Northwest Atlantic Fisheries Organization

Serial No. N2320 NAFO SCS Doc. 93/20

SCIENTIFIC COUNCIL MEETING - SEPTEMBER 1993

Report of Scientific Council, 7-10 September Meeting

CONTENTS

REPORT OF SCIENTIFIC COUNCIL

Annual Meeting, 7-10 September 1993

Chairman: H. Lassen Rapporteur: T. Amaratunga

I. PLENARY SESSIONS

The Scientific Council met at the Holiday Inn, Dartmouth, Nova Scotia, Canada, during 7-10 September 1993. Representatives attended from Canada, Denmark (in respect of the Faroe Islands and Greenland), European Economic Community (Denmark, France, Germany, Portugal, Spain and United Kingdom), Iceland, Japan and Russian Federation. In the absence of the Chairman V. P. Serebryakov (Russian Federation), the Vice-Chairman, H. Lassen (EEC-Denmark), chaired this meeting. The Assistant Executive Secretary was in attendance.

The opening meeting was called to order on 7 September 1993 at 1030 hr.

The Chairman welcomed representatives to the 15th Annual Meeting. The Assistant Executive Secretary was appointed rapporteur.

The Chairman considering the provisional agenda, noted that many new specific items needed to be included in the agenda, and proposed the following changes:

Item II.2.b. Shrimp in Division 3M (this would represent a change in the numbering of the *subsequent agenda items*)

Item II.4.e. Proposal for annual shrimp meeting in November.

Item II.4.f. Adoption of work procedures for the June 1994 Scientific Council Meeting.

It was noted that the Item VIII. "Space Requirements for June Meetings and Structure of Scientific Council", would relate mostly to the work of STACFIS. The Chairman proposed that this item be undertaken by STACFIS, before the Council considered it. It was similarly proposed that STACREC undertake this item under Item III.8. However, it was proposed that this item be re-numbered as Item III.9, with the insertion of a new Item III.8. "Research coordination for Greenland Halibut". This agenda item was removed from the STACFIS agenda. The agenda (Appendix IV) was **adopted** with these modifications.

The Council noted the need for a new Designated Expert for the assessment of Silver Hake in Divisions 4V, 4W and 4X. M. A. Showell, Marine Fish Division, Bedford Institute of Oceanography, was selected by the Council as Designated Expert.

With respect to Shrimp in Division 3M, D. G. Parsons, Northwest Atlantic Fisheries Center, Newfoundland, was selected by the Council as Designated Expert.

Having considered the work plan for this meeting, the session was adjourned at 1050 hr.

The Council reconvened at 1100 hr on 10 September 1993 to address the outstanding agenda items, and these are reported under the relevant sections.

The Council noted the requests from the Fisheries Commission which were postponed during the June 1993 Meeting, for further consideration by the Council at this meeting, were addressed as given in the STACREC report (see App. II).

There were no formal requests from the Fisheries Commission received by the Council at this meeting. However, the Chairman attended several meetings of the Standing Committee on International Control (STACTIC) of the Fisheries Commission and responded directly to some of the questions posed. The Council noted these would be reflected in the report of the Fisheries Commission.

The concluding session was called to order at 1200 hr on 10 September 1993, and the Council considered and **adopted** the reports of the Standing Committees and the Scientific Council Report of this meeting.

The meeting was adjourned at 1415 hr.

Brief summaries of the Standing Committee Reports and other matters considered by the Scientific Council are given below in Sections II-VI. The Agenda, the List of Participants and Lists of Research (SCR) and Summary (SCS) Documents of this meeting are given in Appendix IV, V and VI, respectively.

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

1. Review of 1993 Recommendations

The Council noted the recommendations from the June 1993 Meeting were adequately addressed as required from the point of view of the agenda of this meeting.

The Council agreed that recommendations pertaining to specific stocks, should be worded to explicitly indicate the stock they pertain to.

2. Stock Assessments

a) Silver hake in Divisions 4V, 4W and 4X

The Council noted that the assessment of silver hake stock in Div. 4VWX which was deferred from the 2-16 June 1993 Meeting was completed, and endorsed the assessment as presented in the STACFIS report. The Summary Sheet as prepared for the assessment is given below.

SUMMARY SHEET - Silver Hake Divisions 4V, 4W and 4X

Source of Information:

Year	1986	1987	1988	1989	1990	1991	1992	1993
Recommended TAC	100	100	161	235	-	100	105	75
Agreed TAC	100	100	120	135	135	100	105	86
Reported Catches	83	62	74	91	69[1]	68[1]	32[1]	29[1]
Sp. stock biomass								
Recruitment (age 1)[3]	1 880	840	822	1 274	1 045	642	400[2]	1 200[2]
Mean F (ages 3-5)	0.99	0.72	0.75	1.44	0.87	1.05	0.32	

[1] Provisional. Weights in '000 tons
[2] Estimated.
[3] Numbers in '000 000.

Catches: Peaked in 1973 at 300 000 tons. In recent years catches have dropped from 91 000 tons in 1989 to 29 000 tons in 1993. The 1993 level is the lowest catch in the time series.

Data and Assessment: Catch-at-age from 1977 to 1992 were included in a formulation of ADAPT using research vessel (juvenile and adult) and commercial CPUE indices.

Fishing Mortality: Fully recruited F for ages 3-5 was 0.32 in 1992, approximately 33% of that estimated for 1991.

Recruitment: The 1991 year-class is thought to be below average, while the 1992 year-class is estimated to be above average.

State of Stock: ADAPT analysis shows age 1+ and 2+ biomass for this stock to be the lowest in the time series 1977-93.

Commercial standardized catch rates have dropped since 1989, but remained stable over 1992-93 at approximately 40% of the 1989 level. Results of July research vessel surveys showed declining numbers and biomass from 1986-92. The 1993 survey showed a moderate increase in numbers and biomass.

Forecast for 1994:

Option Basis	Predicted catch (1994)	Predicted SSB (1.1.1995)
$F_{0.1}$ = 0.72	51 000	
F_{92} =		
F_{max} =		

Recommendations: The retrospective analysis using ADAPT methodology indicated a consistent tendency for F estimates to increase by 40 to 60% for a particular year when additional years of data were added. There is no reason to expect that the current estimate of F in 1992 will not, in future, also appear to be an underestimate. It is likely, therefore, that the projected catch at $F_{0.1}$ in 1994 of 51 000 tons is also overestimated to some extent. Unfortunately, the extent of this is difficult to determine.

Special Comments: The year-classes which may be overestimated by ADAPT are those of 1990 and older which will account for about 45% of the projected catch in 1994.

b) **Shrimp in Division 3M**

The Council noted that the available information on shrimp in Div. 3M was reviewed by STACFIS and endorsed the report as presented by STACFIS.

In response to a request from the Fisheries Commission on the shrimp in Div. 3M, the Council endorsed the following response prepared by STACFIS:

STACFIS, at the September 1993 meeting considered information pertaining to the status of the shrimp (*Pandalus borealis*) resource on Flemish Cap (Div. 3M). Although the presence of shrimp on Flemish Cap has been known for many years, no significant shrimp commercial effort was reported from the area before spring 1993. Since then, a multi-national fishery has developed with removals of shrimp in the order of 20 000 tons up to late-August.

Fishery information from Canada, Greenland, Norway, Faroe Islands and Iceland indicated that effort was distributed around the Cap along the 400 m contour (see STACFIS report, Fig. 4). Catch rates generally declined from May to early-July 1993 and stabilized somewhat thereafter. Size composition data from all countries were similar, showing three size groups of males and one of females. Overall sizes ranged between 14 and 30 mm (oblique carapace length) and included at least 5 ages. Females were not ovigerous from May to July indicating that the egg bearing period lasts from about August to March. By-catch consisted primarily of small redfish (14 cm) and Canadian observer data indicated levels between 10-15% of the total catch in April-June, increased to higher levels in July. By-catch of other commercial species was low during that period.

STACFIS noted the general ocean circulation in the Flemish Cap area is characterized by an anticyclonic gyre, which could play an important role in the retention of shrimp larvae. Also, hydrographic data showed a cooling trend since 1988, which could favour the survival of shrimp. EEC groundfish surveys from 1988 to 1993 showed that the abundance from 1991 to 1993 was substantially higher than the 1988-90 period. The increase appeared to be due to the recruitment of at least one strong year-class produced in the late-1980s.

STACFIS agreed that shrimp abundance in recent years has increased but it is uncertain whether or not this high level of abundance will continue. The general decline in catch rates from May to July may be an effect of exploitation or due to the seasonality as observed in other shrimp stocks. Information is lacking on the history of the stock, present stock size, future recruitment and impact of the 1993 catch level. At present, it is not possible to conclude that a fishery at or near the 1993 catch level is sustainable in the Flemish Cap area and STACFIS has not sufficient data to provide a basis for the calculation of an initial TAC. However, based on the uncertainties mentioned above, concern was expressed for the level of removals in 1993 and a cautious approach to exploitation should be considered.

The by-catch of small redfish was considered as a potential for significantly impacting the redfish resource in this area. STACFIS **recommends** that, *effective immediately, sorting grates be mandatory in shrimp fishing operations on Flemish Cap as a means of minimizing the by-catch of redfish and other fish species.*

c) **Workshop on Assessment Methods**

The Council agreed with the STACFIS view that a special workshop on assessment methods should be considered as and when the need arises.

d) **Data Availability for Assessment of Northern Shrimp in November 1993**

With respect to the proposal from Denmark/Greenland to have a mid-term meeting for assessment of Northern Shrimp in Subareas 0 and 1, and Denmark Strait, the Council noted that STACFIS had reviewed the data available, and decided to set a meeting. The Council accordingly endorsed the recommendation to call a meeting of the Scientific Council in November 1993 at NAFO Headquarters.

3. **Review of Research Documents**

The Council observed that many of the Research Documents deferred from the June 1993 Meeting of the Scientific Council for further review at this meeting were found to have been adequately considered at the June 1993 Meeting. The two papers that needed further review are summarized in the STACFIS report.

