Northwest Atlantic Fisheries Organization

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SCIENTIFIC COUNCIL MEETING - NOVEMBER 1995

Report of Scientific Council, 17-20 November 1995 Meeting

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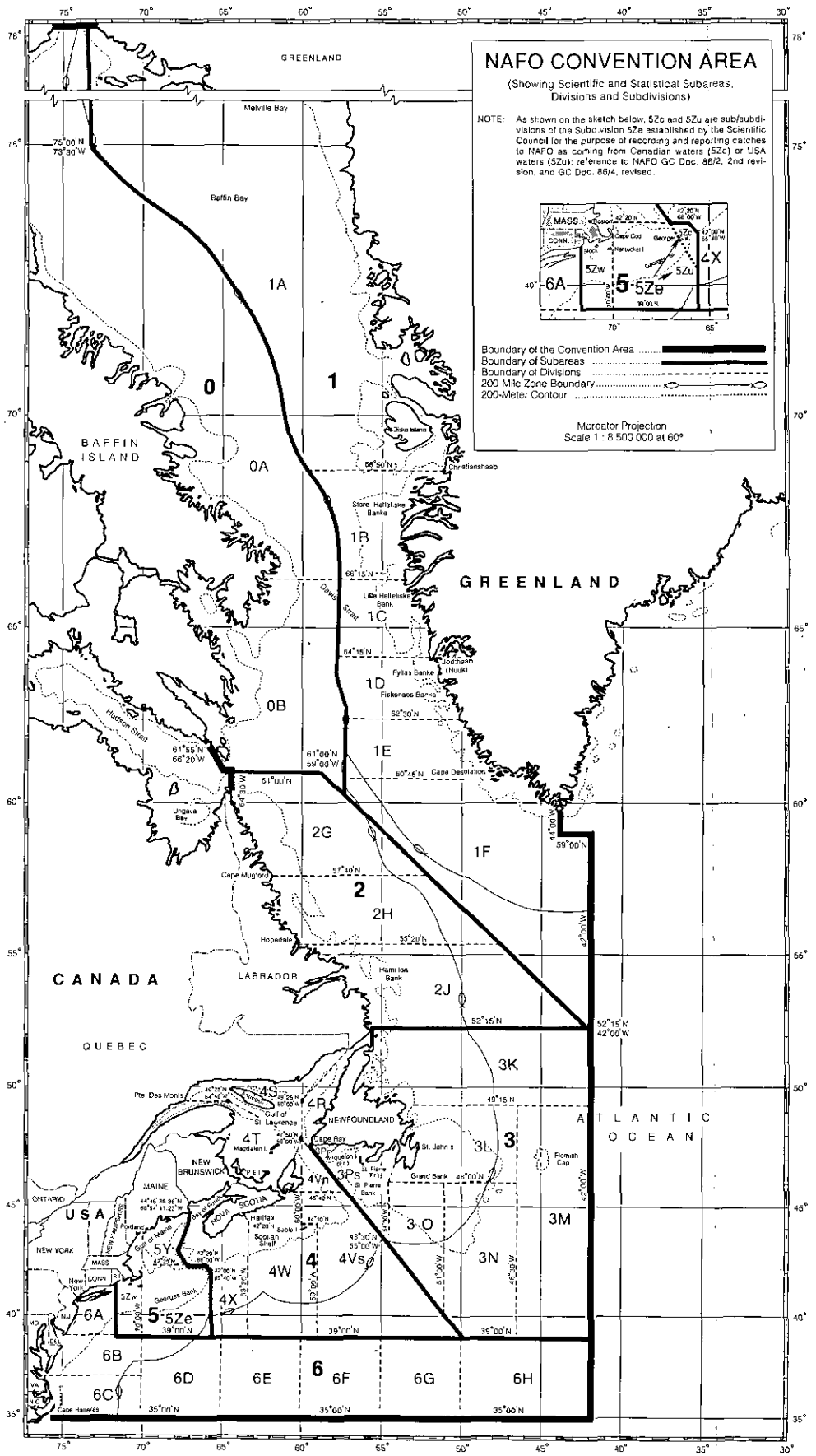
NAFO CONVENTION AREA
(Showing Scientific and Statistical Subareas, Divisions and Subdivisions)
NOTE: As shown on the sketch below, 5Zc and 5Zu are sub/subdivisions of the Subdivision 5Ze established by the Scientific Council for the purpose of recording and reporting catches to NAFO as coming from Canadian waters (5Zc) or USA waters (5Zu); reference to NAFO GC Doc. 86/2, 2nd revision, and GC Doc. 86/4, revised.
Boundary of the Convention Area
Boundary of Subareas
Boundary of Divisions
200-Mile Zone Boundary
200-Metre Contour
Mercator Projection
Scale 1 : 8 500 000 at 60°
GREENLAND
Melville Bay
Baffin Bay
BAFFIN ISLAND
CANADA
LABRADOR
QUEBEC
NEWFOUNDLAND
ATLANTIC OCEAN
USA
MAINE
NEW BRUNSWICK
NOVA SCOTIA
ONTARIO
NEW YORK
Christianshaab
Godthaab (Nuuk)
Cape Desolation
Cape Mugford
Hopedale
Hamilton Bank
Pte Des Monts
Gulf of St Lawrence
Cape Ray
St. John's
Grand Bank
Flemish Cap
Halifax
Sable I
Scotian Shelf
Georges Bank
Cape Hatteras
Hudson Strait
Davis Strait
Ungava Bay
0
1
0A
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5Y
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6A
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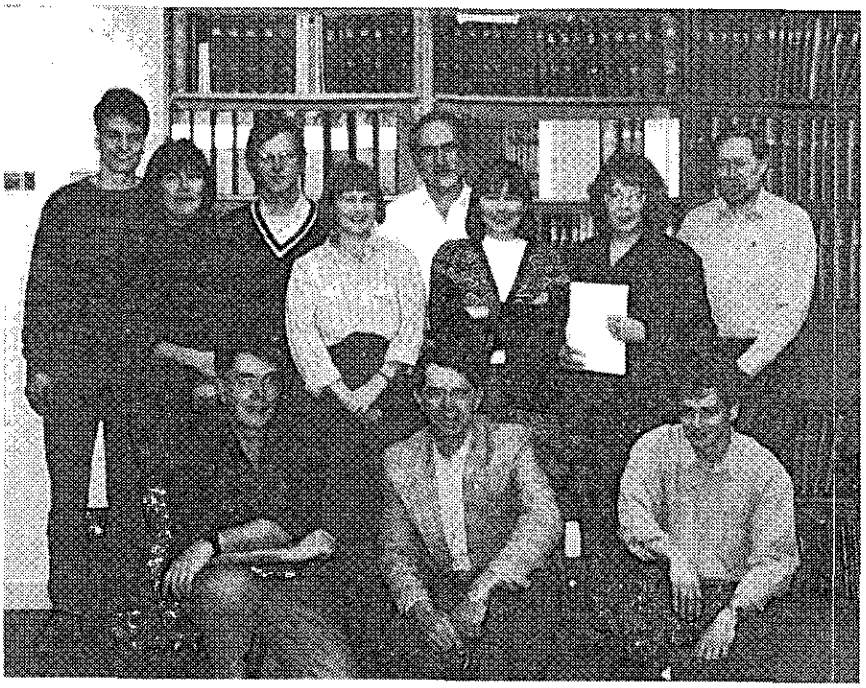
6H

