REPORT OF THE FIFTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION

13-17 June 1988

REYKJAVIK, ICELAND

WGC(88)8

WEST GREENLAND COMMISSION

COMMISSION DU GROENLAND OCCIDENTAL

CHAIRMAN:	MR EARLE MCCURDY (CANADA)
VICE-CHAIRMAN:	MR ARNI OLAFSSON (DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND))
RAPPORTEUR:	MR GILBERT RADONSKI (USA)
SECRETARY:	DR MALCOLM WINDSOR

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EDINBURGH

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

WEST GREENLAND COMMISSION

WGC(88)8

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1. OPENING OF THE MEETING

1.1 The Fifth Annual Meeting of the West Greenland Commission, in the absence of the Chairman Mr Earle McCurdy (Canada), was opened by the Vice-Chairman Mr Arni Olafsson (Denmark (in respect of the Faroe Islands and Greenland)).

1.2 The list of participants is given in Annex 1.

2. ADOPTION OF THE AGENDA

2.1 The Commission adopted its agenda, WGC(88)9, (Annex 2).

3. ELECTION OF OFFICERS

3.1 The Commission elected Dr Wilfred Carter (Canada) as its Chairman.

3.2 The Commission re-elected Mr Arni Olafsson (Denmark in respect of the Faroe Islands and Greenland) as its Vice-Chairman.

4. NOMINATION OF A RAPPORTEUR

4.1 The Commission nominated Mr Gilbert Radonski (USA) as the Rapporteur for the meeting.

5. REVIEW OF THE 1987 FISHERY AND ACFM REPORT FROM ICES ON SALMON STOCKS

5.1 The Chairman of the ACFM, Mr Bernard Vaske, presented the scientific advice from ICES relevant to the West Greenland Commission, CNL(88)13 (Annex 3), prepared in response to a request from the Commission at its Fourth Annual Meeting.

5.2 The West Greenland fishery opened on 25 August and ended on 7 October. The total nominal catch was 966 tonnes, exceeding the adjusted quota of 935 tonnes by 31 tonnes. In response to a question from the representative of USA, the representative of Denmark (in respect of the Faroe Islands and Greenland) described the factors leading to the over-fishing of the quota. In 1987, in addition to a "free quota" (533 tonnes) and a "small boat quota" (356 tonnes), 46 tonnes was reserved for a long-line fishery and as a buffer for the total fishery. The "free quota" had been over-fished by 81 tonnes but the extent of the over-fish had been reduced by not fishing the 46 tonnes allocated to long-lines and the buffer.

5.3 The representative of Canada expressed concern that the harvest of fish of North American origin in the West Greenland fishery had increased in 1986 and 1987. He asked the representative of ICES if the data indicated a trend of increased proportions of North American origin salmon in the catch at West Greenland and if there had been a significant reduction in the number of North American origin salmon caught at West Greenland between the periods 1978-82 and 1985-87. The Chairman of the ACFM responded that no trend could be observed in the data and that the difference in the numbers caught between 1978-82 and 1985-87 was not statistically significant.

5.4 The representative of Canada asked if the fish of North American origin, which were smolt age groups one, two and three, came from the southern portion of their range (New Brunswick, Nova Scotia and Maine). The Chairman of the ACFM confirmed that a large proportion of the North American fish taken at West Greenland were from the southern range.

5.5 The representative of Canada referred to reports NAC(88)3, "1987 Statistics on Canadian Salmon" (Annex 4), and NAC(88)4, "CAFSAC Advice for 1988" (Annex 5) and asked that they be introduced for consideration by the West Greenland Commission.

6. REGULATORY MEASURES

6.1 The representative of Denmark (in respect of the Faroe Islands and Greenland) presented a review of the regulatory measure in place for 1986 and 1987 which set a quota for both years of 850 tonnes (subject to 1 August starting date). The TAC for 1986 was 909 tonnes and the TAC for 1987 was 935 tonnes, both adjusted for opening dates later than August 1.

