1998

FIFTEENTH
ANNUAL MEETING

EDINBURGH, SCOTLAND

8-12 JUNE 1998

President:	Mr Einar Lemche (Denmark (in respect of the Faroe Islands and Greenland))
Vice-President:	Mr Ole Tougaard (European Union)
Secretary:	Dr Malcolm Windsor

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Report of the Fifteenth Annual Meeting of the Council 8-12 June 1998, Edinburgh, Scotland

1. Opening Session

1.1 The President, Mr Einar Lemche, opened the meeting, welcomed delegates to Edinburgh and made an opening statement on the work of the Organization (Annex 1).

1.2 The representatives of Canada, Denmark (in respect of the Faroe Islands and Greenland), the European Union, Iceland, Norway, the Russian Federation and the United States of America made opening statements (Annex 2).

1.3 The representative of the International Baltic Sea Fishery Commission, attending the meeting as an Inter-Government Organization (IGO), made an opening statement (Annex 3).

1.4 Opening statements were made jointly on behalf of a number of Non-Government Organizations (NGOs). In addition, opening statements were made by the European Anglers Alliance, the Federation of Irish Salmon and Sea-Trout Anglers, the Institute of Fisheries Management, the National Anglers Representative Association, the Salmon Net Fishing Association of Scotland and the Scottish Anglers National Association. These opening statements are contained in Annex 4.

1.5 The President expressed appreciation to the Parties, to the IGO and to the NGOs for their statements and closed the Opening Session.

1.6 A list of participants is given in Annex 5.

2. Adoption of Agenda

2.1 The Council adopted its agenda, CNL(98)48 (Annex 6).

3. Administrative Issues

3.1 Secretary's Report

The President announced the decision of the Council to re-appoint the Secretary for a five year period and thanked the Secretary and his staff for their work for the Organization. The Secretary thanked the Council for their confidence and expressed his gratitude to his excellent staff.

The Secretary made a report to the Council, CNL(98)5, on the status of ratifications and accessions to the Convention, membership of the regional Commissions, applications for observer status at the 1998 meeting, possible topics for Special Sessions, a possible joint meeting with the North Pacific Anadromous Fish Commission (NPAFC), the Organization's project work, the Headquarters Property and the possible implications for NASCO of a Scottish Parliament. Reports were also

made on the audited accounts for 1997, CNL(98)6, and on the draft budget, CNL(98)8.

The Secretary indicated that the contributions for 1998 had been received from all Parties except Iceland. The representative of Iceland had, however, assured the Secretary that the contribution would be made.

In the light of the recommendations from the Working Group on the Precautionary Approach in North Atlantic Salmon Management, the Council agreed to hold a Special Session on habitat issues at its Sixteenth Annual Meeting in 1999. The Secretary was asked to develop proposals for the Special Session in consultation with Heads of Delegations. The Council also agreed that there would be benefits from a joint meeting with the NPAFC to exchange information of interest to both Organizations. The International Baltic Sea Fishery Commission should also be invited to participate. The meeting should include sessions on the scientific aspects and on the application of the Precautionary Approach to salmon management. The Council agreed that it would schedule this meeting, so far as possible, to coincide with an NPAFC meeting, probably in Seattle or Vancouver, and reserved the period 15-26 March 1999. Assuming that the NPAFC is willing to proceed, and that the dates are convenient, the Secretary was asked to finalise the arrangements and advise the Parties.

The Council agreed in principle that the information in the Organization's databases should be made accessible to the public. The Secretary was asked to develop a proposal as to how to improve the accessibility of this information and investigate what conditions and disclaimers may be necessary to attach to the use of the data. The information in the databases should be made accessible electronically as far as possible.

3.2 **Report of the Finance and Administration Committee**

The Chairman of the Finance and Administration Committee, Mr Eero Niemela, presented the report of the Committee, CNL(98)9. Upon the recommendation of the Committee the Council took the following decisions:

(a) to ask the Secretary to continue to liaise with ICES and with the other Commissions on the contribution to ICES;

(b) that the contributions of the Parties should be adjusted to take account of the difference in provisional and confirmed catch statistics and that this arrangement should take effect from the 1999 contributions;

(c) to appoint Coopers and Lybrand of Edinburgh as auditors for the 1998 accounts;

(d) to accept the audited 1997 annual financial statement, CNL(98)6;

(e) to adopt a budget for 1999 and to note a forecast budget for 2000, CNL(98)49 (Annex 7).

(d) to adopt the report of the Finance and Administration Committee.

The President thanked Mr Niemela for his valuable work and for that of the Committee.

3.3 Report on the Activities of the Organization in 1997

In accordance with Article 5, paragraph 6 of the Convention, the Council adopted a report to the Parties on the activities of the Organization in 1997, CNL(98)10.

4. Scientific, Technical, Legal and Other Information

4.1 Scientific Advice from ICES

The representative of ICES presented the report of the Advisory Committee on Fishery Management (ACFM) to the Council, CNL(98)12 (Annex 8).

4.2 Report of the Standing Scientific Committee

The Chairman of the Committee presented a draft request to ICES for scientific advice. Upon the recommendation of the Committee, the Council adopted a request for scientific advice from ICES, CNL(98)13 (Annex 9).

4.3 Catch Statistics and their Analysis

The Secretary introduced a statistical paper presenting the official catch returns by the Parties for 1997, CNL(98)14 (Annex 10), and historical data for the period 1960-1997.

There had previously been some discrepancies in the statistics provided by ICES and the official statistics provided by the Parties to NASCO and the Council had asked the Secretary to seek clarification for the differences. He reported that the problem had now been resolved and for the 1997 catch data, there was only one minor discrepancy in the information provided to ICES and that provided to NASCO.

4.4 Salmon Tagging and the Tag Return Incentive Scheme

The Secretary presented a summary of tag release data, CNL(98)16, which had been prepared from information submitted by ICES. He suggested that this compilation, which had been needed in earlier years, might now be discontinued. The Council accepted this proposal.

The Secretary reported on the operation of the Tag Return Incentive Scheme in 1997/98, CNL(98)17. The 1997 awards had received favourable publicity for the work of the Parties and of the Organization and the need to return scientific tags had again been publicised. In excess of 2,000 external tags had been entered into the 1998 draw.

The President announced that the draw for the Tag Return Incentive Scheme was made by the Auditor at NASCO Headquarters on 1 June and the winner of the $2500 Grand Prize was Mr A Thomas, Llangollen, Wales. The Council offered its congratulations to the winner.

4.5 Review of International Salmon Related Literature Published in 1997

The Council took note of a review of the literature concerning Atlantic salmon published during 1997, CNL(98)18, which had been prepared in accordance with Article 13, paragraph 2 of the Convention. The representative of Norway suggested that in future this information might be made available electronically through a NASCO web site.

5. Conservation, Restoration, Enhancement and Rational Management of Salmon Stocks

5.1 Measures Taken in Accordance with Articles 14 and 15 of the Convention

The Secretary presented a report on the returns made under Articles 14 and 15 of the Convention, CNL(98)19 (Annex 11).

5.2 Special Session on the Precautionary Approach to Salmon Management

Last year, the Council established a Working Group to consider how the Precautionary Approach might be applied to NASCO's work. In order to allow for detailed consideration and discussion of this subject and the Working Group's recommendations, the Council held a Special Session on the Precautionary Approach to Salmon Management. Presentations were made on the "Principles of the Precautionary Approach" and on the "Application of the Precautionary Approach to the Work of NASCO". There was unanimous support for adoption of a Precautionary Approach and during the discussion period a number of points were raised which were later considered by the Council under agenda item 5.3 (below).

5.3 Report of the Working Group on the Precautionary Approach to Salmon Management

The Council reviewed the report of the Working Group on the Precautionary Approach to Salmon Management, CNL(98)21 (Annex 12). Papers concerning the Precautionary Approach were also tabled by Norway, CNL(98)35 (Annex 13) and the Russian Federation, CNL(98)39 (Annex 14).

In the light of the Working Group Report, the Council and the Contracting Parties agreed to adopt and apply a Precautionary Approach to the conservation, management and exploitation of Atlantic salmon in order to protect the resource and preserve the environments in which it lives. The Council and the Contracting Parties agreed to adopt and apply the Working Group recommendations, CNL(98)46 (Annex 15). The Council agreed a Preliminary Draft Action Plan for Application of a Precautionary Approach to Salmon Management, CNL(98)47 (Annex 16). The Parties would be given the opportunity to make written submissions to the Secretariat concerning this Preliminary Draft Action Plan. The Council agreed to establish a Working Group which should meet and refine further this Plan. Terms of Reference for this Working Group were agreed, CNL(98)44 (Annex 17).

The Council identified the establishment of river-specific conservation limits for stocks in the North-East Atlantic Commission area as a priority for immediate action.

The Council agreed on the scientific advice that might be sought in support of a Precautionary Approach, CNL(98)41, which was referred to the Standing Scientific Committee for inclusion in the request for scientific advice from ICES.

5.4 Unreported Catches

Last year the Council had asked the Secretary to undertake a review of previous NASCO actions to enhance the level of reported catch. It was agreed that at the Fifteenth Annual Meeting the Parties would be asked to report on the measures they have taken to improve the level of the reported catch statistics in the light of this report, CNL(98)22 (Annex 18). The Council expressed concern about the high level of unreported catches and strongly emphasised the need to take stronger measures to minimise the level of such catches. It was agreed that ICES should be requested to provide a breakdown of unreported catches on a stock area basis. The Parties were therefore encouraged to provide as detailed information as possible. It was further agreed that the Secretary should be asked to request, on an annual basis, from each Contracting Party:

1) a description of its management control and reporting systems by country;
2) an explanation of how it arrives at the figure for unreported catch along the lines of the breakdown given in paragraph 10 of document CNL(98)22;
3) the extent of catch and release fishing;
4) the measures taken to further minimise the level of unreported catches.

5.5 By-Catch of Atlantic Salmon

At its Fourteenth Annual Meeting the attention of the Council was drawn to the enormous growth of fishing for pelagic species of fish in the North-East Atlantic Commission area, principally for herring and mackerel in ICES Division IIa. The concern had been raised that, even if a very small percentage of the catch in these fisheries is salmon post-smolts, the losses could be significant.

The representative of Denmark (in respect of the Faroe Islands and Greenland) provided the Council with information on the spatial and temporal distribution of Atlantic salmon post-smolts and of the pelagic fish species. He agreed to submit this information to the Secretary. The Council agreed that it needed further information on the possible by-catch of salmon in pelagic fisheries, and asked the Secretary to write to the Contracting Parties requesting any available information. Information should also be sought from, *inter alia,* the North-East Atlantic Fisheries Commission.

5.6 Fishing for Salmon in International Waters by Non-Contracting Parties

The Secretary presented a report, CNL(98)24, describing actions taken in relation to the Resolution on Fishing for Salmon on the High Seas. There have been no sightings since February 1994 but there have been few surveillance flights over the winter and spring period. The Council asked the Secretary to continue to take action in relation to any future sightings.

5.7 Scientific Research Fishing in the Convention Area

The Secretary introduced document CNL(98)25 which summarised actions taken since the last annual meeting. Reports on this research were presented.

5.8 **Impacts of Aquaculture on Wild Salmon Stocks**

(a) Convenors' Report on the ICES/NASCO Symposium

The Secretary introduced a summary of the report by the Convenors, CNL(98)26, of the ICES/NASCO Symposium on 'Interactions between Salmon Culture and Wild Stocks of Atlantic Salmon: The Scientific and Management Issues' held in 1997. The Council noted this report.

(b) Report of the Meeting on Implementation of the Oslo Resolution

In 1997 the Council recognised that if there was to be full implementation of the Resolution by the Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean to Minimise Impacts from Salmon Aquaculture on the Wild Salmon Stocks (the "Oslo Resolution") by 1998, as had been the intention when the Resolution was adopted in 1994, further measures would be needed. A Working Group was held in Brussels during 26-27 January 1998 to consider the implementation of the Oslo Resolution in the light of the information arising from the ICES/NASCO Symposium.

The Council reviewed the report of this Working Group, CNL(98)27 (Annex 19). The Council adopted all of the recommendations in document CNL(98)27 and strongly encouraged the Contracting Parties to fully implement the Oslo Resolution. The Council asked the Secretary to prepare a document containing both the Oslo Resolution and these new recommendations. This document should also refer to the Organization's other Resolutions and Guidelines concerning introductions and transfers and transgenic salmon. The need for consistency between the recommendations adopted for aquaculture and those concerning the Precautionary Approach was stressed. The Council agreed that it would be desirable to consider, for each Contracting Party, how various aspects of the Oslo Resolution are implemented, and the priority issues. It was agreed that each year reports will be made by two Contracting Parties and that there should be an opportunity for comment on and discussion of the measures taken in a Special Liaison Meeting with the Aquaculture Industry. The authorities from NASCO Parties which deal with aquaculture issues should also be invited to participate. The Secretary was asked to develop procedures for such sessions in consultation with Heads of Delegations. For 1999 it was agreed that reports would be presented by Canada and Norway, and for 2000 by the United States of America and the European Union.

The representative of the European Union stated that although neither the Oslo Resolution nor the recommendations developed are binding on the Contracting Parties, the measures are necessary and should be fully implemented.

(c) Returns made in Accordance with the Oslo Resolution

The Secretary presented reports, CNL(98)28 (Annex 20) and CNL(98)37 (Annex 21), on the returns made in accordance with Article 5 of the Oslo Resolution. In accordance with the recommendations of the Working Group

on Implementation of the Oslo Resolution (see paragraph 5.8(b) above), the returns for 1998 had been requested according to a new, more detailed format.

(d) Report of the Meeting of the Aquaculture Liaison Group

The Secretary presented a report, CNL(98)29 (Annex 22), of the first meeting of the Liaison Group which was held in Glasgow on 20 March 1998. The meeting was a first step in cooperating more closely with the salmon farming industry with the aim of avoiding adverse impacts on the wild stocks in concert with the development of that industry. The meeting had allowed a frank exchange of views. The Council welcomed the cooperation with the salmon farming industry, supported the proposals in the report and encouraged wider participation and closer liaison on these issues.

(e) NASCO Guidelines for Action on Transgenic Salmon

At its Fourteenth Annual Meeting the Council had expressed its concerns about the risks posed by transgenic salmon and had adopted NASCO Guidelines for Action on Transgenic Salmon, designed to prevent impacts on the wild stocks. Under these guidelines the Parties agreed to advise the Council of any proposal to permit the rearing of transgenic salmonids, providing details of the proposed method of containment and other measures to safeguard the wild stocks.

5.9 **Guidelines on Stocking**

The Secretary reported that, due to other commitments, it had not been possible to produce Draft Guidelines on Stocking. The Council agreed that it would consider Draft Guidelines on Stocking at its Sixteenth Annual Meeting.

5.10 **Guidelines on Catch and Release**

At its last annual meeting the Council had adopted guidelines on catch and release. During the year these guidelines had been published. The Secretary reported (CNL(98)31) that the guidelines had been extremely well received and in response to demand had been translated into French. To date, approximately 20,000 copies have been distributed. In addition to promoting conservation by use of techniques to improve the survival of fish where it is decided to release them, the guidelines have increased awareness of the Organization and its conservation work.

5.11 **Reports on Conservation Measures Taken by the Three Regional Commissions**

The Chairman of each of the three regional Commissions reported to the Council on their activities.

6. Election of Officers

6.1 On a proposal from the US, seconded by Norway, the Council unanimously re-elected Mr Einar Lemche (Denmark (in respect of the Faroe Islands and Greenland)) as President. On a proposal from Canada, seconded by the Russian Federation, Mr Ole Tougaard (European Union) was unanimously re-elected as Vice-President.

7. Other Business

7.1 There was no other business.

8. Date And Place of Next Meeting

8.1 The Council agreed to hold its Sixteenth Annual Meeting in Ireland from 7-11 June 1999.

8.2 The Council accepted an invitation to hold the Seventeenth Annual Meeting in Canada from 5-9 June 2000.

9. Draft Report of the Meeting

9.1 The Council agreed the draft report of the meeting, CNL(98)34.

10. Press Release

10.1 The Council adopted a press release, CNL(98)50 (Annex 23).

NOTE: The Annexes mentioned above begin on page 19, following the French translation of the report of the meeting.

CNL(98)51

Compte rendu de la Quinzième réunion annuelle du Conseil 8-12 Juin 1998, Edimbourg, Ecosse

1. Séance d'ouverture

1.1 Le Président, M. Einar Lemche, a ouvert la conférence et souhaité la bienvenue à Edimbourg aux délégués avant de prononcer une déclaration d'ouverture portant sur le travail de l'Organisation (annexe 1).

1.2 Les représentants du Canada, du Danemark (pour les îles Féroé et le Groenland), de l'Union Européenne, de l'Islande, de la Norvège, de la Fédération de Russie, et des Etats-Unis d'Amérique ont prononcé leur déclaration d'ouverture (annexe 2).

1.3 Le représentant de la Commission internationale des pêches de la mer Baltique, présent en tant qu'Organisation intergouvernementale (OIG), a prononcé sa déclaration d'ouverture (annexe 3).

1.4 Les représentants de nombre d'organisations non gouvernementales (ONG) ont prononcé leur déclaration d'ouverture conjointement. Les organisations ci-dessous ont également prononcé leur déclaration d'ouverture (annexe 4): L'Alliance européenne des pêcheurs à la ligne, la Fédération des pêcheurs à la ligne de saumons et de truites de mer d'Irlande, l'Institut de Gestion des pêcheries, l'Association nationale représentant les pêcheurs à la ligne, l'Association écossaise de la pêche du saumon au filet et l'Association nationale des pêcheurs à la ligne écossais.

1.5 Le Président a exprimé sa reconnaissance aux Parties, a l'OIG et aux ONG pour leurs déclarations et a clos la séance d'ouverture.

1.6 Une liste des participants figure en annexe 5.

2. Adoption de l'ordre du jour

2.1 Le Conseil a adopté son ordre du jour, le document CNL(98)48 (annexe 6).

3. Questions administratives

3.1 Rapport du Secrétaire

Le Président a fait part de la décision du Conseil de réélire le Secrétaire pour une période de cinq ans et a remercié le Secrétaire et son personnel pour le travail qu'ils avaient accompli au nom de l'Organisation. Le Secrétaire a remercié le Conseil de sa confiance et a exprimé sa reconnaissance envers ses employés pour l'excellence de leur travail.

Le Secrétaire a rendu compte au Conseil, de par son rapport CNL(98)5, des questions suivantes: état d'avancement des ratifications et des adhésions à la Convention, nombre des adhérents aux Commissions régionales, demandes d'obtention du statut d'observateur à la réunion de 1998, suggestions de thèmes pour les Séances spéciales,

réunion éventuelle avec la Commission des poissons anadromes du Pacifique nord (CPAPN), projets entrepris par l'Organisation, propriété du siège, et l'établissement du Parlement d'Ecosse et ce que ceci implique pour l'OCSAN. A ce compte rendu sont venus s'ajouter des rapports sur l'état apuré des comptes pour 1997, CNL(98)6, ainsi que sur le budget provisoire, CNL(98)8.

Le Secrétaire a indiqué que les Parties avaient toutes envoyé leurs contributions pour 1998, à l'exception de l'Islande. Le représentant d'Islande avait, cependant, assuré au Secrétaire que leur contribution serait versée.

Compte tenu des recommandations du Groupe de travail chargé de l'approche préventive dans le cadre de la gestion du saumon nord atlantique, le Conseil a convenu de tenir une Séance spéciale dédiée aux questions d'habitat, au cours de sa Seizième réunion annuelle en 1999. Le Secrétaire a ainsi été prié de préparer des propositions pour cette Séance spéciale en consultation avec les Chefs de délégations. Le Conseil a également reconnu qu'il serait utile de tenir une réunion conjointe avec la CPAPN afin d'échanger des informations d'intérêt mutuel. La Commission internationale des pêches de la mer Baltique devrait également être invitée à participer. Il serait opportun que la réunion comprenne des séances portant sur les aspects scientifiques de l'approche préventive et sur son application à la gestion du saumon. Le conseil a convenu que la planification de cette réunion coïnciderait, dans la mesure du possible, avec une réunion de la CPAPN, qui devrait probablement se tenir à Seattle ou à Vancouver et a réservé la plage du 15 au 26 mars 1999 à cet effet. En supposant que la CPAPN soit disposée à donner suite à cette proposition et que les dates soient acceptables, le Secrétaire a été prié de finaliser les préparatifs et d'informer les Parties.

Le Conseil a donné son accord en principe pour que l'information saisie sur les bases de données de l'Organisation soit mise à la disposition du public. Le Secrétaire a été prié de mettre au point une proposition qui étudierait comment cette information pourrait être rendue plus accessible et quelles conditions et démentis il faudrait lier à l'utilisation des données. L'information des bases de données devrait être mise à la disposition du public par voie électronique de préférence.

3.2 Rapport de la Commission financière et administrative

Le Président de la Commission financière et administrative, M. Eero Niemela, a présenté le rapport de la Commission, CNL(98)9. Suite aux recommandations de la Commission, le Conseil a pris les décisions suivantes:

(a) demander au Secrétaire de continuer à travailler en liaison avec le CIEM et les autres Commissions quant à la contribution au CIEM;

(b) ajuster, dans la mesure du possible, les contributions des Parties de façon à tenir compte de la différence entre les statistiques de captures provisoires et les statistiques de captures confirmées. Cette mesure devrait entrer en vigueur à partir des contributions de 1999;

(c) nommer Coopers et Lybrand, Edimbourg, en tant que vérificateur des comptes pour l'année 1998;

(d) accepter la déclaration financière révisée de 1997, CNL(98)6;

(e) adopter un budget pour 1999 et prendre acte du budget prévisionnel pour l'an 2000, CNL(98)49 (annexe 7);

(f) adopter le rapport de la Commission financière et administrative.

Le Président a remercié M. Niemela pour son excellent travail et pour celui de la Commission.

3.3 Rapport sur les activités de l'Organisation en 1997

Le Conseil a adopté un rapport adressé aux Parties, CNL(98)10, portant sur les activités de l'Organisation en 1997, conformément à l'article 5, paragraphe 6 de la Convention.

4. Questions scientifiques, techniques, juridiques et autres

4.1 Recommandations scientifiques du CIEM

Le représentant du CIEM a présenté au Conseil le rapport du Comité consultatif sur la gestion des pêcheries (CCGP), CNL(98)12 (annexe 8).

4.2 Compte rendu du Comité scientifique permanent

Le Président du Comité a présenté une demande provisoire de recommandations scientifiques au CIEM. Sur le conseil du Comité, le Conseil a adopté une demande de recommandations scientifiques au CIEM, CNL(98)13 (annexe 9).

4.3 Statistiques de captures et analyses

Le Secrétaire a présenté un document statistique portant sur les déclarations de captures officielles effectuées par les Parties en 1997, CNL(98)14 (annexe 10), et sur les données historiques pour la période 1960-1997.

Le Conseil avait déjà pris acte des divergences entre les statistiques fournies par le CIEM et celles que les Parties avaient officiellement présentées à l'OCSAN et avait prié le Secrétaire d'élucider la question. Le Secrétaire a indiqué que le problème avait maintenant été résolu et qu'il n'y avait dans le cas des données de captures de 1997 qu'une légère différence entre l'information fournie au CIEM et celle fournie à l'OCSAN.

4.4 Marquage et Programme d'encouragement au retour des marques

Le Secrétaire a présenté un résumé des données sur les lâchers de marques, CNL(98)16, qui avait été rédigé à partir des informations communiquées par le CIEM. A son avis, cette compilation qui était nécessaire dans les premiers temps, pourrait maintenant être abandonnée. Le Conseil a accepté cette proposition.

Le Secrétaire a rendu compte des activités du Programme d'encouragement de retour de marques en 1997/98, CNL(98)17. En 1997, les activités des Parties et de l'Organisation avaient reçu une publicité favorable grâce à la remise des prix. On avait par ailleurs rediffusé le message soutenant la nécessité de renvoyer les marques

scientifiques. Ainsi, plus de 2 000 marques externes ont été inclues dans le tirage au sort de 1998.

Le Président a annoncé que le tirage au sort du Programme avait été effectué par le Commissaire aux Comptes, au siège de l'OCSAN, le 1 juin. Le gagnant du Grand Prix de 2 500 $ est M. A. Thomas de Llangollen au Pays de Galles. Le Conseil a félicité le gagnant.

4.5 Revue des publications internationales portant sur le saumon parues en 1998

Le Conseil a pris acte d'une revue de publications portant sur le saumon atlantique parues en 1997, CNL(98)18, qui avait été compilée conformément à l'article 13, paragraphe 2 de la Convention. Le représentant de Norvège a suggéré qu'à l'avenir cette information soit mise à la disposition du public électroniquement par le biais d'un site web OCSAN.

5. Conservation, restauration, mise en valeur et gestion rationnelle des stocks de saumons

5.1 Mesures prises au titre des articles 14 et 15 de la Convention

Le Secrétaire a présenté un compte rendu sur les renvois effectués au terme des articles 14 et 15 de la Convention, CNL(98)19 (annexe 11).

5.2 Séance Spéciale sur l'approche préventive dans le cadre de la gestion du saumon

Le Conseil avait, l'année dernière, constitué un Groupe de travail chargé d'étudier comment l'approche préventive pouvait être appliquée au travail de l'OCSAN. Afin d'étudier et de débattre ce sujet ainsi que les recommandations formulées par le Groupe du travail en détail, le Conseil a tenu une Séance spéciale dédiée à l'approche préventive dans le cadre de la gestion du saumon. Des exposés ont été faits sur les "Principes de l'approche préventive" et sur "L'application de l'approche préventive au travail de l'OCSAN". L'adoption de l'approche préventive a reçu un soutien unanime et nombre de questions ont été soulevées lors des débats, questions qui ont été par la suite étudiées sous le point 5.3 de l'ordre du jour (voir ci-dessous).

5.3 Rapport du Groupe de travail sur l'approche préventive dans le cadre de la gestion du saumon

Le Conseil a étudié le rapport du Groupe de travail chargé de l'approche préventive dans le cadre de la gestion du saumon, CNL(98)21 (annexe 12). La Norvège ainsi que la Fédération de Russie ont également présenté des documents sur ce sujet, (CNL(98)35 (annexe 13) et CNL(98)39 (annexe 14) respectivement).

A la lumière du rapport du Groupe de travail, le Conseil et les Parties signataires ont convenu d'adopter et d'appliquer une approche préventive à la conservation, la gestion et l'exploitation du saumon atlantique afin de protéger la ressource et les milieux dans lesquels elle évolue. Le Conseil a convenu d'adopter et d'appliquer les recommandations du Groupe de travail, CNL(98)46 (annexe 15). Le Conseil et les Parties signataires ont également convenu d'un avant-projet de plan d'action pour l'application de l'approche préventive dans le cadre de la gestion du saumon,

CNL(98)47 (annexe 16). Les Parties seront invitées à faire part au Secrétariat de leurs commentaires sur ce plan préliminaire par écrit. Le Conseil a décidé de constituer un Groupe de travail dont la tâche serait d'affiner ce plan. Le mandat de ce Groupe de travail a été fixé, CNL(98)44 (annexe 17).

Le Conseil a choisi de déterminer comme priorité et nécessitant une action immédiate l'établissement de limites de conservation spécifiques à chaque rivière pour les stocks de la zone de la Commission de l'Atlantique du Nord-Est.

Le Conseil s'est mis d'accord sur ce qui devait être obtenu en matière de recommandations scientifiques dans le contexte de l'approche préventive, CNL(98)41, le texte ayant été soumis au Comité scientifique permanent pour inclusion dans la demande de recommandations scientifiques du CIEM.

5.4 Captures non déclarées

L'année dernière, le Conseil avait prié le Secrétaire d'entreprendre un examen des mesures que l'OCSAN avait déjà prises pour améliorer le niveau de déclaration des captures. Il a été convenu que l'on demanderait aux Parties, à la lumière du rapport du Secrétaire, CNL(98)22 (annexe 18), de faire un exposé au cours de la Quinzième réunion annuelle sur les mesures qu'elles avaient elles-mêmes prises pour améliorer le niveau des déclarations de captures. Le Conseil a exprimé son inquiétude à propos du haut niveau de captures non déclarées et a insisté fortement sur la nécessité de minimiser le niveau de ces captures. Il a été décidé de charger le CIEM de fournir une ventilation des captures non déclarées par zone de stock. Les Parties ont ainsi été invitées à fournir autant d'informations que possible. Il a été d'autre part convenu de demander au Secrétaire d'obtenir chaque année auprès des Parties signataires les informations suivantes:

1) une description de son contrôle de gestion et des systèmes de rapport par pays;
2) une explication de la façon à laquelle elle arrive au nombre de captures non déclarées présentée d'une façon similaire à la ventilation figurant au paragraphe 10 du document CNL(98)22;
3) le volume de la pêche avec remise à l'eau des captures;
4) les mesures prises afin de réduire encore plus le niveau des captures non déclarées.

5.5 Prises accidentelles du saumon atlantique

Lors de la Quatorzième réunion annuelle, l'on avait attiré l'attention du Conseil sur le fait que la pêche aux espèces pélagiques dans la zone de la Commission de l'Atlantique du Nord-Est avait énormément augmenté, surtout dans le cas du hareng et du maquereau dans la division IIa du CIEM. Le fait que les pertes en saumon pouvaient être considérables, même si les post-smolts de saumons ne représentaient qu'un faible pourcentage des captures dans ces pêcheries avait en effet suscité des inquiétudes.

Le représentant du Danemark (pour les îles Féroé et le Groenland) a fourni au Conseil des informations, dans l'espace et dans le temps, sur la distribution des post-smolts de saumons et des espèces de poissons pélagiques. Il a convenu de soumettre ces

renseignements au Secrétaire. Le Conseil s'est mis d'accord sur le fait que de plus amples informations sur les possibilités de captures accidentelles de saumons dans les pêcheries pélagiques étaient nécessaires, et a prié le Secrétaire d'écrire aux Parties signataires pour leur demander de fournir toute information disponible. Cette information devrait également être requise auprès, *inter alia,* de la Commission des Pêcheries de l'Atlantique du Nord-est.

5.6 **Pêche au saumon effectuée en eaux internationales par les Parties non-signataires**

Le Secrétaire a présenté le rapport CNL(98)24 décrivant les mesures prises dans le cadre de la Résolution sur la pêche au saumon en haute mer. Aucun navire n'a été détecté depuis février 1994, mais il faut noter qu'il n'y avait eu que peu de vols de surveillance au cours des périodes hivernale et printanière. Le Conseil a prié le Secrétaire de continuer à prendre les mesures nécessaires dans l'éventualité de toutes détections futures.

5.7 **Pêche à des fins scientifiques dans la zone de la Convention**

Le Secrétaire a présenté le document CNL(98)25 qui résume les mesures prises depuis la dernière Réunion annuelle. Des rapports sur la recherche ont également été présentés.

5.8 **Effets de l'aquaculture sur les stocks de saumons sauvages**

(a) Rapport des organisateurs du co-symposium CIEM/OCSAN

Le Secrétaire a présenté un résumé du rapport rédigé par les organisateurs du co-symposium CIEM/OCSAN, CNL(98)26, tenu en 1997 et qui traitait des 'Interactions entre l'élevage du saumon et les stocks sauvages de saumons atlantiques: science et gestion'. Le Conseil a pris acte de ce rapport.

(b) Compte rendu de la réunion portant sur la mise en oeuvre de la Résolution d'Oslo

En 1997, le Conseil avait reconnu que des mesures supplémentaires seraient nécessaires si l'on voulait voir, d'ici 1998, une complète mise en oeuvre de la "Résolution passée par les Parties dans le cadre de la Convention pour la conservation du saumon dans l'océan Atlantique Nord visant à minimiser les effets du saumon d'aquaculture sur les stocks de saumons sauvages" (la Convention d'Oslo), comme cela avait été prévu lorsque la Résolution avait été adoptée en 1994. Une réunion du Groupe de travail s'est tenue à Bruxelles les 26 et 27 janvier 1998 en vue d'étudier l'application de la Résolution d'Oslo au vu des renseignements obtenus lors du symposium CIEM/OCSAN.

Le Conseil a examiné le rapport de Groupe de travail, CNL(98)27 (annexe 19) et en a adopté les recommandations. Le Conseil a par ailleurs fortement incité les Parties signataires à exécuter la Résolution d'Oslo dans son intégralité. Le Conseil a demandé au Secrétaire de préparer un document qui contiendrait la Résolution d'Oslo et ces nouvelles recommandations. Ce document devrait également faire référence aux autres Résolutions et Orientations de l'Organisation portant sur les introductions et transferts et le saumon transgénique. La nécessité de cohérence entre les recommandations adoptées pour l'aquaculture et celles concernant l'approche préventive a été soulignée. Le Conseil a convenu qu'il serait souhaitable d'étudier, pour chaque Partie signataire, comment les différents aspects de la Résolution d'Oslo devraient être mis en oeuvre, et de déterminer les questions prioritaires. Il a été convenu que deux Parties signataires présenteraient chaque année des rapports et que la possibilité de commenter et de débattre les mesures prises serait offerte au cours d'une Réunion spéciale de liaison avec l'industrie salmonicole. Les responsables des Parties membres de l'OCSAN chargés des questions aquacoles seraient également invités à participer. On a prié le Secrétaire d'organiser des procédures pour ces séances, en consultation avec les Chefs des délégations. On a convenu que le Canada et la Norvège présenteraient leur rapport en 1999, suivis des Etats-Unis d'Amérique et de l'Union Européenne en l'an 2000.

Le représentant de l'Union Européenne a déclaré que, même si la Résolution d'Oslo et les recommandations n'engagaient pas les Parties signataires, les mesures étaient nécessaires et devraient être pleinement exécutées.

(c) Renvois réalisés dans le cadre de la Résolution d'Oslo

Le Secrétaire a présenté les rapports, CNL(98)28 (annexe 20) et CNL(98)37 (annexe 21), sur les renvois réalisés conformément à l'article 5 de la Résolution d'Oslo. Conformément aux recommandations du Groupe de travail sur la mise en application de la Résolution d'Oslo (voir paragraphe 5.8(b), ci-dessus), l'on avait demandé à ce que les renvois de 1998 suivent un nouveau format plus détaillé.

(d) Compte rendu de la réunion du Groupe de liaison «Aquaculture»

Le Secrétaire a présenté un rapport, CNL(98)29 (annexe 22), portant sur la première réunion du Groupe de liaison qui a eu lieu à Glasgow le 20 mars 1998. La réunion représentait le premier pas vers une coopération plus étroite avec l'industrie salmonicole. Elle avait pour double objectif d'éviter les effets défavorables des stocks d'élevage sur les stocks sauvages tout en continuant à développer cette industrie. La réunion avait permis un franc échange d'opinions. Le Conseil a accueilli favorablement la coopération avec l'industrie salmonicole, a offert son soutien aux propositions contenues dans le rapport et a encouragé une participation plus large, et une liaison plus étroite, sur ces questions.

(e) Orientations de l'OCSAN pour une action sur le saumon transgénique

Lors de sa Quatorzième réunion annuelle, le Conseil avait exprimé ses préoccupations quant aux risques posés par le saumon transgénique et avait adopté les orientations de l'OCSAN recommandant l'application de mesures concernant le saumon transgénique, conçues pour éviter les effets nuisibles sur les stocks sauvages. Selon ces orientations, les Parties ont convenu d'informer le Conseil de toute proposition qui permettrait l'élevage de salmonidés transgéniques, donnant les détails de la méthode de confinement prévue et des autres mesures prises pour protéger les stocks sauvages.

5.9 **Orientations sur le repeuplement**

Le Secrétaire a indiqué qu'en raison d'autres engagements, il n'a pas été possible de préparer un avant-projet d'orientations sur le repeuplement. Le Conseil a ainsi convenu de reporter l'étude de ce document à sa Seizième réunion annuelle.

5.10 **Orientations sur la remise à l'eau des prises**

Lors de sa dernière Réunion annuelle, le Conseil avait adopté des orientations sur la pêche avec remise à l'eau des prises. Ces orientations ont été publiées au cours de l'année. Le Secrétaire a déclaré (CNL(98)31) que les orientations avaient été très bien accueillies et, compte tenu de la demande, avaient été traduites en français. A ce jour, 20 000 exemplaires du document avaient été diffusés. Mis à part le fait d'encourager la conservation par l'utilisation de techniques qui augmentent la survie du poisson, là ou il est décidé de les remettre à l'eau, les orientations ont également servi à rendre le public plus conscient de l'existence de l'Organisation et de son travail dans le domaine de la conservation.

5.11 **Rapports sur les initiatives de conservation prises par les trois Commissions régionales**

Le Président de chacune des trois Commissions régionales a soumis au Conseil un compte rendu de leurs activités.

6. Election des Responsables

6.1 A la suite d'une proposition par les Etats-Unis, appuyée par la Norvège, le Conseil a réélu à l'unanimité M. Einar Lemche (Danemark (pour les îles Féroé et le Groenland))

en tant que Président. A la suite d'une proposition reçue du Canada, appuyée par la Fédération de Russie, M. Ole Tougaard (Union Européenne) a été réélu Vice-Président à l'unanimité.

7. Divers

7.1 Aucune autre question n'a été traitée.

8. Date et lieu de la prochaine réunion

8.1 Le Conseil a convenu de tenir sa Seizième réunion annuelle en Irlande, du 7 au 11 juin 1999.

8.2 Le Conseil a accepté l'invitation de tenir sa Dix-septième réunion annuelle au Canada, du 5 au 9 juin 2000.

9. Compte rendu préliminaire de la réunion

9.1 Le Conseil a adopté le compte rendu préliminaire de la réunion, CNL(98)34.

10. Communiqué de presse

10.1 Le Conseil a approuvé le communiqué de presse, CNL(98)50 (annexe 23).

ANNEX 1

Opening Statement made by the President

Distinguished Delegates, Ladies and Gentlemen:

After 5 years away on a long migration which took us first to Oslo then Glasgow then Gothenburg, we, like the salmon, moved across to Greenland last year where, as most of you will recall, we held our Annual Meeting in Ilulissat. Most of us have survived this long migration. Now we are back in Edinburgh. I would like to welcome you back to your home base. I suppose you could say it is the place where we were spawned - though I think the spawning process was a little more complicated than for the salmon. It certainly took a lot longer.

Last year there were two major issues that concerned the Council. The first was the impacts of salmon aquaculture; the question of whether we are running risks of irreversible genetic change as well as transmission of diseases and parasites. We set up a Working Group on this matter chaired by the Secretary. The Working Group is convinced that we have not moved far enough and fast enough. I believe that we must give this matter much more attention during these next few days. In that regard, we shall also need to put our relations with the international salmon farming industry on a firm basis. While we may want to see a successful salmon farming industry, it must not be at the expense of the wild salmon.

The second major issue is the adoption by NASCO of a new principle, the Precautionary Approach. We held a Working Group on this subject earlier this year. We also held an interesting Special Session yesterday when some of the issues were discussed in detail. Here again, we shall need to consider very carefully how to proceed. It is a complex subject and although I do not personally believe that we can move on every front in a very fast way, indeed it would be essential to consider each step, I do think that we must take a decisive first step here this week. Apart from these major tasks the Council has agreed to look at Unreported Catches, By-catch of Salmon in fisheries for pelagic species, and our new Guidelines on Stocking. So we have much to do.

The Commissions all have work to do and so we all have to cover a lot of ground in these next few days. Nevertheless, our Organization has shown that it can be a successful forum for international cooperation in a way that few felt possible only a dozen years ago. We have shown the ability to work together with a good spirit and I feel sure that we will do so again this week.

Finally, I would like to give a special welcome to our NGOs who, if I might say so, made a very helpful contribution to the Special Session yesterday. Their contribution to our work is growing and we see this partnership as very important for the future.

With these remarks, I now invite the Parties to make Opening Statements. I believe that last year I started at the end of the alphabet so this year I would like to revert to alphabetical order and I give the floor to the Representative of Canada.

ANNEX 2

Opening Statements made by the Parties

Opening Statement made by Canada

Mr President, Distinguished Delegates, Observers, Ladies and Gentlemen:

It is a pleasure to be in Edinburgh, the home of NASCO. On behalf of the entire Canadian delegation, I would like to express our appreciation for the warmth of our welcome and for the excellence of the arrangements. We are looking forward to both an enjoyable and a productive Fifteenth Annual Meeting.

We have many issues to address, but there are two broad themes which underlie our discussions this week:

- scientific assessment and advice which focuses us on the critical state of wild salmon stocks throughout the North Atlantic; and

- application of the Precautionary Approach as a framework for more effective conservation action.

The condition of the stocks continues to deteriorate, and we do not have a clear understanding of why. Much has been done. More is required. Because the future of the stock remains unclear, a Precautionary Approach is essential.

We have consulted broadly in Canada on the report of the Working Group which met in Brussels in January. The predominant view was that there is a critical need to support further application of the Precautionary Approach both in Canada and internationally through NASCO. We will strongly support adoption of the framework recommended by the Working Group. We will be taking further action to convert this framework to reality, and we urge all other Parties to do so as well.

Canadian stakeholders, in their comments to us, made several good points on priorities which should be emphasised and balanced in applying the approach, and we will convey those points when we discuss this item later in the Council's agenda.

In Canada we have made a fundamental commitment to application of the Precautionary Approach in the development of long-term strategies and objectives for all of our fisheries. Canadians want this applied on both the Atlantic and Pacific Coasts. They want it applied equitably both domestically and internationally. We have begun to apply it very specifically for several species, including both Atlantic and Pacific salmon.

Last year in Ilulissat we presented in detail the substantial effort that Canada has put into Atlantic salmon conservation, restoration and enhancement. Major reductions in fisheries have been imposed and large investments have been made. This includes some $75 million in commercial licence retirements alone, and a further $85 million in habitat restoration, enhancement and measures to improve recreational fish stocks.

Well before the scientific assessments were completed this year, we realised from the discouraging decline in 1997 returns that even more stringent actions were needed. Later in this meeting I shall present a more detailed overview of our Atlantic Salmon Action Plan for 1998. In brief summary, however, those actions to date include:

- a commercial fishing moratorium and licence retirement program for the Straits of Labrador in the fall of 1997;

- an extension of the 1992 commercial fishing moratorium on the Island of Newfoundland and further restrictions on retention to one grilse in the recreational fishery;

- further restrictions to grilse only in the recreational fishery in the Maritime provinces, where no commercial fishery has been allowed for many years;

- a joint program of the Government of Canada and the Province of Quebec to retire the commercial licences for the fishery on the Lower North Shore of the St. Lawrence River, which will virtually end the commercial fishery in Quebec and reduce the total catch in Quebec by some 50%.

In all these areas the federal and provincial governments, with the cooperation of our stakeholders, are expanding the application of the Precautionary Approach on a river-specific basis. Several rivers have been closed to fishing altogether, several more have river-specific restrictions and are subject to a "stoplight" system of in-season review. This even applies to catch and release fishing where water conditions may lead to unacceptable risk of mortality.

The remaining focus for 1998 is action under our Long Term Strategy and Management Plan for Labrador, which I described in detail in our presentation last year.

The priorities throughout Canada for Atlantic salmon strategies and management plans are to serve first conservation and then, in order of precedence, the rights of aboriginal peoples, the recreational fishery and finally the commercial fishery. All of these are important factors in the Labrador fishery.

Decisions are now being made on significant further restrictions throughout the Labrador fishery, and I will be able to report the details to you very soon.

The issues in Labrador illustrate the challenge of reconciling stringent scientific advice for conservation with the special needs of remote northern communities. Yesterday, in the Special Session discussion, there was discussion on socio-economic factors as a criterion in applying the Precautionary Approach. We do indeed need to provide for the critical needs of both the resource and the users of the resource. The founders of NASCO recognised this and expressed it in Article 9 of the Convention. This prescribes an integrated approach taking into account the best available scientific advice together with several other factors. Nevertheless, conservation remains our first priority and ultimate goal.

The application of the Precautionary Approach is closely related to another important set of issues which we will consider at this meeting - aquaculture and the interactions of farmed salmon with the wild stock. We are committed to applying the Precautionary Approach in a context which allows for the development of a environmentally sound, economically viable and commercially competitive aquaculture industry. We firmly believe that this is feasible. In the discussions ahead we will speak of the factors which we in government and the Canadian industry consider central to allowing for the development of a healthy industry co-existing with a healthy wild stock.

We are taking action toward that goal, and I look forward to a detailed exchange of views on progress in implementing the Oslo Resolution. We regard progress on containment as a key basis both to mitigate impacts on wild stocks and to open up new opportunities for the industry. With our US partners in the North American Commission, we are committed to our

obligations under the NAC Protocols for Introductions and Transfers. These are mandatory. We will also be urging, in the interests of both conservation and equity, that our colleagues in the North-East Atlantic Commission make their guidelines mandatory. A competitively level international playing field for our industries will greatly facilitate progress in application of the Precautionary Approach.

Mr President, I should not take too much advantage of being first in the alphabet at this table. I look forward to hearing the remarks of my colleagues, and then to going to work under your, as ever, wise leadership.

Opening Statement made by Denmark (in respect of the Faroe Islands and Greenland)

Mr President, Distinguished Delegates, Observers, Ladies and Gentlemen:

It is a great pleasure to be here in Edinburgh at the Fifteenth Annual Meeting of NASCO. It is always a pleasure to be here in Scotland and many links have been made between the people of the Faroe Islands and the people of Scotland. This year it is also an opportunity to celebrate The Year of the Ocean. To the people of the Faroe Islands and Greenland the ocean and its resources play a major role in our existence. Thus the socio-economic impact from management decisions on fisheries are considerable. The salmon fisheries in the Faroe Islands and Greenland are very important to the people in our countries.

However, this Fifteenth Annual Meeting of NASCO is again a further step forward in our discussions between the Parties and presents an opportunity for the Organization to strengthen regional co-operation in the North-East Atlantic and West Greenland Commissions and to study the management of salmon. One of the steps is the ongoing work in NASCO with the implementation of the Precautionary Approach.

In NASCO we also have the opportunity to raise our concerns on measures taken for rational management, conservation and sustainable utilisation of the living resources of the sea and to develop such management procedures which take into account our customary method of fisheries with respect to the stocks.

Of great concern is the high proportion of unreported catches of salmon which are estimated to be several times higher than the combined quotas of the Faroe Islands and Greenland. It is of major importance that NASCO focuses on this issue.

Many other factors are affecting the salmon stocks, and great losses of salmon are caused by pollution, habitat damage, and impacts from aquaculture. All these factors reduce the spawning opportunities and the survival of wild salmon, and their impacts are more severe than the effects of the fisheries at the Faroe Islands and Greenland.

Since 1991 the Faroese quota has been significantly reduced to the present level. The fishery has only been on a research basis during these years. However, we would like to stress our right to fish and maintain a sustainable utilisation of the stocks based upon the best scientific advice presented to NASCO, bearing in mind the Precautionary Approach, and that research fishing is the best way to obtain scientific information necessary for advice on sustainable management. This means that the Faroese quota share cannot be lower than the existing level.

The Faroese research fishery has been recognised as of major importance to the scientific programme and a continuation of this research is recommended by ICES. With a large herring stock together with mackerel and blue whiting, the role of salmon in the ecosystem in the North-East Atlantic needs to be further investigated.

Our delegation fully undertake the principles of burden sharing and recognise the fact that it should be based upon the abundance of salmon and not only on the catch levels. In our opinion the present level of the stocks are not adequately represented by the total homewater catches. The lower catches in homewaters in recent years are partly due to a reduction in effort and of lower abundance.

We are looking forward to hearing the views of the Parties and to discussions which may give us inspiration to agree measures for the rational utilisation of the fisheries resources in the North Atlantic and sustainable fisheries.

Opening Statement made by the European Community

Mr President, Distinguished Delegates and Observers:

This is the Fifteenth Annual Meeting of NASCO and we are once again back in the seat of our Organization's Headquarters in Edinburgh in Scotland, perhaps a little bit less spectacular than last year's venue although I understand that we are almost sitting on a (hopefully) dormant volcano. It is, however, no less beautiful than Ilulissat, but a little more crowded.

As the largest Contracting Party to NASCO, the European Community intends to play a major role in this week's proceedings. Our common interest, as Contracting Parties in NASCO, continues to increase through the years as the complexity of the issues we deal with increases accordingly.

You see before you a European Community delegation representing fifteen countries with very diverse points of view. Our salmon interests range geographically up and down the Community from the Arctic to the Mediterranean. Wherever you go in the Community, there is a direct interest in salmon, with 350 million consumers and many producers.

Edinburgh is a modern and bustling capital city situated in the midst of the salmon-producing areas of the North Atlantic. It has a history which goes back for centuries and I know that it was formerly the home to the kings and queens of Scotland. It is a fitting venue for our meeting this year. This is the place where we must discuss the future of the king of all fish, the wild salmon.

There are a number of important challenges ahead of us in the next few days. It is our duty to make proper decisions on the future of the wild salmon stocks in the North Atlantic. The European Community is fully committed to the sound management of fishery resources based on the best possible scientific information available. This will be the basis for our thinking this week and I believe it will enable us to reach clear decisions on the future management of North Atlantic salmon. We are determined to contribute towards the successful outcome of this year's meeting.

Yesterday, we had the opportunity to discuss in an open forum the Precautionary Approach to fisheries management as it applies specifically to salmon. As we all expected, this debate raised a number of issues, many of which were discussed at our working group meeting in January this year in Brussels. Unfortunately we know and understand far too little about the salmon in our care. It is this fact which has led us, around this table, to examine an approach which will be guided by greater caution and will therefore lead to even sounder management.

We have all had the opportunity to read the long report of the ICES Working Group on North Atlantic Salmon. The ACFM report is a much less arduous read; however, it leaves us with the same message. We need to continue our quest to help the wild salmon to survive. They will not survive without our help. Scientists have given us the tools and it is for us, the managers, to lift up those tools and use them in a responsible manner. The Community will insist that even without having fully endorsed the Precautionary Approach, all the Contracting Parties to NASCO must take their responsibilities with the utmost seriousness in order to guarantee wild salmon for future generations.

In this context, I wish to note with concern the ICES assessment of the state of the salmon stocks in the North Atlantic. Stocks in Southern Europe, in particular, are at unprecedentedly low levels and the situation is especially worrying for multi-sea-winter salmon. Action to

improve the conservation of salmon in homewaters in the European Union is the responsibility of its Member States: I can assure the Council that they take this responsibility seriously and will be considering, in the light of ICES advice, what additional measures are necessary.

Aquaculture is a special case and we are increasingly concerned about its possible impact on the wild salmon and the potential risk for the spread of disease and unwanted genetic impacts. Therefore, we must exercise the utmost caution when decisions are taken on the location of production facilities for aquaculture-reared salmon.

Mr President, it is the first time I have had the opportunity of being in Edinburgh and I would like to take this occasion to thank the people of this city for their instant hospitality. I am very satisfied with all the arrangements that have been made for our comfort and very much look forward to the remainder of my stay. I would like to thank you, Mr President, for all the work you have carried out during the course of the year in preparing our meeting here in Edinburgh. Of course I cannot forget our ever-hard-working Secretary, Malcolm Windsor, and all the members of the Secretariat, who continue to beaver away behind the scenes in order to make each occasion of our meeting as smooth as possible.

Mr President, Distinguished Delegates and Observers, may I wish everyone present from all the Contracting Parties here today the very best from my delegation and may we have success in our common work over the next few days. I look forward to working with you all in the most constructive way possible in order that we can fulfil all the objectives we have set ourselves.

Thank you.

Opening Statement made by Iceland

Mr President, distinguished Representatives, Delegates, Observers, Ladies and Gentlemen:

It is nice to be back in the friendly and familiar surroundings of Edinburgh after many visits to other places such as the exotic town of Ilulissat, where we had our last annual meeting. We saw some beautiful scenery and icebergs in that part of Greenland, but the Atlantic salmon once so plentiful in Disko Bay now seem to be in disturbingly low numbers. The West Greenland Commission has, however, had a remarkable success in controlling the fishing effort in the area based on sound scientific advice. By that remark I am not implying that the West Greenland fishery was the main cause for this decline and the countries of origin certainly have numerous problems right in their backyard ranging from acid rain to river deterioration.

According to our scientific advisers multi-sea-winter stocks in the North-East Atlantic are also in a precarious state and we believe that every effort should be made to minimise mixed stocks fisheries on those stocks both in the open sea as well as in coastal waters. The Icelandic Delegation urges all Members of NASCO to take a precautionary stand in quota decisions so as to allow the multi-sea-winter stocks to start recuperating before the millennium rolls around.

The main purpose of Iceland´s participation in NASCO is to protect all wild stocks of Atlantic salmon and promote their restoration. Coastal fishing for salmon has been prohibited in Iceland since the 1930s and the fishing rights of the remaining coastal farms with heritable netting rights were permanently bought in 1997 through compensation payments amounting to 450 thousand British pounds. This commitment rests to a large extent on salmon river associations as well as private donors. The Icelandic government, however, has pledged to pay up to half of the costs.

The issue of unreported catches will once more be brought up at this meeting. It is totally unacceptable to Iceland, which only has minor errors in its catch statistics, that unreported catches in the NASCO area average close to 30% of the total catches as presented in CNL document CNL(98)22. This anomaly clouds correct estimation of stock abundance and introduces scepticism and suspicion into quota negotiations. Its implications for the contributions to NASCO are obvious. Iceland demands that each country be obliged to provide ICES with its estimate of unreported catches so that these can be provided to NASCO for each Member State.

As reiterated at many previous annual meetings, Iceland is of the view that ranched salmon, which are essentially aquaculture production, should not be included when NASCO contributions are calculated. We emphasise the importance of resolving this problem as soon as possible.

As some of you may know the NASCO contributions have in the past been calculated on the basis of provisional catch figures submitted by many Member States. Iceland has submitted a proposal of correcting these contributions when correct catch figures are available. We hope that this proposal gets a favourable reception in this forum.