Participants of November 1995 Scientific Council Meeting



(From left to right)

Standing: Ole Folmer, Helle Siegstad, Dan Carlsson, Unnur Skúladóttir, Don Parsons, Louise Savard, Dorothy Auby, Per Kanneworff

Kneeling: Howard Powles, Steve Clark, Carsten Hvingel

(From left to right)

Meeting in Progress: Don Parsons, Howard Powles, Ray Bowering, Bill Brodie

REPORT OF SCIENTIFIC COUNCIL

Special Meeting, 17-20 November 1995

Chairman: W. R. Bowering Rapporteur: T. Amaratunga

I. PLENARY SESSIONS

The Scientific Council met at NAFO Headquarters, Dartmouth, Nova Scotia, Canada, during 17-20 November 1995. Representatives attended from Canada, Denmark (in respect of Faroe Islands and Greenland), Iceland and the United States of America. The Executive Secretary and Assistant Executive Secretary were in attendance.

The opening session was called to order on 17 November 1995 at 1000 hr.

The Chairman, W. R. Bowering, welcomed representatives to this Special Meeting of the Scientific Council to conduct assessments on shrimp in Subareas 0 and 1, and Denmark Strait. The Assistant Executive Secretary was appointed rapporteur. The Chairman noted that the USA was joining NAFO, and he was particularly pleased to welcome S. H. Clark, National Marine Fisheries Service, Woods Hole, Massachusetts, USA, to this meeting. The meeting welcomed U. Skúladóttir (Iceland), as the ICES observer to this meeting.

In considering the Agenda, the Chairman noted that at its meeting in September 1995, the Council had recommended that a publication dealing with shrimp on Flemish Cap be considered at this meeting, and this matter be considered under 'Other Matters'. The Provisional Agenda was **adopted** (Appendix II).

The Council noted that STACFIS would undertake the assessments of the stocks, while the prognoses and the advice would be undertaken by the Council.

The session was adjourned at 1015 hr.

The Council briefly convened on 18 November 1995 at 1545 hr to consider the presentation on the Flemish Cap shrimp.

The concluding sessions were convened on 20 November 1995, noting that the shrimp assessment reports had been prepared by STACFIS. The Council then addressed the requests of the Coastal States considering the results of the assessments and provided advice and recommendations. The meeting was adjourned at 1320 hr.

Summary reports of the assessments and other matters considered by the Scientific Council are given below in Sections II-IV. The Agenda, List of Research (SCR) Documents and the List of Participants of this meeting are given in Appendix II, III and IV, respectively.

II. FISHERY SCIENCE (see STACFIS report, App. I)

The Council noted that matters referred to STACFIS relating to assessments of Shrimp in Subareas 0 and 1 and Shrimp in Denmark Strait were addressed. The complete reports are given in Appendix I.

III. FORMULATION OF ADVICE

The Council reviewed the STACFIS assessments of shrimp in Subareas 0 and 1, and Denmark Strait and the agreed summaries are as follows:

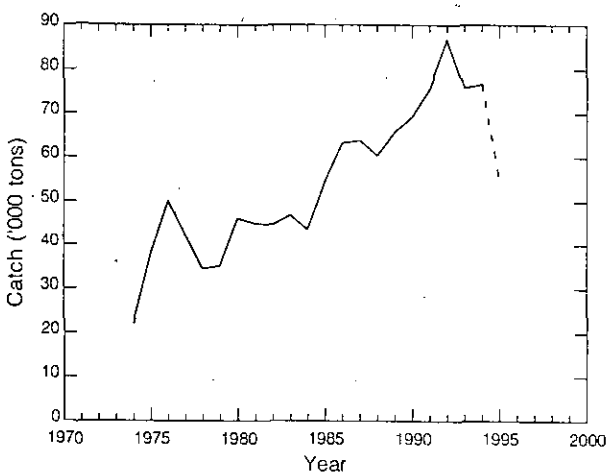
Shrimp in Subareas 0 and 1

Background: A small scale inshore fishery began in SA 1 during the 1930s. Since 1969 an offshore fishery has developed and the shrimp fishery is now the largest in Davis Strait.

Fishery and catches: The fishery is conducted mainly by Greenland and Canada. Recent catches from the stock are as follows:

	('000 tons)	
Year	Inshore	Offshore
1990	13.6	55.7
1991	16.3	59.4
1992	20.6	66.2
1993[1]	17.8	58.0
1994[1]	18.1	58.5
1995[1] (to Oct)	9.6	45.2

[1] Provisional.

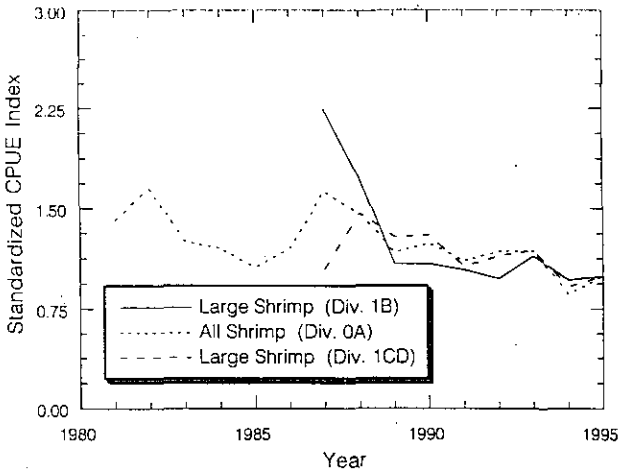


Data: Catch, effort and biological sampling data were available from the offshore fishery and catch and effort data for the inshore fleet. Time series of biomass indices and stock composition data were available from research surveys from both offshore and inshore areas.