6.2 The representative of the USA noted that the catches exceeded the quota by 51 tonnes in 1986 and 31 tonnes in 1987 and asked the representative of Denmark (in respect of the Faroe Islands and Greenland) if the problem of exceeding the quota was being addressed. The representative of Denmark (in respect of the Faroe Islands and Greenland) noted that the overfish amounted to 3% of the quota in 1987 which was an improvement over the 1986 overfish. He considered that this was a very small overfish considering that landings can be made at 40 different locations within Greenland. This overfish was less than the catch from one days fishing.

6.3 The representative of Canada noted that Canada was in the fifth year of a five year Management Plan, which focussed on recovery of stocks from rivers in the southern zone (New Brunswick and Nova Scotia), and which had closed the commercial fishery and introduced a catch and release policy for anglers in the southern zone. The northern zone (Newfoundland and Labrador) had also been affected by severe management measures which had resulted in a reduction in harvest in the period 1982-87. Despite the reduction in harvest, through sacrifices made by Canadian fishermen, the southern zone did not have the returns in 1987 that had been predicted. Although returns were less than predicted, Canada will continue in 1988 with the measures called for in the five year Plan. The representative of Canada noted that the harvest in numbers at West Greenland was about the same as before the five year Plan and Canada must therefore ask for a reduction in the West Greenland quota.

6.4 The representative of Denmark (in respect of the Faroe Islands and Greenland) noted that prior to regulatory measures agreed within the West Greenland Commission of NASCO, the West Greenland fishery was subject to a quota of 1190 tonnes. This quota had been reduced within NASCO through the cooperation of the Danish delegation but, this year, the Danish delegation would require an increase in the quota. The representative of Denmark (in respect of the Faroe Islands and Greenland) drew attention to the fact that catches in Canada have increased in recent years and commented that the problems experienced by Canada in 1987 may have been a one-year phenomenon.

6.5 The representative of the USA expressed concern about the low level of returns to USA rivers in 1987. Early reports for 1988 indicate another poor year and despite reductions in interceptions in Canada and West Greenland, the situation is worse than a few years ago. The representative of the USA commented that actions such as the delayed season (well beyond August 1) in West Greenland may be causing differential exploitation on fish of North American origin. The West Greenland fishery is catching as many USA origin fish as presently return to rivers, and the USA could not therefore agree to any proposal for an increase in the West Greenland quota.

6.6 The representative of the EEC commented that in view of the state of European multi-sea-winter salmon stocks, the EEC would favour a reduction in the quota for the West Greenland fishery.

6.7 The representative of Canada proposed a draft regulatory measure for the West Greenland salmon fishery, WGC(88)5 (Annex 6). This measure proposed a TAC of 740 tonnes, subject to an opening date of 1 August, for both 1988 and 1989 and that the harvest of North American salmon should not exceed 292000 fish for the two combined years. Upon a vote, the representatives of Canada, the EEC and the USA voted in favour of the proposal. The representative of Denmark (in respect of the Faroe Islands and Greenland) voted against the proposal. In accordance with the Rules of Procedure of the Commission the proposal was rejected.

6.8 The representative of Denmark (in respect of the Faroe Islands and Greenland) proposed a draft regulatory measure for the West Greenland salmon fishery, WGC(88)4 (Annex 7). This measure proposed that the catch of salmon at West Greenland shall not exceed 1000 tonnes (subject to an opening date of 1 August) for each of the calendar years 1988 and 1989. Upon a vote, the representative of Denmark (in respect of the Faroe Islands and Greenland) voted in favour of the proposal. The representatives of Canada, the EEC and the USA voted against the proposal. In accordance with the Rules of Procedure of the Commission the proposal was rejected.

6.9 The Chairman of the Commission proposed a draft emergency regulatory measure for the West Greenland salmon fishery, WGC(88)6 (Annex 8). This measure proposed that the total catch of salmon at West Greenland for the years 1988, 1989 and 1990 shall not exceed a total of 2520 tonnes and that in any year the annual catch shall not exceed the annual average catch (840 tonnes) by more than 10%. These quantities are based on an opening date of 1 August. If the fishery is opened at a later date then the quantities shall be adjusted using the formula developed by ICES. Upon a vote, the representatives of the EEC and USA voted in favour of the proposal. The representatives of Canada and Denmark (in respect of the Faroe Islands and Greenland) abstained from the vote. In accordance with the Rules of Procedure of the Commission the proposal for an emergency regulatory measure for the West Greenland fishery was adopted by the Commission.

