NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

ORGANISATION POUR LA CONSERVATION DU SAUMON DE L'ATLANTIQUE NORD

REPORT OF THE

ELEVENTH ANNUAL MEETING

OF THE COUNCIL

6-10 JUNE 1994

OSLO, NORWAY

PRESIDENT:	MR BØRRE PETTERSEN (NORWAY)
VICE-PRESIDENT:	MR DAVID MEERBURG (CANADA)
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REPORT OF THE ELEVENTH ANNUAL MEETING OF THE COUNCIL OF THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION 6-10 JUNE 1994, GRAND HOTEL, OSLO, NORWAY

1. OPENING SESSION

1.1 The President, Mr Børre Pettersen, opened the meeting and introduced the Norwegian Minister of the Environment, Mr Thorbjørn Berntsen, who made a welcoming address (Annex 1).

1.2 The President joined the Minister of the Environment in welcoming delegates to Oslo and made an opening statement on the work of the Organization (Annex 2).

1.3 The representatives of Canada, Denmark (in respect of the Faroe Islands and Greenland), the European Union, Finland, Iceland, Norway, the Russian Federation, Sweden and the United States of America made opening statements (Annex 3).

1.4 The President expressed appreciation to the Members for their statements and closed the Opening Session.

1.5 A list of participants is given in Annex 4.

2. ADOPTION OF AGENDA

2.1 The Council adopted its agenda, CNL(94)50, (Annex 5).

3. ELECTION OF OFFICERS

3.1 The Council, on a proposal by the representative of Russia, seconded by the representative of the European Union, re-elected, for a further two-year period, Mr Børre Pettersen (Norway) as President and Mr David Meerburg (Canada) as Vice-President.

4. ADMINISTRATIVE ISSUES

4.1 Secretary's Report

The Secretary made a report, CNL(94)6, to the Council on the status of ratifications of and accessions to the Convention, membership of the regional Commissions, applications for non-government observer status, topics for Special Sessions, project work, the Headquarters property and the external relations of the Organization. Reports were also made on the receipt of contributions for 1994, CNL(94)8. The Council decided that, in view of the business to be conducted at the 1995 meeting, it would not hold a Special Session. However, the Council would encourage a statement by NGOs at the Opening Session; a total period of 15 minutes would be allocated to NGO statements.

4.2 Report of the Finance and Administration Committee

The Chairman of the Finance and Administration Committee presented the report of the Committee, CNL(94)10. In closing his term of office he drew attention to the favourable financial situation of the Organization and congratulated the Secretary and staff on the management of the Organization's funds. Upon the recommendation of the Committee, the Council took the following decisions:

(a) To appoint Coopers and Lybrand of Edinburgh as auditors for the 1994 accounts;

(b) To accept the audited 1993 annual financial statement, CNL(94)7;

(c) To adopt a budget for 1995 and to note a forecast budget for 1996, CNL(94)56, (Annex 6).

The Council thanked the Chairman of the Committee, Mr Arni Isaksson, for his work and that of the Committee.

4.3 Report on the Activities of the Organization

The Council adopted a report to the Parties, CNL(94)11, in accordance with Article 5, paragraph 6 of the Convention.

The President referred to a document, CNL(94)36, summarising the progress made by the Organization in its first ten years and on its future tasks.

4.4 Provisions of Article 13 of the Convention

The representative of Denmark (in respect of the Faroe Islands and Greenland) referred to the provisions of Article 13 of the Convention, in particular the operation of paragraphs 3 and 5 of that article. He drew attention to the different objection procedures in relation to emergency regulatory measures under which any Party, not just the Party in whose area of fisheries jurisdiction the measure would apply, may object within the specified time period. The problem he saw would arise from a subsequent withdrawal of such an objection by another Party which would imply a revival of the measure. The Council agreed that this was an issue that would require careful consideration and might require a change to that Article of the Convention or a less formal agreement between the Parties. The Council asked the Secretary to prepare a review on this matter for the Twelfth Annual Meeting with proposals for possible action by the Council.

4.5 The Future Working Methods of NASCO

The representative of Norway referred to the fact that as NASCO was now ten years old it would be an appropriate opportunity to examine its working methods. The Council decided that it would be valuable to have a forward look in the shape of a discussion paper well in advance of the next Annual Meeting from the Secretary focusing on future issues which might be faced in achieving the objectives of the Convention.

5. SCIENTIFIC, TECHNICAL, LEGAL AND OTHER INFORMATION

5.1 Scientific Advice from ICES

The representative of ICES presented the report of the Advisory Committee on Fishery Management (ACFM) to the Council, CNL(94)13, (Annex 7). The President thanked the Chairman of the ACFM for his valuable work for the Organization. The representative of Denmark (in respect of the Faroe Islands and Greenland) referred to the magnitude of the unreported catches as shown in the ACFM report. In the light of the magnitude of these unreported catches he felt that the attention given by the Organization to the regulatory measures for the Faroese and Greenlandic fisheries might be considered disproportionate and that more attention should be given to the level of unreported catches.

5.2 Report of the Standing Scientific Committee

The Council decided that the Standing Scientific Committee, established at the Ninth Annual Meeting, should continue its work. The Chairman of the Committee presented a draft request for scientific advice from ICES. Upon the recommendation of the Committee, the Council adopted a decision to request scientific advice from ICES, CNL(94)58, (Annex 8).

5.3 Catch Statistics and their Analysis

The Secretary introduced a statistical paper presenting the official catch returns by the Parties for 1993, CNL(94)15, (Annex 9) and historical data for the period 1960-1993.

The Secretary presented a brief report, CNL(94)17, on the minimum standard for catch statistics adopted by the Council at its Tenth Annual Meeting. It had previously been agreed that because of some difficulties in bringing in the new arrangement in some countries, the adoption of the standard would be phased in so that all Parties had achieved it for the 1995 statistics. Mechanisms to ensure compliance with the minimum standard would, therefore, require to be in place before the commencement of the 1995 fisheries.

5.4 Salmon Tagging and the NASCO Tag Return Incentive Scheme

The Secretary presented a summary of tag release data, CNL(94)18, (Annex 10) from the information submitted by ICES.

The Secretary reported on the Tag Return Incentive Scheme, CNL(94)19, (Annex 11) during its fifth year of operation. During 1993 favourable publicity for the work of the Parties and of the Organization had again been received as a result of the Scheme and the need to return scientific tags had been widely publicised. At its Tenth Annual Meeting the Council had decided that it would continue with the Scheme, with a review after three years, and that the cost would be borne by the Organization. The Council discussed the future scope of the Scheme and agreed that, because of recent changes in fisheries in the North Atlantic and in order to reduce the impact on the Organization's budgets while still retaining the high incentive prizes, it would in future offer four prizes (one Grand Prize of $2500 and a prize in each Commission of

$1500). The Council agreed that the Secretary should examine the advantages, disadvantages and possible mechanisms for extending the scheme to include microtags.

5.5 Database of Salmon Rivers in the North Atlantic

The Secretary presented a progress report, CNL(94)20, (Annex 12) on the establishment of a database of salmon rivers flowing into the Convention area. Information received from five Parties had been incorporated into the database and a sixth Party had responded just prior to the Annual Meeting. Information on approximately 1,000 salmon rivers had now been incorporated into the database. Of these, about 70% were categorised as "not threatened with loss". However, a total of 7.6% of the rivers had lost their natural stock and a further 15% were considered to be threatened with loss. The President encouraged the three remaining Parties which had not yet submitted their information to do so as soon as possible so that a complete review could be prepared.

5.6 Review of International Salmon Related Literature Published in 1993

The Council considered a review of the literature concerning Atlantic salmon published during 1993, CNL(94)21, which had been prepared in accordance with Article 13, paragraph 2 of the Convention.

5.7 Laws, Regulations and Programmes

The Secretary presented a report on the Laws, Regulations and Programmes database, CNL(94)22.

5.8 Economic Value of Atlantic Salmon

The Secretary presented a review, CNL(94)23, (Annex 13) of studies on the economic value of Atlantic salmon which had been made available to the Secretariat since the last Annual Meeting. The review also included some preliminary information on the economic aspects of salmon farming which suggested that both farmed and wild salmon generate considerable economic benefits and there are therefore economic reasons for safeguarding the future of both activities through sustainable aquaculture.

6. CONSERVATION, RESTORATION, ENHANCEMENT AND RATIONAL MANAGEMENT OF SALMON STOCKS

6.1 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(94)24, (Annex 14).

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

(a) Protocol for Non-Contracting Parties

The Secretary presented a report, CNL(94)25, (Annex 15) on progress in implementing the "Protocol Open for Signature by States not Parties to the

Convention for the Conservation of Salmon in the North Atlantic Ocean". At its Tenth Annual Meeting the Council, in response to further sightings, had agreed that diplomatic efforts should be intensified with regard to adherence to the Protocol and although neither Panama nor Poland has yet agreed to sign the Protocol, the diplomatic efforts of the Parties and the Organization have resulted in actions by these two Governments to address the problem. The Council agreed that diplomatic efforts should be continued in response to any further sightings and that efforts to improve and better coordinate surveillance should continue.

(b) Actions Taken in Accordance with the Resolution

The Secretary presented a report, CNL(94)26, (Annex 16) detailing progress on actions taken in accordance with the Resolution on Fishing for Salmon on the High Seas adopted by the Council at its Ninth Annual Meeting. This review contained information on the sightings of vessels fishing for salmon in international waters; scientific and technical data on the fishery; information on landings and transhipments and details of actions taken to establish contact with other international organizations with an interest in the area. The Secretary indicated that he would continue with the tasks laid down in the Resolution.

(c) International Cooperation on Surveillance

At its Tenth Annual Meeting the Council had endorsed the recommendations of an International Meeting on Surveillance of Fishing for Salmon in International Waters on possible areas of international collaboration aimed at improving the surveillance information. The Secretary presented a report, CNL(94)27, (Annex 17) containing proposals as to how these recommendations might be progressed. This report proposed that a cooperative surveillance project aimed specifically at assessing the scale of the problem be conducted on three occasions between November 1994 and May 1995 and that the results of this project and progress with the other recommendations be assessed at a second meeting of the coastguard authorities and NASCO in May 1995. In view of the importance of surveillance information in assessing the scale of the problem and in support of diplomatic initiatives the Council supported the proposals and urged the Parties to participate to the full extent possible in the surveillance project.

The representative of Norway stated that there was a need to develop rules to effectively ban unregulated fishing on the high seas. To be effective there is a need to give the states most concerned, i.e. coastal states, enhanced powers of enforcement of fisheries regulation. In addition, rules to prohibit landing of illegal catches are required. The principal forum to address these issues is the ongoing UN Conference on Straddling and Highly Migratory Fish Stocks. She indicated that Norway considered the NASCO Protocol to be an effective tool and that Norway will continue its diplomatic and surveillance efforts. She suggested that NASCO consider a system for control and surveillance of fisheries within the Convention area as a whole. The representative of Canada expressed support for the views put forward by the representative of Norway.

The representative of the European Union expressed strong concern at the representative of Norway's comments. He indicated that he firmly believed that the best way to find a solution is multilateral cooperation in accordance with the provisions of UNCLOS. He stated that he could not agree to any unilateral action by any coastal state to empower that state to have jurisdiction over vessels beyond their fishing zones, since such action would constitute creeping jurisdiction.

6.3 Research Fishing in International Waters in relation to the Provisions of Article 2 of the Convention

In March the Faroese Home Government advised the Organization that it proposed to extend the joint research programme in the Faroese zone into international waters. Under Article 2, paragraph 1 of the Convention fishing for salmon in international waters is prohibited and the Parties were therefore notified of the proposal. Some concerns were expressed and the Faroese authorities did not proceed with the proposal. The representative of Canada proposed that the general issue of whether there should be exceptions to Article 2, paragraph 1 of the Convention should be examined. There was a reference to research fishing in the Convention for the Conservation of Anadromous Stocks in the North Pacific which might be worth considering. The representative of the USA referred to the provisions of Article 2, paragraph 2 concerning prohibitions on fishing within areas of fisheries jurisdiction and to the possible need for a two-tier approach to research fishing within and beyond fishery zones. The representative of Denmark (in respect of the Faroe Islands and Greenland) stated that the issue of research fishing might be resolved by interpretation of, rather than modification to, the Convention. The Council agreed that the Secretary should be asked to submit a report at the next Annual Meeting offering some options for dealing with this matter.

6.4 SPECIAL SESSION: Report of the Working Group on the Impacts of Salmon Aquaculture on Wild Salmon Stocks

At its Tenth Annual Meeting the Council established a Working Group to consider how aquaculture may be conducted in a way that is designed to remove adverse impacts on the wild stocks. The Secretary introduced the Report of the Working Group on Impacts of Salmon Aquaculture, CNL(94)28, (Annex 18). He referred to the need for cooperation with the salmon farming industry and to the skill and energy demonstrated by this rapidly developing industry. Those involved with the wild stocks and the salmon farming industry need to cooperate so as to safeguard the wild resource which forms the genetic bank for both sides. There was a need for cooperation, not confrontation, so as to develop sustainable aquaculture. The Secretary indicated that while the potential genetic, disease and parasite and other possible impacts on the wild stocks are not proven, the risks are high and the advice from the scientists to the managers is to act now on the basis of the information currently available. In such a scenario the use of the Precautionary Approach, recently discussed in a preliminary way by the United Nations in relation to fisheries management, was of interest and he referred to a brief report, CNL(94)35 (Annex 19) on the Precautionary Approach. The report of the Working Group contained a number of recommendations concerning improvements in the standard of physical containment, improvements in the prevention and control of diseases and parasites, the use of areas for the protection of wild salmon and the use of sterile fish. The Working Group also

recommended in this report that the Council adopt an international agreement containing a statement of principles and practical measures designed to minimise the impacts from salmon aquaculture.

The representatives of the salmon farming industry and six of the NGOs made interventions and expressed a diversity of views in regard to salmon aquaculture, the wild salmon stocks and the environment. These statements are contained in Annex 20.

6.5 Actions by the Council to Eliminate Impacts on Wild Stocks

The Council welcomed the Report of the Working Group on Impacts of Salmon Aquaculture.

The Contracting Parties, expressing their concern in regard to the possible impacts from salmon aquaculture on the wild salmon stocks, adopted a Resolution CNL(94)53, (Annex 21) which makes recommendations to minimise such impacts. The Parties agreed that the subject of the impacts on wild stocks would be reviewed annually and that the situation with regard to the implementation of these recommendations would be re-examined at its Fifteenth Annual Meeting in 1998 with a view to considering whether additional measures may be desirable. The Council was eager to retain and strengthen the good relationship which had been established with the salmon farming industry and asked the Secretary to consider how this might be achieved.

6.6 Long-Term Trends in Abundance

At its Tenth Annual Meeting the Council considered the utility of long-term catch records as an indicator of trends in salmon abundance and agreed that it would be useful to review the available literature and to examine the availability of new data sets so the present period of low abundance could be assessed in an historical perspective. The Secretary introduced a brief report, CNL(94)29, which indicated that work on the project had commenced and that a report would be made at the next Annual Meeting. The President requested the Parties to provide the Secretariat with details of studies involving analysis of long-term catch data.

6.7 Diseases and Parasites

The Secretary presented a review, CNL(94)30, (Annex 22) on diseases and parasites which included information on the spread of *Gyrodactylus salaris* in the North-East Atlantic Commission and on M-74 syndrome in the Baltic area. He referred to the new Working Group agreed by the North-East Atlantic Commission to deal with Introductions and Transfers.

6.8 Catch and Release

The Council considered a review, CNL(94)31, (Annex 23) on catch and release. In recent years there has been growing interest in this technique in response to declining stock levels or components of the stocks in a number of North Atlantic countries. Few studies have assessed the survival of sea-run Atlantic salmon following catch and release but the published literature indicates that mortality levels are low. It is important, however, that stress and physical damage to the fish is avoided and the

Council agreed to consider guidelines on techniques for handling and releasing fish for consideration at the Twelfth Annual Meeting.

6.9 **Guidelines on Stocking**

The Secretary presented a report, CNL(94)32, on progress in developing guidelines on stocking.

6.10 **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.

7. OTHER BUSINESS

7.1 The Secretary referred to a further communication from the United Nations concerning large-scale pelagic drift netting on the High Seas, CNL(94)33. The Council asked the Secretary to make a further response on behalf of the Organization indicating that NASCO is unaware of any such fishing activity within the Convention area.

8. DATE AND PLACE OF NEXT MEETING

8.1 The Council agreed to hold it Twelfth Annual Meeting in Glasgow from 12-16 June 1995.

8.2 The Council accepted an invitation from the Swedish delegation to hold its Thirteenth Annual Meeting in Sweden from 10-14 June 1996.

9. DRAFT REPORT OF THE MEETING

9.1 The Council agreed a draft report of the meeting, CNL(94)37.

10. PRESS RELEASE

10.1 The Council adopted a press release, CNL(94)54, (Annex 24).

ANNEX 1

WELCOMING ADDRESS MADE BY THE MINISTER OF THE ENVIRONMENT MR THORBJØRN BERNTSEN

Mr President, Distinguished Representatives, Delegates and Observers:

On behalf of the Norwegian Government, I welcome you all to Oslo, to Norway and to this Eleventh Annual Meeting of the North Atlantic Salmon Conservation Organization (NASCO). It is both an honour and pleasure for Norway and for me as Minister of the Environment to host this meeting here in our capital.

Atlantic salmon has been an important species for Norway from ancient times. Today, this species is more important than ever due to the increasing importance of traditional and recreational fishery for wild salmon in our rivers and the development of our salmon farming industry. In both of these areas the salmon creates great value for the benefit of Norwegian society.

From the very beginning, wild salmon represented a valuable food resource for people in the river valleys. The salmon was caught through an astonishing variety of gears which clearly describes the great importance of this fish for local people. Today the situation is very different. Recreational fishing for salmon in rivers is by far the most popular form of utilization of wild salmon, and this activity also represents the most profitable utilization of this resource.

However, it is an explicit goal for the Norwegian policy on salmon to enhance the availability of recreational fishing to the public. To this end, a wide variety of regulatory and enhancement measures have been applied during recent years. Even through economically difficult periods, measures for Atlantic salmon have been given priority, and an amount equalling some USD 100 million has been spent during the last ten years. In addition, a great and very valuable effort has been made by the great number of private organizations devoted to the wellbeing of salmon.

You are convened here at this meeting to discuss matters related to the wild stocks of Atlantic salmon. In sum, you will cover all aspects of the wild stocks with the clear aim to effectively conserve and manage Atlantic salmon stocks throughout their range. In my view, the salmon as a species is quite unique with its division into specific stocks, and the challenges related to implementation of stock-specific conservation measures for salmon in many ways illustrate the challenges facing us all in the important task of implementing the convention on biological diversity. In this respect your work will make an important contribution to the efforts for the conservation of biological diversity, and - hopefully - we may all gain experience enabling us to improve our efforts.

The Norwegian efforts to safeguard the salmon have been mentioned. Our clear aim is to re-establish the runs and secure a sustainable production of the stocks. But there are several factors with a negative influence on this process. Possibly the most important problem for Norwegian stocks of salmon is acid rain that, up to now, has eliminated salmon stocks in at least 25 rivers. In addition, acid rain represents a lethal threat to the rivers in Western Norway that still have a salmon stock. A focus on this problem in organizations like NASCO

is therefore most valuable and welcome, and underlines the role of the Organization as a driving force. As you all know, the acid rain problem must be solved in other fora than this, but focusing on the problem from international organizations is indeed valuable, and contributes to the preparation of specific international conventions and protocols. As a matter of coincidence, I can mention that the Protocol to the 1979 Convention on long-range trans-boundary air pollution on a further reduction of sulphur emissions will be signed next week in this very hotel.

Norway emphasizes the importance of international cooperation in environmental issues. In the difficult area of managing a common international resource like Atlantic salmon, we see the Salmon Convention and NASCO as the appropriate forum for solving common international problems relating to salmon. It is our explicit wish that NASCO continues to strengthen its role as a forum for exchange of information and constructive discussions between the Parties, thereby producing the best possible results for the future of the Atlantic salmon. We do, however, also engage in other international discussions with some relevance for Atlantic salmon, and the ongoing UN conference on straddling and highly migratory fish stocks is an example of this engagement.

Aquaculture has grown to be an important industry in Norway. In my opinion it is important that NASCO engages in questions relating to effects of aquaculture, trying to identify and propose solutions for possible conflicts with the wild stocks. I am informed that NASCO has convened a special Working Group on this topic, and I want to express my admiration for the way this Working Group has been organized. This kind of open-minded work in good faith across boundaries of interest and nations may indeed serve as an example for international work.

Your agenda for the week is full. I bid you once again welcome to Oslo and I wish you success in completing the work ahead of you. I wish you all a pleasant stay here in Oslo.

Thank you.

ANNEX 2

OPENING STATEMENT MADE BY THE PRESIDENT

Ladies and Gentlemen:

The original stocks of Atlantic Salmon were once huge and strong. Their spawning grounds were almost untouched by man. The North Atlantic Ocean was lying there as an enormous feeding potential waiting for millions of smolts. Thousands of small rivers and huge water courses were waiting for their return. One of the most productive rivers was the Rhine in Germany - with an annual catch of 100,000 fish. Today many of these stocks are gone forever, others fight for their survival. We only try to manage what's left of the original stocks. How could this happen?

Allow me to mention:
- Dam buildings
- Hydro power stations
- Road construction
- Pollution of rivers
- Acidification
- Spreading of parasites and bacteria
- Over-harvesting in the high seas, home waters and in rivers, especially after the Second World War
- Escapes from the fish farming industry

With this history of man-made threats to wild salmon stocks there are still some people requiring scientific evidence to put regulatory measures into action.

The head of the scientific group to the Bergen Conference in 1990 was asked how to deal with the precautionary principle from a scientific point of view. He replied "It's better to be roughly right than precisely wrong."

I would like to emphasize that we are not doing any harm to wild Atlantic salmon by reducing catch including the anglers' catch in rivers. Over the period of the last 40 years we have increased the catch on stocks which were already declining. In the debate of the wild salmon we often mention predators - seals, mergansers, cod, cormorants and other predators. But they have been in the ecological system for a long time and maybe we blame them because we have a bad conscience about our own behaviour towards the wild salmon. The main predator is man. We have to attack the man-made picture of threats. All of us will have plenty of work to do in our own backyard for the benefit of salmon stocks.

To conclude the strategy must move along two lines:

- Rebuilding the stocks
- Taking strong action against the threats

These measures must be taken by all of us - through NASCO - as well as in our domestic fields. I hope this annual meeting of NASCO will contribute to a broad international understanding of the challenge we are facing.

I wish you all constructive days here in Oslo. Thank you for your attention.

ANNEX 3

OPENING STATEMENT MADE BY THE REPRESENTATIVE OF CANADA

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

It is a pleasure for the Canadian delegation to participate in the Eleventh Annual Meeting of the North Atlantic Salmon Conservation Organization. We compliment and thank all of those who have worked so hard and so well on the arrangements.

The scientific advice on Atlantic salmon continues to be challenging. The status of Atlantic salmon stocks is generally poor. Catch levels in 1993 were the lowest recorded. This reflects the state of the stocks, but it also reflects reductions in fishing effort for conservation.

Canada's commitment to conservation and reduction of fishing effort is well known to NASCO. The total Canadian harvest of Atlantic salmon, including the commercial, recreational and native fisheries, has been reduced in every year since 1987. In 1993 it was 367 tonnes, down from 711t in 1991 - a reduction of virtually one half in two years. The commercial catch portion of these totals has fallen at an even faster rate. In 1993 it was 160 tonnes, down from 529t in 1991 - a reduction of over two thirds in two years. This rate of reduction is largely due to the continuing moratorium on commercial salmon fishing on the Island of Newfoundland, which started in 1992, and the retirement of commercial salmon fishing licenses in Quebec and Labrador in the last two years.

The state of the stocks has adversely affected much of the recreational fishery. Many areas were closed to retention angling at early dates last year. The estimate of the Canadian angling catch in 1993 is 170t, down from 208t caught in 1992.

In 1994 there will be further reductions in the Labrador commercial fishery, and additional stringent conservation measures throughout much of the recreational fishery, as is reflected in our 1994 Atlantic Salmon Management Plan just released last week. Canada's investment in salmon enhancement and restoration will remain strong, as will our commitment to NASCO and its important role in the management of Atlantic salmon.

In 1993 NASCO achieved a significant agreement on management measures for the fishery at West Greenland, which are making an important contribution to conservation through reduced commercial fishing effort. Canadians in the hard-hit Atlantic ground fishery understand and appreciate this difficult, but necessary conservation commitment by Greenland fishermen.

The scientific advice also highlights continuing concerns about the impact of aquaculture escapees on wild stocks. Aquaculture will continue to grow as an important industry in Canada, especially considering the devastation of our traditional Atlantic ground fisheries. Canada was pleased to participate actively over this past year in the NASCO Working Group on the Impacts of Aquaculture. We welcome its report as a balanced consideration of the requirements to develop a healthy aquaculture industry while at the same time minimizing the impact on wild stocks - which must be the backbone of a restored resource for fishermen, anglers and the people of northern coastal communities.

As most of you appreciate, Canada shares a special concern with NASCO about the importance of controlling predatory fishing on the high seas. As we implement further conservation measures to reduce fishing effort, there are increasing allegations of interception fishing in international waters. We must continue to be vigilant, and cooperate to deter this type of pirate fishing. We expect further discussions at this meeting on measures to stop any illegal fishing for Atlantic salmon on the high seas.

Mr President, we are looking forward to a productive Eleventh Annual Meeting.

Thank you.

OPENING STATEMENT MADE BY THE REPRESENTATIVE OF DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

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

In last year's Opening Statement this delegation expressed support for the Dialogue Meeting call for the principles of environmental sustainability, integrated resource management and partnership.

For our part, we certainly lived up to these goals. Quotas were agreed upon both in the North-East Atlantic Commission and in the West Greenland Commission.

The negotiation in the West Greenland Commission was particularly difficult. Our delegation has over the years maintained the position that we would only agree to a substantive reduction of the Greenland quota under two conditions:

1) that a quota could be based upon biological findings, and
2) that a system be found, whereby our quota would go up as well as down, depending upon stock developments.

These two conditions were met in 1993, for the first time. Accordingly, Greenland did agree to a quota which was only about 25% of the previous NASCO quota.

After the NASCO quota had been agreed, the KNAPK (the Fishermen's and Hunters' Organization in Greenland) entered into a private arrangement, whereby they would refrain from fishing in 1993 and 1994, in return for some financial compensation. The Greenland Home Rule Government supported KNAPK in their decision, as the Greenland Home Rule Government would have supported KNAPK, if their decision had been to decline the arrangement.

My delegation wants to emphasise that we see NASCO agreements and private arrangements as two completely separate issues. There is no linking whatsoever. This is true for the Faroe Islands and for Greenland. This delegation will, within NASCO, continue to work arduously for reasonable quotas for our countries, irrespective of the size of the wallet which might be shown in private discussions.

Though we from time to time may refrain from utilizing our family silver, we are certainly not going to sell it.

OPENING STATEMENT MADE BY THE REPRESENTATIVE OF THE EUROPEAN UNION

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

This Eleventh Annual Meeting of NASCO could represent a turning point in the work of our Organization.

In previous years, our main preoccupation has been to resolve the problems associated with the management of salmon fishing at sea, particularly the agreement over maximum catches at sea. However, after last year's success in finding a satisfactory formula to establish a maximum catch in West Greenland, on the basis of scientific assessment, this problem should basically be considered resolved and, consequently, have a lower profile from now onwards. The European Union considers that the spirit which allowed us to reach such agreement last year should prevail in the future, and wishes that this or another similar type of agreement will avoid reverting to the previous situation, where autonomous quotas were established as a result of failure to find agreed solutions.

However, the question of fishing for salmon at sea is not, unfortunately, automatically finished by the establishment of maximum catches and their respect by Contracting Parties. As we are aware, fishing for salmon on the High Seas has taken place in the past and continues to date. This activity is not in conformity with customary international law and with the NASCO Convention and must therefore cease. The European Union reiterates, in this context, its full commitment to respect international law and its strong belief that these problems must be resolved through cooperation on a multilateral basis. In the recent past, the European Union has led diplomatic representations to countries involved in this practice, and is prepared once again to play an active role in the resolution of this problem on a multilateral basis.

Once the problem of setting maximum catch levels appears to be resolved, other questions will probably reach a higher profile in the context of the conservation of wild salmon stocks. This year, we will examine a report on the possible impacts of salmon aquaculture on wild stocks. The report of the Working Group reflects, we believe, a high degree of consensus among Contracting Parties, and in general terms represents a reasonable balance between the need to protect wild stocks and the need to keep fish farming viable. We hope that on the basis of this document we will also be able to make some progress in this field.

Finally, this may be the last year that the European Union represents 12 Member States. As from next year, the EU may be made up of 16 Member States. Some concerns may be expressed regarding the effects of this in the future work of NASCO. It is our view that this enlargement should not result in a reduction in the diversity of the views expressed. The European Union, as a multi-national institution, is well equipped to deal with the widest possible diversity of views, and can successfully use this diversity to enrich its own position, and the general debate in NASCO.

OPENING STATEMENT MADE BY THE REPRESENTATIVE OF FINLAND

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

It is a pleasure for the Finnish Delegation to participate in the Eleventh Annual Meeting of NASCO particularly as the meeting is being held here in Oslo. Finland has a long relationship with Norway in the management of salmon since the first fishing agreement concerning the River Teno was established as early as 1873. This long regulatory period of 121 years has been successful, to the extent that there has never been any need to enhance salmon stocks by stocking. Finland and Norway both understand the great biological, economic and cultural importance of the River Teno and have agreed to use only regulatory measures to maintain and increase its salmon stocks.

We are convinced that NASCO as an international organization has improved salmon stocks in the River Teno and other rivers by establishing catch quotas for the Faroese fishery and by having a leading role in preventing salmon fishing in international waters.

Salmon catches in the River Teno have also improved for another important reason. In 1989 Norway closed its coastal driftnet fishery which caught a substantial part of the River Teno salmon stock during the spawning migration.

Today the salmon stock in this river is much better than 15 years ago when Finland started an extensive research programme on the density of salmon juveniles. Last year the reported salmon catch on the Finnish side was 68 tonnes and the total for the river including the Norwegian catch was 152 tonnes. Thus the River Teno is the best salmon river in Europe.

However, we must wait for some years to see the full effects of different catch restrictions such as compensation agreements for the Faroese salmon fishery and the Norwegian closure of the driftnet fishery, because alterations between salmon generations in subarctic rivers take a number of years.

NASCO has made very good progress in its understanding of the interactions between salmon aquaculture and wild stock and the management of these interactions. There is still a lot to do to avoid diseases and harmful genetic disorders. For example, *Gyrodactylus salaris* is a grave threat to all salmon stocks in the North Atlantic. Finland is still very concerned about salmon farming in the Teno Fjord. The possible use of sterile fish could offer protection from the genetic impacts.

Salmon fishing in international waters in the NASCO Convention area by vessels flying flags of non-contracting States has taken place for some years. This is of great concern to all of us and this problem must therefore be solved as soon as possible by a NASCO Protocol or by some other international instrument, e.g. by the agreement prepared by FAO.

OPENING STATEMENT MADE BY THE REPRESENTATIVE OF ICELAND

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

Since our last meeting all matters relating to Icelandic salmon rivers and salmon ranching in Iceland have been undergoing a dynamic change and revision. Salmon ranching has continued to increase, especially in western Iceland, where there has been some friction between the ranching industry and the local river owners, who claim that the ranching stations in the area are trapping some wild salmon from their rivers in their estuarine traps. This has not been substantiated, but research into this problem is high priority, both through tagging of wild smolts and reading of tags and scales from the ranching stations.

Last month the Icelandic Parliament passed a new partial Freshwater Act, which introduces a number of new concepts into Icelandic salmon management. The following changes are of greatest importance:

1. The Minister of Agriculture sets a regulatory measure regarding the design and use of traps used by the ranching industry.

2. The Minister has the power to declare aquaculture-free zones.

3. Ranching and rearing stations need to apply for an operating license, which specifies the initial scale of operation.

4. A biological survey is mandatory prior to any contract work affecting rivers or lakes.

5. The salmon sport fishing season is extended by 2 weeks and daily fishing period extended into the night during the midnight summer period.

6. Net fishing of charr in the sea is considerably restricted, which should reduce incidental catches of salmon in the nets.

These changes introduced much-needed provisions regarding commercial ranching and aquaculture, which were practically non-existent, when the previous law was passed in 1970. Regarding the salmon sports fisheries the spirit of the law tends to bring more authority to the river associations regarding in-river regulations and the allocation of daily fishing time.

As most of you know the abundance of wild salmon in the North Atlantic has been hitting an all time low with total catches being only a little over 3,000 tonnes in 1993, excluding Icelandic ranched salmon. Wild multi-sea-winter salmon, which sustain the Faroese and West Greenland salmon fisheries, have been declining to a greater extent than grilse in most areas.

Considering these facts, it should be clear that a quota in excess of 500 tonnes within the Faroese economic zone, which corresponds to over 17% of the total homewater catches of Atlantic salmon last year, is too high. It may not be feasible to prove scientifically that a quota of the magnitude allocated in previous years is detrimental to the salmon stocks, but considering the drastic decline of homewater stocks in most countries in recent years, it is very important to take a precautionary approach in harvest decisions.

North American scientists have demonstrated that the available marine habitat for salmon has been shrinking in recent years, especially in the western Atlantic. Some ICES scientists have indeed found a strong relationship between the reduction in habitat and the decline in their respective salmon stocks as well as a reduction in salmon abundance at West Greenland, which led to a reduced quota in that area. The same evidence suggests that a considerable reduction in the Faroese quota is warranted.

Taking this into account, the Icelandic government emphasizes that there must be a considerable lowering of the Faroese quota during the coming years. It is logical and fair to expect that the Faroe Islands share the burden of restoring the dwindling wild stocks of Atlantic salmon.

The Icelandic delegation also commends the fact that no NASCO salmon quota was fished in 1993 to the benefit of wild salmon stocks in the countries of origin.

Finally we would like to thank the Norwegian government for holding this meeting in the heart of the old Viking empire and look forward to a productive meeting.

Thank you Mr President.

OPENING STATEMENT MADE BY THE REPRESENTATIVE OF NORWAY

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

First, I will add my words of welcome to those of our Minister of the Environment and our President Børre Pettersen. On behalf of the Norwegian delegation, I welcome you all to Oslo.

The catch of Atlantic salmon in the North Atlantic has reached a historically low level. At the same time we observe that more than 20% of the salmon rivers in the area have lost their salmon stocks or the stocks are threatened. In this situation, all aspects of the management, including high seas fisheries, must duly reflect the state of the stocks. Scientific evidence normally constitutes the basis for measures to be taken. However, in situations where strong indications suggest a need for measures, the precautionary principle should apply. It should also be noted that great resources and strict conservation measures are presently used in the countries of origin of the salmon stocks, and all Parties should take a responsibility in that situation.

Research activities on Atlantic salmon in the Norwegian Sea is an area of priority. In cooperation with the Faroes we have developed a joint research program which also involves other Nordic countries. We regard increased knowledge of salmon in the high seas as a necessity for a better understanding of the whole life-cycle of Atlantic salmon, and thus for proper salmon management. Initiatives and contributions from the Parties in this field should therefore be encouraged by NASCO.

Norway's commitment to salmon conservation continues with substantial effort. Much attention is given to applying management measures according to the status of the fish stocks in each river. To secure the most threatened stocks we have built a second gene-bank facility to take care of stocks seriously threatened by acid rain, that seems to be a more serious and widespread problem in Norway than previously assumed. In this respect, treatment of rivers with limestone can only be seen as a temporary measure even if liming receives great resources today. The only way for long-term improvement is reduction of emissions.

At present, Norway can report strong and healthy stocks of salmon in the northern parts of the country. Compared to the situation in many rivers further south, where different threats may influence the stocks, the rivers in the north are in a favourable condition. It is of great importance that this favourable condition remains unchanged. In this respect appropriate national management is an important tool. Equally important, however, is the bilateral cooperation that has been established with Russia and Finland. In our opinion the exchange of information, the initiation of joint research projects and development of common management plans that are all elements in the bilateral work are of utmost importance to safeguard the salmon stocks in this area. Consequently, this work is given high priority in Norway.

In the later years much attention has been given to fishing for salmon in international waters in the North-East Atlantic. The NASCO initiatives in developing a protocol and for collection of information and coordination of control have shown some effect. We, however, see a need for improvements in the coordination of surveillance in this area as well as improvements of the legal international instruments regulating fisheries in international waters. Norway, therefore will give priority to continued international efforts in this field.

NASCO is now more than ten years old and it may be appropriate at this point to stop for a moment and examine our achievements as well as the future challenges of the Organization. We see it as important that the Organization emphasises its role as a forum for exchange of information and open-minded deliberations across limits of interests and national borders. This may enable NASCO to increase the activity directed at other international fora and processes.

The potential negative effects of salmon farming on wild stocks has been a matter of great concern within this Organization, and Norway welcomes the report from the special Working Group on aquaculture as a first important step. We also feel that the process in the Working Group itself has been valuable, creating a positive and constructive atmosphere between Parties and the relevant interest groups.

Lastly, Mr President, the Norwegian delegation look forward to this meeting which we hope will be productive and that we will have progress in our work. I can assure you that Norway will participate and contribute in the deliberations in an open-minded and constructive way.

Thank you Mr President.

OPENING STATEMENT BY THE REPRESENTATIVE OF THE RUSSIAN FEDERATION

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

On behalf of the Russian delegation I should like to express our pleasure in participating once again in the NASCO Annual Meeting. I greet all those who are now attending this conference.

The year since the last Annual Meeting of NASCO was full of intensive work, many difficult issues were addressed and we feel especially glad to recognize that we succeeded in having made certain progress and reached understanding on the way to resolve them.

First of all, the obvious importance and timeliness of convening the two meetings of the Working Group on Impacts of Aquaculture on Wild Stocks should be mentioned. Due to different opinions and approaches to this problem shown by the Parties it was not easy work. Nevertheless, the Working Group concluded having jointly produced a draft document, which I hope could be positively appraised by the Council and enable better coordination efforts by all Parties in resolving this problem.

We can not help referring to the importance of work and measures taken by NASCO to discontinue unregulated fishing for salmon on the high seas. As evidenced by information provided by Russian scientists a reduction of sea fishing effort produced a favourable effect on status of salmon stocks in Russian rivers. Therefore, efforts undertaken by NASCO, including those through diplomatic channels, can only be welcome.

Nowadays, commercial fisheries for Atlantic salmon in Northern Russia are at a much lower level compared to 1980, the catch declined almost 10 times since then, this was in the first place due to development of recreational fishing for salmon, which is now in good progress in the Kola Peninsula.

We, like our neighbours Finland and Norway, are very much concerned about further spread of *Gyrodactylus salaris* in the North-East Atlantic and we hope that a special Working Group set up at the last Annual Meeting will give further consideration to the *Gyrodactylus* problem and recommend strategies to prevent its further spread.

Lastly, as a conclusion I should like to wish you all a useful and productive meeting.

Thank you.

OPENING STATEMENT MADE BY THE REPRESENTATIVE OF SWEDEN

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

It is a pleasure for the Swedish delegation to participate in the Eleventh Annual Meeting of the North Atlantic Salmon Conservation Organization here in Oslo. Norway's commitment to conservation is well known in NASCO as well as its important role in the rational management of North Atlantic salmon.

After ten years, NASCO is well established as the international forum for the conservation and management of salmon in the North Atlantic. The Organization's achievements are quite significant and the quality of the scientific work under NASCO is widely recognised. At a Swedish Symposium this spring it was shown that there is a potential area in the west-coast rivers of about 200 hectares implying an annual production of 400,000 salmon smolts. Today the number of smolts produced is about half that amount. It was also indicated as a rather unique example, that the genetic depletion had been stopped in the rivers and that the genetic diversity had even been increased. In several of these watercourses there are still aboriginal salmon stocks to be found. The work within NASCO has undoubtedly contributed to this circumstance.

There are many threats on the wild salmon and they include a wide range of parameters during its life-cycle. From the ICES Working Group reports, there is indisputable evidence of a decline in the wild salmon stocks. During the coming meeting of the North-East Atlantic Commission, Sweden is going to present a paper entitled "Alarming Trends in Salmon Populations in Swedish West Coast Rivers". The recent negative trends apply both to the abundance of salmon fry and to the poor recaptures of tagged, reared salmon smolts. The reasons for the decline are not yet known. At the annual NASCO meeting in 1993, you, Mr President, touched upon the problem of low abundance of salmon and asked the Parties to take extreme care and accept the precautionary principle.

In its Opening Statement last year the Swedish Delegation drew the Council's attention to the impacts of aquaculture on wild salmon stocks. Farmed fish now occur on the marine feeding grounds, in fisheries and on the spawning grounds of wild salmon. Furthermore, fish diseases and parasites are introduced to such stocks. The Swedish Delegation is prepared to strengthen the mechanisms for avoiding negative impacts of aquaculture on wild salmon stocks.

At the Dialogue Meeting last year three principles related to salmon management were stressed, i.e. environmental sustainability, integrated resource management and partnership. In a situation threatening to deplete the salmon stocks, all Parties must take the responsibility to correct the situation. Sustainable management of salmon stocks can only be achieved through an overall balanced policy, also as to the interceptory fishery.

Mr President, the task of the meetings this week are many. The Swedish Delegation is fully committed to seeing effective solutions in accordance with our Convention.

Thank you Mr President.

OPENING STATEMENT MADE BY THE UNITED STATES OF AMERICA

Mr Minister, President Pettersen, Ambassador Agustsson, Representatives, Delegates, Observers, Ladies and Gentlemen:

The United States wishes to take this opportunity to express our gratitude to Norway for hosting this Eleventh Annual Meeting of NASCO here in the beautiful city of Oslo. So rich in history and culture and at this time of the year so vibrant that it is hard to feel compelled to sit inside and conduct the business of our meeting.

Also on the occasion of our meeting it is notable to reflect on events of 50 years ago, when many of our nations found it necessary to resolve their differences by taking the most extreme of measures.

We are fortunate that the events of yesterday have led to more reasonable means to resolve differences of opinion. A little over 10 years ago representatives of our nations realised that they had several differences relative to the proper and rational management of our Atlantic salmon resources. I remember well one of our earlier meetings, when we were letting our differences take on greater significance than our common interests, that I observed with all the problems affecting mankind, if we, the few assembled parties of NASCO, could not resolve the relatively simple problems of only one species of fish, the salmon, then our fellow men would not be proud of our abilities.

In the ensuing years, there always appeared to be another challenge, another problem to be resolved. It became commonplace in our opening statements to point out the differences that faced us in our deliberations. And further, to point out the problems that would be set upon us or the salmon if we were unsuccessful in our deliberations.

Today I am pleased to say that the United States does not come to this meeting with that view. Yes, we recognise that the populations of salmon are still at great risk, that our fisheries could be greatly improved and that there are a great myriad of problems with which to be dealt, but we believe that NASCO has been very successful over the last few years in resolving the major issues affecting our salmon. The interceptory fisheries for salmon have been placed under control. Our knowledge and understanding of the salmon's life in the ocean has advanced significantly and we are addressing problems of interactions between cultivated and wild salmon stocks in a deliberate and constructive fashion. Today, patience is what we need most. We must let our labours and efforts bear fruit, consistent with the salmon's life cycle. The agreements made last year will require many, many years before we are rewarded, but we need to maintain our diligence, lest we slip back to the ways of the past.