Iceland strongly supports the Precautionary Approach both with respect to salmon management and regulation of aquaculture. The growth of salmonid aquaculture in cages in various member countries of NASCO has reached a level where not only neighbouring countries but also more distant ones are threatened with transmission of diseases and possibly

parasites to their wild stocks. NASCO needs to have close liaison with the aquaculture sector in its member countries as well as the public policy makers regarding the aquaculture industry.

The organisational structure of the Icelandic salmonid management system has been undergoing some changes in recent years and the Icelandic parliament recently passed a bill which transferred most of the responsibility of salmonid management decision making, as well as enforcement, from the Ministry of Agriculture to the Directorate of Freshwater Fisheries. This speeds up and increases the efficiency of the salmonid management process and opens up an appeal channel to the Ministry of Agriculture. This change will probably be beneficial for the salmonid resource and more in line with current practices in government.

Thank you, Mr President.

Opening Statement made by Norway

Mr President, Delegates, Observers, Ladies and Gentlemen:

I want to be brief on this occasion - especially since I have discovered that the development within this Organization by far outweighs that of the Norwegian opening statements.

NASCO has shown itself to be a vivid and highly adaptive international forum, able to take appropriate action when faced with new challenges. During the last few years, this Organization has created instruments to deal with such diverse items as fishing for salmon in international waters, research fishing, impacts from salmon aquaculture on the wild salmon stocks, transgenic salmon and protection of wild salmon stocks from introductions and transfers.

In my opinion, we have three major items on this year's agenda. First and foremost, I want to underline our work on the Precautionary Approach in North Atlantic salmon management. The report from the working group on this issue and the Special Session give an excellent basis for fruitful discussions in the Council. We should therefore be in a good position to develop the results of our deliberations on this issues into operative policy. In addition to a strengthening of NASCO's work, this will also affirm NASCO's role as an able organization for conservation and sustainable use of living resources and contribute to the development of international standards.

The second important issue will be the review of NASCO's focus on impacts of aquaculture on the wild salmon stocks and relevant measures to reduce the problems. On this issue, we have a good basis for our work in the report from the Working Group on Implementation of the Oslo Resolution and the returns made by the Parties. In my opinion, this material gives the broad outlines of how NASCO can improve the implementation of the Oslo Resolution and thereby enhance the conservation of the wild salmon stocks as well as the public image and long term profitability of the aquaculture industry. The newly formed liaison group will hopefully make important contributions to this end.

The last major issue I want to mention is the need for balanced and equitable regulatory measures consistent with a Precautionary Approach. In my opinion, the major proof of NASCO's conservation policy lies in the regulatory measures.

Let me say, Mr President, that it gives me great pleasure to be once more in Edinburgh. I want especially to thank the chairmen of the two working groups for their contributions in the preparatory phase and the Secretariat and all those involved for their excellent work in organising and preparing for this meeting.

Opening Statement made by the Russian Federation

Mr President, Distinguished Delegates, Observers, Ladies and Gentlemen:

On behalf of the Russian delegation, please accept my cordial greetings to the Fifteenth Annual Meeting of NASCO here it its home city. I am also very pleased to tell you that the abbreviation 'NASCO' is well known in Russia, especially in its northern areas. Its work is well known and supported and this is proof of the high prestige of this Organization. This is evident because in Russia conservation of Atlantic salmon stocks has become a high priority when management issues are addressed. Therefore, a policy towards the gradual reduction of the commercial fishery was further implemented during the 1997/1998 season.

In the time since the last Annual Meeting NASCO has completed a considerable amount of work and many complex issues have been resolved. NASCO Working Groups on Implementation of the Oslo Resolution and the Precautionary Approach were held in January this year. As always the meetings were held at a high level and their outcome will prepare a good foundation for joint measures aimed at conserving wild salmon stocks. These meetings have demonstrated once again that this conservation can be attained only through efforts made jointly and with the mutual understanding of all Parties concerned.

Our agenda for this year's Annual Meeting of NASCO is, as always, very full. Many interesting and important issues are to be considered. In particular, the problem of the impacts of farmed salmon on wild salmon stocks still remains very important. Of no less importance is the problem of transgenic salmon. However, regretfully, a discussion on this subject has not resulted in any practical solutions as yet. In this respect the Special Session of the Council on the Precautionary Approach to Salmon Management held yesterday was very productive. It has considered issues which are topical and its outcome will compel us to revise concepts and ideas which have seemed obvious before and to alter traditional approaches to salmon management.

As before the Russian delegation considers it necessary to draw your attention to the importance of a cessation of the sea fishery for salmon. Owing to efforts being made jointly the salmon fishery in the Faroese fishing zone has been suspended for a number of years now, which is extremely important in the light of the dramatic decline in salmon stocks. However, the coastal fishery remains and the catch taken in this fishery is still quite large. I would also like to draw your attention to the problem of pollution of the environment and the impact of this factor on salmon stocks. I believe that NASCO should also include this aspect into the range of its interests.

In conclusion, I should like once more to point to the importance of this Meeting. I hope that our work will be fruitful. We believe that at this Meeting an understanding will be reached on all issues under consideration and our joint endeavours here will be successful and productive.

Thank you, Mr President.

Opening Statement made by the United States of America

Mr President, Distinguished Delegates, Observers, Ladies and Gentlemen:

The United States of America is very pleased to participate at this Fifteenth Annual Meeting of the North Atlantic Salmon Conservation Organization (NASCO) in Edinburgh. Mr President, as you have noted in your opening remarks, NASCO has been effective in taking many important steps toward salmon conservation. While taking pride in our achievements, we must also recognise where we have not gone far enough in our efforts. At this meeting, more than ever before, NASCO must live up to its name and the Convention we are all Parties to by taking strong actions to conserve Atlantic salmon and to halt the dramatic decline in the stocks this past year has brought all around the North Atlantic.

We are all aware that the health and well-being of salmon stocks results from a complex interplay of environmental, biological and human-caused factors. This past year, the climatic and oceanographic conditions for salmon growth and survival have apparently been nothing short of dreadful. The North Atlantic Oscillation, which gets much less press than its counterpart, the Southern Oscillation and El Nino, is resulting in broad scale ocean patterns which seem outside the normal range favourable to salmon. And our salmon are not returning home to their rivers, Mr President.

So, what must we do when factors outside of NASCO control are strongly affecting salmon? Our responsibility is to conserve the stocks for future sustainable fisheries. We cannot simply blame it on the weather; we must act on those factors that we can control, such as habitat and harvest. And we must act this year, at this meeting.

The United States has taken strong actions in our rivers to try and bring salmon back from critically low levels. We compliment Canada for the important new measures they have taken. We urge all Contracting Parties to commit to further action at this meeting on fishery regulations, controlling impacts of aquaculture on wild stocks, and on habitat protection.

Finally, Mr President, the United States is very supportive of NASCO's efforts to implement a Precautionary Approach to Atlantic salmon management. To be precautionary is to exercise prudent foresight. I think we all wish we could be exercising such foresight before the stocks' precipitous decline. But let us surely, now, exercise prudence and foresight in ensuring the future of North Atlantic salmon through the work of NASCO.

Thank you.

ANNEX 3

Opening Statement made by Inter-Government Organization

Opening Statement made by the International Baltic Sea Fishery Commission

Mr President, Distinguished Delegates, Ladies and Gentlemen:

First of all I would like to thank NASCO for having invited IBSFC to attend this meeting in an observer capacity.

Mr President, I believe that our cooperation is becoming more and more important because, among others, both of our organizations are faced with the same issue, that is, the "Precautionary Approach". We are challenged to further define, to further develop and to apply the Precautionary Approach. I was listening with great interest to the discussion during the Special Session yesterday as well as to the statements made this morning by the representatives of the Contracting Parties to NASCO and I got the impression that our cooperation could take on a new dimension.

Reference was made to all the 'famous' documents, such as the FAO Code of Conduct of Responsible Fishing, we are confronted with. I may tell you that IBSFC is, in addition, faced with another new document that is the 'Agenda 21 for the Baltic Sea Region'. The 'Agenda 21' is a global strategy for a sustainable development in the Baltic Sea Region for the period from now to 2030 covering all fields from Industry to Fisheries and takes into account not only resource and environment aspects but also socio-economic aspects. The Agenda will be adopted by the Ministers of Foreign Affairs on 22/23 June 1998. IBSFC is the lead party for the sector fisheries (e.g. sea fisheries as well as Inland Water Fisheries and Aquaculture). The Commission held an Extraordinary Session in February 1998 to elaborate the Agenda 21 sector fisheries.

The IBSFC Salmon Action Plan 1997 - 2010 became one of the key elements of the Sector Report Fisheries. IBSFC, when adopting the Action Plan in February 1997, already took into account the socio-economic aspects. There is a section on the protection of wild salmon populations as well as a section on the promotion of fishing activities.

Mr President, I believe the time has come to combine our efforts concerning the Precautionary Approach. It might be very helpful for all of us if NASCO, IBSFC and ICES could coordinate their activities by establishing a "Joint Working Group". This could even include NEAFC and NAFO. It might be reasonable to consider this further.

Mr President, allow me now to make some remarks on the latest activities in IBSFC to implement the Salmon Action Plan 1997-2010. The Salmon Action Plan Surveillance Group established under the Plan held its second meeting in May 1998 in Alvkarleby, Sweden. It considered the outcome of the Meeting of the Advisory Sub-group on Genetic and Ecological Aspects on Stocking of Baltic Salmon, in Helsinki, Finland, in January 1998. Special attention was given to:

- the principles that should be applied when carrying out enhancement or re-establishment programmes among others to consider the genetic structure of the Baltic salmon in the planning of the programmes; and

- the consideration of the division of salmon rivers into two categories:

    (i) rivers where the population by year 2010 is supposed to be self-sustaining and normal enhancement activities in these rivers will be stopped;

(ii) rivers having wild reproduction but also stocking reared fish for a long period and it is assumed that the stocking will continue after 2010.

At its Twenty-Fourth Session in September 1998, the Commission will deal further with these matters and in particular the further development of the Precautionary Approach principle.

Thank you, Mr President.

ANNEX 4

Opening Statements made by Non-Government Organizations

Joint NGO Statement made by
the Atlantic Salmon Federation and the Atlantic Salmon Trust

Mr President:

It is appropriate that the Atlantic Salmon Federation of North America and the Atlantic Salmon Trust of the United Kingdom launch the International Atlantic Salmon Accord in 1998, designated by the United Nations as the International Year of the Ocean. The Accord follows the extremely alarming year of 1997, when runs of Atlantic salmon to just about every river that empties into the Atlantic Ocean dropped to the lowest levels ever. The Accord is a "call to international action" to countries that produce and harvest Atlantic salmon. It is a call by a strong coalition of non-government organizations (NGOs) for an integrated North Atlantic strategy to save the Atlantic salmon. The Atlantic Salmon Federation and the Atlantic Salmon Trust have gathered together a powerful coalition of NGOs who are supportive and willing to take a lead role in getting the support of governments. And we have just begun. Among our allies are all the NGOs accredited at NASCO.

In North America we have the full support of all the national, provincial, state and local salmon associations, representing more than 150 organizations and 500,000 members. We also have the support of many large and influential mainstream conservation groups including the:

World Wildlife Fund
National Audubon Society
Natural Resources Defence Council
National Fish and Wildlife Foundation
Centre for Marine Conservation

- representing 3 million concerned citizens.

As you well know, wild Atlantic salmon populations are in serious decline around the world. The International Council for the Exploration of the Sea (ICES) reports that the pre-fishery abundance for North American populations returning to rivers in 1998 has reached an all-time low of 114,000, barely half the 200,000 needed to meet minimum spawning targets. Populations of large salmon of European origin in the ocean are at their lowest level in twenty-five years. In Norway, 36% of the wild salmon populations are either extinct, threatened by extinction or are vulnerable. In the United States, Atlantic salmon populations are so low in the State of Maine that they are candidates for listing under Endangered Species legislation.

Mr President, it is important for us to remember that when a river loses its run of wild salmon, we lose it for all time. Extinction is forever.

The Accord outlines rationally and succinctly what must be done to save salmon. No government can ignore the urgency of the problem. The Commissioners at NASCO bear a huge responsibility in the days ahead. Decisions made by them at these meetings will have tremendous impact on the future of the Atlantic salmon. That impact will be very positive if high-seas fisheries are eliminated. Even the smallest harvest will be devastating.

To prevent the loss of wild salmon populations, concerted action must begin immediately and must engage all countries where Atlantic salmon live or are harvested. The International Atlantic Salmon Accord was conceived at a conference last September in Galway, Ireland, when it became apparent that the dramatic decline in salmon populations in 1997 was a phenomenon experienced throughout the North Atlantic rim. Scientists believe that the cause of the sharp declines lie in the ocean.

However, it is obvious that if we are to save the salmon, we must improve our treatment of the species and its ecosystem and maximise its numbers in both freshwater and the sea. Atlantic salmon, like the canary in the coal mine, reflect the ecological well-being of the North Atlantic. The decline in Atlantic salmon populations parallels a general decline in sea birds, fish and other species. This dilemma reflects the destruction of the web of life, an imbalance between predator and prey, and less hospitable habitat. The salmon's threatened demise both follows and foreshadows the demise of other creatures.

There are actions we can and must take immediately. We continue to commercially harvest mixed populations at sea off the coasts of Greenland and Faroe Islands and in the territorial waters of Canada, Ireland, United Kingdom, Norway, Iceland, Finland, Sweden and Russia. We must eliminate fisheries for mixed populations of Atlantic salmon at sea. We must also eliminate in-river harvests where conservation requirements are not being met. Industrial fisheries target species upon which salmon feed, harvesting vast quantities in making feed for farmed animals, and even fuel. This is madness. We must eliminate fisheries for species central to the marine food web, such as krill, sand lance, herring and capelin. Where sufficient data is not available to guide management decisions, we must adopt a precautionary management approach. There has been a lot of talk about the precautionary approach. It is time we stopped talking and implement precautionary salmon management plans before we are forced to implement endangered species management plans.

Development of the salmon aquaculture industry has helped conserve wild Atlantic salmon populations by providing high quality, affordable salmon to the market. However, we now know that aquaculture is inflicting environmental damage throughout the North Atlantic. Millions of cultured salmon are escaping into the wild. Scientific studies are documenting negative impacts upon wild populations from interaction with these escapees. In Norway, for example, the parasite *Gyrodactylus salaris*, transmitted from Swedish hatcheries, has decimated juvenile populations in 25 rivers. In Ireland, and on the west coast of Scotland, there has been a virtual collapse of sea trout stocks infected by sea lice from salmon sea-cage installations. In Canada's Bay of Fundy, a severe outbreak of Infectious Salmon Anaemia recently resulted in the aquaculture industry killing more than 1,000,000 farmed fish. Farmed escapees may be infecting the salmon runs of the rivers that empty into the Bay of Fundy. Since the aquaculture industry began in the Bay of Fundy in the early 1980's, runs of wild Atlantic salmon have declined to the point that it is doubtful that they will ever recover.

All these problems are international in scope and must be solved internationally through research, conservation, and public awareness. We must convince all North Atlantic governments, where responsibility and authority for managing and conserving the species lie, to act responsibly. The International Atlantic Salmon Accord outlines the threats and the

solutions. It is a comprehensive conservation plan that represents our best chance for saving our wild Atlantic salmon runs.

Thank you Mr President.

I would like to ask my colleague, Col. Bill Bewsher, Chairman of the Atlantic Salmon Trust, to continue this joint presentation.

Mr President, distinguished delegates, observers:

Thank you for allowing me to continue this joint presentation. You have heard how the continuing serious - I believe it would be true to say, catastrophic - decline in salmon stocks led to the development of the International Atlantic Salmon Accord. This document, to which all the NGOs Bill Taylor mentioned subscribe, is a statement of the problem and of the measures needed to attack it. If I may, I should like to describe it very briefly - copies will be available to all participants in the meeting after this Opening Session.

This situation is really urgent, and needs to be expressed and understood clearly. The Accord itself is therefore a very short document of no more than three pages.

It begins by stating emphatically that wild Atlantic salmon population levels are at their lowest recorded levels, and that this decline must be reversed by:

- optimising the number of fish spawning in their native rivers
- optimising their survival in freshwater and at sea

In many cases we cannot either specify or measure the achievement of spawning or survival targets - the precautionary approach (which was discussed at length yesterday, and will be discussed again in Council) therefore argues that we must seek to maximise numbers.

The Accord identifies seven issues which affect the wild salmon. I would remind you that we are looking at the whole range of North Atlantic salmon-producing countries - conditions and priorities can, and do, vary widely across that vast expanse, and therefore we have not attempted to attach overall priorities to these issues. Instead, we have listed them in an order with which no-one can argue - the general order in which they affect the wild salmon during the course of its extraordinary life-cycle. The issues are:

1. Inadequate in-river production
2. The impact of aquaculture
3. The impact of fisheries targeted against other species
4. Low marine survival
5. The impact of mixed-population fisheries
6. Predation
7. In-river exploitation and management

We hold that there are four underlying conservation strategies:

- Co-operative efforts: the application of integrated and coordinated action by all countries which produce or harvest wild salmon

- The precautionary approach: Governments must encourage and adopt conservation measures even when supporting data is not yet complete
- Reduction of mortality: we must eliminate harvesting of salmon outside their native rivers, and manage river fisheries to allow adequate spawning escapement
- Research co-ordination: international research effort is needed to understand the effects of the ocean ecosystem upon Atlantic salmon.

To apply these strategies, the Accord lists a number of recommendations for action in respect of each of the seven issues that I have mentioned. I will not go through them now, but they are there to be read and acted upon. They are set out simply, without justification, in order to keep the document short - the background and arguments for their development are contained in a separate twelve-page Appendix.

The recommendations are phrased in general terms, because they are designed to apply across the whole range of North Atlantic salmon countries, and they have to take account of differing conditions and differing river and salmon management regimes. Thus it goes without saying that their detailed application in individual countries will need to reflect local requirements.

We now call upon the NGOs to seek the support of other organisations in their respective countries. This, however, is only a prelude to the really important action: namely, that of seeking the endorsement and implementation of the Accord, and its formal adoption, by each national government. This is a bold and courageous aim, but we make no apology for that boldness - the severity of the situation demands plain speaking and above all, clear and determined action.

Mr President, thank you for allowing the Atlantic Salmon Federation and the Atlantic Salmon Trust to speak on behalf of the other non-government organisations. In so doing, we have spoken for those who are affected by the decisions of NASCO and of individual governments. We urge you and all delegates to take note of what we have said. Given the appalling and, frankly, frightening situation of the wild Atlantic salmon, we commend this Accord to your support.

As my colleague, Bill Taylor, has already remarked, all of you involved in NASCO bear a huge responsibility. My colleagues and I are confident that you will exercise it in a positive and responsible manner.

In closing, I would remind you of something the late King George VI said - which is as true today as it was then: “the wildlife of today is not ours to dispose of as we please; we all hold it in trust for those who come after”.

Joint NGO Statement on the Precautionary Approach and Implemention of the Oslo Resolution

Mr President, Delegates, there are two short joint statements:

1. Given the continuing inexorable decline in wild Atlantic salmon stocks worldwide, the NGOs applaud the initiative taken by NASCO in setting up the Working Group on the Precautionary Approach to Salmon Management. We support all the recommendations contained in CNL(98)21, and urge Council to adopt them. What is even more important is for the Contracting Parties to implement them as soon as possible.

2. The NGOs also urge the Parties to implement the Oslo Resolution more rigorously, particularly in terms of Article 2, measures to minimise genetic and other biological interactions, and Article 3, measures to minimise the risks of transmission of diseases and parasites. We note the report of the NASCO Working Group, CNL(98)27, and urge its adoption by Council as one way the Parties can contribute to the conservation of our wild Atlantic salmon.

Mr President, these two statements are supported by all the NGOs present here today.

Opening Statement made by the European Anglers Alliance

The European Anglers Alliance represents 6 million anglers in 16 European countries.

We are all familiar with the disastrous decline in wild Atlantic salmon stocks, and the particular decline in the multi-sea-winter (MSW) component of the stock.

In the past 14 years of the existence of NASCO, the catch across the whole North Atlantic has declined from more than 4 million fish to less than 0.75 million in 1997.

We have to ask the question whether all of the Parties signatory to the NASCO Convention are really interested in salmon conservation? It seems not from the lack of realistic action over the past 14 years by some of the Parties.

This criticism is particularly directed at two members of the EU Delegation, Ireland and the UK. Consider the evidence. In the UK the damaging north-east coast drift net fishery, which intercepts mixed stocks of salmon destined for east coast Scottish rivers, is being phased out successfully in terms of the numbers of nets, down from 141 in 1992 to 89 this year, but the catch remains totally unregulated, and has actually risen in three of these six years. The five year average catch of the fishery is some 30,000 fish, 50% of the total catch in England and Wales. A study published last year by the UK Ministry of Agriculture and Scottish Office scientists maintains the fishery poses no threat to stocks.

As regards early running MSW fish, both the 1994 National Rivers Authority Salmon Management Plan and Lord Nickson's 1996 Task Force urged a postponement of the start of the coastal and drift net seasons to June 1st as one protection measure. UK NGOs have been promoting this measure, supported with a raft of data from ICES, for four years, and still we have no action.

Anglers catch more spring fish than nets, and are already playing their part with voluntary bag limits and adoption of catch and release - more than 25% of salmon were returned by anglers in 1997. Unless netsmen are prepared to also adopt voluntary measures, it is up to Government to impose these restrictions, however unpopular, and however many public enquiries may result.

In Ireland the Task Force set up by the Minister of the Marine in 1995 recommended a number of conservation measures, some of which have now been adopted - the postponement of the opening of the net season to June 1st and the reduction of the fishing limit from 12 to 6 miles are welcome. The imposition of quotas, now planned for 1999, might also have been welcome had they been realistic. The Irish drift net fishery is the most damaging in the North Atlantic. It intercepts Irish, Welsh, English, Scottish, what is left of French and Spanish fish, and even some recovering Rhine salmon. The recorded catch averages 350,000kg (described recently by one EC official as "obscene") and it is believed that the actual catch may be double that figure. Yet the quotas suggested by Irish Government scientists are set at levels higher than the current five year average catch! This apparently is an attempt to recognise the high unrecorded catch, but in practice is an extraordinary and disgraceful reward for years of illegal fishing by Irish netsmen.

In Northern Ireland (UK) a Resolution by the Fisheries Conservancy Board to adopt measures to reduce commercial exploitation of salmon, particularly the MSW component, has been summarily rejected by Government.

How on earth can we expect the hunting and fishing communities in Greenland to continue exercising such commendable restraint in accepting subsistence quotas if we are unable or unwilling to control exploitation in our homewaters?

Against the background of inexorably declining wild stocks and continuing increases in production of farmed salmon, as well as the well-documented economic benefits of the rod fishery, there is no longer justification for the netting of wild salmon for food in developed countries. Of course, there are seasonal jobs and traditions at stake which must be taken seriously. Compensation and retraining must be provided, which costs money, but the alternative, doing little or nothing, will also cost money and jobs as the rod fishery declines, just as we have seen with the sea-trout collapse.

A marvellous opportunity to close both the north-east coast and Irish drift net fisheries has just been missed. The UK re-introduced a 1994 Commission proposal to ban drift nets which in its original form included salmon. Unfortunately, the additional complication of the Baltic, where drift netting in the southern Baltic Sea threatens to eliminate wild Baltic salmon, led to the removal of salmon from the proposal. Although motivated by the publicity gained by saving cetaceans, the impact of the measure on the Atlantic tuna fishery is to be welcomed, but for salmon represents another lost opportunity.

Mr Commissioner, your officials tell me the EC is opposed to drift netting in all its forms, but there appears to be no real political will amongst your member nations towards salmon conservation. Unless these Parties can demonstrate such a will, and do it quickly, predictions for the continuous decline of our wild Atlantic salmon will be realised.

Mr President, I have been examining the past record of these two Governments. The adoption of a Precautionary Approach to salmon management points the way forward, and I hope these Parties can now react positively to curtail drift netting in homewaters.

Opening Statement made by the Federation of Irish Salmon and Sea-Trout Anglers

Mr President, International Delegates and Fellow NGOs:

This Federation (FISSTA) views NASCO as having the potential and determination to reverse the alarming decline in salmon and sea-trout stocks. Much of the shared knowledge and work of NASCO has been beneficial. Our Federation, with your permission, used documentation which helped us to prevent several commercial non-indigenous species hatcheries on pristine salmonid waters.

The enlightening debate within NASCO on the "Precautionary Principle" to salmon management is most necessary at this critical time. However, the situation has deteriorated beyond just putting academic definitions on this Principle. In other words it must have teeth to have it implemented where and when required. Certainly in Ireland's case this principle is urgently needed in an era when salmon stocks are plunging and sea-trout stocks are almost wiped out in many areas due to massive numbers of sea-lice from aquaculture salmon farms which impact on salmon smolt runs as well. The NASCO minimum guidelines are not being applied and many of these farms are sited in the estuaries of salmonid river systems.

The socio-economic aspects of salmon management are being seriously damaged by drift netting as well as habitat degradation and fin fish farming. FISSTA's aim and policy is the elimination of interceptory netting. In the interim period, while agreements and arrangements are being worked out to achieve this, we are supporting the earliest possible implementation of tagging and quotas. If this is not done we insist on the restoration of the ban on monofilament netting.

One of our Clubs on the famous River Moy, the Foxford Salmon Anglers reported that one German angling tourist agency are threatening to withdraw game angling in Ireland from their brochures. They had sent 300 clients to the Foxford area since the season opened in February last and only 7 salmon were caught by them. Allowing that the runs of salmon are late it is still a depressing picture. This is only an indication of the economic loss that is looming for the game angling tourist industry unless the decline in stocks is reversed.

Anglers acknowledge the seriousness of the situation and will cooperate with emergency conservation measures put forward to conserve stocks. Unfortunately, as an article in "The Kerryman" newspaper of 6 June, 1998 states, the response by some netsmen has been very disappointing.

Mr T P O Conchuir, spokesman for the salmon driftnetters in West Kerry, who was appointed by the Irish Government to sit on the Salmon Management Task Force and report back to the Department of the Marine in Dublin, has now threatened that his members, regardless of the plight of the stocks, will break the law and fish for salmon after the netting season legally closes on 31 July 1998.

FISSTA will not tolerate such a situation possibly arising and will keep NASCO informed of developments and shall not hesitate to seek diplomatic help and support from the international salmonid organisations, NGOs and countries.

Opening Statement made by the Institute of Fisheries Management

Mr President:

On behalf of the Institute of Fisheries Management, may I thank you for your invitation to participate as an NGO representative in this, the Fifteenth Annual Meeting of NASCO. That NASCO is now well into its second decade is surely a reflection of its acceptance as an important and valuable contributor to the international conservation, restoration, enhancement and rational management of Atlantic salmon stocks.

The Institute of Fisheries Management represents a broad interest in many aspects of fisheries management. For this reason, the IFM requires to take a rather wider view than other NGO's on matters involving fish and other aquatic resources. From this point of view, we fully endorse NASCO's strategy of incorporating and implementing scientific knowledge and research as vital components in the attempt to understand the changing ecology of the wild Atlantic salmon.

The Institute recognises the very real concerns expressed by salmon anglers and notes the substantial contribution made by their sport to the economies of member States. We also note the progress being made by our fisheries scientists in developing predictive techniques to allow managers to better apportion the catch between beneficiaries. These techniques are increasingly showing that in many rivers there is now no harvestable surplus available, and we urge all bodies to exercise the maximum possible restraint in their take of wild salmon. We applaud most warmly your Council's approach to the promotion of catch and release as a management tool and commend it to regulatory agencies throughout NASCO's area of influence.

With regard to the balancing of subjective and objective argument on the status of salmon stocks, the inclusion of the Special Session on "The Precautionary Approach to Salmon Management" in this year's Meeting would appear to be particularly relevant. As Dr Windsor pointed out in his submission (CNL(97)21) last year, "the Precautionary Principle advocates restraint on development if there is a reasonable suspicion of damage without waiting for scientific proof". We await with interest the outcome of this year's debate to see if the possible implementation of a more flexible Precautionary Approach will result in reducing, if not eliminating, serious impacts on the Atlantic salmon resource of each and every country.

Mr President, we wish you and your colleagues a very successful meeting, and look forward to our involvement as one of the 24 NGOs.

Opening Statement made by the Salmon Net Fishing Association of Scotland

The Salmon Net Fishing Association of Scotland welcomes this opportunity to make an Opening Statement at this, the Fifteenth Annual Meeting of NASCO.

My Association regrets the removal of any reference to seal predation from the Council agenda, particularly as this action coincides with the poorest spring fishery in recent years. The initial reports from netsmen around the Scottish coast suggest that the number of salmonids observed eaten or destroyed by seals will probably exceed their total catch taken over the same period.

It may also be an unfortunate coincidence that any reference to seal predation should disappear from the agenda in the same year as the ICES Working Group on North Atlantic Salmon had the confidence to state for the very first time in its report (CNL(98)11), and I quote, "two decades of increasing seal populations, a decadal decline in many North American salmon stocks and the low probability of observing salmon in harp seal stomachs even under extremely high predation rates suggest that the potentially significant impact by seals should not be discounted". Although the Working Group was referring to North America the decline in salmon stocks and the massive increase in seal numbers are common to both sides of the Atlantic.

Over a number of years scientifically trained observers abiding by strict guidelines have witnessed seals (grey and common) feed on salmonids in the estuaries of four north-east Scottish rivers. They reported that in one, the Aberdeenshire Dee, the number recorded eaten by seals may be having a significant impact on the salmon population of that river during the winter when the component of the stock generally agreed to be under most pressure in its fight for survival is returning from the sea in the greatest number.

Last year when the Council considered the review (document CNL(97)44) of the management implications arising from the Special Session held in 1996 entitled "The Atlantic Salmon as Predator and Prey", the real issues highlighted in the discussion were fudged with a call for yet more research or reference to ongoing projects not yet concluded. However, if the Precautionary Approach (PA) to salmon management is adopted the absence of adequate scientific information can no longer be used as a reason for postponing or failing to take conservation and management measures to protect a species, particularly if it is in free-fall decline.

For more than 40 years my Association has been providing detailed information to the Scottish Office which has included the number of seals seen at fishing stations and the numbers of seal-damaged salmon in catches. Although this information may be considered inadequate to formulate management decisions regarding the seal population, the PA would require managers, in the absence of better data, to use such information to take decisions deemed necessary to at least maintain the *status quo*.

A pertinent question at this time could be - Who will be the ultimate benefactors, the Atlantic salmon, fishermen or seals, from the restrictions presently being placed with ever-increasing severity on all types of salmon fishing if seal numbers are allowed to continue their upward spiral? The most likely scenario is that fishermen (rod and net) will be left with no option but to quit and search for another quarry. Their expertise will be lost and the infrastructure built up over many years to conserve and protect salmon at all life-history stages will disintegrate and be lost forever.

One ray of hope was the action taken earlier this year by Lord Sewel, the Scottish Office Fisheries Minister, who removed the additional protection afforded to seals in Shetland for many years (The Conservation of Seals (Common Seals) (Shetland Islands Area) Order 1991 Revocation Order 1998). Any public response to this action has been minimal.

This statement has the support of all the Non-Government Organizations attending this meeting, with one exception.

Thank you, Mr President.

Opening Statement made by the Scottish Anglers National Association

Mr President, Distinguished Delegates, Fellow NGO's, Ladies and Gentlemen:

The Scottish Anglers National Association once more welcomes you to the northern part of the United Kingdom, that is the part without drift netting for salmon.

We wish to add our support to the statement by the European Anglers Alliance in relation to drift netting operations of the United Kingdom and Ireland within the European Union.

It was in 1962, under a UK Labour Government, that drift netting for salmon in Scotland was banned overnight. There was no prolonged phase-out and no compensation.

Yet 36 years later we, in Scotland, still suffer drift-netting on our doorstep off the north-east coast of England and thousands of salmon, bound for Scottish rivers, are taken every year. Why, when something deemed by Government to be inappropriate in Scotland 36 years ago, is it still seen as acceptable a few miles over the Border in England in 1998 and more than 1 million salmon later?

In the current context of overall stocks, the situation in Ireland is even worse as far as numbers of salmon are concerned. Last year the Irish drift nets reported a catch of just under 140,000 fish weighing 379 tonnes. That is two-thirds of the total Irish catch, where the recreational rod fisheries took around 17 per cent and other nets the remainder.

We acknowledge the successful measures which have been taken within NASCO at international level. We also commend the attitude and efforts of the Parties in the North American Commission and the restraint exercised within the West Greenland Commission. But we view with concern the situation in the North-East Atlantic Commission where the considerable work of the European Union is devalued by the drift netting activities of Ireland and the United Kingdom through its operations in England and Northern Ireland.

The combined reported catch by all methods from the United Kingdom and Ireland now totals about 50 per cent of the entire recorded wild Atlantic salmon harvest. With that figure in mind, the continued existence of drift netting could well jeopardise future agreements for Greenland and the Faroe Islands.

We maintain that the policies of successive UK and Irish Governments in relation to drift netting are detrimental to salmon conservation and, particularly during a period of historic low abundance, are in conflict with the ideals and aspirations of NASCO itself.

Thank you, Mr President.

ANNEX 5

List Of Participants

* Denotes Head of Delegation

CANADA

*MR JACQUE ROBICHAUD	Representative Department of Fisheries and Oceans, Ottawa, Ontario
MR PIERRE TREMBLAY	Representative Atlantic Salmon Federation, St Andrews, New Brunswick Fédération québécoise pour le saumon atlantique, Quebec
MR PIERRE BERTRAND	Department of Environment and Wildlife, Province of Quebec, Quebec
MR MIKE CALCUTT	Department of Fisheries and Oceans, Ottawa, Ontario
MR KEN CURNEW	Department of Forest Resources and Agrifoods, Province of Newfoundland and Labrador, St John's, Newfoundland
MR RICHARD HEGAN	Department of Fisheries and Oceans, Ottawa, Ontario
MR MURRAY HILL	Department of Fisheries, Province of Nova Scotia, Pictou, Nova Scotia
MR MARC KIELLEY	Newfoundland Aquaculture Industry Association, St John's, Newfoundland
MR BRIAN MEANEY	Department of Fisheries and Aquaculture, St. John's, Newfoundland
MR DAVID MEERBURG	Department of Fisheries and Oceans, Ottawa, Ontario
MR JOHN MOORES	Department of Fisheries and Oceans, St John's, Newfoundland
MR REX PORTER	Department of Fisheries and Oceans, St John's, Newfoundland

DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

*MR KAJ MORTENSEN	Representative

	Faroese Home Government, Torshavn
MR EINAR LEMCHE	President of NASCO Greenland Home Rule, Copenhagen
THE HON. PAAVIARAAQ HEILMANN	Greenland Home Rule, Nuuk
MR JAN ARGE JACOBSEN	Fisheries Lab of the Faroes, Torshavn
MR PER KANNEWORFF	Institute of Natural Resources, Copenhagen
MR JASPUR KRUSE	Felagid Laksaskip, Klaksvik
MR SIVERTH D LARSEN	Greenland Home Rule, Nuuk
MS RIKKE NIELSEN	Greenland Home Rule, Nuuk
MR MOGENS H PEDERSEN	Ministry of Foreign Affairs, Copenhagen
MR SOFUS POULSEN	Faroese Commercial Attaché, Aberdeen
MR HEDIN WEIHE	Faroese Home Government, Torshavn

EUROPEAN UNION

*MR OLE TOUGAARD	Representative European Commission, Brussels
MR ANDREW THOMSON	Representative European Commission, Brussels
MR JACOB K ANDERSEN	Ministry of Food, Agriculture and Fisheries, Copenhagen
MR ROB BOWMAN	Ministry of Agriculture, Fisheries and Food, London
MR JOHN BROWNE	Marine Institute, Dublin
MR HYWELL DUCK	Secretariat General of the Council of the European Union, Brussels
MR DAVID DUNKLEY	Scottish Office Agriculture, Environment and Fisheries Department, Edinburgh
MR PETER FUNEGARD	National Board of Fisheries, Gothenburg
DR PADDY GARGAN	Central Fisheries Board, Dublin
MR CURT INSULANDER	Salmon Research Institute, Alvkarleby
MR ERICH KAINZ	Bundesamt für Wasserwirtschaft, Vienna

MR IVOR LLEWELYN	Ministry of Agriculture, Fisheries and Food, London
DR GUY MAWLE	Environment Agency, Bristol
MR PHILIP McMAHON	Department of the Marine, Dublin
MR EERO NIEMELA	Finnish Game and Fisheries Research Institute, Utsjoki
MR PEKKA NISKANEN	Ministry of Agriculture and Forestry, Helsinki
MR MICHAEL O'CINNEIDE	Southern Regional Fisheries Board, Ireland
MR BERNARD O'SULLIVAN	Central Fisheries Board, Dublin
MR TED POTTER	Centre for Environment, Fisheries & Aquaculture Science, Lowestoft
MR HENRIK SVENBERG	Ministry of Agriculture, Stockholm
MR GEORGE THOMSON	Scottish Office Agriculture, Environment and Fisheries Department, Edinburgh

ICELAND

*MR ARNI ISAKSSON	Representative Directorate of Freshwater Fisheries, Reykjavik

NORWAY

*MR STEINAR HERMANSEN	Representative Ministry of the Environment, Oslo
MR ARNE EGGEREIDE	Representative Directorate for Nature Management, Trondheim
MS EVA ESPELAND	Representative Ministry of the Environment, Oslo
MR DAGFINN GAUSEN	Directorate for Nature Management, Trondheim
DR LARS PETTER HANSEN	Norwegian Institute for Nature Research, Oslo
MR ARNE SIVERTSEN	Directorate for Nature Management, Trondheim

RUSSIAN FEDERATION

*MR VLADIMIR MOSKALENKO	Representative PINRO, Murmansk
MR ALEXEY MAZUR	Department of Fisheries, Moscow
MR VICTOR NESVETOV	JV Arctic Salmon, Murmansk

MS ELENA SAMOILOVA	PINRO, Murmansk
DR ALEXANDER ZUBCHENKO	PINRO, Murmansk

USA

*DR ANDREW ROSENBERG	Representative National Marine Fisheries Service, Gloucester, Massachusetts
MR ROBERT JONES	Representative Connecticut River Salmon Association, S. Windsor, Connecticut
DR RAY B OWEN, JR.	Representative Bangor, Maine
MS KIMBERLY BLANKENBEKER	National Marine Fisheries Service, Silver Spring, Maryland
MS MARY COLLIGAN	National Marine Fisheries Service, Gloucester, Massachusetts
DR KEVIN FRIEDLAND	National Marine Fisheries Service, Woods Hole, Massachusetts
DR JAMES GEIGER	US Fish and Wildlife Service, Hadley, Massachusetts
MR MICHAEL HASTINGS	Maine Aquaculture Innovation Centre, Brewer, Maine
DR DAN KIMBALL	US Fish and Wildlife Service, Nashua, New Hampshire
DR JEAN-PIERRE PLÉ	Department of State, Office of Marine Conservation, Washington DC
MR RANDALL SNODGRASS	World Wildlife Fund, Washington DC

INTER-GOVERNMENT ORGANIZATIONS

MR JEAN-JACQUES MAGUIRE	International Council for the Exploration of the Sea, Sillery, Quebec
DR WALTER RANKE	International Baltic Sea Fishery Commission, Warsaw

NON-GOVERNMENT ORGANIZATIONS *

MR FREDERIC MAZEAUD	AIDSA, France
MR JUAN ANTONIO VENTURA	AIDSA, Spain

MR WILLIAM TAYLOR MS SUE SCOTT MR JIM GOURLAY	Atlantic Salmon Federation, Canada
CAPTAIN JEREMY READ COLONEL H F O BEWSHER MR TIMOTHY HOGGARTH	Atlantic Salmon Trust, UK
MR RICHARD BEHAL MR LUKE BOYLE MR ED STACK	Federation of Irish Salmon and Sea-Trout Anglers, Ireland
MR JOHN GREGORY MR GORDON STRUTHERS	Institute of Fisheries Management, UK
MR PATRICK BYRNE	National Anglers Representative Association, Ireland
MR BJORNULF KRISTIANSEN	Norges Bondelag (Norwegian Farmers Union), Norway and Norske Lakseelver (Norwegian Salmon Rivers), Norway
MR WILLIAM SHEARER	Salmon Net Fishing Association of Scotland and Association of Scottish District Salmon Fishery Boards, Scotland
MR CHRIS POUPARD	Salmon and Trout Association, UK and European Anglers Alliance
MRS FIONA WILLIS	Salmon and Trout Association, UK
MR IAN CALCOTT MR ALASTAIR HUME	Scottish Anglers National Association, UK
MR ROBERT HAUGHEY MR NEWELL McCREIGHT	Ulster Angling Federation, Northern Ireland

SECRETARIAT

DR MALCOLM WINDSOR	Secretary
DR PETER HUTCHINSON	Assistant Secretary
MISS MARGARET NICOLSON	PA to Secretary
MRS THERESA GAWTHORNE	PA

* NOTE: UP TO TWO REPRESENTATIVES FROM NON-GOVERNMENT ORGANIZATIONS ARE ALLOWED TO ATTEND THE MEETINGS OF THE COUNCIL AND COMMISSIONS AT ANY TIME.

ANNEX 6

CNL(98)48

Fifteenth Annual Meeting of the Council
8-12 June 1998
Balmoral Hotel, Edinburgh, Scotland

Agenda

1. Opening Session

2. Adoption of Agenda

3. Administrative Issues

3.1 Secretary's Report

3.2 Report of the Finance and Administration Committee

3.3 Report on the Activities of the Organization in 1997

4. Scientific, Technical, Legal and Other Information

4.1 Scientific Advice from ICES

4.2 Report of the Standing Scientific Committee

4.3 Catch Statistics and their Analysis

4.4 Salmon Tagging and the Tag Return Incentive Scheme

4.5 Review of International Salmon Related Literature Published in 1997

5. Conservation, Restoration, Enhancement and Rational Management of Salmon Stocks

5.1 Measures Taken in Accordance with Articles 14 and 15 of the Convention

5.2 Special Session on the Precautionary Approach to Salmon Management

5.3 Report of the Working Group on the Precautionary Approach to Salmon Management

5.4 Unreported Catches

5.5 By-catch of Atlantic Salmon

5.6 Fishing for Salmon in International Waters by Non-Contracting Parties

5.7 Scientific Research Fishing in the Convention Area

5.8 Impacts of Aquaculture on Wild Salmon Stocks

(a) Convenors' Report on the ICES/NASCO Symposium
(b) Report of the Meeting on Implementation of the Oslo Resolution
(c) Returns made in Accordance with the Oslo Resolution
(d) Report of the Meeting of the Aquaculture Liaison Group
(e) NASCO Guidelines for Action on Transgenic Salmon

5.9 Guidelines on Stocking

5.10 Guidelines on Catch and Release

5.11 Reports on Conservation Measures Taken by the Three Regional Commissions

6. Election of Officers

7. Other Business

8. Date and Place of Next Meeting

9. Draft Report of the Meeting

10. Press Release

ANNEX 7

Council

CNL(98)49

Outline of 1999 Budget, 2000 Forecast Budget and Schedule of Contributions

North Atlantic Salmon Conservation Organization
1999 Budget and 2000 Forecast Budget (Pounds Sterling)

Section	Description	Expenditure	
		Budget 1999	Forecast 2000
1	Staff Related Costs	215,960	222,410
2	Travel And Subsistence	31,850	29,090
3	Contribution To ICES	23,200	23,890
4	Contribution To Working Capital Fund	0	0
5	Meetings	6,000	19,290
6	Office Supplies, Printing And Translations	31,940	32,880
7	Communications	11,000	11,330
8	Headquarters Property	-24,020	-23,390
9	Office Furniture And Equipment	7,250	7,460
10	Audit And Other Expenses	8,340	8,580
11	Tag Return Incentive Scheme	4,550	4,550
	Total	316,070	336,090

		Revenue	
		Budget 1999	Forecast 2000
12	Contributions - Contracting Parties	324,570	343,090
13	Miscellaneous Income - Interest	11,000	11,000
14	Stabilisation	-19,500	-18,000
15	Surplus Or Deficit (-) From 1997	0	0
	Total	316,070	336,090

NASCO Budget Contributions for 1999 and Forecast Budget Contributions for 2000 (Pounds Sterling)

Catch (tonnes)	Party	Budget 1999	Forecast 2000
225	Canada	35,935	37,985
59	Denmark (Faroe Islands and Greenland)	19,686	20,809
1142	European Union	125,699	132,871
154	Iceland	28,985	30,639
630	Norway	75,580	79,892
111	Russian Federation	24,776	26,189
0	USA	13,910	14,704
2321	TOTAL	324,570	343,090

Contributions are based on the Official Catch Statistics as provided to NASCO by the Contracting Parties. Column totals can be in error by a few pounds due to rounding.

ANNEX 8

Council

CNL(98)12

Report of the ICES Advisory Committee on Fishery Management

CNL(98)12

Report to the North Atlantic Salmon Conservation Organization

Source of information: Report of the Working Group on North Atlantic Salmon, April 1998 (ICES Doc. CM 1998/ACFM:15).

Sections 1-4 of this report are set out in the order of the questions from NASCO to ICES (Appendix 1).

1. ATLANTIC SALMON IN THE NORTH ATLANTIC AREA

1.1 Overview of Catches

1.1.1 Nominal Catches

Nominal catches of salmon by country in the North Atlantic (including ranched salmon in Iceland) for 1960-1997 are given in Table 1.1.1. Reported catches, by NASCO Commission Areas, are illustrated in Figure 1.1.1, and those for 1992–1997 are shown below (in tonnes):

Area	1992	1993	1994	1995	1996	1997
NEAC	3366	3333	3566	3271	2744	2038
NAC	524	375	358	260	292	226
WGC	242	0	0	85	92	59
Total	4132	3708	3924	3616	3128	2323

The catch data for 1997 (Table 1.1.1) are provisional and incomplete, but the final figures are unlikely to exceed 2 400 t. Catches in most countries remain below the averages of the previous 5 and 10 years. Much of the decline in catches in recent years can be accounted for by management plans which have reduced fishing effort in several countries.

1.1.2 Unreported Catches of Salmon

The total estimate of unreported catch by fishery managers/protection officers or bailiffs within the NASCO Commission areas in 1997 was 827 t (Table 1.1.1), a decrease of 26% compared with 1996 and 41% below the 1992–1996 mean of 1 413 t. There are no data available on salmon catches in international waters in 1997. Estimates for the Commission Areas are given below (in tonnes):

Area	1992	1993	1994	1995	1996	1997
NEAC	1825	1471	1157	942	947	732
NAC	137	161	107	98	156	90
WGC	n/a	12	12	<20	<20	5
International waters	25-100	25-100	25-100	n/a	n/a	n/a

1.1.3 Catch and Release of Salmon

Catch and release data for 1SW (small), MSW (large) and/or 'total' salmon were provided for some recent years by five countries. In 1997, the proportion of the total rod catch that was released included 100% of 333 fish in USA, 87% of 17 000 fish in Russia and 51% of 97 300 fish in Canada. 23%, 18% and 5% of catches in UK (England and Wales), UK (Scotland) and Iceland, respectively, were caught and released.

1.1.4 Production of Farmed and Ranched Salmon

The production of farmed salmon in the North Atlantic area in 1997 was 479 498 t. This is the largest production in the history of the industry (Figure 1.1.4) and represents a 6% increase over 1996 (451 581 t) and a 42% increase over the 1992–96 average (335 586 t).

In 1997, an additional 122 600 t, i.e., 20% of the total world production of farmed salmon, was grown outside the North Atlantic Area. Areas of largest production were Chile (72%) and western Canada (15%).

The total production of ranched salmon in countries bordering the North Atlantic in 1997 was only 55 t which is the lowest value since 1987. The majority (87%) of the ranching is conducted in Iceland where a production of 48 t in 1997 was only 20% of that of 1996 and where ranched production is now only one-half the nominal catch of wild fish.

1.2 Recent Research Developments

Post-smolt growth and marine juvenile habitat: In trying to explain the relationship between the thermal habitat and post-smolt survival, ICES examined scale circuli spacing data from historical collections of post-smolts made in the Gulf of St. Lawrence, Canada, with the aim of understanding the role of estuarine and coastal habitats as juvenile habitat for Atlantic salmon. The analysis suggests that in some years post-smolts remain in the Gulf throughout the entire summer growth season whereas in other years only slower-growing fish remain in these areas. Growth patterns were compared to patterns from returns to the more southern Connecticut, Penobscot and Saint John rivers which are assumed to grow in open ocean habitats. The data suggest that in some years post-smolt growth in the Gulf is as fast as that observed for both the 1SW and 2SW returns to southern rivers and that in some years either post-smolts from other areas invade the Gulf and use it as a nursery area or the Gulf region is continuous with a larger area of similar growth conditions where the nursery is formed.

Spatial-temporal convergence of North Atlantic salmon at sea: ICES examined scale samples from historical collections of post-smolts made in the Labrador Sea with the aim of understanding the growth dynamics of stocks at the southern end of the range versus what is hypothesised to be the juvenile nursery for post-smolts from the entire stock complex. For two of the three years examined, growth patterns for fish from the southern stocks intersected the patterns for post-smolts from the Labrador Sea collections after 4-5 circuli pairs. Since circuli pairs are laid down at a rate of approximately one per week, the data suggest that distribution patterns for regional groups begin to overlap and stocks begin to experience similar environmental conditions by July of the post-smolt year or two months after their migration to sea. In some years, it would appear that regional groups do not mix until fall.

Catch and release as a conservation measure: The practice of hook-and-release angling as a conservation measure for Atlantic salmon is a recent phenomenon that has promulgated divergent opinions among user groups on its effect on salmon mortality and reproductive success. A review of studies indicated that hook-and-release angling and associated handling

at 20°C, or above, can result in grilse mortalities of between 8–40% (immediate and delayed) and that these critical temperatures can decrease survival if other stressful conditions are present, for example, soft water. Fish which had recently entered fresh water from the sea and which were hooked-and-released had an elevated rate of mortality compared to no mortality for kelts in the spring in freshwater and for salmon in the autumn that had been in the river for some time.

Information was limited on the long-term effects of hook-and-release angling; some studies using radio-tracking have documented that a large number of the fish survive for at least several months and spawning by some of these fish has been confirmed. Hook-and-release angling was deemed to be a conservation measure relative to retention angling, due to the generally low levels of mortality, but caution still must be exercised in its implementation. Mortality and resulting impact on resource conservation is potentially increased under certain river conditions and if anglers do not take care in releasing hooked fish.

1.3 Causes of Changes in Abundance

1.3.1 Linkage Between Climate, Growth and Survival

ICES re-evaluated the analysis of two long-term tagging studies of salmon on the River Figgio in southern Norway and the North Esk in eastern Scotland. The return rates for 1SW fish, the predominant age at maturity for both stocks, were highly correlated. An analysis of sea-surface temperature distributions for periods of high versus low return rate showed that when low sea surface temperatures dominate the North Sea and southern coast of Norway during May, salmon survival has been poor. Conversely, when high sea surface temperatures extend northward along the Norwegian coast during May, survival has been good.

Ocean conditions were further related to the recruitment process through growth studies with the North Esk stock. Post-smolt growth increments for 1SW and 2SW returning to the North Esk were highly correlated with survival (Figure 1.3.1) and were patterned similarly to changes in thermal habitat as shown in the 1997 report to NASCO. The results suggest that there is a link between ocean climate conditions, post-smolt growth, and post-smolt survival for salmon stocks in the North Sea area. The analysis is discrete over time and space and suggests that the ocean climate variation related to salmon survival occurs in spring when the post-smolts first enter the marine environment and occurs in the area of the North Sea and Norwegian coast.

1.3.2 Factors Potentially Influencing Recent Returns to North America

ICES reviewed a number of factors potentially contributing to lower than expected returns and sea survivals of Atlantic salmon to eastern Canada in 1997 and general declines in recent abundance of salmon. No single factor was identified that explained the cause of a decline in 1997. There are, however, indications that the ecosystem of the Northwest Atlantic has changed since the late 1980s and could be adversely affecting the overall abundance of Atlantic salmon.

Marine exploitation: Low overall catches of Atlantic salmon in commercial fisheries and lack of evidence of increasing by-catches in some inshore and offshore fisheries indicate that fisheries are unlikely to have been an important factor in the low returns of salmon in 1997.

Environmental conditions: The index of winter thermal habitat has been large when salmon abundance was high and low in recent years when abundance was low. During most of the

1990s temperatures of the waters off Labrador and Newfoundland have been relatively cold. These cold conditions continued through 1995 before warming in 1996 to above normal values. In 1997, temperatures remained well above the early 1990s values, but were lower than those observed in 1996, i.e., survival should not have declined further.

Significant large-scale ecosystem changes in the 1990s and late 1980s have been associated with the ocean climate changes. For example, Arctic cod increased in abundance on the Labrador Shelf and extended further southward onto the Grand Banks and into the Gulf of St. Lawrence. Greenland halibut extended their range further south and capelin returned to the Scotian Shelf and spread eastward from the Grand Banks to the Flemish Cap. Cold waters in the 1990s delayed the inshore spawning time of capelin by approximately 1 month, and they have continued to spawn late in recent years. There have also been large-scale changes in the distribution and abundance of Atlantic herring, and on the northeastern Scotian Shelf, snow crab, which prefer temperatures colder than 3ºC, have increased their distribution. In addition, many important commercial species including cod and redfish declined to very low numbers, although the respective roles of fishing and the environment in this decline remain unclear.

The extent to which these changes may be affecting reductions in survival of salmon is unknown.

Predation:

Birds: Based on sampling and estimates of potential consumption, common mergansers and belted kingfishers take a substantial fraction of juvenile salmon in some Maritime rivers. Similarly, double-crested cormorant colonies are known to deplete smolt runs in localised areas. However, numbers of these birds in the Maritimes have been stable in the years up to 1996.

Salmon in the diets of Funk Island gannets, large seabirds which capture fish by plunge-diving from the air, was rare in 1977–89, but increased during the 1990s. Their principal foods also shifted from warm-water species (mackerel) to cold-water species (capelin and others, including salmon). Salmon are also suggested to be included in the diet of herring gulls and great black-backed gulls in Newfoundland, which markedly changed their feeding behaviour in the 1990s due to reductions in fisheries discards and plant offal as a result of closure of the ground fisheries and also due to major delays in arrival times of inshore spawning capelin.