6.10 In abstaining from the vote, the representative of Canada stated that while respecting the intent of proposal WGC(88)6, Canada finds this proposal is inconsistent with the arguments put forward earlier for a significant reduction in the Greenland harvest of North American MSW salmon. While the compromise proposal by the Chairman does include a reduction in the number of fish harvested by Greenland, this decrease is not of the magnitude which Canada feels is necessary to achieve the recoveries which the Canadian Government has been targeting for over the past number of years.

Nevertheless, noting that the proposed three year approach provides for a period of stability, in a spirit of compromise and cooperation and in view of the potential threat to NASCO as an organization, were no agreement to be achieved, Canada concluded that an abstention would be the most appropriate response to the proposal. The representative of Canada wished to point out that this abstention, for the reasons given above, does not prejudice Canada's position with respect to negotiations leading to a quota in any future year.

6.11 In abstaining from the vote the representative of Denmark (in respect of the Faroe Islands and Greenland) commented that he sincerely hoped that unreported catches in homewater fisheries could be significantly reduced. His delegation would find it difficult to cooperate in establishing future regulatory measures for the West Greenland fishery if this does not occur.

7. RECOMMENDATIONS TO THE COUNCIL ON SCIENTIFIC RESEARCH

7.1 The Commission reviewed and accepted the relevant section (Section 1) of CNL(88)40 (Annex 9) and agreed to recommend it to the Council as part of the annual request for scientific advice to ICES.

8. OTHER BUSINESS

9. DATE AND PLACE OF NEXT MEETING

9.1 The Commission agreed to hold its next meeting during the Sixth Annual Meeting of the Council, 13-16 June 1989, in Edinburgh.

10. CONSIDERATION OF THE DRAFT REPORT OF THE MEETING

10.1 The Commission decided that the draft report of the meeting would be agreed by circulation to the members of the Commission after the meeting.

13 JUNE 1988
REYKJAVIK

ANNEX 1

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
FIFTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION
13-17 JUNE 1988, REYKJAVIK, ICELAND

LIST OF PARTICIPANTS

* Denotes Head of Delegation

MEMBERS OF THE COMMISSION

CANADA

*MR BILL ROWAT	Representative Department of Fisheries and Oceans, Ottawa, Ontario
DR GABY WARD	Representative Champlain College, Quebec
DR WILFRED CARTER	Representative Atlantic Salmon Federation, St Andrews, New Brunswick
DR DAVID MEERBURG	Dept of Fisheries and Oceans, Ottawa, Ontario
MR BERNARD VEZINA	Dept of Fisheries and Oceans, Ottawa, Ontario
MR MICHEL BROUILLARD	Ministere du loisir, de la chasse, et peche, Quebec
MS LOUISE COTE	Dept of Fisheries and Oceans, Ottawa, Ontario
FATHER DES MCGRATH	Fishermen, Food and Allied Workers Union, St Johns, Newfoundland
MR GLENN BLACKWOOD	Department of Fisheries, St Johns, Newfoundland

DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

*MR EINAR LEMCHE	Representative Greenland Home Rule, Nuuk, Greenland
MR ARNI OLAFSSON	Representative Ministry of Foreign Affairs, Copenhagen
MR OLE SAMSING	Representative Ministry of Foreign Affairs, Copenhagen
MR JENS MOELLER JENSEN	Greenland Fisheries Research Institute, Copenhagen