Mr President, we look forward to a successful meeting, constructive dialogue, and resolution of some of the problems facing us.

Thank you.

ANNEX 4

ELEVENTH ANNUAL MEETING OF THE COUNCIL
GRAND HOTEL, OSLO, NORWAY
6-10 JUNE 1994

LIST OF PARTICIPANTS

* Denotes Head of Delegation

CANADA

*MR JEAN E HACHE	Representative Department of Fisheries and Oceans, Ottawa, Ontario
DR WILFRED CARTER	Representative Atlantic Salmon Federation, St Andrews, New Brunswick
MR JEAN-PAUL DUGUAY	Representative Gaspé, Quebec
MR GEORGE ARSENAULT	Department of Environment and Wildlife, Government of Quebec, Quebec City
MR DAVID CLARK	Atlantic Salmon Federation, St Andrews, New Brunswick
MR RICHARD HEGAN	Department of Fisheries and Oceans, Ottawa, Ontario
MR DAVID MEERBURG	Vice-President of NASCO Department of Fisheries and Oceans, Ottawa, Ontario
MR REX PORTER	Department of Fisheries and Oceans, St Johns, Newfoundland

DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

*MR EINAR LEMCHE	Representative Greenland Home Rule Government, Copenhagen
MR ARNI OLAFSSON	Representative Faroese Home Government, Torshavn
MR OLE SAMSING	Representative Ministry of Foreign Affairs, Copenhagen
MS ANNA MARIA HOLBECH	Faroese Home Government, Torshavn

MR FLEMMING ENEQUIST	The Organization of Hunters & Fishermen in Greenland, Nuuk
MR JAN ARGE JACOBSEN	Fishery Laboratory, Torshavn
MR JENS MOELLER JENSEN	Greenland Fisheries Research Institute, Copenhagen
MR JASPUR KRUSE	Felagid Laksaskip, Faroe Islands
MR HENRIK NIELSEN	Greenland Home Rule, Nuuk
MR SOFUS POULSEN	Faroese Commercial Attaché, Aberdeen
MR ANTHON SIEGSTAD	The Organization of Hunters & Fishermen in Greenland, Nuuk

EUROPEAN UNION

*MR OLE TOUGAARD	Representative Commission of the European Communities, Brussels
MR ERNESTO PENAS	Representative Commission of the European Communities, Brussels
MRS MARIA ZOGRAFOU	Ambassador, Embassy of Greece, Oslo
MR MICHAEL WALDRON	Secretariat General of the Council of the EU, Brussels
MR JOHN BROWNE	Department of the Marine, Dublin
MR DAVID DICKSON	Scottish Office Agriculture and Fisheries Department, Edinburgh
MS CATERINA N DIMAKIS	Embassy of Greece, Oslo
MR DAVID DUNKLEY	Scottish Office Agriculture and Fisheries Department, Montrose
DR PADDY GARGAN	Central Fisheries Board, Dublin
MR JOHN KEOHANE	Department of the Marine, Dublin
MR IVOR LLEWELYN	Ministry of Agriculture, Fisheries and Food, London
VISCOUNT CHRIS MILLS	National Rivers Authority, NW Region, Preston
MR PHILIPPE PERONNE	Ministry of Agriculture and Fisheries, Paris
MR TED POTTER	Ministry of Agriculture, Fisheries and Food, Lowestoft

MR WILLIAM SCRIVEN	Ministry of Agriculture, Fisheries and Food, London
MR JOSE SERRANO	Secretaria General de Pesca Maritima, Madrid
MR BOB WILLIAMSON	Scottish Office Agriculture and Fisheries Department, Edinburgh

FINLAND

*MR PEKKA NISKANEN	Representative Ministry of Agriculture and Forestry, Helsinki
MR EERO NIEMELA	Representative Finnish Game and Fisheries Research Institute, Helsinki

ICELAND

*MR HELGI AGUSTSSON	Representative Icelandic Ambassador to the United Kingdom, London
MR ARNI ISAKSSON	Representative Institute of Freshwater Fisheries, Reykjavik
MR ORRI VIGFUSSON	Ministry of Agriculture, Reykjavik

NORWAY

MR BØRRE PETTERSEN	President of NASCO Ministry of the Environment, Oslo
*MR TORMOD KARLSTRØM	Representative Ministry of the Environment, Oslo
MR SVEIN MEHLI	Representative Ministry of the Environment, Oslo
MS INGER LAVIK OPDAHL	Representative Ministry of Foreign Affairs, Oslo
MR RAOUL BIERACH	Directorate for Nature Management, Trondheim
MR ARNE EGGEREIDE	Directorate for Nature Management, Trondheim
MR PER FOLKESTAD	Ministry of Agriculture, Oslo
DR LARS PETTER HANSEN	Norwegian Institute for Nature Research, Trondheim
MR STEINAR HERMANSEN	Ministry of the Environment, Oslo
MR STIG JOHASSON	Directorate for Nature Management, Trondheim

MR TERJE KARTERUD	Directorate for Nature Management, Trondheim
MR HAAKON KRYVI	Ministry of the Environment, Oslo
MR HELGE LORENTZEN	Ministry of the Environment, Oslo
MR HARALD MULADAL	Ministry of Fisheries, Oslo
MR GEORG RIEBER-MOHN	Ministry of the Environment, Oslo
MR ARNE SIVERTSEN	Directorate of Nature Management, Trondheim
MR YNGVE SVARTE	Directorate of Nature Management, Trondheim

RUSSIAN FEDERATION

*DR ALEXANDER SOROKIN	Representative PINRO, Murmansk
MR GUENRIKH BOROVKOV	Committee of Russian Federation on Fisheries, Moscow
MR GEORGY LUKA	Embassy of the Russian Federation, Oslo
MR VICTOR A NESVETOV	JV Arctic Salmon, Murmansk
MR BORIS F PRISCHEPA	Murmanrybvod, Murmansk
MS ELENA SAMOILOVA	PINRO, Murmansk

SWEDEN

*DR INGEMAR OLSSON	Representative National Board of Fisheries, Göteborg
MRS LENA ELLWERTH-STEIN	Representative Ministry of Agriculture, Stockholm

USA

*MR ALLEN PETERSON	Representative National Marine Fisheries Service, Woods Hole, Massachusetts
MR DAVID EGAN	Representative Connecticut River Atlantic Salmon Commission, Guilford, Connecticut
MR CLINTON TOWNSEND	Representative Maine Council of the Atlantic Salmon Federation, Canaan, Maine

DR VAUGHN ANTHONY	National Marine Fisheries Service, Woods Hole, Massachusetts
DR KEVIN FRIEDLAND	National Marine Fisheries Service, Woods Hole, Massachusetts
DR JAMIE GEIGER	US Fish and Wildlife Service, Hadley, Massachusetts
MR ROBERT A JONES	Connecticut River Salmon Association, S. Windsor, Connecticut
DR RAY B OWEN, JR.	Maine Atlantic Sea Run Salmon Commission, Augusta, Maine
MR JOHN C PHILLIPS	Department of Fisheries, Wildlife and Law Enforcement, Boston, Massachusetts
MR GILBERT C RADONSKI	Sport Fishing Institute, Warrenton, Virginia
MR ANDREW V STOUT	New England Atlantic Salmon Association, Newburyport, Massachusetts
DR DEAN SWANSON	National Marine Fisheries Service, Silver Springs, Maryland
MR STETSON TINKHAM	Department of State, Office of Fisheries Affairs, Washington DC

ICES

PROFESSOR CHRIS HOPKINS	International Council for the Exploration of the Sea, Copenhagen
DR ROGER BAILEY	International Council for the Exploration of the Sea, Copenhagen
MR ESKILD KIRKEGAARD	Danish Institute for Fisheries and Marine Research, Charlottenlund

NON-GOVERNMENT OBSERVERS

DR FREDERIC MAZEAUD	AIDSA
LT COL G D B KEELAN COL. ROBERT CAMPBELL	Association of Scottish District Salmon Fishery Boards
ADMIRAL JOHN MACKENZIE CAPTAIN JEREMY READ	Atlantic Salmon Trust

MR JIM MAXWELL MR RICHARD BEHAL	Federation of Irish Salmon and Sea-Trout Anglers
MR ED CHANEY	International Friends of Wild Salmon
MR SIRI PARMANN	Norwegian Association of Hunters and Anglers (Norges Jeger og Fiskerforbund)
MR BJORNULF KRISTIANSEN	Norwegian Farmers Union (Norges Bondelag)
MR BJORN MOE	Norwegian Salmon Rivers (Norske Lakseelver)
MR THOMAS A F BARNES	Salmon and Trout Association
MR WILLIAM SHEARER	Salmon Net Fishing Association of Scotland
MR JOUNI KITTI	Sami Parlamenta
MR WILLIAM BROWN MR ALASTAIR HUME	Scottish Anglers National Association

SALMON FARMING INDUSTRY REPRESENTATIVES (Special Session only)

MR WILLIAM CROWE DR JOHN WEBSTER	Scottish Salmon Growers Association
MR KNUT A HJELT	Norwegian Fish Farmers Association

SECRETARIAT

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

ANNEX 5

CNL(94)50
ELEVENTH ANNUAL MEETING OF COUNCIL
6-10 JUNE 1994
OSLO, NORWAY

AGENDA

1. **Opening Session**

2. **Adoption of Agenda**

3. **Election of Officers**

4. **Administrative Issues**

   4.1 Secretary's Report
   4.2 Report of the Finance and Administration Committee
   4.3 Report on the Activities of the Organization
   4.4 Provisions of Article 13 of the Convention
   4.5 The Future Working Methods of NASCO

5. **Scientific, Technical, Legal and Other Information**

   5.1 Scientific Advice from ICES
   5.2 Report of the Standing Scientific Committee
   5.3 Catch Statistics and their Analysis
   5.4 Salmon Tagging and the NASCO Tag Return Incentive Scheme
   5.5 Database of Salmon Rivers in the North Atlantic
   5.6 Review of International Salmon Related Literature Published in 1993
   5.7 Laws, Regulations and Programmes
   5.8 Economic Value of Atlantic Salmon

6. **Conservation, Restoration, Enhancement and Rational Management of Salmon Stocks**

   6.1 Measures Taken in Accordance with Articles 14 and 15 of the Convention
   6.2 Fishing for Salmon in International Waters by Non-Contracting Parties

      (a) Protocol for Non-Contracting Parties
      (b) Actions Taken in Accordance with the Resolution
      (c) International Cooperation on Surveillance

   6.3 Research Fishing in International Waters in Relation the Provisions of Article 2 of the Convention

   6.4 **SPECIAL SESSION**: Report of the Working Group on the Impacts of Salmon Aquaculture on Wild Salmon Stocks

6.5 Actions by the Council to Eliminate Impacts on Wild Stocks
6.6 Long-Term Trends in Abundance
6.7 Diseases and Parasites
6.8 Catch and Release
6.9 Guidelines on Stocking
6.10 Reports on Conservation Measures Taken by the Three Regional Commissions

7. Other Business

8. Date and Place of Next Meeting

9. Draft Report of the Meeting

10. Press Release

ANNEX 6

COUNCIL

CNL(94)56

OUTLINE OF 1995 BUDGET AND 1996 FORECAST BUDGET AND SCHEDULE OF CONTRIBUTIONS

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
1995 BUDGET AND 1996 FORECAST BUDGET (Pounds Sterling)

SECTION	DESCRIPTION	EXPENDITURE	
		BUDGET 1995	FORECAST 1996
1	STAFF RELATED COSTS	161700	166540
2	TRAVEL AND SUBSISTENCE	27000	33810
3	CONTRIBUTION TO ICES	25530	26290
4	CONTRIBUTION TO WORKING CAPITAL FUND	0	0
5	MEETINGS	18800	7070
6	OFFICE SUPPLIES, PRINTING AND TRANSLATIONS	29930	33860
7	COMMUNICATIONS	11840	12180
8	HEADQUARTERS PROPERTY	11980	7240
9	OFFICE FURNITURE AND EQUIPMENT	7750	7970
10	AUDIT AND OTHER EXPENSES	9600	9870
11	TAG RETURN INCENTIVE SCHEME	4200	4200
	TOTAL	308330	309030

		REVENUE	
		BUDGET 1995	FORECAST 1996
12	CONTRIBUTIONS - CONTRACTING PARTIES	304421	301530
13	MISCELLANEOUS INCOME - INTEREST	10000	10000
14	STABILISATION	-7500	-2500
15	SURPLUS OR DEFICIT (-) FROM 1993	1409	0
	TOTAL	308330	309030

NASCO BUDGET CONTRIBUTIONS FOR 1995 AND FORECAST
BUDGET CONTRIBUTIONS FOR 1996 (Pounds Sterling)

CATCH (tonnes)	PARTY	BUDGET 1995	FORECAST 1996
364	CANADA	32469	32160
33	DENMARK (FAROE ISLANDS AND GREENLAND)	12171	12055
1288	EUROPEAN UNION	89130	88284
70	FINLAND	14440	14303
656	ICELAND	50375	49896
867	NORWAY	63314	62712
140	RUSSIAN FEDERATION	18732	18555
56	SWEDEN	13581	13452
1	USA	10209	10112
3475	TOTAL	304421	301530

Contributions are based on the Official Catch Returns as advised by the Parties. Column totals can be in error by a few pounds due to rounding.

ANNEX 7

COUNCIL

CNL(94)13

REPORT OF THE ICES ADVISORY COMMITTEE ON FISHERY MANAGEMENT

REPORT TO THE NORTH ATLANTIC SALMON CONSERVATION ORGANISATION COUNCIL

Sources of information: Reports of the Working Group on North Atlantic Salmon, April 1994 (ICES, Doc. C.M. 1994/ Assess:16) and the Study Group on Interactions of Wild, Ranched (Enhanced) and Reared Salmon, April 1994 (ICES, Doc C.M. 1994/M:3)

The following report is laid out in the format of the questions from NASCO to ICES (Appendix 1).

1. EVENTS OF THE 1993 FISHERIES AND THE STATUS OF STOCKS BY COMMISSION AREAS

1.1 Overview of catches in the North Atlantic

1.1.1 Nominal catches of salmon in the North Atlantic

Nominal catches of salmon by country in the North Atlantic for 1960-93 are shown in Table 1.1.1 and catches by NASCO Commission Areas for 1988-93 are summarised below (in tonnes).

Area	1988	1989	1990	1991	1992	1993
NEAC	5507	4412	3748	2936	3361	3195
NAC	1314	1143	915	713	525	369
WGC	897	338	275	476	232	-
Total	7718	5893	4938	4125	4118	3564

Figures for 1993 are provisional, but it appears likely that the final data will still show a decrease from 1992. This is the sixth year in which the total catch has decreased from the previous year. Management plans in several countries have reduced fishing effort and this accounts for some of the decline in catches. However, a greater decline in the catch of wild fish may be masked by the inclusion of fish farm escapees and ranched fish in the statistics.

1.1.2 Unreported Catches

The total unreported catch within NASCO Commission Areas in 1993 was estimated to be 1644 t, a decrease of 26% compared with the 1988-92 five-year mean of 2212 t. Estimates for 1988-1993 by Commission area are given below (in tonnes):

Area	1988	1989	1990	1991	1992	1993
NEAC	3087	2103	1779	1555	1825	1471
NAC	161	174	111	127	137	161
WGC	N/A	N/A	N/A	N/A	N/A	12
International waters	-	-	180-359	25-100	25-100	25-100

Many of the national estimates are based upon the level of declared catches, and thus the total unreported catch tends to vary in line with the nominal catch figures.

1.2 Fisheries and Stocks in the North-East Atlantic Commission (NEAC) Area

1.2.1 Fishery at Faroes

Gear and effort: 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 1994 to 1996.

A research fishery for salmon took place in the Faroes area in the 1992/93 season and the gear used was the same as in previous seasons. One research vessel fished a total of 39 sets on 3 trips during the season. There has been a progressive decline in the number of vessels operating in the fishery since 1981 (Figure 1.2.1).

Catch: The total catch in the research fishery in the 1992/93 season was 22 t, and the preliminary catch for the calendar year 1993 was 21 t excluding fish that were tagged and released (Table 1.1.1, Figure 1.2.1). The proportion of fish less than 60 cm (that would normally have been discarded) was 9.4%, which is within the range observed since the 1982/83 season.

CPUE (Catch per unit effort): The average CPUE was the highest recorded since the 1981/82 season (Figure 1.2.2). However, it is difficult to compare this with other years as only one boat was fishing in the last two seasons. The high incidence of farmed fish in the fishery will also have affected the CPUE.

Composition of catch: Marked differences were observed in the river and sea age composition and size distribution of catches between the autumn and spring in the 1992/93 season. This suggests that different stocks were being exploited at these times, with stocks from more southerly areas probably being taken in the autumn. The incidence of reared fish is discussed in Section 4.

Origin of the catch: External tags (ext.) and CWTs were recovered from countries regularly represented in the tag recovery programmes in the past, namely: Norway (58 ext.), Sweden (7 ext.), Ireland (12 CWT) and UK (England and Wales) (2 CWT).

A total of 3667 salmon have been tagged and released in the open sea to the north of the Faroe Islands in the 1992/93 and 1993/94 seasons. After one fishing season (i.e.

1993), 51 recaptures have been reported by commercial fishermen and anglers in homewater fisheries as shown below:

Country	No. Recaptures	%
Norway	31	61
Sweden	3	6
Scotland	8	16
England	1	2
Ireland	3	6
Iceland	1	2
Spain	1	2
Denmark	2	4
Canada	1	2
No. released	1992/93: 3050 1993/94: 617	

The pattern of recaptures confirms earlier information that the majority of the salmon in the Faroes area originate from Norway. It appears that the recapture rate for farmed fish may be considerably lower than for wild fish.

Exploitation rates: Exploitation rates in the Faroes fishery on 1SW fish from monitored stocks in Norway and Sweden and on both 1SW and 2SW fish from monitored stocks in UK and Ireland were very low in the 3 seasons prior to the suspension of commercial fishing and have been less than 1% in the 2 seasons since. Exploitation rates on 2SW fish from Norwegian and Swedish monitored stocks (shown below) have been below 10% since the suspension of commercial fishing.

Country	River	Mean exploitation rate (%)	
		1987/88-1990/91	1991/92-1992/93
Norway	Drammen	25	1
	Imsa (Wild)	7	5
	Imsa (Hatchery)	21	3
Sweden	Lagan	15	8

Biological data: Preliminary results from the stomach analysis of salmon caught in the fishery show that the most important items in the diet were hyperiid amphipods of the genus *Parathemisto* and Euphausiids. The fishes were mainly lantern fishes and *Maurolicus* sp.

1.2.2 Homewater Fisheries in the NEAC Area

Gear and effort: Restrictions on rod fishing methods were introduced in two districts in UK (Scotland) in 1993. Decreases in effort in net fisheries were reported in Ireland,

Sweden and UK (England and Wales) and UK (N. Ireland). Increases in rod fishing effort were reported in Finland and France.

Catch: In general, catches in the North-East Atlantic Area in 1993 were lower than in 1992, although increases were recorded in a few countries (Iceland, Sweden and UK (England and Wales)) (Table 1.1.1). Catches in Iceland continue to reflect the increasing importance of ranched fish. In a number of areas grilse were reported to have appeared in fisheries later than usual, and there were observations of substantial numbers of fish entering rivers after the end of the fishing seasons in some countries. (Unreported catches in the NEAC Area are discussed in Section 1.1).

CPUE: CPUE data were available for a limited number of fisheries/countries. CPUE in rod fisheries in France and Finland were higher in 1992 and 1993 than in previous years and a similar pattern has been evident for the River Bush (UK, N. Ireland). Finnish catch rates have benefited from the closure of the Norwegian coastal fisheries while the Bush has been supplemented by ranching. CPUE data were also available for regional net fisheries in UK (England and Wales) and showed an improvement in catch rates in 1993 after a steady decline from 1988-92. Long-term CPUE data for net fisheries in UK (Scotland) suggest that catch rates increased from 1950-70 but have declined since.

Composition of catch: Finland, Russia and Sweden reported decreases in the proportions of grilse in their catches. Elsewhere, however, there was a perception that the grilse component of catches was increasing.

Origin of catch: Table 1.2.1 indicates the estimated origin (in %) of the 1992 catch in each country. Percentages can only be estimated where countries have suitable monitoring programmes. Where catches are known to occur but percentages could not be estimated they are indicated by a '+'. The results, although very approximate, confirm that there are exchanges between fisheries in most adjacent countries, particularly Ireland and the countries of the UK. The table also shows estimates of the proportions of the catches in 1992 that were of ranched and farmed origin (see also Section 4).

Exploitation rates: Exploitation rates for monitored stocks in homewater fisheries in the NEAC area in 1993 were generally within the ranges observed between 1988 and 1992 and less than the means for that period (Table 1.2.2). The main exceptions were the Itchen (UK, England & Wales) and Ponoy (Russia), where net exploitation rates were greatly reduced in 1993, and the Imsa and Lagan, where exploitation rates on 1SW hatchery fish were the highest for at least five years.

1.2.3 Status of stocks in the NEAC Area

Short-term: 1993

Comparison of recruitment and escapement indices for 1993 from monitored rivers in the NEAC area gave variable results. In Russia, 1993 seemed to be an average year in terms of adult returns. In Scandinavia and western Europe, smolt output seemed to be relatively poor (in all but one case output was below the long-term average), while adult counts were fairly high, some rivers being close to or at the maximum level on

record. There were, however, some notable exceptions, with counts on 3 rivers being near the minimum recorded. In addition, it must be noted that the good returns appeared to be mainly attributable to the 1SW fraction of the stocks. If survival at sea does not increase significantly, the low levels of smolt production observed in 1993 will have a negative impact on grilse returns in 1994 and on returns of 2SW salmon in 1995.

Indices of marine survival for wild 1SW fish, before exploitation in coastal waters, were higher in 1993 than in 1992 in 3 out of 4 cases, while falling within the range of values observed in the past. Information on salmon of hatchery origin confirmed the general improvement of sea survival of 1SW fish. When compared with previous years' data, return rates of 2SW salmon showed variable results depending on the river and on the origin of the fish (wild or reared); average return rates remained low.

Long-term trends

Smolt counts in Scandinavian and West European stocks do not seem to have followed any common trend over the past 5 and 10 years. However, except in Russia, adult returns have tended to improve in rivers for which counts are available. Sea survival of 1SW fish has decreased over the last decade, but this was probably outweighed by a reduction in exploitation rates in coastal waters. No common trend can be detected for survival at sea of 2SW salmon.

Optimum spawning levels

The use of optimum salmon spawning stock levels in the north-east Atlantic would be a valuable tool in assessing the status of stocks and ensuring that quotas can be set at a level which will allow sufficient spawning escapement to maximise smolt production. There is also a need to develop regional estimates of spawning stocks in the north-east Atlantic for use in stock assessments.

1.2.4 Data deficiencies and research needs for the NEAC Area

ACFM identified three areas where there was a particular need for work in the NEAC Area in the next year:

- effort should be made to improve the methods used to estimate unreported catches;
- provisional optimal spawning levels should be developed for appropriate monitored rivers, (at least one river per country) and historical and current attainment with respect to these spawning targets should be assessed;
- work should be carried out to develop models for use in the provision of catch advice in relation to stock abundance for European stocks.

1.3 Fisheries in the North American Commission (NAC) Area

1.3.1 Fisheries in NAC Area

Canada

Gear and effort: The moratorium on the commercial fishery in Newfoundland continued in 1993. Quotas were reduced in commercial fisheries in parts of Labrador and Quebec. Quotas and daily catch limits were also reduced in rod fisheries and some rivers were closed to rod exploitation for all or part of the season. Further details of the 1993 management restrictions are given in Appendix 2. There were no changes in gear used in Canada.

Catch: The total salmon landings for Canada in 1993 were 367 t, which was the lowest recorded since 1960 (Table 1.1.1). The landings of small and large salmon were 36% and 44% of the previous 5 year averages respectively. The decline in catches from 1593 t in 1987 has been influenced by the closure of fisheries in SFAs 3-14A in 1992 and the general decline in population size. Figure 1.3.1 shows the 1993 rod catches in each SFA as a percentage of the quota. Recreational catches of both small and large fish have generally decreased or remained stable. Unreported catches are discussed in Section 1.2.

Composition and origin of catch: Only salmon of Canadian and USA origin were recorded in Canadian catches in 1993. CWTs were recovered from 1SW salmon from USA (7) and Canada (2) in Labrador (31% of the catch was scanned). Only one Carlin tag from a Maine-origin salmon was reported from Canada in 1993. Catches of farmed fish are discussed in Section 4.

USA

Gear and effort: There were no changes in gear used in 1993. In 1993 the season limit in boundary waters with Canada was made consistent with all other Maine waters (i.e. 1 fish/angler/season).

Catch: The total harvest of 152 salmon in the Maine sport fishery in 1993 was 21% lower than in 1992 and 58% lower than the 1988-92 average. The decrease was attributed to reduced runs and restrictive management measures.

Composition and origin of catch: All salmon caught were of local origin and no salmon of farmed origin are known to have been taken.

Exploitation rates: The average exploitation on combined age classes in the Penobscot River in 1993 was 7.4%, which was approximately equal to that in 1992.

France (Islands of St. Pierre and Miquelon)

The catch of salmon for the Islands of St. Pierre and Miquelon in 1993 was 1.8 t, which was similar to previous years.

1.3.2 Status of stocks in the NAC Area

Stock abundance and stock status were quite variable within the NAC Area. Populations of small and large salmon (mostly measured as returns to rivers) were lower than in 1992 for most stocks in New Brunswick, Nova Scotia, Québec Zones Q1-8, Q10 and Q11, Labrador (SFA 1,2) and Maine. Increased population sizes were observed in Newfoundland SFA 3-5, 14A, Labrador SFA 14B and Québec Q9. Population sizes were similar to 1992 in Newfoundland SFA 6-13 and in the Miramichi R (large salmon only).

Although the population sizes have increased in many northern Newfoundland rivers in 1992 and 1993, they are still lower than observed in years prior to the moratorium. Generally, the population sizes of large and small salmon in rivers in Canada and USA were lower than expected given that 1993 is the second year of the closure of the Newfoundland commercial fisheries. There is evidence that the marine survival rates have been unusually low for the past several years which may have off-set the reduction in fishing mortality.

Estimates of egg deposition were provided for 20 rivers in Canada and 3 rivers in Maine for which targets are available (Figure 1.3.2). Of the Canadian rivers 55% (12) had less than 75% of their target spawning levels and 35% of the rivers exceeded their target levels. The other 10% of the rivers were between 75 and 100% of the target. All of the Maine rivers had less than 20% of their target spawning levels. USA salmon production remains hatchery dependent. Data from the Penobscot reveal a progressive decline in marine survival for MSW fish (Figure 1.3.3). The salmon stocks in SFAs 1, 2, 19-23 and Maine appear to be at very low levels and ACFM recommends that fishing mortalities on these stocks should be kept as low as possible.

1.3.3 Data deficiencies and research needs for the NAC Area

ACFM identified the need for:

- spawning targets for North American stocks to be further refined as additional information on sea age composition of spawners becomes available and as further understanding of life history strategies is gained.

1.4 Fishery in the West Greenland Commission (WGC) Area

1.4.1 Fishery at West Greenland

In accordance with the agreement between the Organisation of Hunters and Fishermen in Greenland and the North Atlantic Salmon Fund, all fishing for salmon in Greenland territorial waters was suspended for the two years 1993 and 1994. The agreement allowed for a small subsistence harvest of 12 t each year. Salmon caught in the subsistence fishery could not be sold to factories, marketing associations or for export.

No information is available on the 1993 harvest either for the actual catch or the catch composition.

1.4.2 Status of Stocks in the WGC Area

The salmon caught in the West Greenland Area are non-maturing 1SW salmon or older fish, all of which would return to homewaters in Europe or North America as MSW fish if they survived. The most abundant European stocks in West Greenland are thought to originate from the UK and Ireland. The MSW component of most of these stocks has declined in recent years. Similar declines in abundance have been noted in many North American stocks that contribute to the West Greenland fishery. Thus the overall status of the stocks and stock components contributing to the West Greenland fishery remains poor. (See Sections 1.2.3, 1.3.3 and 3.4 for information on stocks contributing to the fishery).

1.4.3 Data Deficiencies and Research Needs for the WGC Area

Until 1992, a sampling programme was conducted in the West Greenland commercial fishery in order to provide data on the stocks in the area. With the suspension of commercial fishing sampling became impossible.

ACFM therefore identified the need for:

- a research programme including experimental fishing should be undertaken at West Greenland to provide up-to-date information on the parameters necessary to assess the stocks in the area.

2. EVALUATION OF EFFECTS OF NEW MANAGEMENT MEASURES ON STOCKS AND FISHERIES

2.1 Quota management measures and closures implemented after 1991 in the Canadian commercial salmon fisheries

Effects on Canadian Stocks and Fisheries

ACFM evaluated the effects of the management measures taken in coastal waters of insular Newfoundland by estimating the total returns of salmon to the area and estimating the increased numbers of salmon that returned as a result of the management measures. These estimates are summarised below:

Year	Angling catch	Total returns	Increase in returns	
			Small salmon	Large salmon
		(,000)	(,000)	(,000)
1992	36,926	123-246	62-123	12-24
1993	42,623	142-284	71-142	5-11

The management changes resulted in an increase in the proportion of large salmon from 6% (1987-91) to 9% (1992-93) as evident from counts of salmon at fish counting facilities.

In Labrador, the small reductions in effort in 1992 are unlikely to have significantly reduced the exploitation rate of salmon in the commercial fisheries. Since the quotas were not attained in either 1992 or 1993, this quota measure did not put any restrictions on the fishery and did not affect returns to rivers. However, the combined licensed effort reduction in 1992 and 1993 was 60% of the 1991 licensed effort, which should have reduced the commercial exploitation on Labrador salmon stocks and may have resulted in a doubling of the returns of small and large salmon to rivers in SFA 2 and 14B.

In zones Q7 and Q8, the commercial exploitation rate in 1990-1992 was calculated to be 3-4% for small salmon and 26-33% for large salmon. The reductions in quota of 98% in 1993 may have resulted in 96 to 187 small salmon and 967 to 1711 large salmon not being caught assuming that the same exploitation rates as in 1990-92 would have applied in 1993 with no management change.

Although the Newfoundland and Labrador commercial salmon fisheries used to harvest small and large salmon with origins in Nova Scotia, New Brunswick, and Québec, the increase in returns to these provinces cannot be quantified.

The moratoria on the commercial cod fishery in Canada in 1992 and 1993 would have reduced the by-catch of salmon.

Effects on USA stocks

ACFM estimated the effects of the 1992 salmon fishery moratorium in Canada upon Maine stocks by estimating the average harvest during the base period 1984-1989 in the SFAs affected. On this basis it was estimated that the harvest of Maine-origin salmon in Canada was reduced by 67%. Given the documented presence of Merrimack and Connecticut river-origin salmon in Labrador, similar reductions in the harvest of these stocks would have been expected.

2.2 Effects of the Suspension of Commercial Fishing Activity at Faroes

Assuming that monitored stocks have been relatively stable over the past four years, the suspension of commercial fishing at Faroes should have reduced exploitation in the Faroes fishery to about 10% of the levels in the previous three seasons. In practice, there was a significant reduction in the exploitation rate on 2SW fish from R. Imsa and R. Lagan from a mean of 18% in the 1988/89 to 1990/91 seasons to 5% in the 1991/92 and 1992/93 seasons (see Section 1.2.1). In most years, exploitation rates on both 1SW and 2SW fish from UK and Ireland have been very low and the effects of the buy-out are therefore difficult to detect.

The estimated reduction in returns to all homewaters that might have been expected in 1993 if the full quota in Faroese waters (550 t) had been taken in the 1991/92 and 1992/93 seasons were as follows:

Age/Origin	Estimated reduction in returns if quota had been taken
Wild 1SW	9,000
Wild 2SW	48,000
Wild 2SW+	38,000

In addition, the fishery would have taken an extra 94,000 fish of farmed origin in these two seasons. It is not possible to project the return rates to homewaters for these fish.

The expected increases in total returns to all homewaters and in stock in Scandinavia, Finland and Russia in 1993 resulting from the reduction in Faroese catches in the 1991/92 and 1992/93 seasons compared with the period 1988/89 to 1990/91 were as follows:

Age/ Origin	Increase in total returns	Estimated increase in stocks in Scandinavia, Finland and Russia	
		Number	%
Wild 1SW	2,000	1,200-1,600	<1%
Wild MSW	47,000	28,200-37,600	11-21%

In addition, about 37,000 fewer fish of farmed origin are estimated to have been taken in each season. It is not known how many of these would have returned to homewaters.

The above increases will have been hidden within the annual variation of catches in these countries.

Catches for Ireland, Scotland (large salmon) and Russia (2SW salmon) in 1992 and 1993 were not significantly greater than those in 1987-1991.

3. ADVICE WITH RESPECT TO THE FISHERY IN THE WEST GREENLAND COMMISSION AREA

3.1 Continue development of the model used in providing advice on catch quotas in relation to stock abundance

Models of North American stocks

ACFM has previously provided catch advice based upon a prediction of the pre-fishery abundance using thermal habitat as the independent variable. The time series of thermal habitat data and revised pre-fishery abundance estimates (see Section 3.3) were used to examine further relationships that could be employed to predict pre-fishery abundance in 1994. A number of relationships between habitat and pre-fishery

abundance estimates were tested but those with March values of habitat proved the best and were similar to the results provided in 1993.

Although the relationship with thermal habitat is considered to be statistically sound, efforts were made to improve the predictive models. Relationships between pre-fishery abundance of non-maturing 1SW salmon and a combination of wind and thermal habitat variables were therefore examined. The best of the new relationships tested was based upon wind speed in an area to the south west of Greenland in December (year 1) combined with thermal habitat in March (in year 2).

The forecasts of pre-fishery abundance by these models were not in good agreement, and ACFM therefore considered information on the maturing 1SW component of the stock in 1993 as an independent means of evaluating the two approaches. The pre-fishery abundance for all North American non-maturing 1SW fish was shown to be correlated to the grilse returns in some SFAs in Canada. This relationship could therefore be used to estimate the pre-fishery abundance of non-maturing 1SW fish in 1993 from the grilse returns in the same year. This estimate of pre-fishery abundance was in good agreement with the forecast from the thermal habitat model but not from the model based on wind and thermal habitat model. ACFM therefore considers the thermal habitat model used in 1993 to be more supportable.

Models of European stocks

ACFM reviewed work in progress towards the development of European models for the provision of catch advice. A number of studies of European stocks have revealed similar correlations between stock abundance and environmental conditions to those currently used for North American stocks. ACFM therefore recommends that work should carried out to develop models for use in the provision of catch advice in relation to stock abundance for European stocks.

3.2 Estimate the pre-fishery abundance of non-maturing 1SW salmon at the time of the fishery

ACFM updated the databases used in the North American run-reconstruction model to derive revised estimates of pre-fishery abundance for 1974-92. Although the exact error bounds for the estimates of pre-fishery abundance are unknown, minimum and maximum values of catch and return data have been estimated and give minimum and maximum estimates of the pre-fishery abundance (Figure 3.2.1). The new estimates are slightly lower than reported in 1993, but the differences are minor and become smaller in more recent years. The new pre-fishery abundance estimate (mid-point of range) for 1992 was the lowest in the 19 year time series with a range between 120 and 224 thousand salmon; the upper value of this range was less than the lower bound for 1991. These results suggest a continuing downward trend in pre-fishery abundance for North American MSW stocks.

The thermal habitat model presented in 1993 was used to forecast the pre-fishery abundance of non-maturing 1SW salmon for 1993 and 1994:

Year	Pre-fishery abundance forecast
1993	243,043
1994	280,028

3.3 **Provide catch options with an assessment of risks relative to the management objective of achieving various levels of target spawning escapement**

The goal in Atlantic salmon management is to ensure that there are adequate numbers of spawners in each river. In mixed stock fisheries this may be difficult owing to varying migration patterns and exploitation rates experienced by individual stocks. Nonetheless, a composite spawning target of 193,741 2SW salmon has been defined for North America by summing the spawning targets of Salmon Fishing Areas and Zones in Canada and river basins within the USA.

To achieve this spawning target, a reserve of fish must be set aside prior to fishery allocation in order to allow for natural mortality in the intervening months between the fishery and spawning migration. Thus, 216,270 (i.e. 193,741/exp*(-.01*11)) fish must be reserved before the fishery to ensure achievement of the target after allowing for natural mortality.

This reserve is subtracted from the appropriate forecast of the pre-fishery abundance to give the harvestable surplus of North American non-maturing 1SW fish. This surplus may be taken at West Greenland as 1SW fish or in Canada as 1SW fish in the same year or 2SW fish in the following year. In the latter case, natural mortality will reduce the numbers of fish that may be harvested.

The proportion of the allowable harvest of North American fish to be allocated to West Greenland ($F_{(NA)}$) must be set by managers. This then allows the number of North American fish which may be caught at West Greenland to be calculated. This can then be converted to a total catch quota in tonnes by converting the numbers to weights and adding the catch of European fish and of fish older than 1SW that are expected to be taken at the same time. The formulae for this process are given in Appendix 3.

Estimates of the parameters used in the assessment (PropNA, WT1SWNA, WT1SWE and ACF) (see Appendix 3) were obtained by simple exponential smoothing of the observed 1978-92 values, as no new data were available for 1993. These estimates are given below:

Parameter	Forecast for 1993
PropNA	0.540
WT1SWNA	2.525
WT1SWE	2.660
ACF	1.121

The probability density function of this forecast was estimated and is shown as a cumulative function below:

Cumulative Density Function (%)	Forecast
25	182,500
30	203,750
35	225,000
40	242,000
45	263,250
50	280,250
55	297,250
60	318,500
65	335,500
70	356,750
75	378,000

The probability density function of the pre-fishery abundance forecast (Section 3.2) gives the probability of the true stock abundance being lower than the value selected. For example there is a 35% chance that the pre-fishery abundance will not exceed 225,000 fish. The probability level also provides a measure of the chance of reaching escapement targets assuming fishery allocations are taken without error. The probability levels associated with certain reference points can be classified into broad categories termed "risk neutral", "risk averse", and "risk prone". The mid-point estimate of the forecast represents a reference point at which there is a 50% chance that the true abundance is lower than required to achieve the spawning target. This level is termed the "risk neutral" forecast. Likewise, the forecast value at the 25th percentile, or the value with a 25% chance that the abundance is lower, is the "risk averse" forecast. The forecast value at the 75th percentile, or the value with a 75% chance that the abundance is lower, is the "risk prone" forecast. ACFM considers that it is important to proceed cautiously by using the mid to lower part of the range of predicted abundance levels for management decisions.

In Table 3.3.1, the West Greenland quota is computed for a range of pre-fishery abundance values between interquartile limits of the probability density function and for different values of $F_{(NA)}$. For the mid-point estimate level (i.e. 50% level), the quota options range from 0 to 344 t.

ACFM notes that the risk neutral approach only ensures that there is a 50% chance that the spawning escapement in North America will exceed the target level for all rivers combined. Even if this overall target is achieved, it is likely that some stocks will fail to meet their individual target spawner requirements while others will exceed target levels (Figure 1.3.2). This 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 risk neutral approach may result in some stocks failing to meet target levels over an extended period. This would be likely to result in the long-term decline in those stocks. If the objective is to meet the

spawning target in every river, then the 50% level will not be adequate and some lower value should be chosen.

The assessment models used for the provision of catch advice are based almost entirely upon data for North American stocks. While it is believed that European stocks are generally less vulnerable to the West Greenland fishery than North American stocks, there has been evidence of a more rapid decline in these stocks, in the West Greenland area at least, than the North American stock. ACFM therefore emphasised the importance of developing similar assessment methods for the stocks in the North-East Atlantic area.

3.4 Describe which stocks make the greatest numerical contributions of salmon to the fishery

Within North America and Europe, there are large numbers of salmon rivers which produce MSW salmon that may contribute to the West Greenland fishery. However, it is not possible to determine the absolute or relative contribution of each stock to the fishery in the absence of stock identification information for West Greenland nor accurate return information for all stocks. This information could not be obtained without a very extensive research programme.

In recent years, estimates based on the smolt age composition of catches suggest that approximately 10% of the catch of North American fish at West Greenland comes from United States rivers and hatcheries and one Canadian hatchery (Mactaquac); about 75% come from Southern stocks (SFA5-23, Q1-7, and Q10); and about 15% come from Northern stocks (Q8-9, Q11, SFA1-4).

Crude examination of river age distributions of European salmon in the West Greenland fishery suggests that wild stocks in northern Norway, Finland and Russia are relatively poorly represented in comparison with stocks from UK, Ireland and southern Europe.

3.5 Evaluate the relationship between spawning escapement and subsequent pre-fishery abundance

Published studies on monitored stocks in the North Atlantic have demonstrated stock and recruitment relationships for Atlantic salmon. These relationships indicate that, below optimal spawning stock levels, reducing the number of spawners would be expected to decrease the production of smolts. However, increasing the number of spawners above these levels will not improve smolt production.

The relationships established between pre-fishery abundance and various environmental parameters suggest that environmental conditions influence the survival of salmon during the first year in the sea (i.e. smolt production to pre-fishery abundance). These relationships have been established assuming that natural mortality after the first year in the sea is relatively low and stable. It is apparent that the environmental influences may mask the relationship between spawning escapement and pre-fishery abundance. This will make it difficult to demonstrate these effects, although they are most likely to become apparent at low stock levels.

4. IMPACTS OF FISH FARM ESCAPEES AND SEA-RANCHED FISH

4.1 Evaluate the Abundance of Fish Farm Escapees and Sea-Ranched Fish in Fisheries and Rivers

4.1.1 Faroes Fishery

Scale samples collected at Faroes have been examined to estimate the proportion of the catch that was of farmed origin:

Season	% farmed
1982/83	1
1985/86	4
1989/90	44
1990/91	42
1991/92	37
1992/93	27

It appears that the occurrence of escapees in the Faroes fishery has paralleled trends in production of farmed salmon, being low in the early 1980's and peaking during the early 1990's.

4.1.2 West Greenland Fishery

The proportion of escaped farmed Atlantic salmon at the feeding grounds at West Greenland was estimated to be 1.1% in 1991 and 1.4% in 1992.

4.1.3 Homewater fisheries and rivers in the NEAC Area

Ranched fish have comprised between 70 and 75% of the catch in Iceland for the past three years and in Sweden between 35 and 50% of the catch has been made up of released fish that are not expected to contribute to natural spawning stocks.

The proportion of farm escapees in homewater fisheries is greatest in areas where there are large numbers of salmon farms (e.g. Norway and west coast of UK (Scotland)). In Norway, the occurrence of farmed salmon in catches in coastal fisheries in 1993 (47%) was comparable to that in previous seasons, while a 20% contribution to catches in fjord fisheries was comparable to that in 1992 but higher than the 1989-1991 average (13%). Data from 1993 from UK (Scotland) were similar to previous years, with highest proportions of farmed fish being reported in catches in the north and west coastal fisheries (20-37%) and much lower proportions being seen in the larger east coast fisheries and in the south-west (0-3%). These data reflect the geographical location and extent of salmon farming in those countries.

Farmed salmon are believed to occur in most other countries in the north-east Atlantic, but contributions to fisheries are thought to be low (Table 1.2.1). There have been no records of farmed fish in catches in France, Russia and UK (England and Wales). In Ireland less than 2% of catches were estimated to be of farm origin although this may be an underestimate.