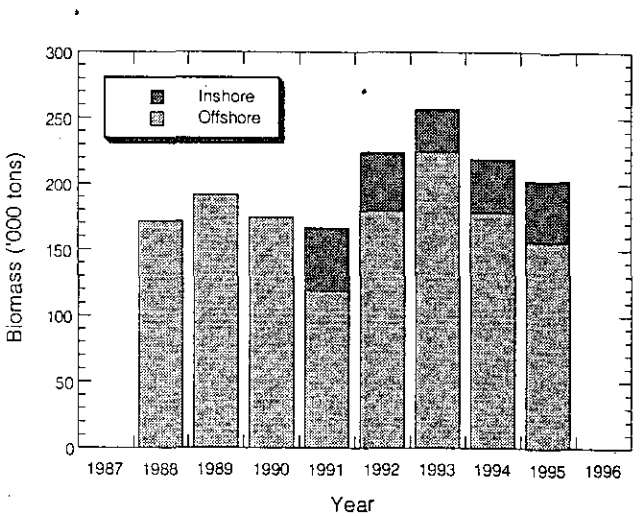
Assessment: No analytical assessment is available and fishing mortality is unknown. Evaluation of the status of the stock is based on interpretation of commercial fishery data (catch, effort, unstandardized and standardized catch rates), time series of research biomass indices and stock composition data.

CPUE: Standardized catch-rate indices from Div. 0A and Div. 1CD showed an overall decrease from 1987/88 to 1995, while the index for Div. 1B has been stable since 1989.

Recruitment: The 1985 year-class was strong and maintained catch rates in the early-1990s. Year-classes produced since have been weaker. The 1990 year-class dominated the 1995 catches in the survey and commercial fishery.



Biomass: Combined survey biomass indices from offshore and inshore were relatively stable over time although a decrease is indicated from 1993 to 1995.



State of the Stock: There are indications that the stock size has declined and the strong 1985 year-class has now passed through the fishery. As well, the abundance of males (as estimated from the surveys), the source of recruitment to the fishery, decreased since 1993.

Recommendations: Due to uncertainties about recruitment and the overall decrease in the abundance indices, it is recommended that total catches not exceed 60 000 tons, as recommended for 1995.

Special Comments: Advice on the 1995 catch level was partly based on use of past inshore catches as an estimate of long-term production. In light of concerns on stock status, the upward revision of inshore catches done in 1995 was not considered sufficient to justify an increase in the advised catch level. The Council expressed concern that recent catches have substantially exceeded the advised TACs.

Source of Information: SCR Doc. 95/107, 110, 111, 113.

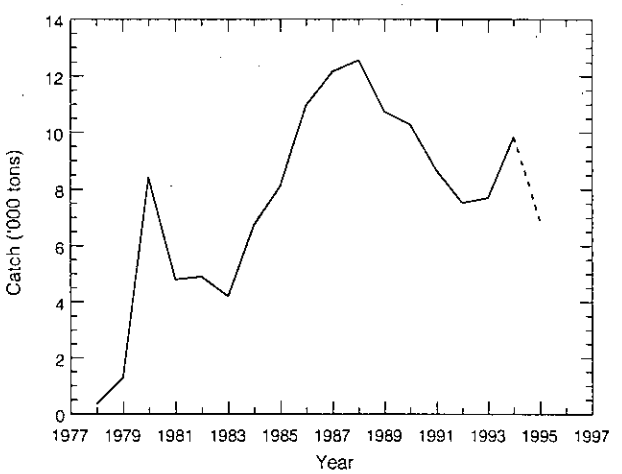
Shrimp in Denmark Strait

Background: The fishery for shrimp in limited areas of the Denmark Strait began in 1978. The fishery started exploiting new areas in 1993.

Fishery and Catches: This soon became a multi-national fishery with recent catches and TACs as follows:

	('000 tons)		
Year	Catch	TAC Recommended	TAC[1] Effective
1992	7.5	8	13.0
1993[2]	7.7	5	9.6
1994[2]	9.8	5	9.6
1995[2]	6.9	5	9.6

[1] On western side of midline.
[2] Provisional.



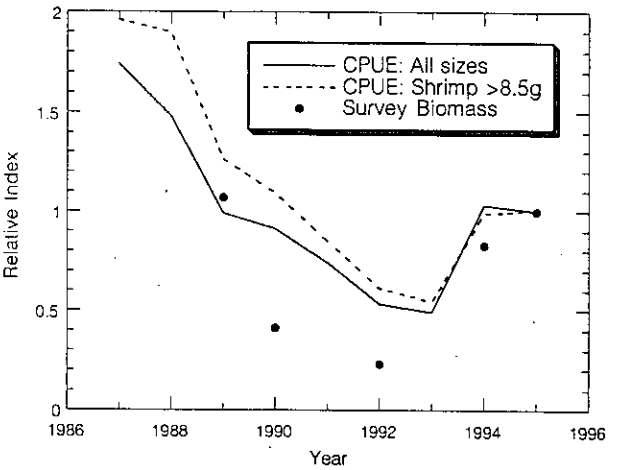
Data: Catch, effort and biological sampling data are available from the trawlers of several nations. Two time series of survey biomass indices are available, one from Norway for the years 1985 to 1989 and another from Greenland for the years 1989 to 1995, with associated biological samples.

Assessment: No analytical assessment is available and fishing mortality is unknown. Evaluation of the status of the stock is based on interpretation of commercial fishery data, the time series of survey biomass indices and biological data from both sources.

CPUE: Standardized CPUE indices have declined from peak values in 1987 to minimum values in 1992-93, subsequently increasing in 1994 and remaining stable from 1994 to 1995.

Recruitment: There are no immediate concerns for recruitment since the number of males in the surveys has increased substantially in the last two years.

Biomass: The biomass index declined from 1989 to 1992, and increased thereafter.



State of the Stock: The stock appears to be recovering from a low level.

Recommendations: For 1996, the catch should be limited to 5 000 tons to allow for continued improvement in stock size. This catch level should apply to the northern (traditional) and the southern (new) fishing areas combined.

Sources of Information: SCR Doc. 95/108, 109, 112, 114, 115.

IV. OTHER MATTERS

Considering a publication on the biology and fishery for shrimp on Flemish Cap (see Annex 2, Attachment 1), the Council was informed by D. G. Parsons (Canada) that the compilation of the publication on Flemish Cap Shrimp was underway. A draft report was tabled and members interested in contributing to and/or commenting on the publication were requested to communicate with D. G. Parsons before late-December. It was hoped that a manuscript for formal review would be ready in early-1996.

V. ADOPTION OF REPORTS

The Council met briefly at 1300 hr on 20 November 1995 and **adopted** the STACFIS Report. The report is given in Appendix I. The Council then **adopted** its own report.

VI. ADJOURNMENT

There being no further business, the Chairman thanked the participants for their long hours of work, the Chairman of STACFIS and the Secretariat for their able assistance in the conduct of the meeting.