MR ERNST THORSOE	Greenland Home Rule, Nuuk, Greenland
MS MALENE JENSEN	Greenland Home Rule, Nuuk, Greenland
EEC	
*MR HENRIK SCHMIEGELOW	Representative Fisheries Directorate-General, EEC Commission, Brussels
MR JOHN SPENCER	Representative Fisheries Directorate-General, EEC Commission, Brussels
MR WOLFGANG RINGE	FRG Representative of the Council of the European Communities, Brussels
MR AUGUSTO BETTE	Council of the European Communities, Brussels
MR SEAN MCDONALD	Permanent Representation of Ireland to the EEC, Brussels
MR PASCHAL LYNG	Department of the Marine, Dublin
MS EILEEN TWOMEY	Department of the Marine, Dublin
MR NICK BROWN	Ministry of Agriculture, Fisheries and Food, London
MR IAN WHITELAW	Department of Agriculture and Fisheries for Scotland, Edinburgh
MR BOB WILLIAMSON	Department of Agriculture and Fisheries for Scotland, Edinburgh
MR BILL MALCOLM	Department of Agriculture and Fisheries for Scotland, Edinburgh
MR TED POTTER	Ministry of Agriculture, Fisheries and Food, Lowestoft
DR KEVIN O'GRADY	Ministry of Agriculture, Fisheries and Food, London
DR DICK SHELTON	Department of Agriculture and Fisheries for Scotland, Pitlochry
MR AGUIRRE FERNANDEZ	Secretaria General de Pesca Maritima, Madrid
MR BENT PALLISGAARD	Ministry of Fisheries, Copenhagen
USA	
*MR ALLEN PETERSON	Representative National Marine Fisheries Service, Woods Hole, Mass.
DR FRANK CARLTON	Representative National Coalition for Marine Conservation, Savannah, Georgia

MR RICHARD BUCK	Representative Restoration of Atlantic Salmon in America Inc, Dublin, New Hampshire
MR ARTHUR NEILL	National Marine Fisheries Service, Woods Hole, Mass.
MR STETSON TINKHAM	US Department of State, Washington DC
DR VAUGHN ANTHONY	National Marine Fisheries Service, Woods Hole, Mass.
MR ROBERT JONES	Connecticut Bureau of Fisheries, Hartford, Connecticut
DR DAVID EGAN	Connecticut River Atlantic Salmon Commission, Guilford, Connecticut
DR DAVID GOLDTHWAITE	US Fish and Wildlife Service, Newton Corner, Mass.
MR HAL LYMAN	Salt Water Sportsman Inc, Boston, Mass.
MR JAMES MCCALLUM	Merchant Marine & Fisheries Committee, US House of Representatives, Washington
DR PAUL RAGO	US Fish and Wildlife Service, Kearneysville
MR HOWARD LARSEN	US Fish and Wildlife Service, Newton Corner, Mass.
MR JEFF PIKE	Merchant Marine & Fisheries Committee, US House of Representatives, Washington
MR WILLIAM BRENNAN	Dept of Marine Resources, Augusta, Maine

OBSERVERS - PARTIES

FINLAND

MR EERO NIEMELA	Representative Finnish Game and Fisheries Institute, Helsinki

ICELAND

MR HELGI AGUSTSSON	Representative Ministry of Foreign Affairs, Reykjavik
MR ARNI ISAKSSON	Representative Institute of Freshwater Fisheries, Reykjavik
MR THOR GUDJOHNSON	Institute of Freshwater Fisheries, Reykjavik

NORWAY

MR SVEIN MEHLI	Representative Directorate for Nature Management, Trondheim

MR TORMOD KARLSTROEM	<u>Representative</u> Ministry of the Environment, Oslo
MR LARS HANSEN	Directorate for Nature Management, Trondheim
MR GEORG RIEBER-MOHN	Regional Boards of Salmon Fishery, Oslo

<u>SWEDEN</u>

MR INGEMAR OLSSON	<u>Representative</u> National Board of Fisheries, Goteborg

<u>OBSERVERS - NON PARTIES</u>

<u>ICES</u>

DR EMORY ANDERSON	International Council for the Exploration of the Sea, Copenhagen
MR BERNARD VASKE	Institut fur Hochseefischerei und Fischverarbeitung, German Democratic Republic

<u>SECRETARIAT</u>

DR M L WINDSOR	Secretary
DR P HUTCHINSON	Assistant Secretary

13 JUNE 1988
REYKJAVIK

ANNEX 2

WGC(88)9

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
FIFTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION
13-17 JUNE 1988, REYKJAVIK, ICELAND

	AGENDA	PAPER NO
1.	Opening of the meeting	
2.	Adoption of the agenda	
3.	Election of officers	WGC(88)3
4.	Nomination of a rapporteur	
5.	Review of the 1987 fishery and ACFM report from ICES on salmon stocks	CNL(88)14
6.	Regulatory measures	
7.	Recommendations to the Council on scientific research	
8.	Other business	
9.	Date and place of next meeting	
10.	Consideration of the draft report of the meeting.	

