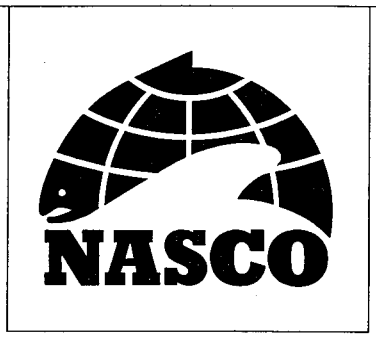
NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

ORGANISATION POUR LA CONSERVATION DU SAUMON DE L'ATLANTIQUE NORD



REPORT OF THE FOURTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION

8-12 June 1987
Edinburgh, UK

WGC (87)5

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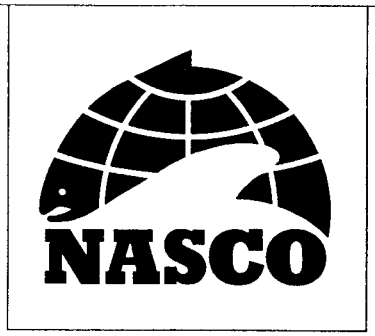

WEST GREENLAND COMMISSION

COMMISSION DU GROENLAND OCCIDENTAL

CHAIRMAN: MR EARLE McCURDY (CANADA)

RAPPORTEUR: MR GILBERT RADONSKI (USA)

SECRETARY: DR MALCOLM WINDSOR

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14 SEPTEMBER 1987
EDINBURGH

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

WEST GREENLAND COMMISSION

WGC (87)5

REPORT OF THE FOURTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION

WGC (87)5

REPORT OF THE FOURTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION OF THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION 8-12 JUNE 1987, DRAGONARA HOTEL, EDINBURGH, UK.

1. OPENING OF THE MEETING

1.1 The Fourth Annual Meeting of the West Greenland Commission in the absence of the Chairman Mr. Earle McCurdy, (Canada), was opened by Vice Chairman, Mr. Einar Lemche, (Denmark, in respect of the Faroe Islands and Greenland) on June 9, 1987. The list of participants is given in Annex 1.

2. ADOPTION OF THE AGENDA

2.1 The Commission adopted its Agenda, WGC (87)6, (Annex 2) and agreed that items 4 and 5 would be discussed jointly under item 4.

3. NOMINATION OF A RAPPORTEUR

3.1 The Commission nominated Mr. Gilbert Radonski (USA) as rapporteur for the meeting.

4. REVIEW OF THE 1986 FISHERY AND THE ACFM REPORT FROM ICES ON SALMON STOCKS

4.1 The Chairman of the ACFM, Professor Oyvind Ulltang, presented the scientific advice from ICES relevant to the West Greenland Commission, CNL (87) 3 (Annex 3) prepared in response to a request from the Commission at its Third Annual Meeting.

4.2 The representative of the EEC expressed concern at the overrun of 51 tonnes from the adjusted quota of 909 tonnes in the West Greenland fishery in 1986, and requested an explanation.

4.3 The representative of Denmark (in respect of the Faroe Islands and Greenland) explained that the free quota of 649 tonnes had been overrun by 51 tonnes because the quota was taken very rapidly (15-25 August) and that although the fishery on the free quota was closed on the 25 August, landings had been permitted until the factories closed on 26 August.

The 260 tonne quota reserved for the municipalities was consequently reduced by 51 tonnes to 209 tonnes but this was also overrun by 51 tonnes as a result of very high abundance of salmon in 3 municipalities (Nuuk, Paamiut and Maniitsoq). The fisheries in these municipalities

were closed on 29 August 1986 and the part quotas for other municipalities could not legally be reduced further. The representative of Denmark (in respect of the Faroe Islands and Greenland) attributed the final overrun to high abundance of salmon.

4.4 The representative of the EEC asked for reassurance that efforts would be taken in the future to avoid an overrun of the quota and suggested that a portion of the quota be held in reserve to prevent such a situation arising again.

4.5 The representative of Denmark (in respect of the Faroe Islands and Greenland) assured the Commission that problems of communication with the fishermen would be addressed, but was not able to comment further on seasonal reserves.

4.6 The representative of Canada expressed concern about the overrun in the West Greenland fishery and explained that Canada successfully uses seasonal reserves in their quota fisheries for other species.

4.7 The representative of the EEC noted that the quota agreed in 1986 was for two years and suggested that the overrun in 1987 could be compensated for in 1988. The representative of Denmark (in respect of the Faroe Islands and Greenland) noted that overall the Greenland catches had been 1,349 tonnes less than the quotas in previous years and suggested that this might also be taken into consideration in discussions on the overrun.

4.8 The representative of Canada explained that his Government had instituted expensive conservation measures affecting Canadian fishermen and that the Canadian harvest of Atlantic salmon was still under historical levels. He could not, therefore, accept the suggestion put forward by the Danish representative.

4.9 The representative of Canada referred to reports NAC (87)7 Canadian Salmon Catches in Tonnes (Annex 4) and NAC (87)8 Status of Atlantic Salmon Stocks in Atlantic Canada and Advice for their Management in 1987 (Annex 5) and asked that they be introduced for consideration by the West Greenland Commission.

5. REGULATORY MEASURES

5.1 The representative of the USA asked the representative of Denmark (in respect of the Faroe Islands and Greenland) to confirm that the 1987 quota would be adjusted to 909 tonnes corresponding to a 15 August starting date.

5.2 The representative of Denmark (in respect of the Faroe Islands and Greenland) advised that he could not respond since discussions were currently underway with the Greenland fishermen.

5.3 The representative of the USA suggested that in preparation for the debate on regulatory measures at the Fifth Annual Meeting of the Commission, consideration should be given to quotas based on numbers of fish as used in the Pacific salmon fishery.

6. REQUEST FOR SCIENTIFIC ADVICE FROM ICES

6.1 The Commission reviewed and accepted the relevant section of CNL (87)35 (Annex 6) and agreed to recommend it to the Council as part of the annual request for scientific advice from ICES.

6.2 The representative of Denmark (in respect of the Faroe Islands and Greenland) noted the need for additional expertise on stock assessment in the ICES Working Group and asked for clarification of the conditions governing attendance at ICES Working Group meetings. The representative of ICES explained that the member countries select the experts to attend the Working Groups.

7. OTHER BUSINESS

7.1 The Vice-Chairman advised the Commission that he would resign at the end of the Fourth Annual Meeting and called for nominations for the office. The Commission elected Mr Arni Olafsson (Denmark in respect of the Faroe Islands and Greenland) as Vice-Chairman. The Commission expressed its gratitude to Mr Einar Lemche for his work as Vice-Chairman.

7.2 The representative of Denmark (in respect of the Faroe Islands and Greenland) expressed concern at the amount of time accorded to the overrun of 51 tonnes in the Greenland fishery while the estimate of 3,500 tonnes unreported catch in home waters was not debated. The EEC representative stated that there was a clear distinction between these two elements. The overfishing of 51 tonnes related to a regulatory measure adopted by this Commission and as such the implementation and respect of this measure was the legitimate concern of the Commission. In contrast, the figure of 3,500 tonnes was an estimate or guess relating to the entire North Atlantic area the basis of which had not been established or explained.

7.3 The representative of the USA considered that an unreported catch approximating to 50% of the declared home water catch was unacceptable and suggested that the Secretary, when collecting catch statistics from the Parties, should request details of best estimates of unreported catches.

8. DATE AND PLACE OF NEXT MEETING

8.1 The Commission agreed to hold its next meeting during the Fifth Annual Meeting of the Council, 13-17 June 1988 in Reykjavik.

9 CONSIDERATION OF THE DRAFT REPORT OF THE MEETING

9.1 The Commission agreed that a report of the meeting would be agreed by circulation of a draft after the meeting.

10 JUNE 1987
EDINBURGH

ANNEX 1

NORTH ATLANTIC SALMON CONSERVATION ORGNANIZATION
FOURTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION
8-12 JUNE 1987, DRAGONARA HOTEL, EDINBURGH, UK.