4. **Review of Current Arrangements for Conducting Stock Assessments and Documentation**

a) **Updating list of Designated Experts**

The Council noted that STACFIS had identified Designated Experts for the 1994 assessments with an additional expert required for the Shrimp in Div. 3M. The availability of the nominees would be confirmed by the Secretariat at the earliest convenient time.

b) **Review of Working Papers to be Prepared by Designated Expert on Their Workload**

STACFIS had noted that an important aspect of stream-lining the assessment work at the June meetings would be to have all the necessary data in advance of the meeting. Recognizing the importance of making every effort to improve the data transference process between the laboratories and NAFO Headquarters, the Council endorsed the STACFIS recommendation that the Secretariat acquire a computerized e-mail system.

c) **Guidelines for Documentation of Assessments**

The Council noted STACFIS discussions on this matter.

d) **Status of Scientific Documents (Working Papers *vs* Research Documents)**

The Council noted STACFIS had considered some problem areas in the preparation of Research Documents, particularly in the light of time constraints at the June meetings. It was hoped that with the efforts currently underway by STACFIS, such problems will gradually rectify themselves.

e) **Proposal for Annual Shrimp Meeting in November**

The Council agreed that the Scientific Council mid-term meeting on Northern Shrimp be scheduled for 19-23 November 1993. With respect to holding these mid-term meetings annually, the Council agreed to review the results of the proposed meeting of November 1993 at its meeting in June 1994 before a decision was made.

f) **Adoption of Work Procedures for the June 1994 Scientific Council Meeting**

The Council took note of the STACFIS discussion of rearranging the assessment work, and considered the proposals made would be preliminary steps toward improving the efficiency in the work of the Council.

5. **Future Special Sessions**

a) **Special Session in September 1993**

The Council was pleased with the interest generated for the Symposium on "Gear Selectivity/Technical Interactions on Mixed Species Fisheries" with S. A. Murawski (USA) and P. Stewart (EEC-UK) as co-conveners to be held during 13-15 September 1993. The Council extended a vote of appreciation to the co-conveners for their enthusiasm, and hoped for a successful and informative meeting.

Noting that the Chairman of this Scientific Council Meeting, H. Lassen, was due to leave before the Symposium, the Council invited H. P. Cornus, STACFIS Chairman, to represent the Council as Chairman.

b) **Progress Report on September 1994 Special Session**

The Assistant Executive Secretary reported to STACFIS there were no new developments since the June 1993 Meeting.

c) **Progress Report on September 1995 Special Session**

The Assistant Executive Secretary reported to STACFIS there were no new developments since the June 1993 Meeting.

d) **Theme for September 1996 Special Session**

The Council took note that a theme would be selected at the September 1994 Meeting.

III. RESEARCH COORDINATION (see STACREC report, App II)

1. **Acquisition of STATLANT 21 Data and Publication of Statistical Information**

The Council agreed with STACREC that the publication of *NAFO Statistical Bulletin* Vol. 40 with the 1990 data should now be completed, in the absence of data for EEC-France (M) and France (SP). It was noted that the Volume 39 with the 1989 data was also published without data for EEC-France (M).

The Council agreed that the publication of *NAFO Statistical Bulletin* Vol. 41 also should proceed when the 1991 data as stated in the STACREC report become available.

2. **Acquisition of Statistical Information From Other Standing Committees**

The Council was pleased some progress was made in understanding the status of working papers in other Standing Committees. The Council believed that this communication process will assist in obtaining the relevant information for the work of the Scientific Council.

3. **Assessment Data Needs for 1994/95 and Respective Budget**

The Council noted that since the June 1993 Meeting, new information on conducting research surveys was available from the Greenland Fisheries Institute, which indicated an annual expenditure of about CAN $5.3 million. The cost of Japanese research was also summarized from the joint Greenland/Japan survey at CAN $1 million. The Council noted that relevant data had been presented by the Russian Federation to the Fisheries Commission. At present, taking into account that only two Contracting Parties had provided comprehensive documentation on this issue, the Council was unable to provide a response to the Fisheries Commission request.

4. **Non-traditional Fishery Resources in the NAFO Area**

The Council noted STACREC had reviewed the recent skate catch data. The Council recognized the importance of considering these and other non-traditional fishery data.

5. **Proposals for Scientific Tasks of Observers in the Pilot Observer Program**

The Council was pleased that the recommendation from the June 1993 Meeting was adopted by the Fisheries Commission, with the modifications as presented in the STACREC report.

6. **Updating of Conversion Factors Used to get Round Fresh Weight**

The Council was informed by STACREC that FAO was currently conducting a survey to revise the previously published conversion factors used by national fleets. This information was thought to be of some use to the Council and these data should be obtained before any further work on compilation of conversion factors is attempted.

7. **Research Coordination for Greenland Halibut**

At its June 1993 Meeting, the Scientific Council recommended that consideration be given to the implementation of a joint multinational trawl survey for Greenland halibut from Davis Strait to the Eastern Grand Bank and Flemish Cap. The Council noted STACREC considered the data provided at this meeting by Canada and Japan/Greenland on current survey activity with additional estimates of the number of required days to complete the proposed survey. It was estimated that about 250 vessel-days would be needed to cover all Divisions from Div. 0A in the north to Div. 3N in the south. The Council noted that it was indicated that funding would not be provided in the foreseeable future to complete this proposed survey. The Council agreed that until such a survey is conducted, an adequate assessment of stock size and its relative distribution is unlikely.

8. **Other Matters**

The Council endorsed the recommendation that the Council should be represented at the 16th Session of CWP in Madrid, Spain, in July 1994 by the Chairman of STACREC, Assistant Executive Secretary and a national representative.

The representative E. de Cárdenas, EEC-Spain, was nominated to attend along with STACREC Chairman, C. A. Bishop (Canada), and the Assistant Executive Secretary.

IV. PUBLICATIONS (see STACPUB report, App. III)

1. **Review of Scientific Publications**

The Council was pleased with the substantial progress made in review of papers and preparation for publication of papers since the June 1992 Meeting.

2. **Promotion and Distribution of Scientific Publications**

The Council was pleased to note that two Journal Invitational publications (one on West Greenland Cod papers and the other on Northern Cod papers) under consideration will cover the cod stocks through most of the Northwest Atlantic. These two publications would be quite timely and very valuable coverage of the recently troubled cod stocks.

3. **Editorial Matters**

The Council endorsed the appreciation extended to R. Halliday for his long and valued services as a one-time Chairman and member of STACPUB and a decade of contributions as an Associate Editor. His advice and directions were often sought in the development of STACPUB processes.

The Council looked forward to an early replacement to his position in the Editorial Board of the Journal.

4. **Review of Papers for Possible Publications**

The Council was hopeful that publication of significant scientific interest will result from the papers slated for the 13-15 September Symposium. The Council agreed with STACPUB view that the

recommendations of the co-conveners of the Symposium should be accepted on the suitable mode of publication.

5. **Guidelines for Authors**

Recognizing the importance of streamlining the document production by the Secretariat for the June meetings, the Council agreed with providing potential authors of Research Documents the guidelines prepared by the Secretariat.

V. RULES OF PROCEDURE

There were no Rules of Procedure considered at this meeting.

VI. COLLABORATION WITH OTHER ORGANIZATIONS

1. **Scientific Council Representatives to CWP 16th Session in July 1994**

The Council considered and endorsed the recommendation of STACREC (see above) regarding the 16th Session of CWP scheduled for July 1994 in Madrid, Spain.

The Council noted the Assistant Executive Secretary was invited by FAO to review the NAFO/FAO database discrepancies.

2. **Scientific Council Invitations to Other International Bodies**

It was noted that the status of the Scientific Council and the busy program of work it carries out was often quite different and not relevant to other international bodies. It was therefore agreed that Council invitations to other bodies will be made when necessary, and the Council will continue the current practice of reviewing each request for observer status on an individual basis.

VII. REVIEW OF FUTURE MEETING ARRANGEMENTS

1. **Proposed November 1993 Meeting on Northern Shrimp**

The Council agreed to the dates of 19-23 November 1993 for the mid-term Meeting of the Scientific Council to consider Shrimp in Subareas 0 and 1 and Shrimp in Denmark Strait. This meeting will be held at NAFO Headquarters, Dartmouth, Nova Scotia, Canada.

2. **Special Session of 13-15 September 1993**

Noting the Special Session (Symposium) would be held after this Annual Meeting, the Council agreed the report of that meeting will be considered for adoption if ready at the end of the Symposium or alternatively the report will be considered by mail.

3. **June 1994 Meeting of Scientific Council**

The Council confirmed the dates of 8-22 June 1994 for the Meeting of the Scientific Council and its Standing Committees.

It was noted the Council would review the report of the November 1993 Meeting on Shrimp in Subareas 0 and 1 and Denmark Strait to determine if a November 1994 meeting will be called.

4. **Special Session and Annual Meeting, September 1994**

The Council agreed to hold the Special Session (Symposium) during 14-16 September 1994, immediately before the Annual Meeting of the Scientific Council during 19-23 September 1994.

5. **June 1995 Meeting of Scientific Council**

The Council agreed on the tentative dates of 7-21 June 1995 for its meeting.

VIII. SPACE REQUIREMENTS FOR JUNE MEETINGS AND STRUCTURE OF SCIENTIFIC COUNCIL

The Council considered the possibility of holding its June meetings at an alternative venue to NAFO headquarters and was informed by the Standing Committee on Finance and Administration (STACFAD) of the General Council, that a sum of money would be made available to facilitate this. A proposal to meet at one of two hotels was discussed. However, it was suggested that a better alternative may be to rent office space for the duration of the meeting, and the Council requested that the Secretariat investigate this alternative.

IX. ADOPTION OF REPORTS

At its concluding session, the Council received and adopted the reports of the Standing *Committees* STACFIS, STACREC and STACPUB.

The Chairman then proposed that the Council's report as discussed be adopted, noting that some text would be inserted by the Chairman and the Assistant Executive Secretary. The Council accordingly adopted the report of this meeting.