JUNE 1988
REYKJAVIK

ANNEX 3

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

COUNCIL

CNL(88)14

SCIENTIFIC ADVICE FROM ICES

REPORT OF THE ADVISORY COMMITTEE ON FISHERIES MANAGEMENT (ACFM)
(SECTIONS 1-4.3 AND 7-8.1.2)

REPORT TO THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION COUNCIL

1. INTRODUCTION

Questions of interest to a particular Commission, such as the description of high seas fisheries, appear in the section dealing with questions of interest to that Commission, while all questions dealing with homewater fisheries appear in Section 7. Many of the questions posed related to more than one Commission area, and these are answered separately. In this summary, the tables, figures, and appendices referred to are from the Working Group report (Doc. C.M.1988/Assess:16).

2. CATCHES OF NORTH ATLANTIC SALMON

2.1 Nominal Catches

Nominal catches of salmon by country (in tonnes round fresh weight) for 1961-1987 are presented in Table 1. The catches in homewaters broken down into grilse and salmon are shown in Table 2. Figures for 1987 (6,511 t) are provisional, but it appears likely that, when confirmed, they will show a decrease from 1986 except for Canada and Finland, where they are expected to increase.

Lack of information on fishing effort presents major difficulties in interpreting the catch data.

Unreported catches were considered an important component in stock assessment, and it was agreed that methods of assessing unreported catches should be investigated. Unreported catches were defined as:

> harvests which are caught and retained but do not enter into unreported catch statistics; such harvests could be either legal or illegal but would not include catch-and-release mortalities whether they arise from nets or angling gear. Such estimates would not include fish retained by public agencies for broodstock purposes.

Although some countries could not provide data, the unreported catches for all countries were considered to be of the order of 3,000t, which is 500t less than the corresponding amount for 1986.

ACFM notes with concern the importance of non-reported catches, and urges participants to continue to make every possible effort to obtain and contribute such data in accordance with normal ICES procedure.

2.2 Catches in Numbers by Sea Age and Weight

Reported national data from several countries are summarized in Table 3. In most countries, the decline in the reported 1987 homewater catches occurred in both the 1-sea-winter (1SW) and multi-sea winter (MSW) age groups.

3. FRAMEWORK FOR SCIENTIFIC ADVICE ON MANAGEMENT OF SALMON

3.1 Introduction

NASCO asked ICES to discuss scientifically-based approaches for managing salmon in the context of existing fisheries.

There are two aspects to this subject: firstly, to establish a practical management strategy, and secondly, to describe a possible scientific approach to provide supporting advice. The Working Group recognized three principal aims in the management of Atlantic salmon: conservation of stocks, optimization of yields, and minimization of the variability of the yield from each fishery.

Conservation can best be achieved by controlling fishing mortality to ensure an adequate number of spawners in each river system to optimize production each year, and this must be the first priority of salmon management.

It is likely to be difficult to optimize yields in mixed-stock fisheries because individual stocks or stock complexes will vary in their availability to the fisheries. The stocks or stock complexes having the largest proportion of their extant numbers available to the fishery will experience the highest exploitation rates and must, therefore, be the key to optimising exploitation in the fishery. The varying relative productivity of the stocks or stock complexes further adds to the difficulties of managing mixed-stock fisheries.

Wide annual variation in the yield in each fishery may have socio-economic implications that must be considered.

It is fundamental to rational management that scientists estimate a target number of spawners of each sea age or stock component which should be attained each year. This number can be converted into a target "spawning biomass" using appropriate mean weights.