Seals: There were an estimated 4.9 million harp seals, 0.6 million hooded, and as well, 180 000 grey and 29 000 harbour seals in Canadian waters in 1996. Harp and hooded seals spend approximately half of the year in the Arctic and Greenland waters, moving to Labrador, insular Newfoundland and into the Gulf of St. Lawrence from about mid-November until mid-June i.e., their spatial and temporal distribution coincides well with Atlantic salmon. Harp seal populations have increased to their present high from 1.78 million animals in 1971. A significant negative association between pre-fishery abundance estimates of salmon in the Northwest Atlantic and harp seal populations, 1973–96, exists. However, evidence supporting large-scale predation of salmon by seals is lacking.

Fish consumption by seals (cod consumed by harp seals range from 10-40 cm in size) has been estimated by combining information on seal abundance distribution, energy requirements, and diet composition. Capelin, Atlantic cod, species of the Family *Pleuronectidae,* herring and window pane comprised 84% of the wet weight of diet samples

collected in 1982–1995, largely within the Gulf of St. Lawrence. Salmon comprised much less than 1% of the wet weight of samples and were estimated to comprise a few thousand tonnes of the annual consumption of fish by harp seals. However the reliability of the estimate was questioned because data were not presented on the number of salmon in the sample, the number of stomachs containing salmon, the size of the salmon, and the method of raising the stomach contents in what was known to be a small proportion of the herd (approx. 10%) to the potential consumption by the entire herd.

Cod: A recent shift inshore of cod distribution in Newfoundland and parts of the Gulf of St. Lawrence and possibly the eastern Scotian Shelf further suggested that cod may be preying on smolts (cod have been shown to consume about 20% of smolts as they enter the sea in some localised areas in Norway). However, no salmon have been found in the several thousand cod stomachs examined to date although few were sampled in the mouths of rivers at the same time as salmon smolts entered the sea.

Forage: Salmon are opportunistic feeders on capelin, sand lance, squid, herring, mackerel, deepwater fishes such as blacksmelts and barracudina, and many different types of crustaceans. They exploit different prey species in different feeding areas and the diet in a particular area may vary both among and within years. The ability to exploit a wide range of prey species, even at the post-smolt stage, suggests that the abundance of any one forage species would not of itself greatly alter growth and therefore survival. However, forage abundance may affect growth rates of individual salmon and a year class composed of slow-growing individuals resulting from low prey abundance would, presumably, be more vulnerable to predators. Sizes of returning fish to most rivers of Atlantic Canada in 1997 were, however, above or near average. Increased growth in the sea has been associated with earlier age-at-maturity and thus reduced returns in 1997 are not expected to materialise as increased returns of 2SW salmon in 1998.

1.4 NASCO Working Group on the Precautionary Approach

ICES was asked to comment and advise on the Report of the NASCO Working Group on the Precautionary Approach in North Atlantic Salmon Management as it relates to the work of ICES. The issues addressed by this group that were of principal interest to ICES were *'the application of a precautionary approach to the management of North Atlantic salmon fisheries'* and '*the formulation of management advice and associated scientific research'.*

The NASCO Working Group advised that the application of a precautionary approach (PA) to fisheries management requires that managers should make use of the best available scientific information when making management decisions; that they should be more cautious when information is uncertain, unreliable or inadequate, and that the absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures.

With respect to the management of salmon fisheries, the recommendations of the NASCO Working Group were broadly consistent with those of ICES. It was proposed, *inter alia* that stocks be maintained above conservation limits by the use of management targets normally set at a higher level; that account should be taken of the risks of not achieving the fisheries management objectives by considering uncertainties in i) the current state of the stocks, ii) biological reference points and iii) fishery management capabilities and, that stock rebuilding programmes (including habitat improvement, stock enhancement and fishery management actions) be developed for stocks that are below their conservation limits.

With respect to the formulation of management advice the recommendations of the NASCO Working Group were broadly consistent with current requests, i.e., advice on risks of not achieving management objectives; provision of catch options; advice on stock rebuilding programmes (where stocks are well below target levels); identification of monitoring and data collection required, and advice on the impacts of existing and new fisheries for other species. It is implicit in the NASCO Working Group's recommendations that scientists should provide an estimate of conservation limits based upon best available information and that the uncertainties in the data should be encompassed in the way that these figures are used in providing management advice, such as catch options.

ICES' mandate is to focus on scientific issues, leaving decisions on management objectives and socio-economic concerns to the managers. Conservation limits are a biological imperative and ICES is concerned about the lack of a clear definition of the word "conservation" in NASCO's objectives and uncertain whether it had the same meaning as in the term "conservation limit".

1.5 Compilation of Tag Release and Finclip Data for 1997

Data on releases of tagged and finclipped salmon in 1997 were compiled by ICES and provided under separate cover. In 1997, a total of slightly over 3 million salmon were marked, approximately 10% less than in 1996. The adipose clip was the most used primary mark (1.73 million), with microtags (0.82 million) the next most used primary mark. Microtag use was down 5% from 1996. Secondary marks were applied to 0.84 million fish. Most marks were applied to hatchery-origin juveniles (2.95 million), while 0.06 million wild juveniles and 0.02 million adults were marked.

ICES initiated data summaries on eggs artificially spawned from sea-run adults that returned in 1997 and all egg and life stages released in 1997. The data will provide measure of the interception of ova for management purposes and broad trend information on enhancement activities.

2. ATLANTIC SALMON IN THE NORTH-EAST ATLANTIC COMMISSION AREA

2.1 Events in Fisheries and Status of Stocks

2.1.1 Fishing in the Faroese Area 1996/1997

In accordance with the agreement between the Faroese Salmon Fishermen's Association and the North Atlantic Salmon Fund, commercial fishing for salmon in Faroese territorial waters was suspended for the years 1991 to 1997. During the 1996/1997 fishing season there was, as well, no research fishery. In the 1997/1998 fishing season, for which there was no suspension of commercial fishing, one vessel completed 4 trips, Jan–Apr, 1998, and reported a catch including discards, of 3 t (approx. 1 000 salmon).

Origin of the catch: In the 1992/1993 to 1994/1995 fishing seasons, a total of about 5 500 salmon caught on long-line were tagged and released in the open sea north of the Faroes. After five fishing seasons (1993–97) 87 wild tagged fish (2 more than previously) have been reported recaptured in 10 countries. The additional recoveries did not alter previous conclusions based on recoveries adjusted for homewater exploitation and tag reporting rates, that the Faroes feeding area is particularly important to salmon of Norwegian (41.7% of tag recoveries), Scottish (20.7%) and Russian (16.5%) origin. Of 19 tagged farmed/reared fish recovered (1.9% of those tagged), 18 were reported from Norway whereas one was recovered from the west coast of Sweden.

2.1.2 Homewater Fisheries in the NEAC Area

Gear and effort: In Ireland, monofilament netting was authorised for drift net fishing in 1997. Other countries did not report changes or restrictions on fishing gear. The number of gear units was generally well below the 5- and 10-year means. In Iceland, only one coastal gillnet operated (August only), as compared to five nets in the early 1990s. In Norway, the coastal bend nets were banned in a large area along the Norwegian coast and some new regulations were introduced to bagnet and rod fisheries. The effort in the Irish fisheries was reported to have decreased somewhat, although the gear units have stayed at the same level since 1995 and in 1997 the number of net licences was capped at the 1995 level. The net fishery in the Adour River, France, was closed in July for the first time. Licences in the French rod fishery increased by 65%, probably because of a significant reduction in licence fees.

Catch: Provisional figures suggest that nominal catches of salmon in Northeast Atlantic countries in 1997 were generally below the 1996 values and for most countries still below the previous 5- and 10-year averages. In general, fishing effort in terms of licences issued has been declining substantially over the years for commercial fisheries and increasing for recreational fisheries. The provisional nominal catch for 1997 was 2 038 t; the final value (including ranched fish) for 1996 was 2 744 t, well below the 1995 value of 3 271 t (see text table in Section 1.1.1).

CPUE: No trends were detected in the CPUE of the fixed engine fisheries of UK (England and Wales). For UK (Scotland) there is a clear, significant downward trend in CPUE in the net fishery. CPUE from recreational fisheries can be difficult to interpret. CPUE in rod fisheries in Finland, France and on the River Bush, UK (N. Ireland) show no trend for catch per angler day for the last 10 years. However, there is a marginally significant positive trend

in CPUE for the whole season for rod fisheries in Finland and France over the same period of time.

Composition of catch: The proportion of 1SW fish in catches has increased for Norway, Russia and Finland compared to both long- and short-term indices. In UK (Scotland), the proportion has remained similar to the 1992–96 mean but decreased relative to the longer-term mean. In France, the proportion remained similar to the longer-term mean while decreasing relative to the 1992–96 mean. Compared to the 1992–96 mean, the proportion in the 1997 UK (England & Wales) catch remained the same while that of Sweden has decreased.

Origin of catch: New analyses of tag recoveries from fish of non-national origin in national catches were provided by Ireland and Sweden. Of 6 747 CWT tags recovered in Ireland in 1997, 2.2% were reported to be of UK (N. Ireland) origin, 0.4% of UK (England & Wales) origin and 0.03% of Spanish origin, i.e., approximately 97% were of Irish origin. In 1997 15% of the catch in the county of Halland, Sweden was assessed to be of Baltic origin, i.e. being larger and paler in flesh colour than normal Atlantic salmon. Some tag recaptures indicate that they emanate from Danish experiments with delayed release. Salmon from Danish releases have been recorded in the past, but accounted for only a small percentage of the catch. Of nearly 805 000 smolts tagged and released in Norway, many being of hatchery origin, 98.8% of recaptures were taken in Norway, 0.6% in Sweden, 0.3% in Denmark and 0.2% in Ireland.

Farmed salmon continue to represent a large percentage of the national reported catch in Norway (31%) and 'ranched' salmon (fish intended to mitigate lost salmon production) now account for 65% of the national catch in Sweden. Although Iceland produces a large (but decreasing) tonnage of ranched salmon, practically all this is harvested at the production sites. Farmed fish formed less than 1% of the national catches in Ireland and UK (N. Ireland).

Exploitation rates: Exploitation rates in homewater fisheries vary considerably among different river stocks. Mean rates (1992–96) for a small number of monitored stocks range from about 10% to about 80%. Exploitation rates for 23 of the 30 datasets decreased in 1997 from those of 1996. Although reported exploitation rates in some fisheries have changed, analyses indicate that there has been no overall trend for Irish, UK, Icelandic or Scandinavian stocks over 10-year or 5-year periods. However, significant downward trends in exploitation were shown for Russian rivers over these periods.

2.1.3 Status of Stocks in the NEAC Area

There are over 1 500 rivers supporting salmon in the NEAC area, but for most of these there is no information on the status of the stocks. Previous estimates of pre-fishery abundance (PFA) of 1SW and MSW salmon in the NEAC area (northern and southern components) have been updated to PFAs for each of 10 nations using estimated catch and unreported catch and bounded by estimates from a reformulated Monte Carlo simulation (1 000 simulations). Parameter values included minimum and maximum estimates of i) 1SW and MSW catch (include proportion unreported), ii) 1SW and MSW returns, iii) maturing and non-maturing 1SW recruits, and iv) 1SW and MSW spawning escapement. Minimum and maximum estimates of the average level of exploitation were used to raise catch to stock abundance and minimum (0.005) and maximum (0.015) estimates of natural mortality were applied to salmon in the sea for more than one winter where months to homewaters were also given minimum and maximum values. Proportion of unreported catches, exploitation levels,

natural mortality, months between fisheries and homewaters were entered as uniform distributions with ranges given by minimum and maximum.

The uncertainties surrounding these estimates need to be emphasised. The unreported catch in the NEAC area is high (the provisional catch in 1997 was 2 038 t with an estimated 36% unreported 732 t). The returns to rivers are estimated in some cases on exploitation figures that are ill defined. The Working Group try to provide estimates of this uncertainty but hard data is largely not available.

Figures 2.1.3.1 and 2.1.3.2 show the range of estimates of the pre-fishery abundance of maturing 1SW (1971–97) and non-maturing (MSW) (1971–96) salmon (and spawners) in the NEAC area for northern and southern European stocks as defined below:

Southern European countries:	**Northern European countries:**
Ireland	
France	Finland
UK (England & Wales)	Norway
UK (Northern Ireland)	Russia
UK (Scotland)	Sweden
Greenland catches	70% Faroes catches
30% Faroes catches	

Note: Icelandic stocks are omitted because their distribution is thought to differ from both groups.

The maturing 1SW component of the northern European stocks has remained relatively constant despite showing marked variation in some years. The non-maturing 1SW component, on the other hand, appears to have been declining since the 1980s, with the most marked change occurring around 1986–87. However, it must be noted that these estimates include large numbers of farm escapees in the more recent years. The southern European stocks appear to have been more volatile, with large fluctuations occurring in the first half of the time series. The maturing 1SW component of these stocks appears to have fallen markedly in the 1990s to a new, relatively stable but low level, while the non-maturing 1SW component has been in steady decline since the mid 1980s.

Spawner requirements and time series of compliance data were available for 12 rivers; spawning thresholds were exceeded in five rivers in 1997. There was no significant trend noted in spawner attainment over the last 10-year period for all stocks combined, but a significant trend towards lower egg deposition was noted over the most recent 5-year period.

Smolt counts or estimates of juvenile abundance are available for 21 rivers. Values for 1997 are higher than in the previous year in most areas. The values in 1997 were lower than the 5-year mean in R. Esk, UK (Scotland), but higher in all other rivers. Analyses show no significant trend in juvenile production in these rivers over the last 10- and 5-year periods.

There appears, however, to be a general decline in escapement in many of the NEAC rivers. Analysis of wild smolt returns to homewaters and freshwater did not indicate a decline in survival, but marine and freshwater survival of hatchery fish declined significantly over the previous 10- and 5-year periods.

Adult counts are available for 33 rivers in the NEAC area for the previous four or more years. The counts in 1997 were generally lower than the 5-year mean. Higher estimates

were obtained for some Russian and UK (N. Ireland and Scotland) rivers. In Russia adult counts increased over the last 30- and 20-year periods but no trend was observed for the last 10- and 5-year periods. For other rivers in the NEAC area there has been a significant downward trend for the last 5 years but no trend for the last 10 years.

Coherence in recruitment patterns in pre-fishery abundance of European salmon: ICES was uncertain whether the split of NEAC countries into the northern and southern groups provided above was the most appropriate for providing catch advice. The split is based upon very limited data which suggest that a much greater proportion of fish tagged in Scandinavian countries are recaptured in the Norwegian Sea, and a greater proportion of fish from southern rather than northern European countries have been caught at West Greenland. However, recent tagging data from some countries are sparse, and the correlation between smolt-to-adult survival for fish from the River Figgio (southern Norway) and North Esk (Scottish east coast) suggests that these rivers should be grouped together (Section 1.3.1).

ICES analysed time series of pre-fishery abundance for national stocks in Europe, disaggregated by age-at-maturity, to attempt to define stock complex borders relevant to the mixed-stock fisheries at Faroes and West Greenland. Two clustering approaches were applied to abundance data normalised by the mean of each time series. K-means clustering did not clearly show the inter-relationship between stocks. Tree clustering methods which use the dissimilarities or distances between objects when forming clusters was restricted to those stocks predominately producing wild fish and revealed two main groupings.

A large cluster of Ireland, UK (N. Ireland and Scotland), Norway, and UK (England and Wales) 1SW salmon was formed which appears distinct from Russia. This cluster suggests survival and abundance of 1SW salmon is tracking similarly for most stocks in Europe and is consistent with emerging models and observations on post-smolt survival and distribution. Normalised abundance for Ireland, Norway, and Scotland show all three stocks have declined over the past two decades and that the pattern of decline for each stock has been weakly correlated.

Clustering of the non-maturing component of national stocks, restricted to those stocks predominately producing wild fish, suggests a pattern of stock boundaries distinct from the pattern observed for maturing fish. Two extreme clusters were formed consisting of Norway and UK (Scotland) and Ireland and UK (N. Ireland). Normalised abundances for Ireland, Norway, and UK (Scotland) support the results of the cluster analysis showing similar patterns for Norway and Scotland versus Ireland, which suggests stock boundaries should be to the west of UK (Scotland). In addition, Russia is sufficiently different from Norway to suggest a third group of northern stocks may be appropriate.

This was considered to be a valuable preliminary analysis but there were concerns that production boundaries for stocks may not match patterns of utilisation in mixed-stock fisheries. It may for example be possible to define various groups of stocks and weight their contribution to the catch option assessments based upon their relative contribution to the fisheries. Other biological stock characters will be examined and tagging databases be reviewed to determine whether functional stock boundaries can be defined.

2.2 Effects of the Suspension of Commercial Fishing Activity at Faroes

Since 1991, the Faroese fishermen have agreed to suspend commercial fishing for the salmon quota set by NASCO in exchange for compensation payments. The number of fish saved from the fishery is estimated by subtracting the numbers of fish taken in the research fishery

from the number that could have been caught if the commercial fishery had operated. The increase in returns to all homewaters is then estimated by subtracting the fish that would have died on their homeward migration. Most fish would be expected to return to European rivers.

Unlike the past assessment, the expected catch in the Faroese fishery was assumed to be equal to the purchased quota in each year. Means of recent discard rates, age composition, and the proportion of farm fish were used in the absence of new data. The estimated increased returns of wild 1SW and MSW salmon to homewaters in Europe and their contribution to the total estimated returns to the NEAC area for the years 1992–97 follow:

Year	Quota (t)	Estimated increased returns to home waters in Europe			
		1SW	%	MSW	%
1992	550	2 842	<1	70 809	6
1993	550	11 429	1	106 307	9
1994	550	21 078	1	134 159	11
1995	550	12 949	1	138 533	12
1996	470	10 573	<1	122 196	11
1997	425	9 578	<1	105 368	12

In 1997, an additional 27 000 farm fish will have escaped capture because the fishery did not take place.

Suspension of the fishery increased MSW returns to all European rivers by 6-12% and 1SW returns by around 1%. Adult tagging studies (Section 2.1) indicate that 65-75% of the MSW salmon caught in the Faroes fishery would return to Scandinavian countries, Finland and Russia. If this were the case, increased returns might have represented 9% to 20% of the MSW returns to northern Europe between 1992 and 1997. However, any increase in catches either has been too small to be detected as a statistically significant change above the normal annual variation or has been masked by other factors such as reduced marine survival or reduced exploitation rates in homewaters.

2.3 Development of Age Specific Conservation Limits

Advances in the development of conservation limits (MSY) came as a result of a Workshop held in Dublin, 10–12 March 1998. The Workshop recognised that limits set on a larger scale than that of the population level could, in practice, lead to genetic risk to some populations and that each individual country's representative would need to decide on the scale at which they felt it was appropriate to set conservation limits.

Ideally, conservation limits should be based on reference points derived from fitted stock-recruitment curves. Unfortunately, less than ten rivers in NEAC have sufficient data to give these curves and only three (the rivers Imsa, Bush and Burrishoole) have been fully developed. Other methods of establishing reference points were addressed, in particular those which are based on habitat/spawning stock indices, transporting targets and correcting for topographical and biological information on river and stock. Emphasis was placed on examining methods which could be applied in the virtual absence of specific river data. Table 2.3 outlines a hierarchy of approaches which have been used with existing data to derive targets/conservation limits for many rivers in the NEAC Area. The basic methodology of each approach and the data required to provide a target estimate or a potential target estimate are outlined. Included are the number of rivers in each country and the number for

which each approach has been taken. It is implicit that the lower the rank the less precise the estimate is likely to be.

The problem of setting age-specific conservation limits is the lack of information on the proportion of each age class in the national stocks. Further, it was undecided as to whether conservation limits should be aimed at (i) conserving a historical age composition (ii) preserving the current age composition or (iii) adopting some other approaches. In reality, management on the basis of combined stock components for individual rivers even when these individual river stocks are low is probably the most that will be achievable over the next few years.

In the absence of S/R based conservation limits for UK (Scotland) and Norway, ICES continued the development of a conservation limit for all rivers combined in the NEAC area based on estimates of the pre-fishery abundance of maturing and non-maturing salmon and the relationship between estimated spawners and subsequent recruitment (lagged spawner model - Approach 13).

2.3.1 Development of Conservation Limits for the NEA Stock Complexes

Lagged spawner analysis: In order to develop conservation limits, information is required on the relationship between spawning stocks and recruitment. The PFA model provides estimates of the numbers of spawners and the numbers of 1SW recruits. However, these values cannot be used to derive stock-recruitment relationships directly because the spawners in year 'n' contribute to the recruitment over several years depending upon the relative proportions of 1- to 6-year old smolts that they produce. 1SW and MSW salmon also contribute to the recruitment in different proportions, principally because of the greater egg deposition from the MSW fish resulting from their greater size and the higher proportion of females. Since most stocks have seen significant changes in the relative proportions of 1SW and MSW salmon in the last 25 years, this difference needs to be taken into account to avoid biases caused by changes in the age composition of the spawning stock. This was addressed by converting the numbers of 1SW and MSW spawners into numbers of eggs deposited.

This approach assumes that there have been no significant changes in the egg production or in the proportion of females for 1SW and MSW salmon over the time period. Males are therefore ignored in the foregoing analysis, the assumption being that their numbers have not limited production during the period 1971–present.

The egg deposition in year 'n' may be estimated to contribute to the recruitment in years 'n+3' to 'n+8' to produce parr in year 'n+1' and 1yr smolts in year 'n+2', and these will generate 1SW recruits in proportion to the numbers of smolts produced of ages 1 to 6 years (e.g., spawners in year 'n' will produce recruits in year 'n+3'). Thus the number of 'lagged eggs' can be related to the number of 1SW recruits. The estimates of lagged eggs provides a measure of the relative spawning level which may be related to the recruitment figures derived from the PFA analysis. Plots of lagged eggs (stock) against the 1SW adults in the sea (recruits) could be considered as pseudo-stock-recruitment relationships. A number of options for setting conservation limits using these relationships were reviewed. However, in view of the preliminary status of the methods, ICES were not in a position to recommend conservation limits.

Provision of Spawning Escapement Reserves (SER): The number of lagged eggs as estimated above which produced the lowest number of recruits was adopted as the Spawning Escapement Reserve (SER) for the two NEA stock complexes. The egg depositions have

been converted to numbers of 1SW and MSW spawners and are shown in Figures 2.1.3.1 and 2.1.3.2. Because of the very preliminary nature of this assessment, only historic minimum egg depositions (escapements) for the stock complexes should be used in the provision of advice this year.

Estimates of the SER are based on values of M = 0.01 and 't' of 7 months for 1SW and 17 months for MSW salmon. The SER values for the northern and southern stock complexes are plotted with PFA estimates on Figures 2.1.3.1 and 2.1.3.2.

Age composition of the estimated egg depositions are based upon the ratio of the averages of the estimated numbers of 1SW and MSW spawners for the last 10 years for each country from a simulation analysis. ICES emphasised that this is one approach that might be adopted. An appropriate choice will depend on the age composition being aimed for. Managers may wish to state explicit criteria regarding the restoration of stocks to their recent or historic compositions.

ICES noted that with further analyses in the development of conservation limits, it would be expected that the spawners required to remain above the conservation limit of these stocks will be higher than the historic minimum suggested above.

The age-specific historic minima have been based upon the average age composition of spawning stocks in the past 10 years. This is a relatively conservative approach, and it would probably be desirable to progressively change the composition towards one thought to be more ideal in the long term. If the age composition had been based upon the state of stocks further in the past, the historic minimum for MSW salmon would probably have been higher and the minimum for 1SW fish lower. As a result MSW stocks in Southern Europe would probably have been below the minimum for much of the past 25 years, while 1SW stocks might still be above that level.

2.4 Abundance of Salmon in the North-East Atlantic for 1998/1999

Pre-fishery abundance estimates could be used to provide catch advice if a forecast could be developed of recruits in the year preceding the fisheries, i.e., 1SW recruits must be predicted for 1998 if we are to provide advice for: the West Greenland fishery in 1998; the Faroes fishery (MSW stock) in 1998/99; and homewater fisheries in 1999. Because the latest estimate of non-maturing 1SW recruits is for 1996, the PFA must be forecast two years ahead, as is currently practised for the North American assessment. For maturing 1SW stocks, a single year's projection is sufficient.

2.5 Provision of Catch Options with Assessment of Risk

Catch Advice: In view of the uncertainties expressed about the most appropriate stock groupings, and the high likelihood that the final conservation limits will be higher than the preliminary Spawning Escapement Reserves (SERs) used this year (see Section 4.4), ICES cannot provide precise quantitative catch advice and risk evaluations.

Northern European 1SW stocks: Although the confidence limits on the PFA estimates for maturing 1SW salmon from northern Europe are large, the estimates in the most recent years are greater than the historic minimum SER, and appear to be relatively stable. **ICES therefore considers the 1SW salmon from northern Europe to be within safe biological**

limits as a stock complex (although the status of individual stocks within the complex may vary). ICES considers the continuation of exploitation of these stocks at the current rate to be acceptable, although there would be risk to the stock complex if exploitation rates were to increase, even marginally.

Northern European MSW stocks: The PFA of non-maturing 1SW salmon from northern Europe has been declining since the late 1980s, and is now approaching the historic minimum. **ICES considers the stock complex to be within or close to safe biological limits. Because the PFA is very close to the SER value, ICES advises that great caution should be exercised in the management of these stocks, particularly in mixed-river stock fisheries. Every effort should be taken to reduce exploitation rate at least until the PFA begins to rebuild away from the preliminary SER value.**

Southern European 1SW stocks: The PFA of maturing 1SW salmon from southern Europe has been low for about 8 years. In 1997 it was very close to its historic lowest value. **ICES considers that the stock complex to be within or close to safe biological limits. Because the PFA is very close to the SER value, ICES advises that great caution should be exercised in the management of these stocks, particularly in mixed-river stock fisheries. Every effort should be taken to reduce exploitation rate at least until the PFA begins to rebuild away from the preliminary SER value.**

Southern European MSW stocks: The PFA of non-maturing MSW salmon in southern Europe has been declining steadily for about 10 years. Present analyses suggest that the PFA reached a historic minimum in 1996, and with the current trend will fall below that preliminary conservation limit in 1998. **ICES considers this stock complex to be outside or close to safe biological limits, and extreme caution should be exercised in the management of these stocks, particularly in mixed-river stock fisheries. A significant reduction in exploitation rate should be achieved in 1999, and reduced exploitation should continue until the PFA has recovered to a size giving a low probability of falling below the preliminary SER value.**

2.6 Potential By-Catch of Post-Smolts in Pelagic Fisheries

There is no new information about the by-catch of post-smolts in pelagic fisheries.

Both the fishery for mackerel and herring in the Norwegian Sea overlap spatially and temporally with the suggested routes of European post-smolts on their northward feeding migration. To date, however, there is only one record of a Carlin-tagged smolt taken in the mackerel fishery in International Waters in the Norwegian Sea.

Fishing methods used in post-smolt trawl-surveys, which to date have recovered over 850 post-smolts, may not be comparable with those used by the commercial fishery. Therefore catch rates from the scientific trawl fishery cannot be used to estimate the number of smolts taken in commercial catches. Hence, ICES will address questions concerning: i) the timing of pelagic fisheries in the ICES Areas I, IIab, IVab, Va, Vb12, VIab and VIIab; ii) specifications of the gear used; iii) catch per month per ICES statistical rectangle in the relevant Areas and iv) information on possible by-catches of salmon in the pelagic catches to the Working Group on Northern Pelagic and Blue Whiting Fisheries, the Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy, and the Herring Assessment Working Groups.

2.7 Data Deficiencies and Research Requirements in the NEAC Area

Estimates of marine mortality of salmon should be re-examined in the North-East Atlantic, and causes for this mortality should be identified and quantified.

ICES strongly endorses the continuation of the post-smolt surveys in the North-East Atlantic, and recommends this to be extended to presently uncovered areas.

Efforts should be made to provide estimates of by-catch of salmon in marine waters.

ICES recommends a continuation of the research fishery at Faroes.

Alternative ways to group salmon stocks, or stock complexes should be examined to improve the catch advice for salmon in the North-East Atlantic.

The quality of data used to set conservation limits in the North-East Atlantic should be improved and provided for smaller stock complexes. Furthermore, a sensitivity analysis of the input parameters to the pre-fishery abundance model should be carried out.

More information is required on a river-by-river basis relating to catches, exploitation rates and habitat assessment and this should be referenced to the appropriate scale (e.g., tributary populations etc.). Specific information on required age class composition of the stocks should be established on a river-by-river basis (historical and current).

Life history models are required for as many index rivers as possible.

Transportability of existing targets derived from known S/R relationships must be evaluated in comparison with other indices of abundance.

Further refinement is required to the model to estimate PFA and Conservation Limit, particularly with regard to the examination of the input data from each country, to explain differences between the model output and current estimates of abundance from other analyses.

Further research and development is required, particularly with regard to establishing stock size (counters) and relating productivity to suitable habitat area (catchment surveys, juvenile production studies and application of GIS and other techniques).

The implications of combining required adult escapement levels over districts, regions and countries must be examined and the scale to which this is appropriate identified.

3. ATLANTIC SALMON IN THE NORTH AMERICAN COMMISSION AREA

3.1 Events in Fisheries and Status of Stocks

3.1.1 Fisheries in the NAC Area

Gear and effort: Restrictions on commercial and recreational fisheries introduced in Canada in 1992 remained in force. In addition, further regulations were introduced in Labrador: the commercial fishery in SFA 14B (south) was closed, the quota for north Labrador was reduced from 55 t to 50 t. In Québec the commercial fishery continued in zones Q9 and Q11, at the same level as in 1996. In the recreational fishery, hook-and-release regulations for small salmon were extended to more rivers of the Maritimes Region; the retention of large salmon continued only in Québec and northern Labrador. Following river-specific in-season reviews of returns, non-retention of salmon regardless of size and in some cases, complete closure, was imposed. In all insular Newfoundland, retention angling seasons were shortened as a result of low returns and/or low water conditions and warm water temperatures.

In the USA there is no commercial fishery for salmon and angling (catch-and-release only) for sea-run salmon in 1997 was permitted only in the State of Maine. No information was available to ICES for professional and recreational net fisheries in Saint-Pierre et Miquelon (France) in 1997.

Catch: The provisional landings for Canada in 1997 were 225 t, a decrease of 22% by weight from 1996 (Table 1.1.1). The landings of small salmon in numbers (57 143) and large salmon (26 530) represented decreases of 30% and 16%, respectively, from those of 1996. Recreational fisheries exploited the greatest number of small salmon in each province, accounting for 71% of the total small salmon harvests in eastern Canada. Commercial fishers took the largest share of large salmon (51% by number). Native peoples harvested 4% (by number) of the total small salmon and 24% of the total large salmon in eastern Canada. Unreported catch for the NAC area was estimated at 89 t.

In 1997, the first year for which estimates are complete for Canada, almost 50 000 salmon (22 000 large and 28 000 small) were caught and released. Most of the fish released were in New Brunswick (46%), followed by Newfoundland (41%), Nova Scotia (9%), Québec (4%) and Prince Edward Island (< 1%). Expressed as a proportion of the fish caught, that is, the sum of the retained and released fish, the highest percentage (75%) was released in Nova Scotia, followed by New Brunswick (62%), Newfoundland (51%), Prince Edward Island (47%) and Québec (13%).

In the USA the estimated number of salmon caught and released in 1997 was 333 fish - 39% lower than in 1996 and 32% and 46% below the 5- and 10-year means. In Saint-Pierre et Miquelon (France) the harvest was not reported but rather, assumed to be 1.5 t, the value provided in 1996.

Composition and origin of catch: No external tagged fish of USA origin were reported from Canadian fisheries in 1997. In Canada, returns to the majority of rivers in Québec, Newfoundland and Labrador are comprised exclusively of wild salmon. Hatchery-origin fish were most abundant in returns to rivers in the Bay of Fundy and along the Atlantic coast of Nova Scotia. Aquaculture escapees were sampled from the St. Croix and Magaguadavic rivers in the Bay of Fundy.

In the USA, some salmon that were caught in the sport fishery in 1997 were assumed escapees from aquaculture operations in Maine and New Brunswick (Canada). In addition, a few of those caught and released originated from captive broodstock that were released into three rivers in June.

3.1.2 Status of Stocks in the NAC Area

Total estimated (mid-point) returns to North America (prior to the Newfoundland and Labrador commercial fisheries) in 1997 were 304 385 1SW and 92 719 2SW fish (Figure 3.1.2.1). The estimate of 1SW returns is 33% lower than the estimate for 1996 and the fourth lowest observed in the 27-year time series, 1971–97. The estimates of returns are quite variable over the time series and have been in some decline over the last decade. The estimated 2SW returns are 19% lower than returns in 1996 and the second lowest in the time series; they have declined from a peak of 226 000 fish in 1980.

The rank of the estimated *returns* in 1997 in the 1971–97 time series (Figures 3.1.2.2 and 3.1.2.3; inc. spawning targets) for six regions in North American is shown below. Estimates of returns to Québec, 1971-1997 were revised upwards as a result of using individual river information for 117 rivers. In the following text table, the closer the rank is to 1 the better the relative performance of the stock:

	Rank of 1997 returns in 1971–1997 time series (1=highest)		Mid-point estimate of 2SW spawners as proportion of escapement requirement
Region	**1SW**	**2SW**	**(%)**
Labrador	4	11	47
Newfoundland	25	13	120
Québec	14	27	30
Gulf (Mainland)	25	23	84
Scotia-Fundy	27	23	19
USA	14	21	6

In most regions the returns of 2SW fish are near the lower end of the 27-year time series except Labrador and Newfoundland where they are about in the middle. Returns of 1SW salmon were at the lower end of the time series in Newfoundland, Gulf and Scotia-Fundy, about at the mid-point in Québec and USA and near the highest in the series for Labrador.

The text table above also shows the estimated total spawning escapement of 2SW salmon in each region expressed as a percentage of the spawning escapement requirement. Only in Newfoundland were requirements exceeded, and in the Gulf of St. Lawrence approached, in 1997. The overall 2SW spawning escapement requirement for Canada could have been met or exceeded in only three (1974, 1977 and 1980) of the past 27 years (considering the mid-points of the estimates) by reduction of in-river fisheries (Figure 3.1.2.1). In the remaining years, spawning requirements could not have been met even if all in-river harvests had been eliminated.

The North American run-reconstruction model was used to update the estimates of pre-fishery abundance of non-maturing and maturing 1SW salmon from 1971–1997. The estimate of pre-fishery abundance of 127 521 of non-maturing 1SW salmon for 1996 was the lowest on record, 19% below that of 1995 and 8% below the previous low estimated for 1993 (Figure 3.1.2.4). Conversely, a 464 962 value for maturing 1SW salmon was a 38% increase over that of 1995. An estimate of 316 949 fish in 1997 is 32% less than that of 1996 and the

lowest in the 27-year time series. The results suggest a continuing decline of North American salmon production. In addition to the steady decline in total recruits over the last 10 years, grilse have become an increasingly larger proportion of the total North American stock complex (Figure 3.1.2.4). This proportion has risen from about 45% at the beginning of the 1970s to between 65 and 80% in the last four years.

Egg depositions exceeded or equalled the specific river requirements in 26 of the 89 rivers which were assessed in Canada and were less than 50% of requirements in 22 other rivers. Large deficiencies in egg depositions were noted in the Bay of Fundy and Atlantic coast of Nova Scotia where 10 of the 20 rivers assessed had egg depositions which were less than 50% of requirements (Figure 3.1.2.5).

The majority of the USA returns were recorded in the rivers of Maine, with the Penobscot River accounting for about 77% of the total USA returns. Salmon returns to the Penobscot River (1 355) were 34% lower than in 1996, 21% lower than the 1992–96 average and 39% lower than the 1987–96 average. Returns to most USA rivers exhibit the same downward trend that has been shown of many Canadian stocks, are hatchery-dependent, and in total (hatchery and wild) represent about 5% of spawner requirements for all rivers.

3.2 Effects of Quota Management and Closure after 1991 in Canadian Commercial Salmon Fisheries

In 1992, a 5-year moratorium was placed on the commercial Atlantic salmon fishery in insular Newfoundland, while in Labrador and Québec North Shore and Ungava, fishing continued under quota or allowance catch. In conjunction with the commercial salmon fishing moratorium, a commercial license retirement programme went into effect in insular Newfoundland, in SFAs 1, 2 and 14B of Labrador, and in Q7, Q8 and a part of Q9 in Québec; there were no changes in the management measures in Q11.

In 1997, ICES considered a detailed assessment of the impact of the Newfoundland-Labrador changes on Newfoundland stocks and of changes in Québec on Québec stocks. As an example, commercial exploitation rates on small salmon during pre-moratorium years (1984-91) in insular Newfoundland were estimated to have ranged from 29% to 66%, and averaged 49%. On large salmon they ranged from 64% to 98% and averaged 76%. No new evaluations were presented.

3.3 Stock Conservation Requirements

Spawning requirements are now considered as threshold reference points synonymously defined as the conservation requirement. The conservation requirements for North America have been expressed in terms of the number of 2SW fish required for all production areas of North America. Requirements for USA rivers are unchanged; Canadian rivers increased by 2.2%, from 151 296 to 154 653 fish. Most of the increase was in the Scotia-Fundy sector and resulted from improved estimates of rearing habitat and biological characteristics of spawners. North American requirements now total 183 852 2SW fish.

3.4 Development of Catch Options

It is now possible to provide catch advice for the North American Commission area for two years. The first is a revised estimate for 1998 for 2SW maturing fish based on improved estimates of the 1997 pre-fishery abundance and accounting for fish which were already removed from the cohort by fisheries in Greenland and Labrador in 1997. The second is an

estimate for 1999 based on the pre-fishery abundance forecast for 1998. A consequence of these annual revisions is that the catch options for 2SW equivalents in North America may either increase or decrease compared to the options developed the year before.

3.4.1 Catch Option for 1998 Fisheries on 2SW Maturing Salmon

A revised estimate of the pre-fishery abundance for 1997, of 93 326 fish (Table 3.4.1) is significantly less than the 196 858 value forecast in 1997 (see Sections 3.1.2; 4.1.1; 4.3 and 4.6.1 for explanations). A pre-fishery abundance of 93 326 in 1997 equates to 84 445 2SW salmon equivalents after adjustment for natural mortality of 1% per month for 10 months (a factor of 0.904837). There have already been harvests of 16 185 2SW salmon equivalents in 1997 as 1SW non-maturing salmon in the Labrador (1 544) and Greenland (14 641) fisheries. The text table below uses the probability density projections for the revised pre-fishery abundance estimate of 93 326. Catch option values = [(PFA-spawner reserve of 205 230/0.904837) – 16 185].

Catch Options for 1998 North American Fisheries (Probability levels refer to probability density function estimates of pre-fishery abundance)

Probability Level	Pre-fishery Abundance Forecast	Catch Options in 2SW Salmon Equivalents (no.)
25	11 899	0
30	29 956	0
35	46 761	0
40	62 706	0
45	78 187	0
50	93 326	0
55	108 533	0
60	123 903	0
65	140 013	0
70	156 801	0
75	174 862	0
80	195 172	0
85	218 847	0
90	248 799	23 238
95	293 386	63 582

Low returns of 2SW salmon to North America would be consistent with the generally low returns of mature 1SW fish from the same smolt class in 1997. The size of the mature 1SW fish was above or at near average values and suggested that age-at-maturity, if changed by unusual environmental conditions, would be lower rather than higher.

Catch advice for the NAC Area is included in the section relevant to West Greenland (4.6.5).

3.4.2 Catch Option for 1999 Fisheries on 2SW Maturing Salmon

The advice for 1999 is based on a prefishery abundance of 113 899 in 1998 (Table 3.4.1) and assumes a 40% Greenland/ 60% North America division of the surplus for harvest (after reserving the spawner requirement of 205 230). Catch options below are expressed as 2SW salmon equivalents (by considering 10 months of mortality at 1% per month, a factor of 0.904837). There is wide variability in the forecast abundance and caution is warranted.

Catch Options for 1999 North American Fisheries (Probability levels refer to probability density function estimates of pre-fishery abundance)		
Probability Level	Pre-fishery Abundance Forecast	Catch Options in 2SW Salmon Equivalents (no.)
25	14 235	0
30	36 326	0
35	56 943	0
40	76 459	0
45	95 362	0
50	113 899	0
55	132 851	0
60	151 512	0
65	171 000	0
70	191 607	0
75	213 945	4 731
80	238 851	18 253
85	268 003	34 080
90	304 873	54 096
95	360 140	84 101

The above numbers of fish refer to the composite North American fisheries and on individual rivers, where spawning requirements are being achieved, there would be little biological reasons to restrict harvests.

Catch advice for the NAC Area is included in the section relevant to West Greenland (4.6.5).

3.5 Data Deficiencies and Research Requirements

There is a need for improved habitat surveys for rivers in Labrador and Ungava so that spawner requirements can be developed on the basis of habitat characteristics.

Review possible changes in the biological characteristics (mean weight, sex ratio, sea-age composition) of returns to rivers, spawning stocks, and total recruits prior to fisheries. As new information becomes available, refine estimates of spawning requirements in USA and Canada by incorporating new information such as on biological characteristics for individual stocks, habitat measurements and stock and recruitment analysis.

Annual estimates of wild smolt-to-adult salmon survival rates need to be obtained for rivers in Labrador, New Brunswick and Nova Scotia. As well, sea survival rates of hatchery and wild salmon should be examined to determine if changes in survival of hatchery releases can be used as an index of sea survival of wild salmon.

4. ATLANTIC SALMON IN THE WEST GREENLAND COMMISSION AREA

4.1 Events in Fisheries and Status of Stocks

4.1.1 Fishery in WGC Area

Catch: In 1997 the West Greenland Commission of NASCO agreed on a 'Reserve Quota' to Greenland of 6% of the forecast PFA using the biological parameters provided by ICES in 1996. The quota was calculated to be 57 t, an amount which the Greenland authorities subsequently set as a TAC for 1997. The fishery began on August 18 and closed on September 23 when the quota was complete. The nominal catch totalled 58 t, the majority of the catch being taken in Divisions 1C, 1E and 1F during the first three weeks. Private sales are now recorded and the unreported catch was estimated to be less than 5 t.

Gear and effort: No new information was available on fishing gear and little information is available on fishing effort. However, the number of actually-used licences, or persons landing salmon per season, may be used as a rough estimate of the fishing effort. The total number of active persons has declined over the period 1987–95, and now numbers about 150 persons.

Origin of catches: Based on discriminant analysis of characteristics from scales sampled in the fishery in 1997, 60% of fish were of North American origin, i.e., similar to the average value for the years, 1989–95. The catch at West Greenland in 1997 was estimated to consist of 37.6 t (12 957 salmon) of North American origin and 23.0 t (8 281 salmon) of European origin.

Four tags of Canadian origin were captured at West Greenland in 1997. Two of the tagged fish were from a smolt release in the Saint John River in 1996, the other two were from kelts tagged on the west coast of Newfoundland. Eight tags of Penobscot River, USA origin were also reported from West Greenland in 1997. Five were from tag releases in 1996, the remainder were from releases in 1984.

The discriminant analysis of characteristics from scales sampled in the fishery in 1996 (42% estimated to be of North American origin) was reviewed in light of analyses of nuclear and mitochondrial DNA from 181 tissue samples collected from that fishery. The scale-determined continent of origin versus DNA-determined continent of origin indicated misclassification rates of 37% and error rates of ± 23.3% in the scale discriminations. This indicated that if the DNA analyses are considered to be reliable indicators of fish origins, then the previous scale analyses had correctly classified 80% of salmon of European origin. However, the scale analysis had also classified approximately 45% of salmon actually of North American origin as being European as well. If these misclassification rates are present in all the 1996 scale analyses, then the proportion of North American salmon should be 67%, rather than 42% from the discriminant function analysis on scales. Because it will require some time to determine how widely the correction should be applied, an interim proportion North American was assumed to be 55%, the mid-point between the estimate based on scales and the estimate based on the smaller number of DNA samples. This change increased the harvest of North American salmon in West Greenland in 1996 from about 12 900 to 16 800 fish. Conversely the number of European fish was reduced from 19 150 to 15 200.

Biological characteristics of the catch: Mean lengths of 1SW North American (62.6 cm) and European (63.1 cm) fish in 1997 ended a downward trend in length observed since 1969. Mean weights of 1SW salmon at West Greenland (2.6 and 2.7 kg for NA and European fish,

respectively) were similar to those observed in recent years. Mean lengths and weights of 2SW salmon were among the highest ever observed.

The proportion of river-age-3 fish among European origin salmon was 37.8%, well above the mean value of 17.5% from 1968–96, but within the range exhibited since 1992. River-age-4 fish (2.9%) approximated the long-term mean; river-age-1 fish (3.6%) comprised the smallest proportion in 23 years. Among North American fish, river-age-2 fish (18.7%) were the lowest in 19 years and of river-age-3 fish (45.3%) were the highest in 18 years.

1SW fish of North American and European origins comprised 98.0% and 98.7% of the commercial catch samples, respectively, and were the highest proportions of an 11-year data set. Conversely, 2SW and older fish comprised the lowest proportion of the data series.

4.1.2 Status of stocks in the WGC Area

Salmon caught in the West Greenland fishery are non-maturing 1SW salmon or older, nearly all of which would return to homewaters in Europe or North America as MSW fish if they survived. While non-maturing 1SW salmon make up more than 90% of the catch there are also 2SW salmon and repeat spawners. The most abundant European stocks in West Greenland are thought to originate from the UK and Ireland although low numbers may originate from northern European rivers. For North American MSW salmon, the most abundant stocks in West Greenland are thought to originate in the southern area of the range.

Stocks originating in the North-East Atlantic: Run-reconstruction estimates of pre-fishery abundance of non-maturing 1SW salmon from southern areas (Figure 2.1.3.2) have been volatile over the period 1971–96, but in steady decline over the past 12 years. Non-maturing 1SW salmon from northern stocks (Figure 2.1.3.1) appear to have been declining since the 1980s, with the most marked change occurring in 1986–87. Conservation limits have only been exceeded in 5 of 11 rivers for which data are available in the NEAC area (separate 2SW reference levels not provided for all stocks). There were no significant trends noted in the spawner attainment over the last 10 years for all stocks combined, but a significant trend towards lower egg deposition was noted over the most recent 5-year period.

In general, there has been no significant change in smolt production in the Northeast Atlantic but marine survival was lower than the previous 5-year mean. Analysis showed no significant trends in marine survival of wild stocks for the last 5- and 10-year periods. Marine survival rates for six hatchery stocks showed a significant downward trend in survival to homewaters for both 1SW and 2SW salmon.

Stocks originating in North America: Run-reconstruction estimates of pre-fishery abundance of non-maturing 1SW salmon provided a value for 1996 that is the lowest on record; although only slightly lower than the 1993 estimate (Figure 3.1.2.4). Pre-fishery abundance in 1996 has declined by 19% from the 1995 value. In addition to the steady decline in total recruits (both maturing and non-maturing 1SW salmon) over the last ten years, maturing 1SW salmon (grilse) have become an increasingly large percentage of the North American stock complex. This percentage has risen from about 45% at the beginning of the 1970s, to around 70% in 1992–95 to almost 80% in 1996.

The estimate of the total number of 2SW salmon returning to North America in 1997 is 19% lower than the estimate for 1996 and lower than the average of the previous years (1971–96) by 34%. It is the lowest observed in the past 10 years and second lowest in the 27-year time series, 1971–97 (Figure 3.1.2.1). The estimates of returns are quite variable over the time

series with no trends indicated. Returns have declined from a peak of 226 000 in 1980. With the exception of Labrador, returns of 2SW fish to most regions were also near the lower end of the 27-year time series.

The estimated 2SW returns and spawners to USA rivers in 1997 was 33% below the 1996 estimate and 21% and 43% below the previous 5-year and 10-year averages, respectively. Returns to most USA rivers are hatchery-dependent. Spawning escapements remained at low levels (5%) compared to conservation requirements.

Egg depositions exceeded or equalled the specific conservation requirements in only 26 of the 89 rivers (29%) that were assessed in Canada and were less than 50% of requirements in 30 other rivers (34%). Large deficiencies in egg depositions were noted in the Bay of Fundy and Atlantic coast of Nova Scotia where 14 of the 19 rivers assessed had egg depositions that were less than 50% of requirements (Figure 3.1.2.5).

North American salmon stocks remain low relative to the 1970s. The 1SW non-maturing component continues to be depressed with river returns and total production amongst the lowest recorded. In addition, returns in 1997 of maturing 1SW salmon (grilse) to North American rivers were very low; the fourth lowest in the 27-year time series. This being the case, improvement in 2SW salmon returns and spawners is unlikely in 1998. Only insular Newfoundland achieved its spawning requirements for 2SW salmon in 1997, where 2SW salmon comprise only a small proportion of salmon production. The next highest was the Gulf of St. Lawrence at 84%, where 2SW salmon are a high proportion of production and very important in terms of their contribution to both North American and Greenland fisheries. The other areas ranged from 5% in USA to 47% in Labrador .

Despite some improvements in the annual returns to some rivers, both in European and North American areas, the overall status of stocks contributing to the West Greenland fishery remains poor, and as a result, the status of stocks within the West Greenland area is thought to be low compared to earlier (historical) levels.

4.2 Evaluation of the "Reserve Quota"

The 'Reserve Quota' was an arrangement that provided for a fishery at Greenland when the forecasted Pre-fishery Abundance (PFA) was between 0 and 300 000 North American 1SW non-maturing salmon. Below 100 000 PFA, only a subsistence fishery was allowed. Between 100 000 and 300 000 PFA, a quota was calculated based on an allocation to Greenland of 6% of the PFA (at the 50% probability level) which was translated into quota weight using the biological parameters forecasted by ICES for the 1996 PFA. Under this approach, quotas ranged from 29 to 86 t when the possible PFAs ranged from 100 000 to 300 000 fish; for a PFA of 196 858 (50% probability level) in 1997, the quota was 57 t.

The quota allocated to Greenland was agreed to be the higher of the 'Reserve Quota' or a 'calculated quota'. The 'calculated quota' was based on a 1993 NASCO agreement (Article 2.3) which prescribed 40% of the available surplus (after subtracting the spawner reserve for North America from the PFA at the 50% probability level) to the Greenland fishery. Under those terms the 'calculated quota" for 1997 was 0 t (i.e., PFA was less than the spawning reserve).

The use of the 'Reserve Quota' arrangement when the calculated quota is 0 t will result in an increased risk (greater than 50%) of failing to achieve the conservation limit objectives, i.e., in 1997, the level of risk for a 57 t quota was 56% if none of the surviving fish were

subsequently harvested in North America. ICES previously cautioned against the use of probability levels greater than 50% and has regularly advised that a precautionary approach would consider much lower levels of risk as more appropriate. ICES also noted that Article 2.3 of the 'Reserve Quota' arrangement would have come into effect based on the revised forecast for 1997 of 93 326 fish and that there would only have been a subsistence fishery at Greenland in 1997.

4.3 Changes from the 1997 Assessment

The models (see Section 4.5) used to predict pre-fishery abundance of the North American non-maturing stock complex and subsequent quota levels for West Greenland were unchanged from those used in 1997. However, some of the input data were modified to reflect new information. These included: modified conservation requirements for the North American non-maturing stock component (see Section 3.3); improved estimates of returns to the province of Québec, 1971-97 (Section 3.1.2); improvement of the catch reporting system in the Province of Newfoundland; corrections to the discriminant model used to estimate continent of origin in Greenland (see Section 4.1.1); and, another year of data. Changes in the data resulted in approximately a 5% increase in the pre-fishery abundance estimates for most years and increases of about 12% and 18% in 1994 and 1995, respectively. The forecast pre-fishery abundance for 1997 would, however, (using 1998 models) have been fewer fish and resulted in a subsistence fishery only in West Greenland (Section 4.2).

4.4 Age-Specific Stock Conservation Limits for all Stocks in the WGC Area

Sampling of the fishery at West Greenland since 1985 has shown that both European and North American stocks harvested there are primarily (greater than 90%) 1SW non-maturing salmon that would mature as either 2SW or 3SW salmon, if surviving to spawn. Usually less than 1% of the harvest are salmon which have previously spawned and a few percent are 2SW salmon which would mature as 3SW or older salmon, if surviving to spawn. In 1997, 98.0 and 99.7% of the sampled catch was 1SW salmon of North American and European origins, respectively. For this reason, conservation limits defined for North American stocks (see Section 3.3) have been limited to 2SW salmon that may have been at Greenland as 1SW non-maturing fish. The total requirement is 183 852 fish, with 154 653 and 29 199 prescribed for Canadian and USA rivers, respectively; the reserve spawner requirement (includes 10 months of mortality at 1%) is 205 230 fish.

Conservation limits are being developed for 1SW and MSW salmon of European and North American origin, based on possible stock/recruit relationships, possible egg to recruit relationships, and marine survival estimates. The functional relationships and estimation methods require further review and validation. In the interim a preliminary spawning escapement reserve (SER) has been estimated, based on the number of spawners required to provide the minimum egg deposition observed historically, and constant natural mortality. The approach used is described in Section 2.3.1. When it becomes possible to use more biologically complete analyses, the resultant final conservation limits have a high likelihood of being higher than these preliminary SERs. Hence the values used in developing the present advice should be considered minimum formal requirements. There is a high likelihood that they will be replaced with even higher conservation limits in future, requiring even greater SERs.

The preliminary estimate of minimum spawners for the total European stock complex in 1998 was 608 768 MSW fish. From tagging information and biological sampling at Greenland, it is clear that the area is used primarily by southern European stocks rather than northern

European ones. For southern stocks the minimum number of spawners was 390 900 MSW fish. Lagging the egg production appropriately, and accounting for natural and fishing mortalities, these estimates indicate SERs of 721 575 for MSW stocks and 463 366 for non-maturing 1SW stocks are required.