APPENDIX I. REPORT OF STANDING COMMITTEE ON FISHERY SCIENCE (STACFIS)

Chairman: W. B. Brodie Rapporteur: Various

The Committee met at NAFO Headquarters, Dartmouth, Nova Scotia, Canada, during 17-20 November 1995, to review the status of the shrimp stocks in Subareas 0 and 1, and Denmark Strait, as referred to it by the Scientific Council. Representatives attended from Canada, Denmark (in respect of Faroe Islands and Greenland), Iceland and the United States of America.

I. STOCK ASSESSMENTS

1. **Shrimp in Subareas 0 and 1** (SCR Doc. 95/107, 110, 111, 113)

a) **Introduction**

In accordance with the recommendation by STACFIS in November 1993, the entire shrimp stock in Div. 0A, and Subarea 1 both north and south of 71°N, as well as inshore, is assessed as a single population.

Overall catches in the entire stock area increased until 1992 then decreased in 1993-94. Preliminary statistics indicate that catches in 1995 will be at the 1994 level (Table 1; Fig. 1).

The nominal catch of shrimp in the offshore areas of Subarea 1 and the adjacent part of Subarea 0 (Div. 0A) increased from less than 1 000 tons before 1972 to almost 43 000 tons in 1976, fluctuated thereafter, stabilized around a level of 54 000 tons during 1985-88, then increased to 66 000 tons in 1992 and decreased to 58 000 tons in 1993 and 1994. Preliminary statistics for the offshore area in 1995 (January to October) show total catches of about 43 000 tons (compared to 42 000 tons in the same months in 1994). The offshore fishery has been regulated by TAC since 1977.

Table 1. Shrimp in Div. 0A and Subarea 1: nominal catches and TAC (tons).

	1985	1986	1987	1988	1989	1990	1991	1992	1993[1]	1994[1]	1995[1,2]
Div. 0A Total	3 069	2 995	6 095	5 881	7 235	6 177	6 788	7 493	5 491	4 766	1 998
SA 1 Offshore	43 896	52 634	50 720	44 159	45 198	49 478	52 652	58 676	52 493	53 693	43 212
SA 1 Inshore	7 500	7 500	6 921	10 233	13 224	13 630	16 258	20 594	17 843	18 118	9 643
SA 1 Total	51 396	60 134	57 641	54 392	58 422	63 108	68 910	70 270	70 336	71 811	52 855
SA 0+1 Total	54 465	63 129	63 736	60 273	60 657	69 285	75 698	86 763	75 827	76 577	54 853
0+1 offshore catch	46 965	55 629	56 815	50 040	52 433	55 655	59 440	66 169	57 984	58 459	45 210
0+1 advised TAC[3]	36 000	36 000	36 000	36 000	44 000	50 000	50 000	50 000	50 000	50 000	60 000

[1] Provisional data.
[2] January-October.
[3] Until 1994 the advised TAC was only for offshore south of 71°N. After 1994, the advised TAC includes offshore north of 71°N and inshore.

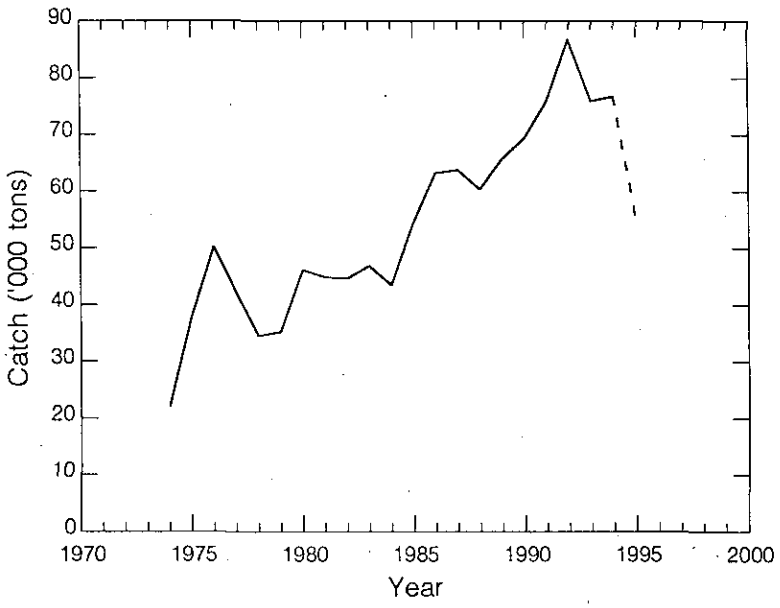


Fig. 1. Shrimp in Subareas 0 and 1: catches.

The West Greenland inshore shrimp fishery was relatively stable from 1972 to 1987 with estimated catches of 7 000-8 000 tons annually (except for 10 000 tons in 1974). A revision of the inshore catch statistics showed that catches in recent years have increased to over 20 500 tons in 1992, but decreased to 18 000 tons in 1993 and 1994. Preliminary data for 1995 (January-August) indicate catches at the same level as for the same period for 1994.

During the history of this fishery, the fishing grounds in Div. 1B have been the most important. Since 1987, however, catches have been continuously increasing in divisions south of Div. 1B.

The fishery in Div. 0A usually takes place from July to November. In Subarea 1 the fishery occurs in all months of the year, however, early in the year it is often confined to the southern divisions due to ice coverage in Div. 1A and Div. 1B. In 1994 and 1995 (Subarea 1) there was less ice than in previous years, and the northern divisions could be accessed one month earlier.

b) **Input Data**

i) **Commercial fishery data**

Fishing effort and CPUE (Fig. 2). Catch and effort data from the shrimp fishery in 1995 were available from fishing records from Canadian vessels in Div. 0A (SCR Doc. 95/107) and from Greenland logbooks for Subarea 1 (SCR Doc. 95/110).

Effort by large trawlers in Subarea 1 and in Div. 0A has been relatively stable in the 1990s. Twin trawls were introduced in 1995 on several trawlers, and this has been accounted for in analyses of effort data.

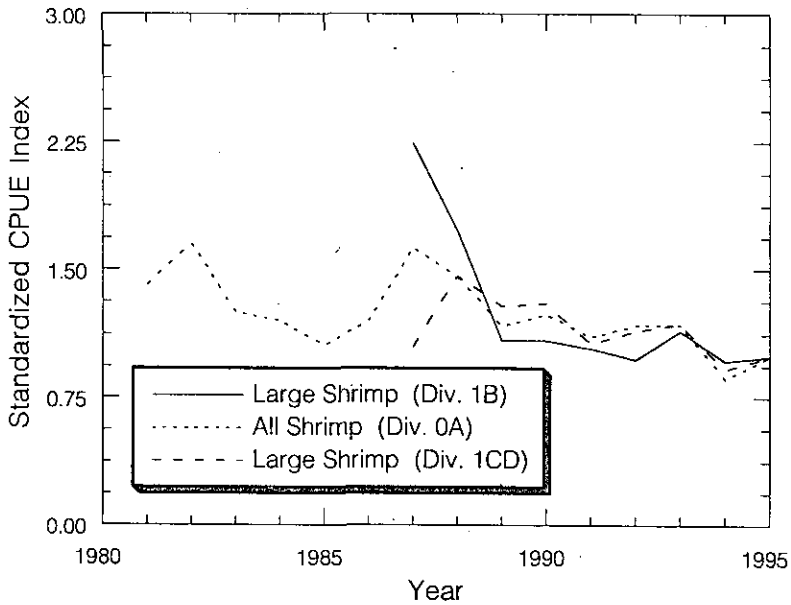


Fig. 2. Shrimp in Subareas 0 and 1: standardized CPUE indices from Div. 0A, Div. 1B and Div. 1CD.