Data on the contribution of farmed salmon to spawning stocks in the NEAC Area were available from Norway, UK (Scotland) and UK (N. Ireland). In Norway, sampling of rod catches and broodstock in numerous rivers indicated that in 1993 about 4% of rod catches and 21% of broodstock comprised farmed salmon. Both figures are lower than previously observed. In UK (N. Ireland) 0.5% of fish entering the River Bush were of farm origin. No new data are available on the incidence of fish farm escapees or their progeny in freshwater in UK (Scotland), but it is likely that these fish contribute to spawning populations in some rivers on the west coast in particular.

4.1.4 Homewater fisheries and rivers in NAC Area

Salmon returning to the Mactaquac hatchery on the Saint John River (SFA 23) were monitored in 1990, subsequent to a purported loss of 16,000-20,000 fish from sea-cages. There were 221 fish identified as being of sea-cage origin, based on scale patterns and fin conditions, out of a total of 3,919 large fish counted at the fishway, approximately 6% of the return.

The incidence of farm fish in the Magaguadavic River, Canada (SFA 23) since 1992 is shown below:

Year	1SW	% farm origin	MSW	% farm origin
1992	238	35	201	31
1193	208	46	177	29

4.2 Evaluate the genetic, disease and parasite, ecological and environmental impacts of fish farm escapees and ranched fish on wild stocks

4.2.1 Genetic impacts

Enhanced, ranched and farmed salmon have the potential to interact genetically with wild fish altering the natural balance of genetic population structure through the following mechanisms:

- relaxation of competition/selection;
- inadvertent or passive selection;
- selective breeding;
- genetic drift;
- transfer of non-local stocks.

These factors will be further affected by the number of fish released or escaping into the wild, the stage at which they enter the wild and their relative fitness. The factors would normally be expected to reduce fitness, and it has generally been observed that cultured fish are reproductively inferior. Although this will tend to reduce the impact on wild stocks, short-term adverse effects may still result from single interactions. Repeated interactions in succeeding generations will complicate the assessment of the effects.

Genetically modified salmon may become available for use in aquaculture in the future. The full implications for wild salmon stocks will need to be assessed. The use of triploid stocks in salmon rearing would reduce possibilities for genetic interaction with wild fish.

4.2.2 Disease and parasite impacts

Most of the disease organisms present in farmed salmon are also present among wild fish. However, the aquaculture industry has been responsible for introducing diseases and parasites into some areas with serious detrimental effect on wild stocks. Examples include the introduction of *Gyrodactylus salaris* and furunculosis into Norway. Although wild fish are thought to be more likely to act as a reservoir of diseases for farmed fish than vice versa, the high frequency of diseases on farms and the concentrations of pathogens have the potential to cause outbreaks of diseases in wild fish populations.

Insufficient information is available to assess the risks of disease/parasite interactions.

4.2.3 Ecological and environmental impacts

Reared fish may cause the following ecological and environmental impacts on wild stocks:

- predator attraction and increased predation rates where reared or ranched fish are present among wild fish;
- inadvertent harvesting of wild fish among ranched salmon where groups occur together near the harvesting site;
- local degradation of natural freshwater habitat caused by effluent from freshwater rearing units.

These mechanisms have not been widely explored. Some effects may extend to other species and may be to the detriment of the genetic population structure in both species.

4.3 Evaluate the impacts of current hatchery practices on wild stocks

With the information available ACFM were not in a position to assess the impacts of current hatchery practices on wild stocks.

5. EVALUATE GRILSIFICATION MECHANISMS AND ASSESS THE IMPACT THAT GRILSIFICATION MAY HAVE ON STOCK ABUNDANCE AND FUTURE SPAWNING REQUIREMENTS

ACFM considered the differing trends that may be observed in the proportion of stocks that mature as 1SW fish. No trend was evident in the proportion of grilse in returns from the River Figgjio (Norway) (1965-91). In the North Esk (UK, Scotland) the proportion of grilse in catches has increased from about 25% in 1952 to about

60% in 1992, while in the Bush (UK, N. Ireland) the proportion of grilse has decreased during the period 1974-91.

In Iceland short-term changes in grilse/salmon ratios could be explained by changes in marine conditions. Climatic changes also appeared to be responsible for long-term changes in the sea-age composition of Icelandic stocks examined, although stocks from different areas were differently affected.

The annual variation in early maturation for a hatchery-dependent stock (Penobscot River, USA) was investigated by comparing scale circuli patterns. In a cohort, the fish with the fastest growth rates tended to return as grilse. It was also found that the maturation fraction was significantly and positively correlated with late summer growth, suggesting that growth during this season is central to the determination of the proportion of a smolt class that matures as grilse.

6. EVALUATE EVIDENCE FOR RECRUITMENT OVERFISHING OCCURRING ON ATLANTIC SALMON POPULATIONS

The level of recruitment to the fishery each year is dependent on the environmental and ecological conditions experienced by the young fish between the time they are spawned and when they become available to the fishery. Since these conditions are variable, recruitment is also variable and does not appear to be simply proportional to the size of the parent stock. There must, nevertheless, be a level of spawning stock below which recruitment will be affected as a result of low egg production. The likelihood that the stock will fall below this level depends on both natural and fishing mortality. Stocks that have been reduced below this level by fishing are said to be suffering from 'recruitment overfishing'.

Whereas time-series of stock and recruitment data are available for some salmon stocks the levels of fishing mortality are not generally known. Without these values it is not possible to assess the impacts of fishing mortality on the spawning stocks.

ACFM therefore considered evidence from a number of salmon stocks for cohorts of spawners failing to replace themselves in succeeding generations as a result of fishing. While this may occur at any level of spawning escapement, it is only likely to be a matter of concern when this replacement failure occurs with some regularity. Overfishing of this form may be considered by examining spawner to spawner relationships on both a regional basis and for individual rivers. Spawner to spawner relationships were derived in two ways, by estimating the number of spawners of a given sea-age either producing or produced by the spawner cohort of the same sea-age in each year. The results are summarised in Table 6.1.

Only the 2SW stocks in the Gulf Region (Canada) have tended to be above replacement level. This result suggests that these stocks should have an ability to increase rapidly should environmental conditions become favourable. Stocks in most other areas appear to be replacing themselves, even when they are below target levels. However, 2SW stocks in Labrador have been below replacement level throughout the period suggesting that they are being seriously overfished.

Several distinct patterns were readily apparent for the individual stocks. In most instances spawner to spawner relationships for grilse were stable with about a 50:50 split between points above and below the replacement line. This pattern held even in stocks where MSW spawners were consistently below target levels. For example, grilse spawners exceeded replacement in 10 of 23 years for the North Esk (UK (Scotland)) (Figure 6.1) whereas 3SW spawners were below replacement in 18 of 22 years. In contrast, spawner recruits for the Nordura River stock (Iceland), which is fished only in the river, were evenly distributed around the replacement line for both grilse and MSW salmon (Figure 6.2). This was also the pattern seen for many North American stocks such as the River de la Trinite (Figure 6.3).

7. EVALUATE THE PROSPECTS OF DEVELOPING PREDICTIVE MODELS OF ANNUAL MIGRATION AND DISTRIBUTION OF ATLANTIC SALMON STOCK COMPLEXES

ACFM considered an Atlantic salmon migration model intended to explore the relative role that different factors play in migration. The model simulates the movement of individual fish through sea surface temperature and surface current fields of the North Atlantic.

The initial results from the model were encouraging with the simulated distribution of fish originating in North America being in general agreement with known data from marine surveys and fisheries (Figure 7.1).

The model as it is presently formulated can be used to evaluate the role of temperature and currents in defining the transoceanic migration of Atlantic salmon. However, it can only deal with the directed movement of salmon related to other cues, such as geomagnetic or celestial cues, by empirically matching the model output with validation data. The geomagnetic field of the earth, in terms of its properties such as field strength and declination, are known to produce gradients across the North Atlantic. If these properties of the field can be detected by Atlantic salmon, much of the directed movement of the migration could be explained. The model could be modified to allow salmon to orient to geomagnetic field; however, this orientation would have to be parameterized in an arbitrary fashion.

8. EVALUATE THE RESULTS OF THE RESEARCH PROGRAMME AT FAROES

Information derived from the research fishing programme at Faroes is presented in Section 1.2.1.

9. PROVIDE A COMPILATION OF MICROTAG, FINCLIP AND EXTERNAL TAG RELEASES BY MEMBER COUNTRIES IN 1993

Records of tags releases and finclip data were compiled as a separate report. In excess of 1.64 million CWTs and 0.21 million external tags were applied to Atlantic salmon in 1993. In addition, 1.77 million salmon were finclipped, 1.73 million with adipose finclips only.

Table 1.1.1 Nominal catch of Atlantic salmon by country (in tonnes round fresh weight), 1960-1993 (1993 provisional figures).

Year	Canada (5)	Den.	Faroes	Finland	France	East Grld.	West Grld. (7)	Iceland	Ireland (1, 3)	Norway (4, 9)	Russia	St. P. & M.	Sweden (West)	UK E. & W.	UK Scotland	UK N.I.(1,2)	USA	Other (8)	Total Rep. Catch	Unreported catches NASCO Areas	Unreported catches Internat. waters (9)	'Total Catch
1960	1636	-	-	-	-	-	60	100	743	1659	1100	-	40	283	1443	139	1	-	7204	-		-
1961	1583	-	-	-	-	-	127	127	707	1533	790	-	27	232	1185	132	1	-	6444	-		-
1962	1719	-	-	-	-	-	244	125	1459	1935	710	-	45	318	1738	356	1	-	8650	-		-
1963	1661	-	-	-	-	-	466	145	1456	1786	480	-	23	325	1725	306	1	-	8576	-		-
1964	2069	-	-	-	-	-	1539	135	1617	2147	590	-	36	307	1907	377	1	-	10725	-		-
1965	2116	-	-	-	-	-	861	133	1457	2000	590	-	40	320	1593	281	1	-	9392	-		-
1966	2369	-	-	-	-	-	1370	106	1238	1791	570	-	36	387	1595	287	1	-	9750	-		-
1967	2863	-	-	-	-	-	1601	146	1463	1980	883	-	25	420	2117	449	1	-	11948	-		-
1968	2111	-	5	-	-	-	1127	182	1413	1514	827	-	20	282	1578	312	1	403	9755	-		-
1969	2202	-	7	-	-	-	2210	133	1730	1383	360	-	22	377	1955	287	1	893	11540	-		-
1970	2323	-	12	-	-	-	2146	195	1787	1171	448	-	20	527	1392	297	1	922	11241	-		-
1971	1992	-	-	-	-	-	2869	204	1639	1207	417	-	18	426	1421	234	1	471	10719	-		-
1972	1759	-	9	32	34	-	2113	250	1804	1568	462	-	18	442	1727	210	1	486	10915	-		-
1973	2434	-	28	50	12	-	2341	258	1930	1728	772	-	23	450	2006	182	2.7	533	12746	-		-
1974	2539	-	20	76	13	-	1917	225	2128	1633	709	-	32	383	1708	184	0.9	373	11941	-		-
1975	2485	-	28	76	25	-	2030	268	2216	1537	611	-	26	447	1621	184	1.7	475	12209	-		-
1976	2508	-	40	68	9	<1	1175	225	1561	1530	772	2.5	20	208	1019	113	0.8	289	9536	-		-
1977	2545	-	40	59	19	6	1420	230	1372	1488	497	-	10	345	1160	110	2.4	192	9495	-		-
1978	1545	-	37	37	20	8	984	291	1230	1050	476	-	10	349	1323	148	4.1	138	7650	-		-
1979	1287	-	119	26	10	<1	1395	225	1097	1831	455	-	12	261	1076	99	2.5	193	8089	-		-
1980	2680	-	536	34	30	<1	1194	249	947	1830	664	-	17	360	1134	122	5.5	277	10060	-		-
1981	2437	-	1025	44	20	<1	1264	163	885	1656	463	-	26	493	1233	101	6	313	9929	-		-
1982	1798	-	865	54	20	<1	1077	147	993	1348	354	-	25	286	1092	132	6.4	437	8634	-		-
1983	1424	-	676	58	18	<1	310	198	1656	1550	507	3	28	429	1221	187	1.3	466	8732	-		-
1984	1112	-	628	46	25	<1	297	159	829	1623	593	3	40	345	1013	78	2.2	101	6894	-		-
1985	1133	-	566	49	22	7	864	217	1595	1561	659	3	45	361	913	98	2.1	-	8095	-		-
1986	1559	-	530	37	28	19	960	310	1730	1598	608	2.5	54	430	1271	109	1.9	-	9247	-		9247
1987	1784	-	576	49	27	<1	966	222	1239	1385	564	2	47	302	922	56	1.2	-	8142	2788		10930
1988	1311	-	243	36	32	4	893	396	1674	1076	419	2	40	395	882	114	0.9	-	7715	3248		10966
1989	1139	-	364	52	14	<1	337	276	1079	905	359	2	29	296	895	142	1.7	-	5893	2277		8170
1990	911	13	315	60	15	<1	274	426	586	930	315	2	33	338	824	94	2.4	-	4938	1890	180-350	6828
1991	711	3.3	95	70	13	4	472	505	404	876	215	1	38	200	462	55	0.8	-	4125	1682	25-100	5807
1992	522	10	23	77	20	5	237	635	630	867	166	1.3	49	186	600	89	0.7	-	4118	1962	25-100	6080
1993	367	9	21	70	16	-	-	656	551	895	140	1.8	56	274	424	83	0.6	-	3564	1644	25-100	5208
5YM	919	-	208	59	19	3	443	448	915	931	295	2	38	283	893	99	1	-	5358	2212	-	7570
10YM	1161	-	402	53	21	4	561	335	1162	1237	441	2	40	328	880	102	2	-	6790	-	-	-

5YM - 1988-1992 Mean
10YM - 1983-1992 Mean

1. Catch on River Foyle allocated 50% Ireland and 50% N. Ireland
2. Not including angling catch (mainly 1SW)
3. Includes only those catches sold through dealers.
4. Before 1966, sea trout and sea charr included (5% of total).
5. Includes estimates of some local sales, and, prior to 1984, by-catch.
6. Includes catches in Norwegian Sea by vessel from Denmark, Sweden, Germany, Norway and Finland.
7. Includes catches made in the West Greenland area by Norway, Faroes, Sweden and Denmark for the years 1965-1975.
8. 1993 data are estimated from the average of the previous four years.
9. Estimates refer to season ending in given year.

Table 1.2.1 Percentage of catches in homewater fisheries in the north-east Atlantic originating from different countries and from reared sources in 1992.

Origin of stock		Catch by country									
		Russia	Finland	Norway	Sweden	UK(E&W)	UK(Scot)	UK(NIre)	Ireland	France	Iceland
Wild	Russia	100%	-	+	-	-	-	-	-	-	-
	Finland	-	99%	+	-	-	-	-	-	-	-
	Norway	-	+	75%	6%	-	-	-	+	-	-
	Sweden	-	-	1%	46%	-	-	-	-	-	-
	UK(E&W)	-	-	-	-	62%	+	+	10%	-	-
	UK(Scotland)	-	-	-	-	38%	95%	3%	5%	-	-
	UK(N.Ireland)	-	-	-	-	+	+	92%	5%	-	-
	Ireland	-	-	-	-	+	+	+	80%	-	-
	France	-	-	-	-	+	+	+	+	100%	-
	Iceland	-	-	-	-	-	-	-	-	-	28%
Reared	**Escapees**	-	<1%	23%	2%	-	5%	1%	-	-	-
	Ranched	-	-	1%	46% a	-	-	3%	<1%	-	72%

'a' = fish released for mitigation purposes and not expected to contribute to spawning.
'+' = catches known to occur but contribution not estimated
'-' = catches rare or not known to occur.

Table 1.2.2 Exploitation rates in homewater fisheries in the NEAC area for 1988-92 (mean) and 1993.

Country	River	Wild/ Hatchery	Sea age	Method	Exploitation rate (%)	
					1988-92	1993
Iceland	Ellidaar	W	1	rod	43	41
Ireland	Burrishoole	H	all	total	69	59
Norway	Imsa	W	1	total	51	48
			2	total	69	80
Russia	Ponoy	W	all	total	47	10
		W/H	all	total	77	79
		W	all	total	49	39
Sweden	Lagan	H	1	total	79	94
			2	total	89	82
UK (England & Wales)	Dee	W	all	rod	12	12
	Itchen	W	all	net	17	0
			all	rod	42	42
	Test	W	all	rod	31	33
UK (Northern Ireland)	Bush	W	1	net	67	41
			2	net	42	12
UK (Scotland)	N. Esk	W	1	river net	27	25
			2	river net	28	19

Table 3.3.1 Quota options (in tonnes) for 1994 at West Greenland based on regression forecasts of fishery abundance. The probability levels refer to the pre-fishery abundance levels derived from the probability density function.

Probability	Proportion of allowable harvest allocated to West Greenland (Fna)										
level	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
25	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0
35	0	5	9	14	19	23	28	33	38	42	47
40	0	14	28	41	55	69	83	97	111	124	138
45	0	25	50	76	101	126	151	177	202	227	252
50	**0**	**34**	**69**	**103**	**137**	**172**	**206**	**241**	**275**	**309**	**344**
55	0	43	87	130	174	217	261	304	348	391	435
60	0	55	110	165	220	275	329	384	439	494	549
65	0	64	128	192	256	320	384	448	512	576	640
70	0	75	151	226	302	377	453	528	604	679	754
75	0	87	174	261	347	434	521	608	695	782	869

Spawning Target = 193,741
Proportion of target = 1.00
Prop NA = 0.540
WT1SWNA = 2.525
WT1SWE = 2.660
ACF = 1.121
M = 0.01

Table 6.1 Summary of spawner-recruit (resultant spawners) analyses for individual and composite stocks in North America and Europe. Analyses types refer to tracking of offspring from a spawning year class (forward) or estimation of the number of spawners contributing to the spawners in year i (backward). Probabilities are exact binomial probabilities under the null hypothesis: p = 0.5.

Region	River	Analysis type	Years	Sea-age	Replacement line			Prob. P≤ No. above
					Number above rep.line	Number below rep.line	Number below in last 5 yrs	
NORTH AMERICA								
Labrador	Composite	Back	1983-93	2SW	0	11	5	0
Newfoundland	Composite	Back	1982-93	2SW	6	6	4	0.613
Quebec	Composite	Back	1982-93	2SW	6	6	1	0.619
Gulf	Composite	Back	1981-93	2SW	9	4	1	0.954
Scotia-Fundy	Composite	Back	1980-93	2SW	7	7	4	0.605
Quebec	R. de la Trinité	Forward	1980-88	1SW	3	6	3	0.254
Quebec	R. de la Trinité	Forward	1980-87	2SW	4	4	3	0.637
Newfoundland	Gander R.	Forward	1974-87	1SW	7	7	3	0.605
Newfoundland	Conne R.	Forward	1974-87	1SW	5	9	5	0.212
Newfoundland	Middle Brook	Forward	1974-87	1SW	5	9	3	0.212
Newfoundland	Biscay Bay R.	Forward	1974-87	1SW	6	8	5	0.395
Newfoundland	Humber R.	Back	1979-93	1SW	7	8	2	0.500
EUROPE								
Iceland	R. Nordura	Forward	1962-88	1SW	15	12	2	0.779
Iceland	R. Nordura	Forward	1962-87	MSW	14	12	2	0.721
Scotland	R. North Esk	Forward	1963-85	1SW	10	13	0	0.339
Scotland	R. North Esk	Forward	1963-85	2SW	6	17	4	0.017
Scotland	R. North Esk	Forward	1963-84	3SW	4	18	5	0.002
France	R. Scorff	Back	1970-93	MSW	8	16	5	0.076
Finland	R. Teno	Forward	1979-85	1SW	7	0	0	1.000
Finland	R. Teno	Forward	1979-84	2SW	5	1	1	0.984
Finland	R. Teno	Forward	1979-83	3SW	2	3	3	0.500
Finland	R. Teno	Forward	1979-82	4SW	1	3	3	0.313
Russia	R. Tuloma	Forward	1982-84	1SW	4	1	1	0.969
Russia	R. Tuloma	Forward	1982-84	MSW	0	3	3	0.125

Figure 1.2.1 Nominal catch of salmon and number of fishing vessels at Faores for the fishing seasons 1981/1982 to 1992/1993.

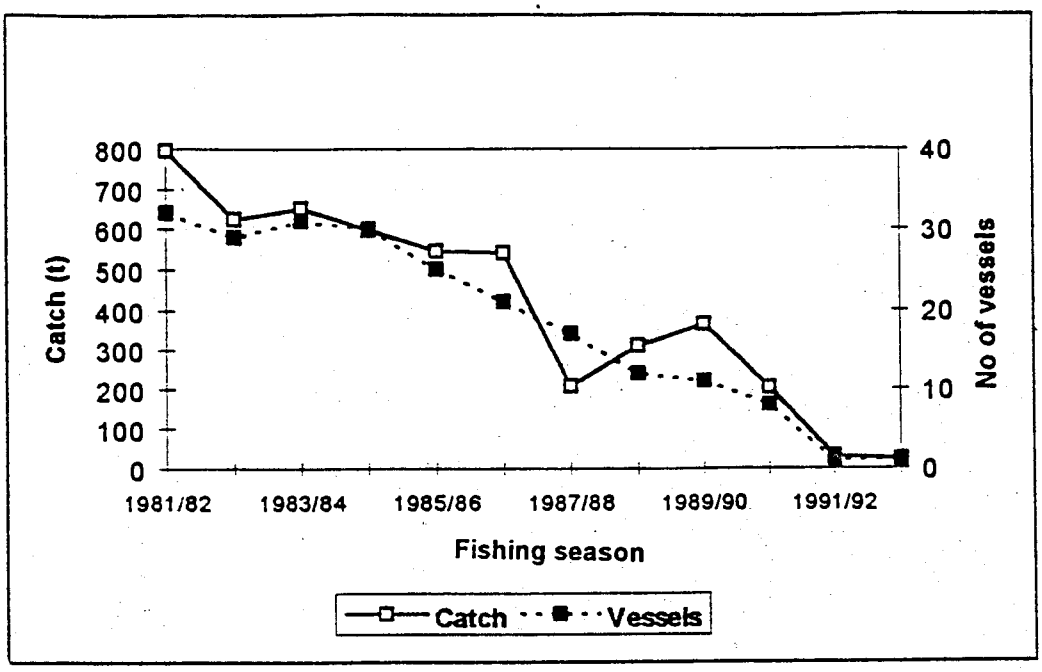


Figure 1.2.2 Catch per unit of effort (1000 hooks) inside the Faores EEZ for the fishing seasons 1981/1982 to 1992/1993.

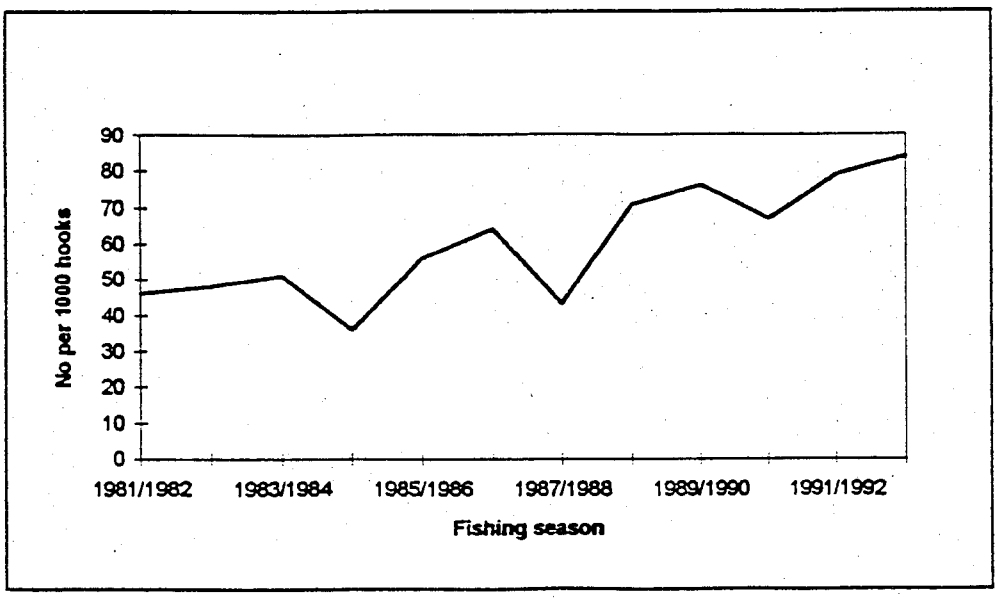


Figure 1.3.1 Retained catch expressed as a percentage of quotas for the recreational fishery in Newfoundland-Labrador by SFA. Quotas (numbers) shown in parenthesis for each SFA.

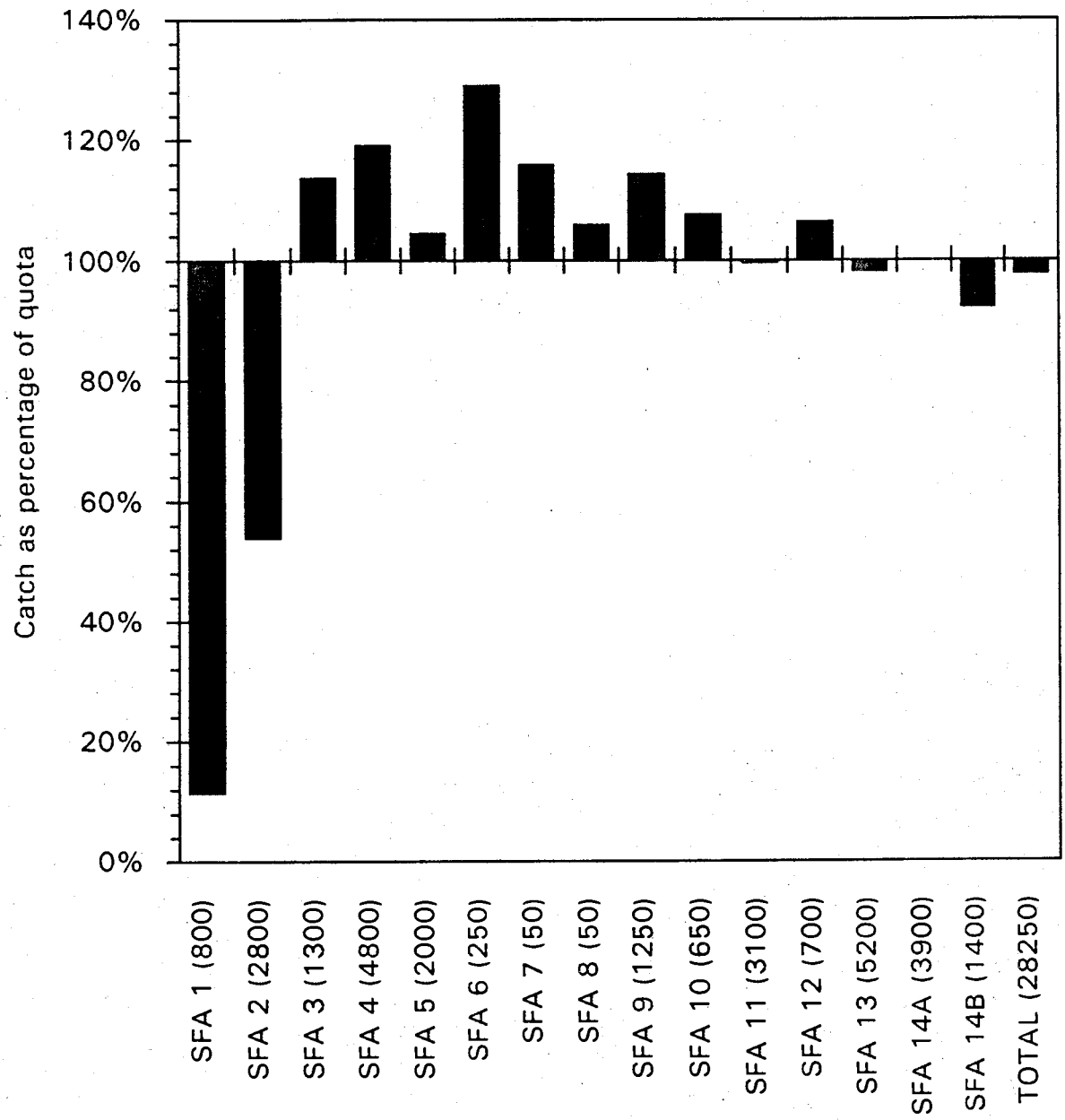


Figure 1.3.2 Percentage of target egg deposition attained in 23 rivers in Canada and USA in 1993.

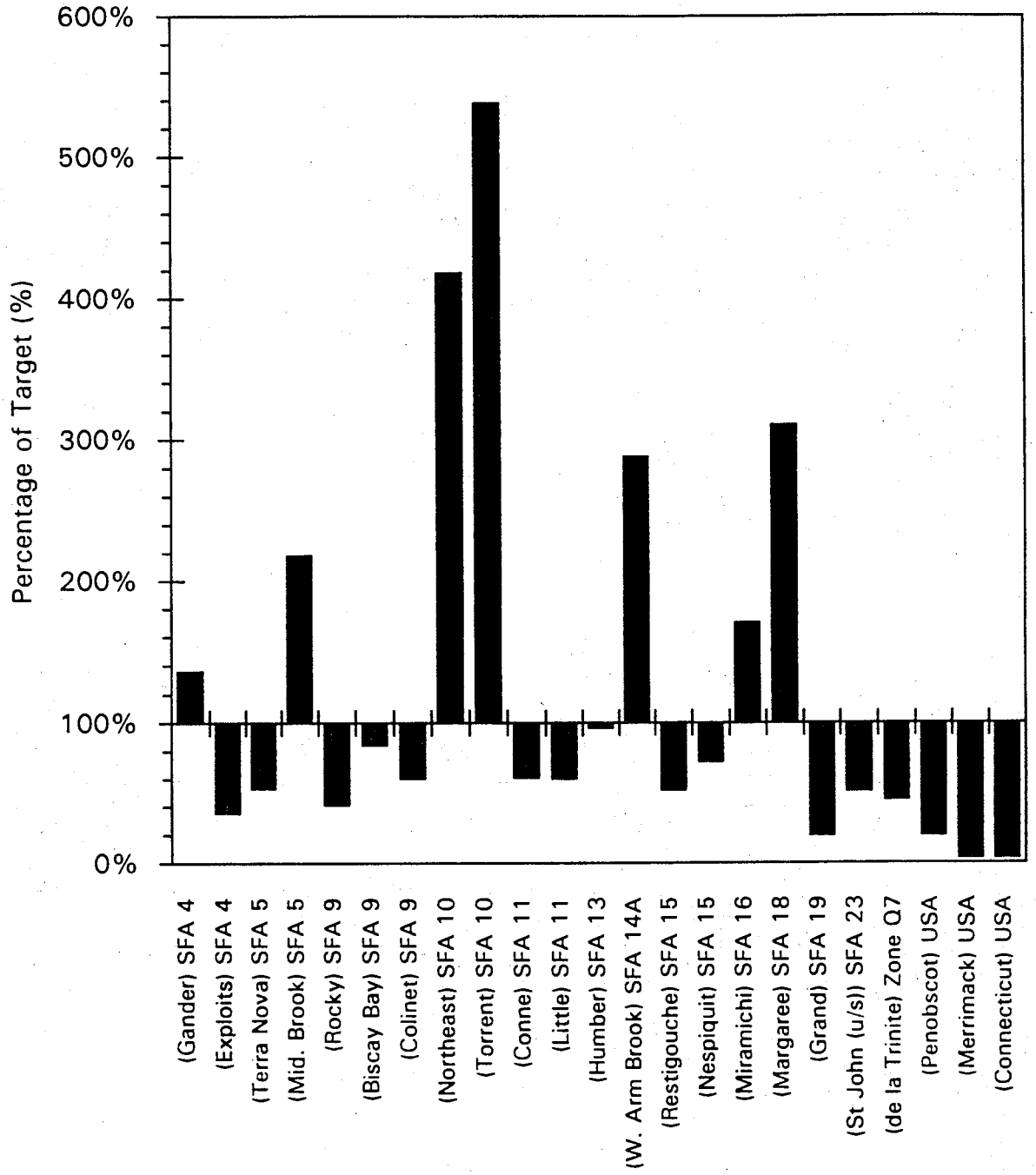


Figure 1.3.3 Return rates of hatchery smolts to homewaters as 1SW and MSW salmon for the Penobscot River (USA) (3 yr running mean)

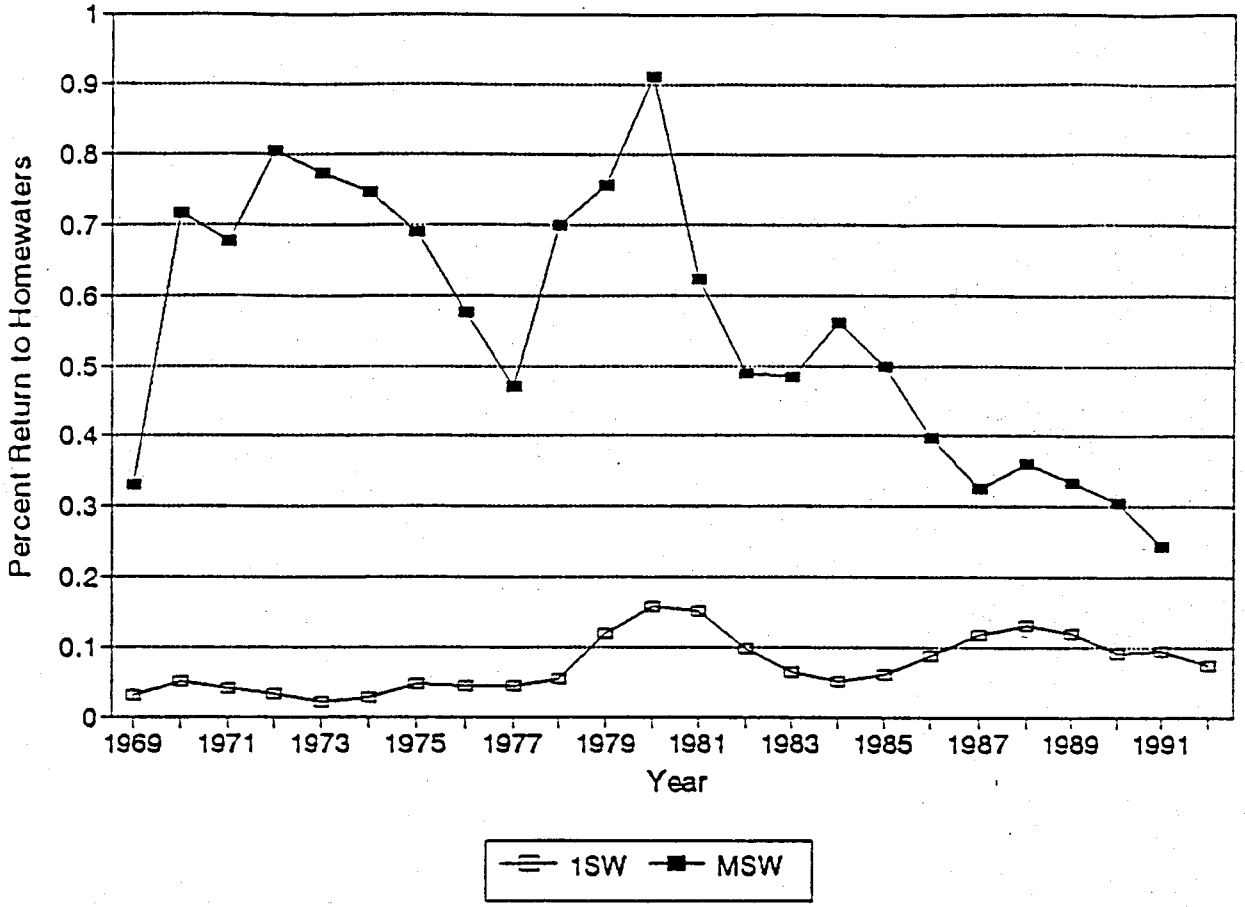


Figure 3.2.1 Estimated pre-fishery abundance of non-maturing 1SW salmon from North America (1974-92) (solid line) with maximum and minimum estimates (dashed lines).

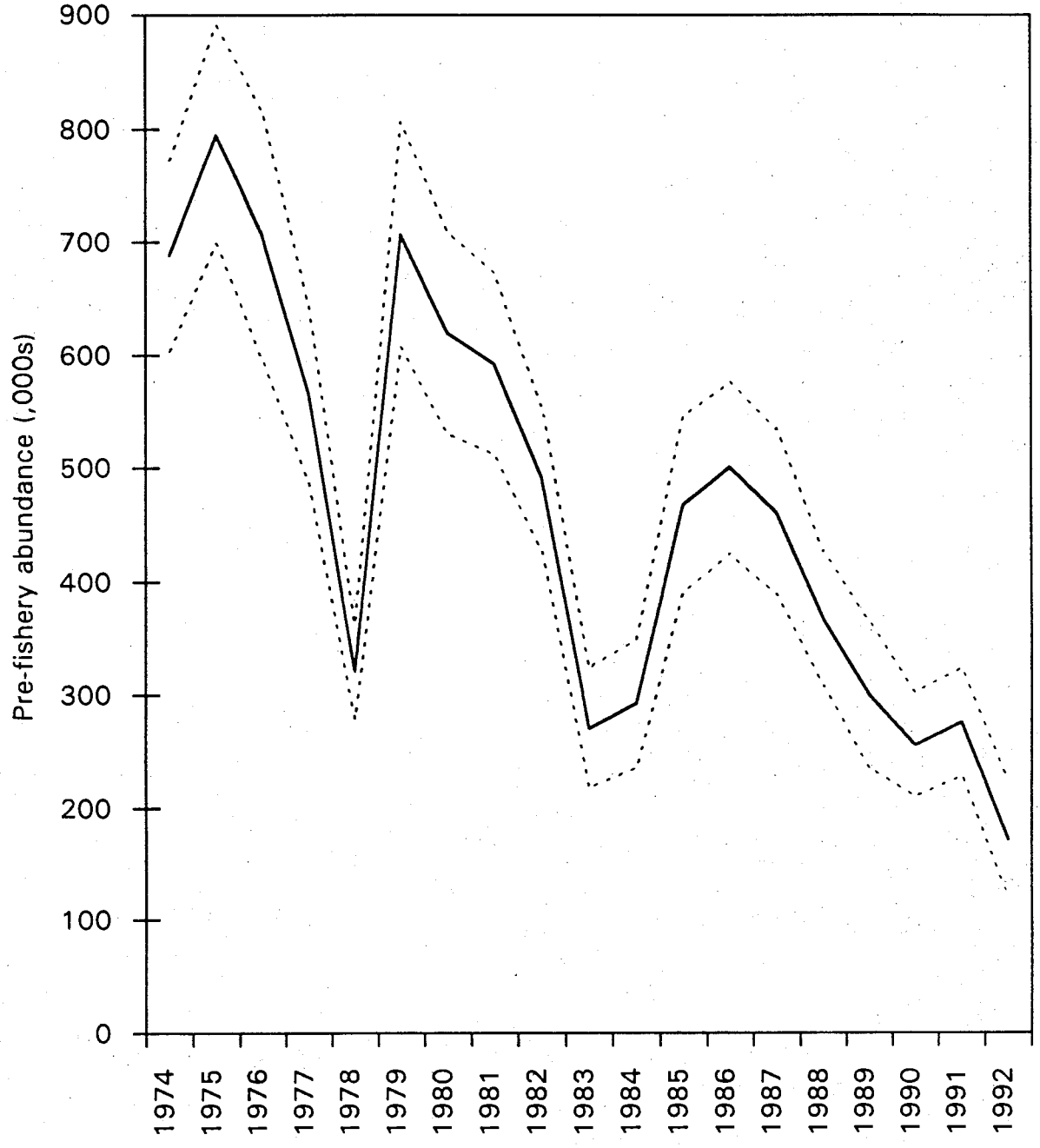
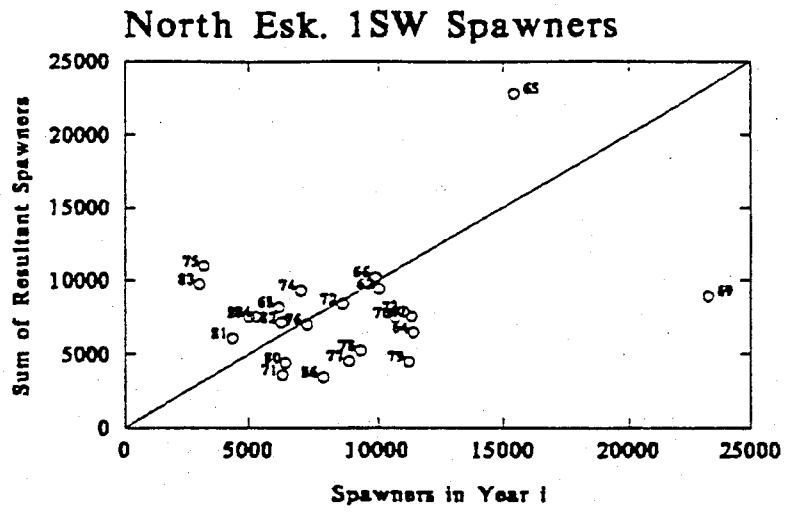
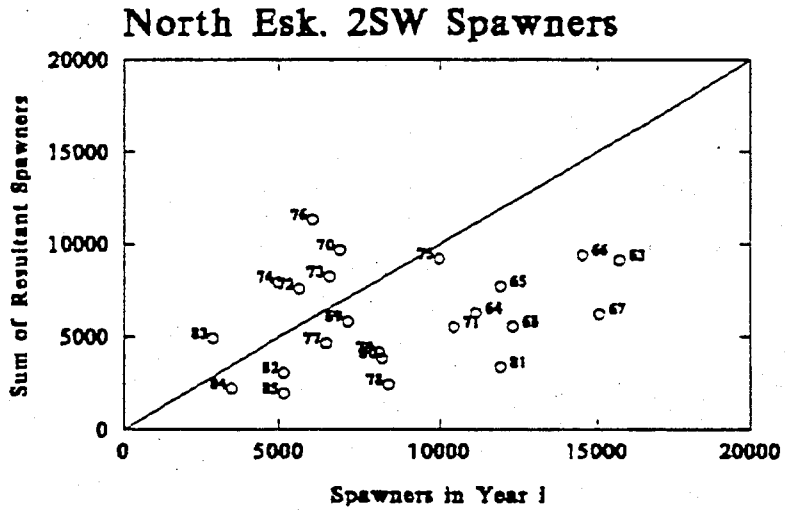


Figure 6.1 Comparison of spawners in year i (x-axis) with cumulative spawners produced (y-axis) for 1SW, 2SW and 3SW salmon in North Esk, Scotland. Years represent the year of the spawner. Diagonal line represents replacement of the spawners.