4.5 Critical Examination of the 'Model' Used to Provide Catch Advice

Background: Catch advice, and associated risk, for North American stocks in West Greenland are the result of a series of steps which begin with the estimation of 2SW returns to regions of North America. The procedure encompasses a number of estimations, e.g., several models are used in estimating returns to North America, but the key estimation procedures, their method, input and output are summarised in Table 4.5.

Evaluation of the 'model': ICES has regularly listed the strengths and weaknesses of the various models contributing to catch advice. Steady improvements have been made in the thermal/lagged spawner model's predictions of pre-fishery abundances, by ensuring that data inputs are the best available, and by incorporating new, biologically relevant variables that are shown to be appropriate predictors.

Further improvements could be realised by improving the quality of the inputs to the various models (e.g., estimates of the number of salmon returning to individual rivers or to regions, confirmatory sampling off Greenland to verify the predicted pre-fishery abundances, better sampling of fish caught at Greenland to determine biological parameters and continent of origin). Useful insights might also be realised through a sensitivity analysis requiring extensive reviews of the various databases and computer simulations.

Vulnerabilities in the existing procedure to provide catch advice include:

Reductions in catch data- Catch data are critical inputs to the run-reconstruction model. As fisheries have been reduced in recent years, a smaller proportion of the salmon stocks have been sampled, and fewer data are available. The reliability of the models is therefore reduced. The catch data also includes unreported catches which are difficult to estimate.

Use of a constant for natural mortality at sea- The models used assume a constant natural mortality for salmon at sea. By contrast, it is quite likely that mortality is variable, possibly highly so, and may be correlated over years. This will introduce uncertainty to the predictions, and if changes in natural mortality persist over several years, then errors may compound over several years before model diagnostics allow the change in mortality to be identified and corrected in the model.

The use of a fixed proportion of smolts- The determination of lagged spawners relies on a fixed proportion of smolt ages (1-3) from 1974-96 which is unlikely to be the case in reality. For the purposes of this calculation 1SW and MSW fish are combined to form one group. It is unlikely that the proportions of each age class being produced is the same for 1SW and MSW fish.

Use of a poorly understood environmental variable- We do not understand exactly how marine environment is linked to salmon production. Because of this, the present formulation of the model is likely to fail. Ongoing studies linking marine survival and growth during the post-smolt stage suggest the importance of thermal habitat prior to the first winter at sea.

Lack of precision for small scale decisions- The resolution of the present model is too imprecise for present management needs. Based on the risk analysis, we can assess the impacts of quotas upon North American spawning requirements to the order of hundreds of tons. Managers are presently considering quotas of the order of tens of tons.

Inaccuracy in risk and probability estimates- The data input to the run-reconstruction model usually represent all the uncertainty in numbers of recruits in individual rivers or Salmon Fishing Areas (SFAs) with a uniform distribution between bounds which have been assumed to be constant over time, and, to varying degrees, must be set arbitrarily. Moreover the uncertainties for individual rivers or SFAs are assumed to be simply additive. These problems may make risk and probability estimates inaccurate.

4.6 Catch Options with an Assessment of Risks

4.6.1 Introduction

The procedures to develop catch advice and concerns were presented in Section 4.5. The processes remain unchanged from those used in the 1997 assessment although some of the input data were modified to reflect new information (Section 4.3).

North American run-reconstruction model: The model is used to estimate pre-fishery abundance of 1SW non-maturing and maturing 2SW fish adjusted by natural mortality to the time prior to the West Greenland fishery. Region-specific estimates of 2SW returns are shown in Figure 3.1.2.3. Estimates of 2SW returns in Labrador are derived from estimated 2SW catches in the fishery using a range of assumptions regarding exploitation rates and origin of the catch. The 1997 spawner and return estimates were adjusted to account for reductions in licensed fishing effort and season in Labrador in 1997 as well as the closure of the commercial fishery in SFA 14B. Also, the methods of calculation of returns and spawners in Québec were further refined revising the entire time series of data and hence the input values for model parameters have also changed (see Sections 3.1.2, 3.4.1 and 4.1.1).

Update of thermal habitat: Thermal habitat has been updated to include 1998 data. Two periods of decline in the available habitat are identified (1980-84 and 1988-95) in the February index (Table 3.4.1). Available habitat for February has increased considerably in 1998 over 1997, from 1594 to 1849 units; an increase of 16%. The 1998 February value is the highest value in the last 17 years and is a return to the high values experienced in the 1970s.

4.6.2 Pre-fishery Abundance Forecast for 1998

The model employed in 1997 using thermal habitat for February and lagged spawners [sum of lagged spawners from Labrador, Newfoundland, Scotia-Fundy and Québec] was updated to reflect the addition of the new data. The linear fit to the 1998 model of pre-fishery abundance versus February thermal habitat and lagged spawners (SNLQ) produced a significant relationship between observed and predicted values at less than the 5% level. With the 1996 data point and revision of the Québec time series of lagged spawners and returns there is an improvement in fit over that of last year (R^2=0.79 in 1998 versus 0.71 in 1997 and 0.68 in 1996). The model parameters are all significant, with lagged spawners accounting for the 66% of the total sum of squares. Individually, the two predictor variables used are also significantly related to pre-fishery abundance (Figure 4.6.2).

The forecast of pre-fishery abundance for 1998 using simulation methods and the February thermal habitat and lagged spawner model is about 113 899 fish at the 50% probability level (Table 3.4.1). Application of the 1998 forecast model to forecast the 1997 value results in a forecast of 93 326 which is considerably lower than the previously reported value of 196 858. It should be noted that deterministic and simulated forecast values will show slight differences due to the method of calculation.

4.6.3 Development of Catch Options for 1998

The spawning requirement for all North American rivers is currently set at 183 852 2SW fish which is the equivalent of 205 230 pre-fishery recruits (spawning reserve) prior to natural mortality between Greenland and home waters. The procedure for estimating the quota for West Greenland is summarised in Appendix 2. Forecast parameter values for the proportion of the stock at West Greenland which is of North American origin [PropNA], mean weights of North American and European 1SW salmon [WT1SWNA and WT1SWE, respectively], and a correction factor for the expected sea age composition of the total landings [ACF] used in the procedure are given in Table 4.6.3.

Greenland quota levels for the forecast of pre-fishery abundance were computed with the revised model and are shown in Table 4.6.3. For the point estimate level and the stochastic regression estimate using NN1, the quota options ranged from 0 to 45 t, depending on the proportion allocated to West Greenland (FNA) and was bounded by the 25% to 75% probability levels. For the FNA level used in recent management measures for the West Greenland Commission (at the 0.4 allocation rate), the quota is 0 t at the 50% risk level.

4.6.4 Risk Assessment of Catch Options

The provision of catch advice in a risk framework involves the incorporation of the uncertainty in all the factors used to develop the catch options. An analysis of the probability of not meeting the conservation requirements in the six stock areas of North America was conducted by incorporating the uncertainty in all the parameters used to evaluate the spawning escapement to North America. They included i) the conservation requirement risk plot, ii) the uncertainty of the pre-fishery abundance forecast, and ii) uncertainty in the biological parameters used to translate catches (proportion North American origin, weight of 1SW North American origin, weight of 1SW European origin, age correction factor) into numbers of North American origin salmon.

Under the assumption of recruitment in direct proportion to the spawner requirement, just over 200 000 fish are required to escape to North America to produce a 50% probability of achieving the spawner requirement concurrently in all six stock areas. This value is higher than the 183 852 fish point estimate of total requirements to North America because it incorporates the annual variation in the proportion of females.

The risk analysis assumed that the management of West Greenland and North American fisheries in 1999 would be similar to that of 1997 and that exploitation rates in North America would be between 0.15 and 0.25. The impact of these fisheries on the salmon returning to homewaters in 1999 in the absence of any fishery at Greenland in 1998 results in a high risk (83%) of not meeting the conservation requirements in at least one of the six stock areas (Figure 4.6.4 lower panel). This assumes that salmon will return to each geographic area in proportion to the relative conservation requirements in each area and that the exploitation rates in each of the six stock areas are similar.

The cumulative consequences of fisheries at Greenland (1998) and in North America (1999) on the potential spawning escapements to North American stock areas increases the risk of severe underescapement (50% of conservation requirements) in North America. There is a 48% risk of severe underescapement with no fisheries and the risk rises to greater than 50% at a Greenland catch option of 50 t and exploitation rates between 0.15 and 0.25 in North America (Figure 4.6.4). Considering the uncertainty in the assessment of the abundance of North American salmon in West Greenland in 1998, precautionary approach principles in managing both the Greenland and North American salmon fisheries are advised.

Even if fisheries are restricted to levels which provide a 50% probability that the overall escapement requirements are achieved, it is likely that some stocks will fail to meet their individual spawner requirements while others will exceed requirement levels. This unequal achievement of escapement goals may result from random variation between years or from systematic differences in the patterns of exploitation on fish from different rivers or regions. In the latter case, adoption of a 50% probability level may result in some stocks failing to meet requirement levels over several consecutive years if the full TAC is harvested. This would be likely to result in a long-term decline in those stocks.

4.6.5 Catch Advice

It is evident from indicators of stock status, including the current and predicted estimates of pre-fishery abundance, that the North American stock complex is in a tenuous condition. If the forecast is accurate then pre-fishery abundance in 1998 will be lower than any other pre-fishery abundance value previously estimated despite nearly complete closures of mixed and single stock fisheries, because of the continuing trend of below-requirement spawning escapements for 2SW salmon, and the low marine survival rates for some monitored stocks. The increasing advantage associated with each additional spawner in under-seeded river systems makes a strong case for a conservative management strategy.

ICES recommends that there should be no exploitation of the 1997 smolt cohort as non-maturing 1SW fish in North America or at Greenland in 1998, and also recommends that the cohort should not be exploited as mature 2SW fish in North America in 1999. Exceptions are in-river harvests from stocks which are above biologically-based escapement requirements. Further, fishing mortality on this cohort should be minimised in the North American Commission and in the West Greenland Commission Areas by controlling by-catch in other fisheries. From a precautionary perspective, in light of uncertainties in changing maturity schedules and spatial distributions, ICES advises that there should be no exploitation of the 1997 smolt cohort as maturing 1SW fish in North America, except for in-river harvests from stocks which are above biologically-based escapement requirements, consistent with existing conservation measures.

4.7 Data Deficiencies and Research Requirements in the WGC Area

The mean weights, sea ages and proportion of fish originating from North America and Europe are essential parameters to provide catch advice for the West Greenland fishery. As these parameters are known to vary over time, ICES recommends that the sampling programme which was carried out in 1995 and 1996 be continued and improved to cover as much of the landings as possible.

Efforts should be made to improve the estimates of the annual catches of salmon taken for local consumption at West Greenland.

The catch options for the West Greenland fishery are based almost entirely upon data derived from North American stocks. In view of the evidence of a long-term decline in the European stock components contributing to this fishery (southern European non-maturing 1SW recruits) ICES emphasises the need for information from these stocks to be incorporated into the assessments as soon as possible.

Appendix 1

CNL(97)50

REQUEST FOR SCIENTIFIC ADVICE FROM ICES

1. With respect to Atlantic salmon in the North Atlantic area:

    1.1 provide an overview of salmon catches, including unreported catches and catch and release, and worldwide production of farmed and ranched salmon in 1997;
    1.2 report on significant developments which might assist NASCO with the management of salmon stocks;
    1.3 provide any new information on the causes of changes in abundance of salmon;
    1.4 comment and advise on the Report of the NASCO Working Group on the Precautionary Approach, as it relates to the work of ICES;
    1.5 provide a compilation of microtag, finclip and external tag releases by ICES member countries in 1997.

2. With respect to Atlantic salmon in the North-East Atlantic Commission area:

    2.1 describe the events of the 1997 fisheries and the status of the stocks;
    2.2 update the evaluation of the effects on stocks and homewater fisheries of the suspension of commercial fishing activity at Faroes since 1991;
    2.3 provide age-specific conservation limits for all stocks occurring in the Commission area based on best available information;
    2.4 estimate the expected abundance of salmon in the North-East Atlantic for 1998/1999;
    2.5 provide catch options with an assessment of risks relative to the objective of exceeding stock conservation limits;
    2.6 evaluate any new information on the potential by-catch of post-smolts in pelagic fisheries;
    2.7 identify relevant data deficiencies and research requirements.

3. With respect to Atlantic salmon in the North American Commission area:

    3.1 describe the events of the 1997 fisheries and the status of the stocks;
    3.2 update the evaluation of the effects on US and Canadian stocks and fisheries of management measures implemented after 1991 in the Canadian commercial salmon fisheries;
    3.3 update age-specific stock conservation limits based on new information as available;
    3.4 provide catch options with an assessment of risks relative to the objective of exceeding stock conservation limits;
    3.5 identify relevant data deficiencies and research requirements.

4. With respect to Atlantic salmon in the West Greenland Commission area:

    4.1 describe the events of the 1997 fisheries and the status of the stocks;
    4.2 evaluate the impact of the Reserve Quota at West Greenland on salmon stocks in relation to the goal of exceeding stock conservation limits {spawning targets};

4.3 provide a detailed explanation of any changes to the model used to provide catch advice and of the impacts of any changes to the model on the calculated quota;
4.4 provide age-specific stock conservation limits {spawning targets} for all stocks occurring in the Commission area based on best available information;
4.5 examine critically the model used to provide catch advice, looking at all the assumptions, and comment on the confidence limits on the output from the model;
4.6 provide catch options with an assessment of risks relative to the objective of exceeding stock conservation limits {spawning targets};
4.7 identify relevant data deficiencies and research requirements.

Appendix 2

COMPUTATION OF CATCH ADVICE FOR WEST GREENLAND

The North American Spawning Target (SpT) for 2SW salmon stands at 183 852 fish.

This number must be divided by the survival rate for the fish from the time of the West Greenland fishery to their return of the fish to home waters (11 months) to give the Spawning Requirement Reserve (SpR). Thus:

Eq. 1. $SpR = SpT * (\exp(11*M))$ (where $M = 0.01$)

The Maximum Allowable Harvest (MAH) may be defined as the number of non-maturing 1SW fish that are available for harvest. This number is calculated by subtracting the Spawning Target Reserve from the pre-fishery abundance (PFA).

Eq. 2. $MAH = PFA - SpR$

To provide catch advice for West Greenland it is then necessary to decide on the proportion of the MAH to be allocated to Greenland (f_{NA}). The allowable harvest of North American non-maturing 1SW salmon at West Greenland NA1SW) may then be defined as

Eq. 3. $NA1SW = f_{NA} * MAH$

The estimated number of European salmon that will be caught at West Greenland (E1SW) will depend upon the harvest of North American fish and the proportion of the fish in the West Greenland fishery that originate from North America [PropNA] [1]. Thus:

Eq. 4. $E1SW = (NA1SW / PropNA) - NA1SW$

To convert the numbers of North American and European 1SW salmon into total catch at West Greenland in tonnes, it is necessary to incorporate the mean weights (kg) of salmon for North America [WT1SWNA][1] and Europe [WT1SWE][1] and an age correction factor for multi-sea-winter salmon at Greenland based on the total weight of salmon caught divided by the weight of 1SW salmon [ACF][1] .

The quota (in tonnes) at Greenland is then estimated as

Eq. 5. $Quota = (NA1SW * WT1SWNA + E1SW * WT1SWE) * ACF/1000$

[1] New sampling data from the 1997 fishery at West Greenland were used to update the forecast values of the proportion of North American salmon in the catch (PropNA), the mean weights by continent [WT1SWNA, WT1SWE] and the age correction factor [ACF] in 1998.

PropNA =	0.584
WT1SWNA =	2.622
WT1SWE =	2.740
ACF =	1.118

[Add 17 pages of tables from ACFM report]

ANNEX 9

CNL(98)13

Request for Scientific Advice from ICES

1. With respect to Atlantic salmon in the North Atlantic area:

    1.1 provide an overview of salmon catches and landings, including unreported catches by stock complex and catch and release, and worldwide production of farmed and ranched salmon in 1998;
    1.2 evaluate non-catch fishing mortality for all salmon gear;
    1.3 report on significant developments which might assist NASCO with the management of salmon stocks;
    1.4 develop a framework for stock rebuilding programmes;
    1.5 provide a compilation of egg collections and juvenile releases in 1998;
    1.6 provide a compilation of microtag, finclip and external tag releases by ICES member countries in 1998.

2. With respect to Atlantic salmon in the North-East Atlantic Commission area:

    2.1 describe the events of the 1998 fisheries and the status of the stocks;
    2.2 update the evaluation of the effects on stocks and homewater fisheries of the suspension of commercial fishing activity at Faroes since 1991;
    2.3 further develop the age-specific stock conservation limits for smaller stock units in the Commission area, where possible based upon individual river-based estimates;
    2.4 further develop methods to estimate the expected abundance of salmon for smaller stock units in the Commission area;
    2.5 provide catch options or alternative management advice with an assessment of risks relative to the objective of exceeding stock conservation limits;
    2.6 provide an estimate of the by-catch of salmon post-smolts in pelagic fisheries;
    2.7 identify relevant data deficiencies, monitoring needs and research requirements.

3. With respect to Atlantic salmon in the North American Commission area:

    3.1 describe the events of the 1998 fisheries and the status of the stocks;
    3.2 update the evaluation of the effects on US and Canadian stocks and fisheries of management measures implemented after 1991 in the Canadian commercial salmon fisheries;
    3.3 update age-specific stock conservation limits based on new information as available;
    3.4 provide catch options or alternative management advice with an assessment of risks relative to the objective of exceeding stock conservation limits;
    3.5 identify relevant data deficiencies, monitoring needs and research requirements.

4. With respect to Atlantic salmon in the West Greenland Commission area:

4.1 describe the events of the 1998 fisheries and the status of the stocks;

4.2 evaluate the effects on European and North American stocks of the Greenlandic management measures since 1993;

4.3 provide a detailed explanation of any changes to the model used to provide catch advice and of the impacts of any changes to the model on the calculated quota.

4.4 provide age-specific stock conservation limits {spawning targets} for all stocks occurring in the Commission area based on best available information;

4.5 examine critically the model used to provide catch advice, looking at all the assumptions, and comment on the confidence limits on the output from the model;

4.6 provide catch options or alternative management advice with an assessment of risks relative to the objective of exceeding stock conservation limits;

4.7 identify relevant data deficiencies, monitoring needs and research requirements.

ANNEX 10

Council

CNL(98)14

Catch Statistics - Returns by the Parties

CNL(98)14

Catch Statistics - Returns by the Parties

1. The Official Catch Statistics, as submitted by the Parties, are tabulated overleaf (Table 1). The figures for 1997 are provisional. These catch statistics, which have been rounded to the nearest tonne, will be used to calculate the contributions to NASCO for 1999 unless the Secretary is advised otherwise.

2. Under Article 12 of the Convention, the Secretary shall compile and disseminate statistics and reports concerning the salmon stocks subject to the Convention. Table 2 presents catch statistics for the period 1960-1997 by Party to the NASCO Convention.

3. Tables 1 and 2 are set out in the format for the presentation of catch statistics which was agreed by the Council at its Fifth Annual Meeting. A further, more detailed, record of catch statistics during the period 1960-1997 is provided, for information only, in paper CNL(98)15.

4. Last year the Council noted some discrepancies between the figures contained in the ICES report and the Official Statistics as notified to NASCO. It was agreed that the Secretary should consult the Parties to seek clarification of the reasons for the differences. In accordance with this request I contacted the Parties concerned. For the 1997 catch data there is only one minor discrepancy in the information provided to ICES and that provided to NASCO.

Secretary
Edinburgh
18 May 1998

Table 1: Official Catch Statistics

	Provisional 1997 Catch (Tonnes)	Provisional 1997 Catch According To Sea Age						Confirmed 1996 Catch (Tonnes)
		1SW		MSW		Total		
		No	Wt	No	Wt	No	Wt	
Canada	225	57,143	99	26,530	126	83,673	225	290
Denmark (In Respect Of Faroe Islands And Greenland)	59	-	-	-		-		92
				-		-		
Faroe Islands *	0	-	-					0
				-	-	-	-	
Greenland **	59	-	-					92
				-	-	-	-	
European Union	1,147	-	-	-	-	-	-	1,474
Iceland***	154	-	-	-	-	-	-	358
Norway	630	124,387	241	69,290	389	193,677	630	787
Russian Federation	111	31,875	72.5	7,107	38.5	38,982	111	131
United States Of America	0	-	-	-	-	-	-	0

* Compensation agreements were in place for the Faroese fishery in 1996 and 1997

** Includes 1.151 tonnes taken in the Municipality of Tasiilaq (East Greenland)

*** The 1997 catch for Iceland includes 48 tonnes of ranched salmon

Table 2: Catches Of Atlantic Salmon By The Parties To The NASCO Convention

	Canada	Denmark (Faroe Islands and Greenland)	European Union	Finland	Iceland	Norway	Russian Federation	Sweden	USA
1960	1636	60	2641		100	1576	1100	40	1
1961	1583	127	2276		127	1456	790	27	1
1962	1719	244	3894		125	1838	710	45	1
1963	1861	466	3842		145	1697	480	23	1
1964	2069	1539	4242		135	2040	590	36	1
1965	2116	861	3693		133	1900	590	40	1
1966	2369	1338	3549		106	1823	570	36	1
1967	2863	1600	4492		146	2058	883	25	1
1968	2111	1167	3623		162	1752	827	150	1
1969	2202	2350	4407		133	2083	360	76	1
1970	2323	2354	4069		195	1861	448	52	1
1971	1992	2511	3745		204	1847	417	35	1
1972	1759	2146	4261	32	250	1986	462	38	1
1973	2434	2402	4604	50	156	2126	772	73	3
1974	2539	1945	4432	76	225	1973	709	57	1
1975	2485	2086	4500	76	166	1754	811	56	2
1976	2506	1479	2931	66	225	1530	772	45	1
1977	2545	1652	3025	59	130	1488	497	10	2
1978	1545	1159	3102	37	291	1050	476	10	4
1979	1287	1694	2572	26	225	1831	455	12	3
1980	2680	2052	2640	34	249	1830	664	17	6
1981	2437	2602	2557	44	163	1656	463	26	6
1982	1798	2350	2533	83	147	1348	364	25	6
1983	1424	1433	3532	79	198	1550	507	28	1
1984	1112	997	2308	75	159	1623	593	40	2
1985	1133	1430	3002	49	217	1561	659	45	2
1986	1559	1490	3524	38	330	1597	608	53	2
1987	1784	1539	2593	49	250	1385	559	47	1
1988	1311	1136	2833	34	412	1076	419	40	1
1989	1139	701	2450	52	277	905	359	29	2
1990	912	542	1645	59	426	930	316	33	2
1991	711	533	1139	69	505	877	215	38	1
1992	520	260	1506	77	636	867	166	49	1
1993	373	35	1483	70	656	923	140	56	1
1994	355	18	1919	48	448	996	141	44	0
1995	259	86	1852	-	439	839	130	-	0
1996	290	92	1474	-	358	787	131	-	0
1997	225	59	1147	-	154	630	111	-	0

NOTES:

1. The European Union catch from 1995 includes the catches by Finland and Sweden.
2. The catch for Denmark in respect of the Faroe Islands and Greenland includes the catch for Greenland when it was a member of the European Union and the catches up to 1983 by Denmark.
3. Figures from 1986 on are the official catch returns to NASCO. Figures to 1986 are based on data contained in the ICES Working Group Reports.
4. The Faroese fishery was subject to compensation agreements during 1991-1997. The West Greenland fishery was subject to compensation agreements in 1993 and 1994.

ANNEX 11

Council

CNL(98)19

Returns under Articles 14 and 15 of the Convention

CNL(98)19

Returns under Articles 14 and 15 of the Convention

The request for the return of information required under the NASCO Convention and relevant to the period 1 January - 31 December 1997 was circulated on 15 January 1998. All Parties were requested to make a return even if there had been no changes since the last notification. Where changes have been notified under Article 15, and the laws, regulations and programmes concerned have been lodged with the Secretariat, the information will be incorporated into the Laws, Regulations and Programmes database. Copies of the detailed submissions are available from the Secretariat. A summary of the new actions taken under Articles 14 and 15 of the Convention is attached. At the time of preparation of this paper, information has not been received from all EU Member States which have salmon interests.

Secretary
Edinburgh
18 May 1998

Returns under Article 14 of the Convention

1. Actions Taken To Make Effective The Provisions Of The Convention *(Article 14, Paragraph 1)*

1.1 The prohibition of fishing for salmon beyond 12* nautical miles from the baselines from which the breadth of the territorial sea is measured. ***(Article 2, paragraph 2)***

* 40 nautical miles at West Greenland
* Area of fisheries jurisdiction of the Faroe Islands

European Union

Ireland

The Irish salmon fishery was reduced by byelaw from 12 miles to 6 miles from baselines to reduce the interceptory fishery and to facilitate enforcement.

Norway

The coastguard in Norway reported no sightings of vessels fishing for salmon following inspection of the high seas area.

1.2 Inviting the attention of States not party to the Convention to any matter relating to the activities of the vessels of that State which appears to affect adversely the salmon stocks subject to the Convention. ***(Article 2, paragraph 3)***

No New Actions

1.3 Measures to minimise the by-catches of salmon originating in the rivers of the other member. ***(Article 7, paragraph 2)*** **[North American Commission members only]**

Canada

The Labrador commercial salmon fishery in the Strait of Belle Isle (SFA 14B Labrador Straits) was closed and a program was put in place to permanently retire the commercial salmon licences in that area. To reduce salmon by-catches, the commercial trout fishery was closed in some southern areas of Labrador and gear limits were effected in the areas that remained open. The moratorium on commercial salmon fishing remained in effect for the island of Newfoundland.

1.4 Alteration in fishing patterns in a manner which results in the initiation of fishing or increase in catches of salmon originating in the rivers of another Party,

except with the consent of the latter. ***(Article 7, paragraph 3)*** **[North American Commission members only]**

No New Actions

2. Actions Taken To Implement Regulatory Measures Under Article 13 *(Article 14, Paragraph 1)*

No New Actions

Returns under Article 15 of the Convention

3. Laws, Regulations And Programmes Adopted Or Repealed Since The Last Notification *(Article 15, Paragraph 5(A))*

Canada

A commercial salmon fishing licence retirement program was effected for the Labrador Straits (SFA 14B) area of southern Labrador.

Denmark (in respect of the Faroe Islands and Greenland)

Greenland

In the Greenland Home Rule Executive Order No. 14 of 5 August 1997 on salmon catch, section 4, subsection 1, the responsibility for issuing licences to catch salmon commercially can be delegated to the local authorities in agreement with the Home Rule Government. Furthermore, section 7, subsection 3 states that the commercial sale of salmon must only take place at landing places authorized by the Inspectorate of Fisheries. Apart from this commercial salmon catches can be sold at local markets ("braedtet").

In the Greenland Home Rule Executive Order No. 15 of 5 August 1997 on buying and selling of salmon and reporting of the salmon catch, section 4 is new. It states that catches of salmon intended for private consumption must also be reported to the authorities as soon as possible.

European Union

Ireland

New regulations were introduced in 1997 which: reduce commercial salmon fishing from a 5- to a 4-day week; prohibit night-time fishing; restrict the salmon fishery to within 6 miles of the baselines; and defer opening of the season to protect multi-sea-winter salmon.

United Kingdom

In the United Kingdom a number of new regulations were introduced in 1997. For England and Wales these include: a national byelaw which prohibits the use of a gaff and regulates the number of rods to be used when fishing for salmonids; Orders for a number of rivers which limit the number of licences which may be issued for fishing for salmon or trout with various types of nets; byelaws for two rivers which establish salmonid bag limits, regulate the maximum size of salmon that can be caught in August/September, prohibit estuarial netting before 1 June and prohibit the use of spinners; a byelaw which prohibits fishing for salmonids on a designated stretch of a specified river; and amendments to existing byelaws. For Northern Ireland byelaws have been introduced to revoke and replace existing byelaws and which, inter alia, specify the annual close seasons and close times for commercial salmon fishing and

for angling; restrict the permitted methods of fishing for salmon; place restrictions on fishing for salmon in tidal waters; and specify the licence duties for salmon fishing.

Iceland

In 1997 management of salmon and general administration of salmonid matters was separated from research activities.

Norway

Management changes

The process of changing the organisation of river and salmon stock management has proceeded in 1997 and is part of a state-wide project (1996-1999). One of the major goals of this project is to provide a basis for sustainable local management models for wildlife and fisheries management in a broad sense. A further NOK 2.8 million (both inland fish and salmon management) were invested in these local efforts in cooperation with the authorities for agriculture. By the end of 1997 local planning had commenced in about 90 rivers. Salmon Rivers Councils were established in 37 rivers and Regional Salmon Management Councils in about 10 areas, e.g. for the Oslofjord and Skagerrak coastline and the Trondheimsfjord.

As reported last year, the County Governors analysed the development of salmon stocks to prepare a basis for decision making on the need for even stricter and geographically precise regulations. As a result, bend nets were forbidden in the sea fisheries on the coastline from Rogaland to Troms. Also the fishing season for bag-nets was shortened by two or three weeks in most areas on the same coastline. At the same time, the fishing season was shortened in many rivers. The fishing period now starts on 15 June or later in the majority of rivers throughout the country.

Because of the high proportion of escaped farmed salmon in Norwegian coastal waters, salmon fishing was permitted in the autumn and winter from 1 October to 28 February in most areas of the coastline mentioned above.

Supervision in territorial sea areas and watercourses

The total cost of supervision in territorial sea areas and watercourses was NOK 7.8 million. The responsibility for supervision has been reorganised into the Norwegian Nature Inspectorate founded in 1997.

USA

In December 1997, the National Marine Fisheries Service and US Fish and Wildlife Service withdrew a proposal to list US Atlantic salmon in the Gulf of Maine as threatened under the federal Endangered Species Act. The federal agencies determined that the regulatory and protective measures in place, including the Atlantic Salmon Conservation Plan for Seven Maine Rivers, adequately protected the species. Federal and state resource agencies, industries, conservation organizations and private citizens are working together to implement the Conservation Plan which protects Atlantic salmon and their habitat in Maine.

4. Other New Commitments Relating To The Conservation, Restoration, Enhancement And Rational Management Of Salmon Stocks Subject To The Convention *(Article 15, paragraph 5(b))*

European Union

Ireland

The Department of Marine and Natural Resources commissioned a report on the implementation of the recommendations of the Salmon Management Task Force. A National Workshop was held with regional salmon managers on setting conservation limits. Workshops were held on catchment management methods.

United Kingdom

The Fisheries Division of the Department of Agriculture for Northern Ireland continues to administer the Salmonid Enhancement Scheme for Northern Ireland.

Norway

Norwegian Salmonid Register

The status of salmon stocks as of 31 December 1997 according to the Norwegian categorisation:

No. of rivers containing a stock of salmon	668
Rivers whose natural salmon stock has become extinct	42
Rivers whose salmon stock is threatened with extinction	55
Rivers containing vulnerable salmon stocks	154
Rivers containing small, natural salmon stocks	241
Rivers containing large, long-established salmon stocks	92
Rivers whose natural salmon stock is extinct and a new one has been established	4
Rivers where there is uncertainty as to whether salmon form a stock	12
Rivers where a salmon stock is present, but its status is unknown	68

The following threats are recorded:

Regulation of rivers; other forms of physical disturbance; acidification; agricultural pollution; other forms of pollution; escape of farmed salmon; *Gyrodactylus salaris*; other fish diseases; overfishing; unknown threats.

Liming

In 1997, 17 Atlantic salmon rivers were limed in Norway at a cost of NOK 40 million. Among these were three large watercourses in southernmost Norway - Tovdalselva, Mandalselva and Bjerkreimselva. In Tovdalselva and Mandalselva the natural Atlantic salmon stocks are extinct due to acidification. Before acidification, catches

of salmon were as high as 30 tons per year at the end of the last century. In both rivers a restocking program will be carried out in connection with the liming program. Bjerkreimselva still has a small population of the natural salmon stock. After liming we expect this river to have a potential annual catch of at least 10 tons.

Rotenone treatment

In 1997, one watercourse was treated with rotenone against *Gyrodactylus salaris*, bringing the total number of watercourses treated in Norway to 25. In 10 of these rivers it is too early to conclude whether or not the treatments have been successful. The Norwegian authorities spent NOK 6.0 million in 1997 on these activities.

Gene bank and sperm bank

By the end of 1997 sperm from a total of 6,163 salmon from 162 stocks has been frozen in the Norwegian gene bank to provide a possibility of rescuing stocks from extinction. 33 characteristic and valuable stocks have been taken into the "living gene banks". In 1997 sperm from 331 salmon was frozen. Norway is spending about NOK 10 million annually to operate the gene bank.

International research programmes

The cooperation between Norway and Russia on environmental issues, research and management of Atlantic salmon has continued. Cooperation between Norway, Finland and Karelia in Russia has commenced in connection with research and monitoring of *Gyrodactylus salaris*.

USA

The National Marine Fisheries Service, US Fish and Wildlife Service and the Maine Atlantic Salmon Authority have entered into a Cooperative Agreement for the conservation and management of Atlantic salmon. Assessment of current habitat protection efforts and river-specific stocking is ongoing, including genetic analysis. Watershed Councils are being formed which will provide local stewardship of rivers.

5. Other Factors Which May Significantly Affect The Abundance Of Salmon Stocks Subject To The Convention *(Article 15, Paragraph 5(c))*

Canada

There were low returns of large salmon and lower than expected returns of small salmon in 1997. There are indications that this results from low rates of sea survival despite recent indications that marine habitat has improved.

European Union

Finland

Increasing salmon farming in Tanafjord and now farming starting near the Neidenfjord.

Iceland

No human factors but environmental factors in northerly areas have probably changed for the better.

ANNEX 12

Council

CNL(98)21

Report of the Working Group on the Precautionary Approach to Salmon Management

CNL(98)21

Report of the Working Group on the Precautionary Approach to Salmon Management

1. In recent years there has been growing concern about the abundance of North Atlantic salmon stocks which appear to have declined as a result of factors which are poorly understood but which have resulted in reduced survival in the marine environment. Many of the pressures on the resource are poorly understood but their effects may be effectively irreversible, for example, through the loss of local adaptations, or only slowly reversible. In these circumstances adoption of a Precautionary Approach to the conservation and management of Atlantic salmon has been seen as appropriate. This approach to fisheries management is now being widely advocated to address problems with the world's fish stocks and it is influencing the thinking of many inter-governmental organizations.

2. Last year the NASCO Council agreed to establish a Working Group to consider how the Precautionary Approach might be applied to NASCO's work. This Working Group met in Brussels from 28-30 January 1998 and its report (PA(97)11) is attached. The Working Group developed a number of recommendations which are highlighted (in bold italic text) in the report. The Council is asked to consider these recommendations.

3. The Council agreed to hold a Special Session on the Precautionary Approach at its Fifteenth Annual Meeting. A programme for this Special Session, which will be held on the afternoon of 8 June, is contained in document CNL(98)20. In accordance with the recommendations of the Working Group representatives of the salmon farming industry have been invited to participate in the Special Session.

Secretary
Edinburgh
15 April 1998

PA(97)11

Report of the Meeting of the Working Group on the Precautionary Approach in North Atlantic Salmon Management 28-30 January 1998, Consilium Justus Lipsius, Brussels, Belgium

1. Opening of the meeting

1.1 The Chairman, Mr Ted Potter (EU), opened the meeting, welcomed delegates to Brussels and thanked the representative of the European Community for agreeing to host the meeting and for the arrangements made.

1.2 He noted that the Council of NASCO has previously considered the Precautionary Approach although there had been no substantial discussions on the subject. Some of NASCO's actions to date could, however, be considered to be precautionary in nature. He indicated that there were likely to be considerable implications of applying the Precautionary Approach widely to the work of the Organization and that the Working Group represented the first steps in what was likely to be an ongoing process of dialogue between managers, scientists and other interested parties. He believed that it was appropriate for NASCO to consider carefully its objectives for salmon management and how the Precautionary Approach might be applied as a general philosophy to guide the wide range of activities undertaken by the Organization.

1.3 A list of participants is contained in Appendix 1.

2. Adoption of the agenda

2.1 The Working Group adopted its agenda, PA(97)7 (Appendix 2).

3. Appointment of a Rapporteur

3.1 The Working Group appointed Dr Peter Hutchinson, Assistant Secretary of NASCO, as Rapporteur.

4. Consideration of the Terms of Reference

4.1 The Terms of Reference for the Working Group as agreed by the Council, PA(97)2, are as follows:

1) Review the principles of the Precautionary Approach as described in FAO Technical Paper No. 350/1, in the UN Agreement on Straddling and Highly Migratory Fish Stocks and pursuant information developed by ICES.

2) Describe the range of activities engaged in by NASCO where the principles of the Precautionary Approach might be applied.

3) Recognising the size of the task of applying the Precautionary Approach to all of NASCO's work, specifically advise on application of the Precautionary Approach to:

- the management of North Atlantic salmon fisheries.
- the formulation of management advice and associated scientific research.
- the area of introductions and transfers, including aquaculture impacts and possible use of transgenic fish.

4) Describe technical tasks, in the form of requests for scientific advice to ICES and further work to be carried out within NASCO to further clarify and support the application of the Precautionary Approach in NASCO's work.

4.2 The Working Group attempted to follow these Terms of Reference.

5. Review of the principles of the Precautionary Approach

5.1 The Working Group considered document PA(97)3 which reviews the principles of the Precautionary Approach as described in FAO Technical Paper 350/1, in the UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks and pursuant information developed by ICES. It was agreed that these documents provided a useful basis for the Working Group's deliberations on the Precautionary Approach.

5.2 The Working Group recognised that the prolonged period of low abundance of many salmon stocks would suggest the need for a more cautious approach to the conservation, management and exploitation of salmon. ***The Working Group therefore recommends that NASCO and its Contracting Parties should adopt a Precautionary Approach, and proposes to the Council that:***

NASCO and its Contracting Parties should apply the Precautionary Approach widely and consistently to the conservation, management and exploitation of salmon in order to protect the resource and preserve the environments in which it lives. NASCO and its Contracting Parties should be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures.

5.3 ***The Working Group recommends that this requires, inter alia:***

1) consideration of the needs of future generations and avoidance of changes that are not potentially reversible;

2) prior identification of undesirable outcomes and of measures that will avoid them or correct them;

3) initiation of corrective measures without delay, and these should achieve their purpose promptly;

4) priority to be given to conserving the productive capacity of the resource where the likely impact of resource use is uncertain;

5) appropriate placement of the burden of proof by adhering to the above requirements.

5.4 ***The Working Group recognised that the application of a Precautionary Approach should involve all parties concerned with salmon conservation, management and exploitation.***

6. Description of the range of NASCO's activities where the Precautionary Approach might be applied

6.1 The Working Group reviewed document PA(97)4 which describes the range of activities where the Precautionary Approach might be applied. This review concluded that the Precautionary Approach, as detailed in PA(97)3, is not limited in its scope but is a philosophy which would apply generally in order to take into account scientific uncertainty and imperfect management. ***The Working Group agreed that the Precautionary Approach should apply to the entire range of NASCO's salmon conservation and management activities and should be applied by NASCO and by its Contracting Parties.***

6.2 It was recognised, however, that there was a need to prioritise the list of issues contained in document PA(97)4. For some of these issues it would be relatively straightforward to identify actions that could be taken to avoid undesirable outcomes. In addition to those specific areas referred to the Working Group in its Terms of Reference, ***the Working Group recommends that both NASCO and its Contracting Parties should give priority to the application of the Precautionary Approach to freshwater habitat issues and the by-catch of salmon in other fisheries.***

7. Application of the Precautionary Approach

7.1 The Working Group reviewed document PA(97)5 (Appendix 3) which provides information and options on the application of the Precautionary Approach to the management of North Atlantic salmon fisheries, the formulation of scientific advice and associated scientific research and the area of introductions and transfers, including aquaculture impacts and possible use of transgenic salmon.

7.2 The management of North Atlantic salmon fisheries

7.2.1 The Working Group recognised that the first step in applying the Precautionary Approach to fisheries management requires the further development and definition of clear management objectives. ***The Working Group recommends to the Council that an objective for the management of salmon fisheries for NASCO and its Contracting Parties is to promote the diversity and abundance of salmon stocks. For this purpose, management measures, taking account of uncertainty, should be aimed at maintaining all salmon stocks in the NASCO Convention area above their conservation limit (currently defined by NASCO as the spawning stock level that produces maximum sustainable yield), taking into account the best available information, and socio-economic factors including the interests of communities which are particularly dependent on salmon fisheries and the other factors identified in Article 9 of the Convention. In order to achieve this, a Precautionary Approach should be applied to the management both of fisheries regulated by NASCO and those in homewaters.***

7.2.2 ***The Working Group therefore considers that the application of the Precautionary Approach to salmon fishery management is an integrated process which requires assessment of at least the following:***

1) ***that stocks be maintained above the conservation limits by the use of management targets;***
2) ***that conservation limits and management targets should be set for each river and combined as appropriate for the management of different stock groupings defined by managers;***
3) ***the prior identification of undesirable outcomes including the failure to achieve conservation limits (biological factors) and instability in the catches (socio-economic factors);***
4) ***that account should be taken at each stage of the risks of not achieving the fisheries management objectives by considering uncertainty in the current state of the stocks, in biological reference points and fishery management capabilities;***
5) ***the formulation of pre-agreed management actions in the form of procedures to be applied over a range of stock conditions;***
6) ***assessment of the effectiveness of management actions in all salmon fisheries;***
7) ***stock rebuilding programmes (including, as appropriate, habitat improvement, stock enhancement and fishery management actions) be developed for stocks that are below their conservation limits.***

7.2.3 ***The Working Group considered that the management procedures for all salmon fisheries could include the following elements:***

1) ***definition of target spawning stock levels in the relevant rivers;***
2) ***definition of pre-fishery abundance of individual salmon stocks or groups of stocks occurring in the relevant fishery;***
3) ***utilisation only of the surplus according to 1) and 2) above;***
4) ***socio-economic factors.***

7.2.4 The Working Group recognised the desirability of involving all interested groups in the application of the Precautionary Approach to fisheries management so that they may be made are aware of the long term benefits and so that their opinion can be sought on how to achieve the objectives of NASCO and its Contracting Parties.

7.2.5 While it is unlikely that new or exploratory fisheries targeted on salmon will develop within the NASCO Convention area in the near future, fisheries for other species could develop which could result in a by-catch of Atlantic salmon. ***The Working Group recognised that it would be desirable for these new fisheries to be subject to cautious conservation and management measures in order to prevent the by-catch of salmon. In accordance with Article 2, paragraph 3 of the Convention, the Parties should invite the attention of non-Contracting Parties to any significant by-catch of salmon by its vessels.***

7.2.6 The FAO Guidelines refer to the Precautionary Approach involving measures being taken to eliminate or reduce non-reporting of catches. The Working Group recognised that there is a need to obtain better estimates of unreported catches of salmon (estimated to be in the region of 25% of total landings), although, by their nature, unreported catches are difficult to estimate. However, they give rise to considerable uncertainty in the assessments undertaken by ICES, which form the basis of the advice to NASCO. The Council has asked the Secretary to review the actions of NASCO in relation to unreported catches. The Parties will then be asked to report

at the Fifteenth Annual Meeting on measures they have taken to address this problem. ***The Working Group recognised that efforts to improve estimates of unreported catch would be consistent with the Precautionary Approach and recommends that action be taken to evaluate and report on progress in this area.***

7.3 The formulation of management advice and associated scientific research

7.3.1 The level of scientific understanding of the stocks and of the fisheries is central to the application of a Precautionary Approach to all aspects of salmon conservation and management. One of the key principles of the Precautionary Approach is that the absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures. Equally, however, the fact that a cautious approach should be taken when few data are available should not be used as a reason for failing to obtain further information. The Precautionary Approach does not mean that there is a decreased need for scientific research. On the contrary, it suggests that where knowledge is inadequate it should be a priority to obtain better information.

7.3.2 The Working Group considered the proposals by the ACFM of ICES on the advisory implications of the Precautionary Approach. If NASCO does decide to adopt a Precautionary Approach ***the Working Group feels that the Council might wish to request ICES or other scientific advisors, inter alia, to:***

1) advise on the risks of not achieving the objectives of NASCO or its Contracting Parties by considering uncertainty in the current state of the stocks, in biological reference points related to specific management objectives and in fishery management capabilities;
2) provide catch options or alternative management advice with associated risk assessments for the fisheries regulated by NASCO and homewater fisheries for all salmon stocks;
3) advise on stock rebuilding programmes including, where appropriate, habitat improvement, stock enhancement, disease prevention and fishery management actions;
4) identify the monitoring and data collection required to better achieve the objectives of NASCO and its Contracting Parties;
5) advise on the impacts on salmon stocks of existing and new fisheries for other species, and of salmon fisheries on non-target species.

7.3.3 The Working Group also recognised that in applying a Precautionary Approach NASCO will require scientific research in support of the points in paragraph 7.3.2 above.

7.4 The area of introductions and transfers, including aquaculture impacts and possible use of transgenic salmon

7.4.1 The Working Group considered NASCO's actions in relation to introductions and transfers, impacts of aquaculture and transgenic salmon.

7.4.2 The risks to the wild stocks from introductions (i.e. the intentional or accidental release of a species into the environment outside its native or natural range), transfers (i.e. the deliberate or accidental movement of a species within its natural or native range) and aquaculture (i.e. culture or husbandry of salmon including farming,

ranching and enhancement activities) are, principally, the spread of diseases and parasites, ecological and genetic interactions with native stocks, and environmental changes. These were reviewed at the recent ICES/NASCO Symposium and in the Convenors' Report of the meeting (IOR(97)3). The introduction of the parasite *Gyrodactylus salaris* to Norwegian rivers by the movement of hatchery stocks from the Baltic region is a well-documented example of serious damage to the wild stocks.

7.4.3 The Working Group noted that the North American Commission has developed Protocols on Introductions and Transfers (NAC(94)14) (which are presently being reviewed); these are intended to be mandatory. The North-East Atlantic Commission has agreed a Resolution which includes guidelines to protect wild stocks from Introductions and Transfers (NEA(97)12). The Council has adopted a Resolution (the Oslo Resolution) to minimise the impacts from salmon aquaculture on the wild stocks (CNL(94)53). These agreements are designed to protect the wild stocks by addressing, *inter alia,* measures to minimise genetic and other biological interactions, and to minimise the risk of transmission of diseases and parasites.

7.4.4 The recent development of transgenic salmon poses additional risks. In 1997 NASCO Council agreed Guidelines for Action on Transgenic Salmon (CNL(97)48). Under these guidelines the Parties will take all possible actions to ensure that the use of transgenic salmon in any part of the Convention area is confined to secure, self-contained, land-based facilities. The Working Group considered a paper proposed by the promoters of transgenic salmon, A/F Protein Inc. (PA(97)6) on the role transgenic salmon may play in contributing to the protection of the wild stocks. In this paper it was suggested that the use of transgenic salmon could facilitate the development of salmon farming based upon fully enclosed, land-based facilities at a distance from the coast and from rivers containing wild salmon stocks.

7.4.5 With regard to the impacts of introductions and transfers, aquaculture and transgenic salmon, there is a lack of scientific consensus on the full extent and nature of the risks. In such circumstances the Precautionary Approach would require that the needs of future generations are taken into account, that changes which are not potentially reversible are avoided, that corrective measures are initiated without delay and that consideration is given to an appropriate placement of the burden of proof.

7.4.6 ***The Working Group noted that implementation of the measures contained in the agreements noted in sections 7.4.3 and 7.4.4 is essential in the light of the Precautionary Approach and recommends that the Parties be requested to report to the Council or appropriate Commission of NASCO on the steps taken to achieve the measures described in the agreements. It could be argued that the agreements developed by NASCO, even if fully implemented, fall short of the full requirements of a Precautionary Approach because they do not ensure a minimal risk of irreversible change, including genetic and ecological impacts, and the introduction of diseases and parasites, and do not adequately place the burden of proof. In the light of this, the Working Group therefore recommends that the Contracting Parties ensure full implementation of these agreements and consider whether they need to be re-examined and complemented by additional steps.***

7.4.7 In view of the difficulty, for, *inter alia,* technical and operational reasons, of ensuring the high level of containment required for the rearing of transgenic salmon, ***the Working Group recommends that the proposed review in 1999 of the use of sterile salmon in farming also considers its application to transgenic salmon.***

7.4.8 ***One aspect of the agreements on introductions and transfers which may need particular attention in the light of the Precautionary Approach is measures to prevent unintentional introductions and transfers of salmonids and of diseases and parasites.***

8. Description of technical tasks to further clarify and support the application of the precautionary approach in NASCO's work

8.1 The Working Group recognised that the current meeting was only the first step in an evolving process which would affect many of the activities of NASCO and its Contracting Parties. It was felt that development of a Precautionary Approach was likely to require further work by NASCO but that it was not appropriate to itemise individual tasks at this stage. However, it was recognised that it might be necessary to convene a Working Group to address specific issues.

8.2 The Council has agreed that the report of the Working Group should be passed to ICES for their comments prior to the 1998 NASCO Annual Meeting. It will also be presented to a wider audience of user groups, managers and scientists at the Special Session to be held in June.

8.3 The Working Group felt that the application of the Precautionary Approach should not be the subject of an extended dialogue between NASCO and ICES but that NASCO should take responsibility for formulating future actions.

9. Consideration of the structure of the Special Session at the Fifteenth Annual Meeting

9.1 The Council had agreed that it would be appropriate to hold a Special Session on the Precautionary Approach at its 1998 meeting. The Working Group considered an outline of the programme for the Special Session (PA(97)9). It was recommended that the programme should allow time for contributions from NASCO's Non-Government Organizations and for discussion. It was suggested that representatives of the salmon farming industry be invited to participate. The Secretary indicated that he would be liaising with the President on the arrangements and would welcome proposals from the Parties.

10. Any other business

10.1 There was no other business.

11. Consideration of a draft report of the meeting

11.1 The Working Group considered a draft report of the meeting. The Council had agreed that the report of the meeting should be distributed by the Secretary to the Parties by 15 February 1998 and, given their approval, forwarded to ICES so that its advice on the implementation of the Precautionary Approach can be obtained at the Fifteenth Annual Meeting.

12. Close of the Meeting

12.1 In closing the meeting the Chairman stressed the need for a cautious approach to the future work of the Organization if there is to be confidence that the resource is protected. In this regard he believed that the first positive steps had been taken at the meeting. He thanked the participants for their contributions and the European Community for hosting the meeting.

12.2 The representative of Canada expressed his appreciation for the work of the Chairman and Secretariat. The representatives of the European Union and the United States of America recognised the progress made at the meeting and expressed their appreciation for the work of the Chairman.

Appendix 1

WORKING GROUP ON THE PRECAUTIONARY APPROACH
28-30 JANUARY 1998, BRUSSELS, BELGIUM

LIST OF PARTICIPANTS

CANADA

MR JACQUE ROBICHAUD	Department of Fisheries and Oceans, Ottawa, Ontario
MR RICHARD HEGAN	Department of Fisheries and Oceans, Ottawa, Ontario
MR KEN JONES	Department of Fisheries and Oceans, Ottawa, Ontario
MR DAVID MEERBURG	Department of Fisheries and Oceans, Ottawa, Ontario
MR JOHN MOORES	Department of Fisheries and Oceans, St John's, Newfoundland
MR REX PORTER	Department of Fisheries and Oceans, St John's, Newfoundland

DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

MR EINAR LEMCHE	President of NASCO Greenland Home Rule, Copenhagen
MR JAN ARGE JACOBSEN	Fisheries Laboratory of the Faroes, Torshavn
MR PER KANNEWORFF	Greenland Institute of Natural Resources, Copenhagen
MR HEDIN WEIHE	Department of Fisheries, Faroese Home Government, Torshavn

EUROPEAN UNION

MR FRIEDRICH WIELAND	European Commission, Brussels
MR ANDREW THOMSON	European Commission, Brussels
MR DAVID DUNKLEY	Scottish Office Agriculture, Environment and Fisheries Department, Edinburgh
MR PETER FUNEGARD	National Board of Fisheries, Gothenburg
MR ALAN GRAY	European Commission, Brussels
MR OLLE HAGSTROM	European Commission, Brussels
MR IVOR LLEWELYN	Ministry of Agriculture, Fisheries and Food, London

DR GUY MAWLE	Environment Agency, Bristol
MR EERO NIEMELA	Finnish Game and Fisheries Research Institute, Utsjoki
DR NIALL O'MAOILEIDIGH	Fisheries Research Centre, Dublin
MR TED POTTER	Centre for Environment, Fisheries & Aquaculture Science, Lowestoft
MR GUNTHER SCHLOGL	Bundesministerium für Land- und Forstwirtshaft, Vienna

ICELAND

MR ARNI ISAKSSON	Directorate of Freshwater Fisheries, Reykjavik

NORWAY

MR STEINAR HERMANSEN	Ministry of the Environment, Oslo
MR HELGE LORENTZEN	Ministry of the Environment, Oslo
DR LARS PETTER HANSEN	Norwegian Institute for Nature Research, Oslo

RUSSIAN FEDERATION

MR VLADIMIR MOSKALENKO	PINRO, Murmansk
MS ELENA SAMOILOVA	PINRO, Murmansk
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USA

DR ANDREW ROSENBERG	National Marine Fisheries Service, Gloucester, Massachusetts
MS MARY COLLIGAN	National Marine Fisheries Service, Gloucester, Massachusetts
DR KEVIN FRIEDLAND	National Marine Fisheries Service, Woods Hole, Massachusetts
MR CHRIS MANTZARIS	National Marine Fisheries Service, Gloucester, Massachusetts
DR JEAN-PIERRE PLÉ	Department of State, Office of Marine Conservation, Washington DC
DR FRED SERCHUK	National Marine Fisheries Service, Woods Hole, Massachusetts

OBSERVERS

MR JEAN-JACQUES MAGUIRE	International Council for the Exploration of the Sea, Sillery, Quebec

SECRETARIAT

DR MALCOLM WINDSOR	Secretary
DR PETER HUTCHINSON	Assistant Secretary

Appendix 2

PA(97)8

Meeting of the Working Group on the
Precautionary Approach in North Atlantic Salmon Management
28-30 January 1998, Consilium Justus Lipsius, Brussels, Belgium

A G E N D A

1. Opening of the meeting

2. Adoption of the agenda

3. Appointment of a Rapporteur

4. Consideration of the Terms of Reference

5. Review of the principles of the Precautionary Approach

6. Description of the range of NASCO's activities where the Precautionary Approach might be applied

7. Application of the Precautionary Approach to:

   (a) the management of North Atlantic salmon fisheries
   (b) the formulation of scientific advice and associated scientific research
   (c) the area of introductions and transfers, including aquaculture impacts and possible use of transgenic salmon

8. Description of technical tasks to further clarify and support the application of the precautionary approach in NASCO's work:

   (a) request for scientific advice from ICES
   (b) further work of NASCO

9. Consideration of the structure of the Special Session at the Fifteenth Annual Meeting

10. Any other business

11. Consideration of a draft report of the meeting

12. Close of the meeting

Appendix 3

PA(97)5

Application Of The Precautionary Approach To Salmon Management, Scientific Advice And Introductions And Transfers Including Aquaculture Impacts

1. Introduction

1.1 The Precautionary Approach provides a philosophical background against which the environment and natural resources may be managed and conserved. The full range of activities to which this approach might be applied to salmon conservation and management is detailed in paper PA(97)4. NASCO Council has asked the Working Group on the Precautionary Approach in North Atlantic Salmon Management to specifically advise on the application of the Precautionary Approach to:

- the management of North Atlantic salmon fisheries;
- the formulation of management advice and associated scientific research;
- the area of introductions and transfers, including aquaculture impacts and possible use of transgenic fish.

