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Denmark/Greenland Research Report for 2002

by

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This report presents information on preliminary catch statistics from the commercial Greenland fishery in 2002 and when possible, a forecast for the coming years. Furthermore, the report gives a brief overview over the research carried out in 2002 by the Greenland Institute of Natural Resources.

WEST GREENLAND (NAFO SUBAREA 1)

A. Status of the fisheries

Provisional statistics for the fisheries in1999, 2000, 2001 and 2002 are presented in Table 1. Additional information on the status of the fisheries is as follows:

1. Shrimp

The shrimp stock off West Greenland is distributed in Div. 0A and Subarea 1. The fishery is conducted by Greenland and Canada. The Greenland fishery exploits the stock in Subarea 1 (Div. 1A to 1F) in offshore and inshore areas (primarily Disko Bay). The Canadian fishery has been restricted to Div. 0A since 1981. Overall annual catch has increased from less than 10 000 tons in the early-1970s to more than 100 000 tons in 2002.

The inshore fishery (vessels below 80 GRT) accounts for around 20% of the total landings. Reported discard and by-catch is low. The stock is evaluated as being in good condition, and supportive of the current level of exploitation (Anon., 2002).

2. Greenland halibut

The total catches of Greenland halibut by Greenland vessels in NAFO Subarea 1 (excluding Div. 1A inshore) amounted to3 906 in 2002 of this were 1 571 tons were taken in Div. 1AB, – 556 tons by gill net and longline (mainly gill net) and 1 015 tons by trawl. Further, 2294 tons were taken off shore mainly in Div. 1D, – 629 tons by gill net and longlines (mainly gill net) and 1 665 tons by trawlers) (Fig. 1). 41 tons were taken inshore in Div. 1B-1F.

The inshore fishery in Div. 1A was concentrated in three areas Disko Bay (11 718), Uummannaq (5 339 tons) and Upernavik (3 020). The fishery was conducted by long lines and gill nets.

No analytical assessment has been made for either inshore or offshore stock components.

Commercial fisheries data. CPUE data, based on logbooks reported to the Greenland authorities, are available from the two Greenland trawlers engaged in the fishery. One trawler showed stable catch rates in Div.1AB (1.14 tons/hr) in 2001 and 2002, while there were too few observations from the other in 2001 to evaluate the trend. Both trawlers

showed an increase in CPUE in Div. 1D, one from 0.82 to 0.96 tons/hr (the same as in 2000). The other from 0.65 to 0.80 tons/hr but this vessel has changed gear from 2001 to 2002 so the increase is hard to evaluate.

Length frequency data were available from the trawl fishery in Div. 1A and Div. 1D and from the Gill net fishery in Div. 1D.

3. **Cod**

Since 1992, the inshore cod fishery at West Greenland is assumed to be based on self-sustained fjord populations. In recent years, catches have decreased dramatically from about 2 000 tons yearly in 1993-1995 to only 326 tons in 1998. In 2001 catches rose to 1 680 tons and preliminary catch statistics for 2002 report approximately 3 700 tons. Information from fishermen suggests that young cod of Icelandic origin, probably the strong 1997 and 1998 year-classes, appear in the catches from 2001 and 2002.

In the inshore fishery (vessels below 40 GRT) about 95% of the catch is taken with pound nets, gillnets and hand lines. A commercial pound net CPUE series is available since 1992 (total catch from pound nets pr day / total number of poundnet landings pr day). The CPUE decreases from 1994 until 1998 and levels off in 1999. No data on commercial CPUE is available from 2001 and 2002.