Because of seasonality in the catch rates and changes in the fleet over time, fishery data from Div. 0A, Div. 1B and Div. 1CD were analyzed using multiplicative models to produce standardized yearly catch rates.

Canadian fishery data from Div. 0A in 1981 to 1995 indicated an overall decrease in CPUE from 1987 to 1995. The estimates for 1994 and 1995 were the lowest in the fifteen year period (SCR Doc. 95/107, Table 5, Fig.4).

From 1987 onward, logbook data from 33 Greenland trawlers, which record the shrimp catch by size category, were used to establish a standardized CPUE index for large shrimp >8.5 g (mainly females), for which unreported discarding is supposedly at a low level (SCR Doc. 95/110, Table 9, Table 11, Fig. 12). The index in Div. 1B showed a decrease from 1987 to 1989 followed by stability from 1989 to 1995. The index in Div. 1CD gradually decreased over time from 1988 to 1995.

The overall unstandardized catch rates from smaller Greenland vessels in the last five years showed no trend in both inshore and offshore areas (SCR Doc. 95/110, Fig. 2).

Length and age composition. Length frequency distributions obtained by observers were available from the commercial fishery in Div. 0A from 1981 to 1995 (SCR Doc. 95/107, Fig. 6) and in Subarea 1 from 1990 to 1995 (SCR Doc. 95/111, Fig. 14). The importance of the 1985 year-class was evident in 1990 as it recruited to the fishery, and in 1991-93, when it clearly dominated the catches. In 1995 this year-class no longer contributed substantially to either the total stock or the commercial catch.

Length samples of shrimp from the commercial catches in 1995 showed a dominant mode of 20 mm carapace length, representing the 1990 year-class (SCR Doc. 95/107, Fig. 5; SCR Doc. 95/111, Fig. 13).

Shrimp discards. In Div. 0A in 1994 and 1995, discarding was lower than in previous years, reflecting the recent favourable markets for all sizes of shrimp.

ii) **Research survey data**

Abundance estimates (Fig. 3). Trawl surveys have been conducted from 1988 in offshore areas (Subarea 1 + Div. 0A) and from 1991 in inshore Subarea 1 (SCR Doc. 95/111, 113).

The estimates of trawlable biomass are as follows:

Biomass ('000 tons)	1988	1989	1990	1991	1992	1993	1994	1995
Offshore (Subarea 1+Div. 0A)	172	192	175	119	179	225	178	158
Inshore (Div. 1A)	-	-	-	48	45	32	41	47
Total	-	-	-	167	224	257	219	205

Offshore: In July-September 1995, a stratified-random trawl survey was carried out in the main area of shrimp distribution in Div. 1A to 1E and the adjacent part of Div. 0A. The survey was carried out with a two-phase design, applying more stations in strata with high shrimp densities (SCR Doc. 95/113).

Biomass estimates from the survey in the period 1988-95 were variable around a mean level of 175 000 tons with a decrease from 1993 to 1995.

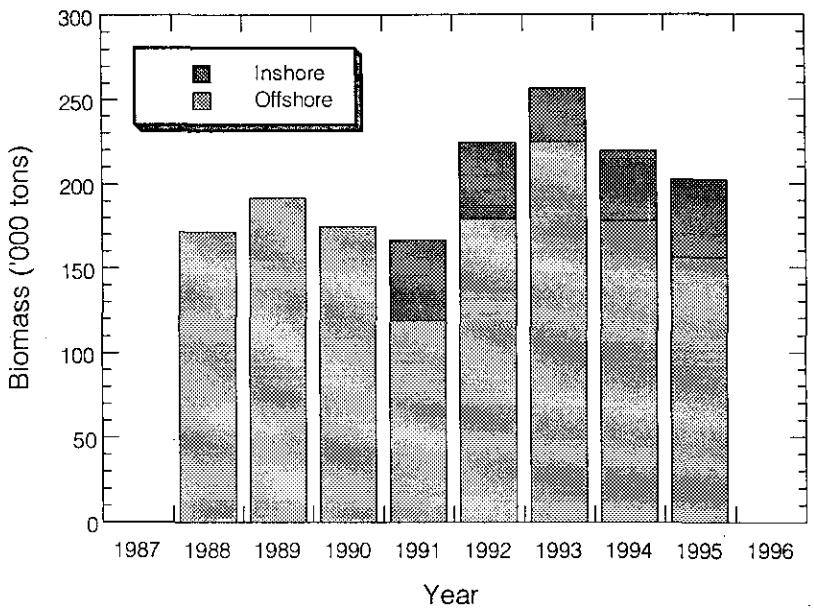


Fig. 3. Shrimp in Subareas 0+1: combined biomass estimates from inshore and offshore surveys.

Analysis of the research survey length frequency data (SCR Doc. 95/113, Fig.5) showed the predominance of the 1985 year-class as males in 1989, 1990 and 1991, throughout the offshore area. The 1990 year-class dominated in the 1995 survey. However, year-classes produced in recent years appeared to be weaker than the 1985 year-class.

Older males and females were most abundant in the northern strata in the main area in 1995, while smaller males were more prevalent in the southern areas.

Abundance-at-age (in percent) for shrimp from Greenland offshore research survey data are given in the following table:

Age	1988	1989	1990	1991	1992	1993	1994	1995
1						1.3	0.8	2.3
2	1.6	1.2	2.8	1.0	2.7	5.4	4.2	2.1
3	1.3	12.2	3.5	3.8	9.3	8.6	7.7	4.9
4	13.3	42.3	10.6	10.4	11.9	18.0	21.1	15.6
5	27.4	18.5	39.2	13.3	21.4	25.7	22.3	32.8
6	24.3	10.2	17.3	45.1	33.7	21.1	23.9	20.3
7+	29.7	15.9	26.8	26.5	20.8	19.9	20.4	22.1
% males	69.9	84.4	73.5	73.5	78.9	80.1	79.6	77.9

Inshore: In August 1995 a stratified-random trawl survey also using a two-phased approach was conducted in the inshore areas in Disko Bay and Vaigat (Div. 1A) (SCR Doc. 95/111). The biomass estimates from the survey series in 1991-95 were variable around 45 000 tons with an increasing trend from 1993 to 1995.

