PART A

Scientific Council Meeting, 1-15 June 2000

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Participants at Scientific Council Meeting, 1-15 June 2000 (Bottom to top – left to right):

A. Nicolajsen, A. Avila de Melo, S. Cerviño, H-J. Rätz,
T. Amaratunga, H. Siegstad, H. Murua
W. B. Brodie, W. Melle, P. Durán D. B. Atkinson, R. K. Mayo
E. A. Colbourne, V. K. Babayan, K. Patterson, V. A. Rikhter, K. F. Drinkwater, M. Stein, J. C. Mahé
D. Cross, A. Okhanov, C. Darby, V. N. Shibanov, E. Valdes, T. Dougherty-Poupore, D. Power, M. Treble, D. Rivard
T. Ichii, A. Vaskov, K. A. Sosobee, C. Simonsen, R. Aploim, O. Jørgensen, W. R. Bowering, D. Stansbury

Missing from picture: N. G. Cadigan, E. G. Dawe, D. W. Kulka, G. R. Lilly, D. Maddock Parsons, M. J. Morgan, G. Stenson, S. J. Walsh, E. Trippel, F. Woodman, T. Saat, E. de Cárdenas, M. Botvinro, F. M. Serchuk, C. M. Jones, T. Jakobsen, H. Lassen, E. J. Molenaar, D. C. A. Auby, G. M. Moulton, B. L. Marshall, C. L. Kerr

REPORT OF SCIENTIFIC COUNCIL MEETING

1-15 June 2000

Chairman: W. B. Brodie Rapporteur: T. Amaratunga

I. PLENARY SESSIONS

The Scientific Council met at the Alderney Landing, 2 Ochterloney Street, Dartmouth, Nova Scotia, Canada, during 1-15 June 2000, to consider the various matters in its agenda.

Representatives attended from Canada, Cuba, Denmark (in respect of Faroe Islands and Greenland), Estonia, European Union (France, Germany, Portugal, Spain and United Kingdom), Japan, Russian Federation and United States of America. The Assistant Executive Secretary was in attendance. An observer from the Netherlands, two ICES representatives and an invited speaker from Norway were present for short periods.

The Executive Committee met prior to the opening session of the Council, and the Provisional Agenda, plan of work and other related matters were discussed.

The opening session of the Council was called to order at 1015 hours on 1 June 2000.

The Chairman welcomed everyone to Dartmouth and to this new venue for the June Meeting. The Assistant Executive Secretary was appointed rapporteur.

The Assistant Executive Secretary informed Council that authorization had been received for proxy votes from Estonia, Latvia and Norway to record their abstentions during any voting procedures.

In the review of the Provisional Agenda, the Chairman noted one modification was needed to include stock monitor of witch flounder in Div. 2J and 3KL. In addition, it was noted that each Standing Committee may include some changes. The Council agreed each Standing Committee should review and report on the previous year's recommendations. The Council **adopted** the agenda with the proposed revision (see Agenda I, Part D, this volume).

The Chairman recalled that E. J. Molenaar, University of Utrecht, who had requested to attend the Scientific Council as an observer, was due to come some time during the course of this meeting.

It was noted W. Melle, Institute of Marine Research, Norway, was the invited speaker in the STACFEN sessions.

In the review of the work plan, the Council noted this year different criteria for providing advice would apply, since some stocks will only be monitored. The Council agreed Designated Experts would address these as needed.

The Council welcomed E. Trippel (Canada) to present the Chairman's update on the progress of the Working Group on Reproduction Potential (see Section XI below).

The Chairman noted an election was needed to the Chair of STACFEN to take office at the end of the NAFO Annual Meeting in September 2000 (see Section XII below).

In accordance with the new Rules of Procedure for STACPUB membership, the Council noted the appointment of members for 3-year periods was needed. Noting that A. Vazquez (Spain) would not be attending the June 2000 Meeting, the Council appointed C. Darby (EU-United Kingdom) to replace him on an interim basis. The Council invited C. Darby to consider continuing as a STACPUB member in subsequent meetings.

Having reviewed the work plan for each Agenda item, the Opening Session was adjourned at 1200 hours.

The Council reconvened briefly at 1645 hours on 3 June 2000.

Progress reports on two forthcoming Scientific Council Special Sessions were considered (see Section X below), and the meeting was adjourned at 1710 hours.

The Council reconvened at 0905 hours on 6 June 2000.

The Chairman presented a review of meetings in 2000 regarding the Precautionary Approach. There were two meetings; the CWP Intersessional Meeting of the Working Group on Precautionary Approach Terminology, and the Joint Scientific Council and Fisheries Commission Working Group on Precautionary Approach. This was followed by a discussion on future developments on the PA by the Scientific Council, as reported in Section III.1 and 2 below.

The Council then considered the recommendation with respect to the proposed millennium publication "NAFO Century Book" by the Executive Secretary, L. Chepel. Noting STACPUB had discussed this item to some extent, the STACPUB Chairman was requested to inform the Council on the status. The Council was informed that the Executive Secretary had made considerable progress on the compilation on his own accord. The Council agreed to request the Executive Secretary for an update (see Section XIII.4. below).

The session was adjourned at 1030 hours.

The Council briefly convened at 0910 hours on 9 June 2000, to address Agenda items XIII.2. regarding Scientific Council representation at ICES ACFM Meetings. The Council nominated W. R. Bowering (Canada), who is currently a Chairman of an ICES Working Group, to be the NAFO Scientific Council observer at ICES ACFM in autumn 2000. The Council extended its appreciation to W. R. Bowering for undertaking this role. A summary of the meeting of FAO ACFR Working Party on Status and Trends of Fisheries was presented by the Assistant Executive Secretary (see Section XIV.1). The Council then considered a proposal for the September 2002 Symposium (Section X.4), and particularly reviewed the financial implications of such a proposed Symposium as well as other Symposia hosted by the Scientific Council (see Section XIV.5.d below).

The session was adjourned at 0945 hours.

During a session on 10 June 2000, the Council was presented a summary of the Joint NAFO/ICES Working Group on Harp and Hooded Seals (see Section XIV.4).

The Council noted H. Lassen, ICES Scientific Advisor, and Tore Jakobsen, Chairman, ICES ACFM, briefly visited the Council as observers.

Noting that two additional STACPUB members were needed in accordance with STACPUB deliberations on the rotating membership, the Council appointed H. Siegstad (Denmark/Greenland) and D. Maddock Parsons (Canada) as STACPUB members. The Council also noted the STACPUB recommendation that a meeting of the Executive Committee should take place near the end of each June meeting. Accordingly, the Chairman held a meeting of the Executive Committee on 13 June 2000 to consider Scientific Council matters related to NAFO budget. The Council noted the Chairman will submit an itemized budget to the General Council Meeting in September 2000.

The Council met as necessary through 12-14 June 2000.

The concluding session of the Council was called to order at 0900 hours on 15 June 2000.

Outstanding agenda items were addressed. The Council discussed its meeting schedules and future meetings, and considered and **adopted** the Reports of the Standing Committees.

The Council then considered and **adopted** the Report of the Scientific Council of this Meeting of 1-15 June 2000, noting changes as discussed during the reviews would be made by the Chairman and Assistant Executive Secretary.

The meeting was adjourned at 1300 hours on 15 June 2000.

The Reports of the Standing Committees are appended as follows: Appendix I. STACFEN, Appendix II. STACREC, Appendix III. STACPUB and Appendix IV. STACFIS.

The Agenda, List of Research (SCR) and Summary (SCS) Documents, List of Participants are given in Part D, this volume.

The Council's considerations on the Standing Committee Reports, and other matters addressed by the Council follow in Sections II-XVII.

II. REVIEW OF SCIENTIFIC COUNCIL RECOMMENDATIONS IN 1999

The Council noted recommendations made in 1999 pertaining to the work of the Standing Committees would be addressed directly by the Standing Committees, while recommendations pertaining specifically to the Council's work would be considered under each relevant topic of its Agenda.

III. IMPLEMENTATION OF PRECAUTIONARY APPROACH (PA)

1. Review of Results of 1999/2000 Meetings

The Chairman noted that there were two meetings concerning the Precautionary Approach (PA): the CWP Intersessional Meeting of the Working Group on Precautionary Approach Terminology during 14-16 February 2000 at ICES Headquarters, Copenhagen, Denmark (SCS Doc. 00/7), and the Joint Scientific Council and Fisheries Commission Working Group on Precautionary Approach (FC Doc. 00/2) during 29 February-2 March 2000, Brussels, Belgium.

The Scientific Council Chairman, W. B. Brodie, who chaired the CWP Intersessional Meeting: *Working Group on Precautionary Approach Terminology*, presented a summary. Representatives of Fisheries and Agricultural Organization (FAO), International Commission for the Conservation of Atlantic Tunas (ICCAT), International Council for the Exploration of the Sea (ICES), and NAFO attended. NAFO Scientific Council was represented by W. R. Bowering (Canada), D. Rivard (Canada) and K. Patterson (EU), and Assistant Executive Secretary, T. Amaratunga, was in attendance.

The terms of reference for the meeting were 1) Review the terminology and definitions of concepts in use by the different agencies, and 2) Identify where concepts are identical and where these differ; explore consequences of such differences in concepts to the reference points used for providing scientific advice within the PA.

The Working Group produced several detailed comparisons on the terminology and concepts in the PA frameworks that are in use or being developed within the three scientific agencies (NAFO, ICES, ICCAT). The Working Group concluded that although specific interpretations of the United Nations Fish Stock Agreement (UNFSA) guidelines differed, the objectives of these three scientific agencies share these common elements:

Reference points should be chosen in such a way as to allow managers to operate a fishery to take sustainable yields close to the estimated long-term maximum. Reference points should generally lead to stock dynamics, which satisfy these conditions, in order of priority: a) Low probability of recruitment over fishing, b) The choice of thresholds should be made so as to avoid a recruitment collapse or to minimize risk when approaching an area where the stock dynamics are poorly known.

The $_{PA}$ ref. points of ICES, the $_{Buf}$ ref. pts. of NAFO, and the $_{Threshold}$ concept of ICCAT all refer to the same idea, i.e. to provide a buffer or safety margin to ensure that there is a high probability that the $_{Limit}$ ref. points on biomass or fishing mortality will not be reached. There are a number of other initiatives on the PA underway in various organizations and national departments. Thus, even if it were possible, the Working Group concluded that it may be premature to recommend a common approach to the PA. In many cases, work on the PA is very much in the exploratory stage.

Scientific Council noted that the full report of this Working Group was available in SCS Doc. 00/7.

The Scientific Council Chairman, W. B. Brodie, who was the co-chairman of this meeting, along with J. Baird (Canada) appointed by the Fisheries Commission, presented a summary of the *Joint Scientific Council and Fisheries Commission Working Group on Precautionary Approach*, which took place 29 February-02 March 2000, in Brussels, Belgium. This was the third such meeting of this Working Group, and the full report is contained in FC Doc. 00/2. The main agenda items dealt with:

- harmonization of concepts and terminology
- operationalizing the PA into the management plans for three model stocks
- implementation plan for the PA for other NAFO stocks
- consideration of changes or additions to the Fisheries Commission request to Scientific Council to reflect the PA
- consideration of criteria for reopening a fishery in light of the PA
- consideration of additional supportive management measures to complement the application of the PA.

Under harmonization, the joint Working Group concluded that although no formulations of the PA framework had been accepted by international fisheries organizations, including NAFO Fisheries Commission, several elements of the PA have been implemented by various management authorities. There are several broad similarities between the ICES and NAFO versions of the PA, and the Working Group preferred NAFO's B_{buf} term as opposed to B_{pa}.

The WG concluded that determination of harvest control rules is the role of managers. In the NAFO context, it is the Fisheries Commission's responsibility to determine appropriate harvest strategies corresponding to reference biomass levels.

The NAFO Scientific Council framework proposes that F_{lim} should be set no higher than F_{msy}, based on its interpretation of the United Nations Fish Stock Agreement (UNFSA). The ICES framework does not make specific reference to F_{msy}. The Working Group did not reach agreement on which formulation was more appropriate. Differences of opinion may be related to experiences with fish stocks in the Northwest Atlantic as regards to their response to exploitation *vs* the Northeast Atlantic. It was observed much work is happening on PA nationally in many Contracting Parties, and seeking complete harmonization at this time may be premature.

Under operationalizing/implementing the PA, the Working Group noted that the three model stocks were cod in Div. 3NO, yellowtail flounder in Div. 3LNO, and shrimp in Div. 3M, and that ongoing work on the PA for the shrimp stock in Div. 3M would be examined at the Scientific Council Meeting in November 2000. The following is an example (for Div. 3LNO yellowtail flounder, see Annex 7 of FC Doc. 00/2) of an action plan for implementing the PA. Similar plans were proposed by the Working Group for cod in Div. 3NO, and American plaice in Div. 3LNO (the latter as an example of an implementation plan for other NAFO stocks). The proposed plans also included additional supportive management measures to complement application of the PA.

For **Yellowtail Flounder in 3LNO**:

Objectives: The action plan for implementation of a PA should include the eight objectives discussed at the Joint Scientific Council/Fisheries Commission Working Group meeting in May 1999:

1) Maintain harvest levels that will continue to rebuild and maintain the stock biomass above the rebuilt biomass level.
2) Continue with a comprehensive suite of management measures.
3) Ensure a conduct of the fishery in a manner that will not jeopardize recovery of other stocks in the area which are currently under moratorium, specifically cod in Div. 3NO and American plaice in Div. 3LNO.
4) Performance measures of interest to the managers could be expressed in terms of biomass and its trajectory and where it is with respect to the reference level and catch levels. With respect to catch, the performance measure was: cumulated yield, yield trajectories and trends (in particular, to identify declining trends).
5) It was noted that production models do not permit determination of all reference points. It should be ensured that data are available for scientists to move toward using age-structured modeling.
6) Despite these limitations, production modeling is a tool that could be used to start to evaluate real F limits and could be used to provide insight to what will happen if there are lower or higher fishing mortality levels.
7) There is a need to develop "target" biomass levels that could be higher than the biological limits so as to take into account management objectives including economic considerations.

8) Endorse the work of the Scientific Council in its attempts to develop a better understanding of the stock-recruit relationship.

Management Strategies

1) As a management objective, Fisheries Commission should maintain SSB at a level that will continue the probability of good recruitment and maintain the stock at a level that will support a sustainable fishery.
2) Given that the present estimate of F_{buf} is in the same range as the 2/3 F_{MSY} value used in past requests from Fisheries Commission, the value of 11% for exploitation rate could continue to be used by Fisheries Commission as a basis for establishing catch levels until such time as Scientific Council may recommend an alternative.
3) Fisheries Commission requests Scientific Council to give priority to work aimed at calculation of possible biological reference points as appropriate including age-based models and any other applicable stock evaluation methodologies.
4) Fisheries Commission shall, as appropriate, review and revise these management measures and strategies based on any new advice provided by Scientific Council.

Data Collection/Analyses

1) Scientific Council and Fisheries Commission should encourage continuation of multiple annual surveys in support of stock assessment
2) Contracting Parties should ensure that appropriate data are collected and that scientists utilize stock evaluation techniques that allow for estimation of stock size and exploitation rates, risk assessment procedures, and a fuller evaluation of reference points.
3) Scientific Council continues efforts to develop a better understanding of the stock-recruit relationship.
4) Scientific Council and Contracting Parties continue to monitor expansion of the range into Div. 3L.
5) Scientific Council and Contracting Parties continue to monitor recruitment as well as trends in weight-at-age.
6) Scientific Council review and update, as necessary, information on spawning locations and timing.
7) Scientific Council provide updated information to the Fisheries Commission regarding the distribution of juvenile yellowtail flounder in relation to adult distribution.

Supportive Management Measures/Good Practices

1) Fisheries Commission should take steps to minimize the catch of juveniles, and ensure that the total catches of yellowtail flounder are in accordance with the target exploitation rate. Some measures that could be considered to achieve this objective are:
   - Review of current directed fisheries for the determination of specific yellowtail flounder by-catch problems so that remedies can be applied.
   - A revision of conservation and technical measures that only permit by-catch that is truly incidental in nature.
   - Closure of specific areas for specific periods of time identified as: a) nursery areas, and b) areas where high concentrations of juveniles are found.

2) Fisheries Commission explore the utility of closure periods to protect spawners as well as the utility of closures of areas identified as spawning locations.

Under consideration of changes or additions to the Fisheries Commission's request to Scientific Council to reflect the PA, the following points were referred to Scientific Council for consideration at its meeting in June 2000:

1) Many of the stocks in the NAFO Regulatory Area are well below any appreciable level of B_{lim} or B_{buf}. For these stocks, the most important task for the Scientific Council is to inform on how to rebuild the stocks. In this context and building on previous work of the Scientific Council in this area, the Scientific Council is requested to evaluate various scenarios corresponding to recovery plans with time frames of 5 to 10 years, or longer as appropriate. This evaluation should provide the information necessary for the Fisheries Commission to consider the balance between risks and yield levels, including information on the consequences and risks of no action at all. Whenever possible, this evaluation should be cast in terms of risks analyses relating removals from various sources to B_{lim} (B_{buf}) and F_{lim} (F_{buf}).

   References to "risk" and to "risk analyses" should refer to estimated probabilities of stock population parameters falling outside biological reference points.

2) Where reference points are proposed by the Scientific Council as indicators of biological risk, they should be accompanied by a description of the nature of the risk incurred if the reference point is crossed (e.g. short-term risk of recruitment overfishing, loss of long-term yield, etc.)

3) When a buffer reference point is proposed in order to maintain a low probability that a stock, measured to be at the buffer reference point may actually be at or beyond the limit reference point, the Scientific Council should explain the assumptions made about the uncertainty with which the stock is measured, and also the level of 'low probability' that is used in the calculation.

4) Wherever possible, short and medium-term consequences should be identified for various exploitation rates (including no fishing) in terms of yield, stability in yield from year to year, and the risk or probability of moving the stock beyond B_{lim} or B_{buf}. Whenever possible, this information should be cast in terms of risk assessments relating fishing mortality rates to the risks of falling below B_{lim}, the risks of stock collapse and recruitment overfishing, as well as the risks of growth overfishing and the consequences in terms of both short and long-term yields.

5) When providing risk estimates, it is very important that the time horizon be clearly spelled out. By way of consequence, risks should be expressed in time frames of 5, 10 and 15 years (or more), or in terms of other appropriate year ranges depending on stock specific dynamics. Furthermore, in order to provide the Fisheries Commission with the information necessary to consider the balance between risks and yield levels, each harvesting strategy or risk scenario should include, for the selected year ranges, the risks and yields associated with various harvesting options in relation to B_{lim} (B_{buf}) and B_{target} and F_{lim} (F_{buf}) and F_{target}.

Under consideration of criteria for reopening a fishery in light of the PA, the Working Group noted that stocks under moratoria have been characterized by a very low spawning stock biomass and a reduced age-range. There is often a concern that the level of spawner biomass reached corresponds to a level where the chance of producing good year-classes is greatly reduced. Once recovery has begun and spawner biomass has reached a level sufficient to allow consideration of reopening of the fishery, under a Precautionary Approach this reopening must be consistent with a strategy of continued stock rebuilding.

The discussion related to stocks under moratoria has necessarily focused on the strategy to reach the first benchmark to rebuilding, i.e. B_{lim}. In order to monitor the progress of stock rebuilding, milestones should be established so as to permit a review of the stock trajectory in relation to reference points within reasonable time frames. For the stocks currently under moratorium, the other elements of a precautionary approach (i.e. other than B_{lim}), have not received detailed attention. Key considerations in the decision of re-opening include the determination of B_{lim}, the determination of the fishing mortality (F) at re-opening, the probability of continued growth in the stock, the trade-off between yield/probability of growth in the stock and the risks that the stock could actually fall (again) below a pre-determined limit.

The other elements of a PA will need to be defined. Also, any reopening of commercial activity should only be contemplated under specific conditions. In particular, increased focus on additional conservation measures such as limitations on by-catch is required in order to afford the resource the best chance of recovery.

As such, additional technical management measures may be specified including, but not limited to the following:

a) *Protection of Spawners:*

Management should incorporate controls to limit the catch during the main spawning periods in order to ensure the best possible spawning success. Information can be made available from scientists to guide managers in this regard. Scientists can also provide information regarding spawning areas for possible protection as well (see above).

An important conservation objective should be to allow development of a full age-range in the spawner population in order to promote the best possible stability in annual recruitment.

b) *Protection of Pre-recruits (Area Closures):*

Specific areas that have been clearly identified as significant nursery areas should be closed, as appropriate, for a specified time so as to minimize the mortality on small fish. In addition, other management measures to protect small fish should be considered.

c) *Concerns with By-catch:*

Fisheries for other species that might result in by-catch of the species under consideration must be conducted in such a manner so as to keep by-catch at the lowest possible level. This would necessitate careful review of possible management strategies including adequate monitoring.

d) *Concerns with By-catch of Other Species:*

Fisheries for the directed species that might result in by-catch of other species, especially those under moratoria, must be conducted in such a manner so as to keep by-catch at the lowest possible level. This would necessitate careful review of possible management strategies including adequate monitoring.

These were the key points highlighted from the Working Group report. Scientific Council noted that this report (FC Doc. 00/2) would be presented to Fisheries Commission during the Annual Meeting in September 2000.

2. **Future Development**

Further to the meetings on PA during 2000, the Chairman did not anticipate developments on the PA at Scientific Council, and deferred its framework considerations until the Report of the Joint Scientific Council and Fisheries Commission Working Group on Precautionary Approach (29 February-2 March 2000) was reviewed by the Fisheries Commission during the 18-22 September 2000 NAFO Annual Meeting. However, the Scientific Council will structure its advice in the PA format and address PA issues as requested by the Fisheries Commission.

Noting that the Scientific Council has been working with the PA framework since 1997 while the Fisheries Commission has not adopted it, the Council recorded that the structure of the last three meetings of the Joint Scientific Council and Fisheries Commission Working Group was not optimal for discussion of the PA framework. The Council was of the view that less formal and smaller meetings in the form of dialogue between scientists and managers may see progress. It was also suggested that there may be more success if the Scientific Council presented applications of the PA to specific cases.

IV. FISHERIES ENVIRONMENT

The Council **adopted** the Report of the Standing Committee on Fisheries Environment (STACFEN), as presented by the Chairman, M. Stein. The full report of STACFEN is at Appendix I.

The **recommendation** made by STACFEN for the work of the Scientific Council as **endorsed** by the Council is as follows:

1. *NAFO's financial contribution to the Joint ICES/NAFO Symposium on "Hydrobiological Variability During the 1990s", August 2001,Edinburgh, Scotland, include the equivalent of GB 3 500 (approximately CDN $8 000) to cover partial costs of conducting the Symposium.*

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V. RESEARCH COORDINATION

The Council **adopted** the Report of the Standing Committee on Research Coordination (STACREC) as presented by the Chairman, R. K. Mayo. The full report of STACREC is at Appendix II.

The **recommendations** made by STACREC for the work of the Scientific Council as **endorsed** by the Council, are as follows:

1. *the Executive Secretary write to the national delegates of the USA and Denmark (in respect of Faroe Islands and Greenland) with reference to their obligations on the submission of data to NAFO.*

2. *the Scientific Council should prepare a document for submission to the General Council and the Fisheries Commission on the adverse effect the absence of the STATLANT 21A and 21B data was having on the work of the Scientific Council.*

3. *the Secretariat should extract from Scientific Council reports the annual estimates of the total catches for each stock for the period from 1985 used by STACFIS in its assessment work and report them alongside the annual STATLANT nominal catches.*

4. *for the fiscal year 2001, the following nominees be supported by the NAFO budget for meeting attendance: i) the Assistant Executive Secretary to the February 2001 meeting of the FAO and Non-FAO Regional Fishery Bodies or Arrangements and the associated CWP Intersessional Meeting at FAO Headquarters, Rome, Italy and ii) the Assistant Executive Secretary and the STACREC Chairman to the CWP 19th Session in Noumea, New Caledonia (9-13 July 2001).*

5. *the comparative fishing in Div. 3NO be continued during future spring surveys conducted by EU-Spain and Canada.*

VI. PUBLICATIONS

The Council **adopted** the Report of the Standing Committee on Publications (STACPUB) as presented by the Chairman, O. Jørgensen. The full report of STACPUB is at Appendix III.

The **recommendations** made by STACPUB for the work of the Scientific Council as **endorsed** by the Council are as follows:

1. *STACREC should consider proceeding with the publication of NAFO Statistical Bulletin for 1994 without the USA data.*

2. *an Executive Committee Meeting be held near the end of the June Meeting to evaluate financial impacts on the NAFO budget which arise from deliberations and decisions made during the course of that meeting,* and

   costs associated with the above activities be enumerated and included in the Scientific Council budget request for 2001.

3. *the Scientific Council Reports and the Reports of the Annual Meeting be included in the contents of the CD-ROM, and the CD-ROM be issued before April of the following year.*

4. *electronic publishing of the Journal begin with the five papers currently awaiting publication in Volume 26.*

With respect to STACPUB deliberations on late submission of SCR/SCS Documents (see Appendix III, Section 9.i), the Council noted the difficulties of not receiving finalized papers by the time the meeting report is finalized, and urged authors to submit the revised papers within the two-week time frame after the meeting.

VII. FISHERIES SCIENCE

The Council **adopted** the Report of the Standing Committee on Fisheries Science (STACFIS) as presented by the Chairman, H.-J. Rätz. The full report of STACFIS is at Appendix IV.

The Council endorsed **recommendations** specific to stock considerations are highlighted under the relevant stock in the STACFIS Report at Appendix IV.

VIII. MANAGEMENT ADVICE AND RESPONSES TO SPECIAL REQUESTS

1. Fisheries Commission

For stocks within or partly within the Regulatory Area, the Fisheries Commission requested scientific advice.

a) Request for Advice on TACs and Other Management Measures for Year 2001

The Scientific Council and the Fisheries Commission during the Annual Meeting of September 1999 agreed to consider certain stocks on an alternating basis. This section presents those stocks for which the Scientific Council provided scientific advice for the year 2001.

