113-119). It was concluded that the stock has remained relatively stable during 1979-81, and no change in the recommended TAC was proposed.

Severe ice conditions have hampered the fishing in the first months of 1982, but it does nevertheless not seem unlikely that the allowed catches will be taken due to the increased input in and interest for this fishery amongst the Greenland fishermen.

4. Other fish

The quota for the salmon fishery was raised to 1,270 tons in 1980 and the fishery opened 25 August. However, after extreme good cathces in the first couple of weeks, catch rate decreased and the full quota was not taken when the fishery was closed by 1 November. Landings of Greenland cod decreased by more than 1/3, wolffish landings by about 19% and those of Greenland halibut by about 8%.

B. SPECIAL RESEARCH STUDIES

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1. ENVIRONMENTAL STUDIES

1. Hydrography

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In 1980 and 1981 the Danish hydrographic work in SA 1 has been rather much expanded. The *R/V Adolf Jensen* has undertaken two major hydrographic surveys in both years, one in July and another one in November. Furthermore, besides the NAFO Standard Sections normally worked, a grid of stations round the Disko Island (Div. 1A) were occupied. The Fylla Bank Standard Section (Div. 1D), was occupied five times annually, including the two major surveys mentioned.

a) Temperature observations

The mean temperature of the upper 40 m over Fylla Bank Section was 1.9°C in 1980 (Fig. 1), a value just about the 1.8°C considered to be the lower limit for good survival of cod eggs and larvae. In 1981 it was only 1.5°C.

The temperature variation through 1980 and 1981 at the station just west of Fylla Bank is shown in Fig. 2. For the surface layer 1981 showed a very long period of cold water. The summer thermocline was very pronounced in 1980 in a depth around 40 m with surface temperature reaching 5.8°C around 1 September. In 1981 the thermocline was very weak. In the deeper water layers 1981 showed slightly higher temperatures than did 1980, but the general temperature trends in the deeper water layers in 1981 was rather similar to those in 1980. Further details for the Fylla Bank Section can be seen in Fig. 3-6.

Amongst the observations from other parts of the area, it should be mentioned that the Disko Bay area was characterized by relatively high temperatures in the summer period, sometimes exceeding 10°C. In contrast to the area south of Disko Bay, for the Disko Bay area, the year 1981 was not colder than 1980 (Fig. 7-10).

b) Salinity measurements

The salinity measurements are illustrated in Fig. 11-18. The surface layer was less saline in 1981 and in 1980. This, together with the temperature measurements, indicates a relatively strong inflow of water from the East Greenland Current. Also, the amount of icebergs and drift ice in 1981 was an indication of this inflow.

For the deeper water layers west of Fylla Bank the difference between the two years was less pronounced, although 1981 showed slightly higher salinity than 1980.

c) Current measurements

During the summer surveys of 1980 and 1981 current measurements were made on a number of stations. Currents in 10 m depth were generally measured to be around 0.20-0.45 m/sec along the Greenland west coast, whereas in the Disko Bay area 0.10-0.15 m/sec was the general speed measured.

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d) Light measurements

During the July 1980 survey a number of optical measurements were made, especially to determine the depth of the euphotic zone (Zq(1%)) and the amount of chlorophyll a. The results of the Secchi-disc measurements, which were also carried out in July 1981, are shown in Fig. 21-22. The water in the Davis Strait was rather clear while in the Disko Bay the content of particles varied much between the stations occupied.

2. Plankton

Oblique hauls with 2 m stramin net (30 min, 225-0 m wire, about 50-0 m fishing depth, speed about 2 naut. mi./hour) and with Bongo nets (60 cm diameter, 50-1 m fishing depth, 4½ naut. mi./hour) were made in July on the same Standard Sections where hydrographic observations were made and at stations in the Disko area.

The volume of plankton caught in the hauls was on average, and for all sections, well below that in 1980. The mean number of cod larvae was only 0.5 per haul in 1981 (3.1 in 1980), while the number of shrimp larvae caught was lower in the southern part of the Davis Strait but higher in the northern part and in the Disko Bay than in 1980. The main occurrence of shrimp larvae in the area covered is in the Disko Bay area and west thereof.

3. Other environmental studies

The monitoring studies at a disposal site for tailings from a lead-zinc mine and mill in the Umanak fiord (Div. 1A) was continued.

The mussel watch program initiated in 1980 was continued in 1981. The objective of this program is to improve the knowledge of the natural variation of the level of a number of chemical elements in *Mytilus edulis* and some species of seaweed.

Land-based studies, including mainly biological studies of a number of streams, were made at locations where future development of hydropower plants may take place.

II. BIOLOGICAL STUDIES

Cod

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a) Eggs and larvae.