The overall size compositions of shrimp from the inshore surveys were similar to those of the offshore in relation to the occurrence of modes.

c) **Assessment Results**

Standardized catch-rate indices from Div. 0A and Div. 1CD showed an overall decrease from 1987/88 to 1995, while the index for Div. 1B has been stable since 1989. Biomass indices from research vessel surveys for the offshore and inshore areas combined were variable, with a decrease from 1993 to 1995.

The 1985 year-class, which was the main contributor to the catch rates in the early-1990s, has passed through the population and no longer contributes to the fishery. Despite its high abundance, however, this year-class only served to maintain, rather than increase, the catch rates. More recent year-classes appear to be weaker, although the strengths of the 1992-94 year-classes cannot be evaluated at this time.

There are indications that the stock size has declined. As well, the abundance of males, the source of future recruitment to the fishery, has decreased since 1993.

d) **Research Recommendations**

For shrimp in Div. 0A and Subarea 1, STACFIS **recommended** for consideration at the November 1996 Meeting that:

- *a single combined standardized CPUE series be developed by incorporating fishing data from Div. 0A and Subarea 1. This should be used to investigate the effects of areas and seasons on CPUE;*

- *an analysis of survey and catch-rate information be conducted to show the relative importance of the northern and southern areas over time;*

- *samples from all surveys both offshore and inshore and from the commercial fishery, be analyzed for age composition to obtain estimates of year-class abundance and mortalities.*

STACFIS also **recommended** that:

- *sampling of the commercial fishery be improved to cover all components of the fishery by area and month.*

2. Shrimp in Denmark Strait (SCR Doc. 95/108, 109, 112, 114, 115)

a) Introduction

The fishery in Denmark Strait started in 1978 and has taken place primarily in the area of Strede Bank and Dohrn Bank as well as on the slopes of Storfjord Deep. The available fishing grounds at any given time depend heavily on the ice conditions. The traditional area extends from approximately 65°N to 67°30'N and between 26°W and 34°W. In 1993, a fishery started in areas between 60°30'N and 65°N and west of 35°W. Catches in the northern (traditional) area increased rapidly to 1980, declined and remained stable from 1981 to 1983, increased gradually to 1988 (12 500 tons) and then decreased again to 1994. In 1995 the catch in the northern area increased to 5 200 tons (January-October). Catches from the southern fishing area were 1 200 and 4 900 tons in 1993 and 1994, respectively, and decreased to 1 700 tons in 1995 (provisional). Catches for the whole area increased from 1992 to 1994 (Fig. 4).

Recent catches and TACs (tons) are as follows:

	1985	1986	1987	1988	1989	1990	1991	1992	1993[1]	1994[1]	1995[1,2]
Catch north of 65°N											
eastern side	1 794	1 150	1 330	1 424	1 326	281	465	1 750	2 553	1 514	1 151
western side	6 316	9 814	10 848	11 125	9 416	9 994	8 192	5 764	3 950	3 358	4 052
Catch south of 65°N	-	-	-	-	-	-	-	-	1 191	4 950	1 704
Total	8 110	10 964	12 178	12 549	10 742	10 275	8 657	7 514	7 694	9 822	6 907
Advised TAC	5 000	-	-	-	10 000	10 000	10 000	8 000	5 000	5 000	5 000
Effective TAC western side	6 090	7 525[3]	7 725[3]	8 725[3]	9 025[3]	14 100	14 500	13 000	9 563	9 563	9 563

[1] Provisional catches.
[2] January-October.
[3] Not including Greenland fishery north of 66°30'N.

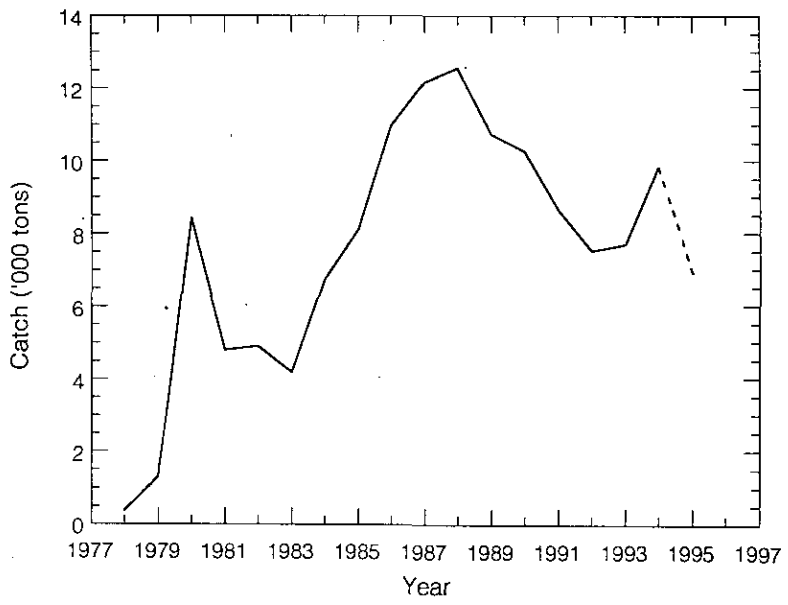


Fig. 4. Shrimp in Denmark Strait: catches.

b) **Input Data**

i) **Commercial fishery data**

Fishing effort and CPUE. Catch and effort data from logbooks were available from Greenland, Norway, Iceland, Faroe Islands and EU-Denmark since 1980, and from EU-France for the years 1980 to 1991. Although shrimp from the southern area are thought to belong to the same stock as those in the northern area, the catch rates and effort data as shown in the Fig. 4 and 5 pertain only to the area north of 65°N.

Between 1980 and 1989, total unstandardized effort increased from about 35 000 hours to more than 100 000 hours, declining thereafter to about 72 000 hours in 1993 and further to about 31 000 hours in 1994. There was a slight increase to 33 000 hours in 1995 (January-October). The fishery in the July-December period became more important at the end of the 1980s, accounting for approximately 50% of the total annual effort, whereas in the 1990s the spring effort has been the most important.

Unstandardized catch-rate series (Fig. 5) declined from 1980 to 1983, fluctuated from 1983 to 1987 then declined again to 1989 (SCR Doc. 95/115, Fig. 4; SCR Doc. 95/114, Table 12). Values for 1990-93 were similar to the low 1989 value at about 50% of the level seen in the early- to mid-1980s. In 1994 there was, however, a considerable rise in the catch rate and the 1995 value was similar to 1994.