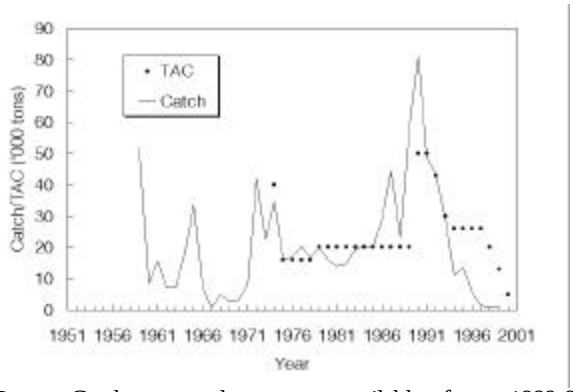
Redfish (Sebastes spp.) in Division 3M

Background: There are 3 species of redfish, which are commercially fished on Flemish Cap: deep-water redfish (*Sebastes mentella*), golden redfish (*Sebastes marinus*) and Acadian redfish (*Sebastes fasciatus*). The present assessment evaluates the status of the Div. 3M beaked redfish stock, regarded as a management unit composed of two populations from two very similar species (*Sebastes mentella* and *Sebastes fasciatus*). The reason for this approach is that evidence indicates this is by far the dominant redfish group on Flemish Cap.

Fishery and Catches: The redfish catches in Div. 3M increased from 20 000 tons in 1985 to 81 000 tons in 1990, falling continuously through 1999, when 1100 tons was reported, mostly as by-catch in the Greenland halibut fishery. The decline in the Div. 3M redfish catches from 1990 to 1999 was related with the simultaneous quick decline of the stock biomass and fishing effort. Despite the fact that since 1995 the redfish by-catch within the shrimp fishery in Div. 3M fell to lower levels, it still constitutes at age 1, on average (1996-99), 20% of the catch in numbers.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended	Agreed
1997	1.5	20	26
1998	1.2	20	20
1999	1.1	10	13
2000		3-5	5

[1] Provisional, including redfish by-catch in the shrimp fishery in Div. 3M.



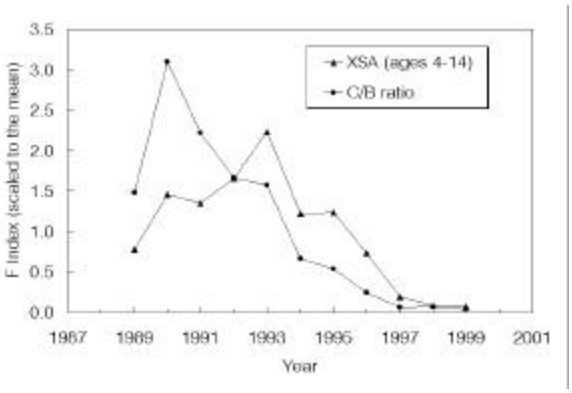
Data: Catch-at-age data were available from 1989-99 including by-catch information from the shrimp fishery.

Catch rate data for 1959-93 were available from the NAFO database.

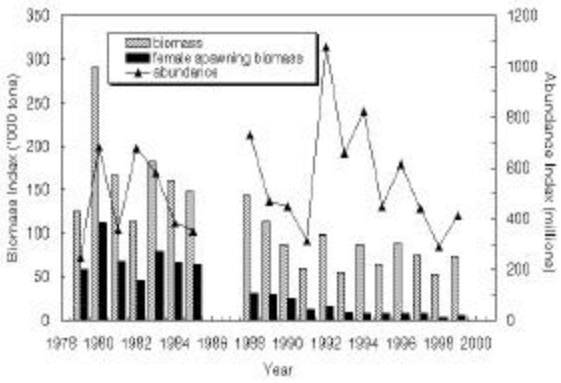
There are three survey series providing bottom biomass indices as well as length and age data for the Flemish Cap redfish stocks; Russia (1983-93 and 1995-96), EU (1988-99) and Canada (1979-85 and 1996). The Russian survey was complemented with an acoustic estimate of the redfish pelagic component for the 1988-92 period.

Assessment: Survey bottom biomass and female spawning biomass were calculated from 1979-89 Canadian and 1988-99 EU surveys. A virtual population analysis (XSA) and a surplus production analysis (ASPIC) were carried out for 1989-99, providing estimates of stock biomass and fishing mortality trends.

Fishing Mortality: The ratio of F to F_{msy} was well above 1.0 until 1994. From 1996 onwards this ratio declined to very low levels.



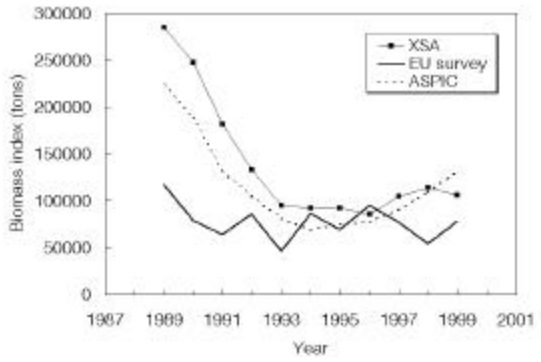
Recruitment: Recruitment at age 4 is fluctuating with no apparent trend in recent years. There has been no strong pulse of recruitment observed since late-1980s, early-1990s.



Biomass: Survey indices and model results indicate a decline of total biomass since the late-1980s. Trends from both XSA and ASPIC models suggested a gradual recent increase in total biomass (1997-99), but that was

not seen in the survey results. Spawning biomass has also declined since the late-1980s and from 1994 onwards has remained at a relatively low level.

Over the past 5 years, female spawning stock biomass has been about 10%-15% of the total biomass. During first 5 years of the more recent 1989-99 time period that proportion was about 22-30%.



State of the Stock: Scientific Council concluded that while the decline in stock biomass appears to have halted, it is still unclear as to whether there has been any actual increase. The total stock and spawning stock are currently at a low level compared to the earlier period in the time series. At the current low fishing mortality, and with growth of the relatively strong 1989-90 year-classes, stock and spawning biomass should gradually increase.

Recommendation: The Council was unable to advise on a specific TAC for year 2001, however, in order to maintain relatively low fishing mortalities so as to promote stock recovery, Scientific Council recommends that catch for Div. 3M redfish in year 2001 be in the range of 3 000-5 000 tons.

Reference Points: No updated information on biological reference points was available.

Special Comments: By-catch of juvenile redfish in the shrimp fishery should be kept at the lowest possible level. Redfish by-catches in this shrimp fishery should be closely monitored with information on length distributions and weights and numbers caught being reported on a regular basis to Scientific Council each November during the assessment of shrimp in Div. 3M.

Sources of Information: SCR Doc. 99/96, 00/9, 34; SCS Doc. 009, 16.

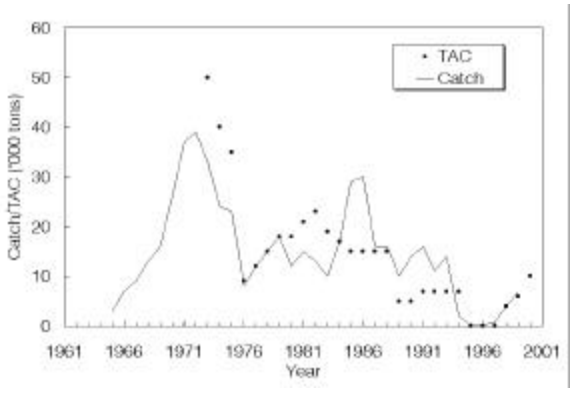
Yellowtail Flounder (Limanda ferruginea) in Divisions 3L, 3N and 3O

Background: The stock is mainly concentrated on the southern Grand Bank and is recruited from the Southeast Shoal area nursery ground, where the juvenile and adult components overlap in their distribution.

Fishery and Catches: There has been a moratorium on directed fishing from 1994 to 1997. Small catches were taken as by-catch in other fisheries. Prior to the moratorium, TACs had been exceeded each year from 1985 to 1993. The fishery was re-opened for 1998 and a catch of 4 400 tons was taken. In the 1999 fishery a catch of 6 700 tons was taken.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended	Agreed
1997	0.8	ndf	0
1998	4	4	4
1999	7	6	6
2000		10	10

[1] Provisional.
ndf No directed fishery.

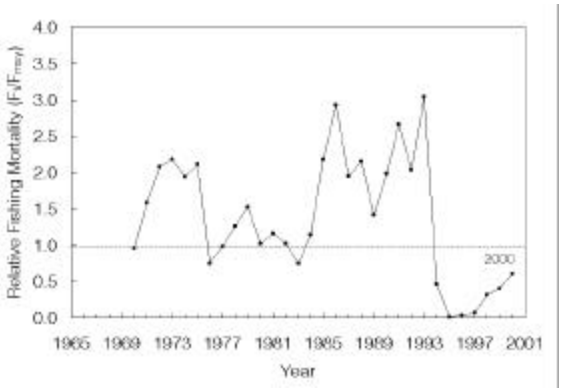


Data: CPUE were available from 1965 to 1999. Limited by-catch sampling data from the Russian, Portuguese and Spanish trawler fleets were available. Abundance and biomass indices were available from: annual Canadian spring (1971-82; 1984-99) and autumn (1990-99) bottom trawl surveys; annual USSR/Russian spring surveys (1972-91); co-operative Canadian Dept. Fisheries and Oceans/Canadian fishing industry surveys (1996-99); and, Spanish surveys in the NAFO Regulatory Area of Div. 3NO (1995-2000).

The analyses of ages were inconclusive due to the unresolved questions about ageing.

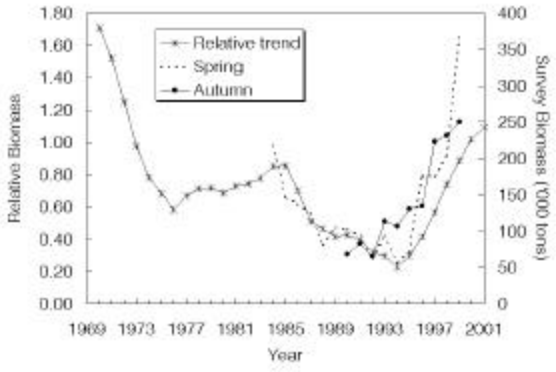
Assessment: An analytical assessment using a stock production model was presented to estimate stock status in 2000.

Fishing Mortality: Has been low since 1994 and is projected to be 61% of F_{msy} in 2000 with an assumed catch of 11 000 tons.



Recruitment: Abundance at length indicated the presence of large numbers of juveniles in the 1999 Canadian autumn survey when compared to other years.

Biomass: The large increase in the survey biomass index in Div. 3LNO in the 1999 Canadian spring survey is indicative of a large change in catchability, i.e. a year effect. Relative biomass from the production model has been increasing since 1994 and is projected to be above the level of B_{msy} in 2001.



State of the Stock: Based on 5 additional surveys since the 1999 assessment, the current view is that the stock size has increased over the past year. The stock biomass is perceived to be at the level of that seen in the mid-1980s.

Recommendation: The TAC for the year 2001 should not exceed 13 000 tons, based on the projection of F= 2/3 F_{msy} and an assumed catch of 11 000 tons in the year 2000.

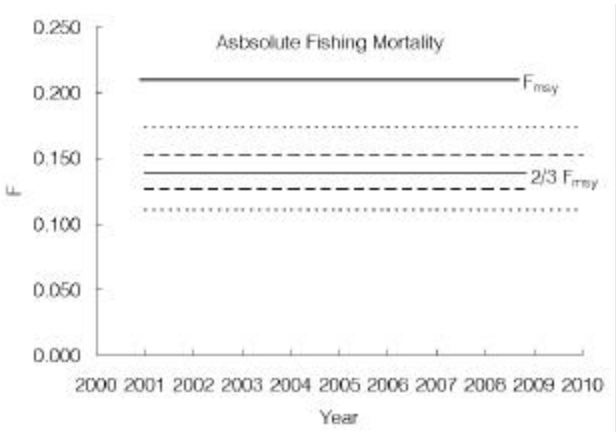
Reference Points: Scientific Council considered 2/3 F_{msy} of 0.139 to be a fishing mortality target but was unable to provide biomass based reference points.

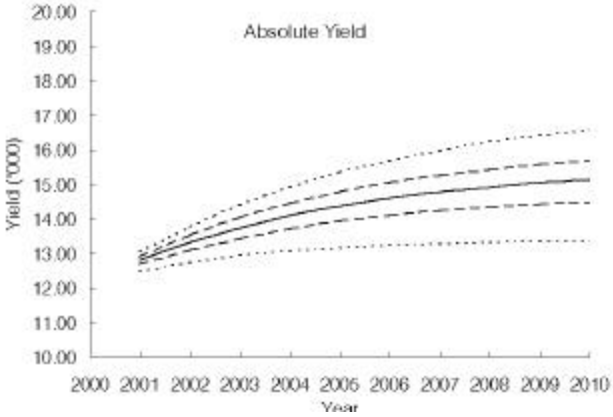
Scientific Council notes it is not in a position to propose age based reference points for this stock at this time and recommends that priority be given to restore the Council's ability to do age-structure analyses on this stock.

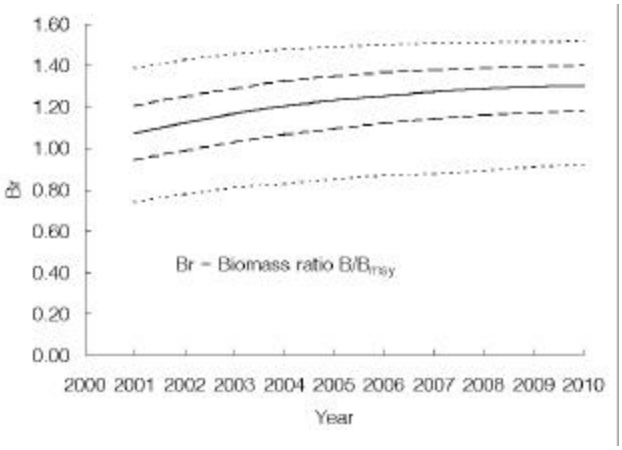
Medium Term Considerations: Projections (see Figures below) were made to estimate yield for each year from 2001 to 2010 while constraining F at 2/3 F_{msy}. The results suggest that yield will increase to a maximum of 15 000 tons in the year 2010. The probability of biomass falling below B_{msy} decreases to less than 10% by 2010.

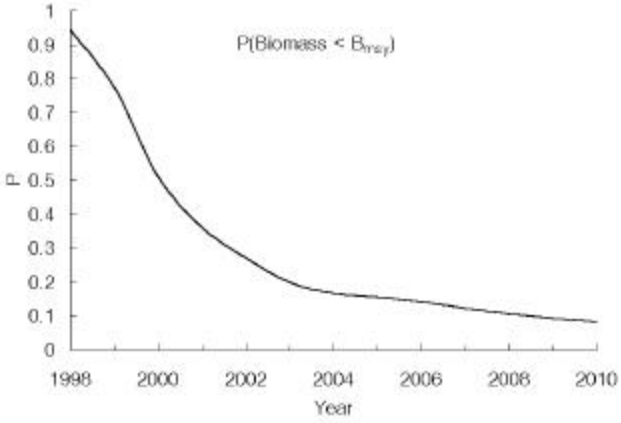
Sources of Information: SCR Doc. 00/35, 42, 44, 46, 50; SCS Doc. 00/9, 16, 20.

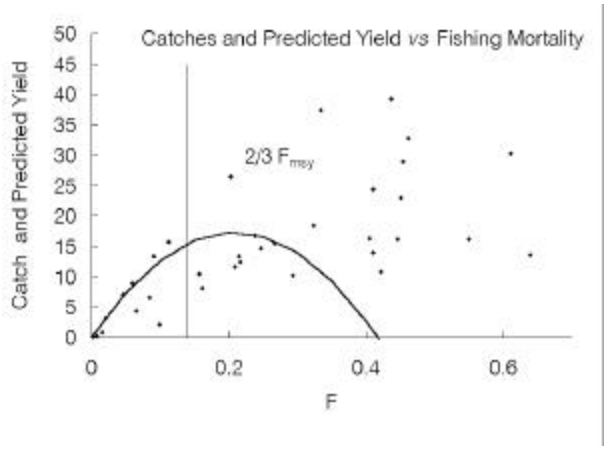
Yellowtail flounder in Div. 3LNO: figures show medium-term projections at a constant fishing mortality of 0.66 F_{msy}. The figures show the 5, 25, 50, 75 and 95th percentiles of fishing mortality, yield, potential yield/MSY, biomass and biomass/B_{msy}. The probability of biomass being less than B_{msy} is also given. The results are derived from an ASPIC bootstrap run (500 iterations) with a catch constraint of 11 000 tons in 2000.











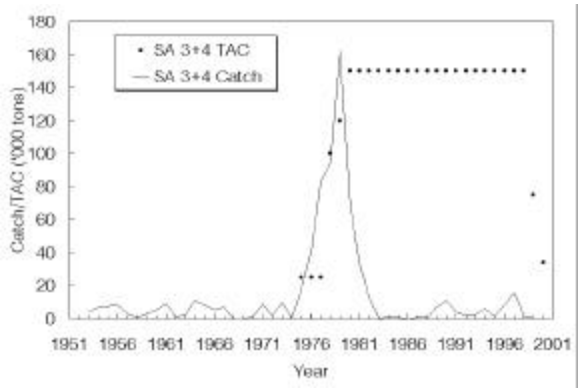
Short-finned Squid (Illex illecebrosus) in Subareas 3 and 4

Background: The northern short-finned squid is an annual species (1-year life cycle) that is considered to comprise a unit stock throughout its range in the Northwest Atlantic Ocean, from Newfoundland to Florida including Subareas 3-6.

Fishery and Catches: Catches in Subareas 3+4 increased during the late-1970s, averaging 81 000 tons during 1976-81, and peaking at 162 000 tons in 1979. Catches in Subareas 3+4 declined to 100 tons in 1986, ranged between 600 and 11 000 tons during 1987-95, increased to 15 800 tons in 1997, and declined to 300 tons in 1999. A TAC for Subareas 3+4 was first established in 1975 at 25 000 tons but was increased in 1978, 1979 and 1980. The Subareas 3+4 TAC remained at 150 000 tons during 1980-98 and was set at 75 000 tons for 1999 and 34 000 tons for 2000.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended	Agreed
1997	15	na	150
1998	2	na	150
1999	0.3	19-34	75
2000		19-34	34

[1] Provisional.
na No advice provided.

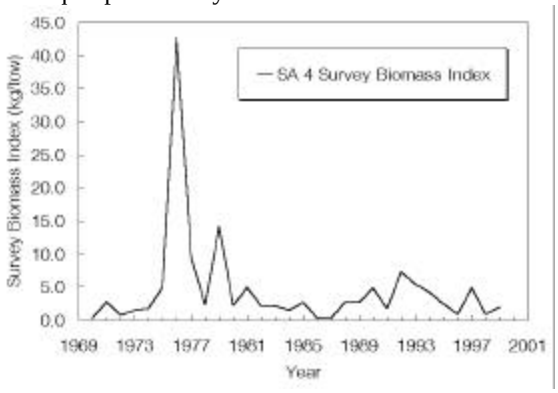


Data: Relative biomass and abundance indices were available from annual Canadian bottom trawl surveys conducted in Subarea 4 in July on the Scotian Shelf (Div. 4VWX, 1970-99) and in September in the southern Gulf of St. Lawrence (Div. 4T, 1971-99). The July survey indices are assumed to reflect relative stock size at the beginning of the fishing season. Size composition data were available from the Subarea 4 survey in July.

Assessment: Absolute biomass and recruitment estimates for the short-finned squid resource in SA 3+4 were not available.

Fishing Mortality: Relative fishing mortality rates increased in the mid-1970s and peaked during 1977-82. During 1983-99, relative fishing mortality rates have been very much lower, about 10% of the average during the peak period.

Biomass: Survey biomass indices reached peak levels during the late-1970s indicating that this was a period of high squid productivity. Since 1982, survey biomass indices have been markedly lower indicative of low squid productivity.



State of the Stock: Based on the survey data, the short-finned squid resource in Subareas 3+4 has remained at a low level.

Recommendation: The Scientific Council is unable to advise on a specific level of catch for year 2001. However, based on available information (including an analysis of the upper range of yields that might be expected under the present low productivity regime), the Council advises that the TAC for year 2001 for short-finned squid in Subareas 3+4 be set between 19 000 tons and 34 000 tons.

The advised TAC range (19 000-34 000 tons) is applicable only in periods of low productivity. In periods of high productivity, much higher catches and TAC levels are appropriate.

Reference Points: Scientific Council is not in a position to propose reference points at this time.

Special Comments: It is important to note that short-finned squid in Subareas 3-6 (and further south to Florida) are considered to comprise a unit stock, and that the current assessment only applies to part of the area.

Sources of Information: SCR Doc. 98/75, 00/36, 37. SCS Doc. 00/8, 14, 21.

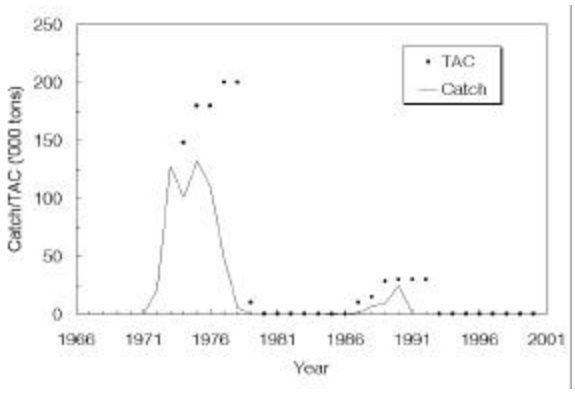
Capelin *(Mallotus villosus)* in Divisions 3N and 3O

Background: Within the NAFO Regulatory Area, the capelin spawning occurs in the area of the Southeast Shoal in Div. 3N.

Fishery and Catches: The fishery was closed during 1979-86 and again since 1993.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended	Agreed
1997	-	na	0
1998	-	na	0
1999	-	na	0
2000	-	na	

na No advice possible.



Data: No recent data available. Scientific Council was informed that some recent research survey data were collected by Canada, but these have not been reviewed by Scientific Council.

Assessment: No assessment was possible.

For several years, the Scientific Council was not in a position to provide advice for capelin Div. 3NO due to absence of data. The Scientific Council proposes that it will give no advice until appropriate data are available.

Recommendation: No advice possible.

Special Comments: Scientific Council recommends to present all data available related to capelin in Div. 3NO for the 2001 June Meeting.

In the absence of new data Scientific Council will not be able to provide any advice for this stock in 2001.

Source of Information: SCS Doc. 00/21.

Greenland Halibut (Reinhardtius hippoglossoides) in Subarea 2 and Divisions 3KLMNO

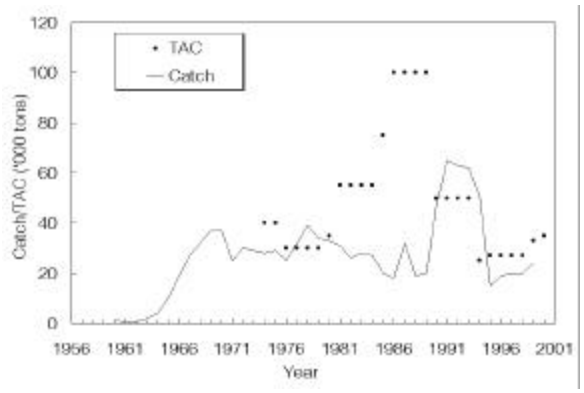
Background: The Greenland halibut stock in Subarea 2 and Div. 3KLMNO is considered to be part of a biological stock complex, which includes Subareas 0 and 1.

Fishery and Catches: Catches increased sharply in 1990 due to a developing fishery in the Regulatory Area in Div. 3LMN and continued at high levels during 1991-94. The catch was only 15 000 to 20 000 tons per year during 1995 to 1998 as a result of lower TACs under management measures introduced by the Fisheries Commission. The catch in 1999 was estimated to be 24 000 tons, the highest since 1994. Catches have been well below TACs during 1995-99.

Catches in the following table are best estimates.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended	Agreed
1997	20		27
1998	20		27
1999	24	~30	33
2000	-	~30	35

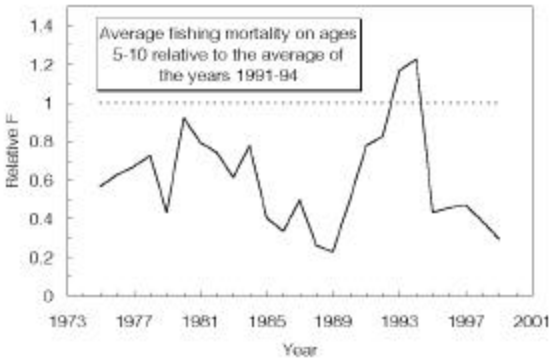
[1] Provisional.
[2] Established autonomously by Canada in 1993-94 and by the Fisheries Commission in 1995-2000.



Data: CPUE data were available from otter trawl fisheries in Canadian zone and the Portuguese otter trawl fishery in the Regulatory Area of Div. 3LMN. Abundance and biomass indices were available from research vessel surveys of Canada (1978-99), EU (1988-99), and EU-Spain (1995-2000). The Canadian autumn surveys in 1996 to 1999 covered most of the stock distribution, including Div. 2GH. International commercial catch-at-age data were updated from 1989-99 providing a series from 1975-99.

Assessment: An analytical assessment using several calibration models was reviewed to estimate population numbers in 2000. The various estimation procedures led to biomass estimates for year 2000 that covered a wide range of values and methods that produced high estimates of biomass also produced low estimates of fishing mortality for 1999.

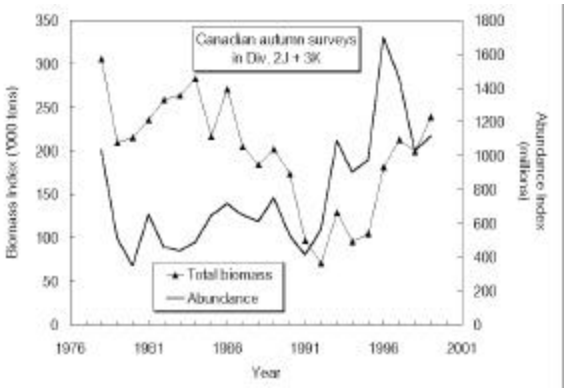
Fishing Mortality: While the levels of fishing mortality implied from these analyses were different, all methods indicated a fishing mortality level for 1999 that is relatively low in comparison to the early-1990s.