LIST OF PARTICIPANTS

* Denotes Head of Delegation

PARTIES - MEMBERS OF THE COMMISSION

CANADA

*MR W A ROWAT	Representative Atlantic Fisheries Service, Ottawa, Ontario
DR G NADEAU	Representative Universite Laval, Quebec
DR W M CARTER	Atlantic Salmon Federation, St Andrews, New Brunswick
DR D MEERBURG	Department of Fisheries and Oceans, Ottawa, Ontario
MS L COTE	Department of Fisheries and Oceans, Ottawa, Ontario
MR B VEZINA	Department of Fisheries and Oceans, Ottawa, Ontario
MR R ANDREWS	Department of Fisheries, St John's Newfoundland
DR R PORTER	Department of Fisheries and Oceans, St Johns, Newfoundland
MR B STEINBOCK	Department of External Affairs, Ottawa, Ontario
MR D A MacLEAN	Department of Fisheries, Halifax, Nova Scotia

DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

*MR K HOYDAL	Representative Foroya Landsstyri, Torshavn, Faroe Islands
MR E LEMCHE	Representative Greenland Home Rule, Nuuk, Greenland

MR O SAMSING	Ministry of Foreign Affairs, Copenhagen
MR A OLAFSSON	Ministry of Foreign Affairs, Copenhagen
MR J MOELLER JENSEN	Greenland Fisheries and Environment Research Institute, Copenhagen
MR A P DAM	Foroya Landsstyri, Torshavn, Faroe Islands
MR J PAULSEN	Greenland Home Rule, Nuuk, Greenland
MR S POULSEN	Faroese Commercial Office, Aberdeen
MR H JAKUPSSTOVU	Foroya Landsstyri, Torshavn, Faroe Islands
MS L RISAGER	Greenland Home Rule, Nuuk, Greenland

EEC

*MR SCHIMIEGELOW	Representative Fisheries Directorate-General, EEC Commission, Brussels
MR E J SPENCER	Representative Fisheries Directorate-General, EEC Commission, Brussels
MS E TWOMEY	Department of the Marine, Dublin
MR R G J SHELTON	Department of Agriculture and Fisheries for Scotland, Pitlochry
DR R JOERDENS	Federal Ministry of Food, Agriculture and Forestry, Bonn
MR S McDONALD	Permanent Representation of Ireland to the EEC, Brussels
MR B PALLISGAARD	Ministry of Fisheries, Copenhagen
MR R B WILLIAMSON	Department of Agriculture and Fisheries for Scotland, Edinburgh
DR C PURDOM	Ministry of Agriculture, Fisheries and Food, Lowestoft
MR T POTTER	Ministry of Agriculture, Fisheries and Food, Lowestoft
MR N L D BROWN	Ministry of Agriculture, Fisheries and Food, London
MR W MALCOLM	Ministry of Agriculture, Fisheries and Food, London

USA

*MR A E PETERSON	Representative National Marine Fisheries Service, Woods Hole, Mass
DR F E CARLTON	Representative National Coalition for Marine Conservation, Savannah, Georgia
DR V C ANTHONY	National Marine Fisheries Service, Woods Hole, Mass
MR H S TINKHAM	US Department of State, Washington DC
DR J E WEAVER	US Fish and Wildlife Service, Boston, Mass
DR P RAGO	US Fish and Wildlife Service, Kearneysville, WV
DR K FRIEDLAND	National Marine Fisheries Service, Woods Hole, Mass
MR W J VAIL	US Fish and Wildlife Department, Augusta, Maine
MR D SWANSON	National Marine Fisheries Service, Boston, Mass
MR A NEILL	National Marine Fisheries Service, Woods Hole, Mass
MR J K McCALLUM	US House of Representatives, Washington DC
MR A STOUT	Atlantic Salmon Federation, Hanover, New Hampshire

OBSERVERS - PARTIES

NORWAY

*MR S A MEHLI	Representative Directorate for Nature Management, Trondheim
MR L P HANSEN	Directorate for Nature Management, Trondheim
MR G F RIEBER-MOHN	Regional Boards of Salmon Fishery, Oslo

SWEDEN

*MR S DE MARE	Representative Ministry of Agriculture, Stockholm
MR I OLSSON	Representative National Board of Fisheries, Goteburg

OBSERVERS - NON PARTIES

ICES

DR B B PARRISH	International Council for the Exploration of the Sea, Copenhagen
PROF O ULLTANG	Institute of Marine Research, Bergen
DR E ANDERSON	International Council for the Exploration of the Sea, Copenhagen

SECRETARIAT

SECRETARY	DR M L WINDSOR
ASSISTANT SECRETARY	DR P HUTCHINSON

9 JUNE 1987
EDINBURGH

ANNEX 2

WGC (87)6

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
FOURTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION
8-12 JUNE 1987, DRAGONARA HOTEL, EDINBURGH, UK

	AGENDA	PAPER NO
1.	Opening of the meeting	
2.	Adoption of the agenda	WGC (87)2
3.	Nomination of a rapporteur	
4.	Review of the 1986 fishery and ACFM report from ICES on salmon stocks	CNL (87)3
5.	Regulatory measures	
6.	Request for scientific advice from ICES	
7.	Other business	
8.	Date and place of next meeting	
9.	Consideration of the draft report of the meeting	

JUNE 1987
EIDNBURGH

ANNEX 3

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

COUNCIL

CNL (87)3

SCIENTIFIC ADVICE FROM ICES

REPORT OF THE ADVISORY COMMITTEE ON FISHERIES MANAGEMENT (ACFM)

(SECTIONS 1-5.2 AND 7-7.8)

This paper makes reference to the report of the meeting of the ICES Working Group on North Atlantic Salmon (Copenhagen, 9-20 March 1987). That report is not annexed here but is available on request to the Secretariat.

NORTH ATLANTIC SALMON

1. REQUEST FOR SCIENTIFIC ADVICE

The advice below and the appended report of the Working Group on North Atlantic Salmon respond to questions posed by ICES and the Council of the North Atlantic Salmon Conservation Organization (NASCO). ICES requested consideration of how to set catches within safe biological limits. NASCO posed questions with respect to its three Commission areas as presented in items 5-7 in Appendix 1 of the Working Group report. Every question posed is addressed below. Because the same or closely related questions were posed for more than one NASCO Commission area and because reordering the presentation allowed related questions to be answered together without repetition of background material, responses have been ordered by topic and not in the sequence of questions asked. The heading to each section lists the NASCO questions responded to in the section. All tables and numbered figures referred to are found in the Working Group report.

In recent years, demands for advice from ACFM have increased. ACFM has been able to provide advice by drawing on the extensive data bases of participating member countries. Although these data bases continue to expand, it has proved difficult to provide complete answers to increasingly complex questions posed by NASCO and ICES. Although ACFM is able to provide much descriptive information pertaining to the fisheries and salmon harvest, it has not been able to provide accurate estimates of non-reported catches and fishing effort, nor to designate origins beyond continent of origin in the sea fisheries. Advice has been provided in the form of ranges of estimated impacts of the mixed stock fisheries. Narrowing these ranges is dependent on new information regarding natural mortality, non-catch fishing mortality, and tag reporting rate, which seems attainable only through further extensive and costly research efforts.

In general, ACFM is able to answer questions pertaining to catches and the biology of the different stocks and provide general estimates of yield consequences relative to the mixed stock fisheries. It is not able, however, to advise on appropriate catch levels, nor is it likely to be able to do so without new and detailed information on salmon abundance in the fishing areas and major advances in stock forecasting capabilities. Both the development of appropriate methodologies and their required application will be costly.

2. FRAMEWORK FOR SCIENTIFIC ADVICE ON MANAGEMENT OF SALMON

ICES requested consideration of the concept of safe biological limits for the exploitation of Atlantic salmon in the North Atlantic in 1986 and again in 1987. The issue was explored on a preliminary way in ACFM's 1986 advice to NASCO. Further consideration of this issue confirmed that there exist formidable practical obstacles to conserving salmon stocks by controlling exploitation in relevant fisheries so as to achieve an adequate spawning biomass.