X. *ADJOURNMENT*

The Council noted the Chairman, V. P. Serebryakov, had fulfilled his 2-year term of office. The Council thanked him for this work during this period, and welcomed the incoming Chairman, H. Lassen (EEC-Denmark).

The Acting Chairman, H. Lassen, on behalf of the Council extended thanks to the work done by the Chairman of STACREC, A. Avila de Melo, during his 2-year term of office, and welcomed the incoming Chairman, C. A. Bishop (Canada).

Noting also that he himself would be stepping down from his position as Vice-Chairman of the Scientific Council and Chairman of STACPUB, he expressed his sincere thanks for the support he received during his term in office, and welcomed the incoming Vice-Chairman of Scientific Council and *ex-officio* Chairman of STACPUB, R. W. Bowering (Canada).

The Acting Chairman also noted that R. G. Halliday had tendered his resignation to the Editorial Board. This represented the end of a very long term of dedicated support to the Scientific Council from during ICNAF times. This also represented the departure of a key founding member of STACPUB and the *Journal of Northwest Atlantic Fishery Science*. On behalf of the Council, sincere thanks and best wishes were extended.

There being no further business, the Acting Chairman closed the meeting and thanked everyone for their contributions and asked the Assistant Executive Secretary to convey to the Secretariat the Council's appreciation of its friendly and efficient assistance during the meeting.

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

Chairman: H. P. Cornus Rapporteur: Various

The Committee met at the Holiday Inn, Dartmouth, Nova Scotia, Canada, during 7-10 September 1993 to consider and report on various matters referred to it by the Scientific Council. Representatives from Canada, Denmark (in respect of the Faroe Islands and Greenland), European Economic Community (EEC), Iceland, Japan and the Russian Federation were present. STACFIS reviewed recommendations of the June 1993 Meeting and it was agreed that the review of assessment methods to be used will be considered under agenda item 2.c.

I. STOCK ASSESSMENTS

1. **Silver Hake in Divisions 4V, 4W and 4X** (SCR Doc. 93/1, 2, 4, 5, 6, 7, 40, 102; SCS Doc. 93/10)

a) **Introduction**

The fishery is conducted primarily by large Cuban and Russian Federation otter trawlers using small-meshed bottom trawls. Before 1977 the fishery was not restricted by season or area; however, since 1977 the fishery has been restricted to April 1 through November 15 and to the area seaward of the small mesh gear line (SMGL). Since 1990, allocations have been made to Canadian companies which have entered into developmental arrangements with Cuban and Russian Federation fishing companies to harvest silver hake. Despite these realignments, the resultant composition of the fleet actively fishing silver hake has not changed. Nominal catches since 1970 ranged from a maximum of 300 000 tons in 1973 to a minimum of 29 000 tons in 1993. Catches generally increased from 1977 to 1989, with the exception of 1983, from 37 000 tons in 1977 to 91 000 tons in 1989. Since 1989, catches have shown a continual decline to levels below those reported in the late-1970s.

Recent catches and TACs ('000 tons) are as follows (Fig. 1):

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
TAC	80	100	100	100	100	120	135	135	100	105	75
Catch	36	74	75	83	62	74	91	69[1]	68[1]	32[1]	29[1]

[1] Provisional.

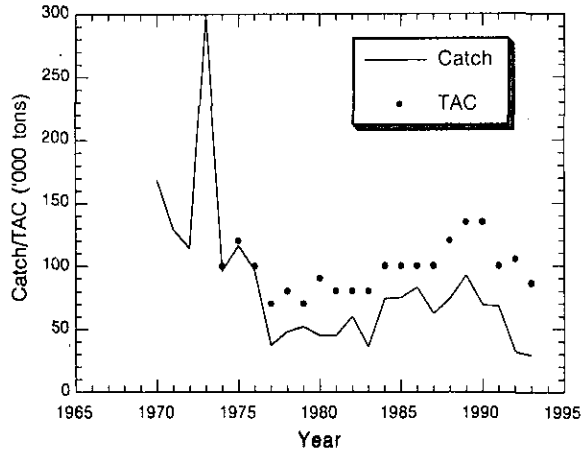

Fig. 1. Silver hake in Div. 4VWX: catches and TACs.

The 1992 fishery commenced in mid-March, on an experimental basis and finished in July. Catch rates were generally poor, with pollock by-catch higher than that seen in previous years. In early-May a portion of the fleet (12 vessels) was forced to stop fishing for one week due to this high by-catch. The 1993 fishery followed a similar pattern, although by-catch was not a limiting factor at any time.

b) **Input Data**

i) **Commercial fishery data**

Catch rates. As in previous assessments, standardized catch rates were calculated using a multiplicative model. The standardized catch rate for this stock had dropped in recent years (Fig. 2), from a peak of 5.5 tons/hr in 1989 to 2.2 tons/hr in 1992. In 1993 the standardized catch rate remained essentially the same as in 1992, at 2.2 tons/hr. The most recent catch rates were similar to those experienced in the late-1970s and early-1980s.

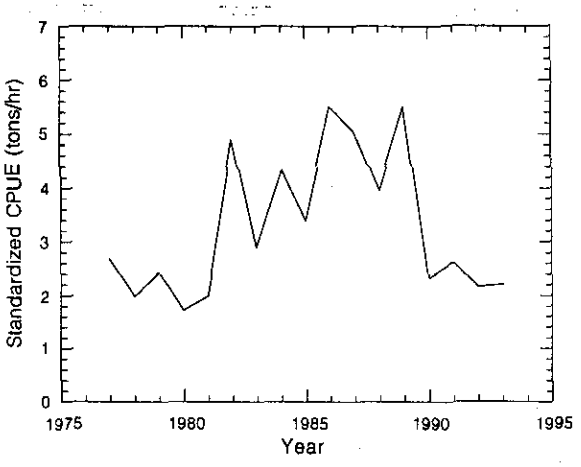

Fig. 2. Silver hake in Div. 4VWX: standardized catch rates.

Catch-at-age data. The commercial removals-at-age for 1992 were calculated from Canadian length samples and a combined Canada/Russia age-length key, following the same procedure used in the previous two assessments. Canadian July research vessel survey data were used in the calculation of weights-at-age. The removals-at-age and weights-at-age for 1977-91 were taken from the previous assessment to provide estimates for the period 1977-92 inclusive.

ii) **Research survey data**

The survey results indicated a continual decline in total numbers and biomass over the period 1986-92 (Fig. 3). Results of the 1993 survey indicated both numbers and biomass had risen moderately.

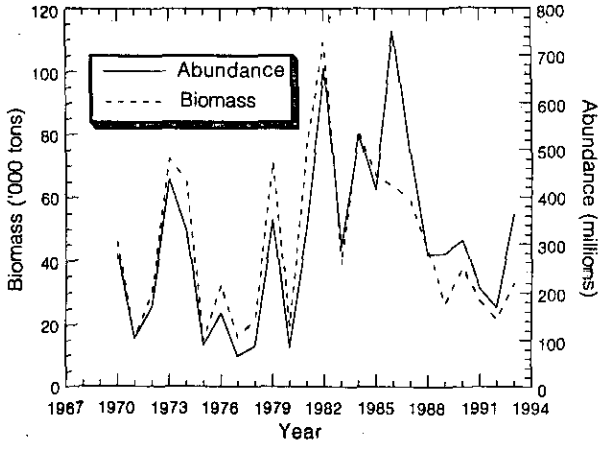

Fig. 3. Silver hake in Div. 4VWX: biomass and abundance estimates from July Canadian research vessel data.

In numbers-at-age the surveys showed the 1990 year-class to be below average in 1991 and 1992 at ages 1 and 2, respectively. The 1991 year-class appeared even weaker than the 1990 year-class at age 1. In 1992 a survey for 0-group silver hake was not conducted. However, an estimate of numbers at age 1 for this year-class were obtained from the 1993 July survey by adding all fish 21 cm and less, half those at 22 cm, together. This suggested that the 1992 year-class was above average in strength.

iii) **Environmental data**

One paper was presented summarizing oceanographic conditions (SCR Doc. 93/1). Analysis of sea-surface temperatures for 1992 showed negative anomalies in spring, summer and winter on the Scotian Shelf, over the 1991 conditions.

iv) **Biological studies**

Several papers investigated the reliability of independent silver hake abundance indices (SCR Doc. 93/2, 4, 7).

Significant correlations were noted between commercial CPUE and research abundance indices at ages 1 and 2. These relationships were not significant at older ages.

Probable relationship between the fluctuations in year-class abundance for silver hake and other gadoids (Div. 4VWX+5 pollock, Div. 2J and 3KL, Div. 3NO, Subdiv. 4Vs, Div. 4W cod) was studied. During the 1980s an inverse relationship between year-class abundance of silver hake and other species was apparent. Such dynamics in abundance can be explained by the influence of the oceanographic processes influencing the Northwest Atlantic. It is suggested that strong year-classes of the silver hake population under consideration appear predominantly in warm years.

The joint USSR-Canadian surveys in 1988 and 1990 in the Scotian Shelf area provided data to estimate silver hake concentration steadiness in relation to species composition, abundance, distribution of food organisms, and hake feeding dynamics. Relationships were noted between concentration locations, diurnal vertical migrations of food organisms, and silver hake aggregations.

Data on feeding, diurnal and annual food ration of silver hake in Div. 4VWX in 1988 and 1990 were summarized (SCR Doc. 93/40). Diurnal rations of hake females and males were calculated by size groups. Annual food uptake was estimated by food items. Comparison of food composition and amount revealed that euphausiids (27%) and young silver hake (56%) constituted the major food in July 1988, while in June 1990 the bulk of food consisted of three groups: euphausiids (34%), young hake (28%) and short-finned squid (28%).

c) **Estimation of parameters**

i) **Sequential population analysis**

Two formulations of the adaptive framework (ADAPT) were reviewed. The first (SCR Doc. 93/5, 6), incorporated a 'stabilization' factor in the model, in an attempt to correct the retrospective pattern. For reasons detailed in Section II.1, (Review of Research Documents), concern was expressed whether the use of the stabilization factor in the model was appropriate. For this reason the SPA was not accepted.