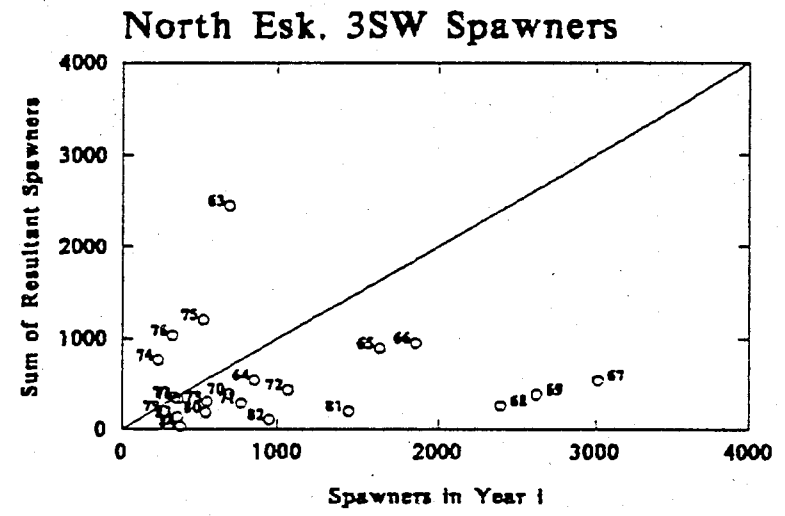
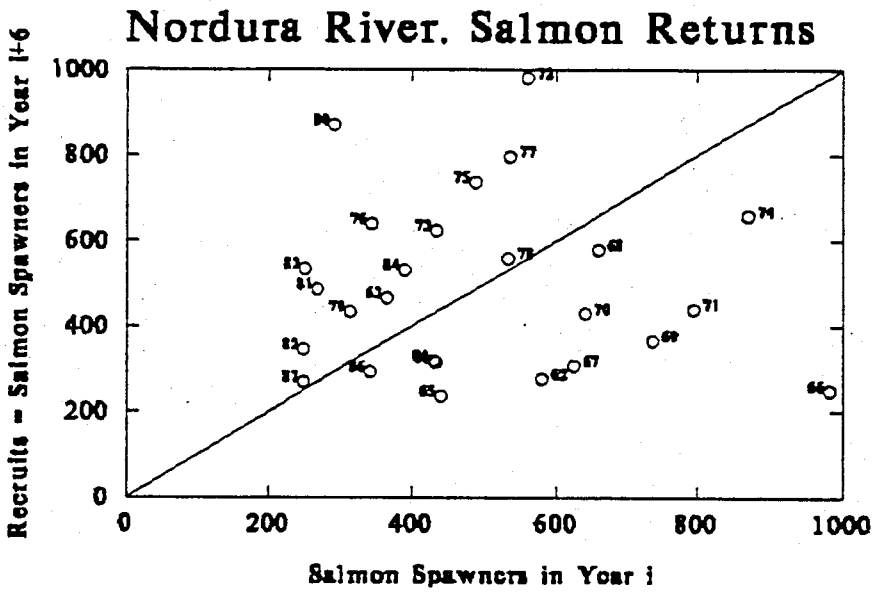


Figure 6.2 Comparison of spawners in year i (x-axis) with cumulative spawners produced in year i+5 for 1SW salmon and year i+6 for 2SW (y-axes) in the Nordura River, western Iceland. Years represent the year of the spawner. Diagonal line represents replacement of the spawners.



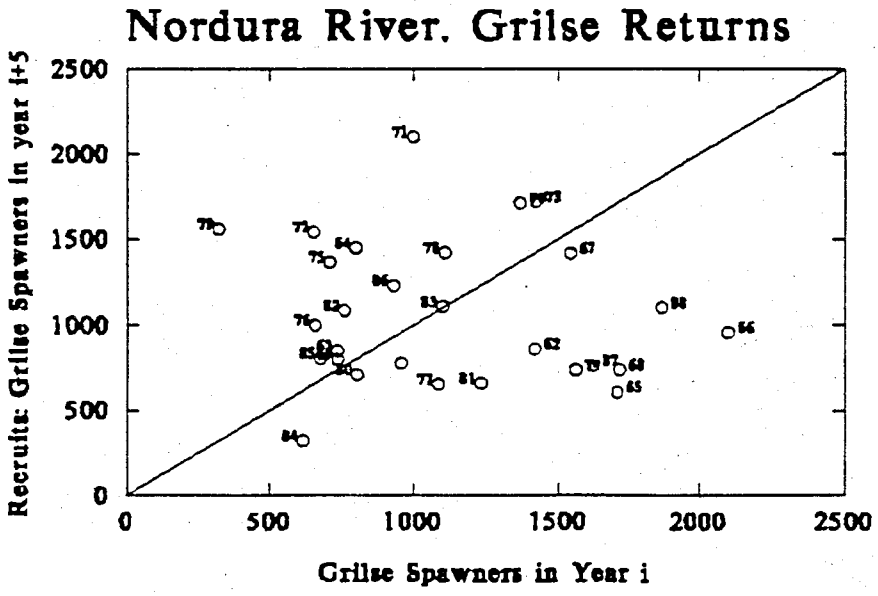
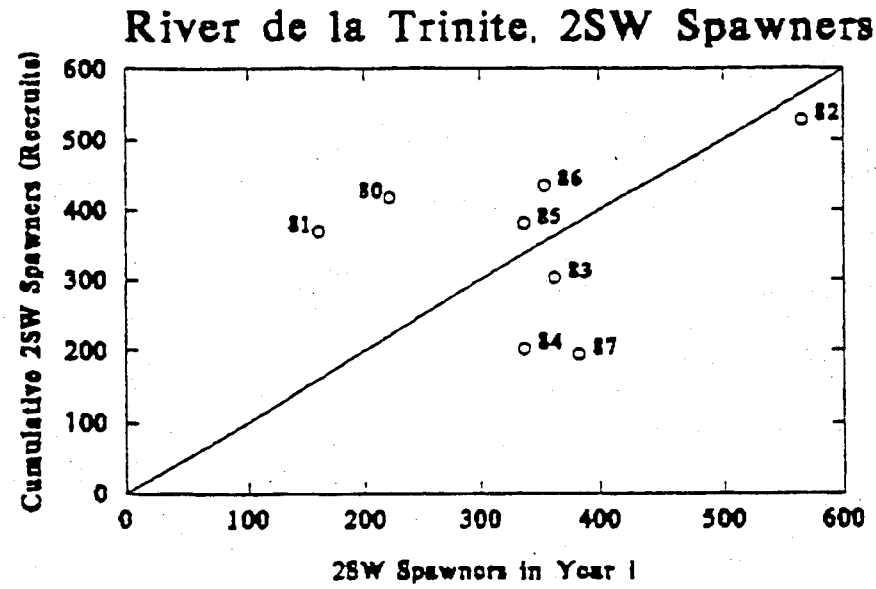


Figure 6.3 Comparison of spawners in year i (x-axis) with cumulative spawners produced (y-axis) for 1SW and 2SW salmon in the River de la Trinite. Years represent the year of the spawner. Diagonal line represents replacement of the spawners.



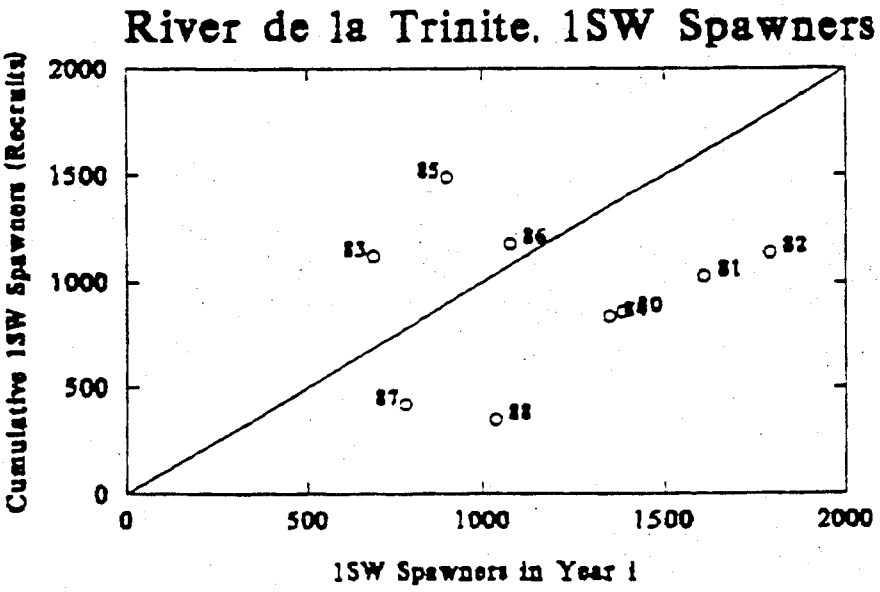
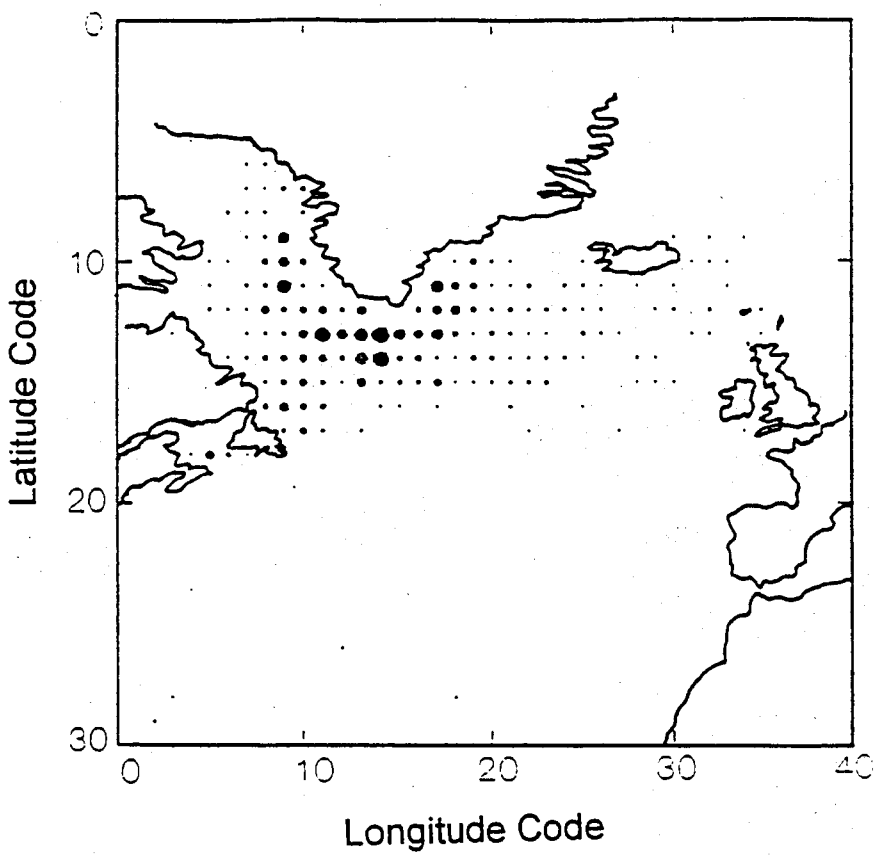


Figure 7.1 Distribution of southern North American stocks during 1SW summer from migration model. Dot size increases with larger numbers of fish.



APPENDIX 1

DECISION OF THE COUNCIL OF NASCO TO REQUEST SCIENTIFIC ADVICE FROM ICES

1. With respect to Atlantic salmon in each Commission area, where relevant:

   a) describe the events of the 1993 fisheries with respect to catches (including unreported catches) gear, effort, composition and origin of the catch and rates of exploitation;

   b) describe the status of the stocks occurring in the Commission area and, where possible, evaluate escapement against targets;

   c) specify data deficiencies and research needs.

2. Evaluate the following management measures on the stocks and fisheries occurring in the respective Commission areas:

   a) quota management measures and closures implemented after 1991 in the Canadian commercial salmon fisheries;

   b) the suspension of commercial fishing activity at Faroes;

3. With respect to the fishery in the West Greenland Commission area:

   a) continue development of the model used in providing advice on catch quotas in relation to stock abundance;

   b) estimate the pre-fishery abundance of non-maturing 1SW salmon at the time of the fishery;

   c) provide catch options with an assessment of risks relative to the management objective of achieving various levels of target spawning escapement;

   d) describe which stocks make the greatest numerical contributions of salmon to the fishery;

   e) evaluate the relationship between spawning escapement and subsequent pre-fishery abundance.

4. Evaluate the abundance of fish farm escapees and sea-ranched fish in fisheries and rivers and the genetic, disease and parasite, ecological and environmental impacts of these fish on the wild stocks and any impacts from current hatchery practices.

5. Evaluate grilsification mechanisms and assess the impact that grilsification may have on stock abundance and future spawning requirements.

6. Evaluate evidence for recruitment overfishing occurring on Atlantic salmon populations.

7. Evaluate the prospects of developing predictive models of annual migration and distribution of Atlantic salmon stock complexes.

8. Evaluate the results of the research programme at Faroes.

9. With respect to Atlantic salmon in the NASCO area, provide a compilation of microtag of microtag, finclip and external tag releases by ICES Member Countries in 1993.

NEW MANAGEMENT MEASURES FOR CANADIAN COMMERCIAL FISHERIES IN 1993

1) The 5-year moratorium which was placed on the commercial fishery in insular Newfoundland in 1992 continued. Fishing was permitted in Labrador, Salmon Fishing Areas (SFA) 1, 2 and 14B. Quotas in SFAs 2 and 14B were reduced from those of 1992 by 90 t in SFA 2 and 5 t in SFA 14B. Quotas for the Newfoundland and Labrador commercial fishery for 1993 and previous years are shown below:

Year	SFA 1*	SFA 2 North	SFA 2 South	SFA 2 Total	SFA 14B
1990	80			200	50+10**
1991	80	65	135	200	15
1992	80	60	120	180	13
1993	80	27	63	90	8

* allowance catch; an estimate of expected catch and not a limitation on allowable harvest.

** The 1990 quota of 50 t was for all of SFA 14; there was also a supplementary quota of 10 t for SFA 14B.

A voluntary commercial salmon/charr license buy-back program was implemented for fishermen in SFA 1. Fishermen were allowed to apply for the buy-back until October 31, 1993, but the value of catch taken during 1993 was to be subtracted from their compensation.

2) In Québec the commercial fishery in areas Q7 and most of Q8 was closed in 1993. The quota in Q8 was reduced to 150 salmon for the remaining 4 fishermen. In area Q9, the number of fishermen and quota were slightly reduced; 90 fishermen had a combined quota of 15,175 salmon.

The following were new management measures for recreational fisheries in 1993:

1) While the seasonal bag limit for the recreational fishery of Newfoundland-Labrador, Nova Scotia, and New Brunswick remained at 8 fish (SFAs 1-16, and 18-23) and in Prince Edward Island at 7 fish (SFA 17), the daily limit was reduced from 2 to 1 fish in Newfoundland and Labrador. Most rivers of the inner Bay of Fundy (SFA 22 and parts of SFA 23) were not opened to recreational fishing for conservation reasons. As a result of low returns to many rivers in Atlantic Canada in 1993, some rivers were closed to exploitation for either the whole or part of the season. As in previous years, large salmon could be retained as part of seasonal and daily limits only in Labrador (SFAs 1, 2, and 14B) and in Québec (Q1-Q11).

2) Quotas continued in the recreational fishery of Newfoundland and Labrador and these were generally increased from 1992. These quotas were subdivided into early and late seasons and as the quota for each time period within each SFA was reached, the retention of salmon in the recreational fishery was not permitted for all rivers of that SFA; only hook-and-release fishing was allowed thereafter. Some rivers of SFAs 11, 13 and 14 were managed by individual river quotas.

APPENDIX 3

COMPUTATION OF CATCH ADVICE FOR WEST GREENLAND

The North American Spawning Target (SpT) for 2SW salmon has been set at 193,741 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 Target 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]. Because there are no samples for 1993, simple exponential smoothing of the observed 1978-1992 values of PropNA is used to generate a forecast for 1994. 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 metric tonnes it is necessary to incorporate the mean weights of salmon for North America [WT1SWNA] and Europe [WT1SWE] and an adjustment for the age composition of the catch [ACF]. The quota (in tonnes) at Greenland is then estimated as

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

where

WT1SWNA = mean weight (kg) of North American salmon at Greenland, the 1994 value was forecasted as described below

WT1SWE = mean weight (kg) of European salmon at Greenland, the 1994 value was forecasted as described below

ACF = 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.

Mean weights by continent [WT1SWNA, WT1SWE] and the age correction factor [ACF] for 1994 were forecasted from the 1978-1992 observations. The exponentially smoothed values were based on estimation of an optimal smoothing coefficient and are given in Section 3.3.

ANNEX 8

CNL(94)58

DECISION OF THE COUNCIL TO REQUEST SCIENTIFIC ADVICE FROM ICES

1. With respect to Atlantic salmon in each Commission area, where relevant:

   a) describe the events of the 1994 fisheries with respect to catches (including unreported catches), gear, effort, composition and origin of the catch (including fish farm escapees and sea-ranched fish) and rates of exploitation;
   b) describe the status of the stocks (including the contribution to these stocks of fish farm escapees and sea-ranched fish) occurring in the Commission area, and where possible evaluate spawning escapement against targets;
   c) specify data deficiencies and research needs.

2. Evaluate the effects of the following management measures on the stocks and fisheries occurring in the respective Commission areas:

   a) quota management and closures implemented after 1991 in the Canadian commercial salmon fisheries;
   b) the suspension of commercial fishing activity at Faroes;
   c) the suspension of commercial fishing activity at West Greenland.

3. With respect to the fishery in the West Greenland Commission area:

   a) provide catch options with an assessment of risks relative to the management objective of achieving target spawning escapement;
   b) review the target spawning level in US rivers in the light of the present condition of the rivers and the stocks.

4. With respect to fisheries and stocks in the North-East Atlantic Commission area:

   a) provide estimates of spawning targets for optimal production;
   b) develop methods which could be used in providing advice on catch quotas in relation to stock abundance and, if possible, provide catch options.

5. Report on significant research developments which might assist NASCO with the management of salmon stocks, with special reference to:

   a) the impacts of fish farm escapees and sea-ranched fish on the wild stocks;
   b) criteria for identifying recruitment overfishing of Atlantic salmon;
   c) predictive models of annual migration and distribution of Atlantic salmon stock complexes;
   d) biological (such as maturation, predation, forage base) and environmental (such as oceanographic, productivity) variables which provide interpretation of trends in salmon abundance.

6. With respect to Atlantic salmon in the NASCO area, provide a compilation of microtag, finclip and external tag releases by ICES Member Countries in 1994.

ANNEX 9

COUNCIL

CNL(94)15

CATCH STATISTIC RETURNS BY THE PARTIES

CNL(94)15

CATCH STATISTIC RETURNS BY THE PARTIES

1. The Official Catch Statistics, as submitted by the Parties, are tabulated overleaf (Table 1). The figures for 1993 are provisional. These catch statistics, rounded to the nearest tonne, will be used to calculate the contributions to NASCO for 1995 unless the Secretary is advised otherwise.

2. Under Article 12 of the Convention, the Secretary shall compile and disseminate statistics and reports concerning salmon stocks subject to the Convention. Table 2 presents catch statistics for the period 1960-1993 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 1960-1993 is provided, for information only, in paper CNL(94)16.

Secretary
Edinburgh
13 May 1994

TABLE 1: OFFICIAL CATCH STATISTICS

	PROVISIONAL 1993 CATCH (TONNES)	PROVISIONAL 1993 CATCH ACCORDING TO SEA AGE						CONFIRMED 1992 CATCH (TONNES)
		1SW		MSW		TOTAL		
		NO	WT	NO	WT	NO	WT	
CANADA	364	-	150	-	214	-	364	520
DENMARK (in respect of Faroe Islands and Greenland)	33	-	-					260
FAROE ISLANDS *	21	-	-	5,415	21	5,415	21	23
GREENLAND	12	-	-	-	-	-	-	237
EUROPEAN UNION	1288.1	-	-	-	-	-	-	1,506
FINLAND	70	11,157	17	8,180	53	19,337	70	77
ICELAND	656	185,461	467	32,188	189	217,649	656	635.8
NORWAY **	867	N/A	-	N/A	-	N/A	-	867
RUSSIAN FEDERATION	140	27,790	43	17,599	97	45,389	140	166
SWEDEN	56	10,540	23	6,369	33	16,909	56	49
UNITED STATES OF AMERICA	0.6	17	0.03	135	0.54	152	0.6	0.7

* Breakdown of the Faroese catch according to sea-age is for the 1992/93 season and excludes tagged fish. The Faroese fishery was subject to a compensation agreement in 1992 and 1993. The Greenland fishery was subject to a compensation agreement in 1993.

** Because of changes to the system of collection of catch statistics in Norway, the 1993 catch is not yet available. The provisional 1992 catch of 867 tonnes has been used until the actual catch is submitted.

TABLE 2: CATCHES OF ATLANTIC SALMON BY THE PARTIES TO THE NASCO CONVENTION

	CANADA	DENMARK*	EUROPEAN UNION	FINLAND	ICELAND	NORWAY	RUSSIAN FEDERATION	SWEDEN	USA
1960	1636	60	2683		100	1576	1100	40	1
1961	1583	127	2331		127	1456	790	27	1
1962	1719	244	3946		125	1838	710	45	1
1963	1861	466	3889		145	1697	480	23	1
1964	2069	1539	4283		135	2040	590	36	1
1965	2116	861	3726		133	1900	590	40	1
1966	2369	1338	3582		106	1823	570	36	1
1967	2863	1600	4524		146	2058	883	25	1
1968	2111	1167	3660		162	1752	827	150	1
1969	2202	2350	4428		133	2083	360	76	1
1970	2323	2354	4099		195	1861	448	52	1
1971	1992	2511	3804		204	1847	417	35	1
1972	1759	2146	4221	32	250	1976	462	38	1
1973	2434	2402	4580	50	256	2126	772	73	3
1974	2539	1945	4416	76	225	1973	709	57	1
1975	2485	2086	4473	76	266	1754	811	56	2
1976	2506	1479	2910	66	225	1530	772	45	1
1977	2545	1652	3006	59	230	1488	497	10	2
1978	1545	1159	3070	37	291	1050	476	10	4
1979	1287	1694	2543	26	225	1831	455	12	3
1980	2680	2052	2593	34	249	1830	664	17	6
1981	2437	2602	2532	44	163	1656	463	26	6
1982	1798	2609	2523	83	147	1348	354	25	6
1983	1424	1433	3509	78	198	1550	507	28	1
1984	1112	997	2290	73	159	1623	593	40	2
1985	1133	1430	2989	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	364	33	1288	70	656	867	140	56	1

NOTES: *In respect of the Faroe Islands and Greenland

1. The EU catch consists of the sum of the catches of the present members of the Union for which data are available.
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 a compensation agreement in 1991-1993. The West Greenland fishery was subject to a compensation agreement in 1993.
5. The 1993 catch statistics for Norway are not yet available so the provisional 1992 catch of 867 tonnes has been used.

ANNEX 10

COUNCIL

CNL(94)18

SUMMARY OF MICROTAG, FINCLIP AND EXTERNAL TAG RELEASES IN 1993

CNL(94)18

SUMMARY OF MICROTAG, FINCLIP AND EXTERNAL TAG RELEASES IN 1993

1. The annual summary of the information on tagging programmes conducted by the Parties in 1993 is attached as Table 1. In excess of 3.6 million fish were either tagged or marked prior to release during 1993, of which 45.5% were microtagged, 48.8% were finclipped (principally adipose clips), 5.5% were tagged with external tags (principally Carlin tags) and less than 0.1% were branded or dyemarked. Approximately 1.68 million fish bore auxiliary marks, principally adipose clips used in conjunction with microtagging. Thus a total of approximately 3.4 million adipose clipped fish were released in 1993 of which approximately 1.6 million carried microtags. Out of the total of 3.6 million marked fish released, approximately 98.7% were of hatchery origin.

2. Table 2 presents a comparison of the tagging programmes in 1992 and 1993. The 1993 figure of 3.6 million released marked fish is almost 20% lower than the number released the previous year. There was a large reduction (almost 50%) in the number of wild fish tagged in 1993 compared to 1992. There were reductions in all types of tagging or marking in 1993 compared to the previous year.

Secretary
Edinburgh
16 May 1994

TABLE 1

SUMMARY OF 1993 TAG RELEASES BY PARTY

PARTY	ORIGIN	MARKING METHOD				
		MICROTAGS	EXTERNAL TAGS	BRANDS, DYEMARKS ETC.	FINCLIPS	AUXILIARY TAGS, FINCLIPS, MARKS ETC.
CANADA	Hatchery	-	21,757	-	977,076	24,478
	Wild	-	7,213	-	-	148
	Mixed*	-	1,229	-	-	16
	TOTAL	-	30,199	-	977,076	24,642
EUROPEAN UNION	Hatchery	626,687	8,841	1,436	482,306	628,523
	Wild	20,545	6,890	848	-	23,822
	Mixed*	-	124	-	-	124
	TOTAL	647,232	15,855	2,284	482,306	652,469
FINLAND	Hatchery	-	-	-	-	-
	Wild	-	93	-	-	-
	TOTAL	-	93	-	-	-
ICELAND	Hatchery	311,350	-	-	-	311,350
	Wild	2,797	1,353	-	-	2,797
	TOTAL	314,147	1,353	-	-	314,147
NORWAY	Hatchery	66,000	138,117	-	156,000	66,000
	Wild	-	4,370	-	-	-
	TOTAL	66,000	142,487	-	156,000	66,000
RUSSIAN FEDERATION	Hatchery	-	2,000	-	93,800	-
	Wild	-	-	-	-	-
	TOTAL	-	2,000	-	93,800	-
SWEDEN	Hatchery	-	6,956	-	-	-
	Wild	-	-	-	-	-
	TOTAL	-	6,956	-	-	-
USA	Hatchery	619,330	186	-	60,158	619,330
	Wild	1,840	82	-	-	1,840
	Mixed*	-	-	-	-	-
	TOTAL	621,170	268	-	60,158	621,170
TOTAL	**Hatchery**	**1,623,367**	**177,857**	**1,436**	**1,769,340**	**1,649,681**
	Wild	**25,182**	**20,001**	**848**	**-**	**28,607**
	Mixed	**-**	**1,353**	**-**	**-**	**140**
	TOTAL	**1,648,549**	**199,211**	**2,284**	**1,769,340**	**1,678,428**

* Either not differentiated into hatchery or wild fish or origin unknown.

TABLE 2

COMPARISON OF 1992 AND 1993 TAGGING PROGRAMMES

	1992	1993	% CHANGE
MICROTAGS			
Hatchery	1,776,870	1,623,367	-8.6
Wild	65,634	25,182	-61.6
TOTAL	1,842,504	1,648,549	-10.5
EXTERNAL TAGS			
Hatchery	290,079	177,857	-38.7
Wild	21,928	20,001	-8.8
Mixed	2,386	1,353	-43.3
TOTAL	314,393	199,211	-36.7
BRANDS, DYEMARKS			
Hatchery	13,061	1,436	-89.0
Wild	-	848	-
TOTAL	13,061	2,284	-82.5
FINCLIPS			
Hatchery	2,329,076	1,769,340	-24.0
Wild	4,060	-	-
TOTAL	2,333,136	1,769,340	-24.2
TOTAL			
HATCHERY	**4,409,086**	**3,572,000**	**-19.0**
WILD	**91,622**	**46,031**	**-49.7**
MIXED	**2,386**	**1,353**	**-43.3**
TOTAL	**4,503,094**	**3,619,384**	**-19.6**

ANNEX 11

COUNCIL

CNL(94)19

NASCO TAG RETURN INCENTIVE SCHEME

CNL(94)19

NASCO TAG RETURN INCENTIVE SCHEME

INTRODUCTION

1. Since its inception on a trial basis in 1989, the NASCO Tag Return Incentive Scheme has been funded by the United States of America. The prizes to be awarded this year for tags returned during 1993 will be the last to be funded in this way. The existence of the Scheme has undoubtedly brought benefits to the Organization in terms of favourable public relations and scientific assessments indicate that in some cases there has been an increase in reporting rate since the Scheme was established. We are grateful to the United States for funding the Scheme during the trial period. At its 1993 Meeting the Council decided that the Scheme would continue and would be funded by the Organization from its own resources.

1993 AWARDS

2. The 1993 awards generally received good coverage in the media. The Grand Prize was presented to Mr P L Williams at a reception hosted by the National Rivers Authority in Chester. We received good publicity in the local press. There was also good publicity for the Commission prizes. At the end of the trial period prizes have been awarded in all participating North Atlantic countries and it would be fair to assume that, given the publicity received, awareness of the need to, and benefits of, returning scientific tags has increased.

1994 AWARDS

3. In accordance with the Rules of the Scheme the participating Parties were requested to provide by 1 May a list of names and addresses of persons returning eligible external tags during the period 1 January - 31 December 1993. Details of the country in which the tag was recaptured were also requested in order that each tag could be allocated to the appropriate Commission area. A total of 1894 eligible tags were returned and entered into the draw for the Grand Prize. This is an increase over the number entered in the 1993 draw of 4.5%. 1012, 16 and 866 eligible tags were entered into the draws in the North American, West Greenland and North-East Atlantic Commissions respectively. The draw will be made by the auditors to NASCO in accordance with the Rules of the Scheme. The winner of the $2500 prize will be announced by the President at the Eleventh Annual Meeting of the Council. The winners of the prizes in each Commission area will be announced by the Chairman of the respective Commissions.

FUTURE OF THE SCHEME

4. At its Tenth Annual Meeting the Council considered the future of the Scheme and decided that it would continue with the awards. At present the Scheme offers 31 prizes ranging in value from $100 - $2500. Each Commission offers 10 prizes and a Grand Prize is awarded by the Council. However, in recent years there have been major changes in the fisheries in the North Atlantic as a result of the compensation

agreements for the Greenland and Faroese fisheries and of the management measures introduced in homewaters. In particular, the compensation arrangement for the West Greenland fishery means that with the exception of a small subsistence fishery there will be no fishing in the West Greenland Commission area. Given these changes it may be appropriate to move away from the existing prize structure to one in which prizes are awarded by the Council for the entire Convention area.

5. It was agreed by the Council that the costs of the Scheme should in future be borne by the Organization from its own resources. The total prize money awarded in the Scheme at present is $13,600 (approximately £9,000) or 3% of the Organization's budget. The greatest publicity is, understandably, obtained for the large prizes and it would, therefore, be proposed to retain these. It would seem to be possible to maintain the influence of the Scheme and minimise its cost by eliminating the smaller prizes. A number of possible options for prizes exist but the following retains the large prizes while having only a minor impact on the Organization's budget:

Grand Prize	$2500
Second Prize	$1500
Third Prize	$1000
Fourth Prize	$750
Fifth Prize	$500

The total prize money under this proposal would be $6,250 or approximately £4,200 and this amount has been included in the 1995 Draft Budget. The Prizes would be on a North Atlantic scale and not allocated by Commission as in the past.

6. Since its inception the Scheme has applied only to external tags. However, the majority of tags applied in the North Atlantic area are microtags with external tags accounting for less than 15% of all tags applied in 1992. While some microtag recovery programmes involve screening of commercial catches by scientists other systems of recovery rely on fishermen identifying adipose-clipped fish and advising the appropriate authorities who then inspect the fish. If a tag is found a reward is paid, although in some cases rewards may be paid even if a tag is not present. While it may not be possible or desirable to offer rewards for microtags recovered from screening programmes, indeed there may be disadvantages as valuable information has been obtained from screening programmes which are free from the problems of variable reporting rates, it would be possible to extend the Scheme to cover microtags which had already received rewards from the national authorities if the Council thought it desirable.

7. The views of the Council are sought on these proposals. On the assumption that the revised awards above are acceptable, revisions to the Rules of the Scheme would be necessary and the proposed modifications are attached. If the Council wished to extend the Scheme to cover microtags further changes to Rule 4 would also be necessary.

Secretary
Edinburgh
13 May 1994

DRAFT REVISED RULES OF THE NASCO TAG RETURN INCENTIVE SCHEME

1. The objectives of the Scheme are to encourage and improve the return of tags and recapture information.

2. Participation by the Parties in the NASCO Tag Return Incentive Scheme is on a voluntary basis.

3. The Council will review the operation of the Scheme at three year intervals.

4. The Scheme will initially apply only to individually identifiable external tags. Only tags returned to the appropriate official agency of a NASCO member Party and deemed to be legitimate by the official agency will be eligible. The authorities where the tag originates report the tag to NASCO.

5. The Secretary will, in December prior to the year when the prizes will be awarded, request each Party wishing to participate to send a list of the names and addresses of eligible participants who have returned tags during the calendar year ending on 31 December. A Party may choose to submit only a list of eligible tag numbers for each Commission area as long as that Party knows the identity of the tag holder and can supply this information in the event of the tag winning an award. The Secretary will request that this be provided to NASCO by 1 May. Only tag returns received by that date will be eligible.

6. All tag returns will be subject to a random selection procedure in which they will be mixed in one closed container and five tags will be selected blind. The procedure will be scrutinised by a representative of the auditor to NASCO. The persons who returned the selected tags will receive awards as follows:

   The First selected will win an award of $2500
   The Second selected will win an award of $1500
   The Third selected will win an award of $1000
   The Fourth selected will win an award of $750
   The Fifth selected will win an award of $500

   The awards will be announced by the President at the Annual Meeting of the Council.

7. The Secretary will send cheques to the winners within 60 days of the announcement of the awards. The Secretary will circulate a list of winners to the Parties.

8. In the event of any dispute by a participant in this Scheme the decision of the Secretary shall be final.

ANNEX 12

COUNCIL

CNL(94)20

DATABASE OF SALMON RIVERS FLOWING INTO THE NASCO CONVENTION AREA

CNL(94)20

DATABASE OF SALMON RIVERS FLOWING INTO THE NASCO CONVENTION AREA

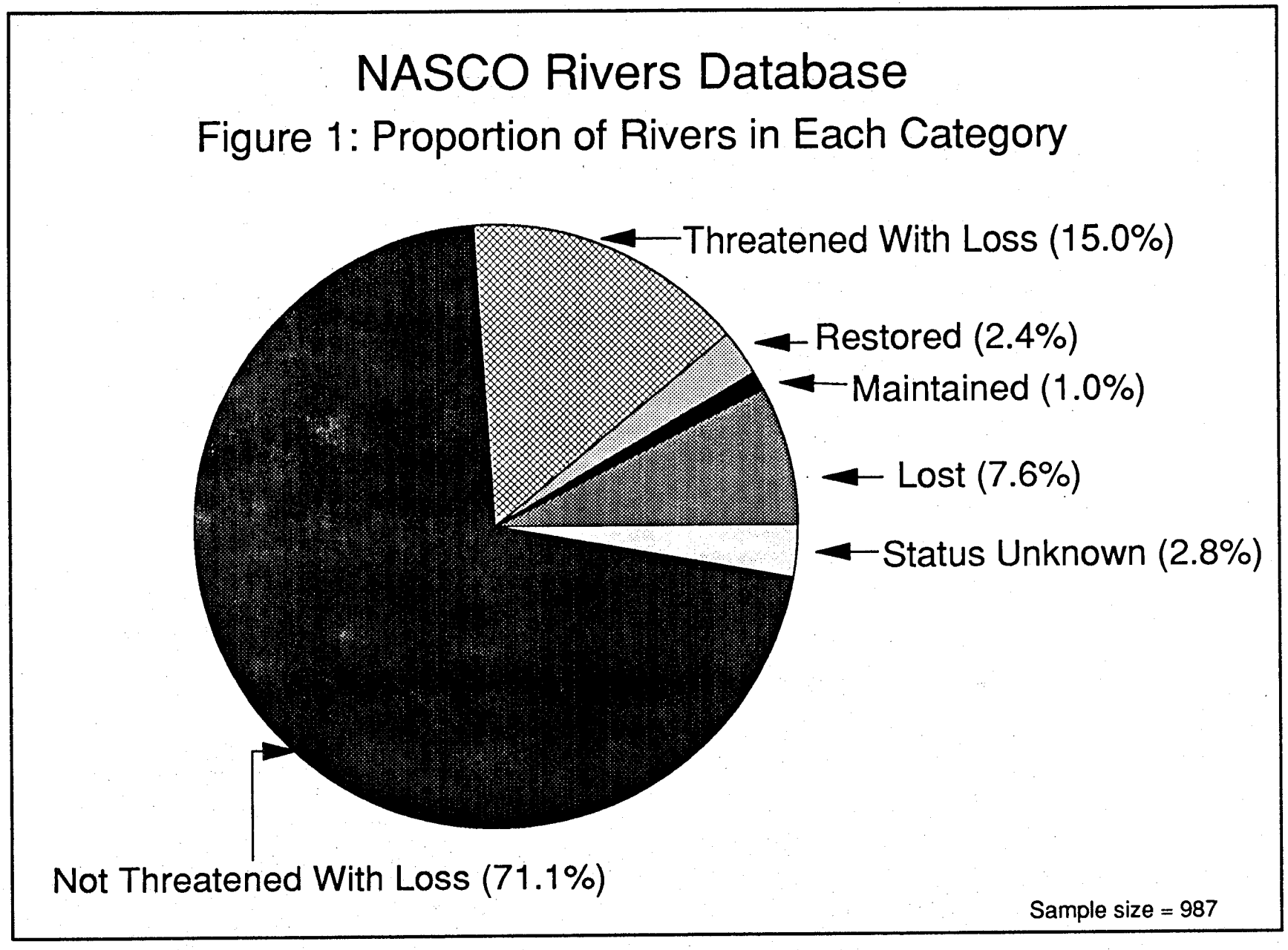
1. At its Sixth Annual Meeting the Council decided to establish a database of all salmon rivers flowing into the Convention area with an indication of their status. A format for provision of the information was agreed in 1990 (Appendix 1) and the information was requested from the Parties on 13 March 1991.

2. Last year it was reported that returns had been received from four Parties (921 rivers). Since then information from one other Party has been received and incorporated in the database. In addition to the basic information requested (i.e. river name, location, category and information on the cause of loss or threats to the salmon stocks) additional information on the size of the rivers (expressed as either catchment area or mean annual flow) and on catch has been provided in some cases.

3. In total, information on 987 rivers has now been included in the database and the percentage of rivers in each category is illustrated in Figure 1. Of these rivers about 71.1% are categorised as being 'not threatened with loss'. However, a total of 7.6% of the rivers have lost their natural stock of salmon and a further 15% are considered to be threatened with loss. For these rivers the most commonly identified threats were deterioration of water quality (including acidification); water regulation and abstraction; diseases and parasites; introductions and transfers (including escapes from fish farms); high marine mortality and over-exploitation (including illegal fishing). It should be remembered, however, that the information presented here is based on data for five Parties and it may not, therefore, be representative of the North Atlantic as a whole.

4. Last year the President encouraged the Parties to provide the relevant information to the Secretary as soon as possible so that work on this important initiative may proceed. Once information has been received from all the Parties a comprehensive review of all salmon rivers flowing into the North Atlantic will be prepared so that progress in the conservation, restoration and enhancement of salmon stocks can be monitored.

Secretary
Edinburgh
12 April 1994


NASCO Rivers Database
Figure 1: Proportion of Rivers in Each Category
Threatened With Loss (15.0%)
Restored (2.4%)
Maintained (1.0%)
Lost (7.6%)
Status Unknown (2.8%)
Not Threatened With Loss (71.1%)
Sample size = 987

Appendix 1

NASCO SALMON RIVERS DATABASE
FORMAT FOR SUBMISSION OF INFORMATION

CLASSIFICATION OF RIVERS

A river is named as the main stem of the system of rivers and tributaries at the point, within the NASCO Convention area, where it reaches the sea. A tributary is defined as any river or stream which does not flow directly into the sea but flows into a river as defined above.

CATEGORY 1: LOST
Rivers in which there is no natural or maintained stock of salmon but which are known to have contained salmon in the past.

CATEGORY 2: MAINTAINED
Rivers in which there is no natural stock of salmon, which are known to have contained salmon in the past, but in which a salmon stock is now only maintained through human intervention.

CATEGORY 3: RESTORED
Rivers in which the natural stock of salmon is known to have been lost in the past but in which there is now a self-sustaining stock of salmon as a result of restoration efforts or natural recolonization.

CATEGORY 4: THREATENED WITH LOSS
Rivers in which there is a threat to the natural stock of salmon which would lead to loss of the stock unless the factor(s) causing the threat is(are) removed.

CATEGORY 5: NOT THREATENED WITH LOSS
Rivers in which the natural salmon stocks are not considered to be threatened with loss (as defined in Category 4).

INFORMATION REQUIRED

A form for the return of information is attached. For each river details of the river name, its category and locational information (latitude and longitude bearings) for the point at which it enters the sea are requested. In addition a section for other information has been included. It would be useful if the following information, in particular, could be provided if available:

Category 1: Information on the cause and approximate date of the loss.
Category 2: Information on the cause and approximate date of the loss prior to the stock being maintained.
Category 3: Information on the cause and approximate date of the loss prior to restoration.
Category 4: Information on the nature of the threat(s) to the salmon stock.
Category 5: Details of any major losses known to have occurred within these rivers, e.g. major tributaries lost to salmon production.

In the case of Categories 4 and 5 it would be useful if those stocks which are considered to be of particular conservation value could be identified.

In the case of border and cross-border rivers each Party should provide information.

SALMON RIVERS DATABASE - RETURN FORM

PARTY:		COUNTRY/REGION/STATE:		
Category	River Name	Location		Other Information
		Latitude	Longitude	

COUNCIL

CNL(94)23

ECONOMIC VALUE OF ATLANTIC SALMON

CNL(94)23

ECONOMIC VALUE OF ATLANTIC SALMON

1. For a number of years the Council of NASCO has reviewed the literature concerning the economic value of Atlantic salmon. Previous reviews have suggested that the economic value of the wild salmon stocks in the North Atlantic Ocean might be in the region of $3.5 billion. This is of course quite separate from the other non-monetary aspects of their value such as social factors relating to employment, recreation and leisure and symbolic aspects. It was agreed that the Council should be kept informed of economic assessments. Since last year one further study on economic aspects of Atlantic salmon has been sent to the Secretariat, by the US delegation, and this is briefly reviewed. In addition, initial information has been obtained on the economic value of farmed salmon and this is presented for comparison.

2. In the US working paper, Clark and Ditton (1992) reviewed the available literature on the social and economic benefits of Atlantic salmon in New England. In colonial times it is stated that a total of 300,000 salmon may have entered at least 28 New England rivers compared to only 7 rivers which today support stable, but small, populations. From 1960-1986 over $101 million was spent on the restoration effort in New England and expected costs of planned restoration efforts to the year 2012 are estimated to be $162 million (using a 4% discount rate). The success of restoration efforts is clearly evident in the Penobscot River where 60% of all Atlantic salmon angling in Maine occurs. The review also refers to the value of the resource to non-anglers even a century ago, referring to a newspaper article from 1879 which stated that "hundreds" of people travelled to observe eight adult salmon lying in a pool in the Pemigewassett River. The review also refers to surveys which showed that the willingness to pay for salmon restoration far exceeded the expected costs and that only 1.4% of those surveyed were prepared to accept a saving of between $1-$600 for discontinuing the restoration work. The total expenditure related to Atlantic salmon fishing on the Penobscot was estimated to be $3.2 million using the travel cost method while a value of $335,468 was obtained using the contingent valuation method (questionnaire). The authors of the review concluded that there was little agreement on the economic value estimates that could be used in support of Atlantic salmon conservation and since most fisheries managers are not economists there is a need for a review that is understandable and useful in addressing the issues facing the restoration effort.

3. As reported previously, care should be used in interpretation of these data since there are many facets to the salmon's value which have not been assessed and because many of the assessments concern only expenditure estimates and not assessment of willingness to pay.

4. Last year it was proposed that information on the economic aspects of salmon farming might usefully be obtained for comparison since in future difficult decisions might have to be made about the relations between wild and farmed salmon. The information available from the Fédération Européene de la Salmoniculture (FES) is provided below.