Despite the complicating factors of hundreds of stocks, many or most of which are vulnerable to multiple fisheries which exploit many stocks in unknown and varying proportions, the need for a systematic approach to conservation is evident. Given the complex nature of the problem, a special effort is required to address the framework for scientific advice on the management of North Atlantic salmon. Consequently, ACFM recommends that three days to one week be set aside in 1988 for examination of an appropriate framework for such advice, with thoroughly researched background papers and participation of Working Group members together with other experts. This could be carried out as part of the Working Group meeting or as a special meeting sponsored by ICES. The ability of the Working Group to consider this issue would be improved if a Study Group were established to prepare data relevant to the North American Commission of NASCO and if its workload were reduced in 1988.

3. NOMINAL CATCHES OF SALMON IN HOME WATERS

Nominal catches of salmon in home waters (in tonnes round fresh weight) for 1960-1985 are given in Table 1. Figures for 1986 are incomplete. The 1986 catches in home waters, apart from that reported by Finland, are higher than the corresponding 1985 values. ACFM is aware of unreported catches throughout the North Atlantic. Due to the lack of data from some countries, no precise estimates were obtained. However, ACFM considers the unreported catch to be of the order of 3,500 t for all countries.

4. CATCH IN NUMBERS BY SEA AGE FOR RECENT YEARS (NE a)

Reported national salmon catches in numbers and weight for eleven countries are given in Table 2. As in Table 1, catches include both wild and reared salmon.

5. NATURAL MORTALITY IN THE SEA (NR e)

5.1 The Effects of Predation on Natural Mortality (WG, H, NE i)

Predators of salmon from the smolt stage onwards include terrestrial and marine mammals, birds, and fishes. Results of studies presented to the Working Group suggest that birds such as cormorants and fishes such as cod can exert high levels of mortality, particularly during the smolt and post-smolt stages.

5.2 Estimated Natural Mortality Rates (WG k, Ne e)

Published estimates of the marine natural mortality of Atlantic and Pacific salmon were considered, together with some data relevant to the natural mortality of Icelandic ranched salmon. Since the natural mortality in the marine phase has not been precisely estimated, the importance of this factor in assessing the impacts of the West Greenland and Faroese fisheries on home-water stocks was illustrated by using monthly natural mortality rates of 0.01 and 0.02 subsequent to these fisheries.

Assuming a monthly natural mortality rate of 0.01 subsequent to the Faroese fishery, analysis of data for salmon from the Burrishoole River (Ireland) and River Imsa (Norway) gave estimates of 50-80% mortality from leaving fresh water until the mid-point of the Faroese fishery.

7. QUESTIONS OF INTEREST TO THE WEST GREENLAND COMMISSION OF NASCO

7.1 The West Greenland Fishery, 1986 (WG a)

Nominal catches for the West Greenland salmon fishery from 1960 to 1986 are given in Table 14. In 1986, the fishery opened on 15 August and ended on 1 December. The total catch was 960 t, 51 t more than the TAC of 909 t. The 909 t TAC and 15 August opening date corresponded to the agreed TAC of 850 t for an opening date of 1 August. There was a "free quota" of 649 t available to all licensed fishermen and a "small boat quota" of 260 t which was allocated to districts and restricted to boats less than 30 feet. In total, 670 t were taken by small boats and 290 t by boats over 30 feet. The free quota was taken in 10 days and was exceeded by 51 t when it was closed.

The 1986 geographical distribution differed from previous years (Table 15). The biggest divisional catch was from Division 1F in 1986, while it had been from Divisions 1B to 1E in the past. Catches decreased from south to north.

Catch rate data were available from 17 vessels. Catch rates in Divisions 1D and 1E were higher than in 1C and 1F. Catch rates in 1986 were higher than those observed in 1970-1975 (Table 16). Larger, non-Greenlandic vessels had lower catch rates in 1970-1975 than did smaller, Greenlandic vessels in 1975 and 1986, due to different fishing patterns and locations and ways of operating the fishing gear.

The very high catch rates in 1986 and the highest observed catch taken in the first two weeks in 1986 could indicate a higher abundance or availability of salmon to the gear than in previous years.

7.1.1 Origin of salmon at West Greenland

A discriminant analysis of scale characters from salmon sampled in the West Greenland fishery in 1986 was developed and tested using 319 fish caught at West Greenland whose origin was known from tags or protein electrophoresis. The discriminant function had a mis-classification rate of 19.5% and an error rate of ±2.5%. Applying this function to catch samples gave an estimated proportion of North American salmon of 54% in 1986 (Table 18). The estimated proportion varied from 63% in Division 1E to 44% in Division 1F.

Using Carlin tag recoveries and a model similar to that of Section 6.3, ACFM estimated the number of Maine-origin salmon caught at West Greenland from 1967 to 1985 (Table 20). The estimated total catch ranged from 230 in 1967 to 2,875 fish in 1974. From 1970 to 1975, catches averaged about 1,600 fish. Since 1976, it has averaged about 1,300 fish. During this period, there was an increasing number of MSW salmon returning to Maine rivers, partly due to increased stocking of smolts.

An independent estimate of numbers of Maine-origin salmon caught at West Greenland for 1976 to 1985 was obtained using the estimated proportion of North American hatchery-origin fish in the catch from scale analysis. Estimates were about four times higher than those obtained by the Carlin tag method and the correlation between the two series was 0.84. ACFM concluded that possible mis-classification of river age and possible biases in sub-sampling of catches should be investigated further.

7.1.2 Biological characteristics

Alternative estimates of the proportionate composition of the catch by continent of origin for 1982 to 1986, obtained by weighting samples from a division by the catch in that division, are presented in the Working Group report. These differ by up to 5% from those shown in Table 18. The weighted 1986 proportion of 56% North American origin corresponds to a catch of 513 t or 179,800 salmon from North America and 447 t or 140,300 salmon from Europe.

Fish length, weight, and age data were compared for the two continents of origin in Table 21. As previously, North American origin salmon were shorter and lighter than those from Europe. Sea and smolt age compositions are presented in Tables 22 and 23. The mean smolt age of North American origin salmon increased from that observed in the previous three years but remained below the 1968-1981 average. There were no corresponding changes in smolt age in European-origin salmon.

The estimated sea age composition for 1986 of 96.2% 1SW, 3.0% 2SW, and 0.8% previous spawners showed a lower proportion of 2SW fish and previous spawners than in the previous three years.

7.2 Salmon Stock Abundance in the West Greenland Fishery (WG b)

ACFM provided rough estimates of salmon stock abundance in the West Greenland fishery using tag recoveries of Maine-origin salmon and assuming that all Maine-origin 1SW salmon extant at the time of the West Greenland fishery were present in the fishery and that all salmon present at West Greenland were subject to the same exploitation rate.

The analysis provided estimates of salmon abundance between 1969 and 1985 ranging from 1 to 2 million fish of all sea ages (Table 25). The lowest estimates of abundance occurred in 1978, 1983, and 1984 when the quota was not taken. Estimated abundance was also low in 1976 and 1982.

A comparison of abundance estimates and catches suggested that the exploitation rate at West Greenland ranged from 33% to 54% during the pre-quota years (1969-1975) and from 11% to 37% since then (Table 25). The rates declined considerably in 1983-1985 to an average of 14%. ACFM noted that these estimates are very sensitive to the tag reporting rate. Although they appear reasonable, they should be viewed as preliminary.

7.3 Effects of Varying Levels of Harvest at Greenland on Subsequent Returns of Large Salmon to Home Waters (WG c)

ACFM reviewed the 1980 assessment of the effects of the West Greenland salmon fishery on subsequent stocks and yields in home waters. Subsequent assessments examined equivalent TACs for differing opening dates. Although parameter values used in the calculations are known to vary from year to year and some parameters are not precisely estimated, there were not sufficient changes or trends to warrant a new assessment. For reasons discussed in Section 5.2, calculations were carried out using monthly natural mortality rates of 0.01 and 0.02 for the period following the Greenland fishery.

ACFM estimated that, on the average, for each tonne of European-origin salmon in the reported catch at West Greenland, 1.22 to 1.69 t would be lost to home-water returns in Europe, and for each tonne of North American origin salmon, 1.45 to 2.02 t would be lost to home-water returns in North America. These ranges reflect the range of parameter values used in the calculations and should not be interpreted as confidence limits.

Applying these figures to the 1986 West Greenland catch of about 447 t of European-origin salmon and 513 t of North American origin salmon, total losses to home waters were estimated to be 545-755 t for European stocks and 744-1,036 t for North American stocks. The combined total losses are estimated to be from 1,287 to 1,791 t.