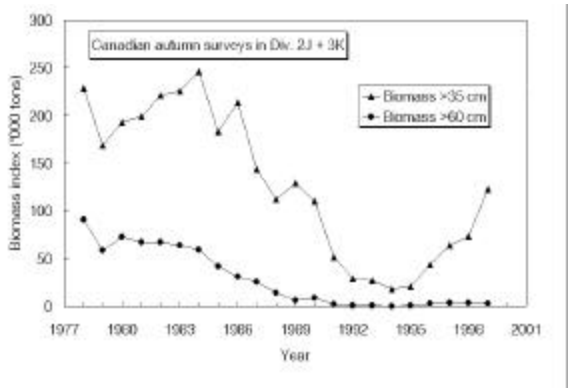
Recruitment: Above average recruitment indicated for the 1990-95 year-classes. The 1996 to 1998 year-classes appear to be average to below average. However, the comparability of the estimates may be significantly influenced by the change in survey gear in 1995.

Biomass: As the dynamics of the population are still uncertain, it is not possible to determine which method provides the best absolute estimate of biomass.

Most survey indices of biomass increased from 1996 to 1999.



Indices of fishable biomass since 1995 (greater than 35 cm) continued to increase as good year-classes recruit to the fishable stock. However, the biomass index of fish greater than 60 cm remains at a low level.



Portuguese CPUE increased in 1997-99 due mainly to recruitment of the 1990-92 year-classes.

State of the Stock: The stock appears to be recovering due to good recruitment and low fishing mortality but the biomass of fish over 60 cm is still low.

Catch Forecast: Short and medium term projections indicate that there should be scope for catches to increase up to 44 000 tons in 2001 without increasing fishing mortality. See Figures below.

Recommendation: The current assessment is considered uncertain. There is a high level of uncertainty associated with the estimates of the 1994 and 1995 year classes, and these year-classes are not yet represented in the catches. In addition, the high exploitation of immature fish and the low abundance of sexually mature fish (>60 cm) is indicative of a situation of significant biological risk, although this risk cannot be quantified at present. In the light of these uncertainties, Scientific Council recommends a stepwise approach to increasing the TAC. For 2001, Scientific Council recommends the catch should not exceed 40 000 tons. Future steps to increase the TAC should be considered on re-evaluation of the contribution of the 1994 and 1995 year-classes to the catches in 2000 during the 2001 assessment. This approach is consistent with considerations raised below under 'reference points'.

The Council again recommends that measures be considered to reduce, as much as possible, the exploitation of juvenile Greenland halibut in all fisheries.

Reference Points: The current assessment results are not considered sufficiently reliable to allow estimation of formal reference points in quantitative terms. Until such reference points can be provided, Scientific Council advises that :

- Fishing mortality should be maintained, with high probability, below the average level estimated for the period 1991 to 1994.

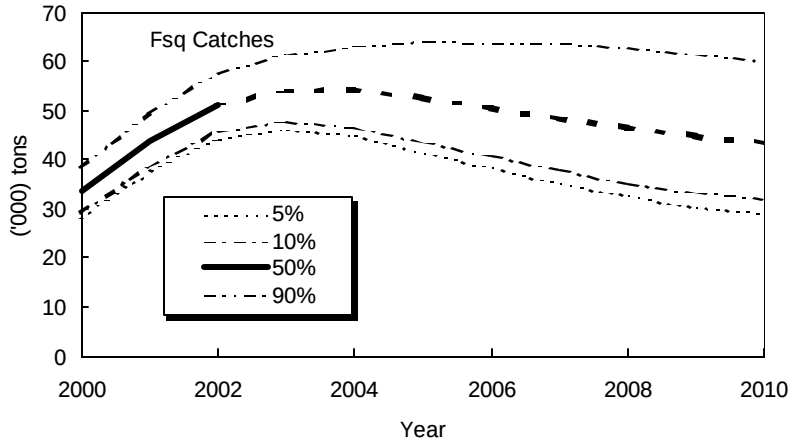
This approach is advised in order to maintain a low risk that the stock will enter regions of unknown dynamics, which are considered to have unacceptable levels of risk.

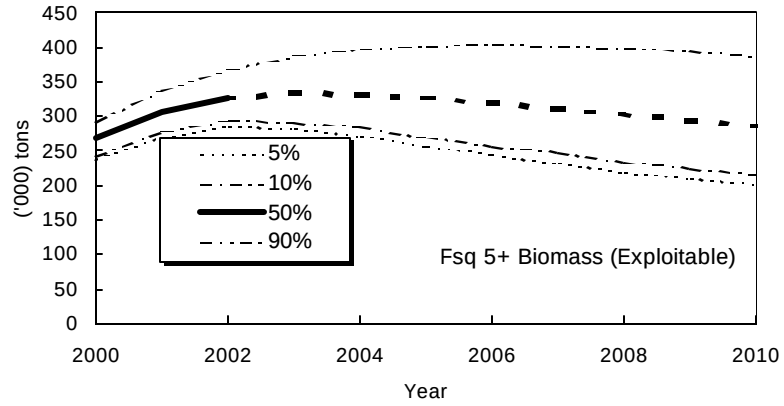
Special Comments: The Council reiterates its concern that the catches taken from this stock consist mainly of young, immature fish of ages several years less than those at which sexual maturity is achieved, and that such exploitation results in foregoing much potential yield.

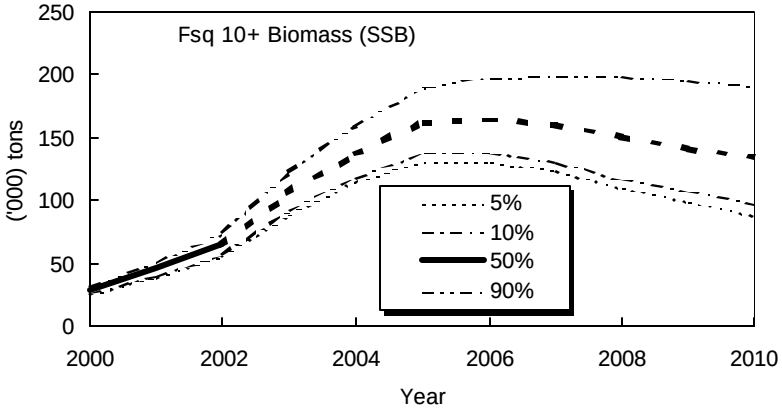
During previous assessments, Scientific Council has noted that fishing effort should be distributed in a similar fashion to biomass distribution in order to ensure sustainability of all spawning components. Application of this approach becomes increasingly important as the overall TAC is increased.

Scientific Council is also concerned that increased catches of Greenland halibut will result in increased catches of other species, some of which are currently under moratorium. It is strongly recommended that Fisheries Commission take steps to ensure that any by-catches of other species during the Greenland halibut fishery are true and unavoidable by-catches.

Sources of Information: SCR Doc. 00/6, 9, 12, 17, 24, 43, 46, 53, 54; SCS Doc. 00/9, 16, 19, 20.







Figures show the medium-term projections for Greenland halibut in Subarea 2 and Div. 3KLMNO.

b) **Request for Advice on TACs and Other Management Measures for the Years 2001 and 2002**

The Scientific Council and the Fisheries Commission during the Annual Meeting of September 1999 agreed to consider certain stocks on a alternating basis. This section presents those stocks for which the Scientific Council provided scientific advice for the years 2001 and 2002.

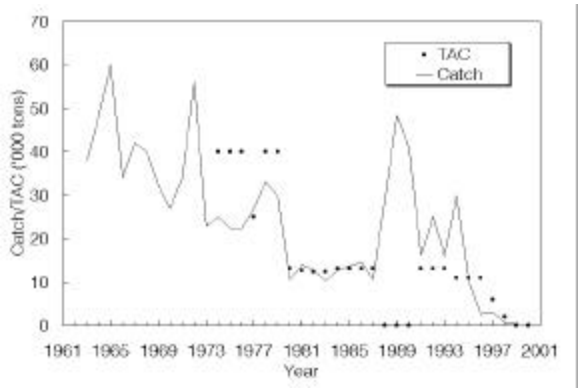
Cod (Gadus morhua) in Division 3M

Background: The cod stock on Flemish Cap is considered to be a discrete population.

Fishery and Catches: Catches exceeded the TAC from 1988 to 1994, however, were below the TAC from 1995 to 1998. Large numbers of small fish were caught by the trawl fishery in most recent years. By-catches were estimated to be low in the shrimp fishery since 1993. The fisheries since 1996 were very small compared with previous years. In 1999 the fishery was closed, virtually all the catch was taken by vessels from non-Contracting Parties.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended	Agreed
1997	2.9	ndf	6
1998	0.7	ndf	2
1999	0.4	ndf	0
2000		ndf	0

[1] Provisional.
ndf No directed fishery and by-catch of cod kept at lowest possible level.

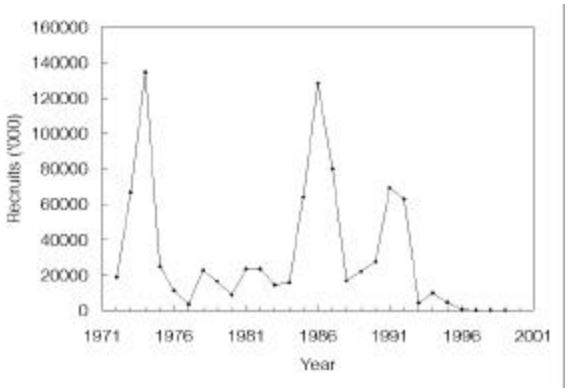


Data: Length and age composition of the 1999 catch was available for Portuguese trawlers. Data were also available from the EU bottom-trawl survey, which covers the whole distribution area of the stock.

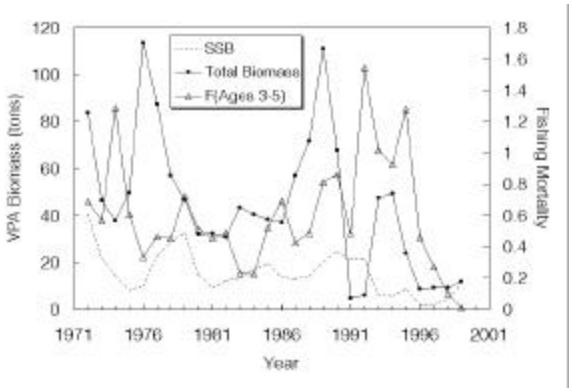
Assessment: An analytical assessment was presented.

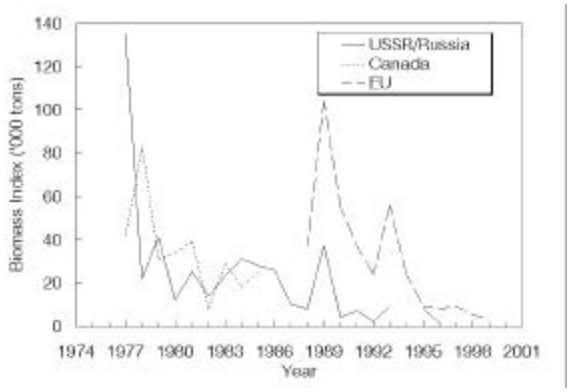
Fishing Mortality: Declined since 1996 as fishing effort and catches did.

Recruitment: The 1985 and 1991 year-classes were the most abundant in recent years. The 1992 to 1995 year-classes appear to be weak and, according to EU survey results, the 1996 to 1999 year-classes are even poorer.



Biomass: The stock biomass and spawning stock biomass at the beginning of 2000 remain at a very low level and is mainly composed by fish 6 and 7 years old. Fish younger are scarce due to the lower recruitment in last four years.





State of the Stock: The stock remains at a very low level.

Recommendation: No directed fishery for cod in Div. 3M in the years 2001 and 2002. Also, by-catch of cod in fisheries directed to other species on Flemish Cap should be kept at the lowest possible level.

Reference Points: There are uncertainties about the precision of the SSB and recruitment estimates. Nevertheless, the SSB-recruitment plot from the VPA shows that there was reduced recruitment at SSB below 14 000 tons, and this value might be considered as a preliminary estimate of B_{lim}.

Special Comments: The next Scientific Council assessment of this stock will be in 2002.

Sources of Information: SCR Doc. 00/9, 40; SCS Doc. 00/16.

American Plaice (Hippoglossoides platessoides) in Division 3M

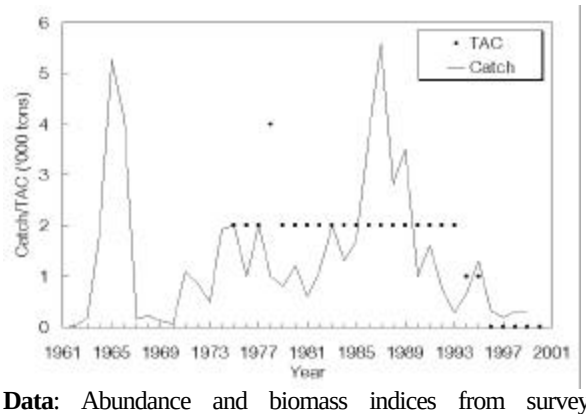
Background: The stock occurs mainly at depths shallower than 400 m on Flemish Cap.

Fishery and Catches: Catches are taken mainly by otter trawl, primarily in a by-catch fishery of the Contracting Parties since 1992.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended	Agreed
1997	0.2	0	0
1998	0.3	ndf	0
1999	0.3	ndf	0
2000		ndf	0

[1] Provisional.

ndf No directed fishing and by-catch kept at lowest possible level.

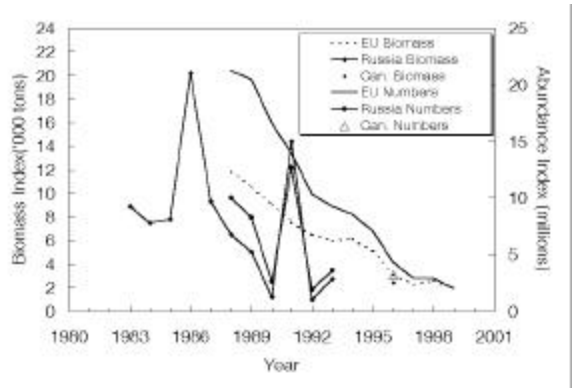


Data: Abundance and biomass indices from surveys were available from USSR/Russia (1983-93), EU (1988-99) and Canada (1996).

Assessment: No analytical assessment was possible.

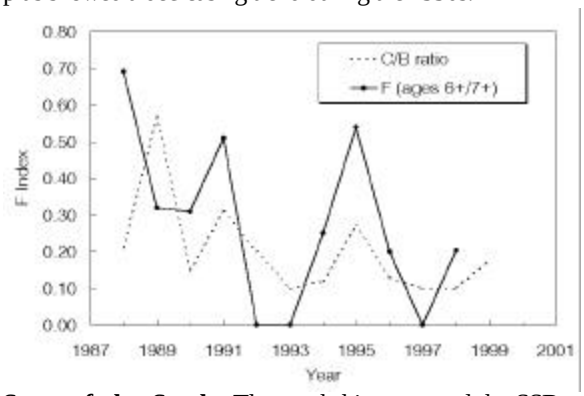
Recruitment: Only weak year-classes have been observed since 1990.

Biomass and Abundance:



The SSB index reached the maximum in 1988, remained more or less stable during 1990-94 and has been declining since 1995. The index in 1999 was at the lowest level observed (18% of the 1988 level).

Fishing Mortality: A comparison of catch levels with EU survey biomass indicated that the exploitation level decreased between 1988 and 1993, after which it remained at that level. Average Z estimated for ages 6 plus showed a decreasing trend during the 1990s.



State of the Stock: The stock biomass and the SSB are at a very low level and there is no sign of recovery, due to the consistent year to year recruitment failure since the beginning of the 1990s.

Recommendation: There should be no directed fishery on American plaice in Div. 3M in years 2001 and 2002. By-catch should be kept at the lowest possible level.

Reference Points: The Scientific Council is not in a position to propose reference points at this time.

Special Comments: Average recruitment per unit of SSB has been low since 1990.

The next Scientific Council assessment of this stock will be in 2002.

Sources of Information: SCR Doc. 00/9, 25; SCS Doc. 00/9.

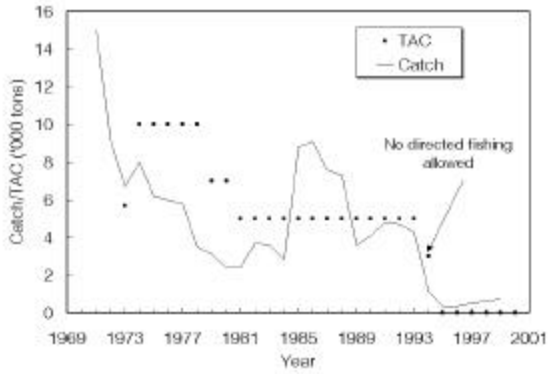
Witch Flounder (Glyptocephalus cynoglossus) in Divisions 3N and 3O

Background: The stock mainly occurs in Div. 3O along the deeper slopes of the Grand Bank. It has been fished mainly in winter and springtime on spawning concentrations.

Fishery and Catches: Catches exceeded the TAC by large margins during the mid-1980s. The catches during 1995-98 ranged between 300-600 tons including unreported catches. The 1999 catch was 800 tons, the highest since 1994.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended	Agreed
1997	0.5	nf	0
1998	0.6	nf	0
1999	0.8	nf	0
2000	-	nf	0

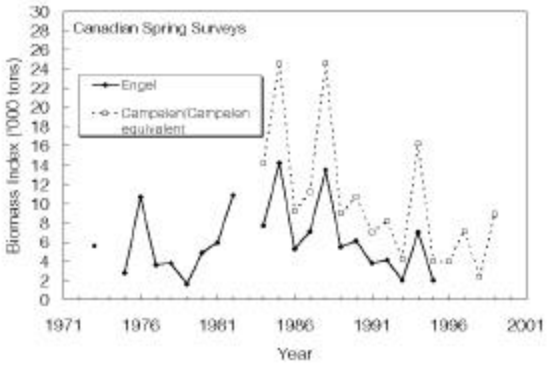
[1] Provisional.
nf No fishing.



Data: Converted abundance and biomass data were available from Canadian spring surveys during 1984-99 and autumn surveys during 1990-99 as well as Spanish surveys during spring 1995-2000.

Assessment: No analytical assessment was possible with current data.

Biomass: Survey biomass indices have trended downwards since the mid-1980s and the 1998 value is the lowest observed. The apparent increase in 1999 is considered to be a year effect similar to spikes observed in some earlier years.



Recruitment: No information.

State of the Stock: Stock remains at a low level.

Recommendation: No directed fishing on witch flounder in the years 2001 and 2002 in Div. 3N and 3O to allow for stock rebuilding. By-catches in fisheries targeting other species should be kept at the lowest possible level.

Reference Points: Scientific Council is not in a position to propose reference points at this time.

Special Comments: No aging data were available since 1993 and none are anticipated in the near future.

The next Scientific Council assessment of this stock will be in 2002.

Sources of Information: SCR Doc. 00/14, 46; SCS Doc. 00/9, 16.

c) **Special Requests for Management Advice**

i) **Precautionary Measures**

The Council noted this matter was discussed before under Agenda item III.

ii) **Request on Squid (*Illex*) in Subareas 3 and 4**

The Fisheries Commission requested the Scientific Council to: *develop an in-season indicator of productivity level based on results from the annual July survey of the Scotian Shelf and any other source of data*. If it is not considered possible to develop an in-season indicator, the Scientific Council is requested to: *comment on the research that would be required to develop such an indicator*. The Scientific Council is also requested to: *review the protocol outlined in FC Working Paper 99/18 and to advise on possible modifications to ensure its applicability on the long term, including a level of TAC which would be applicable during the high productivity regime* (see Part D, Agenda 1, Annex 1, Item 3f for complete request).

Scientific Council noted in 1999 that it may be possible to identify the onset of a new productivity regime based on marked changes in (a) survey abundance and biomass indices; (b) the average size of squid in the population; and (c) environmental conditions which persist for two or more years. For an in-season predictive model to be of practical value it should be based on early-season indices that are simple and readily available.

An initial exploratory analysis was presented which used July research vessel abundance and size indices, fishery CPUE indices and an environmental index to predict annual SA 3+4 squid catches (SCR Doc. 00/36). While the results of this analysis were promising, further research and developmental work is required before a reliable in-season indicator of short-finned squid productivity is available. Considerable resources will be required to accomplish this work.

Scientific Council was unable to advise on any modification to the protocol for determining productivity of the short-finned squid resource in NAFO Subareas 3+4 to ensure its applicability on the long term. Furthermore the Scientific Council is not in a position to advise on a specific level of TAC which would be applicable during the high productivity regime.

iii) **Information on Catches and/or Discards of Juvenile Fish in the Various NAFO Fisheries** (SCR Doc. 99/96, SCR Doc. 00/46)

The Fisheries Commission requested the Scientific Council to: *compile and review all information on catches and/or discards of juvenile fish in the NAFO fisheries,* and *describe and evaluate the effectiveness of additional technical management measures arising at reducing catches of juvenile fish and male shrimp in various NAFO fisheries* (see Part D, Agenda 1, Annex 1, Item 8) .

The Scientific Council commented as follows:

a) **Introduction**

As the distribution of demersal species often overlaps, a directed fishery hardly ever avoids by-catches completely. Also, as fishing aggregations often include fish of all sizes, the capture of small, immature fish has been inescapable given the current gear configurations and fishing practices.

A preliminary inquiry was carried out among Designated Experts to collect information on relevant catch statistics, biology etc. for the considered stocks. As a result of the sporadic research effort in this area there is a relatively large number of cases with no available information. Information from NAFO observers program should be of great benefit in providing information on by-catches and discards.

The number and weight of juveniles were calculated as numbers in the size distribution less than L_{50} for maturity of females.

b) **Catches of Juveniles**

The result of the inquiry with quantitative catches are presented by stock units for 1999 are listed in Table 1.

c) **By-catches in the Shrimp Fishery**

By-catch rates of Greenland halibut in Subareas 2 and 3 in Canadian shrimp vessels greater than 500 GRT calculated for combined grates (22 and 28 mm) in 1997, 1998, 1999 was 12.5, 9.9 and 5.9 kg/hr, respectively. Indication from analysis of age disaggregation shows that no more than 1.5% of any cohort was removed by the offshore shrimp fleet in this period. Theoretical losses computed from yield-per-recruit analysis showed that total loss due to shrimp by-catch mortality in this fishery in 1997, 1998, 1999 were 449 tons, 275 tons and 202 tons, respectively. The loss for each year will be distributed over the 17-year life span of the fish.

d) **By-catches – Technical Measures**

No specific technical management measures aimed at reducing catches of juvenile fish were evaluated. A number of examples were discussed during the assessments of various stocks (mesh size, exclusion grates, etc.). Scientific Council noted that a document on codend mesh selection studies was presented (SCR Doc. 00/49), and that there was a considerable amount of valuable information contained in this paper. As well, Scientific Council noted that research vessel surveys should provide useful data in delineating distributions of species, including juveniles. In addition, the data could also be used to delineate areas where by catches would probably occur, and areas where such by-catches would be unlikely. An example using Canadian autumn survey data in Div. 3LNO suggested that by-catches of yellowtail flounder in a fishery for Greenland halibut would be expected to be extremely low, given that there is very little overlap in the depth distribution of these species.

Table 1. Overview of catch, by-catch, discard, by-catch of juveniles, discards of juveniles of relevant fish species and squid in the NAFO area for 1999 if not otherwise stated.

	Size limits		Directed fishery								By-catch in other fisheries							
	A	B	C	D	E	F	G	H	I	J		K	L	M	N	O	P	Q	R
Stocks	Length at 50% mature female (L50), cm	Minimum landing size, cm	Total catch, t	Total catch in numbers ('000)	Catch of juveniles, t	Catch of juveniles in numbers ('000)	Discarded catch, t	Discarded catch in numbers ('000)	Discarded juveniles, t	Discarded juveniles in numbers ('000)	Fleet	Total bycatch, t	Total bycatch in numbers ('000)	Juveniles in bycatch, t	Juveniles in bycatch in numbers ('000)	Discarded by-catches, t	Discarded by-catches in numbers ('000)	Discarded juveniles in by-catch, t	Discarded juveniles in by-catch in numbers ('000)
American plaice in Div. 3LNO	33	25	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF	Greenland halibut	163	N/A	N/A	N/A	N/A	N/A	N/A	N/A
											Yellowtail flounder	212	N/A	N/A	N/A	N/A	N/A	N/A	N/A
											Skate/Greenland halibut	1,243	N/A	N/A	N/A	N/A	N/A	N/A	N/A
											TOTAL	1,618	2,898	84	338	N/A	N/A	N/A	N/A
American plaice in Div. 3M	34	None	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF	Greenland halibut/Redfish	255	288	1	3	N/A	N/A	N/A	N/A
Capelin in Div. 3NO	14-16	N/A	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cod in Div. 2J3KL	about 43	N/A	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cod in Div. 3M	43.47	45	353 2)	189 2)	13 2)	14 2)	N/A	N/A	N/A	N/A	Redfish	3	2	0	0	N/A	N/A	N/A	N/A
Cod in Div. 3NO	N/A	41	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF	Skate	584	N/A	N/A	N/A	N/A	N/A	N/A	N/A
											Other	325	N/A	N/A	N/A	N/A	N/A	N/A	N/A
											TOTAL	909	68	96	95	N/A	N/A	N/A	N/A
Thorny skate	55	None	10,374	N/A	~500	N/A	433	N/A	N/A	N/A		<662 3)	N/A	N/A	N/A	117	N/A	N/A	N/A
Greenland halibut in Div. 1A, inshore	N/A	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Greenland halibut in SA 0+1	57	None	9,667	6,185	5,290	5,038	~0	~0	~0	~0	Shrimp	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Greenland halibut in SA 2+3KLMNO	74.1-81.7	35	24,232	23,782	21,973	23,486	N/A	N/A	N/A	N/A	Shrimp	85	N/A	85	N/A	N/A	N/A	N/A	N/A
Other finfish in SA 1	N/A	None	4,983	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Shrimp	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Redfish in Div. 3LN	28.30	None	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF	Greenland halibut	2,388	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Redfish in Div. 3M	29	0	1188	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Shrimp	55	1,434	55	1,434	N/A	N/A	N/A	N/A
Redfish in SA 1	35	None	88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Shrimp	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roughead grenadier in SA 2+3	26	None	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF	Greenland halibut	7,052	13,078	5,149	12,568	N/A	N/A	N/A	N/A
Roundnose grenadier in SA 0+1	N/A	None	10	N/A	N/A	N/A	~0	~0	~0	~0	Shrimp	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roundnose grenadier in SA 2+3	N/A	None	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF	Greenland halibut	83	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Squid in SA 3+4	N/A	None	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Silver hake	294	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Witch flounder in Div. 2J3KL	40	None	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF	Greenland halibut	1080	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Witch flounder in Div. 3NO	44-46	None	NDF	NDF	NDF	NDF	NDF	NDF	NDF	NDF	Greenland halibut	808	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Yellowtail flounder in Div. 3LNO	34	25	5,413	N/A	N/A	4)	N/A	N/A	N/A	N/A	Greenland halibut	96	N/A	N/A	3%	N/A	N/A	N/A	N/A
											Greenland halibut/Redfish	308	N/A	N/A	3%	N/A	N/A	N/A	N/A
											Skate	752	N/A	N/A	8%	N/A	N/A	N/A	N/A
											TOTAL	1,148	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A: Not available. NDF: No directed fishery. NCP: non-contracting parties.
1) All data for 1998 2) NCP 3) Canada by-catches <50 t 4) 0.4% fro Canada

iv) **Elasmobranchs in Subareas 0-6**

The Fisheries Commission requested the Scientific Council to: *summarize all available information from the Convention Area on catches of elasmobranches by species and by the smallest geographic scale possible,* and to *review available information from research vessel surveys on the relative biomass and geographic distribution of elasmobranchs by species, and to quantify the extent of exploitation on these resources.* Further, the Scientific Council was requested to: *initiate work leading to the development of precautionary reference points* (see Part D, Agenda 1, Annex 1, Item 6).