Country	1993 Production	Ex-farm value ($/kg)	Total Ex-farm value ($)
Canada	11,115		
Faroe Islands	16,000		
France	500		
Iceland	2,348		
Ireland	12,000	4.6	55.2 Million
Norway	170,000	4.0-5.7	680-969 million
Spain	2,000		
Sweden	350		
United Kingdom	48,791	5.13	250.3 million
USA	6,755		
TOTAL	269,859		985.5 - 1274.5 million

Source: Report of the Working Group on North Atlantic Salmon, CNL(94)12
Fédération Européene de la Salmoniculture

Ex-farm values/kg were only provided by FES for three countries. However, on the basis of the proportion of the total production in those countries the total annual ex-farm value of farmed salmon production in the North Atlantic area can be estimated to be $1153-1491 million. It is clearly a very valuable product which has had marked economic impact on the small wild fish production. Salmon farming now produces 75 times the harvest of wild fish and while the wild fish still attracts a premium price in most countries, the advent of farmed salmon has reduced the price obtained for wild fish, particularly where these fish are frozen before marketing. This has had an impact on the pattern and level of exploitation of the wild stocks.

5. It is clear from this brief review that both farmed and wild salmon generate considerable economic benefits. They create employment, often in remote rural areas where there are limited alternative opportunities. For example, figures provided by the Irish Salmon Growers Association indicate that the Irish salmon and sea-reared rainbow trout industry employed the full-time equivalent of 750 people. Employment figures for Ireland indicate that all forms of angling generate about 1400 jobs (approximately half of the expenditure on angling was by game anglers) (Whelan and Marsh, 1988). It is clear that there have been some benefits to the wild stocks from salmon farming and that the salmon farming industry depends on the well-being of the wild stocks to supply its future genetic base and for marketing reasons. There are therefore good economic reasons for safeguarding the future of both activities through sustainable aquaculture.

6. On a very crude basis the figures here might suggest that the economic value of the wild stocks could be two or three times the value of salmon aquaculture. Such comparisons are however extremely difficult and liable to different interpretation. There is still a need for a consistent methodology for assessing the economic value of the resource.

Secretary
Edinburgh
1 June 1994

References

Clark, D J and Ditton, R B (1992): Status of data on the social and economic benefits of Atlantic salmon. Working paper. Texas A&M University. November 11, 1992.

Whelan, B J and Marsh, G (1988): An economic evaluation of Irish Angling. A report prepared for the Central Fisheries Board by the Economic and Social Research Institute. December 1988. 84pp.

COUNCIL

CNL(94)24

RETURNS UNDER ARTICLES 14 AND 15 OF THE CONVENTION

CNL(94)24

RETURNS UNDER ARTICLES 14 AND 15 OF THE CONVENTION

The form for the return of information relevant to the period 1 January - 31 December 1993 was circulated on 26 January 1994 for completion by the Parties. All Parties were requested to complete and return the form even if there had been no changes since the last notification. Where changes have been notified under Article 15, the Laws, Regulations and Programmes concerned have been lodged with the Secretariat and this 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 of the EU's member states which have salmon interests.

Secretary
Edinburgh
12 May 1994

ARTICLE 14

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

Norway

The Norwegian coastguard has continued the inspection of the high seas area and notified the Directorate for Nature Management of any sightings. The coastguard authorities also participated in an international meeting concerning problems of supervising fishing-activities in international areas of the Norwegian sea.

Pursuant to the new Salmon Act, adopted on May 15 1992 (§ 49) Norwegian citizens fishing salmon on the high seas can be sentenced to up to 2 years in prison. This frame of penalties is a marked increase compared to the former law (up to 3 months).

USA

Cable traffic from the US Department of State regarding the alleged continuation of fishing activities in international waters by non-contracting Parties to NASCO.

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)***

Canada

Continued to draw attention of Poland and Panama to desirability of signing NASCO Protocol on high seas fishing, as urged in diplomatic notes sent following adoption of Protocol in 1992.

Norway

The Norwegian Ministry for Foreign Affairs has informed the authorities in Poland about the importance of signing the Protocol on fishing on the high seas. Poland has indicated an intention of improving its national legal basis making it possible to sign the Protocol.

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 commercial quotas in southern Labrador were reduced from 193t in 1992 to 98t in 1993, thereby reducing incidental catches of Atlantic salmon by commercial fishermen.

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

ARTICLE 15

3. LAWS, REGULATIONS AND PROGRAMMES ADOPTED OR REPEALED SINCE THE LAST NOTIFICATION *(Article 15, paragraph 5(a))*

Canada

1993 is the second year of the five year moratorium on commercial salmon fishing off insular Newfoundland. Under the commercial licence retirement programme established in 1992, but offered in 1993, 71% (103 of the 145 commercial salmon fishermen in northern Labrador) voluntarily retired licences in 1993. Management measures for the 1993 recreational fishery in Newfoundland and Labrador were taken to help extend the period in which anglers can retain salmon by spreading out fishing effort and promoting catch and release fishing. Press releases giving details of these measures were submitted.

Denmark (in respect of the Faroe Islands and Greenland)

A new fisheries law has been adopted in the Faroe Islands. This has not resulted in any changes in the substance of the law.

European Union

During 1993 a number of regulations were introduced within the United Kingdom and Ireland. These were as follows:

Foyle Area (Control of Drift Net Fishing) Regulations, 1993
Salmon (Definition of Methods of Net Fishing and Construction of Nets) (Scotland) Amendment Regulations, 1993
Byelaws in the North-West, Wessex and South-West Regions of the National Rivers Authority.

In addition, a number of regulations/orders have been introduced or are under consideration in 1994.

Norway

New Salmon Act

The most important alterations in the new Salmon Act (§§4, 7-12, 25, 49) are:

The principle of general protection (§ 4) - fishing Atlantic salmon in the territorial sea areas and all watercourses is basically prohibited unless certain permission is given by the authorities. When such permission is given, restrictions in fishing gear and/or a limitation of the fishing season due to the status of the river salmon stocks might be necessary.

Protection of fish biotopes (§ 7) - salmon habitats can be protected. Further the fisheries interest shall be incorporated into general planning activities pursuant to the Planning and Building Act.

All import of fish of any species is prohibited (§ 8).

The release of anadromous salmonids and stock enhancement measures are prohibited without permission from the Ministry of Environment (§§ 9, 10).

Acute environmental crises - According to the new Act it is now possible to conduct necessary measures such as stopping fishing activity in watercourses with immediate effect (§ 11) or in both sea area and watercourses (§ 12). All fishing, both recreational and commercial, can be prohibited in a sea area up to 2km outside river outlets (§ 40).

The organisation of river and salmon stock management is in a process of alteration pursuant to the new law (§§ 6, 25-28). The Directorate for Nature Management has taken action to establish a "National Council for Salmon Management and Fishing Regulations". In addition initiatives are taken to establish "Regional Salmon Management Councils" with representatives from recreational and commercial fishermen, landowner and nature conservation organisations and other groups with a significant interest in salmon management. Furthermore, encouragement is given to establish "Salmon River Councils" for the most important salmon rivers. Both local and regional councils are supposed to advise the authorities concerning fishing and stock management regulations etc in sea areas or rivers. One of the aims of these alterations is to improve local participation in salmon management and increase public acceptance for regulations.

The following regulations were introduced:

Regulations defining permission to fish for anadromous salmonids
Regulations relating to duty to report and register implements
Regulations relating to seasons for salt-water fishing of anadromous salmonids (salmon, sea-trout, char etc)
Regulations relating to technical stock enhancement measures and interference with watercourses
Regulations relating to use and marking of fixed implements to fish for anadromous salmonids
Regulations relating to definitions, design and use of implements to fish for anadromous salmonids
Regulations relating to establishment and operation of stock enhancement facilities for fish and crabs
Regulations relating to fishing fee
Regulations relating to subletting of fishing rights
Regulations relating to the release of fish and other fresh-water organisms

Supervision in territorial sea-areas and watercourses

In 1993 a special program was implemented at a cost of NOK 1.1 million enforcing supervision activity in the coastal area of Mid-Norway - The Mid Norway Project.

The press showed great interest in following the actions and the evaluation of this project indicates significant preventative effects. Action levelled supervision will also be conducted in 1994.

Sweden

Fishery

New Regulations on the fishery in the Skagerrak and the Kattegatt with adjacent freshwater areas entered into force January 1, 1994 (FIFS 1993:30). The following new regulations refer to the fishery for salmon and sea trout:

- Fishery with anchored floating nets in the sea is now no longer permitted. According to former regulations it was allowed to carry out such a fishery during one month in the summer period (June 20 - July 20) in the coastal area outside the county of Halland.

- A new closed area has been established as well as extensions of some existing areas.

Aquaculture

In 1993 the National Board of Fisheries and the Environmental Protection Board issued new application forms for fish farming in Sweden.

According to the Fishery Ordinance permission is always required to establish a farming operation. The application is evaluated by the County Board and is especially concerned with rules for fish farming techniques, stocking of fish and moving of fish from one place to another. Health control in the operation is taken care of by a special body "Fiskhälsan". Farmers can sign a contract for sampling and advice for monitoring their operation. Farmers with a site where there is a risk of spreading diseases from reared to wild fish are obliged to join "Fiskhälsan".

Other laws etc which have to be taken into consideration are the Environment Protection Act, the Environment Protection Ordinance, the Nature Conservation Act and the Water Act.

USA

The State of Maine now permits the keeping of one (1) grilse per year on the Saint John River to be consistent with Canadian regulations for that river (housekeeping). The State of Connecticut promulgated regulations to give it greater flexibility on continuing an experimental recreational fishery; it allows the Commissioner of the Connecticut Fisheries Division the authority to open waters in the State to Atlantic salmon fishing for sport. The State of Rhode Island also opened up recreational fishing for Atlantic salmon in the State to two salmon per day with a minimum size of 15" and shall be included in the daily bag for trout, salmon and charr. Specific sections of the Pawcatuck River are closed to salmon fishing; the Pawcatuck is currently under restoration.

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

In Ireland, a number of byelaws were made varying by up to 12 days in 1993 only the open season for salmon fishing by draft nets and/or rod and line in a number of locations.

Norway

Register of salmon rivers

In 1993, together with local environmental authorities in all coastal counties, the Directorate for Nature Management has continued and improved the categorisation of rivers according to the present status of their Atlantic salmon stocks. In the future efforts will be made to update the register annually. The register now includes 575 different rivers with Atlantic salmon stocks (Table 1).

Table 1 - Status of Norwegian Atlantic salmon stocks (February 1994)

Category		Number of rivers	Cause
1	Extinct	34	Acid rain, river regulations, Gyrodactylus, farmed salmon
2	Threatened	60	Gyrodactylus, acid rain, overexploitation, reared salmon
3	Vulnerable and reduced	116	Gyrodactylus, acid rain, river regulations, pollution, diseases, reared salmon, overexploitation
4	Small stocks (No human impact)	225	e.g. small coastal rivers
5	Large production	127	
	Restored	2	
	Unknown status	11	

In the first category, 34 rivers are extinct due to acid rain, river regulation, *Gyrodactylus salaris* and interference with salmon escaped from fish farms. In the second category, 60 rivers are threatened by *Gyrodactylus*, acid rain, overexploitation and interactions with salmon escaped from fish farms. In total 116 rivers are categorised as vulnerable and with depleted stocks due to the spread of different diseases, interactions with domesticated farmed salmon, river regulations, pollution and overexploitation. In category four we have 225 rivers with naturally small stocks with no significant human impact. These watercourses could for instance be small coastal rivers. We have a total of 127 rivers with large production, and which have had a large production for a long time. The majority of the rivers in category five are

located in the northern part of Norway. Finally, we have 2 rivers which have been restored and 11 rivers of unknown status.

The register is used in river and stock management and has a direct impact on, for example, regulation of the fishing season, fishing gear, certain preservation zones in rivers and sea areas and remedial measures such as liming, rotenone treatment, stock enhancement etc.

Monitoring

In 1993 the monitoring of salmon stocks in rivers and at sea has continued at a high level. The monitoring of, for example, development of total stock size, stock recruitment in different rivers, the further spread of *Gyrodactylus* and stock development in infected rivers, sea-lice infestation, fish diseases, the number of fish escaped from fish farms and damage to wild salmon caused by fixed salmon gear are being investigated in a number of rivers and in sea areas. The Directorate spends approximately NOK 6 million each year to support and finance monitoring programmes. In addition Research Institutes and the owners of waterpower plants contribute in the financing of these activities.

Liming

In 1993 the liming of 6 rivers with stocks of Atlantic salmon was continued. For two of them, the river Vikedalselva and the river Vosso, the main goal is to preserve the local stocks. Norway spent NOK 4.8 million in 1993 conducting liming measures.

Rotenone treatment

In 1993 another 7 watercourses were treated with rotenone against *Gyrodactylus* and the total number treated reached 21. The experiences with rotenone treatment are rather good and so far 5 rivers have been taken off the sick list. Another 8 are expected to be taken off the sick list in 1994. Norwegian authorities spent NOK 6.4 million in 1993 on these activities.

Mandatory releases of salmon juveniles

The imposed releases of Atlantic salmon fry (1.5 million/year) and smolt (0.5 million/year) in about 60 regulated rivers by the owners of waterpower plans have continued in 1993. The main strategy for this activity is the use of local stocks, caught throughout the whole season, to provide juveniles representing the genetic diversity of the stock.

In 1993 new hatcheries producing fingerlings were brought into production on the river Driva and Stjørdalselva.

In the river Suldalslågen a research program is being conducted to examine whether it is possible to replace juvenile releases with habitat improvement and restoration measures. In about 8 rivers significant planning effort has been made to establish salmon stocks in previously uninhabited stream habitat.

In several rivers research programs are being conducted to investigate the possible impacts of the regulation on salmon stocks. Software to simulate the impacts of different factors on the river environment caused by regulating a watershed has been developed.

Gene bank/sperm bank

By the end of 1993 sperm from a total of 5088 salmon from 162 different stocks had been frozen in the Norwegian gene banks to provide a possibility of rescuing them from extinction - 25 characteristic and valuable stocks have been taken into the "living gene banks" in Haukvik (Mid-Norway) and in Eidfjord (Southwest-Norway). In 1993 sperm from 684 salmon from 68 stocks was frozen. 274 salmon, male and female, from 13 stocks were taken into a "living gene bank". Norway is spending approximately NOK 7 million each year to operate the gene banks.

International research programmes

A cooperative research program involving Norway, Iceland, Sweden and the Faroe Islands was carried out in 1993. The purpose of this project was to explore the stock structure, distribution and migration of Atlantic salmon caught and tagged in the sea within the Faroese economic zone.

The cooperation between Norway and Russia on environmental issues, on research and management of Atlantic salmon has continued.

5. OTHER FACTORS WHICH MAY SIGNIFICANTLY AFFECT THE ABUNDANCE OF SALMON STOCKS SUBJECT TO THE CONVENTION *(Article 15, paragraph 5(c))*

Finland

Factors such as *Gyrodactylus salaris* and an increasing number of fish which have escaped from fish farms.

Iceland

There has been a further increase in ranching production in Iceland.

Norway

Acidification

Acidification continues to be one of the main threats to salmon stocks in Norway. After several years with heavy acidification in the southern part of Norway, for example, almost all natural salmon stocks are now extinct in the counties of Agder. There are also strong indications that acidification is becoming a serious problem for salmon rivers in Western Norway. However, in 1993 some progress has been made in determining values of different chemical parameters in river habitat, which are critical for salmon survival at different juvenile stages. Studies of river habitat have shown that zones where less acid water is mixed with highly acid water are extremely toxic especially to juvenile salmon at the smolt stage. This new knowledge has to be taken into consideration when conducting liming measures in watersheds with watercourses of various pH.

Gyrodactylus salaris

In 1993 the total number of known rivers infested with *Gyrodactylus salaris* was 37, which is the same as in 1992. After approaching the Finnish authorities on the *Gyrodactylus salaris* matter in Lake Enare in northern Finland in 1992, the north-east Atlantic countries of NASCO arranged a symposium in Utsjoki, Finland on 23-25 August 1993. During this conference possible action against the parasite and to prevent further spreading to the river Tana were discussed.

Salmon farming and sea lice

In the winter of 1993 the Norwegian authorities introduced regionalised delousing strategies along the coastline in order to reduce problems of sea lice in fish farming. Sea lice infestations along the Norwegian coastline showed a slight decrease in 1993 compared to 1992.

Furunculosis

By the end of 1993, 79 watercourses were affected by *Aeromonas salmonicida* subspecies *salmonicida* (furunculosis bacteria).

Sweden

The recruitment of salmon in some Swedish west-coast rivers during the period 1988-1993

The salmon migrates into and spawns in about 15 river systems along the Swedish west coast. In the late 1980's the potential annual, natural production of salmon in these rivers was estimated to be 125,000-200,000 smolts with about 60% of this smolt production attributed to four of the largest river systems, i.e. Örekilsälven, Viskan, Ätran and Fylleån.

As part of the on-going monitoring programmes related to liming operations, pollution impacts etc the National Board of Fisheries (Department of Research, Fisheries Research Office in Jönköping) carried out electrofishing in the four rivers mentioned above during the 1980's and the early 1990's. It has been of interest to compare the status of the west-coast rivers with that of the Baltic salmon rivers with M74 syndrome (very high mortality of salmon fry in rearing plants and in rivers with natural reproduction).

The results during the period 1988-1993 for two sampling sites from each of the four rivers indicate an alarming decline in abundance of salmon fry (Figure 1). A decline has been observed in each of the four rivers and at all the sampling sites, which implies that the results are statistically significant. Of course the four rivers exhibit somewhat different conditions and the variation is relatively high. The greatest change has been in the river Högvadsån, a tributary of the river Ätran. Despite improved environmental conditions in Högvadsån after the first years of mitigation liming, a considerable reduction in the number of fry has been observed.

In the four river systems, the average total fry abundance in 1993 amounted to only approximately 40% of the mean for the period 1988-1993 (variation about 20-60%). The abundance of about 0.3-1.0 fry/m^2 (sum of 0+ and >1+) may, however, be regarded as relatively high. On the other hand it should be pointed out that densities of 2-4 fry/m^2 were recorded earlier in the investigation period. The causes of the observed decline in fry numbers are not clear but changes in environmental conditions in the Atlantic feeding areas as well as in the rivers cannot be excluded.

Decreased recapture of tagged salmon smolts

Reduced recaptures of tagged, reared salmon smolts have been observed in some Swedish west-coast rivers (report from the County Board, Halland) and an increased proportion of grilse has also been observed. Figure 2 demonstrates the decreasing trends in yield (in kg/1000 released smolts) during the period 1981-1992 in the rivers Lagan, Nissan, Högvadsån (Ätran) and Göta älv/Säve ån. In addition, the number of recaptured naturally produced, tagged smolts in Högvadsån shows a similar trend. It should be noted that the recaptures of sea trout do not exhibit a decreasing trend.

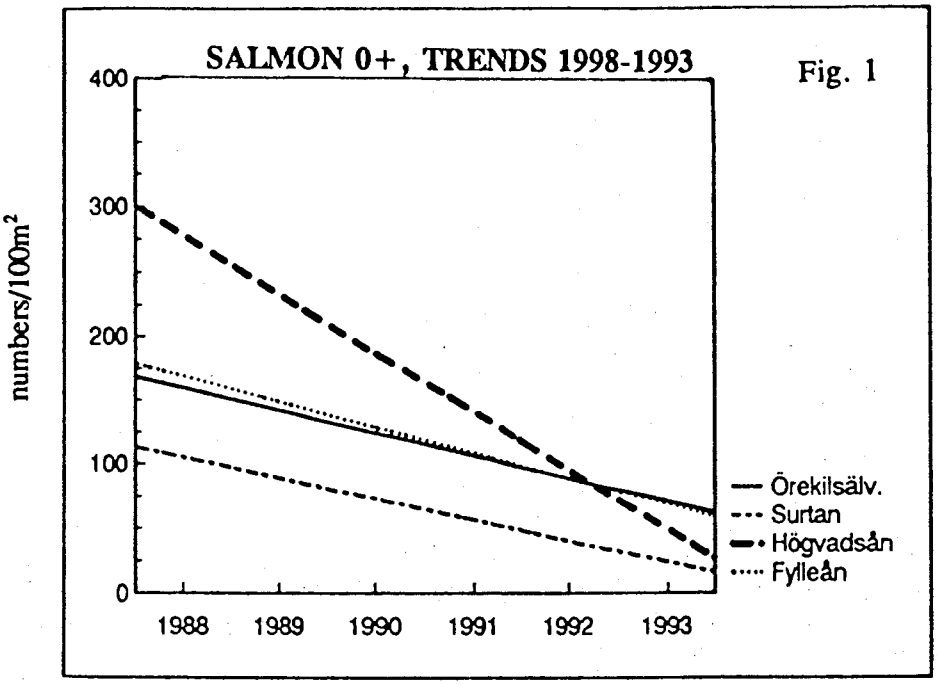


Fig. 1

RECAPTURES OF TAGGED SALMON IN KG/1 000 RELEASED

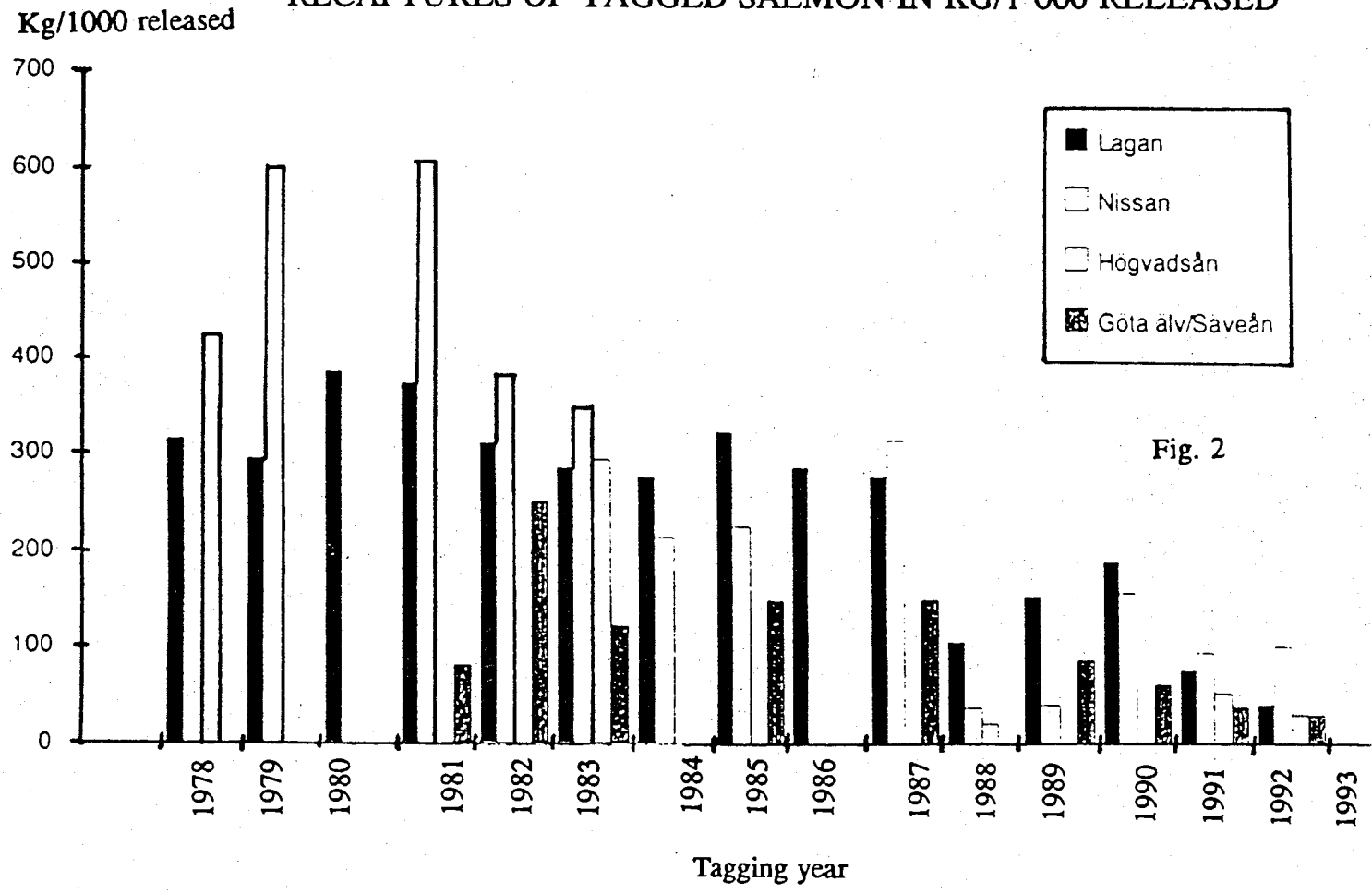


Fig. 2

COUNCIL

CNL(94)25

PROGRESS REPORT ON THE NASCO PROTOCOL

CNL(94)25

PROGRESS REPORT ON THE NASCO PROTOCOL

1. At its Ninth Annual Meeting in Washington DC, the Council unanimously adopted the "Protocol Open for Signature by States not Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean". The Council requested that copies of the Protocol should be transmitted to the governments of Panama and Poland bringing to their attention the activities of their vessels. In accordance with this request copies of the Protocol were transmitted to these governments in December 1992 through their Embassies in London.

2. Prior to the Tenth Annual Meeting I received a response indicating that the government of Poland was in the process of reviewing the draft Maritime Fisheries Act, the provisions of which would authorise the Minister of Transport and Maritime Economy to prohibit fishing on the high seas, as well as the landing and sale of certain species of fish. The Polish government advised that it would not review the question of signing the Protocol until there was clarity regarding the draft Maritime Fisheries Act. The Polish authorities also indicated that the landing of salmon in Polish ports by vessels registered abroad had ceased. This has subsequently been corroborated by the crew of the 'Brodal' who indicated that as they could no longer land their catch in Poland they would be seeking to land in other countries. During March of this year we received information indicating that this vessel would try to land its catch in other Baltic ports such as Kaliningrad in Russia and we were also advised that 'Brodal' had tried to enter the port of Klaibeda in Lithuania.

3. In June last year I also received a response from the Panamanian Government requesting details of the annual payments to NASCO and of any other dues and of the frequency and venues for NASCO's meetings. I responded to this request, which suggested that Panama might be considering signing the Protocol, indicating that there would be no payments since signing the Protocol did not constitute membership of NASCO. There has been no subsequent correspondence from Panama.

4. At its Tenth Annual Meeting the Council, in response to further sightings, agreed that diplomatic efforts should be intensified with regard to adherence to the Protocol and I therefore wrote to both the Panamanian and Polish governments urging them to become Parties to the Protocol. The Icelandic Ambassador to London, H E Helgi Agustsson, also raised this issue with the Panamanian Chargé d'Affaires during a meeting in February this year in London. To date neither of these governments have agreed to sign the Protocol although as I indicated last year this process is anticipated to be slow. Nevertheless the diplomatic efforts of the Parties and the Organization have resulted in action by both Panama, in removing 'Brodal' from its register, and by Poland, in preventing landings of salmon caught by vessels known to be operating in international waters. So, although they have not signed the Protocol the actions by these two governments have been the same as if they had signed it. However, it is always possible that registers of other States could be used by 'Brodal' and other vessels in future and we shall have to remain alert. The initiative of the FAO in developing an "Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas" is also a useful

initiative complementary to the NASCO Protocol. This Agreement was approved by the 61st Session of the FAO Committee on Constitutional and Legal Matters and was subsequently adopted at the 27th session of the Food and Agriculture Organization Conference in Rome during 6-25 November 1993. This Agreement will enter into force following receipt of the twenty-fifth instrument of acceptance, although this could take a considerable length of time. Its main provisions are that:

1) each Party shall take measures to ensure that fishing vessels entitled to fly its flag do not engage in any activity that undermines the effectiveness of international conservation and management measures;

2) no Party shall allow any fishing vessel entitled to fly its flag to be used for fishing on the high seas unless authorised to do so;

3) no Party shall authorise any fishing vessel, previously registered in the territory of another Party that has undermined the effectiveness of international conservation and management measures, to be used for fishing on the high seas unless certain conditions are satisfied.

5. In conclusion, it is clear that we have made considerable progress through our diplomatic efforts despite the fact that neither Panama nor Poland has signed the Protocol. The episode with the 'Brodal' showed that the vessel was subject to delay and to problems with the port authorities wherever it went so that if we can continue to cooperate this way its activities will become less and less profitable. This is probably the most effective way to dissuade such activities. Diplomatic efforts should be continued in response to any further sightings and it is important that our efforts to improve and better coordinate surveillance are progressed. This information is vital if the diplomatic initiatives of the Parties and of the Organization are to be successful and a report on improving the surveillance is presented separately, CNL(94)27. The FAO initiative would also seem to be a useful initiative which should complement the NASCO Protocol in dealing with the problem although there may be long delays before it enters into force and its success will depend on countries whose registers are being used accepting the agreement, which is far from certain.

Secretary
Edinburgh
15 April 1994

ANNEX 16

COUNCIL

CNL(94)26

PROGRESS REPORT ON ACTIONS TAKEN IN ACCORDANCE WITH THE RESOLUTION ON FISHING FOR SALMON ON THE HIGH SEAS

CNL(94)26

PROGRESS REPORT ON ACTIONS TAKEN IN ACCORDANCE WITH THE RESOLUTION ON FISHING FOR SALMON ON THE HIGH SEAS

SUMMARY

Attached is a report on the available information and on actions taken regarding fishing for salmon in international waters. In summary, I believe that although the Protocol has not been signed the actions taken by the countries concerned have been almost the same as if they had signed them. The best way to deal with this problem is to ensure that our cooperation is so good that the vessels that undertake this fishery encounter difficulties every time they enter a NASCO member harbour, that other countries like Poland deny landing rights, that Panama withdraws its flag and that Switzerland refuses imports. That way the vessels will find the fishery unprofitable and very inconvenient. Interestingly, we recently received a request from a Danish vessel owner as to whether NASCO dealt with cod in international waters. This suggests that the vessels may be concluding that they should turn elsewhere.

Secretary
Edinburgh
18 April 1994

CNL(94)26

PROGRESS REPORT ON ACTIONS TAKEN IN ACCORDANCE WITH THE RESOLUTION ON FISHING FOR SALMON ON THE HIGH SEAS

1. At its Ninth Annual Meeting the Council unanimously adopted a Resolution on Fishing for Salmon on the High Seas. This Resolution requested the Secretary to obtain and compile information on sightings of vessels; draw the attention of non-Contracting Parties concerned to the activities of their vessels; obtain and compile information on landings and transhipments; obtain and compile scientific and technical data on the fishery; and establish regular contacts with other international organizations with an interest in the area, in particular NEAFC, with a view to sharing information.

2. The actions taken in accordance with the Resolution since the Tenth Annual Meeting are detailed below.

Obtain and Compile Information on Sightings

3. Information on the activities of vessels in international waters has been obtained principally from Norwegian and Icelandic coastguard airborne surveillance flights. The following surveillance flights have been undertaken between April 1992 and April 1994:

Icelandic Coastguard			Norwegian Coastguard		
1992	**1993**	**1994**	**1992**	**1993**	**1994**
2 April	15 March	28 March	10 April	3 April	11 Feb
4 September	21 April		24 April	17 April	18 Feb
15 September	14 June		6 May	13 May	26 Feb
2 November	7 July		8 May	19 May	2 March
	16 September		24 May	3 June	29 March
			5 June	28 June	
			22 June	23 July	
			7 July	17 September	

It is clear from the above details that there are considerable periods when no surveillance flights occurred over the area of international waters and it is known that vessels have in the past operated without detection. A report on the actions taken to improve the surveillance is presented separately in CNL(94)27.

4. Since last year's report (CNL(93)26), consultations with the Norwegian and Icelandic coastguards have confirmed further sightings of the vessel 'Brodal', which was located at position of 71°35'N, 04°20'E on 3 June 1993 and 66°48'N, 03°22'W on 11 February 1994 and of the vessel 'Sea Gull' which was located at a position of 71°35'N, 06°32'E on 3 June 1993. The information on sightings from airborne surveys which has been received by the Secretary to date is as follows:-

Icelandic Coastguard				Norwegian Coastguard			
Date	Vessel Name	Location		Date	Vessel Name	Location	
17/01/90	Brodal	67°04'N	05°41'W	28/01/90	Uncle Sam	66°27'N	00°48'W
	Seagull	66°40'N	04°22'W	22/02/90*	Name unknown	66°51'N	01°09'W
26/01/90	Minna	66°22'N	04°15'W		Name unknown	66°55'N	00°24'W
	Seagull	67°41'N	04°22'W		Name unknown	67°05'N	00°20'W
21/02/90	Brodal	66°49'N	01°15'W		Name unknown	66°56'N	03°02'W
	Seagull	66°55'N	00°36'W		Name unknown	67°43'N	00°34'W
02/03/90	Brodal	66°58'N	02°33'W		Name unknown	67°41'N	00°30'W
	Annette Bri	66°58'N	02°33'W		Name unknown	67°50'N	00°40'W
				10/03/90	Brodal	66°45'N	03°17'W
				24/02/91	Name unknown	68°33'N	01°08'E
				06/05/92	Brodal	72°00'N	06°00'E
					Netanya	72°00'N	06°00'E
				08/05/92	Brodal	72°17'N	06°25'E
					Netanya	71°57'N	05°28'E
				19/05/93	Brodal	70°30'N	04°02'E
				03/06/93	Brodal	71°35'N	04°20'E
					Sea Gull	71°35'N	06°32'E
				11/02/94	Brodal	66°48'N	03°22'W

* Photographs taken of Annette Bri, Seagull, Minna, Brodal.

5. In addition the following information has been received from ports:

Date	Vessel Name	Port
18/1/90	Minna	Torshavn
2/2/90	Minna	Torshavn
28/1/91	Brodal	Bodø
4/3/91	Brodal	Bodø
5/12/91	Brodal	Bodø
5/3/92	Brodal	Bodø
31/01/94	Brodal	Bodø

During its visit to Bodø, on 31 January 1994, for repairs the vessel 'Brodal' was arrested by the Norwegian authorities because it could not present the required documents. It was subsequently permitted to leave Bodø on 4 February. Inspection of the vessel during its detention resulted in the following information being obtained:

- "Se 68 Brodal", Int. call sign HP5157, Registered in Panama.
- Captain Hjarne Funch Jensen, born 090544
  Adr. Johannes Strasse 31, A 6344, Walchsee, Austria.
- Shipowner: Myrtleberry Inc.
  Edificio, Bank of Amerika, Calle 50
  Apartado 5
  Republica de Panama.
- The Captain is the owner both of the ship and the shipowner company.
- Shipowner's agent in Denmark:
  Bornholm Forvaltning
  Strandgade 2
  3730 Nexø
  Denmark.

- Shipowner's firm of lawyers in Denmark:
  Nebelong, Groth-Andersen & Vinding Kruse
  Fredriksberggade 1A
  Postbox 1051
  1007 København
  Denmark.

The same information concerning the ownership of the vessel had been obtained previously by Scottish Fisheries Protection Agency officers when they boarded 'Brodal' en route to Lerwick in December 1989.

6. On 21 February 1994, H E Helgi Agustsson, the Icelandic Ambassador to the UK, Head of the Icelandic delegation to NASCO, met the Panamanian Chargé d'Affaires at the Panamanian Embassy in London to discuss the activities of the 'Brodal'. He was advised that the vessel's Panamanian registration had been cancelled by a resolution (603-04-487-ALCN) of 29 December 1993. We understand that the Panamanian Chargé d'Affaires believes that the owners of the vessel, finding themselves in difficulties with the Norwegian authorities, contacted a surveyor in Denmark working for National Shipping Adjuster Inc (Panama) who issued and signed a Certificate of Tonnage based on previous documents. This document was presented by the Captain of the vessel as a Certificate of Panamanian Registration. It would appear therefore that the vessel 'Brodal' was operating in international waters without a valid registration from any country and it is likely that this would be grounds for detaining the vessel in port. The owners of 'Brodal' may now seek a new register before returning to fish for salmon in international waters. In this respect the FAO initiative referred to in document CNL(94)25 may be helpful in support of the NASCO Protocol.

Drawing the Attention of Non-Contracting Parties to the Activities of Their Vessels

7. In accordance with the Resolution of the Council on the Adoption of a Protocol for States Not Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean, copies of the Protocol were transmitted to the governments of Poland and Panama through their respective London missions in December 1992. At this time we provided them with the information concerning the activities of the vessels which were believed to be registered in their countries. Following the decision of the Council at its last meeting that diplomatic efforts should be intensified with regard to adherence to the Protocol, I again wrote to the governments of Poland and Panama urging them to become Parties to the Protocol (see paper CNL(94)25). Although neither country has signed the Protocol our diplomatic efforts have been successful in that Panama has removed 'Brodal' from its register and Poland appears to have taken steps to prevent the landing of salmon by this vessel at its ports.

Obtain and Compile Information on Landings and Transhipments

8. No information has been provided by the Parties concerning landings and transhipments. However, we were advised by the Swiss Department of the Interior (Office of the Environment, Forests and Countryside) that there was an import to Switzerland in May 1993 of salmon believed to have been caught by 'Brodal' which

had been landed at the Polish port of Kohlberg. We have been advised that 36 tonnes of salmon were landed. The Swiss authorities requested that we keep them advised of the activities of vessels operating in international waters. During the first quarter of 1994 detailed information on the movements of the vessel 'Brodal' was obtained following its detention by the Norwegian authorities in Bodø. This vessel proceeded to the international zone and was sighted fishing for salmon before entering the Baltic on 14 March. Information provided by the crew of the 'Brodal' indicated that the vessel could no longer land its catch in Poland and that it would therefore try to land its catch in Russia. We therefore contacted the Russian authorities asking for their cooperation in alerting the port authorities in Murmansk, Archangel and the Baltic ports to the situation. We also contacted the Embassies of Latvia, Lithuania and Estonia advising them of the activities of this vessel. As a result we were subsequently advised by the Lithuanian Embassy that 'Brodal' had attempted to enter the port of Klaibeda. The Russian port of Kalingrad was also believed to be a possible port of call. No information is available as to where and in what quantities the salmon from this most recent fishing trip were landed but it is believed that the vessel returned to Bornholm on 20 March. The appropriate authorities in Switzerland were advised of the situation so that they could monitor imports of wild salmon. Further information on landings will be developed.

Obtain and Compile Scientific and Technical Data on the Fishery

9. To date six vessels are known to have been involved in fishing for salmon in international waters. Their details are given below:

Name of Vessel	Registration Number	Country of Registration	Call Sign	Size of Vessel	
				Weight (GRT)	Length (m)
BRODAL	--	PANAMA	HP5157	133	29
MINNA	WLA69	POLAND	OZTH	84.5	
SEA GULL 1	--	PANAMA	3ELD6	148	--
ANNETTE BRI	WLA12	POLAND	OUHZ	--	
UNCLE SAM	--	PANAMA	OYXP	--	
NETANYA	SG76	SWEDEN	--	--	--

* A number of vessels do not display a registration number.

In addition, there are unconfirmed reports that two other vessels, 'Bermuda' and 'Marie Viking', have also been involved. The vessel 'Bermuda' was registered in Panama but it is believed that this vessel may have reflagged to Poland in March 1991. Its call sign is OWRG and its Polish registration number is understood to be LEB72.

10. During the year we consulted Lloyd's Register of Ships for 1992-1993 in an attempt to confirm details of the vessels known to have been involved in the fishery. However, few of the vessels are listed in the register which only includes boats in excess of 100 tonnes. Previous documents presented to the Council contained details of the vessel 'Sea Gull' in which this vessel was described as being 46m long, of 299 tonnes with call sign OVID2. However, Lloyd's Register lists this vessel as a General Cargo Ship with ice-strengthened hull formerly known as 'Tove Lindinger' (-1976), 'Pax' (-1978) and 'Juto' (-1984). However, the Lloyd's register includes a listing for a vessel 'Sea Gull 1', formerly 'Else Horne' (-1988) with the call sign 3ELD6, of 148

tonnes which is referred to as a side fishing long-line vessel built in 1966 by VEB Rosslauer and belonging to Sea Ocean Trading Corporation, Panama. This company is listed in Lloyd's List of Shipowners with the following address: Ro Skolevej 12, 3760 Gudhjem, Denmark. Information provided by the US State Department indicates that this vessel was preparing to leave its home port in Bornholm in March to fish for salmon in international waters and it seems likely that this is the vessel which has been observed fishing for salmon in international waters in previous years although photographic evidence indicated that the vessel displays the name 'Sea Gull'. The Coastguard authorities have been advised of this information. Information obtained by the Norwegian authorities suggests that the international call-sign of the 'Brodal' is HP5157 and not OVUH as stated previously.

11. It is expected that most of the catch from international waters would be salmon of European origin. Information on catches by individual vessels has been obtained as a result of vessels calling at ports and following the boarding of the vessel 'Brodal' by Scottish Fisheries Protection Agency officials. When the vessel 'Minna' called at Torshavn harbour in February 1990 it had 5 tonnes of salmon on board but the Faroese authorities were advised that the intention was to catch 25 tonnes before returning to Poland. When the vessel 'Brodal' was boarded it had 30 tonnes of salmon on board. The catch by the vessel 'Netanya' is believed to have been 150kg. Information from the former Northern Norwegian Sea fishery indicates that salmon fishing can be conducted as far north as 75°N and that catch levels at latitudes of 69-72°N can be high. On the basis of known catches by the vessels 'Brodal' and 'Minna', and assuming that between 2000-3000 hooks can be set a day, historical catch rates would indicate that the vessels would have to fish in the area of international waters for between 30-100 days. It is clear then that the vessels must be in this area for considerable lengths of time.

12. Estimates of the catch in international waters by reflagged vessels based on known catches by individual vessels and the number of sightings have been made by ICES over the last four years and the time series of information is as follows:

Year	Estimated catch (tonnes)
1989/90	180-350
1990/91	25-100
1991/92	25-100
1992/93	25-100

Establish Contacts with Other International Organizations with Interests in the Area

13. A report on the activities of other international organizations in relation to fishing by non-Contracting Parties (CNL27.030) was presented to the Special Meeting on Fishing for Salmon in International Waters held during 14-15 January 1992. The report presented information on actions taken by the Northwest Atlantic Fisheries Organization (NAFO); the North-East Atlantic Fisheries Commission (NEAFC) and the International Commission for the Conservation of Atlantic Tunas (ICCAT). All of these organizations have become aware of the activities of vessels registered to

non-Contracting Parties within their areas of competence and it is clear that this problem is not restricted to the North-East Atlantic or to salmon.

14. Last year I reported that I had met with the Secretary of NEAFC and that we had agreed to develop closer links on sharing information on this subject. I have therefore sent copies of relevant documents concerning the activities of vessels operating in international waters and of our actions to address the problem to NEAFC. In November last year I was invited to participate in the 13th Regular Meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT) so as to describe NASCO's actions in relation to fishing by non-Contracting Parties. ICCAT had previously adopted a Resolution concerning catches of Bluefin Tuna by Non-Contracting Parties and at the Thirteenth meeting a number of recommendations were adopted concerning the fishing of Atlantic Bluefin Tuna and Atlantic Yellowfin Tuna in response to the Commission's serious concerns about increasing fishing activity by non-member countries. I agreed with the Executive Secretary that we should seek closer cooperation between our Organizations through exchange of information on the problem of fishing by non-Contracting Parties.