7.4 Effects of Opening Date and Quota on Number of Salmon Caught at West Greenland (WG m)

ACFM reviewed the analysis on which it had based its advice on this question in 1982 and considered a new analysis using relative frequencies of weight classes by month in West Greenland salmon catches.

ACFM concluded that the new analysis generally confirmed its earlier conclusion, which was based on a more detailed model, that the catch level corresponding to various opening dates giving the same impact on stocks is:

$$\hat{Y} = 1183.79 + 5.4398x - 0.00710x^2$$

where x is the opening date with 9 August = 0 and 1184 is the catch for that opening date.

7.5 Historical Catches and Sustainable Yield (WG 1)

ACFM reviewed historical catches of North American origin salmon and considered catch levels corresponding to sustainable yields. Table 27 shows catches in North America from

1910 to 1985 and estimated catches of North American origin salmon at West Greenland from 1960 to 1985. ACFM expressed concern regarding the reliability of all catch figures prior to 1970.

Sustainable yield was defined as any level of harvest that could be maintained on a continuing basis. In the context of historical catches and also considering the complexity of the fisheries involved, ACFM noted several concerns with the application of this concept to manage the North American Atlantic salmon resource. Large variation in annual productivity is evident in the historical catch statistics. The sea fisheries harvest a mixture of stocks of considerably varying productivity. Catches of salmon at differing sea ages are not equivalent in their impact on home-water returns and spawning escapements. Setting a single catch level for all North American origin salmon would include assigning a level of catch to the Greenland fishery, thereby affecting European stocks also caught there. Finally, it was noted that application of a management system based on maintaining a sustainable yield constitutes a major change in the present system whereby stocks are managed on the basis of satisfying stock conservation requirements.

ACFM considered a proposal to set a TAC of 2,650 t for North American-origin salmon, equal to the mean of historical catches from 1948 to 1985. This level was not proposed as a sustainable yield but as a ceiling subject to downward adjustments. The TAC at West Greenland under such a procedure would depend on the division of this catch between Canada and West Greenland as agreed by NASCO. The 1986 catch at West Greenland and in Canada relates to a North American catch of 2,346 t (840 + 1,506). This is based on the 960 t catch at West Greenland assuming half is of North American origin which, if taken in North American home waters, would equal 840 t. ACFM noted that the concerns expressed in the previous paragraph applied in varying degrees to all levels of TAC.

7.6 Home-Water Fisheries and Stocks

7.6.1 Impact of management measures taken and proposed by states of origin on home-water catches and spawning escapements of salmon (WG d)

Management measures of European states of origin are discussed in Section 8. Existing management measures in North America, as described in last year's report, remain in effect.

New conservation measures for 1986 in the Newfoundland-Labrador fishery are:

- closure of the commercial salmon fishery on 15 October;
- a limit of 15 fish per season for recreational fishermen;
- a requirement that all commercially caught salmon be tagged with market tags;

A mandatory registration system to monitor catches for all MSW salmon taken by angling in Maine will take effect in 1987.

Based on average historical catches, the reduction in landings associated with area closures of Canadian salmon fisheries in some areas was 22% for MSW (212 t) and 3% for 1SW (16 t) salmon in 1986. Similarly, delayed seasons were expected to give a reduced catch of 74 t of MSW salmon and 6 t of 1SW salmon, some of which might be subject to mortality in later fisheries. Closure of the Newfoundland-Labrador salmon fishery on 15 October would reduce the catch by an average of 7 t of MSW and immature 1SW salmon.

Returns to Canadian rivers in 1984 to 1986 were higher than predicted, with the exception of the Saint John River. ACFM confirmed that the increased returns to rivers were consistent with management measures adopted in 1984 to 1986 and that these measures had reduced the harvest of salmon in other Canadian fisheries, particularly of MSW salmon.

Additional regulations placed on recreational fishermen in the Penobscot River of Maine beginning in 1985 reduced the exploitation rate to 10% as compared with previous estimates of 22-27%.

7.6.2 Spawning escapements and target spawning biomass for salmon stocks occurring in the West Greenland Commission area (WG f)

Target spawning escapements and 1986 spawning escapements were provided for six Canadian rivers and three USA rivers. Targets were exceeded in four Canadian rivers; in the remainder, they were not met. Spawning escapements were presented for four European rivers.

7.6.3 Exploitation rates in home waters for salmon stocks occurring in the West Greenland Commission area (WG j)

Exploitation rates for European rivers are discussed in Section 8. Within Canada, the Conne River salmon fishery in Newfoundland had an exploitation rate of 28% in 1986 and the Saint John River had exploitation rates from 25% to 40% for 1SW and 29% to 62% for MSW salmon during 1983-1986.

Estimated exploitation rates for the Penobscot River, Maine varied from 5% to 15% for 1SW and 12% to 35% for MSW salmon from 1982 to 1986.

7.7 Tagging of Salmon (WG i)

In 1985, 5% of the West Greenland catch was screened for microtags and 34 microtags were recovered from the 14,319 fish examined (tags were detected but not recovered in two fish). In 1986, 10% of the catch was examined and microtags were recovered from 70 of 30,360 fish examined. In 1985, 90% of the 34 tags read were from Ireland. In 1986, 31% were from England and Wales, 27% from Canada, 26% from Ireland, 10% from the USA, and 3% each from Iceland and Scotland.

ACFM noted that analysis of external tag recoveries from Greenland was proceeding and discrepencies in numbers of tags sent and received had been resolved. Additional written feedback to laboratories forwarding tags was recommended. Completeness of data accompanying tag returns has varied. Trends in completeness, however, of reported data paralleled estimated trends in tag reporting rates.

Tag rewards in Greenland increased to 100 D.Kr. in 1986. This increase in reward and improved publication of the programme led to increased recovery of tags, some of which had been held by fishermen for several years.

External tags from Canada (54), the USA (58), Scotland, Norway, and Sweden were recovered in 1986.

Tag reporting rates for external tags recovered at West Greenland were estimated using variations in the proportion of tags recovered from two North American rivers. Relative rates were calibrated against the value of 0.8 calculated from a 1972 experiment. The results are presented in Table 36. There is a decline in the estimates from about 80% in the early 1970s to 40% at the end of the decade, followed by an increase to about 80% in the mid 1980s.

Microtagging programs were discussed. Many purposes exist for such programs. The ANACAT Committee of ICES compiles an annual listing of tags and finclips applied. ACFM noted that some countries were not reporting and the delay of a year or more in publishing the list posed problems in the case of Atlantic salmon. The Working Group provided an updated table of 1985 releases and a preliminary draft of a 1986 table (Table 33). More than 600,000 microtags were applied in 1985 and preliminary listings for 1986 exceed 875,000. In all known 1986 microtag applications, the adipose fin was clipped.

7.8 Accuracy of Classification by Continent of Origin and Accuracy of Age Composition Estimates (WG g)

The accuracy of classification by continent of origin was discussed in Section 7.1. The accuracy of river age composition by continent of origin is also important. It was cal-

culated that the random sample size taken in 1986 would allow estimation of the proportion of river age 1 salmon from North America to about ± 20% of its value. However, other sources of error of comparable magnitude may exist, such as biases due to the way the catch was sub-sampled and biased determination of river age. ACFM recommended that these possibilities be examined further.