In a recent paper [McEachran, J. D. and K. A. Dunn, 1998. Phylogenetic analysis of skates, a morphologically conservative clade of elasmobranchs (*Chondrichthyes: Rajidae*). *Copeia*, 2: 271-290], changes to the genus names of the following skates species were proposed:

Common name	Old Scientific name	Proposed (new) scientific name
Little Skate	*Raja erinacea*	*Leucoraja erinacea*
Arctic Skate	*Raja hyperborea*	*Amblyraja hyperborea*
Barndoor Skate	*Raja laevis*	*Dipturus laevis*
Winter Skate	*Raja ocellata*	*Leucoraja ocellata*
Spinytail Skate	*Raja spinicauda*	*Bathyraja spinicauda*
Thorny Skate	*Raja radiata*	*Amblyraja radiata*
Smooth Skate	*Raja senta*	*Malacoraja senta*

It is anticipated that these proposed scientific names will be accepted as the official names of these species by the American Fisheries Society (AFS) Names of Fishes Committee, and will be published in the 2000 edition of the AFS publication, "Common and Scientific Names of Fishes from the United States and Canada".

Geographic Distribution

Subareas 0+1. Thorny skate (*Amblyraja radiata*), Arctic skate (*Amblyraja hyperborea*) and Greenland shark (*Somniosus microcephalus*) are the common elasmobranchs distributed throughout Subareas 0 and 1. A survey in Div. 0A in October 1999 showed thorny skate were distributed primarily at depths <751m in the area of Davis Strait and Arctic skate was distributed primarily at depths >501m throughout Davis Strait and Baffin Bay.

Subarea 2. No information is available for this area.

Subarea 3. Thorny skate are distributed throughout Subarea 3 and perform seasonal migrations, tending to move into deeper water along the shelf edge during winter-spring. Analyses of distribution of thorny skate in the Canadian bottom trawl surveys (Div. 3LNO and Subdiv. 3Ps) suggest that in the past a greater abundance of skates was distributed further to the north in Div. 3K and 3L than is currently found. Recent Canadian surveys indicate that about 20% of the overall biomass in Div. 3LNO and Subdiv. 3Ps is found in the NAFO Regulatory Area. The information from commercial catches indicates that barndoor skate (*Dipturus laevis*) may be more widely distributed than reflected by research survey data and perhaps continuously distributed along deep slope waters of the Northwest Atlantic. Apparent changes in abundance as observed from research surveys may in part reflect periods of expansion and contraction in to and out of the shallower waters within its range.

Subarea 4. No information is available for this area.

Subareas 5+6. Bottom trawl research surveys in Subareas 5+6 have documented 33 species of elasmobranchs including large and small sharks and stingrays. Of the 12 species examined for patterns in distribution, 11 exhibited large seasonal shifts in distribution from south to north or

offshore to inshore as water temperatures warmed. The exception to this was chain dogfish (*Scyliorhinus retifer*) that generally remained in deep slope waters year round.

Winter skate (*Leucoraja ocellata*) are most abundant in the Georges Bank and Southern New England offshore regions, with few fish caught in the Gulf of Maine or Mid-Atlantic regions. Little skate (*Leucoraja erinacea*) are abundant in the inshore and offshore areas in all regions of the northeast USA coast, but are most abundant on Georges Bank and in the Southern New England region.

Barndoor skate are most abundant in the Gulf of Maine, Georges Bank, and Southern New England offshore regions, with very few fish caught in inshore (<27m depth) waters or the Mid-Atlantic region. Historically barndoor skate were found in inshore waters to the tide-line, and in depths as great as 400m off Nantucket.

Thorny skate and smooth skate (*Malacoraja senta*) are most abundant in the Gulf of Maine and Georges Bank offshore regions, with very few fish caught in inshore (<27m depth) areas, and in the Southern New England and Mid-Atlantic regions. Clearnose skate (*Raja eglanteria*) and rosette skate (*Raja garmani*) are most abundant in the Mid-Atlantic region, with very few fish caught in Southern New England and no fish caught in other regions.

Spiny dogfish (*Squalus acanthius)* migrate from offshore southern waters (south of Georges Bank) to the Gulf of Maine and into Canadian waters as far north as Newfoundland in the summer and autumn.

Relative Biomass

Absolute biomass and recruitment estimates for elasmobranch species are not available for any Subarea. However, relative biomass and abundance indices were available for Subareas 3, 5 and 6. Survey biomass indices for thorny skate showed increasing trends in recent years in Subarea 3 but has declined to historic lows in Subareas 5+6.

For the aggregate skate complex in Subareas 5 and 6, biomass remained relatively constant from 1963 to 1980, then increased significantly to peak levels in the mid-to late-1980s. The index of skate complex biomass then declined steadily until 1994, but recently began to increase again. The large increase in skate biomass in the mid- to late-1980s was dominated by winter and little skate. The biomass of large-bodied skates (>100 cm maximum length; barndoor, winter, and thorny) has steadily declined since the mid-1980s and the recent increase in aggregate skate biomass has been due to an increase in small-bodied skates (<100 cm maximum length; little, clearnose, rosette, and smooth). All large-bodied skates (winter, barndoor, and thorny) and all primary skate species in the Gulf of Maine (thorny and smooth) are currently at low biomass.

Biomass of spiny dogfish in Subareas 5+6 increased from the late-1970s to the early-1990s, but has declined over the past 5 years. This change is largely due to a decline in mature female (>80 cm) biomass.

Fishery and Catches

There are directed fisheries for skate in Subareas 3, 4, 5 and 6. An unregulated non-Canadian directed fishery outside 200 miles began in Div. 3N in 1985 and a regulated directed Canadian fishery began inside 200 miles in Div. 3LNO and Subdiv. 3Ps in 1994. Thorny skate is the targeted species in Subarea 3 with total catches in the order of 9 000 to 12 000 tons since 1997.

Thorny, winter skate and porbeagle (*Lamna nasus*) are fished in Div. 4V. This fishery is regulated through quota controls established by Canada.

A number of skate species are harvested in Subareas 5 and 6. Composition varies by area but catches are primarily dominated by winter skates and little skates in most areas. Average catches in the mid-1980s increased to 5 000 tons, mostly due to by-catch in USA fisheries. In the late-1980s, an unregulated directed fishery for skates (primarily large skate wings) developed and catches increased to 13 000 tons. Total catches for the skate complex in Subareas 5 and 6 reached a peak in 1998 at 17 000 tons due to a demand for bait and were comprised mainly of smaller bodied species.

Catches of spiny dogfish in Subareas 2-6 increased from very low levels in the early-1960s to an average of 24 000 tons in the 1970s. Catches then declined to by-catch levels in the mid-1980s, but increased sharply, reaching 28 300 tons in 1996 before declining through the late-1990s. The fishery directed towards spiny dogfish in Subareas 5 and 6 is presently under regulation.

Elasmobranchs such as thorny skate, Arctic skate, barndoor skate, Greenland shark, and black dogfish (*Centroscyllium fabricii*) are also taken as by-catch in other fisheries in Subareas 0 to 6.

Exploitation

Exploitation rates could not be determined for any elasmobranch species in Subareas 2-4. In Subareas 5 and 6, fishing mortality on winter skate increased coincident with the onset of the directed fishery, and was estimated to be 0.4 in 1999. Fishing mortality on little skate also increased in recent years and is estimated to be 0.3 in 1999. Fishing mortality on large female spiny dogfish ranged from 0.35-0.5 during 1997-99.

Sources of Information: SCR Doc. 00/15, 18, 19, 27, 31, 46; SCS Doc. 00/9, 20.

d) **Monitoring of Stocks for Which Multi-year Advice was Provided in 1999**

During the 1999 assessments, the Scientific Council provided 2-year advice (for 2000 and 2001) for cod in Div. 3NO, redfish in Div. 3LN, American plaice in Div. 3LNO and witch flounder in Div. 2J+3KL. The Scientific Council reviewed the status of these stocks at its June 2000 Meeting and found no significant change in status for any of the stocks. Therefore, the Scientific Council has not provided updated/revised advice for 2001 for these stocks. The next Scientific Council assessment of these stocks will be in 2001.

2. **Coastal States**

a) **Request by Canada for Advice**

i) The Scientific Council was requested by the Coastal State Canada to provide advice on stock status for cod in Div. 2J+3KL and impact of by-catch on yellowtail flounder resource in Div. 3LNO. This section provides the Scientific Council advice.

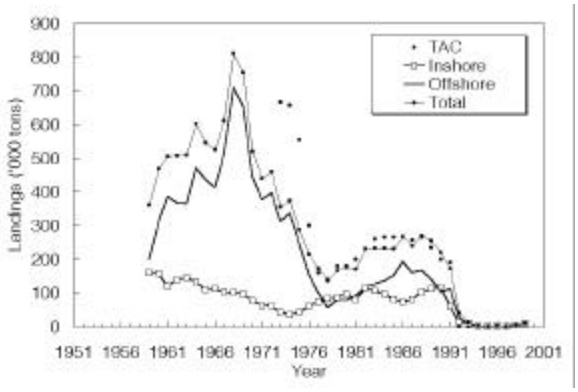
Cod (Gadus morhua) in Divisions 2J, 3K and 3L

Background: Cod in these Divisions are considered a single stock complex. However, there is considerable evidence of sub-stock structure. Historically, many of the cod migrated between the offshore and the inshore. There are at present very few cod in the offshore compared to any time prior to 1993. Denser aggregations exist in the inshore from southern Div. 3K to the southern boundary of the stock. Tagging studies indicate that the inshore of Div. 3KL is inhabited by at least two groups of cod; a northern resident group that inhabits southern Div. 3K and northern Div. 3L and a migrant group that moves into southern Div. 3L from Subdiv. 3Ps from spring to autumn.

Fishery and Catches: The rapid decline in the resource in the early-1990s led to reduced TACs and eventually to a moratorium on commercial fishing in 1992. A food/recreational fishery was permitted in 1992-94, 1996, 1998 and 1999 but not in 1995 and 1997. Catches also came from sentinel surveys in 1995-99 and an index or test fishery in 1998. The commercial fishery was reopened in 1999 with a TAC of 9 000 tons for the inshore only.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended[2]	Autonomous
1997	0.5		0
1998	4.5		0
1999	8.5		9

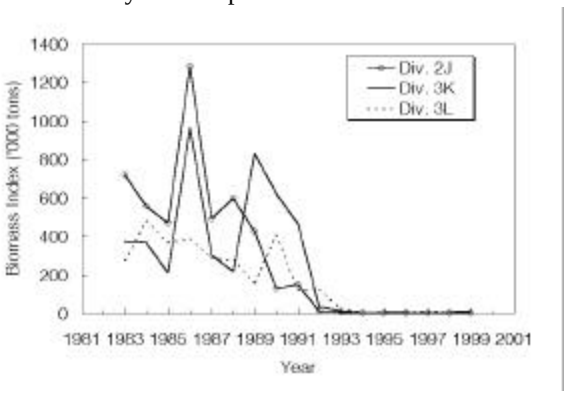
[1] Provisional.
[2] Advice not requested.



Data: Abundance and biomass indices were available from bottom-trawl surveys in autumn and spring (Div. 3L only). Removals-at-age in 1999 were available from the limited by-catch, the sentinel survey, a food/recreational fishery and the commercial fishery. Exploitation rates were derived from inshore tagging studies. Data on growth and maturity were also available.

Assessment: Stock status was estimated based on research vessel indices, sentinel survey data, acoustic studies in limited areas and a mark-recapture study in the inshore. An analytical assessment was not attempted.

Biomass: The biomass index for the offshore area from the autumn research vessel survey in Div. 2J and 3KL declined abruptly in the early-1990s. The 1999 estimate is very low compared to the 1980s.



The biomass index from the spring research vessel survey in Div. 3L in 1999 is also very low compared to the 1980s.

In the inshore, exploitation rates calculated from tag return data indicate a biomass of at most 55 000 tons in Div. 3K and northern Div. 3L in 1999. An unquantified additional biomass was available in southern Div. 3L, but much of this migrated seasonally from Subdiv. 3Ps. Acoustic studies of Smith Sound (northern Div. 3L) in winter of 2000 when cod are aggregated produced estimates of about 22 000 tons. No additional large aggregations were found in northern Div. 3L and southern Div. 3K during this survey.

Standardized catch rates calculated from limited fishing throughout the inshore of Div. 2J and Div. 3KL with commercial gears (the sentinel surveys) revealed patterns that differed with gear; in gillnets there was an increase from 1995 to 1998 and a decline in 1999, whereas in line trawls there was an increase from 1995 to 1997 and a decline to 1999.

Mortality: Total mortality, as calculated from research vessel data, has remained well above 0.2 since declaration of the moratorium in 1992. The cause for this has not been determined. Predation by harp seals may be an important contributor. Exploitation rates for

the first and second openings in the inshore fishery in 1999 were estimated to have been at least 19% and 13% in Div. 3K and 2.3% and 3.8% in northern 3L.

Recruitment: Recruitment has been extremely low during the 1990s and recent year-classes are uncertain.

State of the Stock: The stock as a whole remains at a very low level. Year-classes recruiting in the 1990s have been extremely weak.

In the offshore there are no signs of recovery. The biomass is very small with few mature fish.

In the inshore, the biomass in Div. 3K and northern Div. 3L was estimated from mark-recapture experiments to be at most 55 000 tons. Additional biomass exists in southern Div. 3L, but much of this migrates seasonally into Div. 3L from Subdiv. 3Ps.

Sources of Information: SCR Doc. 00/33.

ii) **By-catch of Yellowtail flounder in Div. 3LNO**

Canada made a special request: *noting the increase in by-catch of Div. 3LNO yellowtail flounder, in particular the skate fishery, the Scientific Council is requested to comment on the potential impacts of these by-catches on the long term sustainability of the yellowtail flounder resource.*

Scientific Council noted that total catches have been 9% above TACs in both the 1998 and 1999 fisheries. In providing its TAC advice, Scientific Council notes that the advice applies to all removals (directed plus by-catch). To the extent that the total catch exceeds the advised catch, fishing morality will be higher than intended and if maintained could have an impact on the long term sustainability of the resource.

Sources of information: SCR Doc. 00/45.

b) **Request by Denmark (Greenland) for Advice**:

During the 1999 assessments, the Scientific Council provided 2year advice (for 2000 and 2001) for redfish in Subarea 1 and other finfish in Subareas 0+1, while 3-year advice (for 2000-2002) was provided upon the request of both Canada and Denmark (Greenland) for roundnose grenadier in Subareas 0+1.

The Scientific Council reviewed the status of these stocks at its June 2000 Meeting and found no significant change in status for any of the stocks. Therefore, the Scientific Council has not provided updated/revised advice for 2001 for these stocks.

c) **Request by Canada and Denmark (Greenland) for Advice on TACs and Other Management Measures**

The Scientific Council was requested by the Coastal States to provide advice for certain stocks. This section presents the stock for which the Scientific Council provided advice for the year 2001.

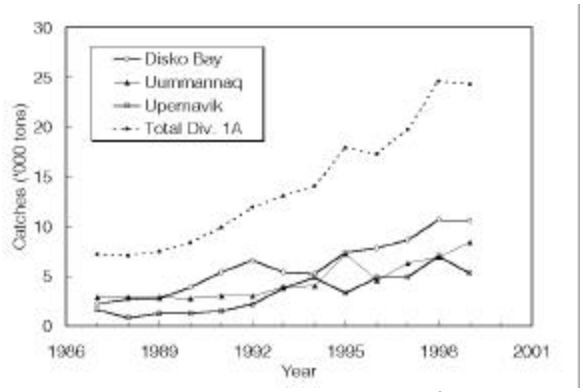
Greenland Halibut (Reinhardtius hippoglossoides) in Division 1A, inshore

Background: The inshore stock is dependent for recruitment on immigration from the offshore nursery grounds in Div. 1A and 1B and the spawning stock in Davis Strait. Only sporadic spawning seems to occur in the fjords, hence the stock is not considered self-sustainable. The fish remain in the fjords, and do not appear to contribute back to the offshore spawning stock. This connection between the offshore and inshore stocks implies that reproductive failure in the offshore spawning stock for any reason will have severe implications for the recruitment to the inshore stocks.

Fishery and Catches: The fishery is mainly conducted with longlines and to a varying degree gillnets. Effort has increased in all areas. The offshore fishery has not been conducted since 1996.

	Catch[1] ('000 tons)	TAC ('000 tons)		
		Recommended		Agreed
Disko Bay	8.6	10.7	10.6	7.9
Uummannaq	6.3	6.9	8.4	6.0
Upernavik	4.9	7.0	5.3	4.3
Total Div. 1A	19.8	24.6	24.3	-

[1] Provisional.
[2] No TAC advised before 1999.



Data: Catch-at-age data were available for years 1988-99 at Disko Bay, and for most years in this period at Uummannaq and Upernavik. Data on mean length in commercial catches were available. A recruitment index for age 1, 2 and 3+ was available from trawl survey. Catch rates and mean lengths were available from inshore longline surveys.

Assessment: The stock component in Disko Bay is composed of younger and smaller individuals than in the other two areas. Survey results since 1993 do not indicate any major changes in abundance. Mean length composition in survey has not changed and in the commercial fishery an increase in mean length has been observed the latest years.

In Uummannaq survey results since 1993 do not indicate any major changes in abundance. Catch composition in the commercial fishery has changed significantly since the 1980s towards a higher exploitation of younger age groups, but have stabilized during latest years.

In Upernavik survey results since 1993 do not indicate any major changes in abundance. Mean length compositions in both commercial and survey catches have decreased, especially in the commercial winter-fishery. New fishing grounds in the northern part of the district have been exploited only recently. Little information exists from these areas, and the stock components are considered virgin.

Fishing mortality: There is indication of an increase in fishing mortality in all three stock components.

Recruitment: Offshore and inshore in Disko Bay the numbers of one-year-olds from the 1998 year-class were above average in 1999. In Disko Bay it was the second highest on record. The 1997 year-class that was very strong inshore at age one was still above average at age 2.

State of the Stock: The stock components in all three areas consist of a large number of age groups.

Disko Bay: indices of abundance have been relatively stable since 1993.

Uummannaq: indices of abundance have been relatively stable since 1993.

Upernavik: There is indication of growth over-fishing of the stock components in the traditional fishing areas around Upernavik and up to 73.45°N (Giesecke Ice fjord). In the northern parts of the district, where new

fishing grounds are exploited, data are insufficient to determine the status of the resource.

Recommendation: Scientific Council still considers that separate TACs are appropriate for each of the three areas.

Assessments indicate that there has been no improvement in stock status in any of the three areas. Therefore, Scientific Council concludes that there be no change in the TACs recommended for 2000. The TAC for 2001 for each of the inshore areas are therefore recommended to be: Disko Bay 7 900 tons, Uummannaq 6 000 tons, and Upernavik 4 300 tons.

Reference Points: Scientific Council is not in a position to propose reference points.

Special Comments: The increase in landings in recent years generates concern, especially because lack of effort data from the commercial fishery impedes the assessment of the stocks.

Because the stock is dependent on recruitment from Davis Strait, exploitation of the spawning stock and by-catches in the shrimp fishery should be taken into account when managing the fishery in the fjords.

Sources of Information: SCR Doc. 00/22, 29, 47; SCS Doc. 00/22.

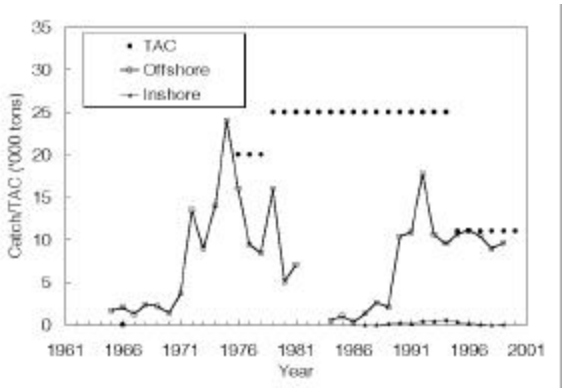
Greenland Halibut (Reinhardtius hippoglossoides) in Subarea 0 + Division 1A Offshore and Divisions 1B-1F

Background: The Greenland halibut stock in Subarea 0 + Div. 1A offshore and Div. 1B-1F is part of a common stock distributed in Davis Strait and south to Subarea 3.

Fishery and Catches: Due to an increase in offshore effort, catches increased from 2 000 tons in 1989 to 18 000 tons in 1992 and have remained at about 10 000 tons annually since.

	Catch[1] ('000 tons)	TAC ('000 tons)	
		Recommended	Autonomous
1997	11	11	11
1998	9	11	11
1999	10	11	11
2000		11	

[1] Provisional.



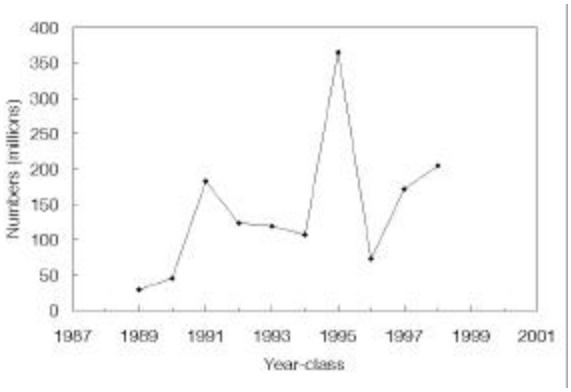
Data: Catch-at-age data were available for assessment from Div. 0B and Div. 1CD. Standardized and unstandardized catch rates were available from Div. 0B and Div. 1CD. Biomass estimates were available from Div. 1CD and 0A. Recruitment data were available from Div. 1A-1F from 1989-99.

Assessment: No analytical assessment could be performed. Combined standardized catch rates for Div. 0B + Div. 1CD have been stable during 1990-99.

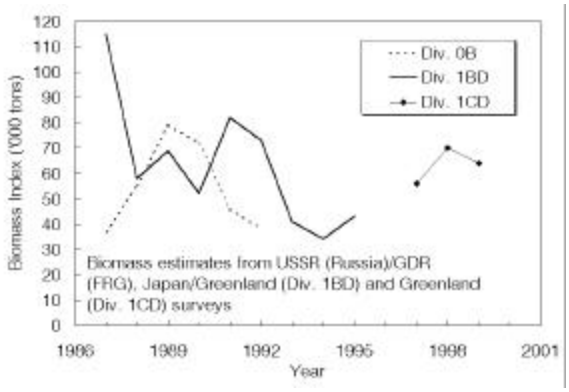
Fishing Mortality: Level not known.

Recruitment: Recruitment of the 1998 year-class at age one was slightly above the estimate of the 1997 year-class and the second largest in the time series.

Abundance (age one):



Biomass: The biomass in Div. 1CD increased from 1997 to 1998 but decreased again in 1999. A new survey in Div. 0A resulted in a biomass estimate of 83 000 tons.



State of the Stock: The age composition in the catches in Div. 0B and 1B-1F, where most of the fishery takes place, has been stable in recent years. Although the survey series from Subarea 1 in 1987-95 is not directly comparable with the series from 1997-99, the decline in the stock observed in Subarea 1 until 1994 has stopped and the stock seems to be back at the level in the late-1980s and early-1990s. The relationship between Greenland halibut in both Div. 0A (offshore) and 1A (offshore), and remaining areas is unknown and needs to be thoroughly investigated.

Recommendation: The TAC for year 2001 should not exceed 11 000 tons for Div. 0B and 1B-1F where the fishery primarily has taken place since it began.

Special Comments. Until the relationship between Greenland halibut in Div. 0A + 1A (offshore) and the remaining areas have been resolved and given the estimated biomass in Division 0A, it is suggested that an additional TAC be implemented for the offshore areas of Div. 0A and 1A that would generate a low

fishing mortality. This could be achieved by a catch in 2001 not exceeding 4 000 tons.

Reference Points: Scientific Council is not in a position to propose reference points at this time.

Sources of Information: SCR Doc. 00/6, 7, 10, 22, 26, 31, 38; SCS Doc. 00/ 9, 11, 22.

3. **Scientific Advice from Scientific Council on its Own Accord.**

The Scientific Council on its own accord considered roughhead grenadier in Subareas 2 and 3 and the following Summary Sheet was prepared.