COUNCIL

CNL(94)27

INTERNATIONAL COOPERATION ON SURVEILLANCE

CNL(94)27

INTERNATIONAL COOPERATION ON SURVEILLANCE

1. In March last year a meeting of coastguard and fisheries protection organizations from the North-East Atlantic area was held at NASCO Headquarters to examine the methods of surveillance used in relation to the problem of fishing for salmon in international waters and the scope for improvements, where appropriate, through international cooperation. A number of recommendations were formulated concerning: a specific salmon fishing surveillance project; longer-term cooperation; sources of information from the military and from ports; on publicity and on future communication of information. These recommendations were endorsed by the Council at its Tenth Annual Meeting.

2. In accordance with the Council's request that the Secretary proceed with appropriate action in accordance with these recommendations, I wrote to those who attended the meeting with proposals as to how the recommendations might be progressed. These proposals are contained in the letter attached. It is proposed that a cooperative surveillance project aimed specifically at assessing the scale of the problem be conducted on three occasions between November 1994 and May 1995. It is further proposed that there be a second meeting of coastguards in May 1995 to assess the results of this project and progress with the other recommendations so that a report can be made to the Council at its Twelfth Annual Meeting. Given the continued sightings of vessels fishing for salmon in international waters, it is important that we have the most comprehensive information possible so that this can be used in supporting our diplomatic initiatives.

Secretary
Edinburgh
15 April 1994

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CNL27.131

12 April 1994

NORTH ATLANTIC SALMON
CONSERVATION ORGANIZATION
ORGANISATION POUR LA
CONSERVATION DU SAUMON
DE L'ATLANTIQUE NORD

Captain Helgi Hallvardsson
Icelandic Coastguard
P O Box 7120
IS 127 Reykjavik
ICELAND

Further to my letter of 19 August 1993 and after assessing the sightings that have occurred during the winter, we have now developed some thoughts on how to progress the recommendations of the International Meeting on Fishing for Salmon in International Waters. These recommendations were endorsed by the Council of NASCO and I would seek your agreement so that these might now be progressed.

1. Salmon Fishery Surveillance Project

It was recommended that there should be a cooperative surveillance project aimed specifically at assessing the scale of the problem. It was agreed that the times and areas for such a project should be prepared by NASCO on the basis of information from the former Norwegian Sea Fishery and the surveillance information available to date. This information is summarised in Appendix 1. It is proposed that, in accordance with the recommendation, surveys aimed specifically at obtaining information concerning salmon fishing be conducted, using all possible means at the Parties' disposal, during November 1994 (week 45), February 1995 (week 6) and May 1995 (week 18), and that the surveys cover the entire area of international waters. It is anticipated that the primary source of information will be Icelandic and Norwegian coastguard airborne surveys and coordination between these authorities with regard to areas covered, timing etc. might lead to more effective surveillance. It is important that the coverage of the area is as complete as possible. It is, of course, a matter for the Parties to decide what resources can be devoted to the project but I would be grateful for your comments on this proposal and for details of your involvement by 5 September so that I can communicate this to the other Parties prior to the commencement date.

2. Longer-Term Surveillance

It is clear from the information in Appendix 1 that salmon fishing can be conducted throughout most of the area of international waters. It is also clear that there are many months of the year when no surveillance of this area takes place. It was recommended that a specific effort should be made to improve the extent of the salmon-related surveillance and I would propose that this question should be reviewed at the next meeting of the group (see paragraph 7 below) in the light of the projects referred to under headings 1 and 3.

3. Military Sources of Information

The Norwegian coastguard has agreed to explore the possibilities of obtaining information from NATO AWACS aircraft. Such information, if available, may be valuable in support of the projects described under headings 1 and 2 above.

4. Information from Port Authorities

It was recommended that a specific effort should be made to alert the port authorities to the problem of fishing for salmon in international waters and that NASCO should provide a draft basis for this. A draft is attached as Appendix 2. I would be grateful for any comments on this by 5 September. Once I have your agreement to the wording I would intend to have the document translated and would then seek your cooperation in distributing it to the relevant authorities. The Norwegian and Icelandic coastguards also agreed to review their harbour records to see if the data were held in a manner that could be readily searched for vessels' names, call signs etc. and progress on this area could also be reviewed at the next meeting of the group (see paragraph 7 below).

5. General Publicity

It was recommended that local publicity for the problem would be useful and that NASCO should prepare a draft article or press release in order to try to improve public awareness of the problem. This is attached as Appendix 3 and again I would seek your comments by 5 September after which I will have the document translated and would seek your cooperation in distributing it to the press and radio networks.

6. Communication of Information

It was agreed that NASCO could best serve as the centre for exchange of information and should establish some guidance and procedures on this function. These are attached as Appendix 4 and I would also be grateful for any comments on these guidelines by 5 September.

7. Future Meetings

It was agreed that the group should meet again after the cooperative project and then approximately every two years. I would propose that we meet in May next year so as to review results of this project and progress with the other recommendations. I will contact you again proposing dates and a venue for the meeting.

I look forward to receiving your comments on the various recommendations by 5 September.

Thank you for your cooperation in this valuable collaborative work.

Yours sincerely

Malcolm Windsor
Secretary

Encs.

SALMON FISHERY SURVEILLANCE PROJECT

1. At the International Meeting on Surveillance of Fishing for Salmon in International Waters it was agreed that there should be a salmon fishery surveillance project with the areas and times for the surveillance being proposed by NASCO, taking account of catch records in the former Norwegian Sea Salmon Fishery and information obtained by NASCO concerning the activities of reflagged vessels.

2. Prior to 1975, the Northern Norwegian Sea Fishery was conducted in a very large area between 68°-75°N and between the Greenwich meridian and 20°E. Following the Norwegian ban on long-lining and the extension of the Norwegian fishery limits to 200 miles, the fishery shifted westwards to an area between latitudes 67°-75°N and from the Norwegian fishery limit across to Jan Mayen Island. Prior to 1975 the fishery was conducted between May - June but thereafter the season was advanced to April. The salmon fishery in the Faroese zone was, however, conducted during November - April.

3. Surveillance has indicated that the reflagged vessels operate in the area between 66°22'-72°17'N and 5°4'-6°32'E. However, it was agreed at the International Meeting on Surveillance that the existing surveillance was not comprehensive and that many sightings had been obtained by chance. In both 1992 and 1993 there were considerable periods of time when no surveillance took place. All of the sightings obtained to date were between January and June but vessels have also operated in international waters during October to December. It is known that catch rates of salmon in the international area can be high compared to those in the Faroese fishery and that the vessels may operate in international waters for considerable periods of time before returning to land their catch.

4. Given the above information, it is clear that salmon fishing may be conducted over large parts of the area of international waters, possibly the entire area, and in many months of the year. A specific salmon surveillance project would, therefore, have to be structured accordingly. One possibility would be to divide the project into three separate survey periods for example in November, February and May. The principal source of information will be airborne surveys but other sources of information may also be available. In order to avoid duplication of effort it might be possible to divide the area for surveillance purposes.

DRAFT NOTIFICATION TO PORT AUTHORITIES ON FISHING FOR SALMON IN INTERNATIONAL WATERS

Since 1989, Coastguards and Fishery Protection Agencies in Norway, Iceland, Faroe Islands and Scotland have recorded the activities of vessels fishing for salmon in international waters north of the Faroe Islands (between 66-72°N). These vessels, previously registered in Denmark, had been reflagged to Poland or Panama so as to avoid an internationally agreed prohibition on fishing for salmon beyond fisheries zones. In addition, one Swedish vessel has been identified. This fishing threatens to undermine domestic and internationally agreed salmon management measures. To date the vessels 'Brodal', 'Minna', 'Sea Gull', 'Annette Bri', 'Uncle Sam' and 'Netanya' have been observed fishing for salmon in international waters.

These vessels are known to have called at the ports of Bodø in Norway and Torshavn in Faroe Islands. One vessel was also boarded in transit to Lerwick in Scotland. Measures to eliminate this fishing have been taken by the North Atlantic Salmon Conservation Organization (NASCO) - an inter-governmental organization devoted to the conservation, restoration, enhancement and rational management of salmon. In order that this Organization can continue to take effective diplomatic action against the Governments whose flags are being used, detailed information on the scale of the problem is required. All information, no matter how trivial it may seem, may be useful. If any of the vessels listed above call at your port or if other vessels are suspected of fishing for salmon in international waters please contact the relevant national coastguard authority as a matter of urgency:

Your assistance in cooperating to eliminate this problem is greatly appreciated.

DRAFT PRESS RELEASE ON FISHING FOR SALMON IN INTERNATIONAL WATERS

International measures to prevent fishing in international waters have recently been agreed in order to safeguard stocks of Atlantic salmon in the North-East Atlantic. These measures include improved airborne surveillance and the possible use of military radar systems.

Since 1990, coastguards and fishery protection agencies in Iceland, Norway, Faroe Islands and Scotland have discovered a number of vessels which had been fishing for salmon in international waters north of the Faroe Islands. These vessels, previously registered in Denmark, had been reflagged to Poland or Panama so as to avoid an internationally agreed prohibition on fishing for salmon beyond fisheries zones.

The measures to counter this fishery are being coordinated by the North Atlantic Salmon Conservation Organization (NASCO), an inter-governmental Organization with Canada, Denmark (in respect of the Faroe Islands and Greenland), the European Union, Finland, Iceland, Norway, Russia, Sweden and USA as members. NASCO has estimated that catches from this fishery may have been as high as 350 tonnes. Given the concern about the wellbeing of wild salmon stocks, catches of this order threaten to undermine the strict domestic and international conservation measures which have been adopted in recent years in order to arrest the decline in abundance. NASCO has taken diplomatic action to ensure that this fishery is eliminated and these new measures aim to improve the coordination and scope of surveillance operations. The success of the diplomatic effort depends on having accurate and detailed surveillance information. Even apparently trivial information has been useful in the past including information obtained in ports and NASCO and the Coastguard authorities would be grateful for any information in relation to this problem. The coastguard authorities may be contacted at the addresses below:

DRAFT GUIDELINES FOR INTERNATIONAL COOPERATION ON THE EXCHANGE OF INFORMATION CONCERNING FISHING FOR SALMON IN INTERNATIONAL WATERS

BACKGROUND

Since 1989 the North Atlantic Salmon Conservation Organization (NASCO) has received reports that vessels originally registered in Denmark have reflagged to Panama or Poland and have been fishing for salmon in international waters. Under the Convention for the Conservation of Salmon in the North Atlantic Ocean, under which NASCO was established, fishing for salmon beyond areas of fisheries jurisdiction is prohibited and the reflagging to countries which are not signatories to the NASCO Convention is a mechanism used by Danish fishermen to avoid this prohibition. Such fishing threatens to undermine national and international conservation measures and NASCO has taken diplomatic action to eliminate the problem. In order that the scale of such fishing can be adequately assessed detailed surveillance information is essential. However, the area of international waters is large and resources scarce so maximum use must be made of each piece of surveillance information available. It is essential that all agencies are alerted to the presence of vessels operating in international waters. Timely and detailed surveillance information will also enable effective diplomatic action to be taken. The guidelines below, which arose from the recommendations of a meeting of Coastguards and the NASCO Secretariat and which were endorsed by the Council of NASCO, should maximise the utility of the information obtained.

SOURCES OF INFORMATION

1. All information in relation to the problem of fishing for salmon in international waters, no matter how trivial it may seem, may be of value.

2. Information has in the past been obtained from airborne surveillance, surveillance at sea, harbour records and interception, by chance, of radio traffic. It is possible that further information may be available through military and other sources. All possible sources of information should be explored.

3. Efforts should be made to inform port authorities and to increase public awareness of the problem and of the need to advise the coastguard authorities of any relevant information no matter how insignificant it may seem. NASCO will from time to time prepare press releases and other information sheets concerning the problem.

4. Coastguard authorities should make a specific effort, as resources permit, to improve the extent of salmon-related surveillance. Salmon fishing can be conducted over large geographical areas (66-72° and 5°-6°E) and in many months of the year (October - June) and whenever possible surveillance should be conducted accordingly.

5. Attempts should be made to improve the coordination of airborne surveillance so that duplication of effort by the different national coastguard authorities is avoided.

NATURE OF INFORMATION

6. Information obtained from airborne surveillance is the primary source of information concerning the time and place of fishing, method used and details of the vessel involved (name and registration number if displayed). Whenever possible,

photographs of the vessels should be taken showing the vessel's name and if possible the gear in use. The photographs should also record the date and location of the fishing. Such documentary evidence is valuable in support of diplomatic initiatives.

7. More detailed information has in the past been obtained from surveillance (and boarding) at sea and from ports. Inspection of vessels within economic zones may be conducted, particularly if fishing gear is visible on deck, and certainly if the vessels enter port. During such inspections every effort should be made to obtain as much information as possible including:

(a) Details of vessel (name, registration details, owners, details of crew) and, if possible, copies of registration certificates and other documentation;
(b) Details of fishing trip (duration of trip, area of fishing, home port, ports of call);
(c) Details of fishing method (type of gear, number of units fished or to be fished);
(d) Details of catch (tonnage caught, number of salmon, biological characteristics of catch if possible (including length of fish, weight of fish and scale samples);
(e) Details of where it is intended to land the catch.

EXCHANGE OF INFORMATION

8. It is important that all Parties are made aware of surveillance information received by national Coastguard authorities with minimum delay, and that this should then be transmitted without delay to the relevant national salmon management authorities and to:

Secretary
NASCO
11 Rutland Square
Edinburgh
EH1 2AS
UK
Tel: +44(31)228 2551
Fax: +44(31)228 4384

9. The Secretary of NASCO will transmit the information immediately upon receipt to all relevant Coastguard authorities in the North-East Atlantic area and to all Heads of Delegations of NASCO member Parties. In this way the relevant authorities will be alerted to the problem and further surveillance may be coordinated so as to improve the information obtained.

10. A review of the information available will be submitted to the Council of NASCO at its Annual Meetings. This information will also be presented at future meetings of NASCO and the Coastguard authorities. In addition, updated information on the problem will be prepared by NASCO for distribution to the relevant port authorities.

ANNEX 18

COUNCIL

CNL(94)28

REPORT OF THE WORKING GROUP ON IMPACTS OF SALMON AQUACULTURE

CNL(94)28

REPORT OF THE WORKING GROUP ON IMPACTS OF SALMON AQUACULTURE

1. At its Tenth Annual Meeting the Council set up a Working Group to review the impacts of aquaculture on wild stocks with the aim of advising how salmon aquaculture "can be conducted in a way that is designed to remove adverse impacts on the wild stocks". The Working Group held two meetings (November 1993 and February 1994) at which there was representation from the salmon farming industries in most North Atlantic countries. The meetings were productive and there was an excellent spirit of cooperation.

2. The report of the Working Group is attached. The Council will be asked to consider the report and in particular to decide what action it will take regarding the Conclusions and Recommendations.

3. One of the main recommendations is that the Council adopt an international agreement which is designed to minimise the impacts from salmon aquaculture on the wild stocks. The Council will be asked to consider this agreement (Appendix 3) with a view to its adoption.

4. The potential genetic, disease and parasite and other damage to the wild stocks is not proven but the risks are high. The advice from the scientists to the managers is to act now on the basis of the information currently available since by the time that any impacts are proven it will be too late to reverse the damage. In such a scenario the use of the recent UN deliberations on the Precautionary Approach might be considered highly appropriate. In this respect a brief report on the Precautionary Approach is presented separately in paper CNL(94)35.

Secretary
Edinburgh
14 April 1994

CNL(94)28

REPORT OF THE WORKING GROUP ON IMPACTS OF AQUACULTURE

WALDORF HOTEL, LONDON
18-19 NOVEMBER 1993 AND 8-10 FEBRUARY 1994

1. INTRODUCTION

1.1 The Chairman, Dr Malcolm Windsor (Secretary of NASCO), opened the meeting and welcomed delegates to London. He briefly described the work of NASCO and referred to the need for cooperation between the aquaculture industry and those involved in managing the wild stocks so as to safeguard the resource in accordance with recent international agreements. Such action would be in the long-term interests of the industry since the wild stocks form a vital genetic bank. He suggested that the fact that there would be international agreement on measures would also be helpful to the salmon farming industry. He indicated that NASCO had spent considerable time reviewing the impacts of aquaculture on the wild stocks. While there may have been some beneficial effects, the Council had agreed that there was enough evidence of a reasonable risk of negative impacts to justify taking precautionary action, since if we waited to find out with certainty whether there were adverse impacts it would be too late, the damage would have already occurred. The Chairman stressed the need for the meeting to concentrate on the practical measures that might be taken to address these impacts.

1.2 Opening Statements were made by the representatives of Canada, Denmark (in respect of the Faroe Islands and Greenland), the European Economic Community, Finland, Iceland, Norway, the Russian Federation, Sweden and the United States of America.

1.3 A list of participants is given in Appendix 1.

2. ADOPTION OF THE AGENDA

2.1 The Working Group adopted its agenda, IAQ(93)1, (Appendix 2).

3. CONSIDERATION OF TERMS OF REFERENCE OF THE WORKING GROUP

3.1 At its Tenth Annual Meeting the Council of NASCO agreed to the following terms of reference for the Working Group:

(i) to consider, in active cooperation with appropriate interests, how salmon aquaculture (including salmon cage rearing and sea ranching), can be conducted in a way that is designed to remove adverse impacts on the wild stocks;

(ii) to report their findings to the NASCO Secretariat no later than 15 April 1994 so that full consideration to the matter can be given at the 1994 Annual Meeting.

3.2 The Working Group agreed that, in accordance with the agenda for the meeting, the terms of reference should be interpreted as including consideration by the Group of the possible mechanisms by which its recommendations could be implemented by the Parties on the recommendation of the Council of NASCO.

4. REVIEW OF THE POTENTIAL IMPACTS ON WILD STOCKS

4.1 The Working Group considered the potential impacts of salmon aquaculture on the wild stocks. Two review papers were tabled, IAQ(93)3 and IAQ(93)9. A paper containing definitions of the various forms of aquaculture, i.e. salmon farming, ranching and enhancement, was also tabled, IAQ(93)5. In recent years there has been a rapid expansion in salmon aquaculture with the development of salmon cage farming. This industry had a production in 1992 of approximately 220,000 tonnes, fifty-five times the harvest of wild salmon. There is also growing interest in salmon ranching in a number of countries although development of commercial ranching is presently restricted to Iceland, where approximately 6 million smolts are released annually. Salmon of farmed origin occur in the marine feeding grounds, in fisheries in marine and freshwaters and on the spawning grounds, giving rise to concern about possible genetic, ecological and disease and parasite interactions. In addition, concern has been expressed about the possible impacts of wastes produced by, and medicines and disinfectants used in, intensive aquaculture in both freshwater and marine environments, although NASCO had been advised by ICES that the main concerns relate to genetic threats and to disease transfer. There is also a risk of increased levels of exploitation on the wild stocks in fisheries enhanced by ranched fish or fish farm escapes. Some of the impacts of aquaculture are local in nature, but others are international in that they affect the fisheries and stocks of other countries. While further research is needed to improve understanding of the impacts the advice from the scientific community urges managers to adopt a cautious approach and to act on the information currently available.

4.2 During discussions, industry representatives referred to the benefits to the wild stocks from salmon farming including improved knowledge of certain aspects of the biology of the salmon and possible impacts on levels of exploitation of the wild stocks. In recent years, furunculosis vaccines have been developed and industry representatives stated that the major diseases of farmed salmon are now under control. Furthermore, it was stated that while in the past the salmon farming industry in some countries had released surplus parr and smolts to the wild, this practice no longer occurs. The Working Group recognised the need for further research and the Chairman referred to new questions on the impacts of aquaculture which had been posed to ICES by NASCO for response in 1994.

5. TECHNICAL, BIOLOGICAL AND MANAGEMENT MEASURES TO MINIMISE IMPACTS ON WILD STOCKS

5.1 The Working Group considered a review of possible measures which might be used to minimise the impacts of aquaculture on the wild stocks, IAQ(93)4. Since some of the measures addressed impacts of a similar nature the Working Group agreed to group them rather than consider each separately as shown on the agenda. There was a full and valuable discussion of these measures and the main points emerging are summarised below.

Site selection, separation distance between aquaculture units, stocking density and fallowing

5.2 The NASCO Guidelines refer to the need to conduct a detailed site survey before approval to develop a site for aquaculture is granted. Careful attention to site selection may reduce escapes and the impact of wastes on the environment and may therefore offer benefits to the farmer in terms of maintaining fish health. The Guidelines also recommend that careful attention be paid to separation distance and stocking density, and that measures should be taken to minimise deterioration of the aquatic environment.

5.3 The Working Group discussed the procedures that must be adhered to before a licence to conduct aquaculture is granted. In most countries a detailed environmental assessment must be carried out before a licence is issued although in some cases such an assessment may only be required for large developments. Some concern was expressed about the impact of smolt rearing in freshwater since even a large smolt rearing facility has a relatively small production but may be located in an environment sensitive to nutrient enrichment. The view was expressed that many of the site selection criteria were intended to protect the aesthetic aspects of the site as well as water quality but did not take sufficient account of the need to safeguard the wild salmon stocks. Furthermore, while site selection procedures may have helped to reduce the impact on the environment, more could be done with regard to siting so as to minimise the impacts. A site which is favourable from the point of view of maintaining water quality may be more at risk from physical damage with a consequent risk of fish escaping, so technical measures such as appropriate cage design for the environment concerned should also be considered. In some countries the farming industry is developing offshore and the question was raised as to whether, from the point of view of protecting the wild stocks, it would be less damaging if fish that escape were widely dispersed rather than concentrated in a small number of rivers. However, it is not clear what the implications for the wild stocks may be of the development of salmon farming offshore. The Group agreed that there was a need to formulate specific measures or guidelines on site selection designed to protect the wild stocks. Such provisions would be complementary to measures concerned with the containment of farmed fish. However, industry representatives indicated that, in future, development of the salmon farming industry might be through more efficient practices leading to increased production at existing sites rather than through development of new sites.

5.4 Minimum separation distances between aquaculture operations have been established in a number of countries in order to reduce impacts on water quality and to reduce the potential for transmission of diseases and parasites. The view was expressed that the recommended separation distances may not have evolved as rearing technology has changed, and that there might, therefore, be a need to reassess these distances. In recent years the farming industry has moved towards lower stocking densities in order to reduce disease and parasite problems and to produce a higher quality product. The technique of fallowing, in which a site is left free from production for a period of time in order to allow recovery of the environment in the vicinity of the rearing units and to break the cycle of disease and parasitic agents, was discussed. A review paper, IAQ(93)15, describing favourable results of fallowing in salmon farming in Ireland, was presented. In Norway fallowing of sites is obligatory following serious disease

outbreaks. However, the technique may not be feasible or necessary in all situations. Single bay management, in which the treatment of diseases and parasites at all farms in a particular water body is coordinated, had also had benefits in terms of fish health. A review of this management strategy was tabled by the Irish Salmon Growers Association, IAQ(93)14.

5.5 The Working Group agreed that there was a need to develop general principles concerning site selection, stocking density, fallowing and separation distances, which could be applied at individual sites, by the appropriate national authorities.

Broodstock selection and management

5.6 Initially, the genetic diversity present in the wild allowed the developing salmon farming industry to select stocks with favourable attributes and in some cases selection has resulted in improvements in certain traits. Both the NASCO Guidelines and the NAC Protocols contain elements concerning broodstocks for release to the wild. These include the use of local stocks; selection of broodstocks which are representative of the donor stock; use of a minimum of 100 parents used in single paired matings, etc. In the case of salmon farming the NASCO Guidelines encourage the use of local stocks, wherever possible, but it is recognised that the industry has developed strains which offer economic and husbandry benefits. In some cases, for example selection for disease resistance, there may be indirect benefits to the wild stocks arising from the use of such strains by the industry. One view expressed was that, if the industry utilised a breeding programme with a high degree of selection, it may render the farmed salmon less fit for survival in the wild and therefore offer some protection against interbreeding.

5.7 Where carefully controlled breeding programmes have been undertaken by the industry the genetic variability present in the original stock may be maintained. However, the Group was advised of incidents where escaped fish with low genetic diversity were found to enter rivers containing wild stocks. In some cases the salmon farming industry utilises salmon stocks from other countries but even where local stocks are used genetic changes may be introduced in establishing a broodstock. The importance of careful sampling of the wild stocks and of using adequate numbers of parents as broodstock was stressed. The Working Group recognised that a requirement to utilise local wild stocks in salmon farming might create serious economic and husbandry problems for the industry, and in that case efforts should therefore focus on containment measures, both biological (use of sterile fish) and physical (minimising escapes) so as to protect the wild fish. The genetic diversity present in these stocks may be required for aquaculture in future if problems occur with the strains currently in use. The need to develop appropriate recommendations to ensure containment of farmed fish was recognised. In the case of enhancement the Group recognised the desirability of using stocks of local origin, i.e. stocks from the same river or a neighbouring river, as recommended in the NASCO Guidelines.

Sea cage design and use of land-based facilities

5.8 Total containment in salmon farming is only possible in land-based facilities utilising appropriate security systems and screening devices. In freshwater both land-based units and cage systems in lakes are used to produce fish to the smolt stage but the on-

growing to harvestable size in marine waters is predominantly conducted in cage units. These units involve low capital investment but escape from such units is considered inevitable. The Working Group recognised that it would be uneconomical under present conditions for the salmon farming industry to transfer to on-growing in land-based units.

5.9 The Working Group discussed the factors responsible for loss from rearing facilities. In the North-East Atlantic escapes occur as a result of cage damage, "trickle mortality" (i.e. small-scale but relatively frequent losses during grading, transfer to sea cages, net changes, treatment of fish, harvesting etc.) and other factors such as predator damage. It is believed that approximately half of the losses are through storm damage to cages, and inadequate moorings had been identified as a problem area in some countries. In Norway escape from freshwater units is believed to be negligible although escape at this stage may occur in other countries and the need for careful design of freshwater sites was recognised. In the North-West Atlantic the main source of escapes is damage to cages in the sea caused by predators, principally grey and harbour seals. In the US, the use of heavy moorings similar to those used in the oil industry means that storm damage is not considered to be a problem.

5.10 In recent years advances have been made in cage design in a number of countries in response to more stringent Health and Safety Regulations and insurance requirements. In Norway, a contained floating sea-based facility is being developed. Minimising the number of fish escaping to the wild is clearly in the interest of the salmon farming industry since insurance premiums are based on production performance. The Group was advised that, in Norway, technical inspection of farms has contributed to a reduction in the number of salmon escaping from 2 million in 1991 to approximately 500,000 in 1992. However, sampling in Norwegian rivers at spawning time had shown that farmed fish still accounted for 24-38% of fish sampled. The Working Group recognised the scope for improvements to be made in reducing escapes from salmon farms through choice of site and appropriate technology, developments in cage design, technical inspections and careful operation of the site. Given the present economic climate facing the industry, limited resources would be available for investment in new equipment but it was agreed that recommendations should be formulated regarding methods of reducing losses during routine operations and with regard to requirements for technical inspections in both freshwater and marine environments.

5.11 The Working Group discussed the possibility of establishing target levels for escapes, but different opinions were expressed concerning their value. Such targets are being considered on a short term basis in Norway. The objective of both the farming industry and managers of the wild salmon is to have zero escapes. However, it was recognised that with the present technology used by the industry escapes were inevitable and while these could be reduced other measures to protect the wild stocks, such as broodstock selection, use of sterile fish or efforts to recapture such escaped fish, would probably be needed. Attempts have been made to recapture escaped farmed salmon in a number of countries but this has proved to be difficult. The need to avoid mortality of wild stocks in any gear set for escapes from salmon farming was stressed.

Sterile fish

5.12 The use of sterile fish is recommended in the NASCO Guidelines and is a requirement of the NAC Protocols for farming and ranching of salmonids in the vicinity of Class 1 rivers. The use of sterile fish could mark a major step forward in eliminating genetic interactions and may offer the farming industry the benefit of flexibility of harvesting since grilsing is eliminated. A number of techniques exist by which Atlantic salmon may be rendered sterile and these were reviewed, IAQ(93)11. A report of a workshop held in Dartmouth, Nova Scotia on methods for the production of non-maturing salmonids was also made available to the Group.

5.13 The only technique presently available for use on a commercial scale is the production of all-female triploid salmon. These fish have an additional set of chromosomes which results from pressure, heat or anaesthetic shock applied to fertilised eggs. The highest triploid yields have been obtained using the pressure shock treatment. During the late 1980s this technique was used in the Scottish salmon farming industry but the fish were found to grow less well than maturing diploid fish (although they grew as well as non-maturing diploid fish) and they appeared to be more susceptible to some diseases and suffered from cataract formation. In addition there had been adverse publicity in the press concerning the use of such fish creating fears about the marketability of the product, although all-female, and to a limited extent all-female triploid, rainbow trout are widely used by the UK trout industry. However, interest in the use of sterile salmon in Scotland has declined and the problem of maturation has been addressed by other means including breeding programmes aimed at producing low grilsing stocks. Trials with triploid fish are being conducted in Canada and Ireland. Documents describing research on sterilisation of Atlantic salmon in Canada, IAQ(93)18, and the status and future development of sterile salmonids in Norway, IAQ(93)19, were tabled. Another technique with potential in commercial aquaculture is the immune control of maturation. It is anticipated that a vaccine may be available in the next 2-3 years which would generate a reaction to the hormones controlling maturation.

5.14 There is some evidence to suggest that in the absence of maturation sterile fish may not enter freshwater. While this would offer protection to the wild stocks from genetic interactions the Group recognised the need for a better understanding of the behaviour and ecological interactions of sterile fish in the wild. The Working Group was advised of a research proposal developed by Scottish, Irish and Norwegian scientists which has been submitted for funding to the European Commission. This proposal aims to investigate the environmental impact of triploid fish together with various aspects of their performance.

5.15 The Group held a wide-ranging discussion on sterile fish because of the potential of this technique to eliminate interbreeding between reared and wild fish. With regard to the acceptability by the industry of changing to sterile fish it would help greatly in bringing in such a change if research was able to demonstrate that not only were there benefits to the wild stocks but that there were also benefits to industry, or at least no disadvantages. The Group considered that this aspect should be taken into account in formulating new research. Nevertheless, even if the technique leads to somewhat more expensive production methods for farmed salmon the Group, with one reservation, felt that it might well be justified in protecting the wild stocks. It is vital

that the salmon farming industry in any one North Atlantic country should not be disadvantaged in its competitive status, so any regulation on the use of sterile fish that led to a more expensive product should be introduced throughout NASCO countries. Under such conditions the industry might find it acceptable. There are other countries producing farmed salmon outside the North Atlantic and which are not members of NASCO, e.g. Tasmania and Chile. It would, of course, be desirable if those countries also adopted the same measures to use sterile fish but since they have no indigenous wild salmon to protect they might be expected to resist such a change. Although this would be regrettable it would not alter the view that there must be progress in North Atlantic countries to protect their wild stocks and that the use of sterile fish should be further evaluated in this regard.

5.16 The Group was also aware of the fact that there had already been some adverse publicity in the media in relation to triploid fish. The Group felt that if this occurred again in future there would be a need to defend the use of such fish as a contribution to the conservation of wild resources. The industry is understandably concerned with the potential negative market reaction to triploid fish without careful prior evaluation. However, in the light of the many other successful food products that had been modified from the natural product, it did not seem likely that this would prove an insurmountable problem.

Low pollution feeds

5.17 Feed is a major component of the cost of intensive aquaculture and it is therefore in the industry's interest to minimise waste through careful attention to the timing and amount of feeding. Overfeeding may result in incomplete digestion with an increase in faecal production and in waste feed settling below the cages.

5.18 Industry representatives advised the Working Group that in recent years the use of high energy feeds had resulted in improvements in food conversion ratios from 2:1 to 1.2:1 or in some cases lower and that farms which did not pay very careful attention to feeding regimes would go out of business quickly in the present economic climate. Nevertheless, concern was expressed about the possible impacts of wastes from fish farms on freshwater and marine environments.

Areas for the protection of wild salmon

5.19 Areas where salmon aquaculture is restricted or prohibited have been established in a number of countries in an attempt to safeguard the wild stocks from influx of escapes and to prevent transmission of diseases and parasites. There was support for the concept of such areas although the need for careful consideration of the size of the areas was recognised. Furthermore, research has shown that escaped farmed salmon can still occur in rivers "protected" by such areas although experience indicated that the incidence of escaped salmon was reduced in rivers afforded this protection. In some cases aquaculture facilities existing prior to designation of the areas were allowed to continue production within such areas but limits were placed on further expansion of these sites.

5.20 It was reported that in some countries expansion of the salmon farming industry would be by further development of existing sites rather than by selection of new sites and

the utility of such areas for restricting the development of new sites may therefore be limited.

5.21 The Working Group discussed the concept of what constitutes an important salmon river. The Group members recognised that each salmon river contained a unique stock and so all rivers should be considered to be important, irrespective of their size, and efforts should therefore be made to ensure their protection. Rivers with small stocks may be more vulnerable to the impacts of aquaculture.

Monitoring measures

5.22 The NASCO Guidelines recommend that a proportion of farmed stocks could be tagged to enable ease of identification in the event of escape. Tagging would also enable those farms suffering large or recurring losses to be identified and could facilitate the separation of escaped farmed salmon and wild fish for example at hatcheries used for enhancement programmes. In Iceland, approximately 300,000 smolts are micro-tagged annually in the ranching industry and fin-clipping has been used in the farming industry in some countries. The Working Group discussed the benefits of tagging reared fish and agreed that it might provide a useful means of assessing the effectiveness of measures designed to prevent escapes. Industry representatives indicated that if the cost of such a programme was reasonable, then it may be acceptable to the industry. The increasing use of vaccines by the farming industry might facilitate micro-tagging and there may be benefits to the industry in terms of allowing identification of stolen fish and for control of numbers should quotas be introduced by producer organizations in the future. Tagging, particularly micro-tagging, offers advantages over fin-clipping or pigment identification in that it would allow the source of escapes to be traced to individual farms which could then be advised of appropriate technical measures to reduce escapes. The need for recommendations on the proportion of fish to be tagged was recognised. One view expressed was that it would be necessary to tag a high proportion of fish, particularly with regard to assessment of trickle mortality. Useful information on the spawning success of farmed salmon had, in the past, been obtained by pigment analysis.

Release and recapture of sea ranched fish

5.23 The genetic impacts of ranched fish on the wild stocks and the possible over-exploitation of wild fish in mixed stock fisheries because of increased fishing effort supported by reared fish is of concern. The Working Group discussed the status of ranching within the North Atlantic. Commercial ranching has only been developed in Iceland. A ranching strain has been developed at Kollafjordur which has higher growth rate, reduced levels of early maturation, reduced straying and higher return rates than wild fish. Concern was expressed about the use of selection in ranching but it was stated that the use of wild fish would result in increased straying and in considerable financial difficulty for the industry. In Norway, there is no commercial ranching at present but research is taking place and ecological and genetic guidelines have been developed and if ranching did develop there would be a requirement to use local stocks. In Ireland, ranching experiments are being conducted in a number of rivers where the performance in terms of return rate and straying of indigenous and non-indigenous stocks is being assessed. The Working Group recognised the desirability of using local stocks in ranching programmes and the need to ensure that

wild stocks were not subject to exploitation in gear designed to harvest ranched fish. Concern was expressed by salmon farming interests about the possible transmission of disease to farm stock from ranched fish if they migrate past cage facilities.

Other measures

5.24 The NASCO Guidelines recommend immediate notification of escapes so that appropriate action such as emergency netting may be undertaken. The Working Group reviewed the procedures in the event of escapes. In many, but not all, countries, there is a mandatory obligation to report escapes from fish farms. However, concern was expressed that small escapes, which in the North-East Atlantic may make up 50% of escapes, may not be reported. Emergency netting of these small-scale escapes is not feasible. The need to identify the sources of "trickle" mortality so they can be addressed by appropriate measures was recognised.

5.25 Concern was expressed by some delegates about the possible discharge of medicines and disinfectants used in aquaculture to the environment. Representatives of the industry indicated that the development of vaccines has had an impact on the amount of medicines used but the need to consider appropriate mechanisms to protect against the effects of medicines and disinfectants was referred to by some delegates. In Norway, sea-lice were a serious problem in caged stocks, particularly during the summer of 1992. A programme has now commenced aimed at treating all farms in a given area at the same time and when the lice are in the early life-history stages. There is also concern about the possible adverse effects of sea-lice on wild salmonids in other countries, particularly in Ireland. The need for effective and coordinated treatment of sea-lice was stressed.

5.26 The need for efficient screening of inflows and outflows from fish farms was recognised, together with measures to maintain water quality during passage through rearing units.

6. POSSIBLE MECHANISMS FOR IMPLEMENTING THE RECOMMENDATIONS OF THE WORKING GROUP

6.1 At its first meeting, the Working Group considered a Protocol to the Convention for the Conservation of Salmon in the North Atlantic Ocean Regarding Impacts from Aquaculture and Sea Ranching on Wild Salmon Stocks, IAQ(93)8, tabled by Norway. The Chairman indicated that as this raised international legal issues he proposed to consult with the Parties in order to seek their approval to proceed with developing the concept of a Protocol but asked the members of the Working Group for an initial reaction to the document. The Protocol was welcomed by all Parties as a useful initiative in focusing the discussions of the Group. Some concerns were expressed about detailed provisions of the Protocol, about the need for clarification of some of the terms used and about the need to consider the relationship with the North American Commission's Protocols on the Introduction and Transfer of Salmonids.

6.2 At its second meeting, the Chairman advised the Working Group that, following consultation with the Parties, there was agreement for the Group to proceed with developing the concept of the Protocol. A revised draft Protocol, IAQ(93)16, was, therefore, tabled by Norway. This revision had taken into account the comments

received at the first meeting. Furthermore, references in the Annex to the NASCO Guidelines had been removed.

6.3 The Working Group discussed a number of possible mechanisms by which it might make its recommendations to the Council. It would be possible to provide the Council of NASCO with a list of options. However, the Working Group agreed that the work of the Council would be simplified if a single mechanism could be recommended. While most Parties in the North-East Atlantic Commission area were able to support the concept of a Protocol, the North American Commission had already adopted Protocols on Introductions and Transfers and the members of this Commission did not, therefore, favour a second Protocol. The Working Group expressed appreciation to the Norwegian delegation for their work in preparing the Protocol and decided that the concepts in the document could be most effectively and quickly implemented by an Agreement made under a Resolution of the Council. The mechanism for implementation should ideally be an Atlantic-wide initiative rather than restricted to the North-East Atlantic Commission and should consist of a statement of principles contained in an Agreement together with practical measures contained in an Annex to the Agreement. The NASCO Council, if it accepted the Agreement, could then adopt it by a Resolution which might also contain some of the principles. The Working Group agreed to develop a draft Agreement based on the structure of the draft Protocol tabled by Norway.

6.4 The Working Group also discussed whether the measures should apply to salmon aquaculture or salmonid aquaculture. It was recognised that there may be adverse impacts to salmon stocks from aquaculture involving salmonid species other than Atlantic salmon but it was agreed that, in accordance with the Terms of Reference for the Group, the measures agreed should refer to salmon aquaculture. The Working Group recognised that aquaculture involving other salmonid species could have an impact on the wild salmon stocks and the measures contained in the Agreement might also be relevant to these aquaculture operations.

7. POTENTIAL EFFECTS ON THE SALMON AQUACULTURE INDUSTRY OF ADOPTING NEW PRACTICES TO REDUCE IMPACTS TO WILD STOCKS

7.1 Representatives of the salmon farming industry indicated that they wished to see a successful industry with a good image and were therefore pleased to have contributed to the dialogue. However, they would need to assess the economic implications of any proposed measures given the investment already made in environmental issues and the current financial difficulties facing the industry. One view expressed was that the present period of low prices offered protection to the wild stocks since the industry could no longer tolerate loss of stock and poorly managed sites would no longer be competitive. The Chairman asked the industry representatives to try to develop a unified response to the ideas which had been discussed at the meeting.

7.2 At the second meeting the Chairman asked the industry representatives for an initial reaction to the deliberations of the Group. Industry representatives indicated that they were keen to cooperate. They stressed that they were working in a competitive environment and that measures would be more likely to be acceptable if they could be imposed without financial hardship and that many measures had already been introduced at considerable expense over the last ten years. Concern was expressed

about the possible marketing aspects of triploid salmon. One view expressed was that the industry could accept some financial burden provided it applied to their competitors. In subsequent discussion the point was also made that the wild fish represented a very valuable resource which must be protected even if there are costs.

8. CONCLUSIONS AND RECOMMENDATIONS

General

8.1 The Working Group recognises that there has been considerable progress in the techniques for salmon farming and that the companies which make up the salmon farming industry have every incentive to prevent their fish escaping and to prevent outbreaks of diseases and parasites. Nevertheless the Group believes that the number of fish escaping and the siting of some aquaculture units means that the subsequent risks to the wild stocks are still at a level that gives rise to real concern. This leads the Group to the view that present actions have been insufficient to adequately address this problem. The Working Group has, therefore, formulated a number of recommendations and conclusions.

Measures

8.2 The Working Group is of the view that there are four major areas where progress should be made:

- An improvement in the present standards of physical containment achieved by salmon farming units. This is the single most important measure in the short term as it will have an immediate effect on the level of escapes. The Working Group urges that attention be given, in all North Atlantic countries which have salmon farming facilities, to further improving the standard of containment so that the number of fish escaping can be significantly reduced.

- Aquaculture units can represent a source of diseases and parasites and improvements in the prevention and control of diseases and parasites should be a priority for all North Atlantic countries which have salmon aquaculture facilities.

- The use of 'areas for the protection of wild salmon' in which salmon aquaculture is restricted or prohibited is an important concept which the Group believes should be further assessed and introduced where appropriate.

- The use of sterile fish in aquaculture should be investigated further as a matter of urgency as it may offer new opportunities to eliminate genetic interactions. The Working Group recommends that the Council of NASCO evaluates the situation annually, in the event of new information being available, with a view to the Parties considering implementing thereafter the use of sterile fish by the salmon farming industry provided that no adverse impacts are shown.

Mechanisms

8.3 The Working Group gave much consideration to the mechanisms by which progress can be made in minimising the impacts of aquaculture on the wild stocks. There were some Parties that could accept, as a way forward, a Protocol to the NASCO Convention with a ratification procedure. However, there was unanimous support for the idea of an Agreement containing both a set of principles and practical measures designed to minimise the impacts. The implementation of the Agreement would be by action of the Parties in accordance with the principles laid down in the Agreement. The Working Group recommends this approach because:

- the Agreement ensures that the salmon aquaculture industry throughout the NASCO Convention area will operate under similar principles with no competitive advantage or disadvantage to the industry in any one country;

- the Agreement can be adopted quickly by a Resolution of the Council followed by action, as necessary, by the Parties;

- the Agreement as drafted represents a strengthening and updating of the NASCO Guidelines which could then be dispensed with;

- the Agreement can be updated readily in the event of progress in research and development.

8.4 The Working Group therefore recommends that the Council adopts the Agreement contained in Appendix 3 of this report, or a modification of it as it shall decide, by a Resolution which should itself re-state the principles involved.

8.5 The Working Group considered the need for another provision in the Agreement which would establish an international mechanism for informing the Parties of any major event in the aquaculture facilities of one Party which could have an impact on the wild salmon stocks of another Party. Some members of the Group would have liked to have such a provision included although others were not convinced that it was useful. The wording of the possible addition, which would be to paragraph 5 of the Agreement, is as follows:

"The Parties shall inform the Organization, on a timely basis, of the incidence of large-scale escapes and of major outbreaks of diseases and parasites which have originated in aquaculture facilities and which could affect the wild salmon of another Party".