The purpose of this paper is to provide background information and options on these topics as a basis for the Working Group's discussions.

2. Management of North Atlantic Salmon Fisheries

NASCO Regulated Fisheries

2.1 Under Article 8 of the NASCO Convention, one of the functions of the West Greenland and North-East Atlantic Commissions is to "propose regulatory measures for fishing in the area of fisheries jurisdiction of a member of salmon originating in the rivers of other Parties". Under Article 7 the functions of the North American Commission include "to propose regulatory measures for salmon fisheries under the jurisdiction of a member which harvests amounts of salmon significant to the other member in whose rivers that salmon originates in order to minimise such harvests" and "to propose regulatory measures for salmon fisheries under the jurisdiction of a member which harvests amounts of salmon significant to another Party in whose rivers that salmon originates". Fisheries other than those described above are not subject to regulatory measures adopted in NASCO. To date regulatory measures have been established for the West Greenland, Labrador and Faroese fisheries.

Biological Reference Points (BRPs)

2.2 A critical step in application of the Precautionary Approach to fisheries management by other organisations has been the selection and definition of biological reference points (BRPs) which may be used to delimit conservation and management objectives. A large number of different BRPs have been proposed and employed in the management of different marine fisheries or species; however, these may be used in different ways.

2.3 Both the FAO Code of Conduct for Responsible Fisheries and the United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks consider two categories of BRP**, limits** and **targets. Limit reference points** define the minimum levels to which stocks should be permitted to fall to ensure that fisheries are operating within safe biological limits and the conservation of the stock is assured; these are thus also referred to as **conservation reference points or conservation limits**. When setting management options there should be a high probability that they will result in the stock exceeding a limit reference point (or in fishing mortality being below a limit). However, there will always be a risk that the stock will fall below the limit and so the dangers to the stocks associated with this need to be considered. If the conservation limit is set at a high level, these dangers will be reduced and so it may be acceptable to permit a higher probability of failure.

2.4 A **target reference point** may be used to meet a management objective and may therefore provide the basis for setting catch options; these are sometimes also referred to as **management reference points**. A target is something that may be aimed 'at' and therefore represents an acceptable state, although it may not be the optimum state of a stock. There will therefore be a roughly 50% probability of the observed value of the parameter being either above or below the target. The target will be set at a point where the various assessment and management uncertainties will not result in the stock falling below the conservation limit more frequently than is acceptable.

2.5 The UN Agreement also states that, 'when information for determining reference points for a fishery is poor or absent, **provisional reference points** shall be set'. Provisional reference points may be established by analogy to similar or better-known stocks and in such situations, the fishery should be subject to enhanced monitoring to allow revision of the provisional data as improved information becomes available.

2.6 Management of salmon fisheries is complicated because, unlike many marine species, the salmon exists as a large number of distinct stocks and stock conservation limits should ideally be established on at least a river-by-river basis. The estimation of reference points for individual stocks must be seen as an evolving process involving regular re-evaluation on the basis of new methods and new information, such as juvenile survey data.

Current use of BRPs by NASCO

2.7 In its request for scientific advice from ICES (CNL(97)50), NASCO has requested that ICES "provide catch options with an assessment of risks relative to the objective of exceeding stock conservation limits". These limits have been defined for all North American rivers, and, for the purposes of setting regulatory measures for fisheries on these stocks, a combined conservation limit for the North American stock complex has been used. ICES has provided catch options with an assessment of the probability of the pre-fishery abundance being lower than a stated value. The West Greenland Commission decides on the appropriate level of probability for establishing quotas; to date a 50% probability has been used. ICES has raised the concern that this level of probability is insufficiently cautious.

2.8 In the North-East Atlantic area, the Parties are in various stages of developing conservation limits. The existence of runs with unique characteristics and evidence of genetic sub-structuring within catchments are, however, complicating the task. In

1997 the Council asked ICES to provide conservation limits for all stocks in the North-East Atlantic Commission area based on the best available information, i.e. provisional conservation limits.

Future use of BRPs by NASCO

2.9 As indicated above, application of a Precautionary Approach requires that stocks are managed so as to ensure that there is a high probability of exceeding conservation limits. One way to achieve this is to set **management targets** at higher stock levels to allow for uncertainties in our understanding of the stock dynamics and the status of stocks, and for imperfect management and enforcement. In the ocean, salmon from many different populations mix together and there is therefore the potential to over-exploit individual river stocks, particularly those which are less productive, in mixed stock fisheries. The larger the number of stocks exploited in a fishery, the greater will be the chance that this will occur.

2.10 ICES currently combines the age-specific conservation limits for large groups of river stocks (e.g. all North American stocks) in providing its advice. If NASCO decided to continue to manage in this way, application of a Precautionary Approach would require a management target to be set at a level above the combined conservation limit, in order to give an agreed probability (say 95%) of this limit being exceeded. This would reduce the number of fish that could be allocated for harvest.

2.11 If NASCO's objective was to ensure that there was a high probability of conservation limits being exceeded in each individual river, a combined management target for any group of river stocks would have to be set at a level higher than the sum of the individual river targets. This would mean an even greater reduction in the number of fish that could be allocated for harvest. It would also mean that if any of the stocks contributing to a fishery was below its conservation limit, that fishery could not operate.

2.12 ICES has suggested that reference points may need to be defined on an even finer scale than individual rivers to take account of genetic structuring within rivers. This would restrict fisheries even further.

2.13 It is apparent from the above considerations that application of the Precautionary Approach to mixed stock fisheries could be highly restrictive. However, NASCO also has to consider social, economic and other factors as detailed in Article 9 of the Convention. Inclusion of these factors in management decisions is consistent with the FAO and UN agreements on the Precautionary Approach. A wide range of other options could therefore be considered:

i) set reference points on an intermediate scale (i.e. group rivers in particular regions);

ii) ensure that an accepted proportion of river stocks (rather than all stocks) exploited by a fishery are maintained above their conservation limits;

iii) allow individual river stocks to fall below their conservation limits for an agreed number of years;

iv) set less precautionary management targets (i.e. at levels that give an intermediate risk, e.g. between 50% and 95%, of conservation limits not being exceeded);

v) establish intermediate reference points for stocks that are undergoing recovery; or

vi) exclude rivers that would unreasonably distort the assessment.

Recovery strategies

2.14 Under a Precautionary Approach fishery management strategies should ensure that the risk of exceeding limit reference points is low. If a stock falls below a limit reference point or is at risk of falling below such a reference point, conservation and management action should be initiated to facilitate stock recovery. Information provided by ICES indicates that many stocks are presently below their conservation limits despite the considerable reduction in exploitation resulting from the establishment of catch and effort restrictions. The Working Group may therefore wish to consider appropriate actions which would be compatible with a Precautionary Approach and which may lead to rebuilding of the stocks to levels above their conservation limits.

New fisheries

2.15 To be consistent with the Precautionary Approach, if a new or exploratory fishery for salmon develops in the North Atlantic area, managers should adopt cautious conservation and management measures. The Working Group will need to consider the approach that NASCO might take if new salmon fisheries develop that are subject to Article 7 or 8 of the Convention.

Unreported catches

2.16 The FAO guidelines refer to the Precautionary Approach involving measures being taken to eliminate or reduce non-reporting of catches. Since 1986, ICES has provided guess-estimates of unreported catches of salmon which in the period 1986-1996 averaged 25.4% of the estimated total catch. In 1993 the Council agreed a minimum standard for catch statistics which stated that the Parties to the NASCO Convention wish to encourage measures to reduce the levels of non-catch fishing mortality, in particular unreported catches. However, despite the adoption of this minimum standard the guess-estimates of unreported catches have not declined, and in 1996 increased. The Council has therefore asked the Secretary to review the actions of NASCO in relation to unreported catches. The Parties will then be asked to report on measures they have taken to address this problem. Reduction of the level of unreported catches would be consistent with the Precautionary Approach as detailed in the FAO guidelines.

2.17 The Working Group is asked to consider the issues raised in Section 2 and to agree on their recommendations to the Council in the light of the Precautionary Approach on:

i) NASCO's objectives for fisheries management;
ii) future use of Biological Reference Points;

iii) recovery strategies;
iv) new fisheries;
v) unreported catches.

3. Formulation Of Management Advice And Associated Research

3.1 The level of scientific understanding of the stocks and of the fisheries is central to the application of a Precautionary Approach to all aspects of salmon conservation and management. One of the principles of the Precautionary Approach is that the absence of scientific information should not be used as a reason for postponing or failing to take conservation and management measures. Equally, however, the fact that a cautious approach should be taken to fisheries when few data are available should not be used as a reason for failing to obtain further information. The Precautionary Approach does not mean that there is a decreased need for scientific research. On the contrary, it suggests that where knowledge is inadequate it should be a priority to obtain the necessary information.

Management advice

3.2 NASCO's management is based on scientific advice which is mainly obtained from ICES. ICES has stressed that a Precautionary Approach needs to be adopted at all stages of fishery management and has proposed that ACFM will attempt in its advice to:

(a) explicitly consider and incorporate uncertainty about the state of the stocks into management scenarios; explain clearly and usefully the implications of uncertainty to fishery management agencies;

(b) propose precautionary reference points which ensure that limit reference points are not exceeded, taking into account existing knowledge and uncertainties;

(c) encourage and assist fishery management agencies in formulating fisheries management and recovery plans;

(d) quantify the effects of fisheries on target as well as on non-target species, and on structural and functional aspects of ecosystems;

(e) incorporate information on fishing fleets and multi-species fisheries systems as appropriate;

(f) evaluate fisheries management systems incorporating biological, social and economic factors as appropriate;

(g) ICES has also indicated that although it will not be in a position to determine whether all management practices accord fully to the Precautionary Approach, it will note where it does not conform where this becomes apparent.

3.3 NASCO will need to consider whether it wishes to endorse this approach and whether it adequately addresses the full range of NASCO's management activities. In particular a paragraph which might need special consideration is 3.2(f) which refers to social and economic factors. NASCO does not currently seek advice from ICES on

such factors and will need to consider whether it wishes to do so in the future. NASCO currently asks ICES to 'provide catch options with an assessment of risks relative to the objective of exceeding stock conservation limits'. This leaves NASCO in a position to take account of risks and uncertainties in the way it considers most appropriate when making management decisions. The Working Group will need to consider whether this provides a satisfactory framework for NASCO's application of a Precautionary Approach to fisheries and other management issues in the future.

3.4 The Working Group is asked to consider the proposal in 3.2 above and the issues in 3.3 and to make appropriate recommendations to the Council.

Scientific research

3.5 Research is required to evaluate the consequences of management actions with respect to objectives. The NASCO Convention requires that the Commissions shall take account of the best available information, including advice from ICES and other appropriate scientific organisations. NASCO therefore needs to specify clearly its management objectives and to describe the context within which it will apply a Precautionary Approach. This will provide the framework within which research requirements can be specified. The question arises as to whether scientific research itself should be precautionary or contain precautionary elements. NASCO requires scientific advice that is independent, non-political and not influenced by any other factors. This means that the scientific research should be focused so as to clearly identify the agreed reference points and address the management objectives. It is doubtful if scientific research should have a precautionary or any other non-scientific element built in to it.

3.6 The Working Group is asked to consider this matter and to agree to recommend to the Council a statement on scientific research.

4. Introductions And Transfers, Aquaculture Impacts And Transgenic Fish

Background

4.1 NASCO has already taken action in relation to introductions and transfers, aquaculture and transgenic salmon. In the case of introductions and transfers, both the North American Commission and the North-East Atlantic Commission have developed agreements. In the case of aquaculture impacts, the 1994 Oslo Resolution takes the form of guidelines to minimise adverse impacts of aquaculture on wild stocks. In the case of transgenic salmon, guidelines on this matter were adopted in 1997. The question to be answered is, in each of these three cases, "Has the decision by NASCO incorporated the Precautionary Approach and, if not, how should it be revised to take account of that approach?" This is discussed separately for each issue below.

Introductions and Transfers

4.2 The risks from introductions (ie the intentional or accidental release of a species into the environment outside its native or natural range) and transfers (ie the deliberate or accidental movement of a species within its natural or native range) are, principally, the spread of diseases and parasites, ecological and genetic interactions with native stocks, and environmental changes. The introduction of the parasite *Gyrodactylus salaris* to Norwegian rivers by the movement of hatchery stocks from the Baltic region is a well documented example and has caused severe damage to the wild stocks in about 40 rivers. A Precautionary Approach might have prevented such a transfer.

4.3 The North American Commission and the North-East Atlantic Commission both have agreements on this subject. The North American Commission has developed Protocols on Introductions and Transfers (NAC(94)14) (which are presently being reviewed). Looked at in the light of the Precautionary Approach these Protocols include measures to protect the wild stocks and they are intended to be mandatory, so might therefore be considered as precautionary. They are also precautionary in that, particularly for the protocols designed to sustain genetic variation, a conservative approach was taken even though this could not always be supported by scientific research on Atlantic salmon. To assure that all the Protocols are precautionary, however, may require that the Commission re-examine them in the light of this new approach. In 1997 the North-East Atlantic Commission agreed a Resolution to protect wild stocks from Introductions and Transfers (NEA(97)12). The measures on this Agreement are guidelines and are not mandatory. That gives less protection against movements of fish which can transmit known or currently unknown diseases. It also gives less than full protection against genetic impacts.

4.4 One aspect of both agreements which may need particular attention in the light of the Precautionary Approach is measures to prevent unintentional introductions and transfers of salmonids and of diseases and parasites.

4.5 In the light of the extensive nature of these agreements and the fact that they were prepared by the two Commissions concerned, the Working Group may wish to consider the need for them to be re-examined in the light of the possible adoption of a Precautionary Approach by the Organization and whether it should recommend to the Council that this could best be undertaken by the respective Commissions.

Aquaculture Impacts

4.6 The risks from impacts of salmon aquaculture (ie culture or husbandry of salmon including farming, ranching and enhancement activities) on wild stocks were reviewed at the recent ICES/NASCO Symposium. The Convenors' Report of that Symposium states that with regard to genetic impacts "there is a substantial risk that profound and perhaps irreversible genetic changes will occur in wild salmon populations repeatedly exposed to intrusions of large numbers of genetically selected fish or fish native to other locations". "The genetic constitution of the population will change. The fitness of the offspring may be reduced …. Irreversible genetic changes may take place". A point made at the meeting in relation to the Precautionary Approach was that the standard of proof required to establish the existence of local adaptations of salmon was too high and that under the Precautionary Approach the reality of local adaptations should be assumed. The Report also states that "contagious diseases are one of the largest and most serious problems in the fish farming industry"; "Releases of hatchery smolts or escapement of salmon from fish farms are potential ways of spreading infectious diseases and parasites that are harmful to wild stocks". The Convenors concluded that "there has been a complete lack of the use of the Precautionary Approach in the whole complex of interactions between cultured and wild salmon in that interactions are being permitted to occur without knowledge of their impacts" and that "it is urgent that interactions between cultured and wild salmon are eliminated or, at the least, very greatly reduced. The risks from salmon farming are most serious because the fish are genetically selected, they are so numerous and because they do not form part of any plan for which a risk assessment has been carried out". The Convenors indicated that "there is urgency about the need for action. Even in the absence of more definitive information than that available, the Precautionary Approach should apply … (which) will require changes not only to the way that salmon aquaculture is managed but also to wild stock management". "If no precautionary action is taken and if the views of the many authoritative scientists prove to be well founded the demise of the wild salmon in their present diverse form may not be far behind."

4.7 In 1994 the Council adopted a Resolution to minimise the impacts from salmon aquaculture on the wild stocks, paper CNL(94)53. This Resolution deals with, *inter alia,* measures to minimise genetic and other biological interactions, measures to minimise the risk of transmission of diseases and parasites and research and development. The situation is one where there is lack of scientific consensus on the extent and nature of the risks. In such circumstances the Precautionary Approach would require us to consider the needs of future generations, avoid changes that are not potentially reversible, initiate corrective measures without delay and consider an appropriate placement of the burden of proof, (paper PA(97)3, paragraph 6). Looked at in the light of the Precautionary Approach it could be argued that the Oslo Resolution, being only a recommendation, does not ensure that the interests of future generations is secured, nor does it protect against irreversible change. Neither does the agreement meet the Precautionary Approach in assigning the appropriate burden of proof.

4.8 It is noted that a Working Group on Implementation of the Oslo Resolution is being held on the two days prior to the Precautionary Approach Working Group, and will be reviewing the need for revisions to this Resolution in the light of the findings of the ICES/NASCO Symposium.

4.9 The Working Group may wish to consider this issue and to advise the Council whether, if the Oslo Resolution is to be consistent with the Precautionary Approach, it will need further revision.

Transgenic Fish

4.10 The risks from use of transgenic salmon, ie salmon that contain genes from another organism, in aquaculture relate to the fact that these fish contain genes from other species. Such fish have never occurred, so far as we are aware, in nature. If they escaped and interbred with wild salmon there could be irreversible genetic change. This would have consequences that are unforeseeable and could present even greater risks than escapes of genetically selected salmon.

4.11 In 1997 NASCO Council agreed on Guidelines for Action on Transgenic Salmon, CNL(97)48. This agreement must now be examined in the light of the Precautionary Approach. The situation with regard to the science is that, so far as we are aware, there has been no research on the interactions between transgenic salmon and the wild stocks. There are real concerns, however, that if such fish interbreed it will be impossible to eliminate their genes from the wild stocks. In such a case the Precautionary Approach would counsel us to consider the needs of future generations and avoid changes that are not reversible, (paper PA(97)3, para. 6). It would also counsel us to place the appropriate burden of proof. Thus the NASCO Guidelines for action on Transgenic Salmon might be considered to be inconsistent with the Precautionary Approach because firstly, being only guidelines, there is no certainty that they will be applied. If they are not, there is the possibility of irreversible change. Secondly, they do not unequivocally transfer the burden of proof to those who promote transgenic salmon to prove that such a development carries no unacceptable risk.

4.12 The Working Group is asked to consider its recommendation on this and to advise the Council whether, if the Guidelines on Transgenic Salmon are to be consistent with the Precautionary Approach, they will need further revision.

ANNEX 13

Council

CNL(98)35

Precautionary Approach to Salmon Management

The Status of Regulations in Norway with regard to:
1) Protection of wild salmon stocks from introductions and transfers,
and 2) Transgenic salmon

(Tabled by the Norwegian Delegation)

CNL(98)35

Precautionary Approach to Salmon Management

The Status of Regulations in Norway with regard to: 1) Protection of wild salmon stocks from introductions and transfers, and 2) Transgenic salmon

1) NEAC Resolution on Introductions and Transfers (NEA(97)12)

General description:

The main elements of the Norwegian legislation relevant in this area are the Salmonid and Freshwater Fish Act and the Fish Diseases Act. The first of these acts contains provisions in importing, stocking and stock enhancement of salmonids and freshwater fish. The Fish Diseases Act was revised in 1997, and provisions were included to strengthen protective elements important for wild salmon stocks, i.a. authority to impose internal control in the aquaculture industry and to establish regions. In addition, the Aquaculture Act and the Gene Technology Act contain relevant provisions.

Live salmonid and freshwater fish as well as eggs or fry of such fish may not be imported without permission from the Ministry of the Environment. The general import ban that existed earlier in the Fish Disease Act has been replaced by regulations giving protection against disease, established by the Ministry of Agriculture and in accordance with the EEA agreement. These regulations prohibit the import of live salmonid and freshwater fish, crayfish, as well as eggs and fry.

Measures in relation to specific articles of the Resolution:

Article 1

No live salmon or eggs have been legally imported from outside the NEAC area in the last 10 years.

Article 2

Until now, no applications have been submitted for scientific research on - or other use of - transgenic salmonids (see Section 2 below).

Article 3

For specified diseases and parasites, the Ministry of Agriculture may establish zones to confirm disease status and eradication. Zones have been established for Infectious Salmon Anaemia (ISA), furunculosis, IHN and VHS.

Norway has also fully implemented the requirements for health inspection of donor facilities. In addition, movement of live salmonids is restricted, and improvements are being discussed regarding the system for disease control in wild stocks.

Article 4

Since 1985, the use of non-indigenous fish for stocking purposes in Norwegian rivers has been prohibited and has ceased. A few exceptions have been made in rivers situated in areas where acidification has destroyed the original stock and liming has restored the environment for salmon. The authorities are presently in the final phases of the implementation of cultivation zones, i.e. zones with strict restrictions on the transportation of live material.

Article 5

Norway has established a river classification system where rivers are divided into 8 main categories. This system operates with two different categories under the NASCO "Group 1 Rivers" and six categories covering "Group 2" and "Group 3".

Article 6

The provisions of this article have been almost fully implemented in Norway. In some regions salmon stocks have been re-established after liming of acidified rivers according to the provisions under "Group 1 Rivers". Also, the management of rivers with a self-sustaining salmon stock is fully compatible with the provisions given under "Group 2 Rivers", whereas the management of rivers with a "pristine" salmon stock may be somewhat lacking compared to the recommendations given. The explanation for this is partially that the criteria for a "pristine condition" are not well defined, and also that general infrastructure development measures (road construction, hydroelectric power plants etc.) in some instances result in major alterations of salmon habitats.

Where the aquaculture industry is concerned, a series of other measures have been implemented (see the Norwegian report on the Oslo Resolution in CNL(98)28).

2. NASCO Guidelines for Action on Transgenic Salmon (CNL(97)48)

The aim of the Norwegian Gene Technology Act that was passed in April 1993 is to meet the requirements for ethically and socially acceptable production and use of genetically modified organisms, and to ensure that the use of this technology is in accordance with an ecologically sustainable development and does not pose a threat to health and the environment.

Section 5 of the Act requires the containment of modified organisms, whereas sections 9, 10 and 11 regulate any deliberate release, giving requirements for official approval including a step-by-step impact assessment. Approval is not required for marketing of products approved for placing on the market in another EEA country (EEA agreement, Annex XX, Entry 25 (Council Directive 90/220/EEC)). However, the Norwegian authorities may prohibit a product if it is considered that its marketing is not in accordance with the Act. Since the passing of the Act, the Norwegian authorities have maintained strict regulations to ensure the purpose of the Gene Technology Act.

In the private sector, the aquaculture industry has been - and is - reluctant to use genetically modified fish, and the Norwegian Fish Farmers Association has made a decision not to use genetically modified fish. Until now no applications have been submitted for the use of genetically modified fish in aquaculture.

As part of Norway's follow-up of the Convention on Biological Diversity, the Norwegian authorities have participated in - and made contributions to - the work on a Protocol on biosafety. Furthermore, the potentially grave risks to the environment posed by genetically

modified organisms were recognised by the North Sea Ministers at their meeting in Bergen in 1997, where they agreed to pursue strategies to avoid any release or spreading into the aquatic environment of genetically modified organisms which might have adverse effects on the conservation and sustainable use of biological diversity.

Research projects have been carried out with the intention of improving understanding of gene flow from organisms in aquaculture to the wild stocks.

ANNEX 14

COUNCIL

CNL(98)39

Precautionary Approach and Management of Atlantic Salmon in Rivers of the Kola Peninsula

(Tabled by the Russian Delegation)

CNL(98)39

Precautionary Approach And Management Of Atlantic Salmon In Rivers Of The Kola Peninsula

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There are 763 water courses on the Kola peninsula (and 765 in the Murmansk Region which is somewhat larger than the Kola peninsula) which are longer than 0.1 km and drain direct into the sea. 216 water courses are longer than 5 km - of these 122 drain into the Barents Sea and 94 into the White Sea. Migrating Atlantic salmon probably enter most of these water courses. However, reliable records are available for only 79 rivers and streams (43 in the Barents Sea basin and 36 in the White Sea basin) the length of which varies from 8.7 km (Kolvitsa river) to 425.7 km (Ponoi river).

The stocks of Atlantic salmon are now in a rather stressed condition. This has been brought about not only by the impact of various biotic factors but also unwise economic activities and overfishing. For example, populations of Atlantic salmon in the rivers Paz, Teriberka, Voronja, Niva and Kovda were lost and a large area of spawning and nursery habitat in the Tuloma river was flooded as a result of construction of hydropower stations. Conditions for production of salmon in the rivers Umba and Kola deteriorated because of log drifting, disposal of industrial wastes, while poaching adversely affected the small salmon populations and salmon stocks in rivers located in the vicinity of large communities (rivers Kola, Tuloma, Umba). There is a real threat of adverse interactions between wild salmon and cultured salmon. All of these factors highlight the need for new approaches to the management of Atlantic salmon stocks.

The objective of this paper is to describe existing measures used in the management of salmon stocks, their compliance with the concept of the precautionary approach and TAC options under different levels of biological reference points. Data on catch statistics, regional documents (fisheries regulation and descriptions of the fisheries and fishing gears) and other material available at PINRO and Murmanrybvod have been used in preparing this paper.

Description of management measures

The fishery for Atlantic salmon on the Kola peninsula has a centuries-old history (Minkin, 1976). Until the beginning of this century the most widely used fishing gear for the in-river fishery was a fence (a wall having a trap and constructed of wooden stakes), which completely partitioned the river. Until the beginning of the 20th century the regulation of the fishery was basically sporadic, although existing legislation from the previous century was available which prohibited, for example, fishing for spawning salmon with harpoons. There was also a clause in the legislation providing that fences which partitioned a river during the

spawning run of salmon should have gates with a width of l\3 to l\6 of the river width (Soldatov, 1903).

Fisheries Inspectors were responsible for compliance with the regulations. Few inspectors were, however, appointed. There were frequent infringements of the regulations which, ccording to Soldatov (1903), had caused a marked decline of salmon abundance in the Barents Sea rivers by the end of the last century.

In the first half of this century the principles used in the regulation of the fishery laid down in previous years remained unchanged. The legislation was of a prohibitive nature. For instance, sport fishing by anglers was totally prohibited. Large fines were imposed on anglers who were caught in possession of a rod and line on a salmon river. At the same time there were no limitations for the commercial fishery for salmon. For instance, in 1932, 1620 J-nets, 31 sea bag nets from 75 to 100 m in length and 29 coracle nets were set and catch per gear per season was 10.3 kg, 107.2 kg and 141 kg, respectively (Smirnov, 1935). In 1947-1951, 944 to 1653 nets (trap nets and drag seines, kilenot, bag nets) were set, and the mean catch per net per season varied from 240 to 530 kg. Catches increased annually from 1934 and reached 743 t in 1936. Large catches were also recorded in 1938-1939, 1944 and 1949 (600-700t).

In 1949 licensed fishing for salmon by spinning rod was permitted on rivers of the Kola peninsula. However, this fishing was not regulated either. For instance, up to 70 anglers a day fished for salmon with a spinning rod based on "catch-and-retain" at a 30 km beat on the Kola river. As a consequence, the required number of adult salmon used as broodfish for enhancement purposes (usually about 1000 salmon were taken) was not collected on the Kola river that year.

In general, as a result of the intensity of fishing and improvements in technique,the catch of Atlantic salmon on the Kola peninsula had doubled by the beginning of the 1950's compared to the 1920's (226t on average in 1922-1930, and 453t in 1941-1950). However, subsequently, despite further improvement in fishing gear, the catch began to decline, which was an indication of declining salmon stocks, and although according to Azbelev (1966) the abundance of salmon in the rivers of the Kola peninsula in the 1950's remained relatively stable and the decline in catch was regarded as a temporary event not associated with man's activity, the need for scientifically underpinned regulation of the fishery was recognised. Initially this concerned the in-river fishery and it was decided to concentrate this fishery at counting fences installed in river mouths. The coastal fishery remained unregulated. The first counting fences were installed in the rivers B.Z.Litsa, Ura, Kola (the Barents Sea basin) and Varzuga (the White Sea basin) in 1958. From 1958 to 1997 counting fences were operated in 36 rivers in various years. The largest number of counting fences (23) was operated in 1978. Only 7 counting fences were operated in 1997. The fishing regime at counting fences provided for release of 50% of the run to the spawning grounds, i.e. a day of fishing alternated with a day of release, when a trap in the counting fence was open for fish to run through. In addition, the wings of the fence were lifted on a day of release and they completely closed the river channel on the day of fishing. For the Kola river a special regime was established under which all salmon captured in the trap were retained, in order to enhance the protection of the river from poaching. This measure was justified by the fact that the counting fence was located 25 km up from the river mouth and the area of spawning habitat in the downstream stretch of the river was sufficient for effective spawning of wild salmon, while the headwaters were stocked with hatchery juveniles. Even under this regime some migrating salmon succeeded in reaching the upstream spawning grounds before the counting fence was installed at the start of the season.

Concentration of the fishery at counting fences allowed for the control of adult returns to rivers and saved many stocks from overfishing. However, by the beginning of the 1980's it became obvious that the existing fishing regime had not produced the anticipated benefits on those rivers where the abundance of salmon was about 1000 salmon (mostly rivers in the north-east of the Kola peninsula). There were several reasons for this. Firstly, because of the flow regime in these rivers the counting fences were established in the estuary and the trap, therefore, captured salmon migrating to spawn in other rivers. Secondly, the abundance of salmon in these rivers was also affected by the coastal fishing and illegal fishing. Thirdly, there was not always full compliance with the fishing regime established. As a result, the fishery on these rivers became uneconomic and it was closed in 1981. The stocks of salmon in these rivers were greatly depleted and they were only restored by the beginning of the 1990's. On other rivers the fishing regime, which provided for the release of 50% of the run to the spawning grounds, was maintained until 1987. By that time counting fences were operated in 10 rivers, and a trap was operated in the upper part of a fish ladder at the Lower Tuloma power station on the Tuloma river. The coastal fishery was still not regulated.

In 1987, for the first time, a catch limit was established for the coastal fishery. By that time the coastal fishery was carried out in the White Sea only, and the catch taken by this fishery (especially in recent years) was unrelated to the status of the stocks - 95% of the catch was composed of salmon from the Varzuga and Umba rivers. For example, in 1985 182 t of salmon (63 204 fish) were caught at coastal fishing stations which corresponded to 48% of the total abundance of Varzuga and Umba salmon.

A quota for the coastal fishery was set at 60 t, which, on the basis of the average weight of salmon, corresponded to 2100 individuals. To compensate for the quota allocated to the coastal fishery, the fishing regime on the rivers Varzuga and Umba was modified in 1987. Under new regulations no less than 63% of the spawning run is to be released through the fence on the Varzuga river and no less than 67% on the Umba river. The fishing regime on 9 other rivers remained unchanged.

From 1990 sport fishing for salmon based on catch-and-release began to develop in the rivers of the Kola peninsula. Since that time quotas for all types of fishing in the rivers of the Kola peninsula (commercial, catch-and-release, catch-and-retain) have been allocated based on a TAC. The TAC is established on the basis of projections of adult returns to the rivers, provided annually since 1978, adult counts and biological data derived from examination of the catch at a counting fence and through sampling, and water temperature measurements in the 0-200 m depth interval at the Kola meridian transect in the Barents Sea (Tretjak et al., 1997). The TAC is set under a regulation specifying that no less than 50% of adults which have entered the river should be allowed to spawn. To this effect, on the rivers where catch-and-release is practised together with commercial fishing an additional number of adults are released through the counting fence to take account of the quota allocated to recreational fishing. On these rivers the fishing regime for the counting fence provides for one day of fishing and two or three days of release subject to the projected adult returns to a given river. In addition, in establishing a TAC and a quota for catch-and-release recreational fishing the potential mortality of salmon after release is allowed for. It has been deliberately raised to 50% although for the Kola peninsula rivers it does not exceed 16.7% (Zjuganov et al., 1996). These regulations have been in place for 8 seasons and enable flexibility in the management of Atlantic salmon stocks in the rivers of the Kola peninsula.

Precautionary approach and biological reference points

The Precautionary Approach to salmon management applies when knowledge is imperfect. Measures applied to manage Atlantic salmon stocks in the rivers of the Kola peninsula since 1958 conform to this approach. The mandatory release of no less than 50% of salmon

through the counting fence to the spawning grounds can in a way be viewed as applying the concept of "minimum biologically acceptable level" (MBAL) or "conservation limit", although the 50% level of release is not scientifically based, rather it is convenient in operating the fence under the regime of one day of fishing followed by one day of release. Analysis of adult counts has shown that during the time when the counting fence was operated on the Varzuga river, the number of females released through the fence to spawn each year was less than the conservation limit (8960 females) on 19 occasions (a conservation limit for this river was only established at the beginning of 1998 (Alexeev, Prusov, 1998). In the Ura river this occurred on 22 occasions (conservation limit - 225 females) and the in the B.Z.Litsa on 24 occasions (conservation limit - 315 females). Estimates of conservation limits are also taken from the paper by Alexeev and Prusov (1998).

As previously stated, since 1990 a TAC has been calculated for all rivers on the Kola peninsula where fishing for salmon is carried out (commercial, catch-and-release, catch-and-retain). It requires that no less than 50% of adults are allowed to spawn. In 1997, a conservation limit was calculated for the first time for the Tuloma river - 3300 females (Tretjak et al., 1997). For the preceding five years under the existing fishing regime it was shown that the number of females released through the trap was less than this limit. In 1997 the operation of the trap on the Tuloma river was altered with the intention of achieving the MBAL. The new fishing regime provided for the release of 3300 females to the spawning grounds. However, the number of salmon entering the river was such that the fishery had to be closed. A projection suggests a similar scenario for 1998. To design regulations for concentrated fishing at counting fences in 1998 conservation limits for other rivers have also been estimated. For the rivers B.Z.Litsa, Ura, Kola, and Varzuga MBALs have been established by using the Ricker model and for the rivers Pechenga, Jokanga, Kitsa and Umba by transporting the reference points from index rivers. Under the projected returns to individual rivers it has been estimated that the fishery can be maintained on the rivers B.Z.Litsa, Ura, Varzuga and Kitsa only. This has been specified by regulations updated for the 1998 season. If a target reference point, exceeding MBAL by at least 25%, was used to calculate the TAC, the fishery could be maintained on the Varzuga river only. The situation is much better on the rivers where only recreational fishing is practiced. If MBAL is used to calculate a TAC, the limits established for the rivers permit recreational fishing to be conducted. However, if a target reference point was used, economically beneficial fishing could be exercised only on the Ponoi river (MBAL is 3900 females (Alexeev, Prusov, 1998), and the projected return is about 12 000 females).

In summary it can be stated that with the present status of salmon stocks in the rivers of the Kola peninsula the application of the Precautionary Approach to management of this resource would practically necessitate the cessation of the fishery. If a minimum biologically acceptable level is used to set the TAC, the commercial fishery can only be maintained on the rivers B.Z.Litsa, Ura, Varzuga and Kitsa, while recreational fishing can be conducted on practically all rivers. If a management reference point is used to set the TAC, the fishing could be maintained on the rivers Varzuga and Ponoi only. Therefore, managers would probably resist the application of the Precautionary Approach to management of Atlantic salmon stocks on the Kola peninsula.

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ANNEX 15

Council

CNL(98)46

Agreement on Adoption of a Precautionary Approach (incorporating minor amendments)

CNL(98)46

Agreement on Adoption of a Precautionary Approach (incorporating minor amendments)

1. NASCO and its Contracting Parties agree to adopt and apply a Precautionary Approach to the conservation, management and exploitation of salmon in order to protect the resource and preserve the environments in which it lives. Accordingly, NASCO and its Contracting Parties should be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures.

2. The Precautionary Approach requires, inter alia:

   a) consideration of the needs of future generations and avoidance of changes that are not potentially reversible;

   b) prior identification of undesirable outcomes and of measures that will avoid them or correct them;

   c) initiation of corrective measures without delay, and these should achieve their purpose promptly;

   d) priority to be given to conserving the productive capacity of the resource where the likely impact of resource use is uncertain;

   e) appropriate placement of the burden of proof by adhering to the above requirements.

3. The application of a Precautionary Approach should involve all parties concerned with salmon conservation, management and exploitation.

4. The Precautionary Approach will be applied by NASCO and by its Contracting Parties to the entire range of their salmon conservation and management activities. Initially the application will be to the following three areas:

   - Management of North Atlantic salmon fisheries;

   - The formulation of management advice and associated scientific research;

   - The area of introductions and transfers including aquaculture impacts and possible use of transgenic salmon.

5. Both NASCO and its Contracting Parties should, as the next step, address application of the Precautionary Approach to freshwater habitat issues and the by-catch of salmon in other fisheries.

Management of North Atlantic salmon fisheries

6. An objective for the management of salmon fisheries for NASCO and its Contracting Parties is to promote the diversity and abundance of salmon stocks. For this purpose, management measures, taking account of uncertainty, should be aimed at maintaining all salmon stocks in the NASCO Convention area above their conservation limit (currently defined by NASCO as the spawning stock level that produces maximum sustainable yield), taking into account the best available information, and socio-economic factors including the interests of communities which are particularly dependent on salmon fisheries and the other factors identified in Article 9 of the Convention. In order to achieve this, a Precautionary Approach will be applied to the management both of fisheries regulated by NASCO and those in homewaters.

7. The application of the Precautionary Approach to salmon fishery management is an integrated process which requires at least the following:

   a) that stocks be maintained above the conservation limits by the use of management targets;
   b) that conservation limits and management targets be set for each river and combined as appropriate for the management of different stock groupings defined by managers;
   c) the prior identification of undesirable outcomes including the failure to achieve conservation limits (biological factors) and instability in the catches (socio-economic factors);
   d) that account be taken at each stage of the risks of not achieving the fisheries management objectives by considering uncertainty in the current state of the stocks, in biological reference points and fishery management capabilities;
   e) the formulation of pre-agreed management actions in the form of procedures to be applied over a range of stock conditions;
   f) assessment of the effectiveness of management actions in all salmon fisheries;
   g) that stock rebuilding programmes (including, as appropriate, habitat improvement, stock enhancement and fishery management actions) be developed for stocks that are below their conservation limits.

8. The management procedures for all salmon fisheries could include the following elements:

   a) definition of target spawning stock levels in the relevant rivers;
   b) definition of pre-fishery abundance of individual salmon stocks or groups of stocks occurring in the relevant fishery;
   c) utilisation only of the surplus according to a) and b) above;
   d) socio-economic factors.

9. New fisheries targeted on salmon or which could result in a by-catch of salmon should be subject to cautious conservation and management measures. In accordance with Article 2, paragraph 3 of the Convention, the Parties shall invite the attention of non-Contracting Parties to any significant by-catch of salmon by its vessels.

10. Efforts to minimise unreported catches, and to improve estimates of them, are consistent with the Precautionary Approach. NASCO and its Contracting Parties agree to evaluate and report on progress in this area.

11. ICES or other scientific advisors should be requested, inter alia, to:

a) provide stock conservation limits and management targets for all river stocks;
b) advise on the risks of not achieving the objectives of NASCO or its Contracting Parties by considering uncertainty in the current state of the stocks, in biological reference points related to specific management objectives and in fishery management capabilities;
c) provide catch options or alternative management advice with associated risk assessments for the fisheries regulated by NASCO and homewater fisheries for all salmon stocks;
d) advise, in the light of current conditions in the freshwater and marine environment, on stock rebuilding programmes including, where appropriate, habitat improvement, stock enhancement, disease prevention and fishery management actions;
e) identify the monitoring and data collection required to better achieve the objectives of NASCO and its Contracting Parties;
f) advise on the impacts on salmon stocks of existing and new fisheries for other species, and of salmon fisheries on non-target species.

The area of introductions and transfers including aquaculture impacts and possible use of transgenic salmon

12. Implementation of the measures contained in the following agreements is essential in the light of the Precautionary Approach:

- North American Commission Protocols on Introductions and Transfers, NAC(92)24.

- Amendments to the North American Commission Protocols on Introductions and Transfers, NAC(94)14.

- Resolution by the Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean to Minimise Impacts from Salmon Aquaculture on the Wild Salmon Stocks, CNL(94)53.

- NASCO Guidelines for Action on Transgenic Salmon, CNL(97)48.

- Resolution by the North-East Atlantic Commission of the North Atlantic Salmon Conservation Organization to Protect Wild Salmon Stocks from Introductions and Transfers, NEA(97)12.

The Parties therefore agree to report to the Council or to the appropriate Commission of NASCO on the steps taken to achieve the measures described in the above agreements. The Contracting Parties should ensure full implementation of these agreements and will consider whether the agreements need to be re-examined and complemented by additional steps.

ANNEX 16

Council

CNL(98)47

Preliminary Draft Action Plan for Application of a Precautionary Approach (including minor amendments)

CNL(98)47

Draft Action Plan for Application of a Precautionary Approach (including minor amendments)

		Responsibility	Period
1.	**Organisation of Activities**		1998/99
	Finalise draft Action Plan for Council consideration	NASCO-WG(a)	
	Agreement and adoption of Action Plan	Council	June 1999
	Establish a Standing Committee/Working Group on the Precautionary Approach	Council	June 1998/99
2.	**Management of Fisheries**		
	Clarify interpretation of NASCO's fisheries management objectives and concepts	NASCO-WG(b)	1998/99
	Develop age-specific conservation limits for all stocks taking due regard of biological diversity NAC - assess uncertainties in current Conservation Limits NEAC - move from national-based to river-based CLs and assess uncertainties	CPs & ICES	Ongoing-2003
	Recommend risk levels for setting management targets	NASCO-WG(b)	1998/99
	Agree upon risk levels for setting management targets	Commission/Council	1999/2000
	Develop management targets for all stocks	ICES	Ongoing-2003
	Develop guidelines on decision rules for management of fisheries	NASCO-WG(b)	1998/99
	Develop decision rules for individual fisheries	Fisheries managers in Commissions/CPs	1999/2000

3.	**Socio-economic Issues**		
	Indicate how socio-economic factors could be included in: Fisheries management Aquaculture, Introductions and transfers Stock rebuilding programmes By-catches	NASCO-WG(c)	1999-2000
4.	**Unreported Catches**		
	Develop and improve estimation procedures	CPs and ICES	1998-2000
	Improve catch reporting procedures	CPs	1998-2000
5.	**Scientific Advice and Research Requirements**		
	Re-formulate request to ICES with respect to CNL(98)38	SSC/Council	June 98
	Reformulate request for advice in light of management decisions on application of PA	SSC/Council	Ongoing
6.	**Stock Rebuilding Programmes**		
	Develop framework for stock rebuilding programmes (SRPs)	ICES	June 99
	Identify stocks requiring SRPs	CPs/ICES	2000
	Develop SRPs for stocks identified above	CPs	Long-term

7.	**Introductions, Transfers, Aquaculture and Transgenics** (including stocking and ranching)		
	Introduce reporting procedures for the Agreements CNL(94)53, CNL(97)48, NEA(97)12): Review reporting procedures Develop and extend reporting procedures	Secretariat/Council	1998/99
	Take account of the application of a PA in the review of NAC(94)14	NAC	1998/99
	Re-examine other NASCO Agreements and consider need for additional steps in the light of the Precautionary Approach	NASCO-WG(d)	June 2000
	Review use of sterile salmon in aquaculture, including in relation to the use of transgenics	Council	1999
	Review measures to prevent unintentional introductions and transfers of salmonids and of diseases and parasites	NASCO-WG(d)	
8.	**Habitat Issues**		
	Special Session on habitat issues	Council	June 1999
	Consider application of PA to freshwater habitat issues	NASCO-WG	2000
9.	**By-catches**		
	Consider application of PA to by-catch problems	NASCO-WG	2001

KEY:

NASCO-WG		**NASCO Working Group on the Precautionary Approach in Salmon Management**
	(a)	**to develop Action Plan**
	(b)	**to consider issues relating to salmon fisheries management**
	(c)	**to consider socio-economic issues**
	(d)	**to consider introductions, transfers, etc.**
CPs		**Contracting Parties**
NAC		**North American Commission**
Commissions		**NASCO Commissions**
SSC		**Standing Scientific Committee**

ANNEX 17

Council

CNL(98)44

Terms of Reference for a NASCO Working Group on the Precautionary Approach

CNL(98)44

Terms of Reference for a NASCO Working Group on the Precautionary Approach

A Working Group on the Precautionary Approach in North Atlantic Salmon Management, consisting of both scientists and managers, shall be established and shall meet during the week beginning either 15 March 1999 or 22 March 1999 chaired by Mr E C E Potter and report to the Sixteenth Annual Meeting of the Council.

The terms of reference shall be:-

- to prepare a draft Action Plan for the implementation of a Precautionary Approach in the activities of NASCO and its Contracting Parties relating to the management of Atlantic salmon, taking account of papers CNL(98)46 and CNL(98)47.

- to propose methods and detailed terms of reference for achieving the aims of the draft Action Plan.

ANNEX 18

Council

CNL(98)22

Unreported Catches

CNL(98)22

Unreported Catches

1. Last year the Council asked the Secretary to undertake a review, by 31 December 1997, of previous NASCO actions to enhance the level of reported catch. It was agreed that at the Fifteenth Annual Meeting the Parties would be asked to report on the measures they have taken to improve the level of the reported catch statistics in the light of the Secretary's report.

2. The review by the Secretary was sent to the Parties on 19 December 1997 with a request that any comments be sent to the Secretariat by 2 February 1998. Comments were received from only one Party, Canada, and these were incorporated into a revised version of the review. The review, as amended, was acceptable to all Parties and is attached. It summarises the methods which might be used to assess unreported catches, the available time series of unreported catches, the factors which could lead to unreported catches, the minimum standard for catch statistics adopted by the Council in 1993 and methods to reduce the level of unreported catches.

3. A concern raised by the Canadian delegation was that the information provided by ICES does not give a breakdown by country of the guess-estimates of unreported catches and does not provide an explanation of how each country determined its value. Canadian scientists participating in the ICES Working Group Meeting in April 1998 have therefore been asked to document the level, sources and methods of estimation of the unreported catch for Canada for 1997. Canada requested that other countries might undertake to do likewise so that there is a useful basis for discussion on the subject of unreported catches in June. The other Contracting Parties were therefore advised of this request.

4. The Parties are asked to consider what further action should be taken, if any, in the light of the attached report.

Secretary
Edinburgh
15 April 1998

Unreported Catches
A Review of Actions Taken by NASCO

Introduction

1. At its Fourteenth Annual Meeting the Council considered a proposal from the West Greenland Commission that NASCO undertake a review related to enhancing the level of reported catch and to refining the estimates of unreported catch. The Secretary was asked to undertake a review by 31 December 1997 of "previous NASCO actions to enhance the level of reported catch". The Parties would then be asked to approve the report within one month and to report on measures they have taken to improve the level of the reported catch statistics, in the light of the Secretary's report, for the Fifteenth Annual Meeting. It was agreed that the reviews by the Parties should consider progress made to date, continuing problems and possible methods to better categorise the nature of these catches such as subsistence, local sales, by-catch, legal and illegal takes.

2. It is assumed that the Council's intention was for the Secretary to review NASCO's actions in relation to unreported catches. Unreported catches have been defined by ICES as "harvests which are caught and retained but which do not enter into the reported catch statistics. These harvests could be either legal or illegal but would not include catch and release mortalities whether they arise from nets or angling gear. They do not include fish retained by public or private agencies for broodstock purposes destined for enhancement".

Assessment of Unreported Catches

3. In 1991, the Council reviewed the methods that could be used to assess unreported catches (document CNL(91)17). At its 1989 meeting the ICES Working Group on North Atlantic Salmon had identified eight methods by which unreported catches could be assessed. These were:

   i. Local inspectors or fishery officers could be requested to estimate illegal fishing from their local knowledge.
   ii. Logbooks could be issued to fishermen and the results used to estimate unreported catch.
   iii. Catch surveys could be used to compare survey results with reported catches.
   iv. Mark-recapture techniques could be used to estimate total catch and the unreported catch could be calculated by comparison to reported catch.
   v. Landings in market categories could be compared to expected values.
   vi. Surveys of coastal areas for illegal netting could be used to estimate illegal catch from records of catch per net and local knowledge of the number of nets in use.
   vii. Local sales could be estimated by a survey of households for the number of salmon bought directly from fishermen.
   viii. A tagging scheme for landed salmon could be introduced.

4. ICES has recognised that unreported catches are an important component in Atlantic salmon stock assessments but that by their nature they are difficult to investigate. A

number of problems in implementing the methods proposed by the Working Group for assessing unreported catches have been identified. For example, not all of the methods are appropriate in all countries and they are not appropriate for assessing unreported catches in international waters. Further, obtaining more accurate catch statistics would involve high costs and often the number of enforcement staff available to carry out survey work is limited. However, the need to assess unreported catches would be reduced if they could be reduced to insignificant levels.

5. For most countries, ICES has advised that information on unreported catches is based upon the local knowledge of fishery managers or bailiffs. These values are usually termed "guess-estimates" indicating that they are not derived from annual surveys of fisheries or analysis of catch data. They are, however, usually supported, in part at least, by observations and survey results. ICES is unable to evaluate the accuracy of the processes used to develop "guess-estimates" of unreported catches but considers that they are based on the best available information. However, the need for efforts to improve estimates of unreported catches has been stressed by ICES.

Time Series of Unreported Catches

6. The Council of NASCO requests ICES annually to provide estimates of all unreported catches, including those taken in international waters by non-Contracting Parties. The time series of official catch statistics as provided by the Parties (in tonnes) and of "guess-estimates" of unreported catches as provided by ICES (in tonnes) for the period 1985-1996 is as follows:

		Unreported Catch (tonnes)		
Year	Official Catch (tonnes)	NASCO Parties	% of estimated total catch which is unreported	International Waters
1985	8105	3070	27	
1986	9201	3500	28	
1987	8207	2788	25	
1988	7262	3248	31	
1989	5914	2277	28	
1990	4865	1890	28	180-350
1991	4088	1682	29	25-100
1992	4082	1962	32	25-100
1993	3737	1644	31	25-100
1994	3969	1276	24	25-100
1995	3605	1060	23	N/A
1996	3068	1123	27	N/A
1985-1996 Average	**5509**	**2127**	**28**	

In the table above, a figure of 20 tonnes has been used for the West Greenland Commission in 1995 and 1996. The figure reported by ICES was <20 tonnes.

7. The "guess-estimates" of unreported catch provided by ICES suggest that NASCO has been able to address the problem of unreported catches arising from fishing for salmon in international waters, at least for the time being. However, unreported

catches by the Parties account for a significant proportion of the estimated total catch (i.e. official reported plus unreported catch). In the twelve-year period 1985-1996 an average of 27.8% of the estimated total catch was unreported.

8. No information is provided by ICES on unreported catches by individual NASCO Parties. ICES has, however, provided a time series of unreported catches by Commission area for the years 1987-1996 as follows:

	North-East Atlantic Commission			North American Commission			West Greenland Commission		
Year	Official	Unreported	% of total	Official	Unreported	% of total	Official	Unreported	% of total
1987	5459	2554	32	1785	234	12	963	N/A	-
1988	5057	3087	38	1312	161	11	893	N/A	-
1989	4436	2103	32	1141	174	13	337	N/A	-
1990	3724	1779	32	914	111	11	227	N/A	-
1991	2938	1555	35	712	127	15	438	N/A	-
1992	3324	1825	35	521	137	21	237	N/A	-
1993	3351	1471	31	374	161	30	12 *	12	-
1994	3602	1157	24	355	107	23	12 *	12	-
1995	3263	942	22	259	98	27	83	<20	<19
1996	2689	947	26	287	156	35	92	<20	<18
1987-1996 Average	**3784**	**1742**	**31**	**766**	**147**	**20**	**-**	**-**	**-**

Official = Official catch statistics provided by the Parties to NASCO (tonnes)
Unreported = "Guess-estimates" of unreported catch provided by ICES (tonnes)
% of total = Percentage of total estimated catch (i.e., official plus "guess-estimate") which is unreported

* No fishery at West Greenland in 1993 and 1994. Official statistics to NASCO included unreported catch estimate.

9. Over the period 1987-1996 the percentage of the catch which is unreported has been highest in the North-East Atlantic Commission area. During this period the "guess-estimates" of unreported catches averaged 1742 tonnes in the North-East Atlantic Commission area and 147 tonnes in the North American Commission area, or 31% and 20% of the estimated total catch respectively. Information is only available for the West Greenland Commission for 1995 and 1996 but in these years the "guess-estimates" were less than 19% of the estimated total catch (ICES only indicated that unreported catches were <20 tonnes). It is not known to what extent the year to year and regional differences are due to differences in the methodology used to provide the "guess-estimates" or to actual differences in the level of unreported catches.