A second ADAPT analysis (SCR Doc. 93/102) utilized commercial catch-at-age, age disaggregated standardized CPUE, Canadian July survey catch-at-age and a juvenile index, with a dome-shaped partial recruitment pattern and M = 0.4.

An analysis using the Laurec-Shepherd technique was also conducted. The results of the two analyses corresponded closely.

A retrospective analysis using the results of the ADAPT formulation on ages 3-5 showed a pattern where F was consistently underestimated (by 40-60%) as a longer time series of data was introduced. This retrospective pattern has been noted in other North Atlantic groundfish stocks, however, the underlying cause remains obscure. It was noted that the high negative residuals associated with the 1992 estimates from both July research vessel and CPUE indices supported the conclusion that the most recent year did not fit the model well. Under these circumstances, it was reasonable to assume that the 1992 fishing mortality produced by ADAPT was also underestimated, however, the degree to which population numbers were being overestimated was difficult to quantify.

d) **Prognosis**

The 1992 year-class will make a significant contribution to the catch in 1994 at age 2. As an 0-group survey was not conducted, the only available estimate of this cohort is that from the 1993 July research vessel survey. The 1991 year-class is also important and its estimation in the SPA is based only on a single occurrence in the catch matrix. While it was decided to accept the estimates of the 1990 and earlier year-classes as given by the SPA, the strengths of the 1991 and 1992 year-classes were inferred from July survey data.

Year-class estimates from the survey were regressed against estimates from the SPA for the 1981-90 year-classes at age 1, using the model SPA = a + b(*ln*RV); r^2 = 0.84. Predictions from this relationship for the strength of the 1991 and 1992 year-classes were 0.4 and 1.2 billion fish, respectively. The estimate for the 1992 year-class was corroborated by data presented for the 1993 Russian commercial fishery. These show the appearance of age 1 fish in the catch in numbers similar to previous abundant year-classes.

An $F_{0.1}$ value of 0.72 was used as in last year's assessment, based on the yield-per-recruit analysis of the Scientific Council in 1990 (NAFO Sci. Coun. Rep., 1990). The mean weights-at-age for projection were taken as the average of recent years (1988-92) observed in the fishery. The partial recruitment pattern was based on the average F-at-age in the SPA for 1990-91. Weight- and PR-at-age used were as follows:

Age	Average weight (kg)	Partial recruitment pattern
1	0.059	0.01
2	0.138	0.29
3	0.189	0.92
4	0.219	1.00
5	0.260	0.88
6	0.310	0.89
7	0.403	0.50
8	0.466	0.33
9	0.662	0.09

The provisional catch of 29 000 tons in 1993 (Canadian observer data) was estimated to have resulted in a fishing mortality of F = 0.40. Fishing at $F_{0.1}$ in 1994 is estimated to equate to a catch of 51 000 tons.

The retrospective analysis using ADAPT methodology indicated a consistent tendency for F estimates to increase by 40 to 60% for a particular year when additional years of data were added. In addition, a review of historical TAC advice indicated that since about 1984, the projected $F_{0.1}$ catches from the assessments have been overestimated. It is only because TACs have not been fully harvested (due to allocation and other restrictions), that the actual F appears to have been close to $F_{0.1}$. There is no reason to expect that the current estimate of F in 1992 will not, in future, also appear to be an underestimate. This suggests that the abundance of year-classes estimated by ADAPT for 1992 may have been overestimated. These are the 1990 and older year-classes which will be ages 4 and older in 1994. These ages account for about 45% of the projected catch in 1994. It is likely, therefore, that the projected catch at $F_{0.1}$ in 1994 of 51 000 tons is also overestimated to some extent. Unfortunately, the extent of this is difficult to determine.

e) **Future studies**

STACFIS continues to support co-operative studies on silver hake. These include continuation of the joint Canada-Russia juvenile survey. As was stated in the past two reports, STACFIS recognized that a Canada-Russia experiment to validate age readings using radio-nucleotides is ongoing and encourages its completion. STACFIS reiterates its previous **recommendation** that *upon completion of the radio-nucleotide studies to validate silver hake age readings, one comprehensive document be prepared by Canadian and Russian authors.*

Attention is drawn to the paper by P. S. Gasiukov on stabilization of ADAPT estimates (SCR Doc. 93/5) as one possible method of resolving the retrospective problem. This is, of course, not an issue which concerns only silver hake but is central to improvement of many of the stock assessments conducted by STACFIS. Thus, further investigation of this and other approaches to the retrospective problem is encouraged. With respect to silver hake, the retrospective pattern in ADAPT SPAs should be examined more closely over a wider range of age groups to better quantify the extent of potential underestimates.

2. **Shrimp in Division 3M** (SCR Doc. 93/22, 101, 103, 104, 105, 107, 110, 111, 112)

a) **Introduction**

Although the presence of shrimp on Flemish Cap has been known for many years, no significant shrimp commercial effort was reported from the area before spring 1993. A shrimp fishery began in late-April 1993 when two Canadian vessels were granted exploratory permits to fish the species in Div. 3M. By late-July, about 50 vessels from several nations were reported fishing for shrimp in the area. Preliminary reports (to August 23) indicated that over 21 000 tons of shrimp have been taken so far in 1993 and that, as of August 31, 18 vessels were still active in the fishery.

b) **Input Data**

i) **Commercial fishery data**

Fishery information from Canada, Greenland, Faroe Islands and Iceland indicated that effort was distributed around the Cap along the 400 m contour (Fig. 4). Catch rates generally declined from May to early-July, stabilizing somewhat thereafter.

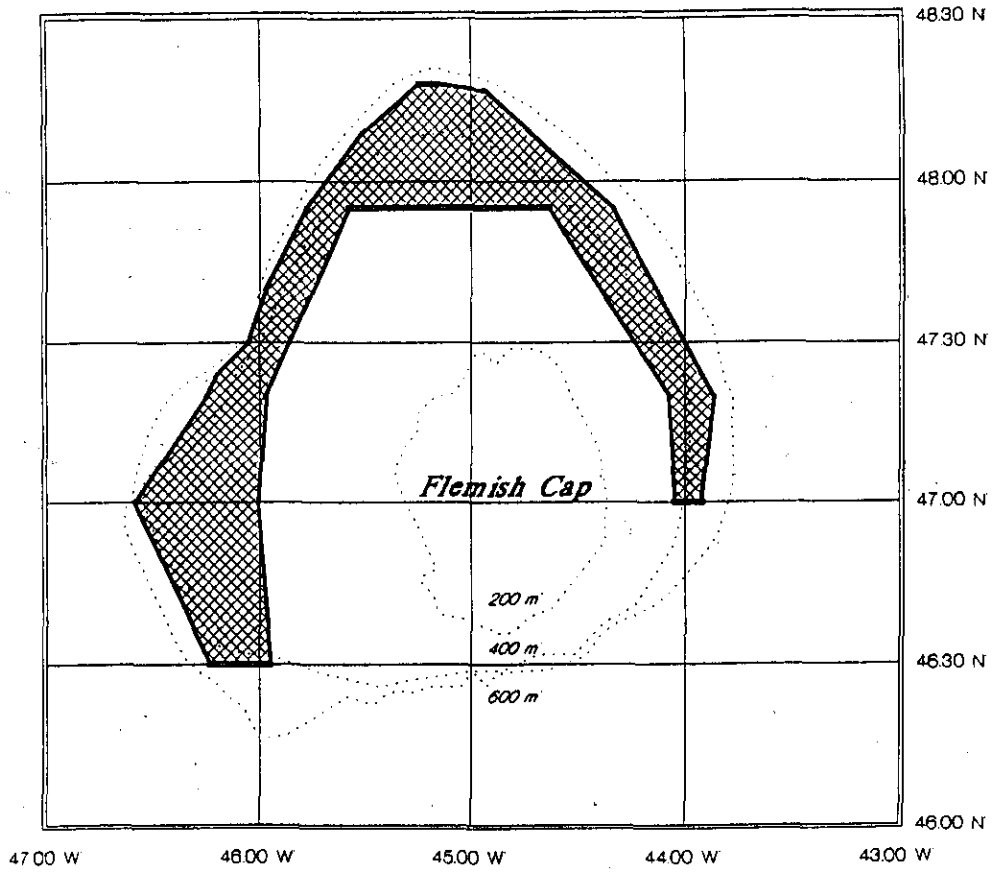

Fig. 4. Main shrimp area on Flemish Cap in May-August 1993.

Size composition data (oblique carapace length - OCL) from commercial sampling from Canada and Iceland showed three size groups of males (16, 20, 23 mm) and one of females (26 mm). Overall sizes ranged between 14 and 30 mm and included at least 5 ages (2 to 6). Females were not ovigerous from May to July indicating that the egg-bearing period lasts from about August to March.

By-catch consisted primarily of small redfish (mode at 14 cm) and Canadian observer data indicated levels between 10-15% of the total catch weight in April-June, increasing to higher levels in July. By-catch of other commercial species was low during that period.

ii) **Research survey data**

Oceanographic data were obtained from the Flemish Cap during a Canadian survey conducted in July 1993 and compared with historical data for the area. The general circulation in the area was characterized by an anticyclonic gyre which could play an important role in the retention of shrimp larvae. Also, the hydrographic data showed a cooling trend since 1988 which could favour the survival of shrimp.

EEC summer groundfish surveys were conducted on Flemish Cap from 1988 to 1993. Shrimp biomass estimates were calculated from the catches obtained using a groundfish bottom trawl and therefore did not represent the absolute shrimp biomass. However, they showed that relative shrimp biomass from 1991 to 1993 was substantially higher than during the 1988-90 period.