Greenland cod stocks are assessed by ICES, see the North-western Working Group report, April 2002 (ICES CM2003 ACFM:.20) and ACFM report 2002: "The offshore component is severely depleted since 1990 with some recovery potential as derived from recent survey indices. The dramatic decrease in stock abundance was associated with changes in environmental conditions, emigration and high fishing mortalities. Inshore catches are increasing although the level is still low compared to landing in the late-1980s. Recruitment to the inshore component has been poor since the moderate 1993-year class but in 2002 some recovery potential was evident in the northern division. Only the offshore catches in Greenland are subject to a TAC regulation. The inshore fishery is unregulated. This may give cause for concern about the exploitation rate of the inshore component. Given suitable climatic conditions (water temperature) and prudent management, sustained production of offshore cod is possible. However, interaction between the East Greenland and Irminger currents during the early-1970s and 1980s has apparently rendered climatic conditions unsuitable for offshore cod in some years. Combined with high fishing mortality, this caused the offshore cod stock to be severely depleted. In order to take advantage of suitable climatic conditions, when they occur, it is necessary to protect the remaining biomass of offshore cod."

4. **Salmon**

The abundance of non-maturing 1SW salmon has declined steadily during the recent 30 years both in the Southern European and the North American continental areas. Some improvement in the number of returning spawners is observed in some of the Canadian rivers. The estimated pre-fishery abundance is at a historical low level, and the predicted level of abundance for 2002 offered only a small positive difference between this level and the estimated number of required spawners. At its annual meeting in 2002 the West Greenland Commission of NASCO agreed to repeat the previous year's *ad hoc* management programme in 2002, however with minor revisions. The programme incorporated the use of real-time data to allocate quota for the commercial part of the fishery. Potential quotas between 20 and 55 tons could be allocated to the fishery, depending on the observed availability of salmon in the beginning of the season. However, shortly before the opening date of the season the Organisation of Fishermen and Hunters in Greenland and the North Atlantic Salmon Fund and its partners agreed to suspend the commercial part of the salmon fishery for 2002. The season was opened August 12 for non-commercial fishery and was open to the end of the year.

The total nominal catches in 2002 amounted to 9 tons. The distribution of the catches along the coast was close to average as was the overall mean size of the salmon. Some unreported catches (mainly private fishery for own consumption) have probably been taken, but due to the very scattered nature of this fishery estimating of the magnitude of this fishery is difficult. As in the past, the magnitude of the unreported catches is estimated at 10 tons for 2002.

5. Capelin

The capelin fishery in West Greenland is carried out inshore and in the spawning season only (May-July). The main part of the catches amounted a total of 6 tons in 2002 is produced as whole frozen fish for bait and local consumption, while a smaller part is dried and stored as food for sledge dogs in the winter season. The majority of the catches were taken in Div. 1A.

6. Redfish

Redfish catches are reported as Beaked redfish (pelagic redfish), redfish (unspecified - mainly by-catch) and Golden redfish. Redfish is mainly taken as by-catch by the offshore shrimp trawlers. Reported redfish taken, as by-catches in 2001 and 2002 were 395 tons and 422 tons respectively, however this is considered an underestimate. Reported catches of beaked redfish from the Greenland pelagic fishery in NAFO Div 1F in both 2001 and 2002 were 124 tons. Smaller vessels take a minor part inshore, but no catches were reported in 2001 and 2002.

Pelagic redfish

Since 1999 a pelagic fishery has developed in Div. 1F in West Greenland for the pelagic *S. mentella* (beaked redfish). The *S. mentella* fished pelagic in the NAFO area is probably an extension of a stock in the Irminger Sea. In 2002, there was significant fishing effort exerted in the NAFO Subarea 1F mainly within the NAFO Regulatory Area. The decrease of annual landings discontinued in 2002 with a catch figure of 10 700 tons in 2001. In 2002, 18% or 2 300 tons of the total landings were taken in the NAFO Div. 1 F. During 1995-1999, the overall unstandardized CPUE decreased from 2 055 kg/h by 53 % to 970 kg/h. In 2000-2002, the CPUE remained at that low level. Given the technical, temporal, geographical and depth changes of the fishing activities the relevance of the estimated reduction in CPUE as indicator of stock abundance remained difficult to assess.