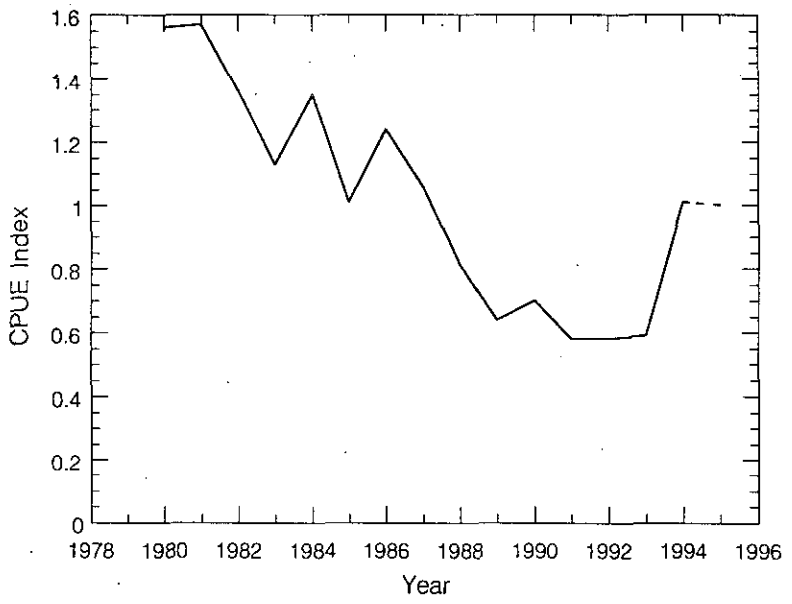


Fig. 5. Shrimp in Denmark Strait: unstandardized catch rates.

Standardized catch-rate series for Greenland vessels for large shrimp and all shrimp (Fig. 5) showed a continuous decline from 1987 to 1993 and a considerable increase in 1994. The 1995 value was approximately the same as that for 1994 (SCR Doc. 95/115, Fig. 5).

Biological data. Samples from the Icelandic fishery in the late-1980s were comprised mainly of females. In the early-1990s, males dominated catches while in 1995 females again made up more than 50% (SCR Doc. 95/115, Fig. 6).

Samples from the Greenlandic fishery showed fewer large females in 1993-95 compared to 1991-92 (SCR 95/115, Fig. 7; SCR 95/112, Fig. 10).

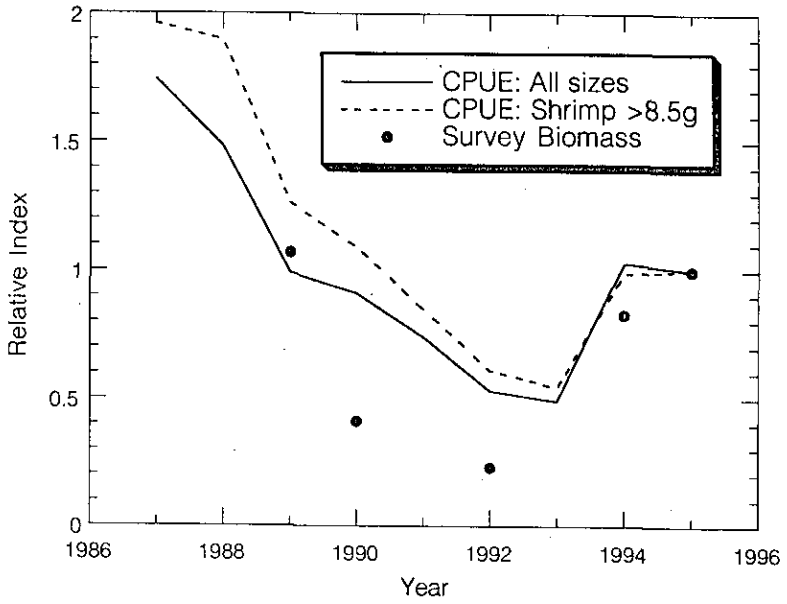


Fig. 6. Shrimp in Denmark Strait: standardized catch rate indices. Biomass indices from research surveys are shown as points. All indices are relative to the 1995 value.

ii) **Research survey data**

A trawl survey was conducted by Greenland in the Denmark Strait in September-October 1995, based on a two-stage sampling method using a spline technique. The biomass index declined from 1989 to 1992, and increased in 1994 and 1995 to almost the 1989 level (SCR Doc. 95/109). Because variance estimates are not available, it is not known whether the differences are statistically significant.

The Greenland survey showed an increase in the proportion of males from 1989 to 1992, which continued a trend from the 1985 to 1989 Norwegian surveys. In 1994 and 1995 the proportion of males was almost the same as 1992.

	Percent males									
Country	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Norway	41.4	53.5	58.5	58.0						
Greenland				63.1	62.5	-	78.3	-	74.5	74.2

The survey also showed a decrease in occurrence of both the largest males and the females between 1989 and 1992. Subsequent increases in the biomass estimate corresponded to an increase in numbers of both male and female shrimp (SCR Doc 95/109). Although the 1995 biomass value was similar to that in 1989, stock composition was different; the estimated number of males was much larger in 1995 while that of females was lower.

It should be noted that since the trawl survey does not cover the whole area, biomass estimates should be looked upon as indices rather than absolute estimates.

c) **Assessment Results**

All indices declined to low levels in 1992-93 followed by an increase in 1994-95. Although these indices suggest an increase in abundance, the stock is still considered to be at a lower level than it was during the first half of the 1980s. In combination with increases in these indices, the high proportion of males in recent survey results may indicate good recruitment prospects.

STACFIS noted that high catches in the northern area in earlier years (over 10 000 tons per year) were followed by a decline in stock abundance indices. Following recent catches of 5 000-6 500 tons in the northern area, abundance indices are increasing. This could indicate that the earlier levels of catch were not sustainable and that recent levels may allow improvements in stock status.

3. **Other Business**

a) **Northern Shrimp in the Gulf of Maine**

A brief overview of the northern shrimp resource in the Gulf of Maine was presented. Catches were highest from 1969-72, then declined to very low levels in the late-1970s. Catches increased in recent years, but are still below the levels of the late-1960s.

b) **Flemish Cap Shrimp Meeting**

The Committee discussed the possibility of conducting the assessment of shrimp on Flemish Cap (Div. 3M) at the November Meeting rather than the Annual Meeting (September). It was agreed that rationale for a proposal be developed and tabled for discussion at the 1996 Annual Meeting of the Scientific Council.

c) **Acknowledgements**

There being no other business, the Chairman thanked the participants for their work, and the Secretariat for its assistance during this meeting. The meeting adjourned at 1130 hr on 20 November 1995.