Year	Average Catch Per Mile (kg) and Standard Error
1988	1.54±0.28
1989	1.37±0.24
1990	1.53±0.21
1991	5.83±0.71
1992	11.75±1.86
1993	6.57±1.04

These surveys also showed that abundance was highest in the western, northern and northeastern parts of the Cap and in depths ranging from about 300 to 500 m. These were the areas fished commercially during May-August, 1993.

Age interpretation of the size distributions from the 1988 to 1992 surveys and the 1993 commercial fishery samples identified the 1988 year-class as strong, possibly accounting for the increase in biomass in recent years. The 1988 year-class was female in 1993 and at the sizes targeted by the industry which explains the success of the new fishery in 1993.

The occurrence of shrimp in cod stomachs taken during winter surveys on Flemish Cap from 1978 to 1984 provided information on shrimp distribution, age, growth and year-class strength. The data suggested that shrimp abundance also varied during this period. Length-at-age 1 was estimated at about 7 mm and it was concluded that the first size group of male shrimp evident in trawl samples was age 2 (16-18 mm).

Cod predation data available from EEC surveys from 1989 to 1992 showed that shrimp increased in importance as prey for cod between 1989 and 1990. The proportion of cod stomachs containing shrimp increased from 12% in 1989 to 26% in 1990 and 33% in 1991.

c) **Assessment Results and Prognosis**

STACFIS agreed that shrimp abundance in recent years had increased but it was uncertain whether or not this high level of abundance will continue. The general decline in catch rates from May to July may be an effect of exploitation or due to the seasonality as observed in other shrimp fisheries. Information is lacking on the history of the stock, present stock size, future recruitment and impact of the 1993 catch level. At present, it is not possible to conclude that a fishery at or near the 1993 catch is sustainable in the Flemish Cap area and STACFIS has not sufficient data to provide a basis for the calculation of an initial TAC. However, based on the uncertainties mentioned above, concern was expressed for the level of removals in 1993 and a cautious approach to exploitation should be considered.

The by-catch of small redfish was considered as a potential for significantly impacting the redfish resource in this area. STACFIS **recommended** that, *effective immediately, sorting grates be mandatory in shrimp fishing operations on Flemish Cap as a means of minimizing the by-catch of redfish and other fish species.*

d) **Research Recommendations**

The development of the Flemish Cap shrimp fishery represents a unique opportunity to monitor closely the response of a shrimp population from the beginning of its exploitation. A comprehensive monitoring program will provide valuable information which can be considered in assessing and managing this resource as well as other shrimp stocks of the Northwest Atlantic. Therefore, with respect to Shrimp in Div. 3M STACFIS **recommended** that:

- *all countries participating in this new fishery provide levels of sampling for shrimp and important by-catch species as recommended by NAFO Conservation and Enforcement Measures;*
- *the EEC groundfish surveys, during summer on Flemish Cap which have provided a valuable time-series of data on shrimp, continue to include the detailed sampling of shrimp and the analysis of the data as in the past year;*
- *that since more data on the food and feeding of cod exist, they be analyzed to obtain additional and historic information on shrimp distribution and abundance in the area.*

3. **Workshop on Assessment Methods**

STACFIS discussed the suitable time to conduct another workshop on assessment methods and recognized that such a meeting should be planned if and when the need arises.

4. **Data Availability for Assessment of Northern Shrimp in November 1993**

STACFIS considered a proposal from Denmark/Greenland regarding the reinstatement of a mid-term meeting for the assessment of Northern shrimp stocks in Subareas 0 and 1 and Denmark Strait.

It was made clear that the data available for the shrimp stock assessments had improved considerably since the suspension of STACFIS mid-term meetings in 1987. Since 1988 a yearly trawl survey has been conducted in July-September giving an index for the trawlable biomass and information on distribution of the stock, size distribution of shrimp and recruitment (20 mm mesh in cod-end introduced in 1993). Further improvements include a new logbook system covering almost 100% of the large vessels since 1988, revealing information on catch rates, catch composition and distribution of the fishery. Additionally the coverage of sampling from the commercial fishery has also been extended.

It could not be stated to what extent the assessments and predictions had also improved, but it was felt that the survey was revealing key information, and that it would be appropriate to include the current information in the advice for the coming year at a mid-term meeting, i.e. to include the 1993 survey in the advice for 1994.

If a mid-term meeting was to be held at NAFO Headquarters in Dartmouth the extra costs to NAFO would be marginal. Accordingly, STACFIS **recommended** that *a mid-term meeting be held for Northern shrimp in Subareas 0 and 1 and Denmark Strait at NAFO Headquarters.*

II. REVIEW OF RESEARCH DOCUMENTS

1. **NAFO SCR Doc. 93/5**

This document dealt with the phenomenon that may be called 'stock estimate instability' as revealed through retrospective analysis. To solve such a condition, special methods were developed, one of them based on the use of a regularization algorithm. Utilization of this method was carried out using known biomass values from the converged portion of the VPA. Such an approach provided stable stock estimates for silver hake in Div. 4VWX. Average deviation of such estimates based on retrospective analyses was less than 10%.

Concern was expressed that although use of the algorithm removed the apparent retrospective pattern, there were no changes in estimates for the terminal year. Therefore, the method appears to be 'masking' the pattern rather than solving the problem.

STACFIS was pleased that work is being carried out to try and solve the retrospective problem and encouraged further work on this topic.

2. **NAFO SCR Doc. 93/23**

Several morphometric analyses were made on bones of the three species of the genus *Sebastes* that occur on the Flemish Cap. The basipterigium is the bone which best discriminates the three species. Cluster analysis indicated that *S. marinus* and *S. fasciatus* are species more closely related than with *S. mentella*.

3. **NAFO SCR Doc. *93/30-39; 41-43; 45; 55-57; 68***

STACFIS noted that the highlights of these papers had been presented and discussed at the June 1993 Meeting in conjunction with the assessment of Div. 2J and 3KL cod. As such it was considered unnecessary to review these papers during this meeting.

III. REVIEW OF CURRENT ARRANGEMENTS FOR CONDUCTING STOCK ASSESSMENTS AND DOCUMENTATION

1. ***Updating list of Designated Experts***

Recognizing the workload of the Designated Experts during the June Meetings, STACFIS felt it would be desirable to nominate one scientist per stock. However, it was noted that it was not practical at the present time. Accordingly, the list of Designated Experts for 1993 was reviewed and the following were tentatively identified for the 1994 assessments:

- From the Science Branch, Northwest Atlantic Fisheries Centre, Department of Fisheries and Oceans, P. O. Box 5667, St. John's, Newfoundland, Canada, A1C 5X1 [Telefax: (709) 772-2156],

for	Cod in Div. 3NO	C. A. Bishop
	Redfish in Div. 3LN	D. Power
	American plaice in Div. 3LNO	W. B. Brodie
	Witch flounder in Div. 3NO	W. R. Bowering
	Yellowtail flounder in Div. 3LNO	W. B. Brodie
	Greenland halibut in SA 2 + Div. 3KL	W. R. Bowering
	Roundnose grenadier in SA 2+3	D. B. Atkinson

Capelin in Div. 3L	J. E. Carscadden
Capelin in Div. 3NO	J. E. Carscadden
Squid in SA 3+4	G. H. Winters
Shrimp in Div. 3M	D. G. Parsons

- From the Instituto de Investigaciones Marinas, Muelle de Bouzas, 36208 Vigo, Spain [Telefax: 34-86292762],

for Cod in Div. 3M — A. Vazquez

- From the Instituto Espanol de Oceanografia, Centro Oceanografico de Cantabria, Aptdo 240, 39080 Santander, Spain [Telefax: 42 275072],

American plaice in Div. 3M — E. de Cárdenas

- From the Polar Research Institute of Marine Fisheries and Oceanography (PINRO), 6 Knipovich Street, Murmansk, 183763, Russia [Telefax: 70 95 9213463 - Telex: 126 111 PINRO],

for Redfish in Div. 3M — K. V. Gorchinsky

- From the Greenland Fisheries Research Institute, Tagensvej 135, 1, DK-2200, Copenhagen, Denmark [Telefax: 45 35821850],

for	Northern shrimp in SA 0+1	D. Carlsson
	Roundnose grenadier in SA 0+1	J. Boje
	Wolffish in SA 1	J. Boje
	Greenland halibut in SA 0+1	J. Boje

- From the Institut für Seefischerei, Fischkai 35, D-27572 Bremerhaven, Republic of Germany [Telefax: 49 47173473],

for Redfish in SA 1 — H. J. Rätz

- From the Bedford Institute of Oceanography, Marine Fish Division, P. O. Box 1006, Dartmouth, Nova Scotia, Canada, B2Y 4A2 [Telefax: (902) 426-7827]

for Silver hake in Div. 4VWX — M. A. Showell

- From the Marine Research Institute, Skulagata 4, P. O. Box 1390, 121 - Reykjavik, Iceland [Telefax: 354 1623790],

for Northern shrimp in Denmark Strait — U. Skuladottir

The Secretariat was requested to confirm the availability of the Designated Experts from their respective laboratories.

2. **Review of Working Papers to be Prepared by Designated Experts on Their Workload**

A number of proposals were endorsed by STACFIS to streamline the assessment work at the June meetings. These consisted of having data such as catch-at-age and indices of abundance available before, or at the very latest, at the start of the meeting. As well, scientists who prepare such data should provide documentation for the STACFIS report.

To improve the transfer of data and information between scientists and the NAFO Secretariat, STACFIS **recommended** that *the Secretariat acquire access to a computerized e-mail system. This is considered to have several benefits to improve communications and reduce the costs.*

3. **Guidelines for Documentation of Assessments**

It was noted that the amount of information resulting from surveys was difficult to describe in the assessment documentation. STACFIS agreed a structural description would be helpful. A proposed structure for the description of survey results was based on biomass, abundance, distribution, length and age structure, recruiting year-classes, maturity and fecundity of the target species.