The pelagic redfish in the Irminger Sea is assessed by ICES (NWWG report 2003). This assessment also covers the pelagic redfish caught in the NAFO Div. 1F, 2H and 2J since 1999. The state of the pelagic stock is not precisely known. Acoustic surveys suggest that the stock may have been larger in the early-1990s. Although variable, CPUE series from the commercial fisheries on both redfish types (above and below 500 m) indicate no trend in the stocks since 1995. Biomass estimates from a survey in 2001 suggest a biomass in the order of 2 million tons, but this estimate is highly uncertain. Therefore it is not known if the current exploitation rate is above or below the 5% exploitation rate considered sustainable. Possible changes in the depth distribution of the two redfish types above and below 500 m combined with the differences in geographic coverage of acoustic surveys in different years mean that the acoustic biomass series cannot be interpreted as a consistent series showing relative changes in stock size. The stock structure for pelagic *S. mentella* remain unknown, various stock discrimination studies are often contradictory and not conclusive. Fishing patterns after 1995 resulted in 2 almost distinct fishing grounds in terms of geographic distribution and trawling depth.

7. Grenadiers

There are two species of grenadiers of commercial interest in Greenland: roundnose grenadier and roughead grenadier. All catches are, however, reported as roundnose grenadier. The catch reported is taken as by-catch in the Greenland halibut fishery. The total catch in 2002 I SA1 was 20 tons.

8. Snow Crab

The snow crab fishery after snow crab is distributed in NAFO Div. 1A, 1B, 1C, 1D and 1E and total catch by Greenland vessel in entire Subarea 1, decreased with 30% in 2002 to 10.271 tons compared to 2001. Offshore catches estimated from logbooks amounted 3.368 tons in 2002 was 20% reduction of the 2001 catch level. In 2002 inshore catches, estimated by landings statistics, was reduced with 33% to 7.285 tons in the same period. Effort in offshore areas is four double since 1999, while efforts figure is unknown from inshore areas, due to the lack of logbooks information from 1999 to 2002. Preliminary catch figures for 1999 to 2002 are given in Table 1.

9. **Scallops**

Total catches of Icelandic scallops in NAFO Subarea 1 amounted to 2.459 tons in 2002, which is a marked increase from 2001. A total quota for scallops was set at 2.320 tons in 2002. All catches are taken in inshore areas in Div. 1A, 1B, 1C and 1D. One of the major fishing grounds, Mudderbugten (1A) has been depleted, and since 2001, catches in this area have been close to 0. Total catches have not been affected by this, but distribution of the effort has changed with increases especially in Div. 1B.

B. **Special Research Studies**

1. **Environmental Studies**

a. **Hydrographic Studies**

A survey of oceanographic stations along the West Greenland standard sections was carried out in 2002. NAO, Nuuk Air Temperatures, medio June water temperature and salinities on top of Fylla Bank – were close to average conditions Inflow of Polar Water as well as Irminger Water was in 2002 less than normal. This was reflected by the fact that no strong gradients between the two water masses was observed; that Polar Water could hardly be distinguished at Fylla Bank, that pure Irminger Water was hardly present at the Cape Farewell region and that Modified Irminger Water was observed only as far north as the Fylla Bank Section (Buch and Ribergaard, 2003).

2. **Biological Studies**

a) **Shrimp**

The series of annual stratified-random trawl surveys initiated in 1988 was continued in 2002. In July-August 218 research trawl hauls were made in the major parts of the distribution area of the West Greenland shrimp stock, including areas in Subarea 0 and the inshore areas in Disko Bay and Vaigat.

During the period of stratified random surveys in the offshore areas of shrimp distribution, biomass estimates have been relatively stable until 1998 fluctuating around 250 thousand tons, apart from somewhat lower values in 1991, 1995 and 1997. Since 1998 a significant increase is observed, with record high biomass in 2002 of 470 thousand tons. Total number of shrimp in 2002 is at the highest level found in the survey series and recruitment to the female group appears to be secured for the coming years.

b) **Greenland halibut**

A Greenland offshore trawl survey for Greenland halibut was initiated in 1997. The survey is a continuing of the joint Japanese / Greenland survey carried out in the period 1987-95. In 1997-2000 the survey covered NAFO Div. 1C and 1D between the 3 nm line and the 200 nm line or the midline against Canada at depths between 400 and 1500 m. In 2001 the survey area was expanded to in clude NAFO Div. 1B-1A (to 74°N). In 2002 the survey covered Div. 1CD and a total of 35 hauls were made. The survey is carried out as a stratified random bottom trawl survey.