Review of Factors Leading to Unreported Catches

10. In 1990, the Council reviewed the factors which could lead to unreported catches (document CNL(90)19). A number of problems which could give rise to unreported catches were identified and grouped under six headings as follows:

(a) absence of a requirement for catch statistics to be collected;
(b) suppression of information thought to be unfavourable;
(c) local sale or consumption;
(d) innocent inaccuracy in making returns;
(e) fishing for salmon in international waters;
(f) illegal fishing.

Minimum Standard for Catch Statistics

11. The question of the comparability of catch statistics has been of concern to NASCO since its establishment and in 1993 a Minimum Standard for Catch Statistics was unanimously adopted by the Council (Appendix 1) in order to improve the comparability of the catch statistics throughout the North Atlantic area. Due to the difficulty of bringing in the new arrangements in some countries it was agreed that the standard should be phased in so that all Parties had achieved it for the 1995 statistics.

12. Under the minimum standard it is stated that the Parties to the NASCO Convention wish to encourage studies to assess non-catch fishing mortality in both salmon-directed and non-directed gears, in particular unreported catches. ICES has defined non-catch fishing mortality as "mortality generated directly or indirectly by fishing but which is not included in the recorded catch". Six types of non-catch fishing mortality have been identified (predation mortality, drop-out mortality, haul-back mortality, escapement mortality, discard mortality and other mortality not appearing as recorded catch (including illegal catch or unreported local sales, etc.)). Unreported catches differ from other forms of non-catch fishing mortality in that they are retained but do not enter into the statistics.

13. Although the minimum standard for catch statistics applied to the 1995 and 1996 statistics, the "guess-estimate" of unreported catch increased in 1996. This is somewhat surprising as the application of the standard should have led to improved reporting at least for some categories of unreported catch (see paragraph 14).

Reducing the Level of Unreported Catches

14. At its 1991 meeting the Council reviewed methods for reducing the level of unreported catches (document CNL(91)18). The minimum standard for catch statistics adopted by the Council (see paragraph 11-13 above) should have had an impact on the level of unreported catches because it requires the inclusion of catches from all components of the salmon fisheries where catches are retained and the inclusion of catches of salmon caught in non-salmon gear where retention of these fish is legal. Further, the initiatives of the Council in eliminating fishing for salmon in international waters appears to have successfully reduced the level of unreported catches from this source. There have been no sightings of vessels fishing for salmon in international waters since February 1994.

15. Possible methods for improving the completeness and accuracy of the catch statistics were identified in the review (CNL(91)18) including collection of statistics from all fishermen in all areas including fish destined for local sales; the provision of catch return forms which are unambiguous and well-designed; the provision of log-books to enable catches to be recorded at the time of capture and allowing validation of

catches; a requirement that returns are made at frequent intervals when catches are likely to be large and the use of postal reminders in the case of non-return. However, illegal fishing has been identified in the literature as a particular problem in some areas, which in some cases has continued despite increased enforcement effort, better equipment and training for enforcement staff and severe sentences following successful proceedings.

16. At its 1992 meeting, the Council reviewed the pros and cons of carcass tagging as a method of reducing the illegal harvesting of salmon. Carcass tagging was first used in Canada in 1980 and has subsequently been introduced in the State of Maine (USA) and within the European Union in France and Spain. Experience reported in the literature suggests that in Canada the programme has deterred poaching and has made marketing of illegally caught salmon more difficult. It has also been reported that carcass tagging results in improved catch statistics, facilitates quota enforcement, allows by-catch of salmon in other fisheries to be assessed and offers marketing and quality control advantages. However, it was recognised that the considerable production of farmed salmon could present practical difficulties if carcass tagging was to be applied to all salmon. There are also costs involved in implementing a carcass tagging programme but in Canada these costs are believed to be justified. It was concluded that if the practical and technical difficulties could be overcome, carcass tagging could offer a simple and effective method of controlling illegal fishing, and of improving the quality of catch statistics.

17. The Council agreed that developments in carcass-tagging techniques should be kept under review since these may lead to the availability of a cheap method of tagging the large quantities of farmed salmon. There is now growing interest in carcass tagging in a number of other areas within the EU. For example, recent Task Forces in both Ireland and UK (Scotland) have recommended that carcass tagging be implemented.

Conclusions

18. The Council is concerned about the implications of the level of unreported catches for the conservation and rational management of the resource. Actions by NASCO to date have involved quantifying the scale of the problem, reviewing the factors which may give rise to unreported catches and considering methods for reducing their level. The Parties have indicated in the Minimum Standard for Catch Statistics that they wish to encourage studies to assess unreported catches and to encourage measures to reduce their level. However, despite actions by the Council which should have reduced the level of unreported catches, the “guess-estimates” provided by ICES indicate that unreported catches remain at a high level (in excess of 1000 tonnes). The Parties may therefore wish to examine what further actions can be taken to reduce the level of unreported catches. This may involve re-focusing efforts on each of the potential sources of unreported catch listed in paragraph 10 above with a view to determining where further progress may be made.

Appendix 1

MINIMUM STANDARD FOR CATCH STATISTICS ADOPTED BY THE COUNCIL AT ITS TENTH ANNUAL MEETING 7-11 JUNE 1993, EDINBURGH, UK

The Atlantic Salmon Catch Statistics of the Parties to the NASCO Convention should:

- include catches from all components of the salmon fisheries where these catches are retained
- include returns to ranching units
- include both the number and weight of salmon
- weight should be whole round weight or be converted to whole round weight equivalent using appropriate conversion factors where fish are landed gutted or gutted and glazed
- be differentiated into sea-age class or alternatively into grilse and multi-sea-winter salmon
- differentiate, wherever possible, between wild fish and fish which have escaped from fish farms
- include salmon caught in non-salmon gear where retention of fish caught in this way is legal
- information on fishing effort should, wherever possible, be obtained for all components of the salmon fisheries.

NOTE:

The Parties to the NASCO Convention also wish to:

~ encourage studies to assess non-catch fishing mortality in both salmon directed and non-directed gears in particular unreported catches

~ encourage measures to reduce the level of non-catch fishing mortality in particular unreported catches

ANNEX 19

Council

CNL(98)27

Report of the Meeting of the Working Group on Implementation of the Oslo Resolution

CNL(98)27

Report of the Meeting of the Working Group on Implementation of the Oslo Resolution

1. In 1994 the Council unanimously adopted the "Resolution by the Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean to Minimise Impacts from Salmon Aquaculture on the Wild Salmon Stocks" (the Oslo Resolution). It was agreed, at the time, that the subject of impacts of aquaculture would be reviewed annually and that the situation regarding implementation of the recommendations in the Oslo Resolution would be re-examined in 1998 with a view to considering whether additional measures may be desirable.

2. Under Article 5 of the Resolution the Parties shall report to the Council on the measures taken in accordance with Article 2 (measures to minimise genetic and other biological interactions) and Article 3 (measures to minimise the risk of transmission of diseases and parasites to the wild stocks of salmon) and on the research and development carried out under Article 4 of the Resolution. In 1995 a format for the provision of this information was agreed and returns were made by the Parties in 1996 and 1997. However, in 1997 the Council recognised that if there was to be full implementation of the Oslo Resolution by 1998 further measures would be needed and agreed to hold a meeting to consider the implementation of the Oslo Resolution in the light of information arising from the ICES/NASCO Symposium on "Interactions between Salmon Culture and Wild Stocks of Atlantic Salmon: The Scientific and Management Issues".

3. At the invitation of DG XIV of the European Commission this meeting was held in Brussels, Belgium during 26-27 January 1998. The report of the meeting, IOR(97)8, is attached. **The Working Group developed a number of recommendations which are highlighted (in bold italic text) in the report. The Council is asked to consider these recommendations with a view to their adoption.**

4. With regard to paragraph 5.2 of the report the Working Group had recommended that the Parties provide comprehensive information to the Council in advance of the Annual Meeting, and if possible by 1 May 1998, concerning the measures in force. It was proposed that this information be based on the list of measures contained in Annex 2 of document IOR(97)2 (see pages 203-204). While this and the other recommendations will be considered by the Council with a view to their adoption, it is clear that the Working Group felt that there would be benefits to the Organization if this information was made available for this year's annual meeting so that the Council would have comprehensive information concerning the measures in force when deciding if additional measures may be necessary. I therefore wrote to the Parties on 4 March requesting that the information be provided according to the new format. **The returns for 1998 are contained in document CNL(98)28.**

Secretary
Edinburgh
15 April 1998

IOR(97)8

Report of the Meeting of the Working Group on the Implementation of the Oslo Resolution

1. Opening of the meeting

1.1 The Chairman, Dr Malcolm Windsor, opened the meeting, welcomed delegates to Brussels and thanked the Commission of the European Community for hosting the meeting. He referred to the fact that the Council of NASCO had adopted a "Resolution by the Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean to Minimise Impacts from Salmon Aquaculture on the Wild Salmon Stocks" (the Oslo Resolution) in 1994. It had been agreed that the subject of impacts of aquaculture would be reviewed annually and that the situation regarding implementation of the recommendations in the Resolution would be re-examined in 1998 with a view to considering whether additional measures may be desirable. Last year NASCO had held an international symposium in conjunction with ICES (the ICES/NASCO Symposium) to review the results of research on interactions between salmon culture on wild Atlantic salmon, to examine the practical implications of such interactions for salmon management, to identify gaps in current knowledge and to establish future research priorities. He suggested that the latest scientific information presented at this symposium indicates that the interactions between cultured and wild salmon may pose a more serious threat to the wild stocks than previously believed and that there is urgency about the need for action. The task before the meeting was, therefore, to consider the extent to which the Oslo Resolution has been implemented, to consider what further measures may be needed to ensure full implementation and to make recommendations for additional measures which may be necessary in the light of the ICES/NASCO Symposium.

1.2 A list of participants is contained in Appendix 1.

2. Adoption of the agenda

2.1 The Working Group adopted its agenda, IOR(97)7 (Appendix 2).

3. Appointment of a Rapporteur

3.1 The Assistant Secretary of NASCO, Dr Peter Hutchinson, was appointed as Rapporteur.

4. Consideration of the Terms of Reference

4.1 The Terms of Reference for the Working Group, as agreed by the Council at its Fourteenth Annual Meeting, were “to consider further the implementation of the Oslo Resolution in the light of the information arising from the ICES/NASCO Symposium."

4.2 The Working Group adopted these Terms of Reference.

5. Implementation of the Oslo Resolution

5.1 The Working Group considered two papers, IOR(97)2 (Appendix 3) and IOR(97)6 (Appendix 4) detailing the measures taken by the Parties to date. This information had been provided to the Organization in accordance with Article 5 of the Oslo Resolution.

5.2 In 1997 the Council had recognised that much would need to be done if the Resolution is to be fully implemented by 1998 as was intended when the Resolution was adopted in 1994. The Working Group felt that the reports to NASCO by the Parties for 1995 and 1996 were incomplete and did not fully reflect the range of measures in place and activities underway designed to protect the wild stocks from adverse impacts of aquaculture. This was, in part, due to the fact that measures in place prior to the adoption of the Oslo Resolution in 1994 had not been reported by all Parties. ***It is recommended that the Parties now provide comprehensive information to the Council in advance of the Annual Meeting, and if possible by 1 May 1998, concerning the measures in force. This information should be based on the list of measures contained in Annex 2 of document IOR(97)2 and a similar format should be used for subsequent annual returns***. In this way, it would be possible for each Party to indicate, for each element of the Oslo Resolution, where action had been taken. ***The returns should also indicate whether or not the measures are mandatory and how they are enforced. The information provided by the Parties could then be recorded by the Secretariat in a database in the same way as the information provided under Articles 14 and 15 of the Convention.***

5.3 ***The Working Group also recommends that during NASCO's Annual Meetings time be allocated on the agenda for discussion of the measures taken by the Parties. It is recommended that the Council might focus each year on the measures implemented by two or three Parties so that experiences of minimising impacts of salmon aquaculture can be shared.***

6. Summary of the Convenors' Report of the ICES/NASCO Symposium

6.1 The Working Group considered a summary, IOR(97)3 (Appendix 5), of the Convenors' Report of the ICES/NASCO Symposium. Copies of the published report were distributed to delegates.

6.2 In their report the Convenors had concluded that the information presented at the ICES/NASCO Symposium suggests that interactions between cultured and wild salmon may pose a more serious threat to the wild stocks than previously believed. The risks are most serious from salmon farming because the fish are genetically selected, because they are so numerous and because they do not form part of any plan for which a risk assessment has been carried out. The Convenors felt that farming technology must be improved so that containment is virtually 100%. Given the difficulty of achieving this, they stated that the most effective measure that can be introduced is the use of only sterile salmon in farming. They concluded that there is urgency about the need for action and a precautionary approach should apply, which will require changes not only to the way salmon aquaculture is managed but also to wild stock management. Where salmon farming is required to adopt new procedures

these should apply equally to all areas where there are risks of damaging wild salmon stocks so that the international salmon farming industry rests on as even a basis as possible.

6.3 The Working Group discussed the findings of the Convenors' Report and noted its conclusions. A range of views was expressed on the details of the report and although it was clear that not all those present agreed with all the conclusions in the report, ***there was a unanimous view that, in order to have confidence that the wild stocks are protected from irreversible genetic change, from ecological impacts and from the impacts of diseases and parasites, the measures in the Oslo Resolution needed to be fully implemented. Stronger measures should be considered where appropriate.***

7. Review of the need for revisions to the Oslo Resolution in the light of the findings at the ICES/NASCO Symposium

7.1 The Working Group considered document IOR(97)4 which reviewed the need for revisions to the Oslo Resolution in the light of the ICES/NASCO Symposium. In terms of Article 6 of the Oslo Resolution, aquaculture is defined as comprising enhancement, ranching and farming. In the Resolution: enhancement is defined as the augmentation of wild stocks in individual river systems by the release of Atlantic salmon at different stages in their life-cycles; ranching is the release of reared juvenile Atlantic salmon with the intention of harvesting all of them on their return; farming is a production system which involves the rearing of Atlantic salmon in captivity for the duration of their life-cycle until harvested. It should be noted that the definition of aquaculture in the Oslo Resolution is different to that used by other organizations. There was a discussion on the need to have a clear distinction between enhancement and ranching on the one hand, which are not considered to be aquaculture in some countries, and farming on the other hand, which is. On balance, however, ***it was agreed not to recommend changes to the structure of the Oslo Resolution but to recommend clarification of the differences between the three activities and to stress that the major aquaculture impact was currently that of salmon farming.***

Enhancement

7.2 The Working Group was aware that the NASCO Council would consider guidelines on stocking at its meeting in June 1998 and suggested that, once agreed, these guidelines should form the detailed basis of NASCO's policy on this issue. The view was expressed that the establishment of an inventory on the stocking activities by each Party would be an appropriate measure.

7.3 The Working Group considers that the provisions of the Oslo Resolution on enhancement are broadly in line with the recommendations arising from the ICES/NASCO Symposium. The measures that are not presently covered by the Oslo Resolution concern the desirability of using alternative means to stocking (eg habitat improvement) and the need to assess stocking programmes. ***The Working Group therefore recommends to the Council that it should consider these measures in more detail in developing its guidelines on stocking in June 1998. In general, the Working Group recommends that priority should be given to ensuring that the existing measures in the Oslo Resolution and the guidelines on stocking, if and when agreed, are fully implemented.***

Ranching

7.4 The Working Group considers that the provisions of the Oslo Resolution on salmon ranching are broadly in line with the recommendations arising from the ICES/NASCO Symposium. ***The Working Group recommends that priority should be given to ensuring that the measures in the Oslo Resolution concerning ranching are fully implemented.***

Farming

7.5 The Working Group recognised that the provisions of the Oslo Resolution on salmon farming appear to be in accordance with many of the recommendations from the ICES/NASCO Symposium. Effective implementation should lead to improved containment of stocks, and further reductions in disease and parasite problems. ***The Working Group recommends that priority should be given to ensuring that the measures in the Oslo Resolution concerning salmon farming are fully implemented.***

7.6 However, it is clear from the ICES/NASCO Symposium that there are real fears of genetic intrusion and genetic homogenisation of the wild stocks because of escapes and the limited number of strains used by the salmon farming industry. The problem of improving physical containment is that with current farmed production at a level in excess of 400,000 tonnes an escapement of only 1% leads to a significant proportion of farmed salmon in the wild. An escapement on this scale would be consistent with observations made in Norway and the Norwegian Sea. ***The Working Group appreciated that it is in the interests of the salmon farming industry to minimise escapes and although there have been improvements to cage structures to reduce escapes containment measures are currently not adequate to deal with the problem***. Moreover, further increases in farmed salmon production would mean that containment levels would have to show corresponding improvements just to ensure that the number of fish escaping remains stable; even greater efforts would be required to achieve a reduction. ***The Working Group recommends that renewed efforts be made to minimise escapes and that a more effective enforcement policy be adopted by the Parties. It is also recommended that efforts to improve recapture procedures should be increased provided that these can be conducted without adversely affecting the wild stocks.*** However, physical containment measures cannot ever be 100% effective. The cost of increasing the percentage containment can be prohibitively high. Recapture of escaped farmed fish is largely untried.

7.7 ***The Working Group recognised the need to co-operate on improvements in the management of salmon farming so as to reduce escapes and protect wild stocks. It was agreed to recommend a closer co-operative effort on developing guidelines on physical containment measures and husbandry practices for salmon farms. The salmon farming industry should be invited to participate in this process. Efforts should be made to obtain better data on the effectiveness of containment measures and on the level of escapes.***

7.8 The Convenors had concluded that the most effective measure for protecting against genetic impacts would be to use only sterile salmon in salmon farming. Research is being conducted in several countries on the feasibility of using all-female triploid sterile salmon in farming and on their ecological impacts. The results will start to

become available in 1998. It should be possible for sterile salmon to be available for use on a commercial scale in a minimum of 4 - 5 years after a decision is taken on their use. ***The Working Group accepted that sterile salmon might offer a way forward to protect the genetic integrity of the wild stocks but recognised that sterile salmon could have disadvantages in terms of yield, fish health, ecological impacts, consumer resistance and other marketing factors. However, these disadvantages would have to be balanced against the risks to the wild stocks from existing practices. The Working Group is not in a position to make any recommendations on the use of sterile salmon in farming but emphasises that this question be the subject of a substantial review by the Council in 1999 when the results of ongoing research should be available.***

7.9 ***The Working Group also recommends that the Parties give emphasis, where appropriate, to the use and effects of wild salmon protection zones. Whilst not included in the Oslo Resolution, the Working Group recognised the value of gene banks, though expensive, as a measure to protect the genetic diversity of the wild stocks where these are threatened with loss and as part of restoration programmes***. The Working Group noted that the Council had previously adopted guidelines on the establishment and operation of gene banks.

7.10 With regard to control of fish movements, introductions and transfers, the Oslo Resolution recommends that transfers of salmon should be conducted so as to minimise the potential for transmission of diseases and parasites and for genetic and other biological interactions and that mechanisms to control transfers should be introduced where necessary. ***The North-East Atlantic Commission has developed a Resolution containing guidelines to protect wild salmon stocks from introductions and transfers and the North American Commission has developed Protocols on introductions and transfers, although neither of these initiatives has been fully implemented. The Working Group considered that these are consistent with the Oslo Resolution.***

7.11 ***The Working Group also endorsed the recommendations from the Convenors for future research.*** In summary these recommendations are as follows: investigation of local adaptation and differential fitness among different populations; confirmation that reduced population viability is a consequence of competitive displacement of wild fish by cultured fish; monitoring of dying or dead fish in specialist diagnostic laboratories; experimentation to test hypotheses on possible relationships between salmon farming and parasite infestation levels in wild salmonids; formal risk analysis with respect to the use of triploid salmon in aquaculture; continued study of genetic populations of wild salmon; experimental study of the risks to wild populations from genetically modified organisms; engineering and design research aimed at improving containment of farmed salmon; monitoring of the frequency of occurrence of straying cultured fish. ***In addition the Working Group recognised the desirability of research into the effects of time spent in sea cages prior to escape on rate of return of farmed salmon and on methods to reduce predator damage at salmon farms. It was agreed that details of relevant ongoing research should be submitted to NASCO with the annual returns made under Article 15 of the Convention so that the Council may play a role in avoiding duplication of research effort.***

Liaison Group

7.12 ***The Working Group strongly endorsed the need for close dialogue with the salmon farming industry through the Liaison Group established between NASCO and the International Salmon Farming Association (ISFA).*** It was noted that a meeting of this group was scheduled for March 1998 in Glasgow. While it would not be appropriate to distribute the present report to the Liaison Group before it had been considered by the Council of NASCO, ***it was agreed that it would be desirable to advise the industry representatives of the main themes under discussion.***

Implementation

7.13 The question of NASCO's role in implementation of the Oslo Resolution was raised. While NASCO was felt to be the appropriate forum to consider impacts on wild salmon stocks from aquaculture and to recommend action, it is not an Organization which could adopt measures which are binding on the salmon farming industry. The appropriate process would be that commitments made by the Parties in NASCO would need to be put into effect by domestic legislation.

Precautionary Approach

7.14 The Working Group noted that the Council had established a Working Group on the Precautionary Approach and that this group would be considering, *inter alia*, how the Precautionary Approach would be applied to the area of introductions and transfers including aquaculture impacts. The Working Group recognised that there is an interaction between the two groups, but they will report independently to the Council.

8. Any other business

8.1 There was no other business.

9. Consideration of a draft report of the meeting

9.1 The Working Group agreed a report of the meeting, IOR(97)8.

10. Close of the meeting

10.1 The Chairman thanked all participants for their contributions to the meeting.

Appendix 1

WORKING GROUP ON IMPLEMENTATION OF THE OSLO RESOLUTION
26-27 JANUARY 1998, BRUSSELS, BELGIUM

LIST OF PARTICIPANTS

CANADA

MR JACQUE ROBICHAUD	Department of Fisheries and Oceans, Ottawa, Ontario
MR RICHARD HEGAN	Department of Fisheries and Oceans, Ottawa, Ontario
MR KEN JONES	Department of Fisheries and Oceans, Ottawa, Ontario
MR DAVID MEERBURG	Department of Fisheries and Oceans, Ottawa, Ontario
MR JOHN MOORES	Department of Fisheries and Oceans, St John's, Newfoundland
MR REX PORTER	Department of Fisheries and Oceans, St John's, Newfoundland

DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

MR EINAR LEMCHE	President of NASCO Greenland Home Rule, Copenhagen
MR PER KANNEWORFF	Greenland Institute of Natural Resources, Copenhagen
MR HEDIN WEIHE	Faroese Home Government, Torshavn

EUROPEAN UNION

MR OLE TOUGAARD	European Commission, Brussels
MR FRIEDRICH WIELAND	European Commission, Brussels
MR ANDREW THOMSON	European Commission, Brussels
MR RICHARD BATES	European Commission, Brussels
MR DAVID DUNKLEY	Scottish Office Agriculture, Environment and Fisheries Department, Edinburgh
MR PETER FUNEGARD	National Board of Fisheries, Gothenburg
MR IVOR LLEWELYN	Ministry of Agriculture, Fisheries and Food, London
MR EERO NIEMELA	Finnish Game and Fisheries Research Institute, Utsjoki

MR PEKKA NISKANEN	Ministry of Agriculture and Forestry, Helsinki
DR NIALL O'MAOILEIDIGH	Fisheries Research Centre, Dublin
MR TED POTTER	Centre for Environment, Fisheries & Aquaculture Science, Lowestoft
MR JOSE SANCHEZ-PRADO	Universidad de Oviedo, Oviedo
MR GUNTHER SCHOGL	Bundesministerium für Land- und Forstwirtshaft, Vienna
MR JOSE SERRANO	Secretaria General de Pesca Maritima, Madrid
MR GEORGE THOMSON	Scottish Office Agriculture, Environment and Fisheries Department, Edinburgh

ICELAND

MR ARNI ISAKSSON	Directorate of Freshwater Fisheries, Reykjavik

NORWAY

MR STEINAR HERMANSEN	Ministry of the Environment, Oslo
MS EVA ESPELAND	Ministry of the Environment, Oslo
MR KJETIL HAMNES	Royal Ministry of Agriculture, Oslo
MR ARNE SIVERTSEN	Directorate for Nature Management, Trondheim
MS ANNE-MARIE VOLL	Ministry of Fisheries, Oslo

RUSSIAN FEDERATION

MR VLADIMIR MOSKALENKO	PINRO, Murmansk
MS ELENA SAMOILOVA	PINRO, Murmansk
DR ALEXANDER ZUBCHENKO	PINRO, Murmansk

USA

MS MARY COLLIGAN	National Marine Fisheries Service, Gloucester, Massachusetts

MR CHRIS MANTZARIS	National Marine Fisheries Service, Gloucester, Massachusetts
DR JEAN-PIERRE PLÉ	Department of State, Office of Marine Conservation, Washington DC

SECRETARIAT

DR MALCOLM WINDSOR	Secretary
DR PETER HUTCHINSON	Assistant Secretary

Appendix 2

IOR(97)7

Meeting of the Working Group on Implementation of the Oslo Resolution 26-27 January 1998, DG-XIV of the European Commission, Brussels, Belgium

A G E N D A

1. Opening of the meeting

2. Adoption of the agenda

3. Appointment of a Rapporteur

4. Consideration of the Terms of Reference
   "To consider further the implementation of the Oslo Resolution in the light of the information arising from the ICES/NASCO Symposium".

5. Implementation of the Oslo Resolution

   (a) Article 2 - Measures to minimise genetic and other biological interactions

   (b) Article 3 - Measures to minimise the risk of transmission of diseases and parasites to the wild stocks of salmon

   (c) Article 4 - Research and development

   (d) Article 5 - Exchange of information

   (e) Measures in Annexes

6. Summary of the Convenors' Report of the ICES/NASCO Symposium

7. Review of the need for revisions to the Oslo Resolution in the light of the findings at the ICES/NASCO Symposium

8. Any other business

9. Consideration of a draft report of the meeting

10. Close of the meeting

Appendix 3

IOR(97)2

Measures Contained in the Oslo Resolution and Actions Taken by the Parties to Implement the Measures

1. The Resolution by the Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean to Minimise Impacts from Salmon Aquaculture on the Wild Salmon Stocks (hereafter referred to as the "Oslo Resolution") was unanimously adopted by the Council in 1994. Under Article 5 of the Resolution, the Parties shall provide to the Organization, on an annual basis, information of a scope to be determined by the Council concerning the measures adopted under Article 2 (Measures to minimise genetic and other biological interactions) and Article 3 (Measures to minimise the risk of transmission of diseases and parasites to the wild stocks of salmon) and the research and development carried out under Article 4 of the Resolution. In 1995, the Council agreed a format for the provision of this information.

2. The Parties agreed that the situation with regard to implementation of the recommendations contained in the Resolution would be re-examined at its Fifteenth Annual Meeting in 1998 with a view to considering whether additional measures may be desirable. In 1997, the Council recognised that if there was to be full implementation of the Oslo Resolution by 1998 further measures would be needed and agreed to hold a meeting to consider the implementation of the Oslo Resolution in the light of the information arising from the ICES/NASCO Symposium.

3. The first annual returns for 1995 were requested from the Parties in 1996 and, to date, returns covering the calendar years 1995 and 1996 have been provided. These returns were reviewed at the Annual Meetings of the Council in 1996 and 1997 respectively. The measures taken to date by the Parties are presented in Annex 1. In Annex 2 we have tabulated the measures contained in the Oslo Resolution.

4. From the information presented in these Annexes it appears that some Parties have taken no measures as yet. For many of the measures detailed in the Oslo Resolution no action has been taken by any Party. There may be a number of reasons for this apparent lack of progress in implementing the Oslo Resolution:

i) Some Parties may not be involved in salmon aquaculture and the provisions of the Oslo Resolution would not, therefore, apply. However, salmon aquaculture as defined in the Resolution includes salmon farming, salmon ranching and salmon enhancement and all Parties are involved to some extent in these activities. Information provided by ICES indicates that salmon farming is conducted in Canada, Denmark (Faroe Islands), the EU (N. Ireland, Ireland, Scotland), Iceland, Norway and the USA. There was a limited amount of production of farmed salmon in Russia in 1990 (5 tonnes) but there has been none since then. Salmon ranching is conducted principally in Iceland but also occurs in the EU (Ireland, N. Ireland and Sweden) and in Norway. ICES do not provide details of Parties conducting enhancement programmes but it is thought that this activity occurs to some extent in all countries

where there are salmon rivers. The scope of the annual returns would, however, be expected to vary considerably depending on each Party's involvement in the different forms of aquaculture. Most of the measures contained in the Resolution apply only to salmon farming and six of the seven Parties to the Convention have salmon farming industries.

ii) The provisions of the Resolution may have been implemented fully or in part by a Party prior to its adoption by the Council and no returns have therefore been made on these measures. However, the wording of the format for the return of information does not refer only to "new" information and some Parties have referred to both new and existing measures in their returns.

iii) The information included in the returns by the Parties might be incomplete because information is not fully available at the time the return is completed. However, it is possible to draw the attention of the Council to additional measures and this occurred during the Fourteenth Annual Meeting when updated and new information was provided by some Parties.

(iv) The Parties may be experiencing genuine difficulties in introducing the measures contained in the Oslo Resolution. This may be particularly marked in the case of measures concerning salmon farming which is now a large industry in some countries.

5. In summary, there are many measures in the Resolution which have not been implemented by the Parties. Some Parties have failed to implement any measures. Few measures designed to protect against genetic impacts have been implemented although there are some developments in this regard. There has, for example, been little progress on implementing measures to require significant changes in farming practice so as to eliminate escapes. There has been some progress on disease and parasite control through use of fallowing, single bay management, vaccination and disease treatments. However, much will have to be done if the Resolution is to be fully implemented by 1998 as the Council intended. While full implementation of the Resolution would represent real progress towards safeguarding the wild stocks, and this should be a high priority, the latest scientific findings presented at the Bath Symposium (see IOR(97)3) suggest that there is a need for measures stronger than those contained in the Oslo Resolution if the Council wishes to be confident that the wild stocks will be protected. Possible additional measures which the Working Group may wish to consider, with a view to recommending to the Council a strengthening of the measures in the Oslo Resolution, are contained in document IOR(97)4.

Returns Made By The Parties Under Article 5 Of The Oslo Resolution In 1996 And 1997 And Covering Measures Implemented In 1995 And 1996

Article 2: Measures to minimise genetic and other biological interactions

Canada

1996 Return: No new measures have been taken. As before, only sterile (triploid) rainbow trout may be used for commercial aquaculture in New Brunswick and Newfoundland. Also, under NASCO guidelines, no Atlantic salmon stocks can be imported to Atlantic Canada from continental Europe and Iceland, and aquaculture operators are encouraged to use only local stocks in their operations.

1997 Return: The Department of Fisheries and Oceans (DFO) is working with industry and provincial governments to develop a Code of Practice for the containment of Atlantic salmon in sea-cage culture in the Atlantic Provinces. DFO is nearing completion of a national policy to minimize potential impacts of research with, and culture of, transgenic fish.

Denmark (in respect of the Faroe Islands and Greenland)

No measures have been taken.

European Union

Finland

No measures have been taken.

Ireland

1996 Return: Restrictions are in place regarding:

a) stocks and stock origin for enhancement/restocking/ranching programmes;
b) numbers of wild fish which may be taken for enhancement.

1997 Return: Aquaculture operators are obliged to ensure that escapees are not present in these operations.

Sweden

1996 Return: Under Swedish regulations there are restrictions concerning introductions and transfers.

United Kingdom

1996 and 1997 Returns: The problems associated with escapes of farmed fish have been the subject of much scientific interest and investigation in recent years and scientists from The Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD) are well to the forefront of such work. No final conclusions have been reached on the long-term impact of such escapes on wild salmon populations but it is clear that escapes of fish should be prevented wherever possible and monitored where accidents occur. Against that background SOAEFD have been looking at the possibility of developing a code of practice on fish farm escapes which would be agreed with the fish farming industry and representatives of wild salmon interests.

Iceland

No measures have been taken.

Norway

1996 Return: A new report to the Government concerning Norwegian Aquaculture Politics and Policy has been put forward (Report to the Storting no. 48 1994-95). As a result of this report a further working group, the third one in the last eight years, has been set up with the purpose of formulating a new proposal regarding certification of technical equipment used in fish farming.

1997 Return: A new proposal has been put forward to the Ministry of Fisheries regarding certification of technical equipment used in fish farming.

Russia

No measures have been taken.

USA

1996 Return: On-going river-specific stocking programmes. The Governor of the State of Maine established an Atlantic Salmon Task Force in October 1995. The Task Force is preparing a "Conservation Plan" which will address genetics, aquaculture, diseases, etc. A report is expected in July 1996.

1997 Return: An Aquaculture Work Group was formed to address the potential impact of Atlantic salmon aquaculture to wild salmon populations in the State of Maine. As a result of those discussions, the Maine aquaculture industry is developing and has agreed to adopt a Fish Culture Code of Practice for the culture of salmon in freshwater and at sea cage sites. Experimentation with triploids is on-going. Also, there is a proposal to place weirs on four Atlantic salmon rivers to aid in research and management and to cull out aquaculture escapes.

Article 3 : Measures to minimise the risk of transmission of diseases and parasites to the wild stocks of salmon

Canada

1996 Return: In the Bay of Fundy, a serious outbreak of sea lice *Lepeophtheirus salmonis* occurred. Emergency release authorizations, under veterinary supervision, were carried out with H_2O_2 treatment, pyrethrin, and azamethiphos. Cypermethrin was authorized in Maine, USA. The illegal use of Cypermethrin in Canada resulted in enforcement actions. Infectious diseases are addressed by immunization procedures at hatcheries with screening for BKD and Furunculosis. Importation of salmonid eggs and fish, and inter-provincial transfers are controlled under the Fish Health Protection Regulations.

1997 Return: DFO is amending the Fish Health Protection Regulations (FHPR) to provide more flexibility to approve transfers of salmonid eggs and fish. These amendments do not increase the risk of introducing exotic diseases and spreading indigenous diseases to new areas. DFO is developing a Quality Assurance/Quality Control program for Laboratories conducting disease diagnostic tests under the FHPR.

Denmark (in respect of the Faroe Islands and Greenland)

No measures have been taken.

European Union

Finland

1996 Return: No new regulations, decisions or laws. Earlier decisions of the Ministry of Agriculture and Forestry concerning transfers of fish are still valid. Information about *Gyrodactylus salaris* has increased.

1997 Return: Voluntary disinfection in organized disinfection stations for all fishermen.

Ireland

1996 Return: Single bay management in most bays with aquaculture installations and fallowing in most aquaculture sites.

1997 Return: All stocks must be certified disease-free before transfer to marine cages. Use of vaccine and treatments greatly reduces the incidence of diseases.

Sweden

1996 Return: Under Swedish regulations there are restrictions concerning introductions and transfers.

United Kingdom

1996 and 1997 Returns: The Diseases of Fish Act 1937, amended by the Diseases of Fish Act 1983, requires the notification of any suspicion of the presence of a notifiable disease to the relevant Minister. The Act provides powers for those appointed as Inspectors under this Act to take samples of any fish, eggs of fish or foodstuffs of fish for testing purposes. Where the presence of disease is suspected or confirmed, all movements of live fish and eggs of fish may be controlled.

The Registration of Fish Farming and Shellfish Farming Business Order 1985 made under the Disease of Fish Act 1983 requires anyone who carries on a business of fish farming to register the business with Fisheries Departments and to keep stocking and movement records.

The Fish Health Regulations 1992 as amended implement Council Directive 91/67/EEC and Decisions made under it and control the movement into Great Britain from elsewhere in the EU of all live fish, their eggs and gametes; and certain dead fish. Directive 91/67 also makes provision for Member States to forward programmes for approval to the Commission to prevent the introduction or spread of certain diseases including IPN, BKD, SVC, Gyrodactylosis and Furunculosis as set out at List III of Annex A of 91/67. Great Britain is seeking controls in respect of IPN, BKD, Gyrodactylosis caused by *Gyrodactylus salaris* and Furunculosis in salmon.

The Diseases of Fish (Control) Regulations 1994 implement the disease control measures which are required on a EU-wide basis where suspicion and/or confirmation of the List I disease ISA, and the List II diseases IHN and VHS occurs. Should a List I or a List II disease be confirmed in Great Britain, the measures in these Regulations would come into effect (as witnessed during the outbreak of VHS on Gigha in 1994).

Iceland

1996 Return: Annual reviews of applications are conducted by the Fish Disease Committee. Concerns regarding further spread of Furunculosis.

Norway

1996 Return: One river, the Skibotn river, was treated with rotenone in 1995. A proposal for a new fish disease act is under consideration. This proposal contains stricter regulations in general and allows for the regionalisation of the Norwegian fish farming industry.

1997 Return: A proposal for a new fish disease act is still under consideration. This proposal contains stricter regulations in general and allows for the regionalisation of the Norwegian fish farming industry.

Russia

No measures have been taken.

USA

1996 Return: On-going river-specific stocking programmes. The Governor of the State of Maine established an Atlantic Salmon Task Force in October 1995. The Task Force is

preparing a "Conservation Plan" which will address genetics, aquaculture, diseases, etc. A report is expected in July 1996.

1997 Return: An emergency disease eradication program is being developed to outline steps to be taken in the event of detection of exotic fish pathogens in public or private rearing facilities. There is a commitment to expand the ongoing epidemiological monitoring program in the State of Maine to determine the type, incidence and geographic distribution of salmonid pathogens in Maine. In addition, the industry's husbandry practices are being documented, evaluated, and compiled into a Fish Health Code of Practice by veterinarians at the University of Maine and the Maine Aquaculture Association.

Article 4: Research, small-scale testing and full-scale implementation carried out in support of the Resolution

Canada

1996 Return: A monitoring of all sea lice treatments in the Bay of Fundy (Canada) and an assessment of residuals in non-target species (e.g. scallop, lobster, etc.) was carried out. Research is underway on migration and behaviour of escapees in a nearby river (Magaguadavic River, NB) in the midst of the New Brunswick aquaculture industry. A study on using sterile Atlantic salmon in aquaculture has also been conducted.

1997 Return: DFO has conducted collaborative research with the Atlantic Salmon Federation and other institutions on the impact of salmon cages on migration of salmon smolts in the Bay of Fundy, and the effect of sea lice treatments on non-target organisms. Work continues in DFO, the private sector and universities, to develop and evaluate sea cage performance of triploid Atlantic salmon. DFO is conducting research to develop an all-female line of Atlantic salmon which, when combined with techniques to render them non-reproductive, will minimize the chances of genetic interaction should escapes occur.

Denmark (in respect of the Faroe Islands and Greenland)

No measures have been taken.

European Union

Finland

1996 Return: Normal biological research on smolt production, catch composition and the amount and share of escapees.

Ireland

1996 Return: Research ongoing:

Fisheries Research Centre - Marine Institute: Exploitation and Survival of Wild Stocks. Adult Stock Census.
Central Fisheries Board: Instream/Physical Rehabilitation/Restocking.

Electricity Supply Board: Restocking and Fish Passage.
Salmon Research Agency: Genetics and Restocking.

1997 Return: The following research projects are being conducted:

An assessment of the genetic consequences of deliberate and inadvertent introduction of non-native Atlantic salmon into natural populations (EU Project No. AIR CT 92 0719).

Hybridisation between escaped farmed Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*): frequency, distribution, behavioural mechanisms and effects on fitness (EU Project No. AIR3 CT94 2484).

Minimising the interaction of cultured and wild fish: comprehensive evaluation of the use of sterile triploid Atlantic salmon (EU Project No. AIR CT94 2216).

Sweden

No measures have been taken.

United Kingdom

No measures have been taken other than those referred to in Article 2 above.

Iceland

No measures have been taken.

Norway

1996 Return: New cage technology, the "Wild-catch system", designed to withstand hurricanes and winter storms, is being tested. Research on the ecological effects of escaped triploid fish has commenced as part of an EU-funded project.

1997 Return: Research on the ecological effects of escaped triploid fish has commenced as part of an EU-funded project. Research on methods of tagging and the cost of tagging is in progress.

Russia

No measures have been taken.

USA

1996 Return: The river-specific stocking program represents a full-scale implementation.

1997 Return: Currently there is research on raising Penobscot strain triploids.

List Of Measures Contained In The Annex To The Oslo Resolution

GENERAL MEASURES
Sites:
Sites only to be assigned for aquaculture where hydrographical and biological standards can be met
Siting of units to avoid risk of damage by collision
Adequate marking of aquaculture units
Operations:
Management of aquaculture units to prevent and control diseases and parasites
Management of aquaculture units to prevent escape of fish
Transfers:
Transfers conducted so as to minimise potential for disease/parasite transmission and for genetic and other biological interactions
Introduction of mechanisms to control transfers
MEASURES TO MINIMISE GENETIC AND OTHER BIOLOGICAL INTERACTIONS
Establishment of standards and technical specifications for the design and deployment of aquaculture units
Optimisation of containment of fish through use of appropriate technology for prevailing conditions
Regular routine inspection and maintenance of aquaculture units and upgrading of equipment as new technological improvements become available
Regular monitoring and use of efficient security systems
Salmon enhancement:
Use of local stocks wherever possible
Implementation of criteria for broodstock selection and management
Salmon ranching:
Use of local stocks or alternatively local ranching stocks
Harvesting of ranched fish close to release site and in a way that prevents overharvesting of wild stocks
Salmon farming:
Use of local broodstocks where practicable
Efforts to recapture escaped farmed salmon
Establishment of site specific contingency plan in the event of large escapes

MEASURES TO MINIMISE DISEASE AND PARASITE INTERACTIONS
Aquaculture production process conducted in accordance with appropriate fish health protection and veterinary controls
Application of appropriate husbandry techniques to minimise risk of diseases (vaccination, use of optimum stocking density, careful handling, proper diet, avoidance of unnecessary disturbance, disinfection of transportation equipment and use of disinfection baths at production facilities)
Treatment or removal of diseased stock
Measures to ensure diseased fish not released to the wild
Stocking density should not exceed levels based on good husbandry practices
Removal of dead/dying fish and disposal in an approved manner
Establishment of procedures for effective removal and disposal of infectious material
Establishment of contingency plans for disposal of mortalities from emergency situations
Separation of aquaculture facilities on basis of assessment of local conditions
Rearing of different generations in separate locations wherever possible
Use of fallowing wherever possible
Careful use of medicines and disinfectants in accordance with manufacturers' instructions, Codes of Practice and in compliance with regulatory authorities
Lists of prevailing infections, diseases and parasites and method for control to be maintained by appropriate authorities
RESEARCH AND DEVELOPMENT
Research, small-scale testing and full-scale implementation of:
Wild salmon protection areas
Sterile salmon
Tagging and marking
Designation of aquaculture regions
Alternative production methods (land-based, closed or contained floating facilities and other containment technologies)
Use of local broodstocks
Understanding of genetic introductions
Prevention and control of diseases and parasites

Appendix 4

IOR(97)6

Additional Actions taken by the Parties to Implement the Oslo Resolution

In addition to the measures submitted in the returns by the Parties under the Oslo Resolution detailed in document IOR(97)2, the following measures were reported to the Council at its Fourteenth Annual Meeting.

Canada

A draft Code of Practice for containment of Atlantic salmon in sea cages has been prepared and will be part of detailed consultations with the aquaculture industry and other interested parties over the coming year.

European Union

On 18 July 1996 the European Commission adopted a decision on protective measures with regard to *Gyrodactylus salaris* in salmonids. Under this decision the introduction of live salmonids into Great Britain, Northern Ireland, the Isle of Man, Ireland and Guernsey is prohibited from outside these regions. Furthermore, introduction of salmonid eggs from outside these regions is subject to disinfection procedures to ensure the elimination of *Gyrodactylus salaris*.

Norway

A new Fish Disease Act has completed its passage through the Norwegian Parliament and will *inter alia* allow for the establishment of epidemiological zones and regions. The Norwegian authorities intend to conduct a sea fishery during the period 1 October - 1 March when wild salmon are not present in coastal waters, in an attempt to capture escaped farmed salmon.

Appendix 5

IOR(97)3

Summary of the Convenors' Report of the ICES/NASCO Symposium on "Interactions Between Salmon Culture and Wild Stocks of Atlantic Salmon: The Scientific and Management Issues"

Overview

1. The Council of NASCO first reviewed the question of interactions between salmon aquaculture and the wild stocks in 1988. Since then there has been mounting concern that interactions between wild and cultured salmon might prove deleterious to the wild stocks, leading to changes in their genetic composition, the introduction of diseases and parasites and additional effects with negative ecological consequences. In these circumstances ICES and NASCO agreed to hold an international symposium in April 1997 at Bath, UK so as to evaluate the state of current knowledge of these interactions and to consider the implications for management and for future research. The Convenors of the meeting were Lars Petter Hansen (NINA, Norway), Malcolm Windsor (NASCO) and Alan Youngson (Scottish Office Agriculture, Environment and Fisheries Department, Scotland). A report of the meeting has been prepared by the Convenors, and will be published in January 1998 by NINA (Norwegian Institute for Nature Research). Attached is a summary of this report. It first outlines the nature of the problems which relate to ecological and behavioural, genetic, and parasite and disease interactions. It then identifies possible management actions, provides recommendations for research and finally draws conclusions.

2. Our knowledge has increased considerably since the Loen, Norway, meeting on the same subject in 1990. Information presented at the ICES/NASCO Symposium suggests that interactions between cultured and wild salmon may pose a more serious threat to the wild stocks than previously believed. The risks are most serious from salmon farming because the fish are genetically selected, because they are so numerous and because they do not form part of any plan for which a risk assessment has been carried out. The Convenors state that the most effective measure that can be introduced in the short-term is the use only of sterile salmon in farming. In the longer term, farming technology must be improved so that containment is virtually 100%. They state that there is an urgency about the need for action and a precautionary approach should apply. Such an approach will require changes not only to the way salmon aquaculture is managed but also to wild stock management. Where salmon farming is required to adopt new protocols for management these should apply equally to all areas where there are risks of damaging wild salmon stocks or other species so that this international industry rests on as even a basis as possible. The possible measures that might be considered in the light of the conclusions arising from the ICES/NASCO Symposium are reviewed in document IOR(97)4.

1. The Problems

1.1 Introduction

During the Symposium many participants expressed concern about the potential impacts of accidentally or intentionally released fish on wild salmon populations. Concern extended to ranching and enhancement activities as well as to salmon farming. Salmon escape from fish farms in all the areas where fish farming is carried out and the incidence of farmed salmon in fisheries and spawning populations is highest where farming activity is most intense. Sea ranching using stocks based on non-native fish or using releases from small rivers or coastal locations is essentially equivalent to mass escapes of smolts from fish farms. Managed inappropriately, salmon ranching is also, therefore, a potential threat to wild salmon populations. The validity of stocking young salmon for enhancement purposes has also been questioned, particularly where this has been carried out using non-indigenous fish or the progeny of salmon of uncertain origin.

There is a substantial risk that profound and perhaps irreversible genetic change will occur in wild salmon populations repeatedly exposed to intrusions of large numbers of genetically selected fish or fish native to other locations. Furthermore, the progeny of escaped reared salmon that have been selected for high growth rate may grow more quickly as parr in natural streams, displacing slower growing wild fish with which they are in competition. This superior performance appears not to be maintained throughout life, however, and as a result the overall abundance of adults later returning to affected streams, and especially the abundance of native fish, will be reduced. Currently, transgenic fish are not used in commercial aquaculture but their presence among wild fish would compound all these risks. Disease and parasite interactions between wild and farmed fish are not sufficiently understood but fish farms increase the overall abundance of pathogens in the environment and the epidemiology of the infections involved. There is a complete lack of the use of the precautionary approach in the whole complex of interactions between cultured and wild salmon in that interactions are being permitted to occur without knowledge of their impacts.

1.2 Ecological and behavioural interactions

One of the most serious problems is continuous straying of farmed and ranched salmon into rivers from which they do not originate. The strays will interact with the wild fish on the spawning grounds and will produce offspring. Ranched fish seem to have lower reproductive success in competition with wild salmon and escaped farmed salmon may have even less success. This is most pronounced in males. Reproductive success seems to increase with the time that cultured fish have spent in the wild. Even when cultured females lose out in spawning competition with wild females, they may spawn later and superimpose their redds on those of wild females.

Massive releases or escapement of reared fish will increase the number of salmon available for harvest in all fisheries. When caught in the sea, reared salmon will be exploited side by side with wild salmon. If the fishing effort in such mixed stock fisheries is increased, as a result of higher abundance of fish, wild stocks may suffer from unintended over-exploitation.

1.3 Genetic interactions

The weight of evidence suggests that salmon are genetically adapted to their own local environment. Genetic distinctions among populations are maintained through the strong homing instinct of salmon. The potential consequence of strays from salmon farms or ranching activities entering rivers to spawn, or from indiscriminate stocking, is that the genetic constitution of the population will change. The fitness of the offspring may be reduced. If significant interbreeding occurs over many years irreversible genetic changes may take place. In a review of the literature on genetic impacts of cultured fish on natural fish populations, it was concluded that when genetic impacts on performance traits have been documented, they are always negative in comparison with unaffected native populations.

1.4 Parasites and diseases

Contagious diseases are one of the largest and most serious problems in the fish farming industry. Although diseases also occur in wild fish, they can usually be regarded as a phenomenon, rather than a problem, and they existed long before the commencement of fish farming. Releases of hatchery smolts or escapement of salmon from fish farms are potential ways of spreading infectious diseases and parasites that are harmful to wild stocks. Movement of fish between localities increases the risk, in particular when the movements are over large distances to river systems isolated from the area where the pathogens and fish evolved and became co-adapted. Examples of the spread of infectious diseases/parasites are the introduction of furunculosis from Scotland to Norway and the introduction of the parasitic fluke *Gyrodactylus salaris* from the Baltic Sea to several countries in the North-East Atlantic. Although there is no scientific evidence of adverse effects of salmon lice on wild Atlantic salmon, results from research with sea trout suggests that they cannot be ruled out.

2. Possible Management Actions

2.1 Responsibilities

There are management actions that will need to be taken by the salmon aquaculture industry, or those who regulate it, and there are actions needed by those managing the wild populations, or those who regulate them. Inevitably, given the subject matter, the report deals essentially with the former aspects. The practical issue is how salmon aquaculture can be managed so as to remove negative impacts on wild populations.

At the same time those concerned with managing and regulating the exploitation of wild salmon have a heavy responsibility to ensure that those stocks are in a strong condition so that they can withstand impacts from aquaculture, among others. Virtually all countries with wild salmon interests have adopted increasingly tough measures to regulate catches, restrict or close netting, reduce interception, reduce pollution, adopt catch and release policies in recreational fisheries where appropriate and improve access to spawning areas. In spite of all these measures the abundance of wild salmon stocks has continued to decline to levels that are lower than at any time since reliable statistics were available. There are many reasons for this decline, some of which are not understood.

The responsibilities to conserve wild salmon by those who manage them are in no way lessened by the conclusions the Convenors draw below about changes to the way that salmon aquaculture is conducted. Aquaculture is an additional effect posing serious risks and where the only solution lies in changes in that industry. How that burden should be shared is a political decision.

Some actions can only be taken by the industry. Most of the changes being sought are in the interests of the aquaculture industry itself. For example, farmed salmon producers do not wish their fish to escape. There are some aspects, such as the sterilisation of those farmed salmon that are put into sea cages, that will cause concern to the aquaculture industry but there are also possible benefits. For both salmon ranching and enhancement too, best codes of practice should be developed and agreed internationally.

2.2 New strategies for enhancement, ranching and farming

The elimination of all stocking, ranching and farming of salmon in the sea would solve the problems caused by interactions between cultured and wild salmon. This is, of course, unrealistic and the solution lies in changes in the practice of salmon aquaculture.

Enhancement

Stocking of young salmon for enhancement requires (i) knowledge about the salmon stock to be enhanced, (ii) knowledge about the effects of salmon culture and (iii) knowledge about the environment in which the fish are to be stocked. Because the fish are expected to participate in the reproduction of the population it is important that they are of local origin. However, in some cases the environment may have changed so considerably that local fish are no longer best adapted to the local environment. In other cases, local source stock may not be available. In such cases, assessments of stocking programmes are required, to design, adjust or terminate programmes, as appropriate. When possible, alternative means to stocking should be considered such as habitat improvement and better management of fisheries.

Ranching

Salmon ranching requires (i) a smolt production strategy, (ii) a release strategy and (iii) a harvesting strategy. These strategies should ensure that there is maximum survival, return and harvest; and that ranched salmon do not interfere with natural salmon stocks. In order to obtain the highest possible harvest as well as minimizing straying to other rivers, arrangements should be in place to ensure that all returns of ranched fish are harvested. Moreover, ranched salmon should be harvested separately from wild fish, as increased fishing effort in mixed stock fisheries will increase the level of exploitation on wild salmon.

Farming

Salmon farming aims to produce a quality product efficiently at a profit. This requires that diseases must not occur or must be kept under strict control, and that fish do not escape. We conclude that there is most to gain by improving the cage technology so that it is virtually impossible for farmed salmon to escape. This will

take care of problems with genetic and ecological interactions, but there will still be effluent released from salmon farms into the environment. However, such improvements may take a long time and will be very costly. Probably the action that would be possible to implement most quickly would be to use only sterile salmon in sea cages. The technology to produce sterile salmon exists, but a code of practice at an industrial level needs to be developed.

In summary, there are a number of management options which will help the wild stocks (not in order of importance):

1. Move rapidly towards 100% cage security through engineering and design.

2. Develop management schemes for salmon farms that will ensure virtually 100% containment.

3. Use only sterile salmon in marine culture.

4. Keep wild populations strong.

5. Develop salmon strains that cannot inter-breed with wild stocks.

6. Use only local stocks in enhancement, ranching and farming.

7. Make greater use of zones free of salmon culture so as to protect wild stocks.

8. Develop effective methods to remove all reared fish where there are escapes from farming and strays from ranching.

9. Use gene banks to provide some insurance against loss of genetic variation (but they are costly and cannot be a long term solution).