4. **Status of Scientific Documents (Working Papers *vs* Research Documents)**

STACFIS noted that due to time constraints during the June Meeting, some documents were not adequately reviewed. One immediate concern was that research documents of some assessments at times did not completely reflect the outcomes of the assessments and showed differences to the text reported in the Scientific Council Report. However, STACFIS agreed that these lapses could be overcome within the present framework of the meetings. It was also agreed that Designated Experts should be informed of these lapses and every effort be made to avoid them.

5. **Proposal for Annual Shrimp Meeting in November**

STACFIS agreed on a meeting on Northern shrimp at NAFO Headquarters during 19 to 23 November 1993. The agenda for this meeting will be circulated by the Secretariat 60 days in advance of the meeting.

6. **Adoption of Work Procedures for the June 1994 Scientific Council Meeting**

A proposal that the Scientific Council and its Subcommittees be restructured was presented for discussion. The specific issue addressed related to changes required to improve the efficiency of work during the STACFIS meeting. This resulted from the observations that conducting stock assessments continues to represent a considerable workload within the scheduled time for the June meetings of the Scientific Council. The main areas of restructuring considered at this time were; the creation of formal Working Groups to deal with the assessment of species or groups of similar species and changes to the meeting timetable.

STACFIS noted previous attempts to use a formalized Working Group approach had limited success. Some of the difficulties encountered related to the adequacy of peer review, required attendance of individuals at concurrent meetings and duplication of effort at subsequent review levels leading to reduced productivity.

A proposed timetable change suggested to have the first meeting day determine the status of data availability and the status of preliminary assessments, as was done during the June 1993 meeting.

The outcome of the first day's session would determine the course of action to be followed which could include the setting up of Working Groups to deal with specific issues or problems. The feasibility of this *ad hoc* approach was considered more practical than a more formalized one in dealing with unforeseen issues or problems. Scheduling the Environmental Subcommittee and STACREC meetings immediately after the first day might also permit additional time for determining the best course of action.

The unavailability to Designated Experts of necessary assessment related data at the beginning of meetings has been a persistent problem that has contributed to lost time and consequent reduced efficiency. It was suggested that data should be provided earlier, and in a form that would permit direct inclusion into the appropriate assessment model.

STACFIS concluded that any improvements that might result from the creation of formal working groups at this time were not clear and considered that the best current option involved changes to the timetable. It was also considered that during the meeting, Designated Experts or Working Groups should also keep the Chairman regularly informed as to progress with the assessments. In this regard it was also considered that this would be more feasible if more meeting and/or working space were available at one location.

IV. FUTURE SPECIAL SESSIONS

1. **Progress Report on 13-15 September 1993 Special Session on "Gear Selectivity/Technical Interactions in Mixed Species Fisheries", Co-conveners S. A. Murawski (USA) and P. A. M. Stewart (EEC-UK)**

STACFIS was pleased with the responses received to date for this Symposium, and the apparent keen interests expressed by scientists. STACFIS expressed its appreciation to the co-conveners for the enthusiastic work to create this interest.

STACFIS considered how the report of this Symposium may be adopted for the report of this meeting. While it was hoped that the report would be ready at the time of the closure of the Symposium, STACFIS agreed that alternatively the report could be adopted by mail.

Noting the acting Chairman of Scientific Council, H. Lassen, was not available to attend the Symposium, STACFIS invited H. P. Cornus to represent him.

2. **Progress Report on September 1994 Special Session**

The Assistant Executive Secretary reported to STACFIS that there were no new developments since the June 1993 Meeting.

3. **Progress Report on September 1995 Special Session**

The Assistant Executive Secretary reported to STACFIS that there were no new developments since the June 1993 Meeting.

4. **Theme for September 1996 Special Session**

It was agreed that a list of possible themes for the 1996 Special Session will be reviewed and a topic selected at the September 1994 Meeting. Representatives were requested to forward their proposed themes to the Secretariat.

V. RESPONSE TO THE FISHERIES COMMISSION

There were no formal requests from the Fisheries Commission at this meeting. However, the Chairman of the Scientific Council attended several meetings of the Standing Committee on International Control (STACTIC), and responded directly to some of the questions posed. These are reflected in the report of that Standing Committee.

VI. OTHER MATTERS

There being no further business, the Chairman thanked everyone for their patience and cooperation during the very busy schedule of this meeting.

APPENDIX II. REPORT OF THE STANDING COMMITTEE ON RESEARCH COORDINATION (STACREC)

Chairman: A. Avila de Melo Rapporteur: W. Brodie

The Committee met on 9 September 1993 at the Holiday Inn, Dartmouth, Nova Scotia, Canada, to discuss various matters referred to it by the Scientific Council pertaining to statistics and fisheries research in the Regulatory Area. Representatives from Canada, Denmark (in respect of Faroe Islands and Greenland), European Economic Community (EEC), Iceland, Japan and Russian Federation were present. It was agreed that agenda item 1 and 3 will be considered together.

1. **Acquisition of STATLANT 21B Data and Publication of Statistical Information**

For 1990, data for France (SP) and EEC-France (M) were still outstanding. STACREC proposed that the Secretariat should proceed with the publication of *NAFO Statistical Bulletin*, Vol. 40, for 1990 data as there was no indication that the French data would be available soon. STACREC noted that the Volume 39 for 1989 data was also published in absence of the French data.

For 1991, data for EEC-Denmark, France (SP), Japan, Norway, USA, and USSR were still outstanding. With the exception of France (SP), the Secretariat had been informed that the data should be available before the end of 1993. STACREC suggested that the Statistical Bulletin for 1991 should be published when these data are received.

It was noted that both the Assistant Executive Secretary and the EUROSTAT Representative will be present at the upcoming meeting of the CWP *Ad hoc* Inter-agency Consultation in Dublin, Ireland, and noting that some statistical officers will be present at that meeting, STACREC agreed that they take that opportunity to raise the issue of outstanding data directly with the national statistical representatives.

STACREC noted that the new deadlines for submission of STATLANT 21A and 21B forms (May 30 and August 31, respectively) were recently proclaimed as law by the EEC.

2. **Acquisition of Statistical Information From Other Standing Committees**

STACREC was informed that the Chairman had discussed this issue with the Chairmen of both the Standing Committee on International Control (STACTIC) and the Standing Committee on Fishing Activities of Non-Contracting Parties in the Regulatory Area (STACFAC). Regarding STACFAC, he was informed that there was no problem in using the data contained in Working Papers, since these were circulated as General Council documents at the annual September meeting. STACTIC's position was similar, in that they did not object to the use of data contained in their Working Papers. For preliminary catch and effort information tabulated by the NAFO Secretariat for future use by these committees, the Chairman of both STACFAC and STACTIC agreed that these data could be requested directly from the Secretariat for use in stock assessments.

STACREC noted that a landings declaration form is being developed by STACFAC to cover landings of non-Contracting Party vessels in the ports of Contracting Parties. It was stressed that such information could only be useful for scientific purposes if it contained a breakdown of catch by species, along with some indication of fishing effort.

3. **Assessment Data Needs for 1994-95 and Respective Budgets**

This item was retained on the agenda of this meeting from the June 1993 Meeting, following a Fisheries Commission request in 1992 on research activities and costs in 1992/93. New information from the Greenland Fisheries Institute, Japan and the Russian Federation were received as follows:.

Research in Subareas 0 and 1 by Greenland. Greenland conducts research on a number of stocks under NAFO management, on its own and in joint ventures with Japan and Norway.

- **Shrimp in Subareas 0 and 1 and Denmark Strait**: research includes stratified-random trawl surveys covering the distribution area (Subareas 0 and 1 only), commercial sampling, analyses of logbooks and studies on selection, discard and stock delimitation. Annual costs amount to approximately CAN $2.4 million.

- **Greenland halibut in Subarea 1**: stratified-random trawl surveys are carried out offshore in joint venture with **Japan**. The surveys involve costs equivalent to CAN $1 million per year, which is covered in the form of additional feasibility fishing. Likewise a longline survey is done in joint venture with Norway involving costs equivalent to CAN $0.3 million per year. Greenland further conducts sampling and research inshore with longlines with costs of CAN $0.4 million per year. A trawl survey covering the entire Greenland halibut distribution in Subarea 1 would require additional funding in the range of CAN $1 million per year.

- **Roundnose Grenadier in Subarea 1**: research and sampling is done concurrently with the sampling on Greenland halibut. The total distribution area of roundnose grenadier is not covered.

- **Redfish in Subarea 1**: research and sampling is done concurrently with the Greenland shrimp/groundfish survey and the Greenland-Japan joint venture survey. Surveys cover most of the redfish distribution area.

- **Environmental research in Subarea 1**: environmental research and ecological studies linked to stock abundance is limited to few standard oceanographic transects. Costs amount to CAN $0.1 million per year. Optimum volume of scientific work would include further sampling and research on primary and secondary production (estimated at CAN $0.5-1 million per year).

In the joint venture with Greenland, the survey expense of Japanese R/V *Shinkai-Maru* is about CAN $40 000 per day. The necessary survey period to cover Div. 1BCD is about 25 days. Hence the total expense of the survey amounts to CAN $1 million.

At present, taking into account that only two Contracting Parties had provided comprehensive documentation on research survey costs, STACREC was unable to provide a global response to the Fisheries Commission request.

STACREC noted that relevant information from the Russian Federation had been forwarded directly to the Fisheries Commission.

4. **Non-traditional Fishery Resources**

The Secretariat provided STACREC, as requested at the June 1993 Meeting, with documentation on skate catches for 1990-92. Although the data were preliminary (STATLANT 21A), they indicated a substantial reduction from 1991 to 1992 in the skate nominal catches for EEC-Portugal and EEC-Spain in Subarea 3. Data from research vessel surveys were, however, not available to compare the relative abundance of skates in each Division of Subarea 3 from year to year with the pattern of nominal catch.

5. **Proposals for Scientific Tasks of Observers in the Pilot Observer Program**

The Chairman informed STACREC that the Standing Committee on International Control (STACTIC) at this meeting had requested some clarifications to the June 1993 Scientific Council recommendation on this matter. The clarification was presented as the following text:

The observers in the Pilot Observer Program should collect catch and effort data on a set by set basis. These data should include location, depth, time net on the bottom, catch composition and discards. Length sampling of the main species of the daily catch should also be set out according to the NAFO standard procedures actually in use in the national sampling programs. Training should be done on a national basis and in conjunction with research institutes in charge of the sampling at sea, and a manual should be provided.