A longline survey for Greenland halibut in the inshore areas of Disko Bay, Uummannaq, and Upernavik was initiated in 1993. There was no survey in 2002 due to technical problems.

During the period 9. to 22. July 2002 a gillnet survey was conducted in the Disko Bay area. A total of 32 stations with 51 gillnet settings were made along 4 transect. Each gillnet was compiled of 4 different nets, each with a different mesh size (46, 55, 60 and 70 mm stretch meshes). A total of 1 679 Greenland halibut were caught, the majority of the fish were in the size interval 40 to 55 cm. The distribution patterned showed a markedly higher density of Greenland halibut in the mouth of the ice fjords.

c) **Young Cod survey**

The series of annual gill-net surveys initiated in 1985 with a main target group of 2-3 years old fish. Survey results from 2002 show an increased recruitment index for Div. 1B, which is the first sign of recovery since the 1993 year class. No juvenile cod survey was conducted in 2001 due to technical problems.

Since 1988, Greenland Institute of Natural Resources has annually conducted a bottom trawl survey off West Greenland. The main purpose of the survey is to evaluate the biomass and abundance of Northern shrimp (*Pandalus borealis*), but data on most fish spices have been recorded. The biomass-indices for cod were estimated to 4,000-7,000 tons in 1988-1990. In 1992 the biomass decreased with over 95% to only 250 tons and 528,000 individuals and remained at this low until recent years. There are indications of a slight improvement in the abundance of small cod. Abundance indices in 2002 were estimated to 4.3 million individuals with a biomass of nearly 2000 tons. This is the highest estimate in the time series. Compared to the German survey, which has been conducted since 1982, abundance in 2002 is still less than 5% of the abundance in 1987.

d) **Snow crab**

Annual monitoring program (trap survey) was initiated in 1997 in Disko Bay (Div. 1A) and Sisimiut (Div. 1B). In 2002 survey were conducted in May/June with the research vessel "Adolf Jensen". On the survey baited traps with large and small mesh are used. All snow crab were enumerated by sex, carapace width, chela height, abdomen width, carapace condition and development stages were determined. Females were sampled in relation fecundity studies.

In 2001 an annual offshore trap survey was initiated in Div. 1D and 1E conducted by the research vessel "Paamiut". The scientific catch was treated similar to the inshore survey.

The objective of both monitoring programs is to assess the abundance of snow crab in inshore and offshore waters of Greenland. Results from this survey are presented in the Technical Report Series of the Greenland Institute of Natural Research.

e) **Marine mammals**

Studies of white whale and narwhal continued in 2002. Details are being reported to JCCM and NAMMCO. Studies of minke whale, fin whale and humpback whale continued in 2002. In 2002, a number of bowhead whales, humpback whales and minke whales were tagged and an aerial survey on large cetaceans was conducted. Details are being reported to IWC. Studies of harp and hooded seals are being reported to the Joint ICES/NAFO Working Group on Harp and Hooded Seals.

f) **Special studies**

A Ph.D. project, initiated in 2002, proposed to study the reproductive potential of snow crab in the coastal waters of West Greenland. The present study will use existing data and data collected in fieldwork surveys in Div. 1A, 1B and 1D. Fisheries exploited and non-exploited stocks will be examined and compared. Effects of latitude, i.e., water temperature, and fisheries exploitation on, 1) carapace width at maturity, and 2) reproduction will be examined. Various life history traits will be related to aspects of snow crab fecundity at three study sites along a latitudinal gradient: Disko Bay (north), Sisimiut (middle) and Nuuk (south). The study will contribute to a better understanding of the reproductive potential in the snow crab fisheries resource, and provide essential base line information for adaptive management and conservation strategies.

GREENLAND FISHERY IN OTHER NAFO SUBAREAS

A. Status of the fisheries

In 2001 no Greenland vessel was engaged in shrimp fishery at Flemish Cap (NAFO Div. 3M) and Grand Bank (NAFO Div. 3L). Two Greenland vessels were fishing shrimp in 2002 and reported catch from Div. 3M was 684 tons and reported catch in Div. 3L amounted to 11 tons.