Roughhead Grenadier (Macrourus berglax) in Subareas 2 and 3

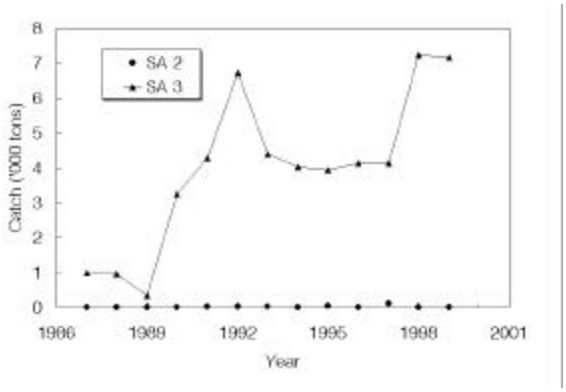
Background: Roughhead grenadier are distributed throughout Subareas 2 and 3 in depths between 300 and 2 000 m. This is an unregulated species.

Fishery and Catches: There is no directed fishery for roughhead grenadier and most of the catches are taken as by-catches in the Greenland halibut fishery in Subareas 2 and 3. Roughhead grenadier is taken mainly in Div. 3LMN Regulatory Area. At the beginning of the Greenland halibut fishery in Subarea 3 of the Regulatory Area in 1988, the grenadier catches were systematically misreported as roundnose grenadier. Since 1997 the roughhead catches have been correctly reported, but the mis-reporting problem is not still solved in the statistics prior 1996. The level of catches remains uncertain in Subareas 2 and 3 before the start of the Greenland halibut fishery in the Regulatory Area.

Catches since 1997 are as follows:

	Catch ('000 tons)
1997[1]	4.7
1998[1]	7.2
1999[1]	7.2

[1] Provisional.



Data: Biomass indices were derived from: the Canadian stratified bottom trawl autumn surveys in Div. 2GHJ and 3KL since 1978, the Canadian stratified random bottom trawl spring surveys in Div. 3LN since 1971, the Canadian stratified deepwater bottom trawl surveys in Div. 3KLMN in 1991, 1994 and 1995, the Spanish stratified bottom trawl spring survey in Div. 3NO Regulatory Area since 1995, and the EU (Spain and Portugal) stratified bottom trawl summer survey in Div. 3M since 1988. The EU (Spain-Portugal) longline deepwater survey in Div. 3LMN in 1995 provided information on the roughhead grenadier depth distribution. It is not known how well trends in these surveys reflect the state of the stock.

A female maturity curve based on histological analysis of fish from Div. 3LMN has been obtained. A selectivity curve for 130-mm diamond mesh is available. Data on length distribution (1995-99) and catches-at-age (1997–99) are available from Portuguese, Russian and Spanish trawl catches.

Assessment:

Fishing mortality: Not known

Biomass: Because of limited time series, limited coverage and various vessels/gears conducting these surveys, the information is of limited value in determining resource status. It is not possible to provide an estimate of the absolute size of the stock.

Recruitment: Not known.

State of the Stock: The state of the stock is not known.

Reference Points: Scientific Council is not in a position to propose reference points at this time

Special Comments: It should be noted that immature fish constituted 80% of the catch in 1997 and 82 % in 1998 and 1999.

Scientific Council in future will monitor this stock and attempt to assess the stock status and provide advice on the state of the stock if possible.

In particular it is recommended that work in age-structured production modelling be continued.

Sources of information: SCR Doc. 00/9, 30, 39; SCS Doc. 00/9, 16, 20.

IX. FUTURE SCIENTIFIC COUNCIL MEETINGS 2000 AND 2001

1. **Scientific Council Meeting and Special Session, September 2000**

The Council reconfirmed its dates for the Annual Meeting, 18-22 September 2000 to be held at Back Bay Hilton in Boston, MA, USA. The Scientific Council Special Session, the Workshop on Assessment Methods, will be held 13-15 September 2000 at the same venue.

2. **Scientific Council Meeting in November 2000**

The Council reconfirmed that its meeting for the assessments of northern shrimp in Div. 3M, in Subareas 0 and 1 and in Denmark Strait, will be held during 8-15 November 2000 in Copenhagen, Denmark

The Council noted that this includes an additional day to address matters pertaining to shrimp in Div. 3LNO as well as considerations on shrimp in Div. 3M.

3. **Scientific Council Meeting, June 2001**

The Council agreed the Scientific Council Meeting will be held from Thursday 31 May 2001 to Thursday 14 June 2001. The Council agreed the facilities and services at the present meeting venue at Alderney Landing, Dartmouth, were quite suitable for its June Meeting, and proposed the same venue for the meeting of 2001. The Secretariat was requested to look into audio systems to enhance the acoustics of the meeting room.

4. **Scientific Council Meeting and Symposium, September 2001**

The Scientific Council noted the Annual Meeting will be held 17-21 September 2001 in Havana, Cuba. The Scientific Council Special Session, the Symposium on "Deep-sea Fisheries", will be held during 12-14 September 2001 at the same venue.

5. **Scientific Council Meeting, November 2001**

The Council had preliminary discussions on advancing the dates of the meeting in order to promote participation by ICES shrimp scientists. The Council agreed to finalize the dates for the November 2001 Meeting for shrimp assessments during its November 2000 Meeting. The meeting will be held in Dartmouth, Nova Scotia, Canada.

X. ARRANGEMENTS FOR SPECIAL SESSIONS

1. **Progress report on Special Session in 2000: Workshop on Assessment Methods**

At its session on 3 June 2000, the Council was presented a progress report and proposed Agenda for the 13-15 September 2000 Workshop on Assessment Methods, by the co-conveners: D. Rivard (Canada) and C. Darby (EU-United Kingdom).

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This Workshop has been designed to provide an opportunity for the members of the NAFO Scientific Council to explore assessment techniques and the various tools available for their application. In particular, the Workshop would focus on tools to perform age-structured analyses and stock abundance estimation, calculate reference points in the context of the Precautionary Approach and carry out risk analyses.

Each session will begin with a brief comment on the theory and common practices. This will be followed by demonstrations or tutorials making use of a common data set. Then, a working session will invite the participants to apply these tools to specific data sets.

To facilitate the planning of this Workshop, the Council agreed a list of potential participants should be prepared during this June 2000 Meeting. A preliminary list of about 35 participants was prepared.

The Council noted that a comprehensive Agenda was proposed for the meeting and agreed this would be an attachment to the Provisional Agenda of the Scientific Council Meeting of 18-22 September 2000. The Council thanked the co-conveners for the work to date, and saw the great value of a Workshop of this nature.

The Council noted an information booklet would be published in the *NAFO Scientific Council Studies*.

2. **Progress Report on ICES/NAFO Symposium on Hydrobiological Variability in August 2001**

The Council noted that STACFEN was presented an update on the Symposium (see STACFEN Report). The Council welcomed the update.

3. **Progress report on Special Session in September 2001: Symposium on "Deep Sea Fisheries"**

At its session on 3 June 2000, the Council Chairman presented a progress report submitted by the co-convener J. Moore (USA). The Council endorsed the view that International Council for the Exploration of the Sea (ICES) and Commonwealth Scientific and Industrial Research Organization (CSIRO) be invited to co-sponsor this Symposium with J. Gordon (ICES/EU-United Kingdom) and T. Koslow (CSIRO/Australia) as co-conveners. The Council Chairman agreed to forward letters of invitation for co-sponsorship.

The Council noted that a worldwide trend exists towards increasing exploitation of deepwater fishery resources, including within the North Atlantic. This has raised a number of issues concerning both the biology and management of these resources.

The purpose of this Symposium will be to discuss the available biological information and the issues in the management of deepwater fisheries. Some possible topics include:

- age, growth and reproduction of target species
- life histories and estimates of production
- identification of stocks
- impacts of fisheries on the target populations
- by-catch and impacts of fisheries on habitats
- techniques and fishing methods used in deepwater fisheries
- deep-sea crustacean and cephalopod fisheries
- policy and management of deep-sea resources, especially in international waters
- sustainability of deep-sea fisheries

It was noted the Symposium will incorporate both traditional and non-traditional species. It was also proposed environmental considerations should be included, especially using global databases, which are available in the Worldwide Web and on CD-ROM issues.

An announcement and 'Call for Papers' will be issued shortly for contributed papers and posters. Papers will be selected on the basis of their relevance to the topic and scientific suitability. It is anticipated that the proceedings of this Symposium will be published in the *Journal of Northwest Atlantic Fishery Science*.

The Council thanked J. Moore for the work to date and was pleased to announce this Symposium to be held in conjunction with the NAFO 23rd Annual Meeting in Havana, Cuba. The Symposium will be co-convened by J. Gordon, (Scotland), T. Koslow (Australia), and J. Moore (USA), and organized by the NAFO Secretariat.

The Council noted the level of success of this Symposium will be related to the possibility of attracting eminent scientists to it, and agreed that financial support is required to invite key speakers, and **recommended** that *NAFO's financial contribution to the Symposium on "Deep-sea Fisheries" in 12-14 September 2001 should be CDN $8 000*. The Council also **recommended** that *ICES and CSIRO as co-sponsors should also be requested to contribute CDN $8 000 each*.

4. **Topic for Special Session in 2002**

At its session on 9 June 2000, the Council received a suggestion that the September 2002 Scientific Council Special Session should be a Symposium on elasmobranchs fisheries perhaps with the title "Elasmobranch Fisheries". The Council considered this topic would be timely, particularly noting the likely progress on the subject within NAFO, and the level of interest internationally.

The Council welcomed F. M. Serchuk (USA) with the assistance of D. Kulka (Canada), the Designated Expert for elasmobranchs, to pursue this matter further and provide a progress report at the 18-22 September 2000 Meeting of the Council.

XI. REPORT OF THE WORKING GROUP ON REPRODUCTIVE POTENTIAL

The Terms of Reference and the proposed work plan for the Working Group was presented by the Chairman, E. A. Trippel (Canada).

The Council recalled the growth in research activity on the reproductive biology of marine fishes was clearly recognized during the Symposium organized by the Scientific Council on "Variations in Maturation, Growth, Condition and Spawning Stock Biomass Production in Groundfish" was in Lisbon, Portugal, September 9-11, 1998. An outcome of that meeting was the **recommendation** of the establishment of a Working Group to further explore and record important data and methodology in this field.

By November 1999, a Working Group had been formed comprised of 18 members (representing 9 countries) to undertake the challenges of completing the Terms of References set out by the Scientific Council. By April 2000, a draft work plan for each Term of Reference was established indicating key participants and tentative completion dates. These work plans were presented for input and possible revision.

Based on comments received from the Scientific Council during this meeting, the Working Group members will begin to undertake their activities in June 2000. A meeting is planned for 10-13 October 2000 in San Sebastian, Spain to assist with data collection and completion of work in an integrated manner. Work includes providing accepted protocols to estimate reproductive potential of fish stocks using data from both wild and captive fish and exploring its integration into conventional stock assessment methodology.

It was clear that the work will be limited to documenting methodology and using some case studies to illustrate the recommended techniques for finfish. The Working Group will not evaluate whether "new" estimates of reproductive potential would improve the ability to predict recruitment for a given stock. If Working Group members are interested in exploring water temperature data in relation to stock reproductive potential, there are certain databases currently obtainable (details can be provided by STACFEN). Work will likely extend to September 2001, but this will be discussed at the September 2000 Meeting of Scientific Council. The Working Group members and work progress will be available to the Council through e-mail communications.

XII. NOMINATION AND ELECTION OF OFFICERS

1. **Chairman STACFEN**

The Council noted that the election of a Chairman for STACFEN to take office at the end of the Annual Meeting in September 2000, should be considered during this meeting. The Council Chairman, recalling that all other elections of the Scientific Council officers will take place in June 2001, proposed that the present Chairman of STACFEN, M. Stein (EU-Germany) be requested to continue for one more year. The Council agreed to this proposal, and M. Stein agreed to continue, with the understanding that an election will take place in June 2001 to replace him.

The Council accordingly elected M. Stein to continue as Chairman of STACFEN for one more year, and extended its appreciation to him for undertaking this task.

XIII. REVIEW OF SCIENTIFIC COUNCIL WORKING PROCEDURES/PROTOCOLS

1. **Adapting the Form of Advice to PA Requirements**

The Council noted that several points were referred to Scientific Council from the Joint Scientific Council and Fisheries Commission Working Group on Precautionary Approach Meeting of 29 February-2 March 2000 held in Brussels, Belgium. These are reported under Section III above. Scientific Council agreed to formulate its advice in these terms wherever possible.

2. **NAFO Scientific Council Observership at ICES ACFM Meetings**

In accordance with the Scientific Council decision of September 1999, the Council had nominated Scientific Council observers to ICES ACFM Meetings on an *ad hoc* basis.

The Council was informed that W. R. Bowering (Canada) was currently the Chairman of the ICES Working Group on Arctic Fisheries and regularly attended ICES Meetings. The Council expressed its appreciation to W. R. Bowering for offering to attend other ACFM meetings in autumn 2000 as an observer, and appointed him as the Scientific Council observer for that period. The Chairman will write to the General Secretary of ICES of this appointment.

3. **STACPUB Membership: Elections**

The Council at its meetings in 1999 established new Rules of Procedures for STACPUB membership (SCS Doc. 00/4). It was agreed to appoint STACPUB members for terms, in order to maintain a rotating membership.

The Council noted the progress made by STACPUB in this new membership scheme, and appointed C. Darby (EU-Kingdom United), D. Maddock Parsons (Canada) and H. Siegstad (Denmark/Greenland) as STACPUB members to fulfil the new rotating membership. Appreciation was extended to the new members for accepting this additional commitment.

4. **Review of Proposed NAFO Millennium Publication "NAFO Century Book"**

The Chairman of the Scientific Council discussed this matter with the Executive Secretary, L. Chepel, and reminded him of previous Scientific Council recommendations to review "*NAFO Century book – Northwest Atlantic Fisheries in the 20th Century*". It was noted that the book was not yet complete. The Executive Secretary noted the potential benefits of a review by Scientific Council and was not opposed to it.

XIV. OTHER MATTERS

1. **Report on FAO ACFR Working Party on Status and Trends of Fisheries, November/December 1999**

The Assistant Executive Secretary, in accordance with the June 1999 Scientific Council **recommendation**, attended the FAO ACFR Working Party on Status and Trends of Fisheries Meeting during 29 November-3 December 1999 at FAO Headquarters, Rome, Italy. The summary of the meeting proceedings was presented to the Council (SCS Doc. 00/15) noting the background, objectives, and the results and conclusions.

2. **Report on NAFO Intersessional Meetings**

With respect to two intersessional meetings, the Chairman announced that some Scientific Council members participated in the CWP Intersessional Meeting in February 2000 in Copenhagen, Denmark, and the Joint Scientific Council and Fisheries Commission Working Group on Precautionary Approach Meeting during 29 February-2 March 2000, in Brussels, Belgium.

The Council also noted there were other intersessional meetings of Standing Committees of other NAFO Constituent Bodies:

> Fisheries Commission Working Group on Quota and Shrimp held during 27-30 March 2000 in Washington, DC
>
> STACFAC Dispute Settlement Procedures held during 29-31 May 2000 in Copenhagen, Denmark.

3. **Participation at ICES ACFM Meetings 1999-2000**

The Council expressed thanks to M. Kingsley (Denmark-Greenland), who represented NAFO Scientific Council as an observer at the ICES ACFM Meeting held October-November 1999 at ICES in Copenhagen. The Council reviewed his report, noting the information on the Precautionary Approach and provision of advice. Scientific Council was not able to send an observer to the May-June 2000 Meeting of ACFM due to the overlap with this 1-15 June 2000 Scientific Council Meeting.

4. **Joint NAFO-ICES Working Group on Harp and Hooded Seals**

At its last meeting in 1998, the Joint ICES/NAFO Working Group on Harp and Hooded Seals concluded that a 1999 meeting was not necessary, and work proceeded by correspondence. Research activities included continued analysis of the data on pup production of White Sea harp seals and a survey of Northwest Atlantic harp seal pup production. Preliminary discussions were held to determine the objectives and contents of the proposed Workshop on Population Modeling of Pinnipeds. The Working Group will meet next at ICES headquarters in Copenhagen in 9-13 October 2000. The terms of reference of the meeting include:

1. Complete the assessment of stock size and pup production of harp seals in the White Sea/Barents Sea and hooded seals in the Greenland Sea;
2. Assess the sustainable yield at present stock sizes and provide catch options for these two stocks;
3. Agree on objectives and plan the forthcoming Workshop on Population Modeling of Pinnipeds;
4. Develop an approach for determining biological reference points for Pinnipeds under the precautionary principle.

The Council was presented with a status report on the Northwest Atlantic Harp Seals by G. Stenson (Canada). An assessment of the status of harp seals in the Northwest Atlantic was carried out by the National Marine Mammal Peer Review Committee (Canada) in April 2000. Marine Mammal scientists from Canada, the United States and Greenland participated. The Committee reviewed recent data on removals, reproductive rates and estimates of pup production obtained from surveys carried out in 1999. They also reviewed the results of a population model that incorporated information from all of these sources to estimate population trajectories for the period 1960-2000.

Northwest Atlantic harp seals are harvested in Canadian and Greenland waters. After a period of reduced catches during 1983-95, reported Canadian catches increased significantly to between 240 000 and 280 000 since 1996. Greenland catches have increased steadily since the mid-1970s and are currently estimated to be over 100 000. Total removals of harp seals was estimated by including reported catches, estimates of by-catch in the Newfoundland lumpfish fishery and estimates of seals killed but not recovered during the harp seal hunts in Canada and Greenland. Total removals have been relatively stable since 1997, at around 465 000 seals annually.

Pregnancy rates of harp seals in the Northwest Atlantic have varied considerably since the 1950s. The percentage of mature females that were pregnant increased from the mid-1950s (85%) to the mid-1960s (95%). It then dropped from approximately 90% in the early-1980s to only 70% during the early-1990s. It appears to have increased slightly (72%) in the mid-1990s. The age at which females become sexually mature has also changed. In the early-1950s the average age at which they matured was 5.8 years, whereas in the early-1980s it was 4.6 years. By the mid-1990s it had increased to approximately 5.6 years.

The most recent estimate of harp seal pup production in the Northwest Atlantic was obtained from surveys conducted by Canada in March 1999. Extensive reconnaissance flights were carried out to find the whelping concentrations and monitor their movements. Both visual and photographic surveys were conducted to estimate pup production. The total number of pups born was estimated to be approximately 998 000 ± 200 000.

The population model indicates that the harp seal population declined during the 1960s, reached a minimum of less than 2 million in the early-1970s, and then increased steadily until 1996. Due to the large harvests in recent years, the population has been stable since then at the highest values in the time series. The total population in 2000 was estimated to be approximately 5.2 million with a 95% C.I. of 4.0- 6.4 million). The uncertainty associated with the estimates of pup production are accounted for in the confidence intervals. Additional uncertainty associated with the reproductive rates, total removals and the age of catches have not been included, and therefore these confidence intervals are underestimates of the total uncertainty.

Although an increase in pup production is apparent in both the model and survey estimates since the early-1980s, the population size has stabilized over the past four years due to large catches of young animals. The impact of these catches on pup production is expected to become apparent in coming years.

Estimates of prey consumption by harp seals in Div. 2J+3KL were presented to the June 1999 Meeting of the Scientific Council. Although consumption has not been recalculated using the new population estimates, it is not likely to differ significantly, since the recent estimates of population size are very close to the estimates used previously.

Following the presentation, there was some discussion in the Scientific Council about the recent results. There were no requests to the NAFO/ICES Working Group from the Scientific Council at this time.

5. **Other Business**

The Council considered 4 items.

a) **Reporting of Assessment Results and Documentation**

The Council discussed the value of standardizing the reporting of assessment results and documentation methods. The Council agreed this should be discussed further during the September 2000 Meeting of the Council.

b) **Meeting Summaries on the Website**

The Council noted the value of releasing information about meeting accomplishments on the website, soon after each Scientific Council Meeting.

The Council agreed to set up a working group including STACPUB Chairman, at the beginning of the June 2001 Meeting to prepare such a report. It was agreed this should be a very short informative note.

The Council noted these and other developments on the website should be reviewed by Scientific Council members through the Working Group set up by STACPUB. Such developments should be coordinated through the Chairman of STACPUB.

The Council took the opportunity to congratulate the Secretariat on the progress made to date in developing a user friendly and practical website for NAFO.

c) **Technology at Meetings**

The Council considered the LAN System used at this meeting and noted it functioned quite effectively for most of the work. There were, however, minor technological considerations such as the interactions with the printers and communication links, that should be considered for the next meeting.

d) **Costs Associated with Council Symposia**

The Council noted most Symposia charge registration fees to offset costs of running them, for example, sponsoring invited speakers, and considered the value of introducing the practice to Scientific Council Symposia. Noting the diverse views of Council members, it was agreed this matter would be further considered during the September 2000 Meeting.

XV. ADOPTION OF COMMITTEE REPORTS

The Council, during the course of the meeting, received summary presentations of the Standing Committee Reports, with focus on the recommendations. Having considered each recommendation and also the text of the reports, the Council during the concluding session on 15 June 2000 **adopted** the reports of STACFEN, STACREC, STACPUB and STACFIS. It was noted that some text insertions and modifications as discussed at the Council plenary will incorporated later by the Chairman and the Assistant Executive Secretary.

XVI. SCIENTIFIC COUNCIL RECOMMENDATIONS TO GENERAL COUNCIL AND FISHERIES COMMISSION

A. The Council considered its **recommendations** from this meeting, and referred the following to the **General Council** as they have financial and administrative implications:

1. The Scientific Council **recommended** that *NAFO's financial contribution to the Joint ICES/NAFO Symposium, August 2001, include the equivalent of GB 3 500 (approximately CDN $8 000) to cover partial costs of conducting the Symposium.*

2. Regarding the September 2001 Symposium, the Scientific Council noted the level of success of this Symposium will be related to the possibility of attracting eminent scientists to it, and agreed that financial support is required to invite key speakers, and **recommended** that *NAFO's financial contribution to the Symposium on "Deep-sea Fisheries" in 12-14 September 2001 should be CDN $8 000.* The Scientific Council also **recommended** that *the ICES and CSIRO as co-sponsors should also be requested to contribute CDN $8 000 each.*

3. The Scientific Council noted that no volumes of *NAFO Statistical Bulletin* had been published since Volume 43, with 1993 data. Volume 44 was still delayed by the absence of data from the USA for 1994 and Volumes 45-48 were delayed by the absence of data for 1995-98 from the Faroe Islands and the USA. The situation on the submission of the data for 1994-98 is shown in the following table.

List of countries that have not submitted STATLANT 21A and 21B data through 1994-98.

STATLANT 21A					STATLANT 21B				
1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
USA	USA	USA	USA	Faroe Is. USA	USA	Faroe Is. USA	Faroe Is. USA	Faroe Is. USA	Faroe Is. USA

The Scientific Council regretted this situation, noting the work of the Scientific Council is seriously jeopardized and the publication of the Statistical Bulletin is seriously delayed, and **recommended** that *the Executive Secretary write to the national delegates of the USA and Denmark (in respect of Faroe Islands and Greenland) with reference to their obligations on the submission of data to NAFO,* and further **recommended** that *the Scientific Council should prepare a document for submission to the General Council and the Fisheries Commission on the adverse effect the absence of the STATLANT 21A and 21B data was having on the work of the Scientific Council.*

4. The Scientific Council **recommended** that *for the fiscal year 2001, the following nominees be supported by the NAFO budget for meeting attendance: i) the Assistant Executive Secretary to the February 2001 meeting of the FAO and Non-FAO Regional Fishery Bodies or Arrangements and the associated CWP Intersessional Meeting at FAO Headquarters, Rome, Italy and ii) the Assistant Executive Secretary and the STACREC Chairman to the CWP 19th Session in Noumea, New Caledonia (July 2001).*

5. There was considerable discussion on additional work to be applied to the Website, and the Council specifically suggested to:

   scan in Journals No. 1-21 (within next year), Studies (thereafter) and make them available from the Website (preliminary considerations suggest that the costs for this project amount to about $27 000 for the Journals, and $24 000 for the Studies)

   Scientific Council further **recommended** that *costs associated with the above activities be enumerated and included in the Scientific Council budget request for 2001.*

   The Scientific Council also noted the following meetings with respect to financial implications in 2001:

   31 May-14 June 2001 Scientific Council Meeting
   12-14 September 2001 Special Session Symposium
   17-21 September 2001 Annual Meeting
   November 2001 Shrimp Meeting

6. The Scientific Council **recommended** that *the Scientific Council Reports and the Reports of the Annual Meeting be included in the contents of the CD-ROM, and the CD-ROM be issued before April of the following year.*

B. The Council noted the following **recommendations** relate to the **Fisheries Commission** considerations:

1. The Scientific Council noted that no volumes of *NAFO Statistical Bulletin* had been published since Volume 43, with 1993 data. Volume 44 was still delayed by the absence of data from the USA for 1994 and Volumes 45-48 were delayed by the absence of data for 1995-98 from the Faroe Islands and the USA. The situation on the submission of the data for 1994-98 is shown in the following table.

   List of countries that have not submitted STATLANT 21A and 21B data through 1994-98.

STATLANT 21A					STATLANT 21B				
1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
USA	USA	USA	USA	Faroe Is. USA	USA	Faroe Is. USA	Faroe Is. USA	Faroe Is. USA	Faroe Is. USA

   The Scientific Council regretted this situation, noting the work of the Scientific Council is seriously jeopardized and the publication of the Statistical Bulletin is seriously delayed, and **recommended** that *the Executive Secretary write to the national delegates of the USA and Denmark (in respect of Faroe Islands and Greenland) with reference to their obligations on the submission of data to NAFO,* and further **recommended** that *the Scientific Council should prepare a document for submission to the General Council and the Fisheries Commission on the adverse effect the absence of the STATLANT 21A and 21B data was having on the work of the Scientific Council.*

2. The Scientific Council noted that further to its 1999 recommendation that: *the (Scientific Council) ad hoc Working Group on Protocol for Scientific Data Collection should work intersessionally to define the type of data from the Observer Program needed for Scientific Council assessment work as requested by STACTIC during the Joint STACTIC/Scientific Council Meeting at the Annual Meeting, 1998, and develop a complete package of observer collection protocols, data forms, instructions and codes, for presentation to Scientific*

Council at the September 1999 Meeting. The Scientific Council during this meeting prepared and submitted Scientific Council Summary Document (SCS Doc. 00/23) to STACTIC for consideration at its June 2000 Meeting.