10. Develop better therapeutants.

11. Control fish movements, introductions and transfers.

12. Ensure high standards of management in salmon aquaculture facilities.

The importance of offering more options to salmon farmers about how they can best operate profitably in a sustainable way which will not adversely affect wild stocks was also recognised.

3. Research Recommendations

It is evident from the presentations made at the meeting that the level of understanding of the impacts of fish of reared origin on wild populations of salmon has increased since the last meeting on the same subject was held in Loen in 1990. This advance has been achieved by a series of individual or parallel studies carried out in many countries and supported both by national funding and by internationally collaborative exercises.

It is also evident, however, that much more remains to be achieved. Some areas of interest remain contentious because insufficient information was available to support a single agreed interpretation of its significance. A potentially damaging consequence of this will be to prevent or delay joint action by aquaculture and wild fisheries management where the need for action or a plan of action cannot be agreed. These difficulties remain to be resolved. It is expected that some of these impasses may be eased in the aftermath of the meeting when the various parties have had more time to assess and assimilate the information presented. However, other areas were identified during the meeting where key information is still lacking or where additional follow-up study is required. These are detailed in the Convenors' Report but include: investigation of local adaptation and differential fitness among different populations; confirmation that reduced population viability is a consequence of competitive displacement of wild fish by cultured fish; monitoring of dying or dead fish in specialist diagnostic laboratories; experimentation to test hypotheses on possible relationships between salmon farming and parasite infestation levels in wild salmonids; formal risk analysis with respect to the use of triploid salmon in aquaculture; continued study of genetic populations of wild salmon; experimental study of the risks to wild populations from genetically modified organisms; engineering and design research aimed at improving containment of farmed salmon; monitoring of the frequency of occurrence of straying cultured fish.

4. Final Conclusions

The data presented at the Symposium showed that we have gained significant knowledge over the past few years. This information from the Atlantic and from the Baltic suggests that interactions between cultured and wild salmon may pose a more serious genetic and displacement threat to wild salmon than we previously believed. The threat is particularly serious in the North-East Atlantic because of the very large amounts of farmed fish present in spawning populations in some rivers, and in the Baltic because of the large number of ranched fish present in fisheries and rivers. Through the development of effective vaccines, the fish farming industry has significantly reduced the problems with some of the serious diseases. There remain serious risks, however, of the transmission of parasites and fish culture can still act as a vector for the spread of diseases.

The Convenors believe that it is urgent that interactions between cultured and wild salmon are eliminated or, at the least, very greatly reduced. The risks from salmon farming are most serious because the fish are genetically selected, they are so numerous and because they do not form part of any plan for which a risk assessment has been carried out. Provided that it does not cause any other negative impact on the wild salmon, the most effective measure that can be introduced in the short term is the use only of sterile fish in salmon farming cages. In the longer term farming technology must be improved so that virtually no fish can escape. It has to be recognised that salmon farming is an internationally competitive industry. Therefore it is important that if and when salmon farming is required to adopt new protocols, they should apply equally to all areas where there are risks of damaging wild salmon stocks or other species so that international salmon farming rests on as even a basis as possible.

In view of the nature of the risks to wild salmon that appear to be posed by interactions with cultured salmon, there is urgency about the need for action. Even in

the absence of more definitive information than that available, the precautionary approach should apply. Such an approach will require changes not only to the way that salmon aquaculture is managed but also to wild stock management. There are challenges for all those who manage salmon, whether they be wild or cultured stocks. If no precautionary action is taken and if the views of many authoritative scientists prove to be well-founded, the demise of the wild salmon in their present diverse forms may not be far behind.

ANNEX 20

Council

CNL(98)28

Returns made in accordance with the Oslo Resolution

CNL(98)28

Returns made in accordance with the Oslo Resolution

1. The Resolution by the Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean to Minimise Impacts from Salmon Aquaculture on the Wild Salmon Stocks, (the 'Oslo Resolution') was adopted by the Council in 1994. At that time it was agreed that the subject of the impacts of aquaculture on the wild stocks would be reviewed annually and that the situation with regard to the implementation of the recommendations contained in the Oslo Resolution would be re-examined at the Fifteenth Annual Meeting in 1998 with a view to considering whether additional measures may be desirable. Under Article 5 of the Resolution each Party is required to provide to the Organization, on an annual basis, information of a scope to be determined by the Council, concerning measures adopted under Article 2 (measures to minimise genetic and other biological interactions), Article 3 (measures to minimise the risk of transmission of diseases and parasites to the wild stocks of salmon) and on research and development (Article 4).

2. Last year the Council recognised that, if there was to be full implementation of the Oslo Resolution by 1998, as had been the intention, further measures would be needed. The Council agreed to convene a Working Group to consider the implementation of the Oslo Resolution in the light of the information arising from the ICES/NASCO Symposium on "Interactions between Salmon Culture and Wild Stocks of Atlantic Salmon: The Scientific and Management Issues". The report of this Working Group meeting, which was held in Brussels on 26 and 27 January 1998, is contained in Council document CNL(98)27.

3. This Working Group felt that the reports to NASCO by the Parties were incomplete and did not fully reflect the measures in place. In its recommendations the Working Group proposed that the Parties should "provide comprehensive information to the Council in advance of the Annual Meeting and, if possible, by 1 May 1998, concerning the measures in force". It was further agreed that "this information should be based on the list of measures contained in Appendix 2 of document IOR(97)2 and a similar format should be used for subsequent annual returns". In accordance with this recommendation I wrote to the Parties on 4 March 1998 asking that the annual return under the Oslo Resolution be made according to the new format. All Parties have completed a return and most Parties have responded according to the new format. The returns are presented in Appendix 1.

4. It was the Working Group's intention that, by adopting a new format for the returns, the Council would have available to it comprehensive information concerning the measures in force when deciding if additional measures to those contained in the Oslo Resolution may be necessary.

Secretary
Edinburgh
18 May 1998

Part 1. General Measures

1.1 Sites

1.1.1 Sites only to be assigned for aquaculture where hydrographical, epidemiological, biological and ecological standards can be met

Canada: Federal siting guidelines exist and are used; existing guidelines are being upgraded in New Brunswick (Bay of Fundy Site Allocation and Administrative Policy is a wide-ranging policy which is expected to be fully implemented in 2002).

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Local authorities approve special zones (sites) assigned for aquaculture in accordance with certain criteria which ensure that hydrographical, environmental and other standards can be met. There is no commercial salmon aquaculture in Denmark at the moment.

England and Wales: There is only one saltwater cage site in England and Wales; freshwater sites have abstraction and discharge controls.

Finland: No measures reported.

Ireland: All aquaculture applications must be accompanied by extensive Environmental Impact Statements.

Northern Ireland: Pre-licensing consultation.

Scotland: The location of sites is controlled by licensing procedures which are the responsibility of the Crown Estate Commissioners (marine farms) and local authorities (freshwater). In addition, farmers are required to apply to the Scottish Environment Protection Agency (SEPA) for a consent to discharge. Conditions designed to minimise adverse environmental effects may be imposed on a consent and SEPA will monitor any consents given.

Sweden: In Sweden three main types of geographical areas are recognised; inland, river mouth, and coastal areas. The migration limit for salmonid fish is regarded as the border between inland areas and river mouths and coastal areas. There are about 25 river mouth areas where permission to conduct fish farming has been granted. There are no specific sites assigned only for aquaculture but the responsible county administrations and local municipalities develop various regional and local plans for the use of all water areas which usually indicates suitable and unsuitable areas for aquaculture. These plans are used when deciding if permission can be given for a fish farm by the county administration. The final decision on siting is made after considerations according to the present national environmental and fisheries legislation.

Iceland: Only one major cage facility in Iceland located on a brackish water lagoon, high quality water exchange.

Norway: Norwegian legislation regulates all relevant elements under this article, and - as a general rule - the assigned sites meet the regulations. Before being used, all sites must have specific permits under the Aquaculture Act, the Fish Disease Act, and the Pollution Act.

Russian Federation: No measures reported.

USA: State permit requires a baseline field survey which includes dive surveys and video recordings, hydrography, water quality, benthic analyses, sediment analyses, and macro-faunal communities. The Maine Finfish Aquaculture Monitoring Program requires site surveys in the spring and fall of each year.

1.1.2 Siting of units to avoid risk of damage by collision

Canada: By federal regulation, sites are marked on nautical charts and sites are not located in navigation channels etc.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Risk of damage by collision is minimised by marking aquaculture units.

England and Wales: The only saltwater cage site in England and Wales is sited so as to avoid collision.

Finland: No measures reported.

Ireland: Specific licence conditions relating to navigation (covered in 2.1.1.)

Northern Ireland: Consultation with Marine Safety Agency pre-licensing.

Scotland: The Department of Transport must give consent to the installation of a fish farm and to do so must be assured that the farm does not constitute a hazard to navigation.

Sweden: No action because there is presently no risk of collision with the few existing coastal fish farms (mussel culture and cage culture of rainbow trout) along the west coast in Sweden.

Iceland: Not applicable.

Norway: Norwegian legislation covers this by requiring a permit under the Harbour Act.

Russian Federation: No measures reported.

USA: Permitting requirements (state and federal) require that sites not interfere with navigation or public use of beaches, parks or marinas. In addition, fishing activity, shellfish beds, and essential habitat for endangered/threatened species is taken into consideration. Applicants are required to site units to limit risk to wildlife and the environment.

1.1.3 Adequate marking of aquaculture units

Canada: By federal regulation, sites are marked by lights and other visible markers.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Aquaculture units are marked in accordance with rules.

England and Wales: Not applicable.

Finland: No measures reported.

Ireland: Specific licence conditions relating to navigation (covered in 2.1.1).

Northern Ireland: Licence conditions requiring marking and lighting.

Scotland: The Department of Transport must give consent to the installation of a fish farm and to do so must be assured that the farm does not constitute a hazard to navigation.

Sweden: When necessary the aquaculture units should be marked with special yellow markings according to the present marking system for sea traffic.

Iceland: Not applicable.

Norway: All aquaculture units are required by regulations to use lights and to put up signs showing the permit number. The signs must be made according to specific directions.

Russian Federation: No measures reported.

USA: Need to obtain a Private Aid to Navigation Permit from the US Coast Guard.

1.2 Operations

1.2.1 Management of aquaculture units to prevent and control diseases and parasites

Canada: Provinces have official veterinarians with varying levels of regulatory authority (according to wording of provincial Aquaculture Acts).

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Aquaculture units are under close veterinary, environmental and technical control by the Danish Veterinary and Food Administration, the Danish Environmental Protection Agency and by local authorities. The control is performed on a regular basis and as an unannounced control.

England and Wales: All aquaculture facilities in England and Wales are subject to inspection and disease testing under EC and national fish health programmes. Great Britain is an approved zone for VHS and IHN, and has been grated safeguards under EC legislation aimed at preventing the introduction of *Gyrodactylus salaris.*

Finland: No measures reported.

Ireland: Units are obliged to report all incidence of disease under licence and under the new fallowing licence they must comply with directions issued from the sea lice monitoring programme. Certification of disease clearance required for all stock transfers.

Northern Ireland: Fish movements controlled by permit. Inspections and sampling/testing under DIR 91/67 by DANI. Disease/parasites have not been a problem due to high health status and site location.

Scotland: No regulations exist for this. It is in the farmer's own best interest to prevent escapes and prevent and control disease.

Sweden: No commercial salmon aquaculture is presently practised in Sweden. Only production for compensatory releases and a few units for enhancement are in operation. All units which mainly produce salmon smolts are enforced to be under legal health control. Yearly monitoring of fish diseases and use of medicines and disinfections is carried out to ensure that no serious diseases or parasites are spread to wild salmon populations. The county administration issues permissions for fish farming after considering the risk of spreading infectious diseases. Normally there are specific conditions given for the permission related to fish health control including voluntary fish health sampling programmes. There are rules for mandatory sanitation when diseases or contamination have been proven in a farm. Furthermore, fish to be stocked should be taken from a fish farm which has been certified by the national fish health organisation to be free from diseases and allowed to sell juvenile fish for stocking. The county administration manages a register of aquaculture units which includes updated information (name of the owner, siting of the unit, specifications regarding species and populations which have been authorised for culture at the farm, the present disease situation and other specifications given in the specific permission for the unit). In order to keep the register updated the owner of the unit has to inform the county administration on a yearly basis before 1 March if and where the culture will be carried out in the coming season (the main season is during May to November). All aquaculture companies are also obliged to keep a journal of their culture activities. The journal should be available at the fish farm and it should include information regarding:

- stock of roe and fish including time, species, populations and age
- transfer of fish within the unit
- number of dead fish
- transfer of roe and fish outside the farm
- treatments carried out in order to prohibit or treat diseases
- health inspections and results of laboratory investigations

The journal should be kept for five years. The present national regulation includes mandatory registers of fish farms, specifications for keeping journals, reporting of possible infectious diseases and sampling (to investigate disease status). If an infectious disease has been identified by the fish health control the aquaculture company is informed and a report is submitted from the laboratory to the country administration, and the National Board of Fisheries. If it is a serious viral infection the aquaculture company will not be allowed to release any living or harvested round fish from the fish farm. Mandatory destruction of all fish or roe or disinfection of the complete farm could be implemented. The aquaculture company will be compensated by the government for the economic losses.

Iceland: Facilities closely monitored by the Fish Disease Veterinary Officer, who reports status to the Government's Fish Disease Commission.

Norway: Existing regulations for operation of aquaculture units contain a number of provisions to prevent and control diseases and parasites. A new Fish Disease Act came into force on the 1st January 1998. The responsibility for the prevention, control and eradication of diseases in wild stocks has been clarified in the new Act and it also includes wild marine fish.

Russian Federation: No measures reported.

USA: Placement of disease-free fish (certification, vaccination, pair mating, up to 100% lethal testing) in sea cages and monitoring of fish health throughout the grow-out period (retrieval of mortalities, feeding behaviour observations, veterinary intervention, disease and parasite treatment). The industry is developing a program of cage rotation and fallowing.

1.2.2 Management of aquaculture units to prevent escape of fish

Canada: Containment Codes of Practice under development.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Technical rules for aquaculture serve to prevent escape of fish. Control is performed by the Danish Veterinary and Food Administration, the Danish Environmental Protection Agency and by local authorities.

England and Wales: From 1st January 1999 all freshwater sites will have to have screens on intakes and outlets to prevent ingress of wild fish and escapes of farmed fish.

Finland: No measures reported.

Ireland: Units are obliged to report escapees and act immediately to prevent further escapes under the conditions of their licence.

Northern Ireland: Regular diving inspections and replacement with heavy netting. Smolt units are screened at inlets/outlets and individual tanks.

Scotland: No regulations exist for this. It is in the farmer's own best interest to prevent escapes and prevent and control disease.

Sweden: Escapes only occur accidentally because the present aquaculture units are mainly landbased and used for releases. The production units are river based and possible escapes will be spread in the river of release. National regulations in order to protect wild salmon populations prohibit in principle all aquaculture activities in water areas within the river mouth areas up to 20km from middle point (at the border of the river mouth to the sea). A permission for fish farming close to the river mouth within a distance of 50km upstream should include conditions for mandatory fish health control, sanitation and destruction of all fish if infectious diseases have been proven and each stocking of fish should be especially examined by the county administration.

Iceland: Units need to be approved by the Directorate of Freshwater Fisheries prior to the issue of an operating licence.

Norway: Regulations also contain provision to prevent escapes of fish. There is, however, room for improvements both in the regulations and with respect to management routines in the industry itself. The provisions are presently under revision, new regulations are expected to come into force by the first part of 1999 (see 2.4.2 and 2.4.3).

Russian Federation: No measures reported.

USA: Minimise impact from storms (site selection, equipment maintenance, storm preparation procedures) seals (acoustic devices, predator nets). Application for site permit requires specific information such as pen schematic, on-site support structures, mooring plan and justification of adequacy and demonstration of technical capability. The application also requires that the mooring array be depicted and its ability to withstand severe storms, surge and equipment break-up be described. Regular equipment maintenance and storm preparation procedures are also required and include gear inspections and relocation of drift-prone equipment. At hatcheries, screens, drains, and containment systems are dismantled, inspected, cleaned and disinfected at the end of each year class production.

1.3 Transfers

1.3.1 Transfers conducted so as to minimise potential for disease/parasite transmission and for genetic and other biological interactions

Canada: By federal regulation, fish may not be moved between provinces or into Canada without an import permit and a fish health certificate; some provinces also control by means in provincial licenses.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: The effects of appointed zones for aquaculture plus general rules for aquaculture serve to minimise the risks of transfers.

England and Wales: Movements of live fish are generally not permitted from sites which are subject to official controls, due to the presence of a notifiable disease.

Finland: No measures reported.

Ireland: All transfers must be accompanied by a disease-free certificate issued by the Department of the Marine and Natural Resources.

Northern Ireland: Transfers by helicopter.

Scotland: Mechanisms exist to control transfer of fish either for aquaculture or enhancement purposes but these are solely related to the prevention of disease or parasitic transmission.

Sweden: No specific transfers have been conducted (see text under 1.3.2).

Iceland: All wild fish transfers are subject to the approval of the Fish Disease Committee.

Norway: Strict regulations for transfers of fish meet the general need to avoid spreading of diseases and parasites as well as other biological interactions.

Russian Federation: No measures reported.

USA: Movement of fish into Maine is subject to the New England Salmonid Health Guidelines which have been adopted as law within the state. Maine has a prohibition on the importation of Atlantic salmon that originate in any European waters.

1.3.2 Introduction of mechanisms to control transfers where necessary

Canada: By federal regulation fish may not be introduced to waters without a permit; national policy for Introductions and Transfers under development to ensure uniform application of evaluation criteria prior to movements.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Unannounced inspections.

England and Wales: Movements of live fish are generally not permitted from sites which are subject to official controls, due to the presence of a notifiable disease.

Finland: No measures reported.

Ireland: All hatchery stock moving from freshwater must be licensed and certified for movement and certified disease-free before transfer to sea.

Northern Ireland: No measures reported.

Scotland: Mechanisms exist to control transfer of fish either for aquaculture or enhancement purposes but these are solely related to the prevention of disease or parasitic transmission.

Sweden: Permission is not allowed for fish farming using exotic species, culture activities which could result in the spread of inappropriate species or populations of fish or of infectious fish diseases, or farming in water areas which, according to the Act of utilisation of natural resources, are of national interest for professional fishing, nature conservation or recreation if the activity will cause any significant damage. Transfers of living fish or roe from coastal waters to inland waters (above the first migration obstacle for salmonid fish) are not allowed. According to the National Board of Fisheries regulations regarding aquaculture, release and transfer of fish, a fish farming permission should only be given under the following conditions:

- only fish from fish farms under the national fish health control organisation and which are free from infectious diseases could be used
- wild fish should be free from infectious diseases
- when proven infectious disease occurs, the holder of the permission should follow specific requirements decided by the National Board of Fisheries

Fish from fish farms which have got IPN sorytyp Ab, BKD, Furunculosis, or yersinios may not be transferred or stocked. Living fish from fish farms with PKD are only allowed to be stocked into rivers with no valuable populations of salmonid fish. During all transfer and stocking of living fish the transportation containers should be cleaned and disinfected to ensure that there will be no risk of spreading the disease. Change of water during transfers is only permitted at sites approved by the country administration.

Iceland: Approval of the Fish Disease Committee needed.

Norway: In order to control specific serious diseases, geographical zones or disease combat zones may be established. Special measures, for example a ban on movement of live animals, can be enforced with the zones. Further limitations may follow from introduction of aquaculture regions which is presently under consideration.

Russian Federation: No measures reported.

USA: International importations are regulated by the US Fish and Wildlife Service under Title 50. Transfers between and within states are regulated by state law.

Part 2. Measures to Minimise Genetic and Other Biological Interactions

2.1 Design Standards for Aquaculture Units

2.1.1 Establishment of standards and technical specifications for the design and deployment of aquaculture units (marine and freshwater)

Canada: Containment Codes of Practice (including standards) under development; Codes will lead to area specific standards required by provincial licensing authorities as basis for regulation.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Standards and specifications on marine and freshwater aquaculture units are defined in laws and in departmental orders.

England and Wales: No measures were reported.

Finland: No measures reported.

Ireland: Plans for all aquaculture units must be approved by the DoMNR engineers including specific reference to gratings in hatcheries and design and construction of holding tanks.

Northern Ireland: Pre-licensing consultation inspections.

Scotland: This is viewed as a matter for the farming industry.

Sweden: No action.

Iceland: Not applicable.

Norway: A system for classification of technical equipment for use in the aquaculture industry has been proposed as an element in the efforts to prevent escapes. The proposal is limited to new aquaculture plants and new equipment, but will cover equipment for use in freshwater as well as the sea. Existing plants will be covered by this system when major components are changed. The new system will involve the preparation of new regulations and adjustments of legislation. Norwegian authorities will take a decision on this proposition in the near future, and the implementation of the revised regulations may come in 1999.

Russian Federation: No measures reported.

USA: Application for the site permit from the US Army Corps of Engineers requires specific information such as pen schematic, on-site support structures, mooring plan and justification of adequacy and demonstration of technical capability.

2.1.2 Optimisation of containment of fish through use of appropriate technology for prevailing conditions

Canada: Containment Code of Practice under development; other Codes relating to habitat protection in preparation; this is good management practice; under provincial jurisdiction.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Standards and specifications on marine and freshwater aquaculture units are defined in laws and in departmental orders.

England and Wales: Screens required on intakes and outfalls on freshwater sites; only one small saltwater site.

Finland: No measures reported.

Ireland: No specific regulation although it is in the interests of the company to maintain the highest standards of containment.

Northern Ireland: Heavy netting and mooring ropes. Sewn in cover nets.

Scotland: This is viewed as a matter for the farming industry and see 1.2.2.

Sweden: No action.

Iceland: Not applicable.

Norway: In general the industry uses appropriate technology for prevailing conditions. There are no specific requirements for use of specific technology in today's regulations, but these factors are considered by the authorities before giving localisation permits. The new classification system mentioned above (2.1.1), will, however, improve this.

Russian Federation: No measures reported.

USA: Permit requirement that the mooring array be depicted and its ability to withstand severe storms, surge, equipment break-up etc be described. The aquaculture industry is currently compiling a code of containment.

2.1.3 Regular routine inspection and maintenance of aquaculture systems and upgrading of equipment as new technological improvements become available

Canada: Good management practice; under provincial jurisdiction and done regularly by industry. No legislated; individuals do as circumstances dictate and permit; Containment Code of Practice would require upgrading to new standards (as cages replaced).

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Inspection is performed on a regular basis by local authorities and by the Danish Environmental Protection Agency.

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: The DoMNR inspect cages.

Northern Ireland: Twice yearly inspection. Grant aiding of upgrading.

Scotland: This is viewed as a matter for the farming industry and see 1.2.2.

Sweden: No action.

Iceland: Not applicable.

Norway: In addition to the government spot control scheme, implementation of internal control in the aquaculture industry and aquaculture related enterprises is under consideration and this will cover *inter alia* inspection and maintenance. (Upgrading of equipment is covered under 2.1.1). Internal control is already in effect on areas such as environment, workers' health and safety. A co-ordinated system for internal control with a basis in the Aquaculture Act, the Fish Disease Act and the Animal Welfare Act has been proposed, but this requires a new provision in the Aquaculture Act. The implementation of internal control may come in 1999.

Russian Federation: No measures reported.

USA: Diver surveys are conducted twice a year on each site.

2.1.4 Regular monitoring and use of efficient security systems

Canada: Good management practice; regulated in the case of fish health quarantine units.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: The regular inspection serves as a monitoring system.

Finland: No measures reported.

England and Wales: Sites are visited regularly by Environment Agency (EA) and Ministry staff.

Ireland: The DOMNR inspect cages.

Northern Ireland: None.

Scotland: This is viewed as a matter for the farming industry and see 1.2.2.

Sweden: No action.

Iceland: Not applicable.

Norway: All aquaculture units are required by regulations to perform daily inspections and regular control and maintenance. The regulations also require the keeping of a log book. Units must be controlled immediately after storms, and there is a requirement to conduct limited but regular fishing within 100 metres of the unit. All escapes, or suspicion of such, must be reported immediately. Monitoring with the purpose of checking out the relative number of escaped farmed fish in rivers, fjords and coastal areas has been on-going since 1989.

Russian Federation: No measures reported.

USA: Regular equipment maintenance and storm preparation procedures that include gear inspections and relocation of drift-prone equipment. At hatcheries, screens, drains and other containment systems are dismantled, inspected, cleaned and disinfected at the end of each year class production.

2.2 Salmon Enhancement

2.2.1 Use of local stocks wherever possible

Canada: By regulation and/or guidelines.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Local stocks are used (as standard procedure) in the only water systems possible, namely in the Skjern Stream system.

Finland: No measures reported.

England and Wales: There is a general EA policy to use local salmon broodstock for restocking programmes.

Ireland: This policy is advised to the Department of the Marine and Natural Resources in all cases by the Marine Institute.

Northern Ireland: Local stocks used.

Scotland: This is the responsibility of the DSFBs. Within the UK there are no controls on the movement of broodstock from one river system to another unless a specific disease problem arises since the whole UK mainland is one zone under the EC Directives.

Sweden: Only releases in rivers for compensatory or enhancement purposes are carried out and salmon from local populations are used. Only in cases when material from the river in question is not available are other populations allowed to be used. During 1997 stocking programmes were implemented in three rivers, with no wild salmon populations, on the Swedish west coast. Yearly compensatory releases of salmon smolts from local populations are carried out in these rivers.

Iceland: Local stocks used in river enhancement, wherever possible, nearby stocks in exceptional instances, especially in small rivers.

Norway: Releases are in general prohibited, and a special permission is required to release salmon for enhancement purposes. Such permission includes conditions regarding the broodstock, and use of local broodstocks will be required whenever this is possible (see 2.2.2).

Russian Federation: No measures reported.

USA: Local river-specific stocks are used for rehabilitation of wild stocks. The aquaculture industry in Maine currently uses both European and North American stocks. A Working Group is being formed and the industry has committed to a research program to screen a variety of strains within North America for commercial production.

2.2.2 Implementation of criteria for broodstock selection and management

Canada: Random sampling for broodstock purposes to maintain genetic diversity.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Broodstocks are selected in accordance with biological principles.

Finland: No measures reported.

England and Wales: Where possible, sufficient broodstock are used and appropriate pairing protocols employed to ensure the maintenance of genetic diversity.

Ireland: Taking of broodstock is subject to a licence which is appraised by the Department of the Marine and Natural Resources with advice from the Regional Fishery Board and the Marine Institute.

Northern Ireland: Wild broodstock selected.

Scotland: This is the responsibility of the DSFBs. Within the UK there are no controls on the movement of broodstock from one river system to another unless a specific disease problem arises since the whole UK mainland is one zone under the EC Directives.

Sweden: Capture of migrating spawners is the basis for the selection of broodstock. At least 100 spawners should be used for stripping and smolt production if available. The selection of female and male spawners is carried out so that the broodstock represent all natural sizes and sea ages at spawning.

Iceland: Broodstock selection random from wild parents.

Norway: Modern enhancement activities aim primarily to stimulate good conditions for natural spawning, with release of reared juvenile salmon from local broodstocks as a subsidiary measure. The use of reared juveniles follows guidelines based on good salmon management practices, the situation in the river in question and a precautionary approach.

Russian Federation: No measures reported.

USA: Development of Broodstock Collection and Spawning Protocols to Maintain Genetic Integrity of Atlantic Salmon Stocks at the Craig Brook National Fish Hatchery for rehabilitation of wild stocks.

2.3 Salmon ranching

2.3.1 Use of local stocks or alternatively local ranching stocks

Canada: Not practised in Canada.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Yes.

England and Wales: Not applicable.

Finland: No measures reported.

Ireland: Ranching is carried out experimentally in three locations. Loose terminology describing "ranching to the rod" in the absence of adequate harvest procedures to remove all returning ranched stock is not considered under ranching but rather as fishery enhancement.

Northern Ireland: Not applicable.

Scotland: Not applicable.

Sweden: Mainly local populations are used. Only releases in rivers for compensatory or enhancement purposes are carried out and salmon from local populations are used. Only in cases when material from the river in question is not available are other populations allowed to be used.

Iceland: Use of a ranching stock recommended in ranching stations and allowed, where salmon are ranched for the rod in unproductive rivers.

Norway: At present there is no salmon ranching in Norway. The potential for sea ranching in Norway based on salmon, cod, char and lobster has been explored through a special programme to promote commercial development. The programme, named PUSH, has shown that with the present knowledge and level of costs, industrial sea ranching based on fish species is not economically feasible. For lobster interesting results have been achieved, and a hatchery has been established. The program has given interesting results, for instance connected to a future perspective where catching, storing, enhancement and farming are seen together. Work on a new law on sea ranching is expected to commence in 1998.

Russian Federation: No measures reported.

USA: Not applicable.

2.3.2. Harvesting of ranched fish at or close to release site or in fisheries managed in a way that prevents over-harvesting of wild stocks

Canada: Not practised in Canada.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Yes.

England and Wales: Not applicable.

Finland: No measures reported.

Ireland: In-river. Each of the existing ranching stations operate upstream traps to separate and remove ranched salmon. Estuary and sea - no specific measures have been adopted to minimise the impact of fishing for ranched fish on the wild stocks.

Northern Ireland: Not applicable.

Scotland: Not applicable.

Sweden: Only harvest in rivers carrying reared populations takes place on a very limited scale and no harvest of wild salmon for rearing is carried out.

Iceland: Ranched salmon are harvested in a terminal estuarine fishery in special traps. Wild salmon occurrence < 1%.

Norway: Refer to measures under 2.3.1 above.

Russian Federation: No measures reported.

USA: Not applicable.

2.4 Salmon farming

2.4.1 Use of local broodstocks where practicable

Canada: By regulation in some provinces; adherence to NASCO/NAC Protocols.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Standard procedure wherever possible.

England and Wales: Not applicable.

Finland: No measures reported.

Ireland: No.

Northern Ireland: Not practicable.

Scotland: Many farms relied on local fish to establish initial broodstocks. However, other elements have now been introduced because of beneficial traits such as low grilsing and disease resistance.

Consequently most stocks used by the Scottish salmon farming industry are now a mix of different stocks where the desirable characteristics in different strains are combined.

Sweden: Not applicable.

Iceland: Norwegian origin farming stock used in land-based operations.

Norway: In general, use of local broodstocks is neither feasible nor of interest in the Norwegian aquaculture industry. There are exceptions, however, where local stocks may be included in the development of special production strategies *inter alia* in isolated fjord systems with rivers and salmon stocks of unique national and international value.

Russian Federation: No measures reported.

USA: The aquaculture industry in Maine currently uses both European and North American stocks. The State of Maine has a prohibition on the importation of Atlantic salmon, live or as eggs, that originate in any Icelandic or European territorial waters. Discussions are ongoing to attempt to provide the industry with a greater variety of strains within North America for growth trails.

2.4.2 Efforts to recapture escaped farmed salmon

Canada: Encouraged by governments; done when human safety not put at risk (eg weather conditions).

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: None. The problem with escaped farmed salmon is estimated to be very limited in Danish waters.

England and Wales: Not applicable.

Finland: No measures reported.

Ireland: In cases of large-scale escapes provision is made to allow for trapping or netting in specific areas if requested by regional fishery managers.

Northern Ireland: Netted at sea and electric fished in river to which they return.

Scotland: The problems associated with escapes of farmed fish have been the subject of much scientific interest and investigation in recent years and scientists from the Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD) are well to the forefront of such work. No final conclusions have been reached on the long-term impact of such escapes on wild salmon populations but it is clear that escapes of fish should be prevented wherever possible and monitored where accidents occur.

Sweden: Not applicable.

Iceland: Permitted by law, seldom applied.

Norway: The efficiency of existing recapture systems in the aquaculture industry is poor. Salmon farmers have a right, but no obligation, to recapture escapees. In the last few years, regional authorities have at times opened for an extraordinary general fishery in order to recapture escapees.

Russian Federation: No measures reported.

USA: Currently capture and possession is prohibited. The Working Group will look at this issue.

2.4.3 Establishment of site specific contingency plan in the event of large escapes

Canada: Recovery plans required and improved procedures being developed; human safety first priority.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: No, not a legal demand.

England and Wales: Not applicable.

Finland: No measures reported.

Ireland: Appropriate action advised by DoMNR, MI, RFB and implemented regionally.

Northern Ireland: Licence condition to ensure escapes are quickly reported to DANI. Netted at sea and electric fished in river to which they return.

Scotland: Against the background detailed in 2.4.2, SOAEFD are preparing site specific contingency plans to deal with fish farm escapes, in line with NASCO recommendations, which would be agreed with the fish farming industry and representatives of wild salmon interests.

Sweden: Not applicable.

Iceland: Not applicable.

Norway: At present there are no regulations demanding site specific contingency plans in the event of large escapes. Provisions for such plans may be included in the new regulations for aquaculture operations.

Russian Federation: No measures reported.

USA: Currently capture and possession is prohibited. The Working Group will look at this issue.

Part 3. Measures to Minimise Disease and Parasite Interactions

3.1 Control and prevention of diseases and parasites

3.1.1	**Aquaculture production process conducted in accordance with appropriate fish health protection and veterinary controls, including the application of appropriate husbandry techniques to minimise risk of diseases (vaccination, use of optimum stocking densities, careful handling, frequent inspection of fish, proper diet and feeding regimes, avoidance of unnecessary disturbance, detailed health inspections, disinfection of transportation equipment and use of disinfection baths at production facilities)**

Canada: Federal and provincial regulations and implementation guidelines in place and enforced; veterinarians are provincially licensed. Regulated in fish health quarantine units; voluntary adherence by industry in private hatcheries.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Laws and departmental orders set the rules for aquaculture. All aquaculture is controlled both regularly and unannounced by the Danish Veterinary and Food Administration, the Danish Environmental Protection Agency and by local authorities.

England and Wales: All aquaculture establishments are subject to inspection and sampling for notifiable infectious disease by the official service. Appropriate controls are placed to prevent the spread of these notifiable diseases. The control of lesser diseases, or those where official controls are not practicable, is the sole responsibility of the operator of the aquaculture establishment.

Finland: Disinfection of fishing gear.

Ireland: Strategies are promoted by DoMNR. Fish farms also engage their own veterinary services. Companies employ best practice in relation to husbandry.

Northern Ireland: These are in place.

Scotland: This seems to be adequately covered by the fish health regulations we have in place under the Diseases of Fish Acts, Fish Health Regulations and the various EC Directives. All registered salmonid farms must be inspected twice each year, and have a 30-fish sample tested for VHS and IHN once every 2 years, in order for GB to maintain its approved zone status for these diseases. All sites holding Atlantic salmon are tested at the 30-fish level annually as part of our national policy. It is in the fish farmers' strong interests to minimise the occurrence of significant diseases in the fish farm populations and considerable efforts are directed towards this objective, although not always fully successfully as diseases such as lice still cause problems. There has been, and currently is, an enhancement of the level of some locally endemic diseases (eg *Furunculosis,* lice) in farmed fish populations, but it has not been possible to quantify the level of transmission of these back to wild populations in the surrounding areas and to determine the consequences of this. The greatest risk to both farmed and wild populations would lie with the introduction of exotic diseases (eg *Gyrodactylus salaris,* IHN) to which local salmon stocks have low tolerance. The current tight fish disease control regulations are designed to reduce the risk from these. Epidemiological factors are also taken into

account during the planning stage; however, the question of protection zones or a "cordon sanitaire" around fish farms is one frequently raised in relation to the planning applications for siting of fish farm sites. Because of the significant differences in the hydrography, topography and biological characteristics of different areas, it is more logical to consider each site on its own merits, rather than attempting to establish standard distances. In addition, the absence of knowledge on the spread and survival of important fish diseases in natural waters causes additional problems. Producers have found that fallowing sites (see 3.6.1) significantly reduce sea lice and other infestations, particularly in the first year of resumed production.

Sweden: Mandatory visits and sampling are implemented by the national fish health organisation in all registered fish farms in order to be able to ensure that Swedish fish farms are free from infectious substances. Sweden has been guaranteed by the EU that such infectious substances will not be allowed to be spread to Sweden. There are national regulations regarding when, how many visits per year, type of sampling and number of fish which should be investigated.

- Fish farms in coastal areas and in river mouths are visited at least twice a year, normally during autumn and spring when the water temperature is lower than 14°C. Every second visit 30 fish are investigated and every second year viruses are controlled.

- Fish farms in inland waters are visited and sampled in the same way as the coastal fish farms and in addition once during the summer when the water temperature is above 15°C. Every second year 30 fish are taken out for control of bacterial diseases.

The personnel implementing the mandatory visits and sampling are veterinarians or fisheries managers who have been selected by the National Board of Agriculture. Together with the owner or somebody representing the aquaculture company, fish are selected for sampling. Firstly fish which behave abnormally in the culture units are selected and secondly normal fish from various culture dams and cages. If rainbow trout are cultured the samples are taken from them; otherwise a representative selection from various fish species being cultured at the farm. During visits when it is not necessary to make a post-mortem dissection or any sampling, a more general inspection of the status of the fish in the farm is conducted. During each visit the journals kept at the farm are examined and a report is made. All virus and bacterial samples are submitted to the national veterinarian institution where the samples are analysed according to conditions decided by the national agriculture department. Written responses regarding all laboratory investigations are sent to the fish farm. The visits and samples are free of charge for the aquaculture company provided that personnel from the fish farm assist with the implementation of the sampling and the costs for the fish used for the sampling are not covered.

Iceland: Aquaculture units are routinely inspected by the Fish Disease Veterinary Officer, who reports any disease occurrences to the Fish Disease Committee. Facilities with certifiable contagious diseases are closed and transfers prohibited. Re-opening must be authorised by the Fish Disease Committee.

Norway: Existing regulations contain provisions to control all these requirements.

Russian Federation: No measures reported.

USA: Compliance with the New England Salmonid Health Guidelines and Maine Fish Health regulations require testing and analysis prior to inter and intra-state movements. Minimum of annual fish health inspection, protected water sources, vaccination of all smolts prior to stocking, paired mating and 100% lethal sampling of broodstock, splitting of pen populations to control densities and age grouping at distinct site when possible.

3.1.2 Treatment or removal of diseased stock and measures to ensure diseased fish are not released to the wild

Canada: Treatment or removal of diseased stock is good management practice; by regulation in one province or voluntary adherence by industry in others. Measures to ensure diseased fish are not released to the wild: by regulation.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Persons responsible for each site have an obligation to inform authorities in case of realised infections and occurrence of parasites so that relevant measures can be taken.

England and Wales: Controls placed on movements of fish with notifiable disease by official service, otherwise the responsibility of site operators.

Finland: No measures reported.

Ireland: All disease incidence must be reported to the DoMNR and measures adopted under advice from Fish Health Unit (FHU) of the Marine Institute (MI).

Northern Ireland: Treatment only in hatchery/smolt unit otherwise culled and disposed of following collection by farm by-products rendering plant.

Scotland: This is controlled by a combination of statutory and voluntary codes. A variety of methods exist for the removal of dead or dying fish from production facilities, eg the dead sock method. These are mainly determined by the design of the unit and are not under any formal planning or regulatory control. There are, however, regulations (EC Directive 90/667) to control fallen animals, which includes fish from aquaculture. Approved methods include incineration and burial at an approved site and are usually regulated by the local authorities. Contingency plans for the disposal of mortalities under emergency situations are covered under the Fish Health Regulations - the controls we put in place after the VHS outbreak in Gigha would be a good demonstration of this. It may also be worth mentioning that the best strategy to reduce this problem is to control mortality by reducing the incidence of disease - thus stimulation of R & D to develop vaccines and particularly the vaccination strategy to combat *Furunculosis* has had a major impact in reducing the requirement to dispose of dead or dying fish. For example, 95% of smolt producers now use vaccines against *Furunculosis* and this has been rising steadily year on year (Table 22 Scottish Fish Farms Annual Production Survey, 1996).

Sweden: Release of diseased fish is not allowed. Individual disinfection plans are made for each fish farm depending on the type of disease. A prerequisite is that all fish in the farm should be removed and all equipment has to be cleaned and disinfected. After these actions the farm could be stocked with new fish and a follow-up sampling scheme conducted. Mandatory sanitation plans are made for all fish farms in inland and river mouth areas.

Iceland: Aquaculture units are routinely inspected by the Fish Disease Veterinary Officer, who reports any disease occurrences to the Fish Disease Committee. Facilities with certifiable contagious diseases are closed and transfers prohibited. Re-opening must be authorised by the Fish Disease Committee.

Norway: Outbreak of diseases is handled with respect of severity. Contingency plans exist for the most serious diseases.

Russian Federation: No measures reported.

USA: Diseases are categorised as either restricted or emergency. Detection of an emergency disease requires eradication whereas detection of a restricted disease triggers treatment. Compliance with state fish health regulations and New England Fish Health Guidelines.

3.2 Stocking density

3.2.1 Aquaculture production adapted to the site's holding capacity and stocking density should not exceed levels based on good husbandry practices

Canada: Part of site licensing.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: There is no commercial salmon aquaculture in Denmark. Hence, problems with adapting to sites holding capacity are estimated to be of limited importance in Denmark.

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: Strategies are promoted by DoMNR. Fish farms also engage their own veterinary services. Companies employ best practice in relation to husbandry.

Northern Ireland: In practice and statutory control by licence conditions.

Scotland: The veterinary controls on animal welfare apply as do the voluntary controls through the industry codes of practice and the pressure from the consumer to comply with such codes.

Sweden: The mandatory conditions given for a fish farm in the permission given by the county administration include approved levels of phosphorus and nitrogen discharge, kilogram of fish per volume, maximum use of fish feed per year, feed efficiency, feeding level during winter season, need for sewage treatment, waste treatment, slaughtering, use of chemicals, keeping of a journal and sampling programme.

Iceland: Subject to health inspection.

Norway: A new system for adaptation of aquaculture production to individual sites - called MOM - has been established and is expected to be implemented in 1999.

The provisions regulating stocking density have been changed during the last years, and the scope has been extended to regulate production in addition to the former aim to improve the health status of the fish and conserve the aquatic environment. The regulations are presently under revision.

Russian Federation: No measures reported.

USA: In order to receive a permit for a cage site, a grower must provide detailed plans of operation and production and demonstrate that those are adapted to and consistent with local conditions. Densities in Maine are among the lowest in the world. Cages must be located at lease 2000 feet apart.

3.3 Removal of dead of dying fish

3.3.1 Removal of dead/dying fish and disposal along with waste materials in an approved manner

Canada: Good management practice; disposal practices by federal and provincial regulation.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Yes, to be done on a daily basis in accordance with laws and departmental orders. Dead fish and infected material must be taken for destruction at an approved destruction site.

England and Wales: Disposal of fish from sites with a List II disease (VHS and IHN) controlled by official service. Routine mortality disposal remains the responsibility of the farmer.

Finland: No measures reported.

Ireland: Disposal of all waste material must be in a manner acceptable to the local authority which is responsible for waste disposal.

Northern Ireland: Collected by farm by-products rendering plant.

Scotland: This is controlled by a combination of statutory and voluntary codes. A variety of methods exist for the removal of dead or dying fish from production facilities, eg the dead sock method. These are mainly determined by the design of the unit and are not under any formal planning or regulatory control. There are, however, regulations (EC Directive 90/667) to control fallen animals, which includes fish from aquaculture. Approved methods include incineration and burial at an approved site and are usually regulated by the local authorities. Contingency plans for the disposal of mortalities under emergency situations are covered under the Fish Health Regulations - the controls we put in place after the VHS outbreak in Gigha would be a good demonstration of this. It may also be worth mentioning that the best strategy to reduce this problem is to control mortality by reducing the incidence of disease - thus stimulation of R & D to develop vaccines and particularly the vaccination strategy to combat *Furunculosis* has had a major impact in reducing the requirement to dispose of dead or dying fish. For example, 95% of smolt producers now use vaccines against *Furunculosis* and this has been rising steadily year on year (Table 22 Scottish Fish Farms Annual Production Survey, 1996).

Sweden: There are specific regulations for transport of dead fish (harvested round fish) from a fish farm in coastal or river mouth areas to a processing plant in inland areas. The transport has to be reported to the county administration by the fish farm or the processing industry. The transport should be carried out in closed and cleaned containers. The processing industry also have to follow specific regulations regarding infected fish from a fish farm in coastal or river mouth areas. The processing water has to be filtered or disinfected. If infectious substances have been found at the fish farm the Ministry of Agriculture issues specific conditions regarding the slaughtering of the fish.

Iceland: Subject to health inspection.

Norway: According to the regulations dead fish should be picked every day in summertime and every second day in wintertime. Dead fish must be ground up and disposed of in a container with acid added to a pH of 4 or less.

Russian Federation: No measures reported.

USA: According to federal permit, all mortalities are removed daily to shore and disposed of properly.

3.3.2 Establishment of procedures for effective removal and disposal of infectious material

Canada: Good management practice; disposal practices by regulation, especially in fish health quarantine facilities.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Yes, to be done on a daily basis in accordance with laws and departmental orders. Dead fish and infected material must be taken for destruction at an approved destruction site.

England and Wales: Procedures for stock removal and disposal form part of official contingency plans.

Finland: No measures reported.

Ireland: This must be carried out under advice from the FHU (3.1.2 as above.)

Northern Ireland: Collected by farm by-products rendering plant.

Scotland: No measures reported.

Sweden: All discharge of water contaminated with blood from the slaughtered fish has to be handled in a safe way to ensure that the infectious substances are not spread to natural waters and to wild fish. Usually the contaminated water is collected in closed containers. Cooperation with the local environment and health administration is mandatory.

Iceland: Subject to health inspection.

Norway: Strict regulations for disposal of waste and infectious materials exist.

Russian Federation: No measures reported.

USA: No measures reported.

3.3.3 Establishment of contingency plans for disposal of mortalities from emergency situations

Canada: In progress; disposal practices by regulation.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: No.

England and Wales: Official service has contingency plans for dealing with a List II disease outbreak. EA has plans for disposal of mortalities from pollution events.

Finland: No measures reported.

Ireland: This must be carried out under advice from the FHU (as 3.1.2 above).

Northern Ireland: Collected by farm by-products rendering plant.

Scotland: This is controlled by a combination of statutory and voluntary codes. A variety of methods exist for the removal of dead or dying fish from production facilities, eg the dead sock method. These are mainly determined by the design of the unit and are not under any formal planning or regulatory control. There are, however, regulations (EC Directive 90/667) to control fallen animals, which includes fish from aquaculture. Approved methods include incineration and burial at an approved site and are usually regulated by the local authorities. Contingency plans for the disposal of mortalities under emergency situations are covered under the Fish Health Regulations - the controls we put in place after the VHS outbreak in Gigha would be a good demonstration of this. It may also be worth mentioning that the best strategy to reduce this problem is to control mortality by reducing the incidence of disease - thus stimulation of R & D to develop vaccines and particularly the vaccination strategy to combat *Furunculosis* has had a major impact in reducing the requirement to dispose of dead or dying fish. For example, 95% of smolt producers now use vaccines against *Furunculosis* and this has been rising steadily year on year (Table 22 Scottish Fish Farms Annual Production Survey, 1996).

Sweden: Specific contingency plans are worked out in cooperation between the fish farming company and the responsible local environmental and health authority.

Iceland: Responsibility of the Fish Disease Veterinary Officer.

Norway: Contingency plans and facilities for approved disposal of heavy mortalities exist.

Russian Federation: No measures reported.

USA: No measures reported.

3.4 Adequate Separation

3.4.1 Separation of aquaculture facilities on the basis of a general assessment of local conditions

Canada: In progress (especially in Bay of Fundy).

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Authorities take local environmental conditions into account when appointing zones for aquaculture. Further, there are rules to prevent bird contact in order to minimise transmission of diseases and parasites.

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: This is covered in the EIS which accompanies each application.

Northern Ireland: Not applicable.

Scotland: From a disease and environmental perspective this is brought about by scientific input to the licensing process to the Crown Estates/Local Authority.

Sweden: No separation is carried out except that all salmon hatcheries are river-based.

Iceland: Not applicable

Norway: No measures reported.

Russian Federation: No measures reported.

USA: Applicants are required to label location of federal projects, navigational channels and existing facilities within 2000 feet or parks within 1000 feet.

3.5 Year Class Separation

3.5.1 Rearing of different generations in separate locations where possible

Canada: In progress.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Based on the estimated possibilities for survival.

England and Wales: No measures reported.

Ireland: Carried out in most production areas.

Northern Ireland: In practice.

Scotland: Single year class stocking widespread and actively encouraged.

Sweden: Normal smolt hatchery routines, ie year classes are separated in different sizes and each year class in several units.

Iceland: Not applicable.

Norway: Different generations of salmon to be reared at separate locations, or a fallowing period between different generations at same site is required.

Russian Federation: No measures reported.

USA: Standard practice for many operators.

3.6 Fallowing of Sites

3.6.1 Use of a fallowing regime wherever possible

Canada: In progress.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: At marine sites during winter (December to March).

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: Carried out in most productions areas.

Northern Ireland: In practice.

Scotland: No formal controls. SOAEFD strongly advise the adoption of a fallowing strategy and that the fallowing period should be as long as possible. Adoption of the strategy by the industry is widespread and is monitored by the annual survey (Scottish Fish Farms Annual Production Survey, 1996). The industry is developing the idea of Regional Management Plans to help in the control of disease and parasite burdens.

Sweden: No actions have been taken.

Iceland: Not applicable.

Norway: By means of artificial light Norwegian fish farmers are now able to put smolts into the sea all year round. This situation makes it more difficult to establish a strict separation between year classes. Fallowing is, therefore, considered to be of increasing importance, hence fallowing will probably be compulsory in the near future. Today it is used as a legal instrument in combat zones.

Russian Federation: No measures reported.

USA: Practised currently at several sites. Need evaluated during annual dive surveys.

3.7 Use of Medicines and Disinfectants

3.7.1 Careful use of medicines and disinfectants in accordance with manufacturers' instructions, Codes of Practice and in compliance with regulatory authorities

Canada: Access and dosages by regulation; private and provincial fish health veterinarians prescribe and monitor health of fish.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Veterinary treatment is done by a VD and registered. Controlled by the Danish Veterinary and Food Administration.

England and Wales: There are many controls on the use of treatments on freshwater farms.

Finland: No measures reported.

Ireland: Operators must adhere to licence conditions and chemicals can only be used in accordance with instructions of the Minister for the Marine and Natural Resources. Records of chemicals and antibiotic quantities used must be kept for inspection.

Northern Ireland: In practice.

Scotland: All medicinal products require authorisation by the Veterinary Products Committee and the assessment of each product covers a wide range of factors including pharmaceutical quality, efficacy and safety to the operator, the fish and the environment. On the farm the actual use of a product is also regulated through veterinary prescription (in most but not all cases) and by the need for a consent

to discharge from SEPA. Directive 96/23/EC on monitoring veterinary residues in farmed salmon will be implemented in 1998.

Sweden: See related text under sections 1.2.1, 3.1 and 3.2.

Iceland: Use of medicines severely limited and by prescription only.

Norway: Regulatory measures and the use of effective vaccines have reduced the use of antibiotics by more than 99% in the last 10 years.

Russian Federation: No measures reported.

USA: Vaccinations utilised. Medicines and disinfectants are tightly regulated by the US Food and Drug Administration and the EPA. Permits are required and strict adherence to application protocol is required. Currently, sea lice treatments are under an Investigation of a New Animal Drug (INAD) permit which requires very stringent protocols. Veterinarians must prescribe any additive to food.

3.8 Lists of Diseases

3.8.1 Lists of prevailing infectious diseases and parasites and methods for control to be maintained by appropriate authorities

Canada: Pathogens listed in federal and some provincial regulations; method of control not regulated (ie use of therapeutants not required by regulation and prophylaxis is not encouraged); names of therapeutants approved for use is public knowledge.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Yes.

England and Wales: Official services publish the list of sites subject to controls for the presence of notifiable disease, and provide advice on the prevention or control of other diseases.

Finland: No measures reported.

Ireland: This would be advised by the FHU.

Northern Ireland: Covered by licence conditions.

Scotland: This is covered by the EC List I, II and III diseases and the UK legislation in place to implement the relevant Directives. Most effort is related to maintaining the UK as a zone free of ISA, VHS, IHN and *Gyrodactylus salaris* and to regulate movements of fish with IPNV and BKD etc.

Sweden: Virus - IHN, VHS, IPN, SVC. Bacterial infectious/diseases - BKD, Furunculosis (ASS), Yersinios (ERM) and PKD. All virus infections and furunculosis, BKD, Yersinios and PKD are mandatory to report. The reporting requires that the laboratory investigating the infected fish has to inform the Board of Fisheries and the county administration. The authorities are doing as much as possible to minimise the spreading of the infection through various activities. See relevant text under section 3.1 regarding control methods practised by the appropriate authorities.

Iceland: Responsibility of the Fish Disease Veterinary Officer.

Norway: Lists of diseases for a broad range of fish, crustacean and mollusc diseases have been established. The diseases are categorised in three groups with respect to their seriousness and distribution in Norway.

Russian Federation: No measures reported.

USA: Reporting requirement to state agencies and annual reporting to the New England Salmon Commission.

Part 4. Research and Development

4.1 Research, small-scale testing and full-scale implementation of

4.1.1 Wild salmon protection areas

Canada: Marine protected Areas provided for under the Canada Oceans Act.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: No.

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: No research at present - specific coastal areas have been designated as to disallow aquaculture development.

Northern Ireland: No activity.

Scotland: The jury is still out on the effectiveness of such measures and experimental work to establish a case would be very expensive. In Scotland the debate might be somewhat academic in that most of the future growth in the industry is anticipated by increasing the size of current units rather than by increasing the number of sites.

Sweden: About 70 closed areas have been designated along the Swedish west coast with regulations implying a total or partial prohibition on fishing of certain species in defined areas during defined time periods. Target species to be protected are salmon and sea trout. Fishing with driftnets or anchored nets for salmon and trout is not allowed.

Iceland: Cages and ranching stations located >100km from major salmon-producing areas.