Management strategy should either:

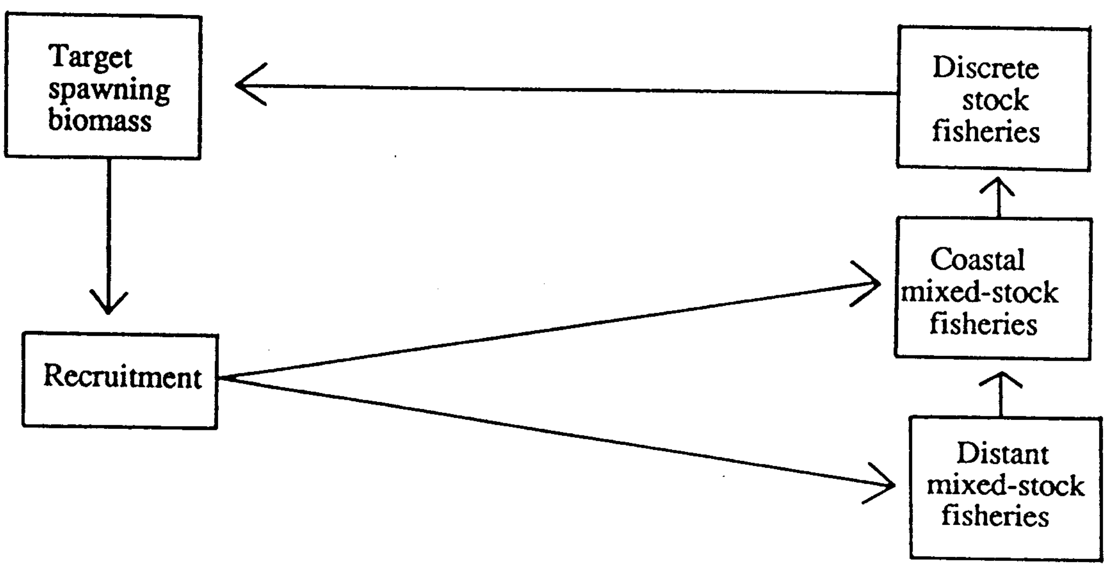
1) permit annual adjustments to harvest levels in all fisheries, or

2) fix the combined harvest of all fisheries at a level sufficiently low to achieve the target spawning biomass of each stock component within normal variations in production, or

3) fix the harvest in mixed-stock fisheries at a level sufficiently low to allow final adjustments to the spawning escapement of each stock component in or close to the river of origin.

3.2 A Conceptual Framework

The diagram below illustrates the type of relationship that could exist between fisheries that must be managed in order to achieve target spawning biomass.



Several models are available which, given sufficient data, can be used to estimate target spawning biomass or production and to assess the effects of varying fishing mortality in one fishery on the harvest in other fisheries and on spawning biomass (see Section 3.6)

3.3 Techniques to Attain Target Spawning Biomass

The ideal system for managing salmon would be to forecast the abundance of all stocks prior to the start of the fisheries each year and then allocate catches to the fisheries on the basis of the distribution of the fish and target spawning escapement.

Existing salmon fisheries cannot be managed within such an ideal framework. Two approaches were discussed which could be used to achieve sufficient spawning escapement for some stock complexes.

A. Real-time management of fisheries

This method utilizes information on stock abundance, either before the fishery commences or while it is in progress. This information is used to close or regulate mixed-stock or discrete fisheries if the abundance of selected stocks or stock components is equal to or less than a predefined target. The method requires:

a) estimates of salmon abundance during the fisheries;

b) techniques to identify stocks;

c) models for estimating the impact of management measures on the predefined abundance targets;

d) enforcement mechanisms for implementation of management measures.

B. Management based on historical performance of the fisheries

This management strategy is one most commonly used at present. The major difficulty with it is that it only reacts to conservation and fishery problems after they occur and operates by trial and error. The method requires:

a) historical data on spawning escapements for a number of stocks;

b) data by stock or stock complex on the contribution to mixed-stock fisheries.

3.4 Proposed Approach to Management

The primary goal of management to ensure target spawning biomass can be achieved by setting harvests in mixed-stock fisheries at a level which would ensure that the number of salmon returning to the vicinity of the river of origin each year is greater than that required for spawning. Adjustments would then be made to fisheries in or near the rivers to ensure that target spawning biomass is attained.

It is not feasible to develop a management strategy or assess its effectiveness by determining the spawning biomass or the fishing mortality of all stocks. Annual assessments and calculations of these parameters should be made on "indicator stocks". An "indicator stock" may be an individual stock or a group of stocks which can represent the stocks in a larger geographic area. For "indicator stocks", it will be necessary to annually estimate the spawning escapement, the fishing mortality in the various fisheries, and the abundance of salmon returning to discrete stock fisheries.