3. The Scientific Council **recommended** that *the comparative fishing in Div. 3NO be continued during future spring surveys conducted by EU-Spain and Canada.*

4. All stock-by-stock scientific advice and recommendations will be submitted by the Scientific Council Chairman to the Fisheries Commission during the 18-22 September 2000 Annual Meeting.

XVII. ADOPTION OF SCIENTIFIC COUNCIL REPORT

At its concluding session on 15 June 2000, the Council considered the Draft Report of the Meeting, and **adopted** the report of this meeting with the understanding that the Chairman and the Assistant Executive Secretary will incorporate later the text insertions related to plenary sessions of 14-15 June 2000 and other modifications as discussed at plenary.

XVIII. ADJOURNMENT

The Chairman expressed his gratitude to the Council members for their co-operation during the meeting. He was especially pleased to note the excellent co-operative efforts on a number of stocks, resulting in improved assessments. Special thanks were extended to the Designated Experts and the Standing Committee Chairs for their commitment and for carrying out an extra workload during the meeting.

The Secretariat was congratulated for its fine efforts and support during the meeting, and for providing an excellent LAN at the new meeting site. The Chair also extended thanks to the administrative staff at the Alderney Landing meeting site for their support.

There being no further business, the Chairman wished everyone a safe trip home and closed the meeting.

The members of the Scientific Council extended a special thank you to the Council Chairman for a well-conducted and productive meeting.

Chairman of Standing Committees of Scientific Council:

M. Stein (Chairman STACFEN), W. B. Brodie (Chairman Scientific Council), H.-J. Rätz (Chairman STACFIS), O. A. Jørgensen (Chairman STACPUB) and R. K. Mayo (Chairman STACREC).

STACFIS members in session during the 1-15 June 2000 Meeting.

APPENDIX I. REPORT OF THE STANDING COMMITTEE ON FISHERIES ENVIRONMENT (STACFEN)

Chairman: M. Stein Rapporteur: K. Drinkwater

The Committee met at Alderney Landing, 2 Ochterloney Street, Dartmouth, Nova Scotia, Canada, on 2 June 2000, to consider environment-related topics and report on various matters referred to it by the Scientific Council. Representatives attended from Canada, Cuba, Denmark (in respect of Faroe Islands and Greenland), Estonia, European Union (France, Germany, Portugal, Spain and United Kingdom), Japan, Russia and United States of America.

1. Opening

The Committee noted the following documents would be reviewed: SCR Doc. 00/1, 2, 5, 8, 10, 11, 20, 21; SCS Doc. 00/9, 11, 14. K. Drinkwater (Canada) was appointed rapporteur.

2. Chairman's Introduction and Intersessional Report

The Chairman welcomed the members to the annual June meeting of STACFEN. He noted, with pleasure, the attendance of Dr. Webjørn Melle, who will present the invited lecture. The Chairman reported that his primary work between sessions was involved in preparing for the annual meeting, securing a speaker and setting the agenda.

3. Invited Lecture

The Chairman introduced Dr. Webjørn Melle (Institute of Marine Research, Bergen, Norway) who presented a talk entitled "Climate-plankton-fisheries interactions". The following is a brief summary:

Pelagic fish catches (mainly herring and blue whiting) increased significantly from the early- to late-1990s in the Greenland and Norwegian Seas. Demersal catches, on the other hand, have been low and relatively stable, a result primarily related to the large depth of the Nordic seas. Krill, amphipods, and shrimps are prevalent zooplankton in the region and the southern Norwegian Sea is a center of distribution for *Calanus finmarchicus*. *Calanus glacialis* and *Calanus hyperborius* are also found in the Nordic Seas. Climatologically, the meteorological and oceanographic variability is strongly linked to changes in the NAO (North Atlantic Oscillation) index. High NAO lead to strong SW winds over Norwegian Sea and increasing temperatures and decreasing salinities in northern waters. The latter is believed to be a result of the narrowing of the Atlantic inflow along the coast.

Previous studies in the region have established links between climate and fisheries. For example, there is a positive correlation between temperature from the Kola section and the spawning stock size of the Norwegian spring spawning herring. Also, condition (as measured by weight/length relationship) and the temperature anomaly at weather station Mike are related, although the positive correlations are weak.

Dr. Melle described a positive relationship between *Calanus finmarchicus* and herring. Two hypotheses were proposed to account for this relationship: (1) through the timing of the annual production cycles (match/mismatch) or (2) through the size of annual zooplankton production (food availability).

In the early spring, the herring inhabit the coastal regions feeding on euphausiids. By April they begin to migrate out towards the Norwegian and Greenland Seas and by July tend to be located along the Arctic front. The importance of Calanus in the diet of herring generally increases during the summer. Those herring that reach Arctic type waters feed almost exclusively on Calanus.

In the Norwegian Sea, *C. finmarchicus* release their eggs prior to the peak of the spring bloom in contrast to other regions where they tend to be released during the peak of the bloom. Observational studies in the Norwegian Sea have shown that in spite of the large interannual variability in the timing of the spring bloom, the copepods match closely the timing of the plankton. This has lead to the rejection of the first hypothesis.

Based upon approximately 3000 CTD profiles, five separate water types were identified from their temperature and salinity properties- coastal, Atlantic water east, Atlantic water west, Arctic water, and mixed Arctic/Atlantic water. The bloom occurs in April along the Norwegian coast, later in Atlantic waters and but slightly earlier than Atlantic waters in Arctic waters. The latter is believed to be due a bloom associated with melting ice. Depletion of NO_3, however, occurs first at the coast, then in the Atlantic and lastly in the Arctic waters.

ICES coordinated surveys in the Norwegian and Icelandic Seas in May showed similar temporal patterns in zooplankton abundance in the Arctic and Atlantic waters but slightly different than in coastal waters. A relationship between *C. finmarchicus* abundance during these surveys and overwintering biomass of herring was found. In addition, the condition index of the herring from 1991 to 1999 was related to zooplankton biomass. This stimulated strong interest by the ICES working group responsible for herring assessments. While there are few years of data and hence relationships are not statistically significant, the herring assessment group is looking at providing prognoses for herring biomass from zooplankton and environmental indices. They are exploring the use of the zooplankton abundance indices from the May surveys and the NAO index.

Following questions and discussion of the presentation, the Chairman thanked the speaker for a very interesting lecture.

4. **Review of Environmental Conditions**

a) **Marine Environmental Data Service (MEDS) Report for 1999** (SCR Doc. 00/16)

The inventory of oceanographic data obtained by MEDS during 1999 was presented along with information on several new initiatives.

i) **Hydrographic Data Collected in 1998**

Data from 5 208 oceanographic stations collected in the NAFO area sent in delayed mode to MEDS in 1999 have been archived, of which 4 040 were CTDs, 1011 were XBTs and 157 were bottles. An additional 882 stations were received directly by MEDS but are not yet archived. A total of 5 191 stations were received through IGOSS (Integrated Global Ocean Service System) and have been archived. The number of stations received directly by MEDS was similar to 1998 while the number of stations obtained through IGOSS decreased by over 12%.

ii) **Historical Hydrographic Data Holdings**

Data from 18 414 oceanographic stations collected prior to 1999 were obtained during the year, close to the number received in 1998.

iii) **Thermosalinograph Data**

A number of ships have been equipped with thermosalinographs to collect surface temperature and salinity data while the vessels are under way. These are transmitted as station data via satellite with over 8 802 stations in the NW Atlantic being received during 1999, an increase over 1998 in excess of 53%.

iv) **Drift-buoy Data**

A total of 138 drift-buoy tracks were received by MEDS during 1999 representing over 407 buoy months. The total number of buoys increased by 29 over 1998 and the number of buoy months is up by over 34%.

v) **Wave Data**

In 1999, 106 172 wave spectra were processed, originating mostly from the permanent network of moored wave buoys in the area. This represents almost a 35% increase compared to 1998.

vi) **Tide and Water Level Data**

MEDS processes and archives operational tidal and water level data obtained from the Canadian Hydrographic Service (CHS). The data are derived from the CHS active permanent water level network. A total of 31 stations were processed during 1999, a decrease of 16 stations from 1998 and 26 less than in 1997.

vii) **Recent Activities**

MEDS reported on three recent initiatives. (1) since 1998, MEDS has been acquiring and archiving data from the profiling buoys, known as PALACE floats. (2) three CD-ROMs will be produced in the near future. The set of CD-ROMs containing WOCE data will be issued in September 2000, the second in the series. A CD that includes positional drift buoy data from the Arctic from 1979 to 1999 will be ready by June 2000. Data acquired during the Canadian Joint Global Ocean Flux Study (JGOFS) will also be published on a CD. The data are presently being acquired by MEDS. (3) MEDS continues to be involved with the Canadian Atlantic Zone Monitoring Program (ZMP) and has assumed the responsibility for leading the data management team. A website displaying indices also allows easy access to the data.

b) **Review of Environmental Studies in 1999**

i) **Subareas 0 and 1** (SCR Doc. 00/1, 00/10, 00/11; SCS Doc. 00/11)

A survey of oceanographic stations along the West Greenland standard sections by Danish scientists was carried out from 1-10 July 1999 (SCR Doc. 00/01). At Fyllas Bank, near surface temperatures were below the record set in 1998 but still were well above normal. Near surface salinities at Fyllas Bank decreased slightly from the 1998 value but remained slightly above the long-term mean. Cold, low salinity surface layer waters were observed south of Fyllas Bank in the inshore areas from Cape Farewell north to 63ºN. These are thought to be Polar Waters from the East Greenland Current. Polar waters were absent at Fyllas Bank for the second consecutive year. In the subsurface layers, a weak inflow of pure Irminger Water was found in 1999, reaching only as far north as the Cape Desolation section. Temperatures in this core were higher-than-normal. Modified Irminger water was observed almost as far north as Holsteinsborg.

The German Research Report (SCS Doc. 00/11) noted that during the 1999 German groundfish survey off Greenland conducted from 4 October to 18 November, 102 CTD stations were occupied in addition to the 4 standard sections off Cape Desolation, Fyllas Bank, Little Halibut Bank and Holsteinsborg.

Examination of atmospheric conditions around Greenland (SCR Doc. 00/11) showed that mean air temperatures at Nuuk were slightly below normal in 1999 due primarily to a cold winter and one month in spring (May). Temperatures during the last half of the year were all above the climatic normal, however. Ice conditions in 1999 were relatively light. Sea-surface temperatures off Greenland in the autumn cooled relative to the very high values of 1998 but still were one of the warmest years since observations began in 1963. Subsurface ocean temperatures at this time were warmer-than-normal along the standard sections off West Greenland with warm Modified Irminger water (4.93°C, $34.88 < S < 34.95$) located as far north as Holsteinsborg.

During a survey for Greenland halibut in Div. 1C-1D from 21 September to 6 October 1999, bottom temperatures were recorded (SCR Doc. 00/10). These ranged from 1.5ºC averaged over depths of 601-800 m in Div. 1C to 4.7ºC in depths of 401-600 m in Div. 1C.

ii) **Subareas 2, 3 and 4** (SCR Doc. 00/8; SCS Doc. 00/9)

Hydrographic conditions on Flemish Cap were described from a CTD survey (116 stations) conducted during July 1999 (SCR Doc. 00/8). As in past years, the warmest waters were found over the central region of the Cap and the coldest tended to be on its northern flank. Four distinct water masses were identified based upon their T-S properties. These were cold, low saline Labrador Water (LW), Anticyclone Gyre Water (ACW) formed from LW through solar heating and evaporative

processes, Modified Labrador Water (MLW) through mixing and has higher salinities than LW and no subsurface temperature minimum, and North Atlantic Current Water (NACW) with relatively high temperatures and salinities. In 1999, MLW was predominant and no NACW was found.

Sea-surface temperatures off Labrador, Newfoundland, the Scotian Shelf and adjacent areas during 1999 were reported (SCS Doc. 00/9). Data were averaged over 5-degree squares. Off Labrador and Newfoundland, including the Labrador Sea, surface temperatures were warmer-than-normal, continuing a trend that started in 1996. Warm temperatures were also observed over the Scotian Shelf, conditions favourable for silver hake recruitment.

iii) **Subareas 5 and 6** (SCS Doc. 00/14)

The United States Research Report listed several ongoing programs. The Narragansett Laboratory during 1999 occupied their standard sections across the Middle Atlantic Bight south of New York and across the Gulf of Maine from Boston to Cape Sable. Several papers based upon the historical data collected along these sections are in preparation including one on the temperature and salinity variability during the 1990s. The GLOBEC studies on Georges Bank completed its fifth and final year of field studies. This program has provided extensive hydrographic coverage of the entire Gulf of Maine during the past five years in addition to concentrated process studies on stratification and front exchange on the Bank.

iv) **Interdisciplinary Studies** (SCR Doc. 00/20)

Near-bottom temperatures and their anomalies over the Grand Banks (Div. 3LNO) during 1990-99 were compared to the spatial distributions of cod catches obtained during spring and autumn surveys. Large interannual variations in the near-bottom thermal habitat for cod were observed from the cold sub-zero degree conditions of the early-1990s to the relatively warm waters of the late-1990s. The percentage of bottom covered by water warmer than 2ºC changed from around 20% in the early-1990s to over 60% by 1999. Over this time there was a significant increase in the number of cod caught per tow in the survey sets in Div. 3NO with more fish being found in the shallower warmer waters on top of the Grand Bank. The cause of the improved catches over the Bank was unclear. In Division 3L there was no significant increase in cod catches.

c) **Overview of Environmental Conditions in 1999** (SCR Doc.00/21)

A review paper was presented based on several long-term oceanographic and meteorological data sets. The highlights follow.

i) Annual air temperatures throughout the Northwest Atlantic were above normal in 1999 with new record highs set in the region from southern Labrador to the Gulf of Maine, including Newfoundland and the Gulf of St. Lawrence.

ii) The atmospheric circulation intensified in 1998 with the largest changes occurring over the eastern side of the Atlantic. This resulted in a relatively high North Atlantic Oscillation (NAO) index and a large increase over 1998 levels. The index was similar to the values of the early-1990s.

iii) While ice formed on schedule or slightly later-than-usual, the warm temperatures during the winter resulted in an early disappearance and shorter ice duration in 1999 than normal off southern Labrador, Newfoundland and in the Gulf of St. Lawrence. Little to no ice reached the Scotian Shelf.

iv) During 1999, the number of icebergs to reach south of 48^{o}N decreased dramatically relative to 1998 (from 1 384 to 22) and was the lowest number of icebergs in over 20 years.

v) Temperatures off Newfoundland and Labrador during 1999 were warmer than normal throughout most of the water column.

vi) The area of CIL (Cold Intermediate Layer) water was below normal from southern Labrador to the Grand Bank. This resulted in the CIL volume during the summer and autumn of 1999 being the lowest on record.

vii) The CIL waters in the Gulf of St. Lawrence warmed significantly during 1999 but the core temperature still remained below normal. Further evidence of the warming in 1999 was supplied by the decrease in the bottom area of the Magdalen Shallows covered by temperatures <0 and <1^{o}C. Cause of the warming was believed related to decreased winter cooling.

viii) Annual coastal sea surface temperatures (SSTs) at Boothbay Harbor and St. Andrews were above average, a pattern similar to the previous four years. Halifax SSTs were about normal, representing a decline over 1998 levels.

ix) Deep-water temperatures on the Scotian Shelf (Emerald Basin) increased by upwards of 2-3°C from 1998 levels. Temperature increases were also recorded in Georges Basin in the Gulf of Maine and the southwestern Scotian Shelf. The warm temperatures in the deep basins on the Scotian Shelf and in the Gulf of Maine were due to the on-shelf penetration of Warm Slope water from the shelf break region.

x) The cold Labrador Slope water observed in 1998 along the shelf edge off the Scotian Shelf retracted to its normal position around the Laurentian Channel. Along the Middle Atlantic Bight and Scotian Shelf it was replaced by Warm Slope water and represents a return to conditions that have generally persisted since the 1970s.

xi) Warmer-than-normal waters were observed over substantial portions of the bottom and at intermediate waters over the northeastern Scotian Shelf for the first time since the mid-1980s.

xii) Density stratification on the Scotian Shelf continued high during 1999.

xiii) Both the shelf/slope front and the north wall of the Gulf Stream moved northward during 1999. While the Stream still remained south of its long-term mean, the Shelf/Slope front moved north of its climatological mean position.

5. **Recommendations Based on Environmental Conditions in 1999**

A discussion followed the presentation of the environmental conditions for 1999. It initially focused upon the possible effect of temperatures on catchability and whether this could explain the improved cod catches on the Grand Banks that were reported in SCR Doc. 00/20. Opinions were divided but it was noted that the number of cod collected was still very low. It was suggested that a similar analysis comparing bottom-temperatures and distributions should be performed with yellowtail flounder since they have been very abundant in recent years. It was stated that when the yellowtail flounder abundance was low, they were confined to the Southeast Shoal of the Grand Bank but have been spreading into the southern areas of Div. 3L. It was also noted that temperature might effect not only distribution or catchability, but also growth. This had been discussed in a previous NAFO meeting in regards to warming around Iceland. No specific recommendations were felt to be required at this time, however.

The Chairman reminded STACFEN members the importance of ensuring that their environmental data are submitted to MEDS for archiving, and in a timely manner. Again, no specific recommendation to Council was felt to be required at this time.

6. **Environmental Indices** (implementation in the assessment process)

No new information was available to the Committee.

7. **Russian/German Project Data Evaluation** (SCR Doc. 00/2, 00/5)

The Chairman presented the Fourth and Fifth Reports on the Joint Russian/German Project "Assessment of short-time climatic variations in the Labrador Sea". A Workshop was held on 23-30 August 1999 in Murmansk, Russia. Using historical data, the interannual variability of the slope trapped boundary currents along the Seal-Island-Cape Farewell Section, as well as the temporal changes of sea-surface temperature (SST) and the North Atlantic Oscillation (NAO) Index correlation patterns in the Labrador Sea region were analyzed. A second Workshop was held on 10-14 April 2000 in Hamburg, Germany. The relationship between physical

variables (air temperatures, winds and SSTs) and cod recruitment off West Greenland and Iceland were analysed. Results included a significant relationship between wind and recruitment of West Greenland cod. During April, northerly winds off southern Greenland and easterly winds in the Denmark Strait favour higher recruitment. During summer, easterly winds west of Iceland favour good recruitment. The next workshop within this project is scheduled for 6-10 November 2000 in Murmansk, Russia.

8. **ICES/NAFO Symposium on Hydrobiological Variability**

In 1998, STACFEN recommended that NAFO co-sponsor, along with ICES, the planned Symposium on Hydrobiological Variability during the 1990s to be held in 2001 in Edinburgh, Scotland. The co-convenors are to be Jens Meincke (Germany) and Bob Dickson (UK). The ICES Oceanic Hydrography Working Group has supported the joint sponsorship. The Chairman of the STACFEN, M. Stein, was appointed to the Steering Committee for the Symposium and K. Drinkwater is on the editorial board for publication of the symposium proceedings. Given that both NAFO and ICES have been proposing to hold similar symposia on the review of the 1990s early in the next decade, a single symposium was felt to be more efficient. In addition to allowing the traditional regional focus that separate symposium would foster, the joint meeting will provide the opportunity to place both the ICES and NAFO areas into a larger-scale perspective through comparisons of different areas around the North Atlantic.

At the 1999 meeting of STACFEN, the Committee proposed a recommendation that NAFO's financial contribution to the Joint ICES/NAFO Symposium include the equivalent of GBP 3 500 to cover the cost of the art exhibition. This recommendation was presented to the Standing Committee on Finance and Administration (STACFAD). STACFAD had concerns with the amount of the contribution considering NAFO's emphasis on budget restraints. There were also concerns with the appropriateness of NAFO funding the transportation of artwork to the Symposium. STACFAD was, however, not opposed to providing a contribution to the joint ICES/NAFO Symposium in August 2001 and requested that the Scientific Council review its request in light of the foregoing concerns for reference back to STACFAD at the next Annual Meeting in 2000. STACFEN agreed the Chairman should present the new recommendation below, which was accepted by the Committee.

STACFEN **recommended** that *NAFO's financial contribution to the Joint ICES/NAFO Symposium on "Hydrobiological Variability During the 1990s", August 2001, Edinburgh, Scotland, include the equivalent of GB 3 500 (approximately CDN $8 000) to cover partial costs of conducting the Symposium.*

9. **National Representatives**

STACFEN noted the national representatives responsible for hydrographic data submission to MEDS are: E. Valdes (Cuba), E. Buch (Denmark), A. Battaglia (France), F. Nast (Germany), H. Okamura (Japan), R. Leinebo (Norway), A.J. Paciorkowski (Poland), J. Pissarra (Portugal), F. Troyanovsky (Russia), L.J. Rickards (United Kingdom) and K.J. Schnebele (USA).

The issue of whether new representatives such as the Baltic States should have national representatives responsible for hydrographic data submission was raised but no decision was made.

10. **Other Matters**

The Chairman noted that he has been in the office for sixteen years and will be stepping down after the Annual Meeting in 2001. STACFEN agreed that at the June 2001 Meeting, a new Chairman will have to be elected, and anyone wishing to assume the Chair or wishing to nominate someone to the position should contact the present Chair or the NAFO Secretariat intersessionally.

11. **Acknowledgements**

The Chairman closed the meeting by thanking the participants for their contributions and co-operation, the Invited Speaker for his interesting lecture, the rapporteur for taking the minutes, and the NAFO Secretariat for providing the scientific papers in due time and excellent quality on the NAFO Website, and in printed version.

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

Chairman: R.K. Mayo Rapporteur: D. G. Cross

The Committee met at the Alderney Landing, 2 Ochterloney Street, Dartmouth, Nova Scotia, Canada, during 1-15 June 2000, to discuss matters pertaining to statistics and research referred to it by the Scientific Council. Representatives attended from Canada, Cuba, Denmark (in respect of Faroe Islands and Greenland), Estonia, European Union (France, Germany, Portugal, Spain and United Kingdom), Japan, Russian Federation and United States of America. The Assistant Executive Secretary was in attendance.

1. **Opening**

The Chairman opened the meeting by welcoming the participants. D. Cross (EU) was appointed rapporteur.

2. **Review of Recommendations in 1999**

a) **From the June 1999 Meeting**

i) STACREC had recommended that *the Chairman of the Scientific Council interact with the Chairmen of the General Council and the Fisheries Commission in establishing a cooperative and integrated approach to ensure the continued development and enhancement of the NAFO Website.*

STACREC noted several major enhancements to the NAFO website, including the availability of 1960-99 21A data-files.

ii) STACREC had recommended that *the (error) detection exercise should be repeated at short intervals at the discretion of the NAFO and FAO Secretariats.*

STACREC noted this exercise has been included in Secretariat's program of work particularly in relation to developing the STATLANT 21 database on the NAFO website.

iii) STACREC had recommended that *STACFIS consider appointing a Designated Expert for elasmobranch species.*

STACFIS accepted and acted upon this recommendation at the June 1999 Meeting with the nomination of D. Kulka (Canada) as Designated Expert.

iv) STACREC had recommended that *the ad hoc Working Group on Protocol for Scientific Data Collection should work intersessionally to define the type of data from the Observer Program needed for Scientific Council assessment work as requested by STACTIC during the Joint STACTIC/Scientific Council Meeting at the Annual Meeting, 1998, and develop a complete package of observer collection protocols, data forms, instructions and codes, for presentation to Scientific Council at the September 1999 Meeting.*

The Working Group reported to STACREC at its September 1999 Meeting (page 24, 1999 Sci. Coun. Rep., 1999, p. 24) and the topic was further discussed during this meeting (see Section 6 below).

b) **From the September 1999 Meeting**

v) STACREC had recommended that *the Working Group on NAFO Observer Protocol communicates by email with STACREC members during development of the coding and sampling procedures in order to ensure concurrence with the recommendation tabled by STACTIC for consideration during the proposed STACTIC intersessional meeting in 2000.*

See STACREC Section 6 below for discussion.

vi) STACREC had recommended that *noting that STACTIC will call an intersessional meeting in 2000 on Observer Protocol, M. Showell (Canada) and D. Kulka (Canada) should represent Scientific Council at that meeting.*

It was noted that the STACTIC Meeting is scheduled for 26-30 June 2000. D. Kulka (Canada) will represent Scientific Council (see STACREC Section 6).

vii) STACREC had recommended that *the Assistant Executive Secretary and STACREC Chairman attend the 19th Session of CWP in Noumea, New Caledonia in July 2001.*

The Council accepted this recommendation. Further discussions are reported in STACREC Section 3.b.ii. below.

viii) STACREC had recommended that *the Assistant Executive Secretary and the STACREC Chairman attend the CWP intersessional meeting in Copenhagen, Denmark in February 2000 and report proceedings to the Scientific Council in June 2000.*

The Assistant Executive Secretary attended the CWP intersessional meeting in Copenhagen in February 2000. See STACREC Section 3b.i. below.

ix) STACREC had recommended that *the Designated Expert for cod in Div. 3NO complete the spreadsheet as proposed by the Working Group on Biological Database Exchange using the data for this stock and present it to the Scientific Council Meeting in June 2000.*

See STACREC Section 5 below.

3. **Fishery Statistics**

a) **Progress Report on Secretariat Activities in 1999/2000**

i) **Acquisition of STATLANT 21A and 21B Reports for Recent Years**

The Assistant Executive Secretary outlined the status of the STATLANT data submissions for recent years. The following table shows the dates STATLANT 21A and 21B submissions were received at the Secretariat up to June 2000.