Other salmonid aquaculture

8.6 In the light of the fact that other forms of salmonid aquaculture, such as for rainbow trout and for Arctic char, could also have an impact on wild salmon stocks, the Group suggests that the Council considers whether an agreement similar to the one in Appendix 3 might be suitable, after consultation with relevant interests, for use in relation to these other forms of aquaculture.

9. OTHER BUSINESS

9.1 There was no other business. The Chairman thanked all participants for a very constructive meeting which had been conducted in an excellent spirit of cooperation. He expressed particular thanks to the representatives of the salmon farming industry for their valuable contributions to the work of the Group.

Appendix 1

IMPACTS OF AQUACULTURE MEETING
WALDORF HOTEL, LONDON, UK
18-19 NOVEMBER 1993
8-10 FEBRUARY 1994

LIST OF PARTICIPANTS

* Denotes Head of Delegation

CANADA

*DR ROBERT H COOK	Department of Fisheries and Oceans, Halifax, Nova Scotia
DR JOHN ANDERSON	Atlantic Salmon Federation, St Andrews, New Brunswick
DR GERRY FRIARS	Atlantic Salmon Federation, St Andrews, New Brunswick
DR JOHN RITTER	Department of Fisheries and Oceans, Halifax, Nova Scotia
MR DANIEL STECHEY	Department of Fisheries and Oceans, Ottawa, Ontario

DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

*MR SOFUS POULSEN	Faroese Commercial Attaché, Aberdeen, UK

EEC

*MR ERNESTO PENAS	Commission of the European Communities, Brussels, Belgium
MR JOHN BROWNE	Department of the Marine, Dublin, Ireland
MR DAVID DICKSON	Scottish Office Agriculture and Fisheries Department, Edinburgh, UK
MS JACQUELINE DOYLE	Department of the Marine, Dublin, Ireland
MR DAVID DUNKLEY	Scottish Office Agriculture and Fisheries Department, Montrose, UK

MR VINCENT EDWARDS	Department of the Marine, Dublin, Ireland
MR TORRENT FERNANDO	APROMAR, (Spanish Marine Farming Association), Pontevedra, Spain
DR PADDY GARGAN	Central Fisheries Board, Dublin, Ireland
MR MARK HELMORE	Irish Wild Fisheries Organization, Co. Clare, Ireland
MR JOHN HORTON	Ministry of Agriculture, Fisheries and Food, London, UK
MRS PAM JARVIS	Ministry of Agriculture, Fisheries and Food, London, UK
DR JOHN R JOYCE	Irish Salmon Growers Association, Dublin, Ireland
MS A MISSA-KERKENTZES	Greek Embassy, London, UK
MR IVOR LLEWELYN	Ministry of Agriculture, Fisheries and Food, London, UK
MR PETER MANTLE	Western Game Fishing Association, Galway, Ireland
MR ADRIAN MCDAID	Permanent Representation of Ireland to the EC, Brussels, Belgium
DR ALAN MUNRO	Scottish Office Agriculture and Fisheries Department, Aberdeen, UK
MR JOHN O'CONNOR	Department of the Marine, Dublin, Ireland
MR TED POTTER	Ministry of Agriculture, Fisheries and Food, Lowestoft, UK
MR GORDON RAE	Scottish Salmon Growers Association, Perth, UK
MR JOSE A SANCHEZ-PRADO	University of Oviedo, Spain
MR JOSE L G SERRANO	Secretaria General, Pesca Maritima, Madrid, Spain
DR JOHN WEBSTER	Scottish Salmon Growers Association, Perth, UK
MR ROBERT WILLIAMSON	Scottish Office Agriculture and Fisheries Department, Edinburgh, UK
MR ALAN YOUNGSON	Scottish Office Agriculture and Fisheries Department, Aberdeen, UK

FINLAND

*MR PEKKA NISKANEN	Ministry of Agriculture and Forestry, Helsinki
MR EERO NIEMELA	Finnish Game and Fisheries Research Institute, Helsinki

ICELAND

*MR ARNI ISAKSSON	Institute of Freshwater Fisheries, Reykjavik

NORWAY

*MR STEINAR HERMANSEN	Ministry of the Environment, Oslo
MR JOHNNY DIDRIKSEN	Head of Aquaculture Division, Ministry of Fisheries, Oslo
MR PER FOLKESTAD	Head of Fish Health Division, Ministry of Agriculture, Oslo
MR KNUT HJELT	Norwegian Fish Farmers' Association, Trondheim
MR SVEIN AAGE MEHLI	Directorate for Nature Management, Trondheim
MR ARNE SIVERTSEN	Directorate for Nature Management, Trondheim

RUSSIAN FEDERATION

*DR ALEXANDER SOROKIN	PINRO, Murmansk
MR GUENRIKH BOROVKOV	Committee of Russian Federation on Fisheries, Moscow
MR VICTOR A KASPRUK	Murmanrybprom, Murmansk
MR VICTOR A NESVETOV	JV Arctic Salmon, Murmansk
MR ALEXANDER ZUBCHENKO	PINRO, Murmansk
MS ELENA SAMOILOVA	PINRO, Murmansk

SWEDEN

*DR INGEMAR OLSSON	National Board of Fisheries, Göteborg
DR LARS KARLSSON	Salmon Research Institute, Älvkarleby

USA

*MR ARTHUR NEILL	National Marine Fisheries Service, Woods Hole, Massachusetts
DR JAMIE GEIGER	US Fish and Wildlife Service, Hadley, Massachusetts
MR FRANK GJERSET	Atlantic Salmon (Maine) Inc., Fairfield, Maine
MR CHRISTOPHER L MANTZARIS	National Marine Fisheries Service, Gloucester, Massachusetts

SECRETARIAT

DR MALCOLM WINDSOR	Secretary
DR PETER HUTCHINSON	Assistant Secretary
MISS MARGARET NICOLSON	PA to the Secretary

NOTE: Not all delegates were present at both Working Group meetings.

Appendix 2

IAQ(93)1

NASCO WORKING GROUP ON IMPACTS OF AQUACULTURE

AGENDA

1. Introduction

2. Adoption of the agenda

3. Consideration of terms of reference of the Working Group

4. Review of the potential impacts on wild stocks

5. Technical, biological and management measures to minimise impacts on wild stocks

   (a) Site selection
   (b) Broodstock selection and management
   (c) Minimum separation distances between aquaculture units
   (d) Design of sea cages
   (e) Stocking density of cages
   (f) Use of sterile fish
   (g) Use of low pollution feeds
   (h) Fallowing of sites
   (i) Use of land-based sites
   (j) Aquaculture-free zones
   (k) Monitoring measures
   (l) Release and recapture of sea-ranched fish
   (m) Other measures

6. Possible mechanisms for implementing the recommendations of the Working Group

7. Potential effects on the salmon aquaculture industry of adopting new practices to reduce impacts to wild stocks

   (a) Financial effects
   (b) Marketing effects
   (c) Management effects

8. Arrangements for second meeting (if required)

9. Report to NASCO Council

10. Other business

WORKING GROUP ON IMPACTS OF AQUACULTURE

IAQ(93)17

AGREEMENT 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 Parties to this Agreement,

NOTING the provisions of the Convention for the Conservation of Salmon in the North Atlantic Ocean of 2 March 1982 (the "Convention"), which seeks to promote the conservation, restoration, enhancement and rational management of salmon stocks;

WELCOMING the achievements in salmon conservation by the Parties to the Convention, within the framework of the Convention, and the role of the North Atlantic Salmon Conservation Organization (the "Organization") therein;

AWARE of the need for cooperation between the Parties in order to maintain and to restore the wild salmon stocks, and promote sustainable conservation and management of such stocks;

RECOGNISING the benefits, including the socio-economic benefits, which have resulted from the development of salmon aquaculture;

BEING CONSCIOUS of the threats to the wild stocks of salmon from different human activities, including possible adverse effects from salmon aquaculture;

DESIRING to minimise the adverse impacts of salmon aquaculture on the wild stocks and noting the earlier initiatives taken by the Organization in this respect;

HAVE AGREED as follows:

ARTICLE 1

Cooperation between the Parties

The Parties shall cooperate in order to minimise possible adverse effects to the wild salmon stocks from salmon aquaculture.

ARTICLE 2

Measures to minimise genetic and other biological interactions

In accordance with Parts 1 and 2 of the Annex to this Agreement each Party shall take measures, to the full extent practicable, to:

Minimise escapes of farmed salmon.

Minimise the straying of ranched salmon.

Minimise adverse genetic and other biological interactions from enhancement activities.

ARTICLE 3

Measures to minimise the risk of transmission
of diseases and parasites to the wild stocks of salmon

Each Party shall take measures to minimise the risk of transmission to wild salmon stocks of diseases and parasites that may exist in salmon aquaculture and shall to this end establish appropriate measures in accordance with Parts 1 and 3 of the Annex to this Agreement.

ARTICLE 4

Research and development

Each Party that is engaged in salmon aquaculture shall develop practices, including research and development as appropriate, which minimise effects on wild salmon stocks and improve the effectiveness of the measures contained in the Annex to this Agreement.

ARTICLE 5

Exchange of information

Each Party shall provide to the Organization, on an annual basis, information of a scope to be determined by the Council concerning the measures adopted under Articles 2 and 3 and the research and development carried out under Article 4.

The Organization shall request from ICES and other relevant scientific organizations appropriate information on the extent of the intermingling in rivers and at sea between wild salmon and salmon of aquaculture origin.

ARTICLE 6

Definitions

For the purposes of this Agreement:

1. "Salmon aquaculture" is the culture or husbandry of Atlantic salmon and includes salmon farming, salmon ranching and salmon enhancement activities.

2. "Salmon farming" is a production system which involves the rearing of Atlantic salmon in captivity for the duration of their life-cycle until harvested.

3. "Salmon ranching" is the release of reared juvenile Atlantic salmon with the intention of harvesting all of them on their return.

4. "Salmon enhancement" is the augmentation of wild stocks in individual river systems by the release of Atlantic salmon at different stages in their life-cycles.

5. "Wild salmon" are salmon which originate naturally and have not been subjected to aquaculture.

6. "Transfer" is the deliberate or accidental transport of Atlantic salmon within their native or natural range.

ANNEX TO THE AGREEMENT

PART 1

GENERAL MEASURES

§ 1. Sites

Sites for salmon aquaculture shall only be assigned where hydrographical, epidemiological, biological and ecological standards can be met. Factors which may be taken into consideration include: availability of water supply and receiving waters for discharge; water quality and exchange, water depth, site protection, separation distances between aquaculture facilities and distance from salmon rivers. Units should be sited so as to avoid the risk of damage by collision with vessels and should be adequately marked.

§ 2. Operations

Aquaculture units should be managed, taking into account established measures to prevent and control diseases and parasites and by taking precautions to prevent the escape of fish.

§ 3. Transfers

Transfers of salmon shall be conducted so as to minimise the potential for transmission of diseases and parasites, and for genetic and other biological interactions. Mechanisms to control transfers should be introduced where necessary.

PART 2

MEASURES TO MINIMISE GENETIC AND OTHER BIOLOGICAL INTERACTIONS

§ 4. Design standards for aquaculture units

Standards and technical specifications should be established for the design and deployment of marine and freshwater aquaculture units. The design of aquaculture units should be appropriate for the assigned site so as to optimise the containment of fish. The risk of escape of fish from aquaculture units as a result of storm or ice damage should be minimised by using appropriate technology for the prevailing conditions. Aquaculture systems, including anti-predator nets and devices, should be routinely inspected, maintained and upgraded as new technological improvements become available. Regular monitoring and the use of efficient security systems are required.

§ 5. Salmon enhancement

Local stocks, i.e. stocks from the same river, or stocks with similar biological characteristics from a neighbouring river with similar ecological conditions, should be used wherever possible for enhancement purposes. In enhancement programmes consideration should be given to: using broodstocks which are representative of the entire spawning run of the donor stock; using broodstocks which comprise at least 100 fish which should be used in single paired matings (where the number of one sex is less than 50 the number of the other sex should be increased to achieve 100 broodfish); using broodstocks which are held in captivity for no more than one generation; avoiding selection of fish with favourable attributes; avoiding the use of escaped farmed fish.

§ 6. Salmon ranching

Local stocks, or alternatively local ranching stocks, shall be used for salmon ranching.

Ranched salmon should be harvested at or close to the site of release or in fisheries managed in such a way as to prevent the overharvesting of the wild stocks.

§ 7. Salmon farming

It is desirable to use local broodstocks for salmon farming where practicable.

Efforts should be made for the efficient recapture of escaped farmed salmon provided that these can be conducted without adversely affecting the wild stocks. Each site

operation should have a site-specific contingency plan in place in the event of an incident involving a large number of escaped fish.

PART 3

MEASURES TO MINIMISE DISEASE AND PARASITE INTERACTIONS

§ 8. Control and prevention of diseases and parasites

All steps in the aquaculture production process from hatchery to processing plant, including transportation of live fish materials, shall be conducted in accordance with appropriate fish health protection and veterinary controls. This includes attention to the application of appropriate husbandry techniques to minimise the risk of disease in the reared stock. These might include vaccination, use of optimal stocking densities, careful handling, frequent inspection of fish, proper diet and feeding regimes, avoidance of unnecessary disturbance of the fish, detailed health inspections, disinfection of transportation equipment and the use of foot baths at production facilities.

Diseased stock should be treated, or removed, and measures should be taken to ensure that such fish are not released to the wild.

§ 9. Stocking density

Aquaculture production should be adapted to the holding capacity of an individual site and not exceed density levels based on good husbandry practices.

§10. Removal of dead or dying fish

Fish which have died and dying fish should be removed immediately from aquaculture production facilities and disposed of, along with waste materials, in an approved manner. Procedures should be established that address the effective removal and disposal of infectious material. Contingency plans should be established for the disposal of mortalities from emergency situations.

§11. Adequate separation

The separation distance between aquaculture facilities at marine sites should be based on a general assessment of local conditions.

§12. Year-class separation

Wherever possible, different generations of salmon should be reared in separate locations.

§13. Fallowing of sites

As local conditions permit, a fallowing regime should be practised wherever possible as a means of minimising outbreaks of disease and parasites.

§14. Use of medicines and disinfectants

Medicines and disinfectants to control diseases and parasites must be used with care and in accordance with the manufacturer's instructions and any Codes of Practice, and in compliance with regulatory authorities.

§15. Lists of diseases

A list of the prevailing infectious diseases and parasites, and the methods in practice for their control, should be maintained by the appropriate authorities.

PART 4

RESEARCH AND DEVELOPMENT

§16. Research, small-scale testing and full-scale implementation should be carried out, as appropriate, in support of this Agreement. Regard should be paid to the following items:

- Wild salmon protection areas

  Wild stocks of salmon may be protected by the establishment of protection areas where salmon aquaculture is restricted or prohibited. Such protection areas may minimise genetic, disease, parasite and environmental impacts.

- Sterile fish

  The production of all-female, triploid salmon and other techniques which produce sterile fish could offer protection from genetic impacts. Practical methods have been developed to produce sterile fish; however, further research is needed on production characteristics, disease susceptibility and the marketing aspects of sterile salmon and on the ecological implications of escaped sterile salmon.

- Tagging and marking

  Tagging or marking could be used in order to facilitate the identification of farmed salmon in the wild and their separation from wild fish, to determine the source of escapes and to assess the interactions of escaped farmed salmon with the wild stocks. The statistical significance of proposed tagging or marking studies should be assessed prior to implementation. The economic viability of tagging or marking large numbers of salmon produced in aquaculture should be evaluated.

- Aquaculture regions

  The designation of aquaculture regions, where all the steps in the production process are carried out and which are separated from similar regions by areas without aquaculture, could prove an effective means of providing a

management framework for the aquaculture industry and controlling the spread of fish diseases and parasites.

- Alternative production methods

  Land-based production facilities, closed or contained floating facilities, water recirculation and other containment technologies may reduce the current problems of disease and parasite transmission and escapes.

- Local broodstocks

  Research on the use of local wild salmon stocks, including hybrids with local and non-local stocks, as the basis for aquaculture broodstock development, should be conducted.

- Genetics

  The potential genetic interactions between salmon which have been reared in aquaculture and the wild stocks needs to be better understood. Research designed to improve understanding of these interactions should be encouraged.

- Diseases and parasites

  The transmission of diseases and parasites from salmon reared in aquaculture to the wild stocks is an area of considerable concern. Research on methods to prevent and control disease and parasite outbreaks in aquaculture should be encouraged.

COUNCIL

CNL(94)35

THE PRECAUTIONARY APPROACH TO FISHERIES MANAGEMENT

CNL(94)35

THE PRECAUTIONARY APPROACH TO FISHERIES MANAGEMENT

1. The use of the "Precautionary Principle" or the "Precautionary Approach" has increasingly been advocated in recent years as a possible way forward in addressing the management problems in most of the world's fish stocks. Until recently, however, the terms had been ill-defined, indeed at one extreme they could be used to propose a moratorium in any fishery. The UN has called a conference on Straddling Stocks and Highly Migratory Species which held a number of sessions on the Precautionary Approach. Although the outcome of the conference does not directly apply to anadromous species there is no doubt that it is one of the most significant developments in international fisheries management since UNCLOS and the philosophies and principles developed will form part of the thinking of all fisheries management organizations. The FAO submitted a very useful discussion paper on the Precautionary Approach and the UN conference considered various wordings to define the principle. Although the conference has not yet completed its work the debate so far may be of some help to the deliberations of NASCO.

2. The essence of the Precautionary Approach can probably be captured by the principle that

   "the absence of adequate scientific information shall not be used as a reason for postponing or failing to take measures to protect target and non-target species and their environment".

   The details of the wording in the draft UN document are shown in the attachment. The objective here is to avoid a tendency to inaction while awaiting scientific proof of damage which can often take many years. On the other hand it is clear that the Precautionary Approach must not be used so as to weaken the need for the best scientific advice which is an essential part of the Precautionary Approach.

3. Assuming that the concepts of the Precautionary Approach are agreed at the final July meeting, and this seems very likely as there appeared to be unanimity on the need for it, such an approach will be enshrined in international fisheries law. We will need to consider how it can and should affect our work. The Precautionary Approach will not change our need for the best scientific advice. But scientific uncertainty leads to the need to be "precautionary". As it happens, a very good example of possible irreversible damage which is not scientifically proven is the genetic impacts on the wild stocks of escaped farmed fish. The Precautionary Approach would suggest that we should not use the absence of such scientific information as a reason for failing to act.

4. Finally, it is notable that, whereas the other stocks in the high seas are subject to damage by fishing, there being few other threats to them, the salmon is threatened from many other sources. It is arguable that of all the damage done to salmon stocks in the past, most of the damage has been from sources other than fishing, i.e. dam-building, pollution, habitat degradation, etc. So the application of the Precautionary

Approach for salmon has implications for many other sectors of society and our task is thereby much more complex.

Secretary
Edinburgh
15 April 1994

DRAFT UNITED NATIONS DOCUMENT ON THE PRECAUTIONARY APPROACH

Precautionary approaches to fisheries management

In order to protect and preserve the marine environment and living marine resources, consistent with the Convention, the Precautionary Approach shall be applied widely by States and by subregional or regional fisheries management organizations or arrangements to fisheries conservation, management and exploitation in accordance with the following provisions:

(a) In order to improve conservation and management decision-making, States shall obtain and share the best scientific information available and develop new techniques for dealing with uncertainty. States shall take into account, inter alia, uncertainties, including with respect to the size and productivity of the stocks, management reference points, stock condition in relation to such reference points, levels and distributions of fishing mortality and the impact of fishing activities on associated and dependent species, as well as climatic, oceanic, environmental and socio-economic conditions;

(b) In managing fish stocks, States should consider the associated ecosystems. They should develop data collection and research programmes to assess the impact of fishing on non-target species and their environment, adopt plans as necessary to ensure the conservation of non-target species and consider the protection of habitats of special concern;

(c) The absence of adequate scientific information shall not be used as a reason for postponing or failing to take measures to protect target and non-target species and their environment;

(d) the precautionary approach shall, based on the best scientific evidence available, include all appropriate techniques and be aimed at setting stock-specific minimum standards for conservation and management. States shall be more cautious when information is poor. States should determine precautionary management reference points, taking into account the guidelines contained in Annex 2 and the action to be taken if they are exceeded. When precautionary management reference points are approached, measures shall be taken to ensure that they will not be exceeded. If such reference points are exceeded, recovery plans shall be implemented immediately to restore the stock(s) in accordance with pre-agreed courses of action;

(e) In cases where the status of stocks is of concern, strict conservation and management measures shall be applied and shall be subject to enhanced monitoring in order to review continuously the status of the stocks and the efficacy of the measures to facilitate revision of such measures in the light of new scientific evidence;

(f) In the case of new or exploratory fisheries, conservative measures including catch and/or effort limits shall be established as soon as possible in cooperation with those initiating the fishery and shall remain in force until there are sufficient data to allow assessment of the impact of the fishery on the long-term sustainability of stocks and associated ecosystems.

Suggested guidelines for applying precautionary reference points in managing straddling fish stocks and highly migratory fish stocks:

(1) Management strategies should seek to maintain or restore populations of harvested stocks at levels consistent with previously agreed precautionary reference points. These strategies should include measures which can be adjusted rapidly as reference points are approached.

(2) Conservation and management objectives should be stock-specific and take account of the characteristics of fisheries exploiting the stock.

(3) Distinct reference points are used to monitor progress against conservation and management objectives. Reference points should incorporate all relevant sources on uncertainty. When information for determining reference points for a fishery is poor or absent, provisional reference points should be set. In such situations, the fishery should be subject to enhanced monitoring so as to revise reference points in light of improved information as soon as possible.

(4) Reference points related to conservation objectives should be chosen to warn against over-exploitation. Management strategies using such reference points should ensure that the risk of exceeding them is low. In this context maximum sustainable yield should be viewed as a minimum international standard. Conservation-related reference points should ensure that fishing mortality does not exceed, and stock biomass is maintained above, the level needed to produce the maximum sustainable yield. For already depleted stocks, the biomass which can produce maximum sustainable yield can serve as an initial rebuilding target.

(5) Management-related reference points provide an indicator as to when and how quickly maximum allowable levels of stock removals are being approached. Management action should ensure that such reference points, on average, are not exceeded.

ANNEX 20

COUNCIL

CNL(94)57

STATEMENTS BY NON-GOVERNMENT OBSERVERS AND FISH FARMING INDUSTRY REPRESENTATIVES CONCERNING THE IMPACTS OF AQUACULTURE ON WILD SALMON STOCKS

STATEMENT BY THE SCOTTISH SALMON GROWERS ASSOCIATION

The SSGA welcomes the opportunity to be involved with the NASCO working party on aquaculture and to make comment on this initiative. The comment is offered in a constructive way, although the SSGA considers there has been some speculative and mis-appropriate opinion expressed about the relationship between salmon farming and wild salmon interests.

First of all, the Industry has a common interest in *Salmo salar* and maintaining the vigour of the species. Indeed, we have come a long way in the understanding of the "animal", which has also focused knowledge on its physiology and health.

Basically, and in comparison with other agricultural species, the fish being farmed today are still wild animals with no more than 5 or 6 generations away from their wild ancestors.

With regard to fish health, the Industry is as concerned about the transfer of disease from wild stocks to farmed fish as wild interests are about possible transfer in the opposite direction.

However, we are concerned about the approach in the NASCO report which identified fish farming collectively with ranching and enhancement, as we are not directly responsible for these activities which are carried on by others outwith the fish farming industry. Parr or smolts may be reared in hatcheries of fish farming companies, but are required to be released at the insistence of the riparian owners on whose rivers the hatcheries are sited.

In Scotland research work has identified "significant percentages" of "fish farm" escapees on west coast netting stations. Subsequent investigation by the Industry has revealed figures running well into hundreds of thousands of smolts have been released for enhancement purposes under the requirement of rental arrangements for many years.

In the SSGA we do have codes of practice, and in this particular case the rules are,

(a) non-native stocks should not be introduced into rivers

(b) no stock should be placed without the written permission of the local District Fisheries Board.

The practice of some riparian owners who enforce the conditions of lease agreements ignoring the code of practice is deprecated by the SSGA.

Throughout the development of the Industry there has been much negative conjecture about salmon farming. In the SSGA we have taken allegations seriously and have undertaken scientific projects at considerable cost to ourselves to investigate these and have invariably had to prove a negative each time. For example, we are spending in excess of £400,000 on a project to prove the recovery of the benthos after salmon cages are removed from a site - something we knew all along, but which had to be proved to refute the allegations that salmon farming creates pollution. This is the action of a responsible industry.

Much is being said currently about the effect of sea lice allegedly emanating from salmon farms on sea trout stocks. Indeed, the work reported from Ireland on sea lice does not stand up to scientific and statistical analysis. There have been sea trout stock collapses periodically

in the past, long before salmon farming existed. Clearly there are other natural phenomena occurring in the marine environment which need to be understood.

The Scottish Industry has spent over £1 million in researching aspects of a sea lice control strategy, and the development of vaccine is a goal which would provide an environmentally sensitive answer.

Indeed, the critics of salmon farming are more likely to obtain the answers from the Industry's research than anywhere else. We have and will continue to be more than happy to share our knowledge of sea lice and other fish pathogens with wild interests.

There are still areas where development of our young industry has to take place, but sound animal husbandry is the basis of good farming practice. Fallowing and rotation has yielded significant improvements.

But, at the end of the day the Industry has to be profitable to fund research and development and technology, and some of the restrictions suggested in the report would burden the industry and be counter-productive to all interests.

The Industry in Scotland was born in an era of public scrutiny particularly with the geographic location of farms in the sensitive sea lochs of the Highlands and Islands. Contrary to public perception, the Industry is a highly regulated one. We come under regular scrutiny of the River Purification Boards (public monitoring authorities) for water quality and environmental inter-action.

The last thing a salmon farmer would wish to do is pollute his own farm site and jeopardise the fish stocks.

The report also recommends the use of triploids. However, the NASCO Secretary introduced the subject of the report by referring to the precautionary approach. If the precautionary approach is applied to triploids then we are a long way from advocating their use because we do not know what the ecological effects of triploid fish would be. If they do not mature and do not succumb to normal limited life-spans then they could prey on parr and smolts with potentially far-reaching consequences for wild salmon. It is, therefore, inconsistent to advocate the precautionary approach on the one hand and recommend triploids without a knowledge of their likely interaction or competition with wild fish.

In the same introduction, the Secretary mentioned transgenics. Can I state categorically that the SSGA and the members of the International Salmon Farmers' Association (ISFA) have taken a firm policy position that transgenics will not be used in the Industry because we do not operate in a closed system and cannot judge what the effects of interactions might be.

We believe these are responsible attitudes and actions which demonstrate that the salmon farming industry exhibits a sensitive and mature position with regard to the environment in which we farm. We too are cautious and wish to continue our dialogue in a reasoned and objective way with our colleagues representing the interest of wild salmon.

STATEMENT BY THE ATLANTIC SALMON TRUST

John Mackenzie of the Atlantic Salmon Trust welcomed the NASCO initiative to minimise the risks of adverse impacts on wild stocks. He said that the Trust has good relations with the Scottish Salmon Growers and that it recognised the immense good that the salmon farming industry has done for the Highlands of Scotland by bringing employment to rural areas where there was none before. He acknowledged that salmon farming had grown up with the minimum of controls but we had to realise that we live in a real world and that even if we wanted, salmon farming would not go away. He spoke of the formation of the West Highland Sea Trout and Salmon Group under his chairmanship with representation of the Salmon and Trout Association, Scottish Anglers National Association, Association of Scottish District Salmon Fishery Boards, Scottish Salmon Growers, Crown Estate Commissioners and the river owners. The Group's aim is to try and work together to find the cause of the decline of sea trout on the West coast of Scotland. The priority must be to work together rather than have confrontations with the fish farmers.

STATEMENT BY THE ASSOCIATION OF SCOTTISH SALMON DISTRICT FISHERY BOARDS

The representative of the Association of Scottish District Salmon Fishery Boards supported the remarks made by the Atlantic Salmon Trust. He felt it was important to avoid confrontation and that it would be in nobody's interests to allow a feud to develop. Every effort should be made to identify those areas of common interest between the salmon farming industry and the wild stocks so that these could be expanded upon to mutual advantage.

STATEMENT BY THE FEDERATION OF IRISH SALMON AND SEA-TROUT ANGLERS

Mr President, Ladies and Gentlemen, I am an angler, not a scientist, having no financial interest in any commercial fisheries.

By now, most of you will have received our 4th Annual Report to NASCO and the Heads of Delegations will have also received a brief history, since 1989, of the collapse of sea-trout stocks in Ireland, that is, in areas with fish farms in bays and estuaries. (We have maps showing the problem areas, those with fish farms, and those with no problems). Very few salmon smolts have been found returning prematurely. We believe that, as the salmon smolt is "nature driven" to go to sea, it goes out and may well be eaten alive by the sea louse. A "Supplementary Report" to the 1993 Sea-Trout Working Group was approved by the STWG in late March 1994, but is not yet available, as the Irish Minister, under "advice" from his civil servants, has not published it. This is, apparently, because the evidence against fish farming within 20km of a wild fish river is overwhelming evidence of lice infestation, disease transmission, etc. We have photographs of fish farm escapees, taken from the Crana River in Co. Donegal. Lough Swilly, like Bantry and Kenmare Bays, are fjord-like, in that they are long and narrow. The Coomhola River, in Bantry Bay, for example, is more than 20km from the nearest fish farm, but as the fish farm is in the same bay, sea-trout stocks have been wiped out, and no research has been done on salmon smolts, in that, or other areas.

Fish farming in Ireland is not labour-intensive; approximately 400 full-time jobs in salmon farming in Ireland. Fish farms are existing through EU and State grant aid. The 1992 ESRI (Economic and Social Research Institute) report showed total losses to the industry of £8.8M in 1990. They received over £6M in grant aid in the same year. Two years later, the State-owned fish farming company had losses of £4.4M, exactly half of the whole Irish fish farming industry losses, two years previously! The State-owned fish farm, close to the famous Waterville fishery, lost £1.98M in 1992, and Waterville village lost £2M in tourism revenue in 1992. The ESB (Electricity Supply Board), the parent company of the State fish farming company, lost over £20M in 1993. How much was lost on their fish farming operations, we cannot find out. I mentioned Waterville, but the picture is the same in all areas with fish farms. For example, salmon stocks, as well as sea-trout stocks, have been virtually wiped out on the famous Ballynahinch Castle fishery in Connemara. To suggest that the new NASCO ruling, which we sincerely hope will be approved by NASCO this year, should only apply to new fish farms, is ludicrous. It is the existing fish farms that have caused the problems, and it is they that must be moved out of wild fish bays and estuaries. Fish farming in Ireland is a disaster and has wiped out millions of pounds in tourism angling and thousands of jobs. Mandatory guidelines (or ruling), without a derogation to Ireland, is the only answer. Those guidelines (ruling) must include a definitive ruling on the siting of fish farms, at least 20km away from the mouths of bays and estuaries containing wild fish rivers, before our stocks of salmon and sea-trout are totally wiped out.

While we appreciate the research being done by ICES, many of our rivers have passed the point of no return. Immediate action is required, if others are to survive. We just cannot afford the luxury of another year without positive measures being adopted.

The Federation of Irish Salmon and Sea-Trout Anglers (FISSTA) was said to be "not living in the real world" in relation to our opposition to ocean salmon farming as it is presently practised in Ireland. We do not wish to be argumentative but must state the facts.

May I at the outset clearly state and put on record, Mr President and distinguished delegates, FISSTA is not against aquaculture "per se" nor in principle totally opposed to the caged salmon farming component of it **provided** that it is conducted in a responsible and environmentally safe manner which adequately protects the legitimate interests of anglers and the entire community.

Unfortunately that is not the case in Ireland, which is relatively new to salmon farming, having a production of approximately 9,000 tonnes. In the late 1980's in the Connemara region on the West Coast, where salmon farming was first established, an alarming decline in the runs of sea-trout was noticed. The Sea-Trout Action Group (STAG) was formed, composed of fishery scientists, governmental regulators and fishery managers. Extensive research was carried out into all possible reasons for this sudden and horrendous collapse of the sea-trout stocks. Quite soon, as one cause after another was eliminated by this Research Study Group, the massive explosion in sea-lice numbers from the salmon farms was suspected. These farms without any foresight were placed mainly in the bays and estuaries of salmonid river systems - and they remain there to this very day! By 1991 STAG issued a Progress Report which produced a "Working Hypothesis" that sea-trout were being attacked by unprecedented numbers of sea lice, as a result of increased salmon farm production. Research continued and now the 1994 "Sea Trout Task Force" Report confirms that fact. Remedial measures taken by salmon farm managers and the Marine Department (Fisheries Department) have failed to solve the problem and merely alleviated some of the worst aspects

of it. Indeed salmon farms were increased in tonnage, in number and sited on new areas of the coast. We have maps that clearly show the correlation between siting of salmon farms and the sea-trout collapse - where there are no farms at all, or none within 20km of salmonid rivers, there are no unusual problems with sea-trout.

In my own area of South Kerry salmon farms were introduced in 1990, despite warnings from anglers and community leaders from the devastated West Coast Regions. Sad to relate, the sequence of adverse effects they had forecast came to pass. Lough Currane, previously a world-renowned "jewel in the crown" of Ireland's fisheries, has already reached the point where the relevant fishery board has had to severely restrict angling. Bord Failte, the Tourist Board, has removed it from promotional literature.

We in FISSTA accept that the people, business interests and governmental departments etc, had the best of intentions when starting into salmon farming. Such a developer was Salmara Limited, a subsidiary of the ESB (Electricity Supply Board), the latter deservedly being one of the most envied and respected electricity supply and consultative companies internationally. All the foregoing saw jobs and economic benefits accruing but utterly failed to appreciate, or allow for, the grave dangers and damaging environmental side-effects posed by rushed and incorrect development of this new salmon farming "industry" - just as early scientists had hailed the nuclear age!

Let us briefly study the economics involved. Yes, 400 full-time and a few hundred part-time jobs were created but this is more than offset by the massive loss of tourist anglers which has caused serious unemployment in the affected areas and has driven many guest houses, hotels and fisheries close to bankruptcy. The question is this, should the "profits" of a few be allowed to devastate whole communities in the south west, west and north west of Ireland?

One point NASCO should perhaps address is the nature of the EU speaking with one voice for its member States. We feel that each salmon-producing State should be accountable for its actions or inactions. There is a contradiction in that the EU speaks as one but members act individually. For instance an agricultural drug called "Ivermectin", which is neither licensed nor approved for aquatic usage by its manufacturers MSD Agvet, nor by the Drugs Advisory Bodies in the UK and Ireland, is not permitted in Scotland, but Irish salmon farmers are "reportedly" using it mixed in the salmon feed for the control of sea-lice - another example of irresponsibility. We, too, want the sea-lice controlled but the most effective solution is to move the cages away from where they are.

Apart from the sea-trout collapse a further grave concern to FISSTA are the very real dangers to wild salmon stocks from salmon farming through disease, parasites and escapees inter-breeding with them. Norway, our host country, has experienced bad problems of this nature. We are told that 33 major rivers there had to be completely sterilised. However, Norway had and has an advantage over Ireland in that it is bigger and richer and could take drastic measures to rehabilitate those rivers and tackle other related problems. Should our country have such a frightening event it would be a catastrophe. We do have great fishery scientists and fishery personnel, some among the best in the world, but we could not cope without help. Unlike Norway we do not have an extensive gene bank programme for re-stocking.

FISSTA does not wish to be in confrontation, but rather in co-operation, with our Marine Department, fishery boards and indeed with salmon farmers themselves to have this fishery environmental disaster satisfactorily resolved. Half-measures like fallowing cages within the

affected bays and estuaries will not suffice. If we have to "walk on toes" so be it, it is not from choice but we owe it to all those whom we speak for here today.

There are many lessons, some good but mostly bad, to be learned from the Irish salmon farming experience. We in FISSTA sincerely invite the aquaculture study group of NASCO to send a team to Ireland to meet with all the concerned Parties, whether they be anglers, fishery owners, governmental and fishery departments and salmon farmers, and visit the farms. Above all, speak with the people who live in the affected communities and learn valuable lessons. Ireland still has a chance to reverse the nightmare and NASCO can play a vital role in encouraging such a move. You will be assured a Cead Mile Failte - a hundred thousand welcomes.

STATEMENT BY INTERNATIONAL FRIENDS OF WILD SALMON

Mr President, delegates, fellow observers, my name is Ed Chaney. I have been professionally involved in salmon management and habitat restoration for more than a quarter century. I speak today on behalf of International Friends of Wild Salmon, an international network of scientists, non-governmental organizations and lay advocates for wild salmon and their habitats.

I appreciate NASCO's granting of NGO status to IFWS, and the opportunity to make these brief comments on the subject of "Impacts of Aquaculture on Wild Stocks".

First, I want to offer our strong support for the proposed convention to minimize impacts from salmon aquaculture on wild salmon stocks. In my view, this convention represents the minimum responsible response to the serious, potentially irreversible ecological harm from interactions of wild and farmed Atlantic salmon. Stronger action is needed.

Ecological common sense and available science, including considerable experience with the interactions of wild and artificially propagated Pacific salmon, provide sufficient justification for the modest safeguards in the proposed convention.

I urge the industry in enlightened self-interest to take a precautionary approach. To support the proposed convention as the first step. To adopt stringent industry standards for ecologically benign operations. To provide for industry certification of compliance with these standards. And to make this certification an integral feature of consumer marketing.

In my view, these steps are necessary to fulfil industry's responsibilities, and to avert public reaction against the industry and demands for aggressive intervention by government.

I want to echo the remark of the delegate from the European Union that NASCO is at a turning point as it enters its second decade. In its first decade the Organization focused on achieving international cooperation in control of harvest. Significant progress has been made.

NASCO's present attention to the issue of minimizing the potential for harm from interaction of wild and farmed Atlantic salmon is an important step toward broadening the Organization's ecological perspective.

Atlantic salmon are in serious trouble throughout much of their range. We heard today that 25 rivers in Sweden have lost their salmon. The famed salmon of the Loire in France are threatened with imminent extinction. These are but two examples of many similar problems that collectively constitute an international crisis that requires a collective, international response. NASCO is the proper place to forge such a response.

I urge the Council to give salmon habitat issues high priority for staff work prior to, and Council action during, the 1995 annual meeting. I also urge that habitat issues be the subject of a special session at that time. I think it important that these discussions include insight and experiences of those who have dealt with habitat problems affecting Pacific and Baltic salmon stocks.

STATEMENT BY THE SCOTTISH ANGLERS NATIONAL ASSOCIATION

Mr President,

We represent the Scottish Anglers National Association (SANA) which is recognised by the Scottish Sports Council as the governing body for the sport of game angling in Scotland.

One of our prominent aims is to assure the purity of Scottish rivers and lochs because, without clean water, our other efforts are in vain. A key issue is over fertilisation and, during 1992 and subsequently, our Environment Officer - Dr Donald Muir - has been active in identifying the extent of damage to fisheries and potential remedial action. In a survey, supported by the Scottish Sports Council, he found that the effects of eutrophication were widespread and we estimate that at least 10,000 rod days were lost during 1992. Among other recommendations, SANA is anxious that biological indices of water be adopted by the regulatory authorities for routine environmental monitoring.

Maintenance of the quality of freshwater in Scotland has a high priority in the major concerns of the Scottish Anglers National Association.

In its report on the Impacts of Salmon Aquaculture, the NASCO Working Group has focused attention on potential risks associated with dilution of the wild genetic pool and with health issues such as parasites and disease. While we share these we would also draw attention to the fact that aquaculture has been responsible for a number of cases of significant "pollution".

Nutrient enrichment from aquaculture facilities is an important factor which must be taken into account especially in inland waters in Scotland where cage culture of salmonids is practised on an extensive scale in freshwater as well as sea-water lochs.

In sea-water sites, cage farming of salmon can normally be located in areas where there is good water exchange without seriously affecting water quality conditions other than on a very local scale and we note that the report acknowledges that advances are being made in cage design which will allow high-energy offshore sites with good water exchange to be used in future.

However, conditions are much less satisfactory in the longer term in freshwater lochs where water exchange is much more limited than in the sea due to lack of tidal movements. As a consequence, phosphorus can reach biologically significant concentrations if not properly

controlled. In the Highlands of Scotland where salmonid fisheries are associated with oligotrophic (nutrient-poor) waters, significant increases in phosphorus levels in lochs can have damaging effects.

We are not against aquaculture and know that fish farm managers are just as enthusiastic to have good water quality as we, the anglers, are.

We at SANA feel that there is an urgent need for research on the development of cage technology for aquaculture on freshwater lochs to allow the waste to be collected and retained for disposal on land out of the loch environment altogether. We refer to the waste food and faeces which deposit on the bottom of the loch. As we all know, substantial deposits do accumulate and the resulting phosphorus may be released back into the water to the detriment of water quality.

Following on from this, similar techniques for retaining chemicals used for the treatment of disease on cage farms and preventing their release into the loch, require to be developed to protect the environment. Surely any further development of farmed salmon production on freshwater lochs should be restricted until cage technology has advanced sufficiently to allow collection of such wastes for safe disposal ashore.

SANA appeals for more technology to keep the water quality of our salmonid lochs at a high level and we strongly support the work of the Scottish River Purification Boards who are the guardians of the water quality in our Scottish rivers and lochs.

We would like to believe that we are joining with Scottish River Purification Boards in appealing to the Secretary of State for Scotland to help our quest for maintaining the high standard of water quality with which we are blessed in Scotland.

TURNING TO OUR OTHER CONCERNS:

The sea-trout in particularly appear to have been decimated. The proliferation of sealice around the fish farm cages, causing severe parasitic infestation, would appear to be of mortal detriment to the sea-trout. It may also be adversely affecting salmon. We cannot really believe that migrating salmon smolts will turn a blind eye or ignore the tasty bites lying below the salmon sea cages. They, too, must be at risk from lice infestation - and the consequences. Is this part of the explanation of the high mortality rate of smolts as they leave the estuaries and enter the "black hole" about which we know so little?

The deleterious effect on sea-trout from this parasite has been clearly linked by scientific research and shown to be a major factor in the decline of this sporting fish and we were glad to learn that the Irish Government have finally acknowledged that salmon farms are the cause of the sea-trout collapse.

In Scotland, finnock and sea-trout are dangerously thin on the ground. Until recent years they offered prolific sport but are now fast becoming an endangered species in and around the West Highlands, Western Isles and, by all accounts, even more so in the Republic of Ireland. Not caused, we would emphasise, by over exploitation but by a parasitic problem exacerbated by man.

We feel it is vital to the survival of sea-trout, and possibly also salmon, for scientists to channel their expertise towards controlling and eliminating the parasitic problem. To further that end we would recommend the introduction of stringent regulations which would site farm cages outwith an area of 20 kilometres from the recognised estuarial limits.

In addition, greater control and scientific research on the effect of chemicals used in fish farming must, in our opinion, be a priority.

We also believe that escaped farmed salmon pose a real genetic threat to wild salmon and that the only feasible way to protect these stocks is for the industry to use sterile fish.

We welcome the initiative by the Council of NASCO to address the considerable threats posed to wild salmon and sea-trout by the rapid growth of fish farming. The industry has expanded very rapidly since NASCO's existence and it is clear that our scientific understanding of the impacts has struggled to keep pace.