The average number of cod larvae found in the plankton samples in 1981 was only 0.5 per 30 min. haul on the Standard Sections from the Fylla Bank Section off Holsteinsborg. This is

a very low number, and since the reference temperature on Fylla Bank was below the "critical" level of 1.8°C the 1981 cod year-class is expected to be a poor one.

b) Occurrence of pre-recruit cod.

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Cod of age-group 1 (the 1980 year-class) did not have a chance to be observed in the 1980 research, nor in the commercial gears.

Two-year old cod (the 1979 year-class) has been observed as by-catch in the shrimp fishery in the Holsteinsborg Deep (Div. 1B), but apart from that the individuals were still too small to occur in commercial gears, and further evaluation of the year-class awaits the fishery in 1982. Three-year-old cod would likely have been observed frequently in the samples of small cod (below 40 cm total length) discarded from catches by pound net. However, the major group in the discard was the slowest growing individuals of the 1977 year-class, which was partly recruited to the fishery in 1981 and seems to be a good year-class. Further details on the judgement of the strength of the pre-recruit year-classes are found in NAFO SCR Doc. 82/VI/50 (revised).

c) Cod in commercial catches.

In Div. 1C-1E, the age composition of offshore trawlers' catches varied widely, while inshore samples in Div. 1B-1D showed the 1977 year-class to be the predominating one. This year-class also occurred in many of the offshore samples.

In Div. 1E and especially Div. 1F the remainders of the important 1973 year-class still played a major role, but in the inshore samples also younger year-classes, mainly the 1976 and 1977 were markedly represented.

Fig. 23 and 24 show length and age frequencies for some of the offshore and inshore samples, respectively. Further analyses of the age compositions of the 1981 landings are found in NAFO SCR Doc. 82/VI/50 (revised).

d) Tagging experiments

A total of 1,253 cod were tagged, the major part (958) in Div. 1D, 264 in Div. 1C and 31 in Div. 1A.

2. Salmon

The commercial catch by Greenland fishermen was sampled at the fishing plants of Godthåb (Div. 1D) and Holsteinsborg (Div. 1B) in cooperation with Canadian scientists.

3. Other fish species

Samples of wolffishes (by species) and of redfish were taken from trawlers' catches, but the age reading has not yet been made.

The R/V Adolf Jensen carried out some hauls with pelagic trawl to supply samples of capelin. Sampl-

ing of all by-catch species in research hauls during the shrimp survey were taken (mainly redfish, Greenland halibut and American plaice). Sampling and tagging (114 specimens) of Greenland cod for biological studies were continued in Div. 1D.

4. Shrimp (Pandalus borealis)

Like in previous years the research on shrimp had high priority in the program of the institute. Members of the staff participated in a number of commercial trips with the large trawlers and collected a great number of samples of shrimp and made observations and samples of by-catch of fish. A bottom-photography survey was again carried out from the R/V *Adolf Jensen* in the area between 66°N and 69°30'N to assess the density and biomass of shrimp. A total of 18 stations were occupied revealing a total of 2,802 exposures were taken.

The results of the photographic survey were presented to the November 1981 Meeting of the Scientific Council (NAFO SCR Doc. 81/XI/155) while observations on the fisheries were reported in NAFO SCR Doc. 81/XI/151.

5. Crab (Chionoecetes opilio)

Experimental trap fishing and collection of samples of crab (Queen crab) continued in special localities in Div. 1D, inshore. Also some hundred bottom photographies of the best locality were taken but have not yet been analyzed.

6. Marine mammals

Sampling of minke whale and observations of this and other species of whales were carried out in June-August on a Norwegian whaling vessel operating in the Davis Strait.

In March an aerial survey was carried out in co-operation with Canadian scientists to collect information of distribution of marine mammals in the Davis Strait.

EAST GREENLAND

A. STATUS OF THE FISHERIES

The total Greenlandic landings from this area (ICES Subarea XIV) are about 2,500 tons in 1981, some hundred tons above the catch in 1980.

The local fishery at Angmagssalik resulted in a catch of 880 tons of cod, a decrease of 43% from 1980. Offshore catches by trawlers were primarily shrimp (about 1000 tons) while catches of cod are about 575 tons with negligible catch of other fish.

B. SPECIAL RESEARCH STUDIES

Apart from studies based on trawlers' logbooks, no special research by the institute took place in East Greenland waters.

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Fig. 1. Long-term variation in mean temperature over Fylla Bank, 0-40 m, in June.



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Fig. 2. Temperature variation on Station 4 just west of Fylla Bank, 1980/81.

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Fig. 23. Subarea 1 ∞d , 1981. Some of the samples from the offshore fishery by otter travlers. The uppermost sample taken ashore from landings, the other samples taken from the catch on board vessels.



Fig. 24.Jubares 1 col, 1981. Jone of the inshore samples from pound nets. The samples from Div.10 and 1D are from catches before discarding undersized fish (below 40 cm), the other samples from landings at fish plants.

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