Norway: The provisional regime for wild salmon protection areas with limited or no aquaculture industry has been prolonged and will be evaluated after collection of more substantive data on the effect of such areas. Preliminary results, however, indicate that extensive protection areas with minimal aquaculture within the area can attain the intended goal of such areas.

Russian Federation: No measures reported.

USA: Atlantic salmon populations within the Gulf of Maine area have been designated as a candidate species by the federal agencies. Activities proposed within this area will undergo additional review and scrutiny. The State of Maine has also developed a Conservation Plan for wild Atlantic salmon in this area which contains specific provisions to reduce any potential threat from aquaculture.

4.1.2 Sterile salmon

Canada: Research in progress; findings are variable but indications are that the technique is feasible.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: No.

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: EU-funded research being carried out by the University College, Galway, Salmon Research Agency of Ireland and Marine Institute on the use of triploid stocks.

Northern Ireland: No activity.

Scotland: The Scottish Office is contributing to an EU-funded collaborative study involving centres in Scotland (Marine Laboratory, Aberdeen; Gatty Marine Laboratory, St Andrews), Ireland (University College, Galway) and Norway (Institute of Marine Research, Matre Aquaculture Research Station). This project (AIR CT94-2216), has just completed the third of a 4-year programme, and has the aim of analysing the overall worth of triploids in culture. It is comparing triploid and diploid genera performance, developmental biology, swimming ability, flesh quality, migration behaviour and disease susceptibility. To date, freshwater performance, timing of organ development, swimming performance and disease susceptibility in controlled freshwater experiments have been generally similar. Triploids appear to perform less well in sea water and exhibit elevated levels of jaw deformity and eye cataract. They also show poorer overall survival in seawater. The industry is still very resistant to triploids.

Sweden: No actions have been taken.

Iceland: Only experimental.

Norway: Norwegian scientists are participating in an EU-funded project which seeks to evaluate the use of sterile, triploid Atlantic salmon in fish farming. Comparisons between triploid and "normal" salmon have shown marginal differences in growth, quality and survival. The triploids are shown to be more prone to cataract (eye disease). Triploids also have bigger, but fewer muscle fibres, and there is a need to study whether this will impact have an impact on processing. No major differences in behaviour and disease resistance (bacteria and viruses) have been found. Norwegian scientists are performing studies on triploid behaviour following release.

Russian Federation: No measures reported.

USA: Experimentation in Maine with growing of Penobscot triploids.

4.1.3 Tagging and Marking

Canada: In progress; done routinely in some rivers and streams for wild salmon.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Yes, within local monitoring programmes.

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: Large-scale microtagging programme operated by the Marine Institute annually (300,000 smolts tagged each year) plus large-scale recovery programme to elucidate the exploitation and survival rates of hatchery and wild stocks, and to investigate the occurrence of and behaviour of escapees.

Northern Ireland: DANI Project 8434, active in 97/98. Salmon tagging programme 40,000 and tagged per year. Expenditure in 97/98 was £34,548.

Scotland: Farmed fish in Scotland are not routinely tagged or marked with an external tag, nor can they consistently be identified by a single gene variant or genetic marker. Given sufficient information on the frequencies of a number of genetic markers in both source (ie fish farm) and sink (local salmonid populations), it is theoretically possible to identify the origin of individuals or parentage of progeny on a probabilistic basis. Recently escaped farmed salmon (ie those escaping from sea cages) are relatively easily identifiable by their external appearance and condition, ie lesions, body and tail shape, eroded fins, fore-shortened gill opercula. Fish which escaped as smolts may resemble wild salmon but examination of their scales usually reveals a period of very rapid freshwater growth not usually characteristic of wild fish. The pigment canthaxanthin is used as an additive in some salmon diets and is accumulated in the flesh and ovaries of farmed fish. The presence of canthaxanthin has been successfully used to distinguish between escaped farmed and wild salmon and to identify the redds (nests) of escaped farmed salmon which have spawned in Scottish rivers. The pigment is also detectable for a short period in emergent fry but pigment profiles soon become attenuated when fish start to accumulate naturally occurring pigments. (None of this work is particularly new - work done in late 80s, early 90s.)

Sweden: Annual taggings of a certain proportion of compensatory released smolt. In 1997 a total of 4,436 salmon and sea-trout were Carlin-tagged and released.

Iceland: Ranching stations required to tag 10% of releases up to 100,000 released. Fixed at 10,000 for larger releases.

Norway: Contact between the relevant research institutions has been established to elucidate the feasibility and positive and negative effects for management, research and the industry of schemes for individual marking of aquaculture fish. A pilot project has been started and will present a report by 1 June 1998.

Russian Federation: No measures reported.

USA: Investigation into a universal, cost effective, durable and readily identifiable mark for aquaculture fish is planned. Experiments with elastomer tags are ongoing. Studies are being funded by the Maine Aquaculture Innovation Center and others will be considered by the Working Group.

4.1.4 Designation of aquaculture regions

Canada: Zoning under consideration or in progress (varies according to province).

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: No.

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: This is under strict control by the Dept of the Marine and Natural Resources under existing aquaculture licensing system.

Northern Ireland: No activity.

Scotland: The concept of an "aquacultural region" has little significance to disease control for salmonids, in that UK mainland is considered as one zone (with the exception of Gigha for List II fish diseases). However, we should note the attempts being made within some sectors of industry to develop the notion of regional management areas in respect of lice control.

Sweden: No specific research or development have been carried out.

Iceland: Not applicable.

Norway: A provision for implementing a system of aquaculture regions (regionalisation) as a measure for disease control was introduced with the new Fish Disease Act which came into force on 1 January 1998. Further consideration of the consequences for the industry will be made before the system can be implemented. It is also desirable to get a similar authority in the Aquaculture Act.

Russian Federation: No measures reported.

USA: Zones are part of the NAC Protocols.

4.1.5 Alternative production methods (land-based, closed or contained floating facilities and other containment technologies)

Canada: In progress; land based technology is very expensive.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: There are at the moment three landbased closed floating facilities and two contained floating facilities.

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: Under investigation at present.

Northern Ireland: No activity.

Scotland: It is in industry's best interests to establish production systems which minimise the transmission of disease and parasites. Land based salmon grower sites have not proved to be economically viable in Scotland and most of those which existed have either become specialised in broodstock production or have turned to other species such as halibut. Without full disinfection of effluent water, the risk of any disease present being discharged to the open environment still exists. It should also be noted that it is not always the case that risk is reduced by the use of land-based and re-circulating systems. Difficulties in cleansing of tanks and pipework and the rapid escalation of disease within a re-circulating system are factors to be considered.

Sweden: During the 1980's several landbased systems with various degrees of re-circulation and purification of discharges were tested (some for salmonid fish) but all pilot projects failed to achieve any economic profit. At present there are a few commercial landbased eel culture units but there are no plans to start any new development of alternative production methods for salmon.

Iceland: Over 70% of farmed production from land-based facilities, the remaining 30% from one cage-facility.

Norway: Aquaculture in closed systems has been tried on an experimental basis, both in land-based and floating facilities. At present, these production methods do not seem to be economically feasible, and containment measures have in some instances been reported to be insufficient.

Russian Federation: No measures reported.

USA: A land-based facility is currently under construction and will be used for experimental purposes. In addition, the Maine industry has experimented with a wide variety of cage types. A Code of Containment is being developed.

4.1.6 Use of local broodstocks

Canada: In progress; done routinely for enhancement.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Yes.

England and Wales: No measures reported.

Finland: No measures reported.

Ireland: This is being evaluated within the National microtagging programme annually.

Northern Ireland: Work concluded. Paper published. Expenditure covered under paragraph 4.1.3 above.

Scotland: As indicated above stocks from multiple sources are currently used in Scotland. Research is on-going to generate information on levels of genetic diversity in farmed strains in Scotland. As part of the LINK Aquaculture Marker Assisted Selection Programme (funded by the SSGA and NERC), staff at the Marine Laboratory are currently involved in the screening of a number of farm

lines (7 in 1997, and more in 1998) using protein electrophoresis and mitochondrial and minisatellite DNA variation to assess existing levels of genetic variability. Although this work is being undertaken primarily to determine whether existing farm lines would be a suitable starting point for genetic improvement through marker assisted selection, it will also yield valuable new information on current levels of genetic diversity in farmed stocks in Scotland, and how it compares with that present in wild salmon from throughout Europe.

Sweden: Local broodstock are used wherever possible.

Iceland: Norwegian origin stocks mostly in farming operations. Ranched salmon are Icelandic ranching stocks from nearby areas.

Norway: A project has been carried out to estimate genetically based improvements in production traits within the Norwegian industrial breeding programme. In this programme 4th generation salmon from the industrial breeding stock was compared to a wild salmon stock. The provisional results show significant increase in fish growth, both in fresh and seawater. With regard to diseases, no difference was found in resistance to bacterial diseases such as furunculosis, vibriosis and cold water vibriosis, and resistance to ISA was found to be lower than in the wild stock.

Russian Federation: No measures reported.

USA: The Maine industry is currently raising local broodstock for enhancement purposes. In recent discussions with the industry, they indicated a willingness to use any surplus in experimental growth trials. They also have committed to experiment with other native North American strains, provided the resource agencies can provide access to these stocks.

4.1.7 Understanding of genetic interactions

Canada: In progress.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Since there are (practically) no self-preserving wild salmon in Denmark genetic interaction is not a problem.

England and Wales: No measures reported.

Finland: Since 1979 studies have been conducted of the number of juveniles at permanent sampling sites and the number of escapees in the catch.

Ireland: Resarch underway funded by the EU on impacts of escapees on wild populations.

Northern Ireland: DANI projects 9317/9318 active in 97/98. Expenditure £22,175.

Scotland: Concern about the adverse consequences of breeding between escaped and indigenous salmonid centres on the existence of locally adapted salmon populations and the relative fitness of farmed and wild fish. Although there is a growing body of evidence for the former the determinants of relative fitness are not well understood or indeed currently measurable. In theory the progeny of farmed fish might be viewed as less fit, suffer poor survival and contribute little to future generations, ie not constitute a problem. However, if they escaped in sufficiently large numbers, or occupied spawning habitat to the detriment of wild fish or over-cut the redds of wild fish, their progeny could

constrain the production of wild fish in freshwater phase being limited by both habitat area and quality. Thereafter the outcome would be affected by the extent to which progeny of farmed salmon proved fit over the remainder of the life cycle, for example, whether they possessed the necessary co-adapted genes to migrate to sea and return to spawn. The fact that despite the substantial effort expended, attempts to establish self sustaining salmon populations in rivers where salmon have been lost have been largely unsuccessful is a powerful argument for the importance of local adaptation and the need to conserve genetic integrity. No work directly addressing this question is currently underway. Indeed it would be difficult to do the definitive experiment. The outcome would depend on a number of factors, eg differences in the genetic makeup of source and sink populations, relative numbers, time of escape, environmental conditions, match or mismatch of spawning time in the two groups, and relative fitness (which is not measurable). A study in the River Polla indicated fish escaped from cages in Loch Eriboll in 1989 entered rivers and spawned with wild salmon, mainly within the lower reaches of the system. Using the tools then available we were unable to detect any significant changes in the genetic makeup of the wild populations, before and after the event. It was suggested that the farmed stock had been substantially founded on local wild population, although the farmer said this was not the case!

Sweden: Regular genetic monitoring in hatcheries and rivers carrying wild populations.

Iceland: Responsibility of Directorate of Freshwater Fisheries.

Norway: Throughout the last decade, studies have been carried out on genetic interactions between escapees from the industry and wild stocks of salmon. During the last few years, studies have also been conducted on ecological and genetic consequences for the wild stocks.

Russian Federation: No measures reported.

USA: The wild stock has been intensively studied genetically and interbreeding with European farm raised fish has not been documented. Seasonal weirs are placed at some river mouths to facilitate exclusion of escapees from spawning grounds.

4.1.8 Prevention and control of disease and parasites

Canada: In progress; transgenics hold promise here.

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

European Union:

Denmark: Yes, Bacterial Kidney Disease in the Skjern Stream System.

England and Wales: There are numerous research projects on the control and prevention of disease problems, in government and other research organisations, often running in conjunction with the industry.

Finland: No measures reported.

Ireland: Large-scale monitoring programmes carried out annually by the Marine Institute and the Regional Fisheries Boards.

Northern Ireland: Sea lice monitoring in adult salmon and sea trout. Expenditure covered under 4.1.3 above.

Scotland: SOAEFD supports a comprehensive package of research in this area including projects on vaccination, the development of better methods of detection and control of disease and understanding the actiology of diseases in wild fish. Specific projects include: improvements in the control of *Furunculosis*; developing better methods for the detection of *Gyrodactylus salaris*, detection and control of Bacterial Kidney Disease; Pancreas Disease and to improvements in the control of the spread of IPN virus. The development or improvement of vaccines to a wide range of fish pathogens is being investigated including: *Furunculosis,* IPN Virus, Pancreas Disease, Salmon louse, ERM and *Pasteurella* and research on the understanding of the fish immune system to improve vaccine effectiveness and delivery. The interaction of disease in wild and farmed fish and the occurrence of Rhabdoviruses in wild marine fish in European coastal waters is also being investigated.

Sweden: Regular health control of broodstocks and hatchery production (see 1.2.1, 3.1 and 3.2)

Iceland: Responsibility of Fish Disease Veterinary Officer and Fish Disease Committee.

Norway: Important areas of research on diseases and parasites include:

1. Sea lice (*Lepeophtheirus salmonis)*
* Parasite biology
* How low temperature affects the development of the parasite
* Impacts on wild stocks of salmonids
2. Infectious Salmon Anaemia - ISA
* Characterization of the infective agent
* Development of an improved diagnostic method
3. Infectious Pancreatic Necrosis Virus - IPNV
   * Pathogenesis studies on IPNV in salmon smolts
   * Atlantic salmon as carrier of IPNV - effect on the immune system
4. *Gyrodactylus salaris*
   * Monitoring, effects of rotenone, alternative treatment regimes, parasite biology, taxonomy and host specificity
5. Vaccines and vaccine-strategy
   * Development of improved vaccines and vaccine strategies with particular emphasis on IPNV and cold water vibriosis

Russian Federation: No measures reported.

USA: In addition to fish health regulations, a Fish Health Advisory Board has been established in Maine to maintain oversight for the health of both cultured and wild stock. Disease screening of wild stock is also ongoing.

ANNEX 21

Council

CNL(98)37

Additional return made in accordance with the Oslo Resolution - Faroe Islands

Since document CNL(98)28, 'Returns made in accordance with the Oslo Resolution', was prepared we have received a return for the Faroe Islands according to the new format. This is attached.

Secretary
Edinburgh
5 June 1998

CNL(98)37

Additional return made in accordance with the Oslo Resolution - Faroe Islands

Part 1. General Measures

1.1 Sites

1.1.1 Sites only to be assigned for aquaculture where hydrographical, epidemiological, biological and ecological standards can be met

Denmark (in respect of the Faroe Islands and Greenland): The number of sea farms in the Faroes has been reduced from 63 farms in 1990 to 24 farms operated by 17 companies in 1997, and the long term policy of the authorities aims at having only one farm in each fjord.

1.1.2 Siting of units to avoid risk of damage by collision

Denmark (in respect of the Faroe Islands and Greenland): As all other units at sea, the aquacultural units shall follow IALA standards. The farming of salmon has been rather unstable in the Faroes for the last 10 years, but in the very near future, all aquacultural sites will be showed on the charts.

1.1.3 Adequate marking of aquaculture units

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

1.2 Operations

1.2.1 Management of aquaculture units to prevent and control diseases and parasites

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

1.2.2 Management of aquaculture units to prevent escape of fish

Denmark (in respect of the Faroe Islands and Greenland): The harsh weather conditions in the islands ensure that equipment used in the fishfarming industry is upgraded, as soon as new technological improvements become available. At the most exposed sites, fish-cages of Bridgestone and Dunlop type are used.

1.3 Transfers

1.3.1 Transfers conducted so as to minimise potential for disease/parasite transmission and for genetic and other biological interactions

Denmark (in respect of the Faroe Islands and Greenland): All transfers of smolts from the smolt units to the sea farms, as well as all movements of fish from one fjord to another, require inspection by a fish disease veterinarian and approval from the Chief Veterinary Officer.

1.3.2 Introduction of mechanisms to control transfers where necessary

Denmark (in respect of the Faroe Islands and Greenland): All transfers of smolts from the smolt units to the sea farms, as well as all movements of fish from one fjord to another, require inspection by a fish disease veterinarian and approval from the Chief Veterinary Officer.

Part 2. Measures to Minimise Genetic and Other Biological Interactions

2.1 Design Standards for Aquaculture Units

2.1.1 Establishment of standards and technical specifications for the design and deployment of aquaculture units (marine and freshwater)

Denmark (in respect of the Faroe Islands and Greenland): No official standards or specifications of technical equipment used in fish farming are required. On the other hand, the fishfarmer needs an approval of cages and mooring systems from the insurance company before start up, and cages containing fish with a value exceeding 2 million D Kr require a double netting.

2.1.2 Optimisation of containment of fish through use of appropriate technology for prevailing conditions

Denmark (in respect of the Faroe Islands and Greenland): The harsh weather conditions in the islands ensure that equipment used in the fishfarming industry is upgraded, as soon as new technological improvements become available. On the most exposed sites, fish-cages of Bridgestone and Dunlop type are used.

2.1.3 Regular routine inspection and maintenance of aquaculture systems and upgrading of equipment as new technological improvements become available

Denmark (in respect of the Faroe Islands and Greenland): Representatives from the insurance companies inspect the farms and technical equipment twice a year, as well as when the fish farm is expanding, and/or new equipment is purchased. Scuba diving on a regular basis to inspect equipment and fish is practised on most fish farms.

2.1.4 Regular monitoring and use of efficient security systems

Denmark (in respect of the Faroe Islands and Greenland): Representatives from the insurance companies inspect the farms and technical equipment twice a year, as well as when the fish farm is expanding, and/or new equipment is purchased. Scuba diving on a regular basis to inspect equipment and fish is practised on most fish farms.

2.2 Salmon Enhancement

2.2.1 Use of local stocks wherever possible

Denmark (in respect of the Faroe Islands and Greenland): Only local stock is used, for the release of fry in the streams, by the sport fishermen's associations.

2.2.2 Implementation of criteria for broodstock selection and management

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

2.3 Salmon ranching

2.3.1 Use of local stocks or alternatively local ranching stocks

Denmark (in respect of the Faroe Islands and Greenland): Experiments with salmon ranching in the Faroes were discontinued from 1990.

2.3.2. Harvesting of ranched fish at or close to release site or in fisheries managed in a way that prevents over-harvesting of wild stocks

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

2.4 Salmon farming

2.4.1 Use of local broodstocks where practicable

Denmark (in respect of the Faroe Islands and Greenland): The 'local' salmon stock (originally imported from Iceland) is inferior for farming, as it is a 100% grilsing strain.

2.4.2 Efforts to recapture escaped farmed salmon

Denmark (in respect of the Faroe Islands and Greenland): During the last few years, the fish farming industry in the Faroes has seen a change from 63 small companies operating in the fjords, to 17 bigger, better managed and economically stronger companies in operation in 1997. This radical change in the industry, together with gained farming experience and substantial new technological improvements of farming equipment, has considerably reduced the problem of fish escaping from the farms. During collection of broodfish for enhancement purposes, escaped farmed fish are removed from the spawning grounds in the streams.

2.4.3 Establishment of site specific contingency plan in the event of large escapes

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

Part 3. Measures to Minimise Disease and Parasite Interactions

3.1 Control and prevention of diseases and parasites

3.1.1	**Aquaculture production process conducted in accordance with appropriate fish health protection and veterinary controls, including the application of appropriate husbandry techniques to minimise risk of diseases (vaccination, use of optimum stocking densities, careful handling, frequent inspection of fish, proper diet and feeding regimes, avoidance of unnecessary disturbance, detailed health inspections, disinfection of transportation equipment and use of disinfection baths at production facilities)**

Denmark (in respect of the Faroe Islands and Greenland): The Faroese Parliamentary Act No. 26 of April 30, 1987 addressed diseases in fish, shellfish and crayfish. This act replaces the act of 1970 regarding provisions in relation to disease, destruction, import etc. This act also provides the Chief Veterinary Officer of the Faroe Islands with far reaching authority. All smolts and rainbow trout are vaccinated with triple-vaccines, before transfer to the sea farms. Disinfection of transportation equipment and use of disinfection baths in lock gates is standard in production facilities, smolt farms and in connection with visitors on sea farms.

3.1.2	**Treatment or removal of diseased stock and measures to ensure diseased fish are not released to the wild**

Denmark (in respect of the Faroe Islands and Greenland): The Faroese Parliamentary Act No. 26 of April 30, 1987 addressed diseases in fish, shellfish and crayfish. This act replaces the act of 1970 regarding provisions in relation to disease, destruction, import etc. This act also provides the Chief Veterinary Officer of the Faroe Islands with far reaching authority.

3.2 Stocking density

3.2.1	**Aquaculture production adapted to the site's holding capacity and stocking density should not exceed levels based on good husbandry practices**

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

3.3 Removal of dead of dying fish

3.3.1	**Removal of dead/dying fish and disposal along with waste materials in an approved manner**

Denmark (in respect of the Faroe Islands and Greenland): Dead or dying fish are as a rule removed daily or every second day from the pens. Dead fish and fish not suitable for human consumption, are ensiled together with the offal from the processing of salmon and trout, and used as food for mink. Material not suitable for this purpose, as well as dead fish from the smolt farms, is transported in special containers to the incinerator plants for burning.

3.3.2 Establishment of procedures for effective removal and disposal of infectious material

Denmark (in respect of the Faroe Islands and Greenland): Dead or dying fish are as a rule removed daily or every second day from the pens. Dead fish and fish not suitable for human consumption, are ensiled together with the offal from the processing of salmon and trout, and used as food for mink. Material not suitable for this purpose, as well as dead fish from the smolt farms, is transported in special containers to the incinerator plants for burning.

3.3.3 Establishment of contingency plans for disposal of mortalities from emergency situations

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

3.4 Adequate Separation

3.4.1 Separation of aquaculture facilities on the basis of a general assessment of local conditions

Denmark (in respect of the Faroe Islands and Greenland): Despite the very big reduction in the number of companies operating in the fishfarming industry, there are still some fjords with more than one fishfarming company in operation. The long term policy of the regulatory authorities is, however, to have only one company farming in each fjord, and in most locations this is the situation today. Farming companies with access to more than one fjord work with fallowing, and rearing of different generations in separate fjords, while the majority of the companies only have access to work in this way between different sites on the same fjord.

3.5 Year Class Separation

3.5.1 Rearing of different generations in separate locations where possible

Denmark (in respect of the Faroe Islands and Greenland): Denmark (in respect of the Faroe Islands and Greenland): Despite the very big reduction in the number of companies operating in the fishfarming industry, there are still some fjords with more than one fishfarming company in operation. The long term policy of the regulatory authorities is, however, to have only one company farming in each fjord, and in most locations this is the situation today. Farming companies with access to more than one fjord work with fallowing, and rearing of different generations in separate fjords, while the majority of the companies only have access to work in this way between different sites on the same fjord.

3.6 Fallowing of Sites

3.6.1 Use of a fallowing regime wherever possible

Denmark (in respect of the Faroe Islands and Greenland): Despite the very big reduction in the number of companies operating in the fishfarming industry, there are still some fjords with more than one fishfarming company in operation. The long term policy of the regulatory authorities is, however, to have only one company farming in each fjord, and in most locations this is the situation today. Farming companies with access to more than one fjord work with fallowing, and rearing of different generations in separate fjords, while the majority of the companies only have access to work in this way between different sites on the same fjord.

3.7 Use of Medicines and Disinfectants

3.7.1 Careful use of medicines and disinfectants in accordance with manufacturers' instructions, Codes of Practice and in compliance with regulatory authorities

Denmark (in respect of the Faroe Islands and Greenland): All fish farms are visited on a regular monthly basis by the fish disease veterinarians, and medicines and disinfectants can only be purchased through the veterinary system.

3.8 Lists of Diseases

3.8.1 Lists of prevailing infectious diseases and parasites and methods for control to be maintained by appropriate authorities

Denmark (in respect of the Faroe Islands and Greenland):

IPN: screening of broodfish
Furunculosis and Cold Water Vibriosis: are controlled by vaccination of all smolts.
BKD: ELISA screening of broodfish and rearing of the broodfish in facilities separated from commercial fish farming.
Lepeophtheirus and *Caligus*: are a problem in some of the fjords, and here the fish have to be treated regularly under veterinary control.

Part 4. Research and Development

4.1 Research, small-scale testing and full-scale implementation of

4.1.1 Wild salmon protection areas

Denmark (in respect of the Faroe Islands and Greenland): Originally trout (*Salmo trutta*) was the only anadromous salmonid fish spawning in Faroese streams. From 1947, however, salmon fry (*Salmo salar*) were introduced from Iceland, and the three most important streams with self-sustaining grilse populations of this origin, are naturally separated from the farming fjords.

4.1.2 Sterile salmon

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

4.1.3 Tagging and Marking

Denmark (in respect of the Faroe Islands and Greenland): No measures reported.

4.1.4 Designation of aquaculture regions

Denmark (in respect of the Faroe Islands and Greenland): The Faroese Parliamentary Act No. 57 of May 24, 1974 addressed building, arrangement, establishment and expansion of plants for hatching roe and for farming fish. This act states that an aquaculturist must acquire a permit from the Faroese government prior to building or expanding a hatchery or a fish farm. The Faroese Act No. 134 of October 29, 1988 addressed protection of the environment. If an aquaculturist wishes to establish or expand a fish farm, it is necessary to obtain approval from the Ministry of the Environment, according to the Environment Act administered by the Hygienic Institute. The long term policy of the Faroese government today is: no more than one fish-farm on each fjord suitable for fish farming.

4.1.5 Alternative production methods (land-based, closed or contained floating facilities and other containment technologies)

Denmark (in respect of the Faroe Islands and Greenland): One land-based farm, rearing broodstock for the national breeding programme for Atlantic salmon, is in operation. Land-based, closed or contained floating facilities, or the use of sterile salmon are, for the time being, economically non-feasible in commercial fish farming in the Faroe Islands.

4.1.6 Use of local broodstocks

Denmark (in respect of the Faroe Islands and Greenland): The first experiments with salmon farming at sea in the Faroes were conducted by The Fisheries Laboratory in 1977, with fish of Faroese origin. In 1979 further experiments followed, now using material originating from eggs imported from Iceland. But slower growth and early maturation made these fish quite inferior to the Norwegian "Sunndalsøra-strain" imported by the Fish Laboratory as eyed eggs in the years 1978-1984.

4.1.7 Understanding of genetic interactions

Denmark (in respect of the Faroe Islands and Greenland): The Faroese Parliamentary Act Number 46 of June 23, 1970 prohibited import of live trout and salmon. This Act was in place ten years before the first commercial fish farms even started. The Faroese government was already trying to protect the future industry of aquaculture, and the environment from transfer of diseases. All smolts for the industry are produced in the islands, and no live salmonid fish or eggs have been imported to the Faroes after 1984.

4.1.8 Prevention and control of disease and parasites

Denmark (in respect of the Faroe Islands and Greenland): Prevention and control of diseases has a high priority in the national breeding programme for Atlantic salmon. The criteria for selection are high growth rate, late sexual maturation, resistance towards diseases and quality at slaughtering. To minimise the risk of diseases in the broodstock used in this breeding programme, a big landbased brood-fish farm has been constructed on Sandoy, one of the few islands with no commercial fish farming. All salmon farmed in the Faroe Islands have their origin from the national breeding programme. A general "Fish Health Programme" for the entire fish farming industry, worked out by The Chief Veterinary Officer of the Faroe Islands, is under consideration.

ANNEX 22

Council

CNL(98)29

Report on the Meeting of the Wild and Farmed Salmon Liaison Group

CNL(98)29

Report on the Meeting of the Wild and Farmed Salmon Liaison Group

1. The ICES/NASCO Symposium gave grounds for concern that the risks to the wild stocks may be more serious than we had previously thought (see CNL(98)26). If adverse genetic impacts are confirmed they may be irreversible and, if the views of the many authoritative scientists prove to be well-founded, the demise of the wild salmon in their present diverse forms may not be far behind. There is, therefore, urgency about the need to protect the wild stocks. One important approach is to cooperate with the industry so as to make progress with mutually agreeable implementation of measures to protect the wild stocks.

2. The Report of the First Liaison Group Meeting between NASCO and the International Salmon Farmers' Association (ISFA) is attached. The meeting was a first step in co-operating more closely with the salmon farming industry with the aim of avoiding adverse genetic, disease and parasite impacts on the wild stocks whilst allowing the continued development of the industry.

3. The meeting allowed a frank exchange of views and established a new relationship based on cooperation. There was a good spirit at the meeting. However, only limited progress was made because the ISFA were, as yet, not ready to respond to the issues raised.

4. The Council is asked to consider this report, which has been agreed by both the NASCO and the ISFA representatives who attended the meeting, and comment on the future direction of collaboration with the International Salmon Farmers' Association and to consider whether other steps may be necessary.

Secretary
Edinburgh
18 May 1998

Report of the First Meeting Of The Wild And Farmed Salmon Liaison Group

Scottish Exhibition And Conference Centre, Glasgow
Friday 20 March 1998

1. Opening of the Meeting

1.1 The Secretary of NASCO thanked the ISFA for agreeing to host the meeting. He referred to previous cooperation between NASCO and the salmon farming industry and noted that the challenge was to put this relationship on a more solid basis since there are many areas of common interest. Salmon farming has contributed to a reduction in exploitation of the wild stocks and industry-funded research has contributed to an increased understanding of the species. The wild stocks represent a gene bank available to the industry in developing strains with desirable characteristics and the farmed product rests firmly on the image of the wild fish. Both ISFA and NASCO have an interest in minimising escapes of farmed fish. He indicated that, as with all relationships, there could be winners and losers. In a lose-lose scenario escapes of farmed salmon would lead to homogenisation of the wild stocks with a loss of genetic diversity. The blame for this would fall on the industry leading to a loss of confidence in its sustainability and environmental credibility and as a consequence reductions in sales. A product once considered 'healthy' and 'environmentally friendly' would lose its image. Conversely, he suggested that in a win-win scenario the wild stocks would be maintained in their genetically diverse form, the salmon farming industry would be sustainable and perceived as environmentally friendly and it would have a competitive advantage over other foods.

NASCO has been concerned, since the late 1980's, about the interactions between cultured and wild Atlantic salmon. These concerns had led the Council of NASCO to adopt the Oslo Resolution (designed to minimise the impacts) and Guidelines for Action on Transgenic Salmon. Last year, in conjunction with ICES, NASCO had organised an international symposium to review the latest scientific findings concerning interactions and the management issues. The information at the Symposium was important in reviewing the measures developed by NASCO to minimise impacts. He believed that, on this issue of interactions between wild and cultured salmon, it is better to work internationally since the industry would have some confidence that salmon farmers in one country would not be put at a competitive disadvantage and those concerned with the wild stocks would have some confidence that there will be widespread implementation of any future accord. He stressed that NASCO is not anti-salmon farming. Almost all NASCO Parties would wish to foster salmon farming, but not at the price of damaging the wild stocks. None of NASCO's Contracting Parties believe that the only threat to the wild stocks is from aquaculture and all have accepted that they must make sacrifices in exploiting the resource so as to conserve stocks. He noted that approximately half of the NASCO delegates participating in this first meeting of the Liaison Group work with the aquaculture industry rather than wild fish and stressed that the NASCO delegation is emphatically not anti-salmon farming. However, NASCO is determined to conserve the wild stocks in their present range with their present biological diversity. All NASCO Parties are committed by an international Treaty to this objective. He explained that

for a number of reasons not all Parties could be represented at the meeting but stressed that this did not mean that NASCO does not value the contact. There is a strong mandate from the Council of NASCO to work with the ISFA and there is a strong incentive to ensure a mutually beneficial outcome.

1.2 Mr Otto Gregussen, Secretary of the Norwegian Fish Farmers' Association, indicated that the ISFA shared the sentiments expressed by Dr Windsor. He stressed that the ISFA had limited funds for administrative support and attendance at meetings and it was not able to adopt decisions which would be binding on its members. The ISFA recognised that there is a common interest in ensuring that there is a win-win situation. He indicated that there had been some hesitation within the ISFA about entering into a process of cooperation with NASCO. However, he believed that cooperation between the two organizations was vital and that this would require building trust and developing methods to work together.

1.3 A list of participants is attached (Appendix 1).

2. Election of a Chairman

2.1 The NASCO delegation proposed that Mr Otto Gregussen be elected as Chairman. He was duly elected.

3. Nomination of a Rapporteur

3.1 The ISFA delegation proposed that Dr Malcolm Windsor be appointed as Rapporteur and he was duly appointed He suggested that it would be important that a mutually acceptable report of the meeting be produced. It was agreed that a draft report of the meeting will be circulated to all participants for comment and that co-ordination of any comments from the ISFA be through the Chairman.

4. Adoption of the Draft Agenda and Draft Constitution for the Liaison Group

4.1 The Liaison Group adopted an agenda for the meeting (Appendix 2).

4.2 The Liaison Group adopted a Constitution (Appendix 3), to serve as a basis of future cooperation between NASCO and ISFA. It was recognised that the Member States of the European Union were represented differently in the ISFA and in NASCO. It was agreed that there would be a flexible approach to representation within the Liaison Group.

5. Advances in research of relevance to wild and farmed salmon interactions

5.1 A brief summary of the two published reports resulting from the ICES/NASCO Symposium on "Interactions between Salmon Culture and Wild Stocks of Atlantic Salmon: The Scientific and Management Issues" was presented. This major international symposium had reviewed the results of research on the interactions between salmon culture and wild Atlantic salmon. A total of 30 scientific papers had, following peer review, been published in the ICES Journal of Marine Science (Volume 54). A separate report on the Symposium by the Convenors has been published by the Norwegian Institute for Nature Research. This report draws on the

scientific papers and on the Chairman's summary of each session. The Convenors had concluded that, in the light of the new information presented at the Symposium on the risks to the wild salmon that appear to be posed by interactions with cultured salmon, there is urgency about the need for action. There are challenges for all those who manage salmon, whether they be wild or cultured stocks. They believe that if no precautionary action is taken and if the views of many authoritative scientists prove to be well-founded, the demise of the wild salmon in their present diverse forms may not be far behind.

5.2 Clarification was sought by the ISFA on the status of the Convenors' Report. The NASCO Secretary indicated that the report simply represented the views of the Convenors and it had not yet been formally considered by the Council. Given the range of issues addressed in the report it was unlikely that all NASCO Parties would agree with every conclusion. Nevertheless, like most symposia reports, its purpose was to contribute to informed debate and eventual decision making. The report had been reviewed by a Working Group established by NASCO to consider implementation of the Oslo Resolution and will go forward to the Council in June.

5.3 Some of the ISFA representatives indicated that they did not agree with the conclusions of the Convenors and were concerned that the document might be seen as official NASCO policy. The NASCO Secretary confirmed that the report was not official NASCO policy but represented the views of the Convenors who had organised the meeting and reviewed all the scientific papers. He suggested that it would be appropriate for the salmon farming industry to prepare a paper indicating where it disagreed with the conclusions and why. Such a paper should go to NASCO Council so that it was aware of the industry's response. It was agreed that the ISFA would make its best endeavours to respond to NASCO, detailing its response to the conclusions in the Convenors' Report, by the end of the year.

6. Technical developments in the industry of relevance to wild-farmed salmon interactions

(a) Transgenic fish

6.1 The NASCO Guidelines for Action on Transgenic Salmon were distributed to the Liaison Group. The promoters of transgenic salmon, Aqua Bounty, had presented their biotechnology as a way to protect the wild stocks since the rapid growth and improved feed conversion efficiency of transgenic salmon would lead to greatly reduced production costs which, they believe, would allow the industry to utilise land-based re-circulation systems away from salmon rivers.

6.2 The ISFA indicated that it is not in favour of transgenic salmon. It was reported that the pilot project with transgenic salmon at a farm in Scotland has been terminated. The view was expressed that those funding public research and development programmes in support of the aquaculture industry should focus more on issues of interest to that industry.

(b) Other developments

6.3 The salmon farming industry representatives indicated that there is a continuous

process of development of new technologies aimed at reducing escapes of farm salmon. While it was stressed that containment will probably never be 100%, the fish farming industry is driving improvements in design so as to minimise escapes. Industry-funded research is also being undertaken on aspects such as genetic markers and fish health. There has been much progress in recent years in developing a co-ordinated approach to the treatment of sea-lice. The ISFA agreed to prepare a brief report summarising the management measures in place and research being undertaken in its member countries for consideration at the next meeting.

6.4 Research, funded by the European Commission, is presently being conducted into the ecological and husbandry aspects of all-female triploid (sterile) salmon and the results should be available in 1999. The use of sterile salmon in aquaculture at some future date might provide a way to avoid irreversible genetic changes to the wild stocks. While some salmon farmers may be in favour of using sterile salmon others would have concerns. The representatives of NASCO asked what the concerns of the ISFA would be about the use of sterile salmon by the salmon farming industry if it was shown to be a technique of assistance in protecting the wild stocks. The representatives of the ISFA indicated that there were concerns about slower growth, presence of deformities and health problems associated with sterile salmon. There are also marketing aspects which would need to be addressed and, in this regard, appropriate product labelling would be an important consideration. It was recognised that all-female and, to a lesser extent, all-female triploid rainbow trout are produced without any apparent marketing problems. The Liaison Group agreed to consider further the pros and cons of sterile salmon at its next meeting.

7. Progress and difficulties in implementing the Oslo Resolution of NASCO

7.1 The Resolution by the Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean to Minimise Impacts from Salmon Aquaculture on the Wild Salmon Stocks (the Oslo Resolution) was adopted by the Council of NASCO in 1994, following consultations with representatives of the salmon farming industry. It had been agreed that the subject of impacts of aquaculture would be reviewed annually by NASCO and that the situation regarding implementation of the recommendations in the Resolution would be re-examined in 1998 with a view to considering whether additional measures may be desirable. In 1997 the Council had recognised that much would need to be done if there was to be full implementation by 1998 and agreed to establish a Working Group to consider further the implementation of the Oslo Resolution in the light of the information arising from the ICES/NASCO Symposium.

7.2 A brief summary of the report of this Working Group was presented to the Liaison Group although the recommendations will not be considered by the Council of NASCO until its meeting in June. The main recommendations of the Working Group were as follows:

- there is a need for the Parties to provide comprehensive information to the Council since the returns to date do not reflect the range of measures in place and activities underway designed to protect the wild stocks from adverse impacts of aquaculture.

- in order to have confidence that the wild stocks are protected from irreversible

genetic change, from ecological impacts and from the impacts of diseases and parasites, the measures in the Oslo Resolution need to be fully implemented and stronger measures considered where appropriate.

- while there have been improvements to cage structures to reduce escapes, containment measures are currently not adequate. Renewed efforts should be made to minimise escapes and a more effective enforcement policy should be adopted. Efforts to improve recapture procedures should be increased provided that these can be conducted without adversely affecting the wild stocks.

- there should be a closer cooperative effort on developing guidelines on physical containment measures and husbandry practices for salmon farms and the salmon farming industry should be invited to participate in this process.

- the use of sterile salmon in farming should be the subject of a substantial review by the Council in 1999 when the results of ongoing research should be available.

7.3 The Liaison Group discussed the level of escapes from salmon farms. In Norway it is thought that approximately 1 million fish escape annually. The ISFA agreed to consider how information on the level of escapes might be improved. The representatives of NASCO indicated that the Council of NASCO is undertaking a similar review with regard to the problem of unreported catches. It was recognised that in addition to catastrophic losses associated with storm and other damage to cages, 'trickle losses' could be a significant problem in some situations. From the point of view of interactions, the Liaison Group recognised that information on the occurrence of farmed fish in the fisheries and in rivers was important. It was noted that in recent years there had been a reduction in the proportion of farmed salmon in the sampling programmes in spite of a considerable increase in production of farmed salmon and a continuing decline in the wild stocks. It was agreed that the information provided to NASCO by ICES concerning the occurrence of farmed salmon in the wild should be provided to the ISFA.

7.4 The Liaison Group agreed that the report of the Working Group on Implementation of the Oslo Resolution should be sent to the ISFA once it had been considered by the Council of NASCO, and that the question of cooperation on development of guidelines on containment measures and husbandry practices could be considered at the next meeting of the Group.

8. Any Other Business

8.1 A brief presentation was given on the conclusions of a Working Group established by the Council of NASCO to advise on how the Precautionary Approach could be applied to salmon management. This approach is being widely advocated and is influencing the thinking of many inter-governmental organizations. Under a Precautionary Approach there is a need to be more cautious when information is uncertain or inadequate, and the absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures. It requires *inter alia* consideration of the needs of future generations and avoidance of changes that are not potentially reversible, initiation of corrective measures without delay and appropriate placement of the burden of proof.

8.2 The report of the Working Group will be presented to the Council of NASCO at its meeting in Edinburgh in June and there will be a half-day Special Session on this subject on the afternoon of 8 June. Representatives of the ISFA were invited to participate in this Special Session and it was agreed that details of the session and a copy of the Working Group report would be sent by NASCO to the Secretary of the ISFA.

8.3 From the salmon farmers' side it was stated that the Precautionary Approach is increasingly part of their industry's efforts to evolve new management systems to minimise environmental impacts. However, the view was expressed that the Precautionary Approach is open to interpretation and there may be occasions where application of the Precautionary Approach could lead to unfortunate consequences despite best intentions. It was recognised that the Precautionary Approach should not be used as a reason for failing to conduct appropriate research aimed at a better scientific understanding of an issue of concern.

8.4 The ISFA asked for clarification of the role of Non-Government Organizations (NGOs) within NASCO. NASCO indicated that it now has a total of 24 accredited NGOs and the Council has welcomed their participation in its meetings. There have been mutual benefits and the extent of their participation in NASCO meetings has been increased. NGO representatives can now attend all meetings of the Council and Commissions, they can make Opening Statements, they receive all documents and they can contribute to Special Sessions. This process has increased the transparency of NASCO's proceedings to the many organizations representing angling and netting interests and those with broader conservation interests. It was agreed that details of the procedures concerning application for NGO status would be sent to the ISFA although because of time constraints at NASCO's annual meetings, the new NASCO/ISFA Liaison Group might well provide a better forum for cooperation on issues of mutual concern.

9. Date and Place of Next Meeting

9.1 The Liaison Group agreed that the meeting had been constructive and promising for future work on issues of mutual concern. A valuable step in building confidence between NASCO and the ISFA had been taken. It was agreed that the process of cooperation should be further developed through a follow-up meeting within a period of 6-12 months.

9.2 The Chairman indicated that it would be advantageous if meetings of the Liaison Group could be held in conjunction with the Annual General Meeting of the ISFA since the organization had very limited funds for attendance at external meetings. It would be desirable to have the widest possible representation at the next meeting of the group and the only time that all ISFA members would be together in the next 12 months would be in Chile at the end of November 1998. The ISFA invited NASCO representatives to meet at that time when there will also be an interesting conference and exhibition on salmon aquaculture. They would be able to offer very inexpensive fares through their Chilean contacts. The NASCO Secretary would need to consult about the level of NASCO representation if the meeting was to be in Chile but agreed to consult on this and to liaise with the ISFA Secretary on arrangements for the next meeting.

10. Close of Meeting

10.1 In closing the meeting, Mr Gregussen expressed his gratitude to all the participants for their contributions to a very fruitful meeting. He referred to the considerable efforts being taken by the salmon farming industry to address the concerns of NASCO and stated that he believed there were opportunities for mutual benefits through future cooperation. Dr Windsor thanked the ISFA for its hospitality and agreed that the meeting had provided a valuable opportunity to consider mutual concerns. He appreciated the excellent spirit of cooperation in which a wide range of issues had been discussed in a short period of time and looked forward to further progress at the next meeting.

Appendix 1

First Meeting Of The Wild And Farmed Salmon Liaison Group

Scottish Exhibition And Conference Centre, Glasgow
Friday 20 March 1998

LIST OF PARTICIPANTS

INTERNATIONAL SALMON FARMERS' ASSOCIATION

MR WILLIAM CROWE	Scottish Salmon Growers Association, Perth, UK
MS AMANDA COURTNEY	International Salmon Farmers' Association, Cheltenham, UK
DR GRAEME DEAR	Scottish Salmon Growers Association, Perth, UK
MR OTTO GREGUSSEN Chairman	Nowegian Fish Farmers Association, Trondheim, Norway
MR KNUT A HJELT	Norwegian Fish Farmers Association, Trondheim, Norway
LORD JAMES LINDSAY	Scottish Salmon Growers Association, Perth, UK
MR ANDRIAS REINERT	P/F Fiskaaling, Hvalvik, Faroe Islands
MR JAMES RYAN	Irish Salmon Growers Association, Co Galway, Ireland
DR JOHN WEBSTER	Scottish Salmon Growers Association, Perth, UK
MR OLAFUR WERNERSSON	Icelandic Fish Farmers Association, Grindavik, Iceland

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

MR DAVID DUNKLEY	Scottish Office Agriculture, Environment and Fisheries Department, Edinburgh, UK
MS EVA ESPELAND	Ministry of Environment, Oslo, Norway
DR PETER HUTCHINSON	NASCO Secretariat, Edinburgh, UK
MR JOHN MOORES	Department of Fisheries and Oceans, St John's, Newfoundland, Canada

MR PHILIP McMAHON	Department of the Marine, Dublin, Ireland
MR VICTOR NESVETOV	Arctic Salmon, Murmansk, Russia
MRS GALJNA NESVETOVA	PINRO, Murmansk, Russia
MR ANDREW THOMSON	DG XIV, European Commission, Brussels, Belgium
DR MALCOLM WINDSOR Rapporteur	NASCO Secretariat, Edinburgh, UK

Appendix 2

WILD AND FARMED SALMON LIAISON GROUP

First Meeting Of The
Wild And Farmed Salmon Liaison Group

Scottish Exhibition And Conference Centre, Glasgow
Friday 20 March 1998

AGENDA

1. Opening of the Meeting

2. Election of a Chairman

3. Nomination of a Rapporteur

4. Adoption of the Draft Agenda and Draft Constitution for the Liaison Group

5. Advances in research of relevance to wild and farmed salmon interactions

6. Technical developments in the industry of relevance to wild-farmed salmon interactions

   (a) Transgenic fish
   (b) Other developments

7. Progress and difficulties in implementing the Oslo Resolution of NASCO

8. Any Other Business

9. Date and Place of Next Meeting

10. Close of Meeting

Appendix 3

WILD AND FARMED SALMON LIAISON GROUP

C O N S T I T U T I O N

The Wild and Farmed Salmon Liaison Group is an advisory group established to provide an international forum for liaison between the salmon farming industry and managers of the wild Atlantic salmon stocks on issues of mutual interest, and to make recommendations for action. The Group will work by consensus.

The Liaison Group shall comprise industry members from each North Atlantic country and representatives from each member Party of the North Atlantic Salmon Conservation Organization (NASCO).

The Liaison Group will meet on an annual basis, or at more or less frequent intervals if it so decides.

The Liaison Group shall appoint from among its members a Chairman who shall serve for a period of two years.

The office of Chairman shall be held alternately by representatives of NASCO and ISFA.

The Secretariats of NASCO and ISFA shall, following consultation, make the arrangements for the meetings of the Group and shall share the administrative responsibilities.

ANNEX 23

Council

CNL(98)50

Press Release

The Fifteenth Annual Meeting of the North Atlantic Salmon Conservation Organization (NASCO) which is concerned with international cooperation on the conservation, restoration, enhancement and rational management of the North Atlantic salmon, was held in Edinburgh, Scotland, during 8-12 June under the Presidency of Mr Einar Lemche (Denmark (in respect of the Faroe Islands and Greenland)).

The Organization has as its member Parties Canada, Denmark (in respect of the Faroe Islands and Greenland), the European Union, Iceland, Norway, the Russian Federation and the United States of America. Observers from two Inter-Governmental and thirteen Non-Governmental Organizations also participated. NASCO comprises a Council and three Commissions (North American Commission, North-East Atlantic Commission and West Greenland Commission).

The scientific advice presented to the Commissions indicated that salmon stocks are at seriously low levels in spite of the management measures taken in recent years. In the light of this, the West Greenland Commission agreed that the 1998 fishery at West Greenland would be restricted to the amount used for internal consumption in Greenland which in the past had been estimated at 20 tonnes. The North-East Atlantic Commission established a quota of 330 tonnes for the Faroese fishery in 1999 and additional restrictive regulatory measures. The North American Commission reviewed the 1997 fisheries and the Canadian and US management measures. In Canada the closure of the commercial fishery in Labrador was announced and a voluntary buy-back programme is in place for Quebec which is expected to reduce the overall harvest in Quebec by 50%. The Commission reviewed its Protocols on Introductions and Transfers designed to safeguard the wild stocks and will consider revised protocols next year. Introductions and transfers may pose ecological and genetic threats and may lead to the spreading of diseases and parasites to the wild stocks.

NASCO and its Contracting Parties agreed to apply the Precautionary Approach widely and consistently to the conservation and management of salmon and its habitats. Under such an approach, which is now influencing the work of many fisheries organizations, the absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures.

The Council strongly emphasised the need to implement the measures in the Oslo Resolution to Minimise Impacts of Aquaculture which it had adopted in 1994. There are concerns that interactions between wild and farmed salmon may cause irreversible damage to the wild stocks. The need for close cooperation with the salmon farming industry on improvements in the management of salmon farming so as to reduce escapes and protect wild stocks was recognised. NASCO will continue to cooperate with the salmon farming industry through a Liaison Group.

The Council believes that the actions it has taken to eliminate the problem of fishing for salmon in international waters by non-Contracting Parties have been successful. It was agreed to obtain information on by-catch of salmon in pelagic fisheries, and to reduce the level of unreported catch.

The Sixteenth Annual Meeting of the Organization will be held in Ireland during 7-11 June 1999.

ANNEX 24

List Of Council Papers

Paper No.	Title
CNL(98)1	Provisional Agenda
CNL(98)2	Draft Agenda
CNL(98)3	Explanatory Memorandum on the Draft Agenda
CNL(98)4	Schedule of Meetings
CNL(98)5	Secretary's Report
CNL(98)6	Audited Accounts for 1997
CNL(98)7	Not issued
CNL(98)8	Budget Commentary
CNL(98)9	Report of the Fifteenth Annual Meeting of the Finance and Administration Committee
CNL(98)10	Report on the Activities of the North Atlantic Salmon Conservation Organization in 1997 (not for publication)
CNL(98)11	Report of the ICES Working Group on North Atlantic Salmon
CNL(98)12	Report of the ICES Advisory Committee on Fishery Management
CNL(98)13	Request for Scientific Advice from ICES
CNL(98)14	Catch Statistics - Returns by the Parties
CNL(98)15	Historical Catch Record 1960-1997
CNL(98)16	Summary of Microtag, Finclip and External Tag Releases in 1997
CNL(98)17	NASCO Tag Return Incentive Scheme
CNL(98)18	Review of Salmon Related Literature
CNL(98)19	Returns under Articles 14 and 15 of the Convention
CNL(98)20	Programme for the Special Session on the Precautionary Approach to Salmon Management
CNL(98)21	Report of the Working Group on the Precautionary Approach to

	Salmon Management
CNL(98)22	Unreported Catches
CNL(98)23	By-catch of Atlantic Salmon
CNL(98)24	Fishing for Salmon in International Waters by Non-Contracting Parties
CNL(98)25	Scientific Research Fishing in the Convention Area
CNL(98)26	Summary of the Convenors' Report of the ICES/NASCO Symposium on "Interactions between Salmon Culture and Wild Stocks of Atlantic Salmon: The Scientific and Management Issues"
CNL(98)27	Report of the Meeting of the Working Group on Implementation of the Oslo Resolution
CNL(98)28	Returns Made in Accordance with the Oslo Resolution
CNL(98)29	Report on the Meeting of the Wild and Farmed Salmon Liaison Group
CNL(98)30	Not issued
CNL(98)31	Guidelines on Catch and Release
CNL(98)32	Election of Officers
CNL(98)33	Dates and Places of 1999 and 2000 Meetings
CNL(98)34	Draft Report of the Fifteenth Annual Meeting of the Council
CNL(98)35	Precautionary Approach to Salmon Management: The Status of Regulations in Norway with regard to: 1) Protection of wild salmon stocks from introductions and transfers, and 2) Transgenic salmon
CNL(98)36	Draft Press Release
CNL(98)37	Additional Return made in accordance with the Oslo Resolution - Faroe Islands
CNL(98)38	Decision of the Council on Adoption of a Precautionary Approach
CNL(98)39	Precautionary Approach and Management of Atlantic Salmon in Rivers of the Kola Peninsula
CNL(98)40	Working Group on the Precautionary Approach to Salmon Management - Terms of Reference/Agenda
CNL(98)41	Working Group on the Precautionary Approach - Draft Questions to ICES

CNL(98)42	Not issued
CNL(98)43	Not issued
CNL(98)44	Terms of Reference for a NASCO Working Group on the Precautionary Approach
CNL(98)45	Draft Action Plan for Application of a Precautionary Approach
CNL(98)46	Agreement on Adoption of a Precautionary Approach
CNL(98)47	Preliminary Draft Action Plan for Application of a Precautionary Approach (including minor amendments)
CNL(98)48	Agenda
CNL(98)49	Outline of 1999 Budget, 2000 Forecast Budget and Schedule of Contributions
CNL(98)50	Press Release
CNL(98)51	Report of the Fifteenth Annual Meeting of the Council

CNL(98)70	NGO Statement - Institute of Fisheries Management
CNL(98)71	NGO Statement - Salmon Net Fishing Association of Scotland
CNL(98)72	NGO Statement - National Anglers Representative Association
CNL(98)73	NGO Statement - The International Atlantic Salmon Accord
CNL(98)74	NGO Statement - Federation of Irish Salmon & Sea Trout Anglers

NOTE: This is a listing of all the Council papers. Some, but not all, of these papers are included in this report as annexes.