JUNE 1987
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ANNEX 4

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

WEST GREENLAND COMMISSION

NAC (87)7

CANADIAN ATLANTIC SALMON CATCHES IN TONNES

(February 18, 1987)

TABLE. Canadian Atlantic Salmon Catches in Tonnes since 1960 and Numbers since 1982 (Information provided to the International Council for Exploration of the Sea (ICES))

Year	Grilse		Salmon		Total	
	tonnes	numbers	tonnes	numbers	tonnes	numbers
1960	-		-		1,636	
1961	-		-		1,583	
1962	-		-		1,719	
1963	-		-		1,851	
1964	-		-		2,069	
1965	-		-		2,116	
1966	-		-		2,359	
1967	-		-		2,863	
1968	-		-		2,111	
1969	-		-		2,202	
1970	761		1,562		2,323	
1971	510		1,482		1,992	
1972	558		1,201		1,759	
1973	783		1,651		2,484	
1974	950		1,589		2,539	
1975	912		1,573		2,485	
1976	785		1,721		2,506	
1977	662		1,883		2,545	
1978	320		1,225		1,545	
1979	582		705		1,287	
1980	917		1,763		2,680	
1981	818		1,619		2,437	
1982*	716	358,000	1,082	240,000	1,798	598,000
1983*	513	265,000	911	201,000	1,424	466,000
1984*	467	234,000	645	143,000	1,112	377,000
1985	593	333,084	540	122,621	1,133	455,705
1986	756	408,521	750	158,773	1,506	567,294

The 1986 total catch of salmon (1,506 tonnes) is:

- 4.7% below the previous 5 year mean (1,580.8)
- 18.2% below the previous 10 year mean (1,841.7)
- 23.9% below the previous 15 year mean (1,978.5)
- 27.6% below the previous 20 year mean (2,079.4)

For the MSW (multi-sea-winter) salmon only, the catch in 1986 of 750 tonnes is:

- 21.8% below the previous 5 year mean (959.4)
- 37.9% below the previous 10 year mean (1,208.4)
- 42.5% below the previous 15 year mean (1,305.4)

For the Grilse only, the catch in 1986 of 756 tonnes is:

- 21.7% above the previous 5 year mean (621.4)
- 18.6% above the previous 10 year mean (637.3)
- 14.1% above the previous 15 year mean (662.3)

NOTE: ALL CATCH FIGURES FOR 1986 ARE PRELIMINARY

* Numbers for 1982-84 are estimated

(February 18, 1987)

NOMINAL CATCHES (PROVISIONAL) OF ATLANTIC SALMON IN CANADA
FOR 1986 (IN KG ROUND FRESH WEIGHT)

	GRILSE	% OF TOTAL	SALMON	% OF TOTAL	TOTAL	% OF TOTAL
QUEBEC						
R	9,521	1.3	56,740	7.6	66,261	4.4
C	7,390	1.0	68,469	9.1	75,859	5.0
Total	16,911	2.3	125,209	16.7	142,120	9.4
NFLD.						
R	62,570	8.3	1,941	0.3	64,511	4.3
C	582,483	77.1	598,411	79.7	1,180,894	78.4
Total	645,053	85.4	600,352	80.0	1,245,405	82.7
MARITIMES						
R	88,042	11.7	0	0.0	88,042	5.8
C	0	0.0	0	0.0	0	0.0
Total	88,042	11.7	0	0.0	88,042	5.8
NATIVE FOOD FISHERY (ALL AREAS)	5,702	0.8	24,911	3.3	30,613	2.0
TOTAL	755,708	100.0	750,472	100.0	1,506,180	100.0

R = Recreational (TOTAL = 218,814 kg or 14.5%)
C = Commercial (TOTAL = 1,256,753 kg or 83.4%)

NOTE: ALL CATCH FIGURES FOR 1986 ARE PRELIMINARY

(February 18, 1987)

TABLE: A COMPARISON OF THE OVERALL 1983, 1984, 1985 AND 1986 ATLANTIC SALMON FISHERIES* (IN TONNES)

AREA	GRILSE				SALMON				TOTAL			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
QUEBEC												
R	4.2	4.0	7.1	9.5	46.6	37.8	47.7	56.7	50.8	41.8	54.8	66.3
C	6.4	1.5	4.2	7.4	88.1	60.6	65.5	68.5	94.5	62.1	69.8	75.9
TOTAL	10.6	5.5	11.3	16.9	134.7	98.4	113.2	125.2	145.3	103.9	124.6	142.1
NEWFOUNDLAND												
R	55.8	63.0	61.7	62.6	8.0	3.4	1.2	1.9	63.8	66.4	62.9	64.5
C	401.5	346.3	464.0	582.5	615.0	475.1	398.8	598.4	1016.5	821.4	862.9	1,180.9
TOTAL	457.3	409.3	525.7	645.1	623.0	478.5	400.1	600.4	1080.3	887.8	925.8	1,245.4
MARITIMES												
R	29.5	34.8	52.9	88.0	37.5	2.0	0	0	67.0	36.8	52.9	88.0
C	15.6	14.9	0	0	115.8	41.0	0	0	131.4	55.9	0	0
TOTAL	45.1	49.7	52.9	88.0	153.3	43.0	0	0	198.4	92.7	52.9	88.0
NATIVE	?	2.1	2.5	5.7	?	25.0	26.3	24.9	?	27.1	28.9	30.6
TOTAL	513.0	466.6	592.6	755.7	911.0	644.9	539.7	750.5	1424.0	1111.5	1132.3	1,506.2

* Numbers may not add directly due to rounding process.

R = Recreational
C = Commercial

NOTE: ALL CATCH FIGURES FOR 1986 ARE PRELIMINARY

(February 18, 1987)

TABLE. Harvest by Zone in the Newfoundland Commercial Salmon Fisheries, 1978-82 Average and Yearly Since 1983

Zone	1978-82 Average Catch (Tonnes)	1983 Catch (Tonnes)	1984 Catch (Tonnes)	1985 Catch (Tonnes)	1986 Catch (Tonnes)	1986 Compared to 1978-82 Average %
1	124	81	51	72	89	-28
2	485	286	211	139	294	-39
3	257	191	134	123	190	-26
4	166	125	128	111	186	+12
5	70	58	60	72	59	-16
6	57	30	35	65	49	-14
7	45	23	20	25	19	-58
8	40	24	32	31	24	-67
9	17	9	12	11	9	-47
10	36	22	28	51	48	+33
11	54	44	34	101	67	+24
12	79	53	0	0	0	-100
13	40	33	43	32	73	+83
14	36	37	33	30	73	+103
TOTAL	1,504	1,016	821	862	1,181	-21
INSULAR NFLD. ONLY	895	649	559	651	798	-11

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ANNEX 5

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

WEST GREENLAND COMMISSION

NAC (87)8

STATUS OF ATLANTIC SALMON STOCKS IN ATLANTIC CANADA AND ADVICE FOR THEIR MANAGEMENT IN 1987

Canadian Atlantic Fisheries
Scientific Advisory Committee

CAFSAC Advisory Document 86/26
(Revised)

The Status of Atlantic Salmon Stocks in Atlantic Canada and Advice for their Management in 1987

At its meeting of December 4-5, 1986, CAFSAC considered available data and analyses concerning the general status of Atlantic salmon stocks throughout Atlantic Canada and, in particular, the status of Atlantic salmon stocks in Miramichi, Restigouche, Saint John, Margaree and Conne rivers.

STATUS OF SPECIFIC STOCKS

Miramichi River

As in the previous two years, the harvest of multi-sea-winter (MSW) salmon in the Miramichi River in 1986 was restricted: there was no drift net or trap net fishery; anglers were allowed to retain one-sea-winter (1SW) salmon only; and, as in previous years, native fisheries were not restricted by quota. Total catches in the period 1951-1970 were at about an annual level of 77,000 fish but with much increased catches in 1964-67, the highest catch being about 162,000 fish in 1967. Catches in the period 1971-83 were at about the 37,000 level. Catches in 1985 and 1986 are given below (number of fish):

	1985		1986	
Fishery	MSY	1SW	MSW	1SW
Native	327	546	640	1,988
Angling*	--	18,439	--	27,051
Total	327	18,985	640	29,039

*Estimates

Returns of MSW salmon in 1986 were about 7% greater than was predicted in 1985 while returns of 1SW salmon were three times greater than the recent average. The high return of 1SW fish appears to be the result of unusually high survival of salmon to maturity. Total estimated returns are shown in Figure 1.

Spawning escapements in 1986 were estimated by two methods: the first, assumes that the Millbank Trap catches a constant proportion of the salmon passing up the river; and the second relates the catches of returning adults in Millbank Trap to the subsequent parr density. The first method indicated that spawning was 160% of the requirement, the second indicated that it was 123%. Both methods depend upon the efficiency of Millbank Trap. An experiment in 1986 gave similar results to one in 1985, that indicated that the efficiency of Millbank was less than half of a previous estimate made in 1973. It is not clear which estimate of efficiency is more appropriate for intervening years. The new estimates of efficiency were used to calculate 1985 and 1986 returns only, but it is not known if the efficiency of Millbank Trap was different in other years, especially since the advent of dredging in 1981.