3.5 Estimation of Target Spawning Biomass and Production

There are several approaches which can be used to estimate target spawning biomass when its is not possible to directly obtain reliable figures. One approach would be to apply estimates of densities at various life stages, or adult production from stocks which have similar biological characteristics, i.e. use values from "indicator stocks". Another approach would be to use values from the scientific literature.

3.6 Fisheries Model

Models could be developed for salmon stocks for which sufficient data exist. Eventually these individual models could be linked in order to develop a cohesive picture of interactions among fisheries and used to judge the effectiveness of management measures.

3.6.1 Spreadsheet system

A spreadsheet system available at ICES Headquarters was used by the Working Group to implement a preliminary descriptive salmon model, using standard measures of catches and abundance, traps, tag recaptures, etc. to develop most, but not all, of the necessary parameters for the model.

The model calculates the abundance and catches in each time step; all fish available in the previous time period are accounted for. Examples are shown in Tables 4 and 5 and in Figures 1 and 2.

3.6.2 Fisheries models for selected stocks

The Working Group also examined two conceptual approaches to reducing exploitation on selected salmon stocks. The first, real-time management, is discussed in Section 3.3 above. The second, linear programming, was used to develop time and area closures which minimizes interceptions in mixed-stock fisheries. By adjusting the necessary constraints, the model can provide an objective standard against which management measures can be evaluated.

3.7 Summary

These models are preliminary and may not be available in the immediate future, but, nevertheless, they are the first steps in such descriptions of salmon fisheries in the North Atlantic. The marine life history model is not predictive, but given the appropriate parameter sets, it can provide a descriptive view of the interactions of the various fisheries and spawning escapements.

3.8 ACFM Comments

ACFM notes and commends the constructive discussion on scientifically-based approaches for managing salmon. The Working Group cannot, however, be expected to select overall objectives of management, since this involves the resolution of social and political conflicts, which are beyond its competence. ACFM, therefore, suggests that the Working Group should continue to develop methods for evaluating the consequences (in terms of yield, stocks size, etc.) of management options involving modest changes in the level of exploitation in the main fishery sectors. NASCO should consider how it could make use of such assessments in choosing among such management options, taking into account the biological importance of spawning stock, as discussed by the Working Group.

ACFM also notes the research priorities listed in Section 9 of the Working Group report, which reflect the proposed approach to scientific management, and the data requirements given in Appendix 5 of the Working Group Report. ACFM requests that countries make every effort to initiate such research and obtain and contribute such data at future meetings of the North Atlantic Salmon Working Group.

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

4.1 The Fisheries in 1987

The fishery at West Greenland is described below, and the fisheries in homewaters are described in Section 7.

4.1.1 Description of the fishery at West Greenland

The fishery opened on 25 August and ended on 7 October. The agreed TAC was 850t, adjusted to 935t for the opening date of 25 August. The nominal catch was 966t, exceeding the quota by 31t.

The TAC was divided into a "free quota" of 533t available to all licensed fishermen and a "small-boat quota" of 356t for boats less than 30 feet, which was allocated to districts. The remaining 46t was reserved for a longline fishery and as a buffer for the total fishery. The "free quota" catch was 614t and exceeded the quota by 81t.

In total, 77% or 744t was taken by boats smaller than 30 feet operating in the inshore area, and logbooks indicate that a great part of the catches taken by larger boats was from the inshore area.

In 1987, the greatest landings were recorded in NAFO Divisions 1C-1E, which differs from 1986 when the highest divisional catch was taken in Division 1F.

The bulk of the catch is taken with drift nets which have a target mesh size of 140mm stretched. On average, the small boats used 40 nets, each 25m long, per fishing day while the bigger boats used an average of 99 nets per day. Compared with procedures formerly used by the big drifters, the fishermen now patrol their nets more frequently to remove salmon and, in most cases, nets are cleared before the gear is hauled. This should have reduced non-catch fishing mortality.

Of the 350 boats supplied with logbooks, 60 boats provided effort and catch information (Table 8). The figures from 1986 are updated in Table 9. The information available is limited but shows that catch per unit of effort was lower in 1987 than in 1986.

During the first 7 days and the first 14 days of the fishery, the landings were lower than in 1986, which may indicate that salmon were less available to the fishery in 1987.