The Chairman informed STACREC that this was adopted by STACTIC as the recommendation from the June 1993 meeting.

6. **Updating of Conversion Factors Used to get Round Fresh Weight**

STACREC was informed that FAO was currently conducting a survey to revise the previously published conversion factors used by national fleets. This information was thought to be of some use to STACREC and these data should be obtained before any further work on compilation of conversion factors is attempted.

7. **Research Coordination for Greenland Halibut**

At its June 1993 Meeting, the Scientific Council recommended that consideration be given to the implementation of a joint multinational trawl survey for Greenland halibut from Davis Strait to the Eastern Grand Bank and Flemish Cap. It was believed that such a survey should be conducted by several large powerful vessels with similar trawling gear fishing to depths of at least 1 800 m, to cover the major depths of Greenland halibut distribution. STACREC was of the opinion that such a survey is necessary to provide the required information on total stock size and its relative distribution among Divisions in order to assess the status of the resource appropriately. Data were provided at this meeting by Canada and Greenland/Japan on current survey activity with additional estimates of the number of required days to complete the proposed survey. It was estimated that about 250 vessel-days would be needed to cover all Divisions from Div. 0A in the north to Div. 3N in the south. However, because it was indicated that funding would not be provided in the foreseeable future to complete this proposed survey, further logistical requirements were not pursued by STACREC. It was agreed, nevertheless, that until such a survey is conducted, an adequate assessment of stock size and its relative distribution is unlikely.

8. **Other Matters**

The 16th Session of CWP is scheduled for July 1994 in Madrid, Spain. STACREC **recommended** that *the Scientific Council should be represented at the 16th Session of CWP by the Chairman of STACREC, the Assistant Executive Secretary, as well as a national representative from Spain.*

9. **Acknowledgements**

In closing, the Chairman thanked the members for their support during his two-year term, in particular the various rapporteurs, the Assistant Executive Secretary and the NAFO Secretariat. The Chairman extended his best wishes to the Committee and the incoming Chairman C. A. Bishop.

APPENDIX III. REPORT OF STANDING COMMITTEE ON PUBLICATIONS (STACPUB)

Chairman: H. Lassen Rapporteur: T. Amaratunga

The Committee met at the Holiday Inn, Dartmouth, Nova Scotia, Canada, on 10 September 1993. In attendance were H. Lassen (EEC-Denmark, Chairman), D. B. Atkinson (Canada) on behalf of J. Carscadden (Canada), V. A. Rikhter (Russian Federation), A. Vazquez (EEC-Spain) and the Assistant Executive Secretary (T. Amaratunga).

1. Review of Scientific Publication

The Assistant Executive Secretary informed STACPUB that editorial work on papers had progressed substantially.

As requested by STACPUB, the Assistant Executive Secretary had inquired from J. S. Campbell (Canada) of the possibility of receiving papers related to the Northern Cod Science Program for a single issue in a NAFO publication. STACPUB was pleased to learn that the response was in general positive, and J. S. Campbell was hopeful of a compilation of papers for an issue of the Studies or Journal, and that he was available to undertake a coordination/editorial role. It was agreed that D. B. Atkinson and the Assistant Executive Secretary would finalize plans for such a publication, after discussions with J. S. Campbell during the 13-15 September Symposium[1].

a) Journal of Northwest Atlantic Fishery Science

The Associate Editor's review and technical editorial work on the invitational paper by H. J. Squires titled "Decapod Crustacean Larvae from Ungava Bay" was completed. However, in view of the printing backlog at the Secretariat, the single issue of the Journal (Volume 15) may be delayed to late-1993 or early-1994.

The editorial work on three of the five papers from the joint Canada/USSR Meeting on capelin in 1990 had been completed. The two other papers for an issue of the Journal were expected shortly.

b) NAFO Scientific Council Studies

The publication of Studies No. 18 containing 8 papers and 10 abstracts of the 24 papers presented at the Cod Symposium titled "Changes in Abundance and Biology of Cod and Their Possible Causes" held during 4-6 September 1991 was completed and circulated in July 1993.

A further 4 papers for the issue of Studies No. 19 have been edited and prepared for publication in late-1993.

In addition, another 6 papers were edited and are in various stages of preparation for publication in Studies No. 20 which is expected to be completed in late-1993 or early-1994. The publication date of this issue too, however, is subject to the printing backlog at the Secretariat.

STACPUB was also pleased to note that 2 papers nominated at the June 1993 Meeting have been submitted for Studies, and a further 3 responses had been received for submission in the near future.

c) Other Publications

STACPUB noted that the *Executive Summary* of the Scientific Council Report of the June 1993 Meeting was published by the Secretariat in preparation for this meeting.

STACPUB also noted the STACREC decision to publish shortly the *NAFO Statistical Bulletin* Vol. 40 containing the 1990 data.

2. Promotion and Distribution of Scientific Publications

a) Invitational papers

STACPUB was informed that work on the invited papers on the West Greenland Cod Stock was progressing. The paper in preparation by Sv. Aa. Horsted, particularly, had received many of the requested reviews from experts.

STACPUB was also encouraged by the prospects of a Studies or Journal issue on the Northern cod (as reported above), especially in view that this would then complete a major geographic coverage of cod in the Northwest Atlantic.

---

[1] It was agreed that J. S. Campbell would coordinate and edit a group of relevant papers for publication in a single Studies issue.

b) **Promotion of the Journal**

No new information was available for consideration at this meeting.

3. **Editorial Matters**

STACPUB noted with regret that R. G. Halliday had announced in late-August his resignation as the Journal Associate Editor on Vertebrate Fisheries Biology. Special appreciation was extended to him in view that this was the 10th anniversary of his very valuable contributions to editorial work of the Journal.

STACPUB considered a possible replacement and agreed that a decision will be made soon by mail communication among members. STACPUB agreed that a note of appreciation for his long and dedicated work will be extended in the next issue of the Journal.

4. **Review of Papers for Possible Publication**

While STACPUB did not have the opportunity to consider the few papers presented at this meeting, SCR Doc. 93/40 would be reviewed for consideration at the June 1994 Meeting. It was recognized many interesting papers were due to be presented at the 13-15 September 1993 Symposium. STACPUB was of the view that it would accept the recommendation of the co-conveners of the Symposium on possible publication of those papers.

5. **Guidelines for Authors of Research Documents**

In order to facilitate the workload of document production and increase the readability of the documents, the Secretariat prepared a draft set of guidelines to authors as requested. STACPUB agreed the guidelines should be issued to potential authors of papers to the June Meeting of the Scientific Council.

6. **Other Matters**

The Committee expressed its appreciation to the outgoing Chairman for his dedicated and efficient work, and welcomed the incoming Chairman. The Chairman thanked the Committee for two years of work in which he had the good fortune to participate. He further thanked the Assistant Executive Secretary for his assistance and asked him to convey the appreciation of the Committee of the Secretariat's efficient work. He welcomed the incoming Chairman, W. R. Bowering.

APPENDIX IV. AGENDA FOR SCIENTIFIC COUNCIL MEETING, 7-10 SEPTEMBER 1993

I. Opening (Chairman: V. P. Serebryakov)

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

II. Fishery Science (STACFIS Chairman: H. P. Cornus)

1. Review of 1993 recommendations

2. Stock assessments

   a) Silver hake[1]
   b) Shrimp in Division 3M
   c) Workshop on assessment methods
   d) Data availability for assessment of northern shrimp in November 1993

3. Review of research documents

4. Review of current arrangements for conducting stock assessments and documentation

   a) Updating list of Designated Experts
   b) Review of Working Papers to be prepared by Designated Expert on their workload
   c) Guidelines for documentation of assessments
   d) Status of scientific documents (Working Papers *vs* Research Documents)
   e) Proposal for annual shrimp meeting in November
   f) Adoption of work procedures for the June 1994 Scientific Council Meeting

5. Future special sessions

   a) Progress report on 13-15 September 1993 Special Session on "Gear Selectivity/Technical Interactions in Mixed Species Fisheries", co-conveners S. A. Murawski (USA) and P. A. M. Stewart (EEC-UK)
   b) Progress report on September 1994 Special Session
   c) Progress report on September 1995 Special Session
   d) Theme for September 1996 Special Session

6. Other matters

III. Research Coordination (STACREC Chairman: A. Avila de Melo)

1. Acquisition of STATLANT 21 Data
2. Acquisition of statistical information from other standing committees
3. Publication of statistical information
4. Assessment data needs for 1994/95 and respective budget
5. Non-traditional fishery resources in the NAFO Area
6. Proposals for scientific tasks of observers in the Pilot Observer Program
7. Updating of conversion factors used to get round fresh weight
8. Research coordination for Greenland halibut
9 Other matters

IV. Publications (STACPUB Chairman: H. Lassen)

1. Review of scientific publications

2. Promotion and distribution of scientific publications

   a) Invitational papers
   b) Promotion of the Journal

3. Editorial matters

4. Review of papers for possible publication

5. Guidelines for authors of research documents

6. Other matters

V. Rules of Procedure

---

[1] Assessment was deferred from the 2-16 June 1993 Meeting of the Scientific Council.