The forecast of MSW salmon returns in 1987 was based on an historical relationship between returns of 1SW salmon to the Miramichi River and returns of MSW salmon in the following year. The predicted return in 1987 is 54,200 MSW salmon, with 95% confidence limits of 31,019-77,320.

There is no method available to predict the numbers of returning 1SW salmon, but based on a correlation between the rate of cooling of water in the southern Gulf of St. Lawrence in September and October, and the return of 1SW salmon the following year, the return in 1987 may be less than the average (38,000) in recent years.

The surplus to spawning requirements in 1987 is estimated to be 30,600 salmon and 15,000 grilse. There are wide confidence limits around the MSW salmon forecast and there is uncertainty about the efficiency of Millbank Trap, so that caution is recommended in increasing the exploitation of MSW salmon in 1987, particularly as the increase in the numbers of returning MSW salmon are forecast for 1987 only.

Restigouche River

Restrictions on the harvest of Atlantic salmon from the Restigouche River in 1986 were similar to those in 1985: no commercial fishery on either the New Brunswick or Quebec side of Chaleur Bay; anglers in New Brunswick were allowed to land only 1SW salmon, with bag limits of 2 grilse per day and 10 grilse per season; anglers on Restigouche tributaries in Quebec could land both 1SW and MSW salmon with bag limits of 1 salmon per day and 7 salmon per season but in New Brunswick/Quebec boundary waters were required to release all MSW fish; and native fishermen at Cross Point, Quebec, were restricted by quota (6,995 kg). Native fishermen at Eel River Bar, N.B. were not restricted by quota. Catches in the period 1951-70 varied from about 18,000 to 46,000 fish with an average of about 32,000 fish. In the period 1971-83 the average catch was about 10,000 fish. Reported catches in 1985 and 1986 were (numbers of fish):

	1985		1986	
Fishery	MSW	1SW	MSW	1SW
Native				
Cross Point	976	35	1,145	4
Eel River Bar	241	0	233	14
Angling				
New Brunswick	---	3,258	---	4,915
Quebec	752	259	1,247	428
TOTAL	1,969	3,552	2,625	5,361

Homewater returns in 1986 were estimated from two methods. The first method, based on an angling exploitation rate of 20%, was considered optimistic. According to this method, the target spawning escapement was exceeded threefold. The second method which related angling catches to spawning escapement as judged from subsequent parr densities indicated that the target was exceeded by 20%. Total estimated returns 1970-86 are shown in Figure 2, on the basis of the second method, which may be more reliable. The figures indicate that returns of MSW salmon (19,900) in 1986 were 34% greater than predicted, while the returns of 1SW salmon (11,000) were 25% greater than the 1981-85 average.

The forecast returns of MSW salmon in 1987 was based on a relationship between sport catch of 1SW salmon at Kedgwick Lodge and total returns of large salmon to Restigouche River in the following year. The predicted returns in 1987 are 21,900 MSW salmon (95% confidence limits of 14,145-29,622).

Returns of 1SW salmon in 1987, assuming they will be the average of returns from 1982 to 1986, could be about 9,100 fish.

The surplus to spawning requirements in 1987 would be about 9,700 MSW salmon and 6,500 1SW salmon. It is noted that the large numbers of MSW salmon that are forecast to return are only foreseen for 1987, and that there is no reason to expect similar returns subsequently.

Saint John River

In 1986, there were only minor changes to the fishing plan that was introduced in 1984: there were no closed periods within the June 1 and October 15 open season for the Kingsclear food fishery (quota remained at 900 fish), and a licence was granted to the Oromocto Band for the capture of 150 salmon. Catches in the period 1949-83 fluctuated widely with an average catch of about 10,000 fish. Catches in 1985 and preliminary estimates for 1986 are given below (numbers of fish):

	1985		1986	
Fishery	MSW	1SW	MSW	1SW
By-catch*	2,294	531	1,307	491
Native*	2,517	483	2,400	600
Sport**	367	3,402	129+	2,836+
TOTAL	5,178	4,416	3,836+	3,927+

*Estimate
**Estimate includes allowance for catch and release mortality and poaching

Estimates of total returns in 1986 were 11,839 MSW salmon and 16,027 1SW salmon, which were respectively 15% below and 70% above the forecasts made in 1985. Estimates for the period 1975-86 are shown in Figure 3. The calculation of the returns to the river below the Mactaquac Dam was based on the estimated return above the dam and the historical (1970-1983) ratio of estimated returns above and below since sport catch statistics were not available in 1986. It was estimated that spawning was 20% under the target requirement above Mactaquac Dam and at least 30% under target for the river below the dam.

Returns in 1987 of wild MSW salmon originating above Mactaquac Dam were forecast from an historical (1970-1985) relationship between wild grilse returns and wild large salmon returns in the following year. Grilse returns in 1987, from production above Mactaquac, were forecast from an historical (1968-80) relationship between egg densities in the Tobique River and the subsequent production of wild grilse above Mactaquac Dam. Wild grilse and MSW returns produced below Mactaquac were forecast using the estimates for returns above Mactaquac and the historical (1970-85) relationship between returns above Mactaquac Dam and returns below. Returns of hatchery - reared grilse and salmon were forecast on a different basis than was used in 1985 due to the release of one-year old smolts rather than of two-year old smolts. Return rates from trial release of one-year smolts in 1976, 1978 and 1979 were used to estimate the returns.

The forecasts suggest that in total there will be a surplus of 5,500 1SW and 7,400 MSW salmon beyond spawning requirements, including a surplus of 1,300 MSW salmon below Mactaquac. These figures rely on less rigorous projections than those provided in recent years, since total removals in 1986 are uncertain, some relationships used in previous years have broken down possibly because of incomplete information, and the impact of delays in salmon entering the Mactaquac fish trap may have increased fishing mortality down stream. These delays were due to apparent avoidance of the trap by salmon because of large quantities of gaspereau that were not harvested in 1986 but were in previous years.

Margaree River

Anglers have been required to release MSW salmon during the early part of the run (before September 1) since 1979, and since 1985, all MSW salmon were to be released regardless of date caught. There was no commercial fishery in 1986. Margaree River salmon stocks are composed of two runs: the summer run enters the river up to the end of August; and the fall run, during

September and October. Since 1979, there have been attempts to rebuild the summer run.

Catches in the recreational fishery were variable but averaged about 300 fish, about two-thirds of which were MSW salmon. The 1985 and 1986 recreational catches (all MSW salmon released) are compared below:

	1985	1986
1SW salmon	222	294
MSW salmon	314	749

Escapement is calculated on the exploitation rate of MSW salmon in the recreational fishery. A rate of 12.9% was used in previous years but this value is no longer considered valid, and values (20.6% and 37.9%) based on earlier work were used instead. Under either assumption, spawning requirements were met (estimates of egg deposition for 1947-86, under either assumption, are shown in Figure 4).

The only indicator that can be used to forecast MSW returns in 1987 is a weak relationship between the sport catch in one year and the sport catch from the progeny of that run when returning as MSW salmon. This suggests that that the return in 1987 will at least be comparable to that in 1985 and 1986.

Conne River

A native food fishery using a modified herring trap located in the estuary was authorized in 1986, with a quota of 1,200 salmon (less than 63 cm in length). Anglers were also prohibited from retaining salmon over 63 cm in length. The total catches were 2,060 salmon to anglers and 519 salmon in the food fishery. The angling catch was some 22% lower than the average for the previous five years, and may have been influenced by the placement of a counting fence which delayed upstream migration of salmon and also resulted in closure of a formerly significant angling area immediately below the fence. In addition to these catches, part of the 17.6 tons of salmon taken in the commercial fisheries in statistical section 36, will have been of Conne River origin.

Estimates of the total return of salmon to the Conne estuary, based on tagging, indicate 8,100 salmon less than 63 cm and 400 longer than this length. It is thus estimated that 5,050 small and 375 large salmon escaped to spawn. The current estimate of the spawning requirement is about 3,000 small salmon.

Given the indications from sports catches in 1980-1986 that the population is fairly stable, it is likely that about 5,500 salmon may be surplus to spawning requirements in 1987.