We therefore strongly recommend that NASCO adopts the precautionary approach and takes immediate action to address the problem in accordance with the Convention.

The Agreement being considered today is an important step forward and a movement in the right direction and we can see the advantages of addressing this problem on an international basis so that the salmon farming industry in any one country is not competitively disadvantaged.

Mr President, we thank you for the opportunity of allowing us to present our views to this Special Session. We have touched on the problems as we see them and hope that our points will be noted.

Mr President, time is not on our side.

STATEMENT BY THE ULSTER ANGLING FEDERATION LIMITED

We would generally welcome the production of this Report, however we must say that it is our very strong view that the Agreement IAQ(93)17 really only skates over the surface of the problem and does not begin to seriously address the issues at stake.

We therefore suggest that this be regarded very much as a preliminary document and that immediate steps be taken to move on to provide a framework for aquaculture that gives solutions to the current problems.

We are particularly concerned that "fallowing" is beginning to be seen as a panacea for many problems, and that the use of chemicals, such as "Ivermectin" in feeds is very risky in relation to escaped fish.

It is now accepted that the problem of the disappearance of sea trout in the west of Ireland has been caused by salmon farms and this question has to be directly addressed by NASCO as a matter of extreme urgency.

The Agreement IAQ(93)17 is only the overture; let the real work now begin.

ANNEX 21

COUNCIL

CNL(94)53

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

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 Parties,

NOTING the provisions of the Convention for the Conservation of Salmon in the North Atlantic Ocean of 2 March 1982 (the "Convention"), which seeks to promote the conservation, restoration, enhancement and rational management of salmon stocks;

WELCOMING the achievements in salmon conservation by the Parties to the Convention, within the framework of the Convention, and the role of the North Atlantic Salmon Conservation Organization (the "Organization") therein;

AWARE of the need for cooperation between the Parties in order to maintain and to restore the wild salmon stocks, and promote sustainable conservation and management of such stocks;

RECOGNISING the benefits, including the socio-economic benefits, which have resulted from the development of salmon aquaculture;

BEING CONSCIOUS of the threats to the wild stocks of salmon from different human activities, including possible adverse effects from salmon aquaculture;

DESIRING to minimise the possible adverse impacts of salmon aquaculture on the wild stocks and noting the earlier initiatives taken by the Organization in this respect;

RECOMMEND as follows:

ARTICLE 1

Cooperation between the Parties

The Parties shall cooperate in order to minimise possible adverse effects to the wild salmon stocks from salmon aquaculture.

ARTICLE 2

Measures to minimise genetic and other biological interactions

In accordance with Parts 1 and 2 of the Annex to this Resolution each Party shall take measures, to the full extent practicable, to:

Minimise escapes of farmed salmon.

Minimise the straying of ranched salmon.

Minimise adverse genetic and other biological interactions from enhancement activities.

ARTICLE 3

Measures to minimise the risk of transmission of diseases and parasites to the wild stocks of salmon

Each Party shall take measures to minimise the risk of transmission to wild salmon stocks of diseases and parasites that may exist in salmon aquaculture and shall to this end establish appropriate measures in accordance with Parts 1 and 3 of the Annex to this Resolution.

ARTICLE 4

Research and development

Each Party that is engaged in salmon aquaculture shall develop practices, including research and development as appropriate, which minimise effects on wild salmon stocks and improve the effectiveness of the measures contained in the Annex to this Resolution.

ARTICLE 5

Exchange of information

Each Party shall provide to the Organization, on an annual basis, information of a scope to be determined by the Council concerning the measures adopted under Articles 2 and 3 and the research and development carried out under Article 4.

The Organization shall request from ICES and other relevant scientific organizations appropriate information on the extent of the intermingling in rivers and at sea between wild salmon and salmon of aquaculture origin.

ARTICLE 6

Definitions

For the purposes of this Resolution:

1. "Salmon aquaculture" is the culture or husbandry of Atlantic salmon and includes salmon farming, salmon ranching and salmon enhancement activities.

2. "Salmon farming" is a production system which involves the rearing of Atlantic salmon in captivity for the duration of their life-cycle until harvested.

3. "Salmon ranching" is the release of reared juvenile Atlantic salmon with the intention of harvesting all of them on their return.

4. "Salmon enhancement" is the augmentation of wild stocks in individual river systems by the release of Atlantic salmon at different stages in their life-cycles.

5. "Wild salmon" are salmon which originate naturally and have not been subjected to aquaculture.

6. "Transfer" is the deliberate or accidental transport of Atlantic salmon within their native or natural range.

ANNEX TO THE RESOLUTION

PART 1

GENERAL MEASURES

§ 1. Sites

Sites for salmon aquaculture shall only be assigned where hydrographical, epidemiological, biological and ecological standards can be met. Factors which may be taken into consideration include: availability of water supply and receiving waters for discharge; water quality and exchange, water depth, site protection, separation distances between aquaculture facilities and distance from salmon rivers. Units should be sited so as to avoid the risk of damage by collision with vessels and should be adequately marked.

§ 2. Operations

Aquaculture units should be managed, taking into account established measures to prevent and control diseases and parasites and by taking precautions to prevent the escape of fish.

§ 3. Transfers

Transfers of salmon shall be conducted so as to minimise the potential for transmission of diseases and parasites, and for genetic and other biological interactions. Mechanisms to control transfers should be introduced where necessary.

PART 2

MEASURES TO MINIMISE GENETIC AND OTHER BIOLOGICAL INTERACTIONS

§ 4. Design standards for aquaculture units

Standards and technical specifications should be established for the design and deployment of marine and freshwater aquaculture units. The design of aquaculture units should be appropriate for the assigned site so as to optimise the containment of fish. The risk of escape of fish from aquaculture units as a result of storm or ice damage should be minimised by using appropriate technology for the prevailing conditions. Aquaculture systems, including anti-predator nets and devices, should be routinely inspected, maintained and upgraded as new technological improvements become available. Regular monitoring and the use of efficient security systems are required.

§ 5. Salmon enhancement

Local stocks, i.e. stocks from the same river, or stocks with similar biological characteristics from a neighbouring river with similar ecological conditions, should be used wherever possible for enhancement purposes. In enhancement programmes

consideration should be given to: using broodstocks which are representative of the entire spawning run of the donor stock; using broodstocks which comprise at least 100 fish which should be used in single paired matings (where the number of one sex is less than 50 the number of the other sex should be increased to achieve 100 broodfish); using broodstocks which are held in captivity for no more than one generation; avoiding selection of fish with favourable attributes; avoiding the use of escaped farmed fish.

§ 6. Salmon ranching

Local stocks, or alternatively local ranching stocks, shall be used for salmon ranching.

Ranched salmon should be harvested at or close to the site of release or in fisheries managed in such a way as to prevent the overharvesting of the wild stocks.

§ 7. Salmon farming

It is desirable to use local broodstocks for salmon farming where practicable.

Efforts should be made for the efficient recapture of escaped farmed salmon provided that these can be conducted without adversely affecting the wild stocks. Each site operation should have a site-specific contingency plan in place in the event of an incident involving a large number of escaped fish.

PART 3

MEASURES TO MINIMISE DISEASE AND PARASITE INTERACTIONS

§ 8. Control and prevention of diseases and parasites

All steps in the aquaculture production process from hatchery to processing plant, including transportation of live fish materials, shall be conducted in accordance with appropriate fish health protection and veterinary controls. This includes attention to the application of appropriate husbandry techniques to minimise the risk of disease in the reared stock. These might include vaccination, use of optimal stocking densities, careful handling, frequent inspection of fish, proper diet and feeding regimes, avoidance of unnecessary disturbance of the fish, detailed health inspections, disinfection of transportation equipment and the use of foot baths at production facilities.

Diseased stock should be treated, or removed, and measures should be taken to ensure that such diseased fish are not released to the wild.

§ 9. Stocking density

Aquaculture production should be adapted to the holding capacity of an individual site and not exceed density levels based on good husbandry practices.

§10. Removal of dead or dying fish

Fish which have died and dying fish should be removed immediately from aquaculture production facilities and disposed of, along with waste materials, in an approved manner. Procedures should be established that address the effective removal and disposal of infectious material. Contingency plans should be established for the disposal of mortalities from emergency situations.

§11. Adequate separation

The separation distance between aquaculture facilities at marine sites should be based on a general assessment of local conditions.

§12. Year-class separation

Wherever possible, different generations of salmon should be reared in separate locations.

§13. Fallowing of sites

As local conditions permit, a fallowing regime should be practised wherever possible as a means of minimising outbreaks of disease and parasites.

§14. Use of medicines and disinfectants

Medicines and disinfectants to control diseases and parasites must be used with care and in accordance with the manufacturer's instructions and any Codes of Practice, and in compliance with regulatory authorities.

§15. Lists of diseases

A list of the prevailing infectious diseases and parasites, and the methods in practice for their control, should be maintained by the appropriate authorities.

PART 4

RESEARCH AND DEVELOPMENT

§16. Research, small-scale testing and full-scale implementation should be carried out, as appropriate, in support of this Resolution. Regard should be paid to the following items:

- Wild salmon protection areas

  Wild stocks of salmon may be protected by the establishment of protection areas where salmon aquaculture is restricted or prohibited. Such protection areas may minimise genetic, disease, parasite and environmental impacts.

- Sterile fish

The production of all-female, triploid salmon and other techniques which produce sterile fish could offer protection from genetic impacts. Practical methods have been developed to produce sterile fish; however, further research is needed on production characteristics, disease susceptibility and the marketing aspects of sterile salmon and on the ecological implications of escaped sterile salmon.

- Tagging and marking

Tagging or marking could be used in order to facilitate the identification of farmed salmon in the wild and their separation from wild fish, to determine the source of escapes and to assess the interactions of escaped farmed salmon with the wild stocks. The statistical significance of proposed tagging or marking studies should be assessed prior to implementation. The economic viability of tagging or marking large numbers of salmon produced in aquaculture should be evaluated.

- Aquaculture regions

The designation of aquaculture regions, where all the steps in the production process are carried out and which are separated from similar regions by areas without aquaculture, could prove an effective means of providing a management framework for the aquaculture industry and controlling the spread of fish diseases and parasites.

- Alternative production methods

Land-based production facilities, closed or contained floating facilities, water recirculation and other containment technologies may reduce the current problems of disease and parasite transmission and escapes.

- Local broodstocks

Research on the use of local wild salmon stocks, including hybrids with local and non-local stocks, as the basis for aquaculture broodstock development, should be conducted.

- Genetics

The potential genetic interactions between salmon which have been reared in aquaculture and the wild stocks needs to be better understood. Research designed to improve understanding of these interactions should be encouraged.

- Diseases and parasites

The transmission of diseases and parasites from salmon reared in aquaculture to the wild stocks is an area of considerable concern. Research on methods to prevent and control disease and parasite outbreaks in aquaculture should be encouraged.

ANNEX 22

COUNCIL

CNL(94)30

DISEASES AND PARASITES

CNL(94)30

DISEASES AND PARASITES

1. Last year the Council considered a review, CNL(93)33, on the spread of the parasite *Gyrodactylus salaris* within the North-East Atlantic Commission area. The spread of this parasite has highlighted the dangers of international or even national stock movements and there is concern in a number of North Atlantic countries about its possible introduction. In August last year an international symposium on Northern Rivers Atlantic Salmon was held at the recently opened Teno River Research Centre in Northern Finland. This meeting was dominated by consideration of the *Gyrodactylus* problem and possible strategies to prevent its further transfer. A brief summary of the papers presented to this meeting and the recommendations arising is presented below. In recent years severe mortalities of both wild and hatchery Baltic salmon have occurred as a result of a condition known as M-74 and a brief summary of the literature on this serious problem is also presented.

Gyrodactylus salaris

2. The Northern areas of Norway, Finland and Russia contain the most important Atlantic salmon producing rivers of these countries with many of the rivers being in a natural condition. In recent years there has been growing concern about the threat posed to these rivers by *Gyrodactylus salaris* and the aim of the symposium was to clarify the present status of the salmon stocks in this area and to seek an agreement on collective guidelines for their future management.

3. *Gyrodactylus salaris* appears to be restricted in its distribution to Europe and has to date been detected in Spain, Germany, Denmark, Finland, Norway, Russia and Sweden. In most of these countries the parasite was detected in hatchery fish, mainly rainbow trout, but it has also been detected in wild fish. The greatest damage to wild salmon stocks has occurred in Norway where by the end of 1992 the parasite had been recorded in 37 rivers and 36 hatcheries (Johnsen and Jensen, 1993). In these rivers there has been very high mortality of salmon parr and the Norwegian authorities have made a considerable investment to eradicate the parasite and to prevent its further spread. It is now believed that the spread of the parasite from the Baltic area occurred as a result of the movement of infected hatchery fish. The subsequent spread of the parasite within Norway has been attributed to stocking for enhancement purposes from infected hatcheries; changing of water and dumping of moribund smolts during transportation; escape of infected fish from hatcheries; movement of fish through brackish water to neighbouring rivers and transfer on wet equipment such as nets and boats (Mo, 1993).

4. While the parasite has been present in Norwegian salmon rivers since the late 1970's, recent studies have also recorded its presence in Russia and Finland for the first time. Studies in Lake Inari in Northern Finland identified *Gyrodactylus salaris* on a single rainbow trout in the vicinity of an infected farm. This lake drains into the River Pasvikelva which is a salmon river and there is real concern that the parasite may spread to the Teno river, a major river which yields approximately 25% of the Norwegian salmon catch. The occurrence of *Gyrodactylus salaris* in the Russian river

Keret which drains into the White Sea is also believed to have resulted from hatchery releases (Ieshko et al, 1993). In this case it is believed that the parasite was transferred from Lake Onega, which drains via Lake Ladoga into the Baltic, to a hatchery on the River Kem. Stock from this hatchery have been planted in the river Keret (Mo, 1993). In 1992 there was a sudden increase in the numbers of this parasite in the river Keret and high mortality of young salmon, highlighting the need for improved parasitological control before salmon are transferred from hatcheries for release to rivers containing wild stocks (Ieshko et al, 1993).

5. Because of the serious threat to the wild stocks of Northern salmon rivers a proposal was developed by the symposium for a cooperative project involving Norway, Sweden, Finland and Russia aimed at developing guidelines to prevent the further spread of the parasite together with investigations of the occurrence of the parasite at hatcheries and in 'potentially infected rivers', i.e. rivers where hatchery reared salmon and rainbow trout have been released. The serious threat posed by this parasite also highlights the importance of the work of the Working Group established by the North-East Atlantic Commission to examine the possibility of developing agreements on introductions and transfers.

6. During the symposium information was also presented on the spread of furunculosis in Norway. This disease was first recorded in Norway in 1964 following the import of rainbow trout from Denmark. A disease eradication programme at farms was carried out and was completed by 1969. However, following an import of smolts from Scotland furunculosis was found in Atlantic salmon in marine farms in 1985. It is believed that following severe storms in 1988 and 1989 some farmed salmon infected with furunculosis escaped and spread the disease when they subsequently ascended rivers. By the end of 1992 fish infected with furunculosis had been found in 74 Norwegian rivers. The extent of the mortality in these rivers has varied but in some rivers large numbers of wild salmon died from the disease (Johnsen and Jensen, 1993). Concern was also expressed at the symposium about the possible effects of sea-lice on wild salmon and sea trout populations. Similar concern has been expressed in other countries, particularly in Ireland. Possible practical measures which might be used to minimise the risk of transmission of diseases and parasites from aquaculture to the wild stocks have been developed by the Working Group on Impacts of Aquaculture (see CNL(94)28).

M-74 syndrome

7. In 1974, abnormally high mortality of alevins during resorption of the yolk-sac was observed in a Swedish hatchery. The mortality could not be explained at that time, and the syndrome was therefore named M-74 (M = mystery 74 = the year it was first observed) (Anon, 1993). The syndrome appeared to be restricted to certain females, with the offspring of larger females experiencing higher mortality than those from smaller females (Ikonen, 1993). The occurrence of M-74 was not influenced by the choice of males. Mortality attributed to M-74 was observed in all Swedish and Finnish hatcheries utilising spawners obtained from Baltic rivers as broodstock and while the level of mortality between 1974-1993 was between 10-30% in 1992 the mortality to the feeding fry stage increased to between 60-95% (Anon, 1993). The problem was not, however, encountered in hatcheries utilising hatchery broodstock maintained in captivity and fed artificial diets (Ikonen, 1993). Electrofishing surveys

conducted during 1992 in a number of rivers with natural salmon populations revealed that despite relatively large numbers of spawners in 1991 there was an almost complete absence of one summer old fry in some areas (de Mare, 1993). Observations in Swedish and Finnish hatcheries indicated that broodfish experienced balance problems and large salmon have been caught by children with their bare hands in the Torniojoki River (Ikonen, 1993).

8. It is thought that the cause of this mortality is organochloride substances accumulated by the females in the feeding grounds in the Baltic. While DDT concentrations in the Baltic have diminished, PCB concentrations in the Baltic increased in 1993 to the levels present in 1985. Ikonen (1993) linked these increased concentrations to increased vertical circulation which resulted in organochlorines present in the sediment entering the food chain, including fish species such as herring - an abundant prey species for salmon in recent years. However, the growth rate of the herring has been low in recent years with the fish taking an additional two years to reach a size at which they are consumed by salmon. These older herring have been shown to contain higher concentrations of organochlorines than younger herring (Pertilla et al, 1982, cited in Ikonen, 1993).

9. It is believed that M-74 is such a serious problem for the natural salmon stock that they are in great danger of becoming extinct (Ikonen, 1993). An action plan has been proposed which includes further surveys of the wild stocks and the establishment of a gene bank based on fish collected during 1993. Furthermore, it has been proposed that the fisheries exploiting the wild stocks should be closed for a 3-4 year period (de Maré, 1993). On the basis of the information presented above it would appear that there are, however, no implications for the salmon in the North Atlantic area.

Conclusions

10. In conclusion, the spread of *Gyrodactylus salaris* from the Baltic to countries with rivers draining into the Convention area highlights the dangers of stock movements. The parasite has recently been identified in northern Finland following movements of rainbow trout and in the river Keret in Russia following hatchery movements from the Baltic. The spread of this parasite highlights the importance of the work to be done by the North-East Atlantic Commission's Working Group which was agreed on last year to advise on matters related to introductions and transfers. Recent research on M-74 syndrome indicates that the problem is related to environmental contaminants and it therefore seems unlikely to have implications for the North Atlantic area.

Secretary
Edinburgh
18 April 1994

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COUNCIL

CNL(94)31

CATCH AND RELEASE

CNL(94)31

CATCH AND RELEASE

1. In recent years there has been growing interest in catch and release fishing both on a voluntary basis and as a mandatory management measure and this subject is reviewed in the attached document. In Atlantic Canada, the return of all salmon 63cm and greater in length has been required in all provinces (except Quebec) since 1984. Further, in all provinces the recreational fisheries remain open to catch and release fishing only once quotas have been reached. Similarly, in the State of Maine anglers may only retain one salmon and in 1992 407 fish were released out of an angling catch of 600. Outside North America catch and release of salmon is less commonly practised. However, concern about declining stock levels, or components of these stocks, has led to increased interest in catch and release in a number of North Atlantic countries.

2. To be of value as a management tool in relation to the conservation and enhancement of wild Atlantic salmon populations, fish which have been exercised to exhaustion, handled and possibly suffered injury caused by the gear, must survive without a substantial reduction in ecological fitness. One concern that has been expressed about catch and release fishing in angling journals is that by releasing fish to the water angling is perceived not as harvesting of the resource but as a "game for personal pleasure" and it could therefore attract more attention from organizations opposed to angling. Few studies have assessed the survival of sea-run Atlantic salmon following catch and release. Those that have been conducted indicated that catch and release had minimal impact on the survival of the fish or on their reproduction. However, the effects of catch and release early in the year require further evaluation. Clearly, where catch and release is practised, it is important that anglers are made aware of the need to minimise the stress and physical damage caused to the fish and it might be useful for the Council to consider guidelines on techniques for handling and releasing fish for use as appropriate in the North Atlantic area.

Secretary
Edinburgh
16 May 1994

CNL(94)31

CATCH AND RELEASE

1. Introduction

1.1 Legislation requiring the release of Atlantic salmon following their capture is not new and exists in many North Atlantic countries. Such legislation was enacted in order to protect fry, parr and smolts and fish close to spawning or which have spawned. For example, under the Salmon Fisheries (Scotland) Act of 1828 it was an offence to wilfully take or destroy any smolt or salmon fry and "unclean" or "unseasonable" salmon and these provisions have been retained, in a modified form, in subsequent legislation. Apart from these "protected" stages of the life-cycle salmon caught by angling are normally retained although there are reports of anglers releasing Atlantic salmon on the Penobscot river as early as 1873 (Wydoski, 1976).

1.2 During the 1950's "catch and release" fishing for trout developed as a result of plans advocating the release of all trout so that they could be caught again (Barnhart, 1989). Angler conservationists such as Roderick Haig-Brown spoke of the need for anglers to exercise restraint. Put another way anglers were "limiting their kill" instead of "killing their limit" (Malchoff et al, 1992). In 1977 the first National Symposium on Catch and Release Fishing was held at Humboldt State University in California. The symposium was dominated by presentations on catch and release trout fishing but the second symposium, ten years later, included reviews on catch and release fishing for a wide range of freshwater and marine species, including Atlantic salmon. Graff (1987) noted that catch and release fishing had grown substantially in popularity both as a fishery management tool and the personal philosophy of anglers in the ten years since the first symposium. In recent years there has been growing interest in catch and release fishing for Atlantic salmon in a number of North Atlantic countries in response to concern about stock levels. This paper examines the extent of the technique's use and reviews the literature concerning the survival of salmon which have been caught by angling and then released.

2. Use of catch and release for Atlantic salmon

2.1 In eastern Canada concern about the decline of Atlantic salmon led to the introduction in 1984 of drastic measures to protect and enhance the stocks including curtailment of commercial netting, mandatory tagging and the introduction of catch and release regulations (Bielak, 1987). These catch and release regulations have been maintained in subsequent Atlantic Salmon Management Plans. For example, under the 1993 Plan only the retention of grilse is permitted in the provinces of New Brunswick, Prince Edward Island, Nova Scotia and Newfoundland (excluding Labrador) and all salmon 63cm and greater in length hooked by anglers are required to be released immediately with the least possible harm to the fish. In Quebec retention of large salmon is permitted subject to a seasonal retention limit of four salmon. In all provinces recreational fisheries remain open to catch and release fishing only once quotas have been reached. The requirement to return all multi-sea-winter salmon was clearly a significant change in the management of the recreational fisheries in Eastern Canada and perhaps not surprisingly led to reactions ranging from 'grudging group acceptance

to vitriolic, and even abusive, individual opposition' (Bielak, 1987). The need for a major education programme was recognised at an early stage by the Atlantic Salmon Federation and with funding from the Department of Fisheries and Oceans a successful 'Catch and Release Club' was initiated building on earlier programmes to promote the technique. In August 1993, a new education programme promoting catch and release as an important conservation and management tool was introduced in order to provide more information for anglers, the general public and fisheries managers. The slogan 'The Future Is In Your Hands' was chosen to identify the programme, which consists of a bilingual brochure, providing information on catch and release techniques, together with a catch and release enamel lapel pin and badge for anglers registering in the programme. In addition, colourful plastic posters were produced and a bilingual advertisement was placed in angling newspapers in an attempt to get the campaign into the public eye. The programme also has elements aimed at school children. Response to the programme has been favourable and it is anticipated that it will gain momentum during the coming angling season.

2.2 Since 1992 there has been a retention limit of 1 fish per season on all Maine rivers, although anglers can continue fishing provided they release any fish caught (Neill, personal communication). In 1992 407 fish were released out of an angling catch of 600. Outside North America catch and release fishing for Atlantic salmon is not commonly practised.

2.3 In Scotland, rod-caught salmon are normally killed for consumption or sold to defray fishing costs and few are returned alive to the river (Walker and Walker, 1991). However, on some rivers catch and release is practised, particularly by visiting North American anglers. It is likely that there will be increasing interest in the technique especially where there is evidence that stocks are depressed (Walker and Walker, 1991). In response to recent problems with salmon and sea-trout populations in the western Highlands the Scottish Office's Freshwater Fisheries Laboratory has made a recommendation to the District Salmon Fishery Boards that if directed fishing for sea-trout cannot be banned a policy of catch and release should be considered (Anon, 1994). There is also growing interest in catch and release of salmon, particularly of fish caught late in the season, in Wales. The National Rivers Authority (Welsh Region) is encouraging the voluntary release of such salmon and had previously developed guidelines on the handling of fish intended for release. In Ireland conservation byelaws have been introduced in the south-western and western regions which prohibit the taking, possession or retention of sea-trout. There is also growing interest in catch and release fishing for salmon, particularly late in the season.

2.4 In Iceland a number of American and Icelandic fly fishermen on at least two rivers, the Grimsa and Laxa i Adaldal, have voluntarily released large salmon to holding pools for hatchery use (Grant, 1980). However, catch and release is not common in other Icelandic rivers. Similarly, it is unusual for anglers to release salmon caught in Norwegian rivers and Swedish (West Coast) rivers. In Finland, anglers also retain their catch but there is growing interest in catch and release fishing late in the season, particularly the release of female salmon, and catch and release fishing is being considered as a management measure for inclusion in the border river agreements with Norway. Following the development of recreational salmon fishing in Russia a number of fishing camps operate a policy of catch and release. In addition, until recently there were restrictions on the type of hooks that could be used on some

rivers. On the Varzuga river, for example, fishermen are only allowed to use single and double hooks and barbless hooks are encouraged. The use of treble hooks is believed to cause too much damage to fish which are to be released to the water.

3. Effects of catch and release on Atlantic salmon

3.1 During muscular activity there are a number of biochemical processes which generate energy. A detailed review of these processes is beyond the scope of this paper but under some conditions severe muscular activity may result in the death of fish. Black (1958) attributed this mortality to the injurious effects of metabolites produced during the chemical release of energy. While the precise cause of the mortality was not known he speculated that the severe acid-base disturbance following accumulation of lactic acid may be the principal cause of death. Such acidosis has a number of effects including a reduction in the oxygen and carbon dioxide combining capacity of the blood. Wood et al (1983) found that six minutes of severe exercise in rainbow trout caused a delayed mortality of about 40% over the next 12 hours, the majority of which occurred between 4-8 hours post exercise. Surviving fish showed short-lived haemoconcentration, a short-lived respiratory acidosis and a more prolonged metabolic acidosis. In dying fish the metabolic acidosis was significantly greater although still within the normal range of tolerance. They concluded that intracellular acidosis might have been the cause of death and this suggestion was supported by Tufts et al (1991) who showed that exhaustive exercise in wild Atlantic salmon resulted in a very large extra cellular acidosis which lasted for about 4 hours without any mortalities during the recovery period.

3.2 In addition to the effects of exhaustive exercise fish caught by angling may suffer damage from the gear used. Wydoski (1977) synthesised the available literature on hooking mortality for a wide range of species taken under a wide range of conditions on a wide range of gear types. The main conclusions were:

(1) The mortality of fish caught on baited hooks was usually higher than if caught on flies or lures.

(2) In general artificial lures cause a greater mortality of fish than artificial flies.

(3) Mortality of fish due to the type of hook (single versus treble) is dependent upon factors such as the size of hook used and the voracity of the fish in taking the bait, artificial fly or lure. Flies tied with single hooks are usually not taken deeply by fish and consequently do not cause high hooking mortalities.

(4) The use of barbless hooks does not significantly reduce losses of fish from hooking mortalities. However, barbless hooks reduce handling time which can be more important than hooking in overall mortality.

(5) Playing time during angling can be an important factor in mortality. The adverse effects of handling fish can be reduced by minimising the handling time and taking care not to squeeze the fish or hold it by the gills.

(6) If hooking causes damage to vital organs losses will occur within 24 hours. If the angling technique causes fatigue, delayed mortality may be more important.

(7) If fish are already under stress from physiological disturbances or habitat alterations the stress of angling and or handling may increase mortality.

3.3 Ferguson and Tufts (1992) examined the physiological effects of air exposure in rainbow trout which had been exercised to exhaustion. Survival was 100% in control fish and 88% in exercised fish but these values fell to 62% and 28% in fish which were exposed to air. The authors concluded that the brief exposure to air which commonly occurs in many catch and release fisheries, so that photographs can be taken and fish weighed, is an additional stress which may have a significant impact on the number of fish which survive.

3.4 To be of value as a management tool in relation to the conservation and enhancement of wild Atlantic salmon populations, fish which have been exercised to exhaustion, handled and possibly suffered injury caused by the gear used, must survive without substantial reduction in ecological fitness (Lewynsky and Bjorn, 1987). It is known that severe exercise may result in mortality of fish several hours later (Wood et al, 1983) and given the reputation of the Atlantic salmon as a 'fighting fish' renowned for its capacity for burst activity (Booth et al, in press) mortality following return to the water might be anticipated. Statements like 'you can't successfully release an Atlantic salmon because they fight their hearts out and would not survive upon release' are not uncommon in the angling press (Grant, 1980). However, while there is considerable literature on the physiological response and mortality following release of other salmonids, principally hatchery reared rainbow trout *Oncorhynchus mykiss*, until recently no such studies had been conducted on wild Atlantic salmon (Tufts et al, 1991).

3.5 Warner (1976) investigated the mortality following 'catch and release' of hatchery reared fall yearling (age 1+; mean length <200mm) landlocked Atlantic salmon and found that the overall hooking mortality for four different gear types (single and treble hook lures; worm fished on a single hook and fly) was 3.3% compared to 0.3% for control fish. Of this total 42.5% of the mortality occurred within 24 hours of hooking. Fish which had been caught using worm or fly suffered significantly higher mortality (5.7% and 4.6% respectively) than fish caught on lures. Mortality was significantly higher for fish caught on single hooks than those caught on treble hooks and this was attributed to the inability of the fish to ingest the treble hook. There was, however, no significant difference in mortality between worm hooked and fly hooked salmon, a result in contrast to other studies. The author attributed the low level of overall mortality in this study to the fact that the experiments were conducted in the fall when water temperatures and fish metabolism were decreasing and the fish were carefully handled and were not played to exhaustion but were landed quickly. In subsequent experiments conducted in the spring using age II hatchery reared landlocked Atlantic salmon, Warner (1979) found an overall mortality of 5% following 'catch and release' compared to less than 1% in controls. 89% of the mortalities occurred within 24 hours and of the fish that died 44% were hooked in the gill or gill arch areas and 24% in the oesophagus. No significant differences were found between the gear types used. However, where the fish were allowed to swallow the worm bait 73% died following

release, although this fell to 57% if the hook was left in place and the leader cut at the mouth.

3.6 Warner (1978) investigated the mortality incurred by trolling for lake-dwelling landlocked salmon using lures and flies during spring and fall. There was an overall mortality of 18% compared to 4% in controls, with significantly lower mortality in the fall compared to the spring, which the author attributed partly to falling water temperatures and to the better physical condition of fish in the fall. Anatomical site of hooking was shown to be important with significantly greater mortality of gill hooked fish than fish hooked in the mouth. The mortality of jaw hooked fish was significantly less than for fish hooked in the mouth and gills (combined sample). Bleeding fish suffered higher mortality (35%) than non-bleeding fish (10%). The study also showed that hook size was more important than the type of hook (single or treble) as smaller hooks were more easily ingested. A subsequent study (Warner and Johnson, 1978) investigated the mortality of landlocked salmon caught on flies and worm in a river nursery area and revealed an overall mortality of 22%. The mortality of worm hooked salmon (35%) was significantly greater than the mortality of fly hooked fish, since salmon taking a worm are more likely to ingest the bait more deeply. The study also showed that fish which bled suffered much higher mortality (86%) than fish which did not bleed (15%). These studies of landlocked salmon may not, however, be indicative of the mortality levels experienced by sea-run salmon.

3.7 On the rivers Grimsa and Laxa i Adaldal in Iceland a number of fly fishermen have voluntarily released salmon >15lbs (6.8Kg) in weight taken in the last month of the season into holding pens for hatchery use. Although no detailed statistics were kept, Grant (1980) believed the mortality of these fish to be less than 5%. He also described the results of experiments in which angled salmon taken early in the season were tagged and returned to the river. Although not scientifically robust the experiments showed that of 246 tagged fish returned to the water in 1978, 30 were caught later that year with a further 6 the following year. Some fish were caught and released several times within the same fishing season and on the basis of this information it was speculated that the mortality of Atlantic salmon caught by fly and released in freshwater does not exceed 2-4%.

3.8 Walker and Walker (1991) utilised radio-tracking of salmon caught by fly fishing in the Little Gruinard River, Scotland, in order to assess survival following release. The study showed that at least 13 of the 25 salmon caught, radio-tagged and subsequently released survived until spawning time despite the additional stress of holding and radio tagging. Angling and predation by another removed 2 other fish prematurely and another ten fish comprised those where signals were lost or where the tag had been regurgitated or released from the carcass. The authors concluded that catch and release does offer scope for increasing the number of spawning fish. Radio-tracking was also utilised in a study on the Upsalquitch River, a tributary of the Restigouche River in Canada, which indicated that survival of fish which have been angled and released to the water may be as high as 90%.

3.9 Tufts et al (1991) examined the effects of exhaustive exercise on wild Atlantic salmon collected during their spawning migration. The fish were transported to Dalhousie University and, following a period of acclimation (at 18°C), they were exercised to exhaustion by manual chasing and briefly handled so as to simulate angling. They

were not, therefore, subjected to any injury caused by hooking. Despite a large metabolic acidosis no mortalities were observed in the recovery period from these experiments, suggesting a higher overall level of fitness for burst activity in wild salmon compared to domestic salmonids. The authors concluded that the results of the study support the rationale for a 'catch and release' recreational fishery for Atlantic salmon. Similarly, Booth et al (in press) observed no mortalities in a sample of 20 salmon that were angled and transported for spawning late in the fishing season (October). In contrast to the study by Tufts et al (1991) the results of the work indicated that the magnitude of the physiological disturbance was no greater than that experienced by other species of salmonids following exhaustive exercise. The authors attributed this difference in results to differences in water temperature during the two experiments. The salmon also recovered relatively rapidly and the authors believed that the stress response in Atlantic salmon after angling must have been minimal. The low water temperature, the long period of starvation which may have reduced the potential for anaerobic capacity and the fact that salmon are probably highly adapted to cope with the physiological disturbance associated with exhaustive exercise, were identified as important factors in this regard. The authors concluded that 'catch and release' will probably have minimal impact on the survival of Atlantic salmon angled late in the season and that there are probably no negative effects on reproduction of the fish following release. While most of the experimental work was conducted on grilse, a small sample of multi-sea-winter salmon was also sacrificed and the results indicated that the physiological disturbance was no greater in multi-sea-winter salmon than in grilse. The authors considered that this suggests that the likelihood of delayed mortality in multi-sea-winter salmon as a result of late season angling is no greater, and possibly less, than in grilse.

3.10 From the information above it is clear that few detailed studies of the survival of sea-run Atlantic salmon have been conducted. There is evidence that the effects on salmon may be minimal. However, the effects on fish earlier in the season require further evaluation. The need for fisheries managers to emphasise the need for proper handling of fish to be released has been stressed (Ferguson and Tufts, 1992). Cordes (1977) stated that 'if anglers are going to practise release fishing then they must know how to release fish properly. A lot of fishermen it seems don't understand the basics of releasing fish unharmed'.

4. Conclusion

In conclusion, the limited number of studies on the effects of catch and release of Atlantic salmon indicate that, for the conditions under which the experiments were conducted, the technique may be a useful management tool, although not necessarily appropriate in all circumstances. However, it is clear from this review that very few studies of the survival following catch and release of sea-run Atlantic salmon have been conducted. There is evidence from Canadian studies that catch and release has minimal impact on survival of the fish or on their reproduction. No mortalities were observed in studies conducted in July and late in the season and no adverse effects were shown on the reproduction of salmon angled late in the season. However, the effects of catch and release on fish caught earlier in the year (January - June) requires to be evaluated. One concern about catch and release which has been expressed recently in a number of angling journals is that by releasing fish angling is no longer perceived as harvesting a natural resource but is seen as a "game for personal

pleasure" which might therefore attract more attention from organizations opposed to angling. In Canada, catch and release has been introduced primarily to reduce the level of exploitation of multi-sea-winter salmon in order to enhance the stock. Voluntary catch and release is also practised by some anglers in other countries and there is growing interest in a number of countries in response to low stock abundance. Where catch and release is practised it is important that anglers are made aware of the need to minimise the stress and physical damage caused to the fish. Guidelines such as those developed under the Atlantic Salmon Federation's Education and Public Awareness Program or the Cornell Cooperative Extension are an important contribution to this process. It might be useful for the Council to consider guidelines on techniques for handling and releasing Atlantic salmon. These might include elements on how to handle fish intended for release and the type of gear to use. Such guidelines could be available for use as appropriate in the North Atlantic area.

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COUNCIL

CNL(94)54

PRESS RELEASE

The North Atlantic Salmon Conservation Organization (NASCO), an international inter-government organization, held its Eleventh Annual Meeting in Oslo from 6-10 June. The Organization provides an international forum for cooperation on the conservation, restoration, enhancement and rational management of wild salmon stocks in the North Atlantic Ocean. It has as members governments in the North Atlantic with salmon interests (Canada, Denmark (in respect of the Faroe Islands and Greenland), Finland, Iceland, Norway, the Russian Federation, Sweden and the United States of America) and the European Union. The Presidency of NASCO is currently held by Mr Børre Pettersen, Deputy Minister of the Environment in the Norwegian Government. He and the Vice-President, Mr David Meerburg of Canada, were unanimously re-elected to serve a second two-year term.

NASCO has been concerned for some years about the potential genetic, disease and environmental risks posed by the number of escaped farmed salmon now occurring in the North Atlantic feeding grounds of the salmon and in rivers. NASCO agreed on recommendations which would go forward to the Parties laying down both a set of principles and some practical measures which would minimise the risks of adverse impacts on wild stocks. The Organization sees this process as a cooperative one with the salmon farming industry; the genetic bank formed by the wild salmon is as vital to the salmon farmers as it is to NASCO. The salmon farming industry which was represented in Oslo, and the Non-Government Observer Organizations to NASCO, supported the recommendations. The Council is eager to retain and strengthen the good relationship which has been established with the salmon farming industry. This unanimous agreement by all North Atlantic nations with salmon interests on a resolution adopting these recommendations marks a significant step forward in protecting the genetic integrity of wild salmon stocks as well as minimising the spread of diseases and parasites and other adverse impacts.

The Council also agreed on a number of other areas of cooperation, for example, improvements in comparability of catch statistics, development of guidelines on stocking and on catch and release. The Council also agreed to continue to act to prevent fishing for salmon in international waters by vessels which have been reflagged so as to avoid the provisions of the Convention and to cooperate further on surveillance in relation to this problem.

NASCO has three Commissions which cover the North Atlantic area. All three made progress. The West Greenland Commission agreed on a Regulatory Measure for the West Greenland fishery which established a catch quota of 159 tonnes for the 1994 fishery. This quota was based on a framework agreement covering 1993-1997 which had been agreed by the Commission at its 1993 meeting. The North-East Atlantic Commission established a Regulatory Measure which set a catch quota of 550 tonnes together with an effort limitation programme for the 1995 fishery in the Faroese zone. The North American Commission further developed its Protocols on Introductions and Transfers.

The Twelfth Annual Meeting will be held during 12-16 June 1995 in Glasgow.

ANNEX 25

LIST OF COUNCIL DOCUMENTS

CNL(94)0	List of Papers
CNL(94)1	Provisional Agenda
CNL(94)2	Draft Agenda
CNL(94)3	Explanatory Memorandum on the Draft Agenda
CNL(94)4	Proposed Schedule of Meetings
CNL(94)5	Election of Officers
CNL(94)6	Secretary's Report
CNL(94)7	Audited Accounts for 1993
CNL(94)8	Contributions by the Parties
CNL(94)9	Outline of 1995 Draft Budget and 1996 Forecast Budget
CNL(94)10	Report of the Finance and Administration Committee
CNL(94)11	Report on the Activities of the Organization in 1993 (not for publication)
CNL(94)12	Report of the ICES Working Group on North Atlantic Salmon
CNL(94)13	Report of the ICES Advisory Committee on Fishery Management
CNL(94)14	Report of the Standing Scientific Committee
CNL(94)15	Catch Statistic Returns by the Parties
CNL(94)16	Historical Catch Record 1960-1993
CNL(94)17	Minimum Standard for Catch Statistics
CNL(94)18	Summary of Microtag, Finclip and External Tag Releases in 1993
CNL(94)19	NASCO Tag Return Incentive Scheme
CNL(94)20	Database of Salmon Rivers Flowing into the NASCO Convention Area
CNL(94)21	Review of Salmon Related Literature

CNL(94)22	Report on Laws, Regulations and Programmes
CNL(94)23	Economic Value of Atlantic Salmon
CNL(94)24	Returns under Articles 14 and 15 of the Convention
CNL(94)25	Progress Report on the NASCO Protocol
CNL(94)26	Progress Report on Actions Taken in Accordance with the Resolution on Fishing for Salmon on the High Seas
CNL(94)27	International Cooperation on Surveillance
CNL(94)28	Report of the Working Group on Impacts of Salmon Aquaculture
CNL(94)29	Long-Term Trends in Salmon Abundance
CNL(94)30	Diseases and Parasites
CNL(94)31	Catch and Release
CNL(94)32	Guidelines on Stocking
CNL(94)33	UN Resolution on Large-Scale Pelagic Driftnet Fishing
CNL(94)34	Dates and Places of 1995 and 1996 Meetings
CNL(94)35	The Precautionary Approach to Fisheries Management
CNL(94)36	NASCO - The First Ten Years
CNL(94)37	Draft Report of the Eleventh Annual Meeting of the Council
CNL(94)38	Application for Non-Government Observer Status to NASCO
CNL(94)39	Topics for Special Sessions
CNL(94)40	Statement by the Ulster Angling Federation Limited on the Impacts of Salmon Aquaculture
CNL(94)41	NASCO Tag Return Incentive Scheme - 1994 Grand Prize
CNL(94)42	Statement by the Scottish Anglers National Association on the Impacts of Salmon Aquaculture
CNL(94)43	ICES Report of the Study Group on Interactions of Wild, Ranched (Enhanced), and Reared Salmon
CNL(94)44	Not issued

CNL(94)45	Not issued
CNL(94)46	Not issued
CNL(94)47	Statement by the International Friends of Wild Salmon on Impacts of Aquaculture on Wild Salmon Stocks
CNL(94)48	Statement by the Federation of Irish Salmon and Sea-Trout Anglers on Impacts of Aquaculture on the Wild Salmon Stocks
CNL(94)49	The Future Working Methods of NASCO
CNL(94)50	Agenda
CNL(94)51	Draft Press Release
CNL(94)52	Figures Used by the Chairman of ACFM in his Presentation to Council
CNL(94)53	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)54	Press Release
CNL(94)55	Report of the Eleventh Annual Meeting of the Council
CNL(94)56	Outline of 1995 Budget and 1996 Forecast Budget and Schedule of Contributions
CNL(94)57	Statements by Non-Government Observers and Fish Farming Industry Representatives Concerning the Impacts of Aquaculture on Wild Salmon Stocks
CNL(94)58	Decision of the Council to Request Scientific Advice from ICES

NOTE: This list contains all papers submitted to the Council prior and at the meeting. Some, but not all, of these papers are included in this report as annexes.