References

Anon. 2002. Scientific Council Reports. Northwest Atlantic Fisheries organization. Dartmouth Canada 2002.

Buch, E. and Ribergaard, M.H., 2003. Oceanographic Investigations off West Greenland 2002. *NAFO SCR Doc.*, No. 3, Serial No. N4809, 16 p.

Table 1. Nominal catches (tons) by Greenland vessels at West Greenland (NAFO Subarea 1) in 1999-2002.

	NAFO SA					
	Div. 1A, B, C, D, E, F				Div 3M	Div 3L
Species	Estimated catch 1999*	Estimated catch 2000*	Estimated catch 2001*	Estimated catch 2002*	Catch 2002	Catch 2002
American Plaice	3	1	4	0		
Arctic char	24	29	20	20		
Atlantic halibut	45	9	1	1		
Atlantic salmon	19	21	43	9		
Atlantic cod	621	764	1.680	3.698		
Capelin	42	43	13	43		
Crabs	4.373	10.236	14.247	10.271		
Greenland cod	1.899	931	1.152	939		
Greenland halibut	26.899	23.219	19.111	23.814		
Grenadiers	33	17	22	21		
Lumpsucker	3.058	1.211	3.216	5.795		
Polar cod	73	118	11	38		
Redfish (unspecified - bycatch maily)	779	606	332	487		
Redfish beaked (pelagic redfish)	*nd*	671	124	124		
Redfish golden	*nd*	129	*nd*	0		
Scallops	2.624	1.630	1.593	2.459		
Shark	*nd*	*nd*	*nd*	*nd*		
Shrimp (P.boreallis)	74.563	80.888	81.398	105.327	684	11
Shrimp (P.montagui)	nd	697	609	206		
Wolffishes	33	59	75	118		
Fish not specified	nd	769	589	584		
Sum total	115.088	122.048	124.240	153.954	684	11

* Catch figures from recent years are provisional.

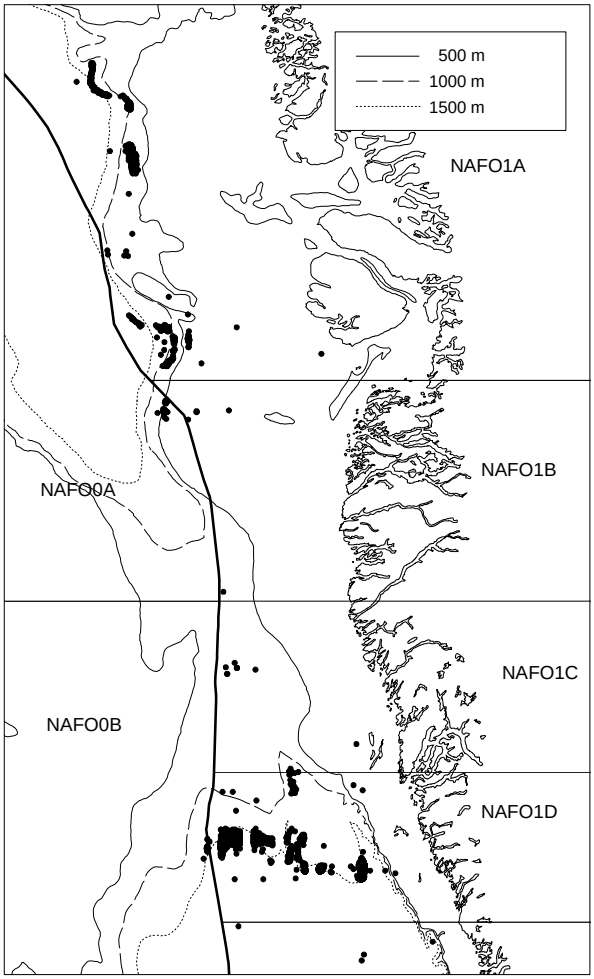

Fig. 1. Distribution of the offshore fishery for Greenland halibut in SA 1.