General Status of Atlantic Salmon Stocks in 1986

Fishery at West Greenland

The positive correlation between catches of MSW salmon in Canadian waters and catches at West Greenland in the previous year suggests that returns to Canadian waters of MSW salmon are related to the abundance of 1SW salmon off Greenland in the previous year. This correlation included only years when there was no quota, or when the quota at West Greenland was not achieved. The catch at West Greenland in 1986 was restrained by the quota. While this catch is thus not appropriate for use in the correlation because of this bias, the rapidity with which the quota (909 t) was caught indicated that it is likely that abundance of MSW salmon in Canadian waters in 1987 will be above the 1984-85 levels.

Sea Environment

In 1985 it was suggested that catches in the commercial fisheries of Newfoundland were delayed because of low sea temperatures. A comparison of the timing of catches in the Newfoundland commercial fisheries in years of light, moderate and severe ice conditions (1974–85) suggests that in years of severe ice conditions, catches in Salmon Fishery Areas (SFA) 3 to 5 were delayed and reduced by about one-third relative to light ice years (177 t vs 110 t); however, catches in salmon fishery areas 6 to 11 increased by about two-thirds (42 t vs 70 t). This pattern indicates a more northerly distribution of salmon in years with moderate or light ice conditions, such as was the case in 1986.

Previous assessments have also shown that abundance of salmon in the West Greenland area is positively related to environmental conditions in the Northwest Atlantic in the same year. Warm conditions in 1986 led to the high abundance of salmon and consequent high daily catch rates at West Greenland in 1986.

Newfoundland Region

Catches in the commercial and recreational fisheries and counts at fishways and counting fences in insular Newfoundland suggest that the abundance of both 1SW and MSW salmon in 1986 was similar to 1985. Commercial catches of 1SW and MSW salmon in Labrador in 1986 showed a marked improvement over 1985, suggestive of increased abundance. Commercial landings of MSW salmon however, still remain below historic levels in both insular Newfoundland and Labrador, although this in part, will reflect recent regulations.

Based on assumptions as to egg depositions in 1982, it is expected that the abundance of 1SW salmon in both insular Newfoundland and Labrador in 1987 will be comparable to 1986.

As a result of the poor prediction of the 1986 catch of MSW salmon for insular Newfoundland (337 t forecast, 235 t caught) and the possibility that the current management regime has resulted in a change in the proportionate exploitation of large and small salmon, it is no longer considered appropriate to use the relationship between the commercial catch of 1SW salmon in one year and of MSW salmon in the next year, as has been used in the past, to predict the commercial catch of MSW salmon. Labrador on the other hand, is relatively unaffected by the management plan and the estimate was accurate using the relationship for 1986. The forecast catch of MSW salmon for Labrador in 1987 is 342 t.

Gulf Region

In all areas, returns of 1SW and MSW salmon were above average in 1986. One-sea-winter and MSW salmon returns to counting facilities exceeded 1985 values and all except Millbank, Miramichi, and Western Arm Brook were above 1974–85 means. One-sea-winter returns to Western Arm Brook, may have been influenced by lower than average water levels as in 1985.

Sport catches of 1SW and MSW salmon on the Restigouche (SFA 15), Miramichi (SFA 16) and Margaree rivers and all other rivers in SFA 18 were above 1985 figures and 1974–85 means. One-sea-winter and MSW salmon sport catches in west Newfoundland exceeded 1985 values, but were equivalent to 1974–85 means. Commercial catches in west Newfoundland also exceeded 1985 values with those of 1SW fish being above, and those of MSW salmon being equivalent to, 1974–85 means.

Actual 1SW returns to the Miramichi and Restigouche rivers in 1986 exceeded predictions, while MSW returns to these rivers and those in west Newfoundland were close to forecasts. Forecasts of MSW salmon returns for the Restigouche and Miramichi rivers in 1987 suggest that 1974–85 means will again be exceeded. Forecasts for Area K (S.W. Newfoundland) indicate slightly above average returns in 1987.

The 1986 management plan and favourable marine environment are the two most important factors accounting for increased returns in 1986. Difference between sea surface temperatures in September and October account for 61% of the variation in 1SW salmon returns to Miramichi River from 1972 to 1986. One-sea-winter salmon returning to Millbank in 1986 were significantly larger than previous years suggesting favourable growth conditions prevailed in 1985.

Scotia-Fundy Region

The absence of a commercial fishery, the absence of DFO angling statistics for New Brunswick, and the incomplete returns of Nova Scotia angling licence stubs provided only a limited base for assessing the status of stocks. The federal-Nova Scotia cooperative program using the licence stubs from angling licences will provide more information on river escapements when further returns are analysed.

Counts at fish passage facilities have provided some information for the Atlantic coast of Nova Scotia. At the Liscomb River, the 1SW count was the highest for the eight years on record, while the MSW count was 98% above forecast. At the LaHave River, counts at Morgan Falls showed wild 1SW fish were 18% above forecast while hatchery 1SW fish were 91% over forecast. The count of wild MSW fish was merely 7% higher than was expected in the presence of a commercial fishery. Environmental variables of rainfall and sea temperature have been shown to be related to salmon returns in the inner Fundy parts of N.S. and N.B. Preliminary 1986 angling catch estimates for inner Fundy are 60-65% below the 1980-85 mean catches. Limited information suggest river escapements in Nova Scotia of 1SW and MSW fish increased at least partly as a result of the 1986 management plan, except for the inner Fundy parts of SFA's 22 and 23 where 1SW runs were very low. The indications are that returns to the inner Fundy in 1987 will be below the 1986 level. Other parts of Nova Scotia should see some improved MSW runs, based on 1986 1SW returns, although the Liscomb River run is expected to be similar to that in 1986 and the returns to the LaHave River are expected to be somewhat lower.

In New Brunswick on the Saint John River, 1SW returns were 70% above forecast while MSW returns were 13% below forecast. The forecast for returns to the Saint John River in 1987 is for MSW salmon returns about 50% higher than in 1986 while the return of 1SW fish is likely to be 18% below the 1986 level.

Quebec (Gaspé)

Management measures in 1986 included the continuation of the ban instituted on commercial fishing in 1984 and the daily retention of one fish (1SW or MSW) in the sport fishery. Gaspé stocks may also have been affected by the ban on commercial fishing introduced in Chaleur Bay, N.B., in 1985.

Sport landings of 6,725 salmon (28.5% 1SW) were up 42.0% over 1985 and 24.3% over the 1981-85 mean. Effort was also up by 22.0% over 1985. Landings increased over the 14 year mean.

The relationship between the number of sport caught 1SW salmon in one year and MSW salmon in the next year, suggests that the 1987 sport catches of MSW salmon would be 6,200 fish.

General

CAFSAC notes that provision of advice for salmon stocks by the end of November is becoming increasingly difficult due to declining availability of catch data, and doubts as to accuracy of the information. In addition a number of factors are complicating the assessment process, and particularly the unknown impact on fishing success due to the release of MSW salmon. Some captures of MSW salmon may, in fact, represent recaptures of fish that have already been taken at least once before. This means that the angling statistics may not be comparable with historical series for MSW salmon.

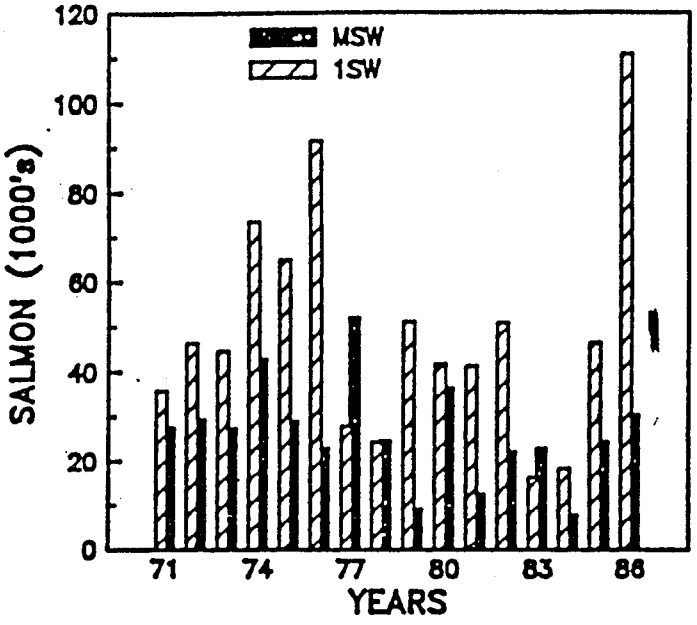

Fig. 1. Miramichi, total returns.