Country/ Component	STATLANT 21A (deadline, 15 May)			STATLANT 21B (deadline, 30 June)		
	1997	1998	1999	1997	1998	1999
BGR	-	-	-	-	-	-
CAN-M	22 Jun 98	10 May 99	12 May 00	12 Jan 99	30 Nov 99	-
CAN-N	02 Jun 98	14 Jul 99	18 May 00	14 Jul 99	25 Feb 00	-
CAN-Q	15 May 98	10 May 99	-	02 Sep 98	04 Nov 99	-
CUB	10 Aug 99	10 Aug 99	01 Jun 00	10 Aug 99	10 Aug 99	01 Jun 00
EST	27 May 98	17 May 99	03 May 00	27 May 98	21 Oct 99	03 May 00
E/DNK	02 Feb 99	07 Jun 99	17 May 00	23 Mar 99	27 Mar 00	-
E/FRA-M	No fishing	No fishing	No fishing	No fishing	No fishing	No fishing
E/DEU	23 Mar 98	23 Apr 99	04 May 00	23 Mar 98	27 Apr 99	-
E/NLD	No fishing	No fishing	-	No fishing	No fishing	-
E/PRT	24 Apr 98	26 Apr 99	16 May 00	14 Sep 98	27 Aug 99	-
E/ESP	14 Sep 98	01 Jun 99	29 May 00	14 Sep 98	07 Sep 99	-
E/GBR	30 Mar 99	11 May 99	No fishing	30 Mar 99	29 Mar 00	No fishing
FRO	03 Feb 99	-	-	-	-	-
GRL	28 May 98	28 May 99	-	03 Feb 99	26 Oct 99	-
ISL	24 Jul 98	07 Jun 99	26 May 00	12 Nov 98	23 Nov 99	-
JPN	14 Apr 98	29 Apr 99	11 Apr 00	14 Apr 98	14 Apr 99	11 Apr 00
KOR	No fishing	No fishing	-	No fishing	No fishing	-
LVA	22 Apr 98	14 May 99	12 May 00	04 Jun 98	14 May 99	12 May 00
LTU	17 Feb 98	29 Nov 99	-	29 Nov 99	29 Nov 99	-
NOR	20 Nov 98	25 May 99	09 May 00	21 Jun 99	-	-
POL	-	10 May 99	-	-	14 Oct 99	-
ROM	-	-	-	-	-	-
RUS	02 Apr 98	01 Jun 99	04 May 00	08 Jul 98	01 Jun 99	-
USA	-	-	-	-	-	-
FRA-SP	29 Jan 99	02 Jun 99	04 May 00	29 Jan 99	02 Jun 99	11 May 00
HND*	-	-	-	-	-	-
VEN*	-	-	-	-	-	-

* Non-Contracting Party.

ii) **Publication of Statistical Information**

The Assistant Executive Secretary reported that no volumes of the *NAFO Statistical Bulletin* had been published since Volume 43, with 1993 data. Volume 44 was still delayed by the absence of data from the USA for 1994 and volumes 45-48 were delayed by the absence of data for 1995-98 from the Faroe Islands and the USA. The situation on the submission of the data for 1994-98 is shown in the following table.

List of countries that have not submitted STATLANT 21A and 21B data through 1994-98.

STATLANT 21A					STATLANT 21B				
1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
USA	USA	USA	USA	Faroe Is. USA	USA	Faroe Is. USA	Faroe Is. USA	Faroe Is. USA	Faroe Is. USA

STACREC regretted this situation, noting the work of the Scientific Council is seriously jeopardized and the publication of the Statistical Bulletin is seriously delayed. Thus STACREC **recommended** that *the Executive Secretary write to the national delegates of the USA and Denmark (in respect of Faroe Islands and Greenland) with reference to their obligations on the submission of data to NAFO.* STACREC further **recommended** that *the Scientific Council should prepare a document for submission to the General Council and the Fisheries Commission on the adverse effect the absence of the STATLANT 21A and 21B data was having on the work of the Scientific Council.*

STACREC reviewed SCS Doc. 00/12 ("Historical Nominal Catches for Selected Stocks") and noted that, while it was useful, the tabulations were of the official STATLANT 21A data and were not necessarily the data used in the STACFIS assessment work. It was considered that the latter data should be documented and, accordingly, STACREC **recommended** that the *Secretariat should extract from Scientific Council reports the annual estimates of the total catches for each stock for the period from 1985 used by STACFIS in its assessment work and report them alongside the annual STATLANT nominal catches.*

iii) **Considerations on Internet Site for Statistical Data**

D. Cross (EU) reported on collaboration between NAFO, EUROSTAT and FAO in reformatting the NAFO STATLANT 21A data files for preparing a user-friendly database for consultation on the NAFO website. The FAO FISHSTAT Plus software was used to demonstrate a preliminary version of the software which, when fully developed, would be made available for down-loading from the NAFO internet site. STACREC welcomed this development which was considered to be a useful extension of services to data users and thanked EUROSTAT and FAO for their collaboration in this work.

iv) **Interagency Data Harmonization (NAFO/FAO)**

The Assistant Executive Secretary reported that although in the last year there had been no formal exercise to detect discrepancies between the NAFO and FAO databases, the close collaboration between the two organisations and the exchange of data between them has contributed significantly to the harmonisation of the data. The development of the FISHSTAT Plus database is also enhancing this process

v) **Elasmobranch Species**

STACREC reviewed the list of Elasmobranch species for which catch statistics are to be requested from national authorities on the STATLANT questionnaires. It was agreed that four additional species should be added to the list, which then is as follows.

Code	Short name	Common name	Scientific name	Abbreviation	Category
452	Spiny dogfish	Spiny (picked) dogfish	*Squalus acanthias*	DGS	3
460*	Sand tiger	Sand tiger shark	*Odontaspis taurus*	CCT	3
462	Porbeagle	Porbeagle	*Lamna nasus*	POR	3
464	Shortfin mako	Shortfin mako shark	*Isurus oxyrinchus*	SMA	3
470	Sharpnose shark	Atlantic sharpnose shark	*Rhizoprionodon terranovae*	RHT	3
467*	Dusky shark	Dusky shark	*Carcharhinus obscurus*	DUS	3
468*	Blue shark	Great blue shark	*Prionace glauca*	BSH	3
473	Boreal shark	Boreal (Greenland) shark	*Somniosus microcephalus*	GSK	3
472	Black dogfish	Black dogfish	*Centroscyllium fabricii*	CFB	3
474	Basking shark	Basking shark	*Cetorhinus maximus*	BSK	3
480	Little skate	Little skate	*Leucoraja erinacea*	RJD	3
482*	Arctic skate	Arctic skate	*Amblyraja hyperborea*	RJG	3
484	Barndoor skate	Barndoor skate	*Dipturus laevis*	RJL	3
487	Winter skate	Winter skate	*Leucoraja ocellata*	RJT	3
490	Spinytail skate	Spinytail (Spinetail) ray	*Bathyraja spinacauda*	RJQ	3
488	Thorny skate	Thorny skate (starry skate)	*Amblyraja radiata*	RJR	3
489	Smooth skate	Smooth skate	*Malacoraja senta*	RJS	3

* Additions since 1999.

b) **CWP Sessions 2000/2001**

i) **Report on the CWP Intersessional Meeting, Copenhagen, 10-16 February 2000**

STACREC noted that the CWP Intersessional Meeting consisted of two Working Groups (the Working Group on Publication of Integrated Catch Statistics for the Atlantic, 10-11 February 2000, and the Working Group on Precautionary Approach Terminology, 14-16 February 2000), held at ICES Headquarters, Copenhagen, Denmark.

D. Cross (EU, CWP Chairman) reported on the discussions in the Working Group on Publication of Integrated Catch Statistics for the Atlantic. The following organisations were represented: ICCAT, ICES, EUROSTAT, FAO and NAFO, the latter in the persons of W. Brodie and the NAFO Assistant Executive Secretary. The discussions centred on a proposal from the CWP 18th Session to produce a CD-ROM of Integrated Catch Statistics using the FAO FISHSTAT Plus software. It was agreed that this CD-ROM would integrate the STATLANT A data (or their equivalent) from Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), Fisheries Committee for the Eastern Central Arctic (CECAF), Fisheries and Agriculture Organisation (FAO), General Fisheries Council for the Mediterranean (GFCM), International Commission for the Conservation of Atlantic Tunas (ICCAT), International Council for the Exploration of the Sea (ICES) and NAFO and that, in selecting data for this integrated data file, priority would be given initially to ICCAT data (for tuna species), then regional agency data and finally to FAO data. As well as the integrated data-file the CD-ROM would contain the individual data-bases of the agencies. It was anticipated that the draft CD-ROM version would be available in time for the NAFO Annual Meeting in September 2000, for review and comments by NAFO members.

STACREC noted that the Working Group on Precautionary Approach Terminology was chaired by W. R. Brodie (Chairman of the Scientific Council) and that the report of that meeting would be addressed by the Scientific Council (see Scientific Council Section III.1).

ii) **CWP 19th session, July 2001**

The preliminary list of topics to be included in the agenda for the CWP 19th session proposed at the intersessional meeting (see SCS Doc. 00/7) were noted. STACREC was informed that the agenda for the CWP 19th session would be finalised at another CWP intersessional meeting at FAO Headquarters (Rome) in February 2001 immediately prior to or following the Second Meeting of FAO and Non-FAO Regional Fishery Bodies or Arrangements.

STACREC discussed the attendance of Scientific Council nominees at CWP sessions as well as at important meetings of other international organisations. It was noted that the attendance of the Assistant Executive Secretary at such meetings was usually financed from the NAFO budget but that other nominees, particularly key officers of the Scientific Council had no financial support from the NAFO budget. STACREC was concerned that the STACREC Chairman was unable to attend the CWP Intersessional Meeting in February 2000 due to lack of financial support.

STACREC reiterated its view that participation by Secretariat officers as well as Scientific Council officers nominated to attend important meetings of international organizations such as CWP should be supported by the NAFO budget. Accordingly STACREC **recommended** that *for the fiscal year 2001, the following nominees be supported by the NAFO budget for meeting attendance: i) the Assistant Executive Secretary to the February 2001 meeting of the FAO and Non-FAO Regional Fishery Bodies or Arrangements and the associated CWP Intersessional Meeting at FAO Headquarters, Rome, Italy, and ii) the Assistant Executive Secretary and the STACREC Chairman to the CWP 19th Session in Noumea, New Caledonia (9-13 July 2001).*

4. **Research Activities**

a) **Biological Sampling**

i) **Report of Activities in 1999/2000**

STACREC noted and reviewed the listings of Biological Sampling Data prepared by the NAFO Secretariat. These listings (SCS Doc. 00/10) include biological sampling data for 1999 reported to the Secretariat prior to the present meeting.

ii) **Report by National Representatives on Commercial Sampling**

Cuba: Samples were obtained in the shrimp fishery in Div. 3M in December 1999. Length composition of shrimp samples were obtained by one observer on board the vessel.

Denmark/Greenland: Subarea 1: samples from the trawl fisheries for shrimp and Greenland halibut were taken at sea. Length composition of shrimp samples were carried out by observers on-board the vessels. Samples of Greenland halibut, cod, snow crab, salmon and scallops were taken at ports of landings. Div. 3M: the fishery for shrimp in Div. 3M was not sampled in 1999.

EU-France: Data on catch rates, length composition of catches were made available for the French trawl fishery of Greenland halibut in Div. 2J, 3L and 3M.

EU-Germany: No fishing in 1999.

EU-Portugal: Data on catch rates, length and age composition were obtained from trawl catches for Greenland halibut (Div. 3LMNO). Data on length and age composition of the catch were obtained for cod (Div.3M) and redfish (Div. 3M). Data on length composition of the catch were obtained for cod (Div.3NO), redfish (Div. 3LNO), American plaice (Div. 3LNO), yellowtail flounder (Div. 3NO), roughhead grenadier (Div. 3LMN) and witch flounder (Div. 3LNO).

EU-Spain: Length composition samples obtained from observers on-board the freezer trawl and pair-trawl fleet were available for Greenland halibut in Div. 3LMNO, roughhead grenadier in Div. 3LM, roundnose grenadier in Div. 3LM, witch flounder in Div. 3LMNO, American plaice in Div. 3LNO, yellowtail flounder in Div. 3N, thorny skate in Div. 3N, cod in Div. 3N and redfish in Div. 3LNO. In addition, data on age composition of the catch were obtained for Greenland halibut in Div. 3LMNO and roughhead grenadier in Div. 3LM.

Russia: Samples were obtained from commercial bottom trawl fishery directed to Greenland halibut in Div. 3LMNO and 1D. The length, age data of Greenland halibut, roughhead grenadier, redfish, American plaice, other flatfishes, sharks and skates were collected by observers on-board the trawlers during January-December 1999 (in Subarea 3) and during September-October (in Div. 1D). Data on catch rates were taken as well.

iii) **Report on Data Availability for Stock Assessments (by Designated Experts)**

Available data from commercial fisheries relevant for stock assessment on a stock by stock basis were prepared with inputs from Designated Experts.

Table 1. Available data from the commercial fisheries related to stock assessment (1999). (+ is data available).

		Biological Sampling						
Stock	Country[1]	Catch	CPUE	Sex	Length	Age	Individual Wt.	Maturity
Cod in 2J3KL	CAN	+	+	+	+	+	+	+
Cod in 3M	EU/PRT	+			+	+		
Cod in 3NO	EU/PRT	+			+			
	EU/ESP	+			+			
	CAN	+		+	+	+		
Redfish in SA1	GRL	+						
Redfish in 3M	EU/PRT	+		+	+	+		+
	EU/ESP	+						
	JPN	+						
	RUS	+		+	+			
	NCP	+						
Redfish in 3LN	CAN	+						
	JPN	+						
	EU/FRA	+						
	EU/PRT	+			+			
	EUESP	+			+			
	RUS	+		+	+	+	+	
American Plaice in 3M	RUS	+		+	+			
	JPN	+						
	EU/PRT	+						
	EU/ESP	+						
	FRO	+						
American Plaice in 3LNO	CAN-M	+						
	CAN-N	+			+	+		
	RUS	+						
Witch flounder in 3NO	CAN	+						
	EU/ESP	+						
	EU/PRT	+			+			
	RUS	+			+			
Yellowtail flounder in 3LNO	CAN	+	+	+	+			
	EU/ESP	+		+	+			
	EU/PRT	+			+			
	RUS	+			+			
Greenland halibut in SA0 + 1B-F	EU/DEU	+	+					
	RUS	+	+	+	+	+	+	
	CAN	+	+			+	+	
	GRL	+	+		+			
	NOR	+	+					
Greenland halibut in 1A	GRL	+		+	+	+	+	+

Table 1 (Continued).

		Biological Sampling						
Stock	Country[1]	Catch	CPUE	Sex	Length	Age	Individual Wt.	Maturity
Greenland halibut in SA 2+3	CAN	+	+		+	+		
	EU/PRT	+	+	+	+	+		
	EU/ESP	+		+	+	+	+	+
	JPN	+						
	RUS	+	+	+	+	+		+
	FRA	+	+	+	+	+		
Roundnose grenadier SA 0+1	RUS	+						
	GRL	+						
Roughhead grenadier SA 2+3	EU/ESP	+	+	+	+	+	+	+
	EU/PRT	+	+		+		+	
	RUS	+		+	+	+		+
Capelin in 3NO	No data available							
Elasmobranchs	EU/ESP	+						
	RUS	+						
	CAN	+						
	USA	+						
Squid in SA 3+4	CAN	313	+		+			
Other Finfish in SA1	GRL	+						
Shrimp in 3L		+	+	+	+	+		+
Shrimp in 3M								
Shrimp in SA 0+1	GRL	+	+	+	+			
Shrimp in Denmark Strait	EU/DNK	+	+					
	FRO	+	+					
	GRL	+	+	+	+			+
	ISL	+	+	+	+			+
	NOR	+						

[1] Country or Component abbreviations as found in *NAFO Statistical Bulletin*; 'NCP' refers to estimates of non-Contracting Parties `who did not report catches to NAFO.

b) **Biological surveys**

i) **Review of Survey Activities in 1999**

An inventory of biological surveys conducted in 1999 as submitted by National Representatives and Designated Experts was prepared by the Secretariat

Table 2. Inventory of biological surveys conducted in the NAFO Area during 1999. ([1]Country or Component abbreviations as in *NAFO Statistical Bulletin*)

Subarea	Division	Country [1]	Month	Type of survey	No. of sets
				Stratified-random Surveys	
0	A	CAN-C+A	10	Greenland halibut deep-sea trawl	66
1	A	GRL	5-6	Snow crab	50 (12)
	B		5-6	Snow crab	66 (12)
	A-F		7-9	Shrimp and groundfish trawl	230
	C-D		7-8	Greenland halibut deep-sea trawl	38
	BCDEF	EU/DEU	10, 11	Demersal fish	67
2+3	GHJ+				
	KLMNO	CAN-N	9-12	Groundfish/shellfish trawl	821
3	LNO		4-6	Groundfish/Shellfish trawl	315
	NO	EU/ESP	5	Groundfish	134
	M	EU/ESP&PRT	7	Groundfish	135
	P	CAN-N	4	Groundfish/Shellfish trawl	171
3+4	Pn+RST	CAN-Q	8-9	Summer multidisciplinary survey in the Estuary and Gulf of St. Lawrence	246
4	X	USA	3,4	Spring bottom trawl	27
	X		6	Ecosystem monitoring	9
	X		8,9	Ecosystem monitoring	8
	X		10,11	Autumn bottom trawl	39
	X		11	Ecosystem monitoring	8
5	YZ		3,4	Spring bottom trawl	189
	YZ		6	Ecosystem monitoring	50
	YZ		7,8	Northern shrimp	61
	YZ		8,9	Ecosystem monitoring	68
	YZ		10,11	Autumn bottom trawl	242
	YZ		11	Ecosystem monitoring	66
	Z		2	Winter bottom trawl	53
	Z		7	Surf clam/ocean quahog	136
	Z		8	Sea scallops	210
6	ABC		2	Winter bottom trawl	94
	ABC		3	Spring bottom trawl	192
	ABC		5	Ecosystem monitoring	23
	ABC		7	Sea scallops	194
	ABC		9,10	Autumn bottom trawl	199
	ABC		6,7	Surfclam/Ocean Quahog	470
	ABC		11	Ecosystem monitoring	33
	BC		5	Apex predators	24
				Other Surveys	
1	A	GRL	7-8	Longline, inshore Greenland halibut	36
	D		6-7	Gillnets, inshore juvenile cod	72
2	J	CAN-N	1	Cod acoustic	171
2+3	J+KLM		7	Physical/biological oceanography	
	J+KLMNO		8	0 group cod/capelin trawl	149
3	LMNO	EU-ESP	4	Selectivity	62
	K	CAN-N	9	White Bay pre-recruit snow crab	
	K		9	Snow crab comparative fishing and selectivity	
	KL		5	Capelin acoustic/trawl	
	KL		11-12	Inshore cod and herring acoustics	
	L		4-5	Inshore cod acoustics	
	L		6	Juvenile cod habitat acoustics	
	L		6	Bonavista Bay and Northeast Avalon snow crab trap/trawl	

Table 2. Continued.

Subarea	Division	Country [1]	Month	Type of survey	No. of sets
				Other Surveys	
3	L		8	Bonavista Bay cod habitat and acoustics	
	L		9-10	Conception Bay snow crab trap. trawl	
	LNO		11	Physical and biological oceanography	
	Ps		3-4	St. Mary's/Placentia Bay herring acoustics	
	Ps		4	Inshore pre-spawning cod trawl/acoustics	
	Ps		4	Inshore cod tagging	
	Ps		6	Post spawning cod	
4	R		9	Iceland scallops	
	R	CAN-Q	10	Newfoundland west coast herring acoustic survey	
	R		11	Study of the cod movements in LaPoile Bay, Newfoundland	
	RST		6	Water and fish	105
	S		5	Population dynamics of snow crab in Sainte-Marguerite Bay	28
	S		6-7	Growth and natural mortality of the Iceland scallop off the Middle North Shore	
	ST		5-10	Abundance, distribution and growth of juvenile shrimp in the Estuary and Gulf of St. Lawrence	
	ST		7-8	Snow crab survey research survey in the Estuary and northeastern Gulf of St. Lawrence	
	ST		8-9	Zooplankton biomass assessment in the Estuary and Gulf of St. Lawrence	60
	T		2-3	Sampling of young grey seals	
	T		4	Sampling of pelagic and benthic species near Les Escoumins wharf	
	T		5	Inter-annual variations of the larvae production by redfish females	12
	T		5-10	Monitoring of the planktonic communities (zoo and phyto) and the marine enivironment in the Laurentian Channel	
	T		6	Fish sampling – Le Bassin, Havre Aubert	
	T		6	Sampling of live cod and varous benthic organisms	40
	T		7-8	Acoustic mapping of the grounds off Magdalen Islands using the EM-1000 echosounder	
	T		7	Hypoxic areas – Chenal Saguenay	
	T		8	Distribution, abundance and biology of scallops off Magdalen Islands	102
	T		9	Abundance assessment of the lobster and rock crab of Îles-de-la-Madeleine	77
	T		9	Characterization of the exploited urchin aggregations	
	T		10	Sampling of live cod, shrimp and other groundfish	
	X		6	Mackerel eggs and larvae in St.. Margarets Bay	27
	X	USA	7-9	Northern right whale	
5	Y		6,7	Gulf of Maine cod closed area	17
	YZ		7-9	Northern right whale	
	YZ		9,10	Herring hydroacoustics	
	Z		1	GLOBEC broad scale	80
	Z		2	GLOBEC broad scale	79
	Z		3	GLOBEC broad scale	78
	Z		3	Essential fish habitat	
	Z		3	ESDIM gear comparison	
	Z		3,4	Harbor porpoise and hydroacoustic	
	Z		4	GLOBEC broad scale	81
	Z		5	GLOBEC broad scale	83
	Z		6	GLOBEC broad scale	41
	Z		6	Closed Area II benthic habitat	
	Z		7	Closed Area I benthic habitat	
6	AB		3,4	Harbor porpoise & hydroacoustic	
	AB		7-9	Northern right whale	
	ABC		2	Deepwater systematics	

ii) **Surveys Planned for 2000 and Early-2001**

An inventory of biological surveys planned for 2000 and early-2001 as submitted by National Representatives and Designated Experts was prepared by the Secretariat.

Table 3. Biological surveys planned for the NAFO Area in 2000 and early-2001.([1] Country or Component abbreviations from *NAFO Statistical Bulletin*)

Area/Div.	Country[1]	Type of Survey	Dates
		Stratified-random Surveys - 2000	
1A-B	GRL	Snow crab	May-Jun
1C-D	GRL	Greenland halibut deep-sea trawl	Sep-Oct
1BCDEF	EU-DEU	Demersal fish	Sep-Oct
2J+3KLMNO	CAN-N	Multi-species trawl	10 Oct-12 Dec
3LNO	CAN-N	Multi-species trawl	4 May-29 Jun
3NO	EU-ESP	Groundfish	May
3M	EU-ESP&PRT	Groundfish	Jul
3OP	CAN-N	Redfish trawl	11-28 Aug
3Ps	CAN-N	Multi-species trawl	7 Apr-2 May
3+4	CAN-Q	Summer multidisciplinary survey in the Estuary and Gulf of St. Lawrence	3 Aug-2 Sep
4R	CAN-N	Scallop	22-31 Aug
4X+	5YZ	Ecosystem monitoring	20-27 Jan
4X+5YZ+ 6ABC	USA	Spring bottom trawl	15 Mar-5 May
4X+5YZ+ 6ABC	USA	Autumn bottom trawl	5 Sep-27 Oct
4X+5YZ+ 6ABC	USA	Ecosystem monitoring	22 May-9 Jun
4X+5YZ+ 6A	USA	Ecosystem monitoring	21 Aug-1 Sep
4X+5YZ+ 6ABC	USA	Ecosystem monitoring	30 Oct-17 Nov
5YZ	USA	Northern shrimp	24 Jul-5 Aug
5Z+6ABC	USA	Winter bottom trawl	9 Feb-1 Mar
5Z+6ABC	USA	Sea scallops	6 Jul-4 Aug
6BC	USA	Apex predators	17 Apr-May
		Other Surveys - 2000	
1A	GRL	Longline, inshore Greenland halibut	Jul-Aug
1B-F	GRL	Gillnets, inshore juvenile cod	Jun-Jul
2J+3KL	CAN-N	Offshore cod tagging	5-16 Jun
3K	CAN-N	Harp seal	24 Apr-3 May
3K	CAN-N	White/Notre Dame Bay snow crab trap/trawl	8-24 Sep
3KL	CAN-N	Capelin acoustic/trawl	9-28 May
3L	CAN-N	Bonavista Bay cod habitat and acoustics	13 Mar-3 Apr
3L	CAN-N	Bonavista Bay cod habitat and acoustics	15 Jan-1 Feb
3L	CAN-N	Avalon snow crab trawl/trap	19 May-3 Jun
		Bonavista Bay snow crab trap/trawl	30 Jul-11 Aug
		Conception Bay snow crab trap/trawl	24 Sep-6 Oct
3L	CAN-N	Predator/Prey	17 Jul-1 Aug
3LMNO	CAN-N	Physical and biological oceanography	22 Apr-7 May 14-30 Jul
3Ps	CAN-N	St. Mary's Bay/Placentia Bay herring acoustics	13 Mar-3 Apr
3Ps	CAN-N	Cod tagging	31 Mar-10 Apr
3Ps	CAN-N	Inshore cod tagging	25 Apr-10 May
3Ps	CAN-N	Cod tagging/tagging mortality	1-14 Nov
4S	CAN-Q	Snow crab assessment	7-17 May

Table 3. Continued

Area/Div.	Country[1]	Type of Survey	Dates
		Other Surveys - 2000	
4S	CAN-Q	Scallop assessment – North Shore	10-14 Jun
		Scallop assessment – Mingan Archipelego	5-17 Jul
4ST	CAN-Q	Snow crab research survey in the Estuary and northeastern Gulf of St. Lawrence	18 Jul-15 Aug
4T	CAN-Q	Validation of the data gathered during the winter sportfishing in the Saguenay Fjord	24-30 Apr
4T	CAN-Q	Prerecruitment of the northern shrimp	1-6 May
4T	CAN-Q	Monitoring of the interannual variations of the number of larvae produced by redfish females	18-24 May
4T	CAN-Q	Sampling of live wolffishes	25-19 May
4T	CAN-Q	Sampling of live cod	30 May-9 Jun
4T	CAN-Q	Urchin assessment – St. Lawrence Estuary	12-17 Jun
4T	CAN-Q	Mackerel egg sampling survey	14 Jun-5 Jul
4T	CAN-Q	Prerecruitment of the northern shrimp	15-26 Jun
4T	CAN-Q	Mackerel assessment by trawling – Magdalen Islands	27 Jun-4 Jul
4T	CAN-Q	Lobster grounds mapping using the EM-1000	Aug
		Rock crab assessment – Chaleur Bay	mid-Aug
		Sampling of live wolffishes	16-23 Aug
		Scallop assessment – Magdalen Islands	24 Aug-4 Sep
		Lobster assessment – Magdalen Islands	5-16 Sep
		Sampling of live fish and invertebrates	11-15 Oct
		Prerecruitment of the northern shrimp	17-21 Oct
4VWX+5YZ	USA	Northern right whale	5 Jul-18 Aug
4VWX+5YZ	USA	Northern right whale	8 Aug-1 Sep
4X	CAN-Q	Sampling of live wolffishes	30 Oct-3 Nov
4X+5Y	USA	CMER – GLOBEC plankton	20-25 Feb
4X+5Y	USA	Porbeagle shark tagging	1-18 Aug
4X+5YZ	USA	Herring hydracoustic	5-29 Sep
5Y	USA	Gear testing	7-17 Feb
5Y	USA	Harbor porpoise/hydroacoustic	28 Feb-17 Mar
5Z	USA	Benthic habitat	19-29 Jun
			30 Oct-9 Nov
5Z+6A	USA	Fishing power	20 Mar-14 Apr
5Z+6ABC	USA	Deep water systematics	27 Nov-8 Dec

5. Report on Biological Information Database Exchange for Divisions 3NO Cod

STACREC received a report on the development of a template for biological information exchange for Div. 3NO Cod and a report of the ICES experience in developing similar data exchange mechanisms. STACREC agreed to a one-year trial of the Div. 3NO Cod template and it was proposed that the STACFIS assessments could be used to indicate where a wider application of this template might be appropriate.