VI. Collaboration with Other Organizations

1. Scientific Council representatives to CWP 16th Session in July 1994

2. Scientific Council invitations to other International bodies

VII. Review of Future Meeting Arrangements

1. Proposed November 1993 Meeting on northern shrimp
2. Special Session of 13-15 September 1993 (see Attachment 2)
3. June 1994 Meeting of Scientific Council
4. Special Session and Annual Meeting, September 1994
5. June 1995 Meeting of Scientific Council

VIII. Space Requirements for June Meetings and Structure of Scientific Council

IX. Other Business

X. Adoption of Reports

1. Committee Reports of present meeting (STACFIS, STACREC, STACPUB)
2. Report of Scientific Council, September 1993

XI. Adjournment

APPENDIX V. LIST OF RESEARCH AND SUMMARY DOCUMENTS, SEPTEMBER 1993

RESEARCH DOCUMENTS (SCR)

SCR #	Ser. #	Title
93/40	N2220	VINOGRADOV, V. I. On the problem of feeding, diurnal, annual food ration and balance for silver hake population in the Scotian Shelf area.
93/92[1]	N2282	CADIGAN, N. G., and W. M. HICKEY. Analysis of subsampled catches form trouser trawl size selectivities studies.
93/93[1]	N2283	S. KUIKKA, P. SUURONEN and R. PARMANNE. Impacts of increased codend mesh size on the catches and fishery of herring in the northern Baltic Sea - uncertainties from the ecosystem and markets.
93/94[1]	N2285	BOULOS, D. L., N. B. CADIGAN, and W. M. HICKEY. Combining selectivities from multiple trouser trawl tows.
93/95[1]	N2287	DEALTERIS, J., and R. RIEDEL. Effect of size selection within and between fishing gear types on the yield and spawning stocks biomass per recruit and catch per unit effort for a cohort of an idealized groundfish.
93/96[1]	N2288	REIS, E. G., and M. G. PAWSON. Characteristics of fish's body affecting gillnet selectivity.
93/97[1]	N2289	REIS, E. G., and M. G. PAWSON. Gill-net selectivity of bass and white croaker using commercial catch data.
93/98[1]	N2290	CLAY, P. M. Management regions, statistical areas and fishing grounds: criteria for dividing up the sea.
93/99[1]	N2291	STEWART, P. A. M., and A. W. NEWTON. Observations on the size composition of haddock and whiting catches taken by the different fishing methods used in the Scottish North Sea demersal fisheries.
93/100[1]	N2293	GORCHINSKY, K. V., S. F. LISOVSKY, and M. K. SADOKHIN. Selectivity of bottom trawls during the fishery for redfish on the Flemish Cap Bank.
93/101	N2294	SKÚLADÓTTIR, U., and S. EINARSSON. The Icelandic shrimp (*Pandalus borealis*) fishery at the Flemish Cap in 1993, with a preliminary analysis of age structure.
93/102	N2295	SHOWELL, M. A., R. BRANTON, M. C. BOURBONNAIS, and R. G. HALLIDAY. Status of the Scotian Shelf silver hake populations in 1992 with projections to 1994.
93/103	N2296	NICOLAJSEN, A. Assessment of the shrimp stock on Flemish Cap (Division 3M) for 1993.
93/104	N2297	SAINZA, C. Northern shrimp (*Pandalus borealis*) stock on Flemish Cap in June-July 1993.
93/105	N2298	LILLY, G. R. Sizes, distribution and relative abundance of northern shrimp (*Pandalus borealis*) on Flemish Cap (Division 3M) in 1978-1984, as inferred from analysis of cod stomach contents.
93/106	N2299	COLBOURNE, E. Environmental conditions in Atlantic Canada, mid-summer 1993, with comparisons to the long-term mean.
93/107	N2300	COLBOURNE, E. Oceanographic conditions of the Flemish Cap during the summer 1993, with comparisons to the long-term mean average.
93/108	N2301	HALLIDAY, R. G. An analysis of scientific advice and TAC levels for the Scotian Shelf (Divisions 4VWX) silver hake stock.
93/109[1]	N2302	CASEY, J. Estimating discards using selectivity data: the effects of mesh size changes in the mixed demersal fisheries in the Irish Sea.
93/110	N2304	SIEGSTAD, H. The Greenland fishery for northern shrimp (*Pandalus borealis*) on Flemish Cap, May-August 1993.

[1] Papers submitted for the 1993 Symposium on "Gear Selectivity/Technical Interactions in Mixed Species Fisheries".

93/111 N2305 PARSONS, D. G., P. J. VEITCH, and E. M. SEWARD. The Canadian fishery for northern shrimp (*Pandalus borealis*) on Flemish Cap (NAFO Division 3M), 1993.

93/112 N2306 PARSONS, D. G., and P. J. VEITCH. Age and growth of northern shrimp (*Pandalus borealis*) on Flemish Cap (NAFO Division 3M).

93/113[1] N2307 CHRISTENSEN, S., and H. LASSEN. Optimal management of the Iceland-Greenland transboundary cod stock.

93/114[1] N2308 HASSAGER, T. K., and H. LASSEN. Why skippers skip grounds: a probabilistic decision model for whether a skipper continues fishing on the same or change to some other ground, based on data from the West Greenland shrimp fishery.

93/115[1] N2309 MURAWSKI, S. A. Factors influencing by-catch and discard rates: analyses from multispecies/multifishery sea sampling.

93/116[1] N2310 CHRISTENSEN, S. On management of va varying shrimp stock in the Davis Strait.

93/117[1] N2311 ENGÅS, A., S. LØKKEBORG, A. V. SOLDAL, and E. ONA. Comparative fishing for cod and haddock with commercial trawl and longline at two different stock levels.

93/118[1] N2312 NEDREAAS, K., A. VOLD SOLDAL, and Å. BJORDAL. Performance and biological implications of a multi-gear fishery for Greenland halibut (*Reinhardtius hippoglossoides*).

93/119[1] N2313 SUURONEN, P., E. LEHTONEN, and V. TSCHERNIJ. Possibilities to increase the size-selectivity of a herring trawl by using a rigid sorting grid.

93/120[1] N2314 SHOWELL, M. Effect of mesh size/type on size distribution and catch rates for 1991 Scotian Shelf groundfish fisheries.

93/121[1] N2315 SINCLAIR, A. Seasonal components in technological interactions in Gulf of St. Lawrence shrimp and groundfish fisheries.

93/122[1] N2316 GABRIEL, W. L. Factors influencing technological interactions in Mid-Atlantic Bight groundfish fisheries.

93/123[1] N2317 FRYER, R. J., and J. G. SHEPHERD. Models of codend selection.

93/124[1] N2318 HOKENSON, R. S., and M. R. ROSS. Finfish by-catch mortality in the Gulf of Maine northern shrimp fishery.

93/125[1] N2319 SINCLAIR, A. Estimating fleet specific F given catch quotas.

93/126[1] N2321 MURAWSKI, S. A. Dynamics models of technological interaction: man a a prudent predator.

93/127[1] N2322 BALFOUR, D. A Canadian northern shrimp selectivity program 1993.

SUMMARY DOCUMENTS (SCS)

SCS No.	Ser. #	Title
93/6	N2172	BOUDREAU, P., M. M. ROBERGE, and J-D. LAMBERT. Canadian research report for 1992.
93/19	N2292	SERCHUK, F. M. United States research report for 1992.
93/20	N2320	NAFO. Report of Scientific Council, September 1993 Meeting.

APPENDIX VI. LIST OF PARTICIPANTS

CANADA

Beckett, J.S.	Fisheries Research Branch, DFO, 200 Kent St., Ottawa, Ontario
Atkinson, D.B.	Northwest Atlantic Fisheries Centre, Box 5667, St. John's, Newfoundland A1C 5X1
Bishop, C.A.	" " " " " "
Bowering, W.R.	" " " " " "
Brodie, W.B.	" " " " " "
Parsons, D.	" " " " " "
Branton, R.	Marine Fish Division, BIO, P. O. Box 1006, Dartmouth, Nova Scotia B2Y 4A2
Halliday, R.G.	" " " " " "
Showell, M.A.	" " " " " "
Savard, L.	Maurice Lamontagne Institute, P. O. Box 1000, Mont-Joli, Quebec

DENMARK

GREENLAND

Nygaard, K.H.	Greenland Fisheries Research Institute, Box 570, 3900 Nuuk, Greenland

FAROE ISLANDS

Nicolajsen, A.	Fiskorannsoknarstovan, Noatun, Postboks 3051, FR-110 Torshavn, Faroe Islands

EUROPEAN ECONOMIC COMMUNITY (EEC)

Astudillo, A.	Commission of the European Communities, Directorate General for Fisheries, Rue Joseph II, 99, 1049 Brussels, Belgium
Lassen, H.	Danmarks Fiskeri-og Havundersøgelser, Charlottenlund Slot, DK-2920 Charlottenlund, Denmark
Avila de Melo, A.	Instituto Nacional de Investigacao das Pescas, Av. de Brasilia, Alges-Praia, 1400 Lisbon, Portugal
Godinho, M.L.	" " " " " "
Battaglia, A.	IFREMER, B. P. 4240, F-97500 St. Pierre, St. Pierre et Miquelon, France
Cross, D.	EUROSTAT, Commission of the EC, Jean Monnet Building, B. P. 1907, Luxembourg (Grand Duchy)
Cornus, H.P.	Bundesforschungsanstalt für Fischerei, Institut für Seefischerei, Palmaille 9, D-22767 Hamburg, Germany
de Cárdenas, E.	Instituto Espanol de Oceanografía, Aptdo 240, Santander, Spain
Vazquez, A.	Instituto de Investigaciones Marinas, Muelle de Bouzas, Vigo, Spain
Casey, J.	Ministry of Agriculture, Fisheries and Food, Directorate of Fisheries Research, Fisheries Laboratory, Pakefield Road, Lowestoft, Suffolk, United Kingdom

ICELAND

Einarsson, S.T.	Marine Research Institute, Skulagata 4, P. O. Box 1390, 121 - Reykjavik

JAPAN

Yokawa, K.	Distant-Water Groundfish, National Research Institute of Far Sea Fisheries, 5-7-1 Orido, Shimizu 424

RUSSIAN FEDERATION

Rikhter, V.A.	AtlantNiRO, 5 Dmitry Donskoy Street, Kaliningrad, 23600
Troyanovsky, F.	PINRO, 6 Knipovich Street, Murmansk, 183763
Mikhailov, A.	Welsford Place, Ste. 2202-3, 2074 Robie St., Halifax, Nova Scotia, Canada