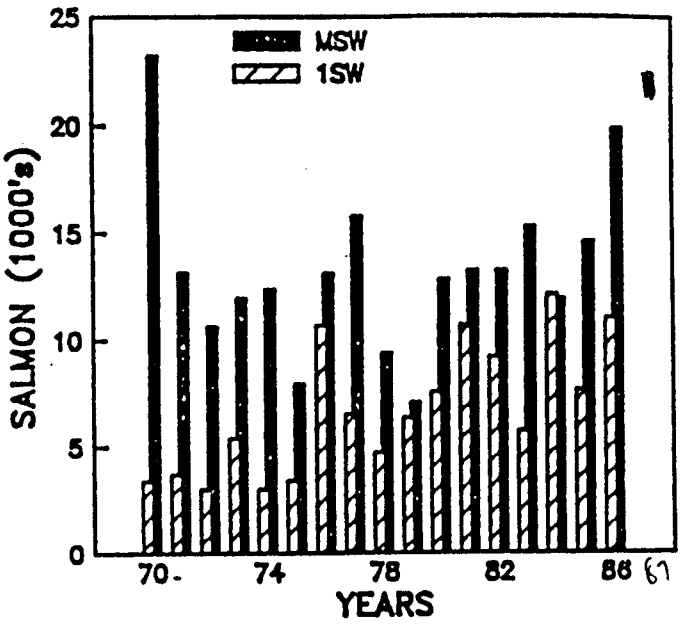

Fig. 2. Restigouche, total returns.

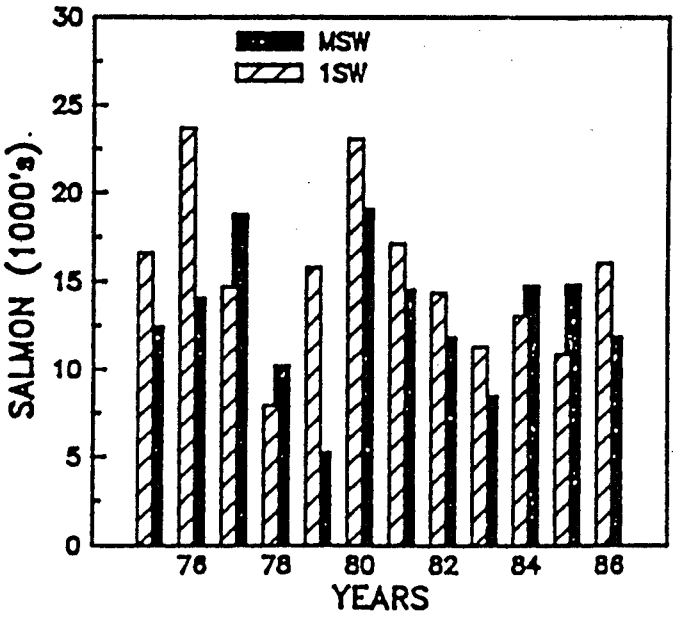

Fig. 3. Saint John, total hatchery and wild returns.

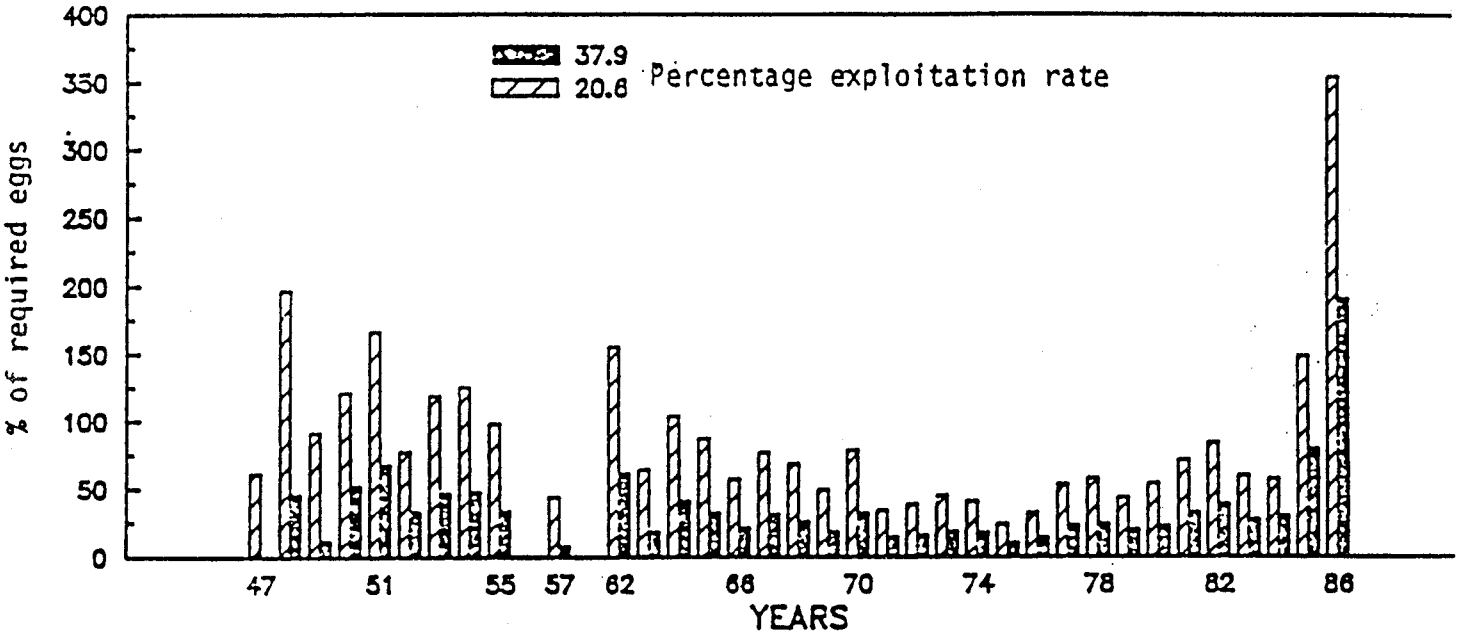

Fig. 4. Margaree, % of required egg deposition at angler exploitation rates of either 20.6% or 37.9% of returns.

12 JUNE 1987
EDINBURGH

ANNEX 6

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

WEST GREENLAND COMMISSION

CNL (87)35

DRAFT DECISION OF COUNCIL TO REQUEST SCIENTIFIC ADVICE FROM ICES
(SECTION RELATING TO THE WEST GREENLAND COMMISSION ONLY)

The Council decides to request the following scientific advice from ICES:

(I) With respect to Atlantic salmon in the West Greenland Commission area:

1. Describe events of the 1987 fisheries with respect to gear, effort, exploitation rate, composition and origin of the catch and assess the status of the stocks.

2. Evaluate the effectiveness of new, existing or proposed management measures for home waters and interception fisheries on stocks occurring in the Commission areas.

3. Discuss scientifically based approaches for managing salmon in the context of existing fisheries.

4. Specify data deficiencies and research needs.

ANNEX 7

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
FOURTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION
8-12 JUNE 1987, DRAGONARA HOTEL, EDINBURGH, UK

LIST OF WEST GREENLAND COMMISSION PAPERS

PAPER NO	TITLE
WGC (87)1	Provisional agenda
WGC (87)2	Draft agenda
WGC (87)3	Draft report of the West Greenland Commission
WGC (87)4	Draft questions to ICES for scientific advice
WGC (87)5	Report of the West Greenland Commission
WGC (87)6	Agenda
CNL (87)3	Scientific advice from ICES - Report of the Advisory Committee on Fisheries Management (ACFM)
CNL (87)35	Draft decision of Council to request scientific advice from ICES
NAC (87)7	Canadian Atlantic salmon catches in tonnes
NAC (87)8	Status of Atlantic salmon stocks in Atlantic Canada and advice for their management in 1987

NOTE: This list contains all papers submitted to the Commission prior to and at the meeting. Some but not all of these papers are included in this report as annexes.