APPENDIX II. AGENDA FOR SCIENTIFIC COUNCIL MEETING, 17-20 NOVEMBER 1995

I. Opening (Chairman: W. R. Bowering)

1. Appointment of rapporteur
2. Adoption of agenda
3. Plan of work

II. Fishery Science (STACFIS Chairman: W. B. Brodie)

1. Stock assessments (see Annexes 1 and 2)

   - Northern shrimp (Subareas 0 and 1)
   - Northern shrimp (in Denmark Strait and off East Greenland)

   [**Note**: For Northern shrimp in Subareas 0 and 1, the assessment and TAC advice should include, if possible, the areas north of 71°N in Subarea 1 as well as the inshore region of Subarea 1.]

2. Other business

III. Formulation of Advice

1. Northern shrimp (Subareas 0 and 1)
2. Northern shrimp (Denmark Strait and off East Greenland)

IV. Other Matters

1. Publication of papers on Flemish Cap shrimp (see Attachment 1)

V. Adoption of Reports

VI. Adjournment

ANNEX 1. *EXTRACTED FROM:* CANADIAN REQUEST FOR SCIENTIFIC ADVICE ON MANAGEMENT IN 1996 OF CERTAIN STOCKS IN SUBAREAS 0 TO 4

1. Canada requests that the Scientific Council, at its meeting in advance of the 1995 Annual Meeting, provide advice on the scientific basis for the management of the following fish and invertebrate stocks in 1996:

Roundnose grenadier (Subareas 2 and 3)
Silver hake (Div. 4V, 4W and 4X)

It is also suggested that, subject to the concurrence of *Denmark (Greenland)*, the Scientific Council, prior to the 1995 Annual Meeting of NAFO, provide advice on the scientific basis for management in 1996 of the following stocks:

Shrimp (Subareas 0 and 1)
Greenland halibut (Subareas 0 and 1)
Roundnose grenadier (Subareas 0 and 1)

With respect to shrimp, it is recognized that the Council may, at its discretion, delay providing advice until later in the year, taking into account data availability, predictive capability, and the logistics of additional meetings.

2. Canada requests the Scientific Council to consider the following options in assessing and projecting future stock levels for those stocks listed above:

a) For those stocks subject to analytical dynamic-pool type assessments, the status of the stock should be reviewed and implications of fishing at $F_{0.1}$ in 1996 and subsequent years should be evaluated. The present stock size should be described in relation to those observed historically and those to be expected at the $F_{0.1}$ level in both the short and long term. In those cases where present spawning stock size is a matter of scientific concern in relation to the continuing productive potential of the stock, management options should be considered to rebuild the spawning stock. All results should be expressed in terms of stock sizes, catch rates and TACs implied for 1996 and the long term.

b) For those stocks subject to general production-type assessments, the status of the stock should be reviewed and management options evaluated in the way described above to the extent possible. In this case, the general reference point should be the level of fishing effort (F) which is two-thirds that calculated to be required to take the MSY catch in the long term.

c) For those resources on which only general biological and/or catch data are available, no standard criteria on which to base advice can be established. The evidence on stock status should, however, be weighed against a strategy of optimum yield management and maintenance of stock biomass at levels of about two-thirds that of the virgin stock.

William A. Rowat
Deputy Minister
Department of Fisheries and Oceans
Ottawa, Canada

ANNEX 2. *EXTRACTED FROM:* DENMARK (GREENLAND) REQUEST FOR SCIENTIFIC ADVICE ON MANAGEMENT OF CERTAIN STOCKS IN 1996

3. Denmark, on behalf of Greenland, further requests that the Scientific Council of NAFO before December 1995, provide advice on the scientific basis for management of the following stock in Subareas 0 and 1 (including Subarea 1 north of 71°N and Subarea 1 inshore) in 1996 and as many years forward as data allow:

i) Northern shrimp (*Pandalus borealis*)

Further, in cooperation with ICES, the Scientific Council is requested to advise on the scientific basis for management of the following stock in the Denmark Strait and off East Greenland:

i) Northern shrimp (*Pandalus borealis*)

J. B. Olsen
On behalf of the
Ministry for Fisheries, Hunting & Agriculture
Aslisarnermut, Piniarnermut, Nunalerinermullu Pisortaqarfik
Direktoratet for Fangst, Fiskeri og Landbrug

ATTACHMENT 1

At its meeting of 9-15 September 1995, the Scientific Council adopted the STACPUB report which contained the following text:

Status of Papers on Shrimp in Division 3M for a Single Publication

Some progress has been made regarding the comprehensive publication on the biology of, and fishery for shrimp on Flemish Cap. An annotated outline has been distributed to relevant scientists and some input has been received. However, a draft document is not yet available.

STACPUB **recommended** that *a draft be made available for discussion during the November 1995 Meeting on Shrimp in Davis and Denmark Straits.*

APPENDIX III. LIST OF RESEARCH DOCUMENTS

RESEARCH DOCUMENTS (SCR)

Doc. No.	Serial No.	Title
95/107	N2646	PARSONS, D. G., and P. J. VEITCH. The Canadian Fishery for Northern Shrimp (*Pandalus borealis*) in NAFO Division 0A and Subarea 1, 1979-1995.
95/108	N2647	SKÚLADÓTTIR, U. The Icelandic shrimp fishery (*Pandalus borealis* Kr.) in the Denmark Strait in 1994-1995 and some reflection on age groups in the years 1991-1995.
95/109	N2648	CARLSSON, D. M., and P. KANNEWORFF. Trawl survey for shrimp (*Pandalus borealis*) in Denmark Strait, 1995.
95/110	N2649	SIEGSTAD, H., C. HVINGEL, and O. FOLMER. The Greenland fishery for northern shrimp (*Pandalus borealis*) in Davis Strait in 1994 and January-October 1995.
95/111	N2650	CARLSSON, D. M., O. FOLMER, C. HVINGEL, and P. KANNEWORFF. Stratified random trawl survey for shrimp (*Pandalus borealis*) in Disko Bay and Vaigat, inshore West Greenland 1995.
95/112	N2651	HVINGEL, C., H. SIEGSTAD, and O. FOLMER. The commercial shrimp fishery in Denmark Strait in 1994 and January-October 1995.
95/113	N2652	CARLSSON, D. M., O. FOLMER, C. HVINGEL, and P. KANNEWORFF. Offshore trawl survey for shrimp (*Pandalus borealis*) in NAFO Subareas 0 and 1 in 1995. (+ Addendum)
95/114	N2653	SKÚLADÓTTIR, U. The catch statistics of the shrimp fishery (*Pandalus borealis*) in the Denmark Strait in the years 1980-1995.
95/115	N2654	SKÚLADÓTTIR, U. Assessment of shrimp in the Denmark Strait.

APPENDIX IV. LIST OF PARTICIPANTS

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