6. Report of the Working Group on NAFO Observer Protocol

STACREC reviewed progress made by the Working Group since the September 1999 Scientific Council Meeting. Forms for recording catch, effort and biological data were developed and reviewed by STACREC. A subgroup was appointed to review additional forms and coding instructions developed by the EU. It was noted that, aside from some additional summary forms, data elements contained on the EU forms essentially overlapped those on the draft NAFO Observer forms. It was decided that the NAFO Observer forms, augmented by additional data elements from the EU forms and a set of coding instructions, would be presented to STACTIC at its June 2000 Meeting by D. Kulka (Canada). It was proposed that an SCS Document using the subgroup compilation (SCS Doc. 00/23) be presented.

7. **Review of SCR and SCS Documents**

a) The results of silver hake young-of-the-year feeding research in the Scotian Shelf Area based on long-term data (1982-91) were presented (SCR Doc. 00/3). Feeding peculiarities in relation to fish growth, inter annual variations of food compositions and feeding rate for autumn-winter were shown. The attempt was made to assess food supply by year. The research show that the young silver hake survival from July-August to October-November was affected by feeding conditions as indicated with food consumption and condition indices. Cannibalism of pelagic young silver hake seemed to increase in the years with unfavourable food condition as well as in the case of appearance of strong year-classes.

b) An analysis of silver hake stock dynamics had been carried out for the period from 1962 to 1996 (SCR Doc. 00/4). An attempt was made to obtain an idea of the general trends in silver hake stock state during earlier years starting from 1920s when no systematic research of the latter was performed. The results obtained show that in 1960s, the late-1970s, the late-1980s to early-1990s the stock size was at the level "worse and much worse than average", while in the late-1960s, the first half of 1970s, the first half of 1980s and probably in the second half of 1990s, it was at the level "better and much better than average". Results of extrapolation allow to suppose that strong and rather regular fluctuations of silver hake abundance took place also in period from 1920s to 1960s.

c) The United States Research Report (SCS Doc. 00/14) was presented. The status of 19 stocks in Subareas 5 and 6 was updated, including the status of *Illex illecebrosus*, for which the US autumn 1999 survey biomass index was among the lowest observed. The presentation included information about ongoing studies on the effects of mobile gear, variables affecting the quality of nursery habitat, bay scallops, many species of finfish, lobster, marine mammals, food web dynamics, aging studies, and observer operations.

8. **Other Matters**

a) **Tagging Activities**

STACREC reviewed the list of tagging activities carried out in 1999 (SCS Doc. 00/5) compiled by the Secretariat, and requested national representatives to up-date the list during this meeting

A 5-year tagging program directed at yellowtail flounder on the Grand Bank (Divisions 3LNO) was begun in May 2000. The project is designed to study and measure movements, stock size, exploitation, mortality, longevity, and growth rates. Each May from 2000-2004, a 12-day trip is planned onboard a Canadian commercial trawler to tag at least 5000 yellowtail flounder with Petersen disc tags and 200 fish with archival electronic tags (data storage tags or DSTs). As done in 2000, Petersen discs of 2 different colors and reward values (red $20 and pink $100) will be applied, some as single tags and some as double, to allow estimates of tag loss and recapture reporting rates.

The tagging program is designed to provide estimates of exploitation, and therefore stock size if catches are known, to be used in annual stock assessments. Estimates of tagging mortality, tag loss and return rates will be available from the Petersen discs and associated laboratory/field work, and will be necessary to calculate exploitation rates. The Petersen disc tags will also provide information on movement, longevity, and age and growth. At present, the growth and longevity of this species is in question, largely as a result of tag returns from experiments in the early-1990s. DST will provide insight into seasonal movements of yellowtail flounder, by allowing information on the depth, temperature, and salinity of water occupied by tagged fish to be collected. These data can be matched to known oceanographic conditions and models to deduce fish movements (horizontal as well as vertical), and address questions on the substantial differences observed in seasonal distribution and abundance.

b) **Conversion Factors**

There was no progress to report in the work on conversion factors.

c) **Comparative Fishing Between Canada and EU-Spain**

Canada and EU-Spain have conducted spring surveys in Div. 3NO (1971-2000 for Canada, 1995-2000 in the NAFO Regulatory Area for EU-Spain), using a stratified random approach. To examine differences in results between these 2 survey series, side-by-side comparative fishing was conducted during May 23-24, 2000, at positions chosen from both the Spanish and Canadian surveys. Fourteen comparative sets were carried out on the southern Grand Bank (Div. 3N), at depths less than 90 m.

The Spanish vessel *Playa de Menduiña*, using a Pedreira trawl, caught substantially more fish than the Canadian vessel *Wilfred Templeman*, using a Campelen trawl. For the most abundant species in the catches (yellowtail flounder, American plaice and thorny skate), the Spanish vessel caught more of each species on every set than the Canadian vessel. For yellowtail flounder, the mean ratio of catch (Spanish vessel to Canadian vessel) was 9.3 for numbers and 9.9 for weights. For American plaice, the ratios of catch numbers and weights were 10.5 and 13.3. The corresponding values for thorny skate were 12.1 for both catch numbers and weights.

Length frequency data were collected but have not yet been analysed. Noting the differences in catches observed in the comparative fishing in 2000, and the potential impact on interpretation of indices of abundance from the Canadian and Spanish surveys, STACREC **recommended** that *the comparative fishing in Div. 3NO be continued during future spring surveys conducted by EU-Spain and Canada.*

d) **Other Business**

The Chairman thanked the participants, especially the rapporteur, for their valuable contributions and cooperation. He extended special thanks to the Assistant Executive Secretary and other members of the NAFO Secretariat for their considerable assistance in document preparation and distribution. There being no other business, the chairman closed the June 2000 STACREC Meeting.

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

Chairman: O. A. Jørgensen Rapporteur: M. Stein

The Committee met at the Alderney Landing, 2 Ochterloney Street, Dartmouth, Nova Scotia, Canada, on 5, 7, 8, 10 June 2000. In attendance were C. Darby (EU-UK), O. A. Jørgensen (Denmark in respect of Greenland), M. J. Morgan (Canada), V. A. Rikhter (Russian Federation), F. M. Serchuk (USA), M. Stein (EU-Germany), and the Assistant Executive Secretary (T. Amaratunga).

1. **Opening**

The Chairman welcomed the Committee. The agenda as presented in the Provisional Agenda was **adopted**. M. Stein was appointed rapporteur.

2. **Review of Recommendations in 1999**

Recommendations in June

i) STACPUB had recommended that *Rule 5.1.c).(ii). of the Rules of Procedure for the Scientific Council be revised to eliminate the words "be chaired by the [Scientific Council] Vice-Chairman, and*". STACPUB had also recommended that *a STACPUB chairperson be elected by the Scientific Council to serve for a term of two years and shall be eligible for re-election.*

STACPUB noted that Scientific Council endorsed these recommendations (see SCS Doc. 00/4).

ii) STACPUB did not reach consensus on a proposal that STACPUB conduct its business in the future in open plenary sessions (as done in STACFEN, STACFIS and STACREC) with Committee membership open to all Scientific Council members. It had therefore recommended that *the issue of STACPUB membership be elevated to the Scientific Council for discussion and resolution.*

Scientific Council had discussed and resolved this item. Accordingly, every STACPUB meeting is open to members of the Scientific Council.

iii) To facilitate the dissemination process STACPUB had recommended that *Scientific Council Research Documents be submitted with an abstract of 250 words or less as described in the instructions for authors*. SCR documents with "white" cover will be available on the NAFO website only for internal purposes. STACPUB had recommended that *the final SCR documents ("yellow" cover) be made available to the public through NAFO website.* Authors were requested to check that their final manuscripts sent to NAFO are error free.

STACPUB noted that there has been significant progress in authors submitting SCR Documents with abstract, and in circulating SCR Documents through the website.

iv) STACPUB had recommended *that NAFO Journals 22, 23 and 24 be made available through the web as soon as possible, and that access to the Journal be highlighted on the main page of NAFO website.* Further to that STACPUB had recommended that *NAFO Journals prior to No. 22 be accessible through the web provided they are available on electronic means.*

Journal Volumes 22 to 25 have been placed on the web, and attempts are being made to scan earlier issues.

v) STACPUB noting that further development of the website had been requested, had recommended that *Scientific Council request a cost accounting from the NAFO Secretariat on the costs involved in maintaining and operating the NAFO website and FTP server.*

A summary had been presented to STACPUB, noting that most website development was done within the Secretariat work.

vi) STACPUB emphasized that information on other bodies of NAFO (General Council, Fisheries Commission) should also be accessible through the NAFO web. STACPUB therefore had recommended that *Scientific Council Chair discuss with the NAFO Executive Secretary the inclusion on the website of the General Council and Fisheries Commission Reports.* There was further discussion on the distribution and dissemination of NAFO science through hyperlinks from the homepages of individual NAFO scientists. STACPUB therefore had recommended that *an ad hoc Working Group of Scientific Council be formed to explore computer requirements, improvement of the NAFO website and software links to enhance external awareness of the activities of NAFO and NAFO Scientific Council.*

The matter was brought to the attention of General Council and Fisheries Commission by the Chairman of Scientific Council.

An *ad hoc* Working Group of STACPUB members was formed, which worked intersessionally by e-mail.

Recommendations in September

vii) STACPUB had recommended that *the final issue of Scientific Council Studies using the present criteria for selection of papers, should include papers of the June 1999 Meeting selected by STACPUB, and the paper selection using the new criteria come into effect thereafter.*

STACPUB noted that this recommendation has come into effect.

viii) STACPUB had recommended that *the Assistant Executive Secretary take the lead in drafting editorial guidelines for Journal papers, and that STACPUB members and editors should provide input.*

The Assistant Executive Secretary informed the Committee that work was in progress according to this recommendation.

ix) With regard to increased use of the NAFO Website and putting documents into an appropriate format (e.g. pdf files), STACPUB had recommended that *additional resources be made available to the Secretariat, or technical support obtained in the form of service contracts, to develop the website for access to NAFO Journal publications.*

STACPUB considered this issue under agenda item 6 c) of this June 2000 meeting.

x) STACPUB had recommended that *the blue covered SCS documents (i.e. final) containing meeting reports are distributed to Designated Experts and national representatives of the Scientific Council, in addition to the current mailing list and website circulation*

STACPUB was informed that blue covered SCS documents have been circulated accordingly.

xi) STACPUB had endorsed the idea of a rotating membership, and had recommended that *Scientific Council consider a change in its Rules of Procedure to accommodate the format of rotating membership of STACPUB.*

This issue was discussed in Scientific Council during the 1999 Meetings and the Rules of Procedure were changed. (see also Section 3 below)

xii) Regarding STACPUB membership, noting that the present Rule 5.1.(c).(ii), after the modifications made in June 1999 reads "consist of five other members appointed by the Scientific Council", STACPUB had recommended that *the following change to the Rules of Procedure be incorporated:*

> *Rule 5.1.(c).(ii): "consist of six other members appointed by the Scientific Council. Members would serve 3-year terms."*

It was noted that a new NAFO Convention (the former NAFO Handbook) with changed Rules of Procedures is in the process of publication (see also SCS Doc. 00/4).

xiii) STACPUB had been informed that a publication was being prepared by the Executive Secretary, L. I. Chepel, for publication by 2001. STACPUB had recommended that *any material related to ICNAF and NAFO scientific information being incorporated in the "NAFO Century book – Northwest Atlantic Fisheries in the 20th Century", should be reviewed by the Scientific Council prior to publication, and that this book when completed should be placed on the NAFO website*.

STACPUB suggested that the Executive Secretary of NAFO, Dr. L. I. Chepel, be invited to the Committee to consider the review process on the "NAFO Century book Northwest Atlantic Fisheries in the 20th Century". The Chairman, after having addressed Dr. L.I. Chepel on this matter, reported that Dr. Chepel appreciates input by the Scientific Council on scientific issues in the planned book. He indicated, however, that there will be no formal review process initiated.

STACPUB found that it would be desirable to have a Publications Committee, which considers publications of the three Constituent Bodies of NAFO, and requested the Scientific Council Chairman to share this view with the Chairmen of General Council and Fisheries Commission to find a means to address this.

3. **Review of STACPUB Membership**

STACPUB noted that the Chairman, O. A. Jørgensen, was elected by the Scientific Council during the June 1999 Meeting for a term of two years beginning at the end of the September 1999 Annual Meeting.

In accordance with the new STACPUB Rules of Procedure, incoming STACPUB members will be designated for a term of three years. STACPUB was informed that A. Vazquez (EU-Spain) who was not able to attend the meeting will step down from his STACPUB membership. STACPUB extended its appreciation to him for his long-standing valuable contributions. STACPUB welcomed C. Darby (EU-United Kingdom), who was nominated by Scientific Council to replace A. Vazquez. STACPUB invited C. Darby to continue as a member.

There was considerable discussion on how to accommodate the new rotating scheme for STACPUB membership. Based on the wishes of the present members, STACPUB prepared a roster noting the terms of membership will end at the end of the Annual Meeting in the given year as follows:

M. J. Morgan (Canada), 2000
V. A. Rikhter (Russian Federation), 2001
M. Stein (EU-Germany), 2001
C. Darby (EU-UK), 2002
F. M. Serchuk (USA), 2002

It was noted the following new members were appointed by the Council during this meeting, and the year their terms end are shown:

H. Siegstad (Greenland), 2003
D. Maddock Parsons (Canada), 2003

4. **Review of Scientific Publications since June 1999**

a) **Journal of Northwest Atlantic Fishery Science**

STACPUB was informed that:

Journal Volumes 22-25 were placed on the NAFO website www.nafo.ca, where individual papers can be downloaded separately, or entire volumes retrieved.

Volume 25 containing the Report of the Symposium and Symposium Presentations (19 papers) and 4 notices (233 pages) presented at the 1998 Symposium on "Variations in Maturation, Growth, Condition and Spawning Stock Biomass Production in Groundfish", held during 9-11 September 1998 in Lisbon, Portugal, was published with a publication date of October 1999.

Volume 26 containing 5 miscellaneous papers is in the final galley stage. This issue is expected to be complete by mid-2000.

Volume 27 containing papers presented at the 1999 Symposium on "Pandalid Shrimp Fisheries – Science and Management at the Millennium", held in Dartmouth, Canada, is in various stages of the editorial process. This issue is expected to be complete by the end of year 2000. STACPUB noted the process is on schedule and hoped the publication will meet the proposed time frame.

There are presently 7 miscellaneous papers in Secretariat files for future Journal issues.

b) **NAFO Scientific Council Studies**

STACPUB was informed Studies Numbers 31 and 32 will be placed on the NAFO website in the near future.

Studies Number 32, containing 8 miscellaneous papers and 3 notices (133 pages) was published with a publication date of April 1999.

Studies Number 33 containing 7 miscellaneous papers is in the galley stage of the editorial process. This issue is expected to be published within the next month.

There are presently 2 papers in Secretariat files for future Studies issues.

c) **NAFO Statistical Bulletin**

STACPUB observed catch data by country, species and division were available on the NAFO website as text files for 1960 to 1998. Information is the most up-to-date information available at the Secretariat and is updated, as new information becomes available.

STAPUB noted the last publication of NAFO Statistical Bulletin was Vol. 43 with 1993 data, published with a publication date of December 1997. Noting the deadline for submission of STATLANT 21B reports for 1994 to 1998 was 30 June of each subsequent year, STACPUB was informed data are still outstanding from USA for 1994 to 1998 and Faroe Islands for 1995 to 1998, and therefore these Bulletin publications have been seriously delayed.

STACPUB **recommended** that *STACREC should consider proceeding with the publication of NAFO Statistical Bulletin for 1994 without the USA data*.

d) **NAFO Scientific Council Reports**

STACPUB noted NAFO Scientific Council Reports are available on the NAFO website for 1998 and 1999.

Only about l/4 of 1998 SCR/SCS Documents are in electronic form. All 1999 SCR/SCS Documents are available on NAFO website. All 2000 SCR/SCS Documents submitted (as of 30 May) are on a special directory on the web, and these will be placed in the public domain at the end of this meeting.

The volume (327 pages) containing reports of the 1999 meetings of the Scientific Council in April, June, September and November was published and distributed on schedule in January 2000. STACPUB was informed CD-ROM copies were also available on request.

e) **Index and Lists of Titles**

The provisional index and lists of titles of 116 research documents (SCR Doc.) and 24 summary documents (SCS Doc.) which were presented at the Scientific Council Meetings during 1999 were compiled and presented in SCS Doc. 00/3 for the June 2000 Meeting. The last 5-year compilation for 1990-94 was published in November 1995 and the 5-year compilation for 1995-99 is scheduled to be issued by mid-2000.

f) **Others**

There were no other publications considered.

5. **Production Costs and Revenues for Scientific Council Publications**

a) **Review of Costs and Revenues**

STACPUB considered the total number of Scientific Council publications being printed at the Secretariat. It was noted this was 250 copies at present. The question whether 200 copies would be enough, was discussed. The Assistant Executive Secretary gave an overview on printing costs for the Journal, the Studies and the Scientific Council Report. After trimming down the different distribution lists, it was felt that 250 copies were an appropriate quantity. According to a query sent out by the Secretariat, STACPUB was informed that about 35-40 recipients of the Scientific Council publications preferred to receive CD-ROM versions instead of printed copies.

b) **Consideration of Publication of 2000 Special Session Papers**

STACPUB observed that there are at present no plans to publish a manual for the Special Session of September 2000, as programs due to be used in the Workshop are documented and published in the different publicly available forms (e.g. Info. Tech. Ser., CEFAS, Lowestoft, 1, 85 p.). STACPUB, however, supported the idea of a publication of a workbook, and accordingly requested the co-conveners to consider documentation in the *NAFO Scientific Council Studies* series.

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

a) **Invitational Paper**

The invited paper by V. A. Rikhter on "Silver Hake of Scotian Shelf" is ready for publication in Journal 26. The invited paper by Sv. A. Horsted on "Review of cod fisheries after WWII" is in the editorial process. The editor reported to the Committee that there was some further work needed and it was agreed this will be expedited with assistance of the Assistant Executive Secretary working with the author.

STACPUB felt it suitable to have the Invited Lectures in STACFEN be considered for publication in the NAFO publication series. The Chairman of STACFEN will make this proposal to the invited speaker at this meeting and to future invited speakers.

b) **Abstracts from Research Documents**

STACPUB noted there was progress made in requesting authors to include abstracts in their SCR Documents. Virtually all had responded to the required formats, and that Research Documents contain abstracts.

c) **NAFO Website**

STACPUB noted that Journals No. 22-25 were mounted to the NAFO Website. There was considerable discussion on additional work to be applied to the Website. Accordingly, it was suggested to:

i) make the Website more user friendly
ii) mount a search engine on the Website
iii) scan in Journals No. 1-21 (within next year), Studies (thereafter) and make them available from the Website (preliminary considerations suggest that the costs for this project amount to about $27 000 for the Journals, and $24 000 for the Studies)
iv) have individual e-mail addresses available for each NAFO staff member
v) have the information on updates available at the Website (home.htm)
vi) implement modern software for designing the website
vii) insert date of update with a new button on front page

Realizing that there may arise financial impacts on the NAFO budget as a result of June meeting deliberations, STACPUB **recommended** that *an Executive Committee Meeting be held near the end of the June Meeting to evaluate financial impacts on the NAFO budget which arise from deliberations and decisions made during the course of that meeting*.

STACPUB further **recommended** that *costs associated with the above activities be enumerated and included in the Scientific Council budget request for 2001*.

d) **Scientific Citation Index (SCI)**

Further to the previous STACPUB Chairman's communications with ISI, the Assistant Executive Secretary had sent a letter to the Institute for Scientific Information (ISI) on 15 November 1999 to promote the Journal through registration with ISI. However, no answer has been received to date. STACPUB suggested the Assistant Executive Secretary telephones ISI on this matter. If this approach is not successful, the Committee deemed it wise to close this matter.

e) **CD-ROM Versions of Reports, Documents**

STACPUB considered the issue of CD-ROM versions of reports and **recommended** that *the Scientific Council Reports and the Reports of the Annual Meeting be included in the contents of the CD-ROM, and the CD-ROM be issued before April of the following year*.

f) **New Initiatives for Publications**

Assistant Executive Secretary presented a proposal on new initiatives for publication of Journal papers, other than those of Symposia proceedings. Fast publication and circulation is needed, and it was suggested to establish "electronic publication" as follows:

i) Establish a Journal publication schedule of one volume per calendar year.

ii) Each paper be e-published (on web) as soon as possible after edit, by assigning a Journal Vol. Number and pagination, so that it can be cited (e.g. Scientist *et al*., 2000. Title. *J. Northw. Atl. Fish. Sci*., **28**(1): 1-23).

iii) These citable papers be collated one after another on e-publication for the year (in the event that more papers come in, the Journal issue can be every 6 months).

iv) At the end of the year, publish the printed and bound Journal Volume (and CDs) and circulate in the usual fashion. [Only author's reprints and incidental specific requests for hard copies of a paper will be entertained until then].

Specific Advantage:
- early release of citable papers
- quick turn-around
- fixed publication schedule

For promotion, it was proposed to announce this new method of fast publication with an e-mail flyer saying "NAFO Journal goes to electronic publication" that can be circulated worldwide.

STACPUB agreed with the above proposal and **recommended** that *electronic publishing of the Journal begin with the five papers currently awaiting publication in Volume 26*.

7. Editorial Matters Regarding Scientific Publications

a) Review of Editorial Board

STACPUB was informed that the Associate Editors G. Krause (Biological Oceanography) and A. Richards (Invertebrate Fisheries Biology) have stepped down from the Editorial Board of NAFO. It was agreed that STACPUB Chairman would continue discussions intersessionally and decisions made as soon as possible.

b) Progress Review of Publication of 1999 Symposium

STACPUB noted the editorial process of the 26 papers from the 1999 Symposium on Pandalid Shrimp for Journal Volume No. 27 are at present more or less on schedule and it is hoped the publication will be completed by the end of 2000.

8. Papers for Possible Publication

a) Review of Proposals Resulting from the 1999 Meetings

i) Papers Nominated by STACPUB

At its meetings since 1980, STACPUB has nominated a total of 681 research documents. This includes 10 documents nominated at the June 1999 Meeting and 29 papers from the 1999 Symposium. Since 1980, a total of 579 papers have been published in the Journal (277) and Studies (302). [It is noted some are papers submitted independent of the research document series.]

Of the 10 papers nominated at the June 1999 Meeting, 1 paper has been submitted for the Journal and 4 papers have been submitted for the Studies series. The authors of the remaining 5 papers did not respond.

In addition, 1 paper from outside of the STACPUB nomination process was submitted for the Journal since June 1999.

ii) Up-date Since June 1999

A total of 39 papers were published or are in their final stage of galley preparation (24 in the Journal and 15 in Studies) since June 1999.

b) **Review of Contributions to the June 2000 Meeting**

The list of SCR Documents was distributed in STACPUB containing 3 notifications by authors. There was considerable discussion on how to handle these papers. STACPUB concluded to follow option (2) of the 1999 September STACPUB report (Scientific Council Reports 1999, p. 243 3 (2)). Accordingly, Assistant Executive Secretary will inform the authors on the new publication policies of STACPUB, and invite them to consider publication in the Journal if they wish so.

Regarding the review of SCR Documents for possible publication, STACPUB members decided to share their views intersessionally by e-mail with the Chairman. Possible authors would be informed by the Assistant Executive Secretary of STACPUB decisions.

9. **Other Matters**

a) **Late Submission of SCR/SCS Documents**

Chairman informed the Committee that there are few instances where a research paper is presented at a Scientific Council Meeting, but the revised SCR Document is not submitted within about 2 weeks after the meeting.

This results in many difficulties e.g.:

The document is referred to in the meeting report and listed in the SCR/SCS series, but there is no document to back it up.

- All documents related to the meeting report are to be placed on the web, and the meeting report is issued within about 2 weeks after the meeting.
- There are often requests for documents, but there are no documents to send.
- The Scientific Council Report is printed at the end of the year, and there is the dilemma of how to address this issue.
- CDs are burned to contain the Scientific Council Report and all related SCR and SCS Documents, at the end of the year.

STACPUB noted these are of course very difficult issues from the point of view of authors as well as they have very demanding time-schedules.

STACPUB agreed the possible solution would be:

- To inform Scientific Council members about the problem
- Set a cut off date. STACPUB proposes the date of release of the meeting Report (i.e. 2 weeks after the meeting ends).
- If the cut off date is exceeded, authors will be asked whether the version of the paper that was presented at the meeting may be used. If this is not accepted, all references to the paper will be removed from the meeting Report (i.e. treated as working papers).

b) **Considerations on Future Symposia**

STACPUB noted that a proposal for the 2002 Annual Meeting, a Symposium on "Elasmobranchs" was considered by Scientific Council. STACPUB discussed the proposal and supported it.

c) **Other Business**

There being no other business the Chairman closed the meeting by thanking the participants for their contributions and co-operation, the rapporteur for taking the minutes, and the NAFO Secretariat for their assistance.