4.1.2. Composition and origin of catch

In 1987, samples of salmon (678 North American and 678 European) caught between 1980 and 1986 were used to develop a data base for discriminating salmon at West Greenland. One character previously used to develop the discriminant function had to be excluded in 1987. The samples caught at West Greenland in 1987 identified to continent of origin by the presence of a tag or by protein electrophoresis indicated a misclassification rate of 18.6 and an error rate of + 4.0.

Applying the discriminant function to catch samples at West Greenland gave an estimated proportion of 59% North American or a corresponding catch of 556t (179,918 salmon) and 41% European or a corresponding catch of 411t (126,395 salmon).

The proportion of North American fish ranged from 47% in Division 1F to 68% in Division 1D.

The number of Maine-origin salmon by statistical area caught at West Greenland in 1967-1986 is shown in Table 12. Since the imposition of a quota in 1976, the catch has averaged about 1,460 salmon.

In 1987, 146 fish tagged with coded-wire tags (CWTs) were recovered out of 25,047 salmon (8.2% of the catch) examined. The tags (see Table 14) originated in five countries: Scotland 2 (1%), England and Wales 17 (12%), Canada 21 (14%), Ireland 24 (16%), and USA 82 (56%).

Valid estimates of harvest can be derived at the tag scanning levels being achieved following the methods developed for external tags (Anon., 1986a).

Comparisons of continent or origin identifications made by examining the levels of mito-chondrial DNA polymorphism among Atlantic salmon stocks were in agreement with those derived from electrophoretic techniques.

Image processing techniques for stock identification, utilizing scales or otoliths, have yielded encouraging preliminary results but require further research.

4.1.3. Biological characteristics

The results of the discriminant function analysis were used to divide samples in NAFO Divisions 1B and 1D-F into North American and European components. As previously observed, the North American 1SW salmon were significantly shorter and lighter than their European counterparts. The sea and smolt age composition of samples are summarized in Tables 16a, 16b, and 17. The mean smolt age of 2.8 years observed in the samples of North American origin is similar to the 1986 value of 2.86 years. The mean smolt age of 2.02 years observed in samples of European origin is slightly higher than that observed in 1986 (1.98).

The sea age compositions in 1987 (Table 16a and 16b) were 97.0%, 2.0%, and 1%, of 1SW, 2SW salmon, and previous spawners, respectively.

4.1.4. Stock abundance and exploitation

In 1987, an improved technique based on estimates of run size and harvest of Maine-origin salmon was used to develop preliminary estimates of the exploitation rate and population size of 1SW salmon at West Greenland. A limitation of the previous model was that it assumed that all fish returning to Maine rivers were available for exploitation in the Greenland summer fishery. Simulations using the modified model suggested that exploitation rates in 1986 had probably increased and that population size had decreased in West Greenland compared with 1985 values, but the magnitude could not be quantified. This inference from the model is not consistent with the apparent high abundance in the 1986 fishery as assessed by the catch levels in the first two weeks of the season as well as by the CPUE data. Low catch rates of 2SW salmon in some Canadian and USA rivers, however, did support the model simulation.

4.2 Accuracy of Age Determination of Hatchery-Origin Salmon at West Greenland

Estimates of the harvest of USA fish at West Greenland derived from the "proportional harvest method" (Anon., 1986b) were about four times higher than estimates from a model based on Carlin-tag recoveries. The method was sensitive to the proportion of the harvest of North American fish estimated to be river age 1, and the accuracy of these estimates was investigated. The Working Group concluded that the river age of salmon of North American origin could be determined without undue bias.

4.3 Effectiveness of Management Measures in the Fishery at West Greenland

Prior to 1984, the quota for the West Greenland salmon fishery for many years was 1,190t (or its equivalent adjusted by season opening date). Since 1984, the quota has been lower, and for 1986 and 1987 it was set to be equivalent to 850t in terms of numbers of fish if the season had opened on 1 August.

The Working Group concluded that significant reductions have taken place in both the average quota (lower by 26%) and the total weight of harvest (lower by 21%) for the years 1985-1987 compared to 1978-1982 (Table 18). Total harvest in Greenland averaged 308,000 during recent years, which is about 58,000 fish less than when the quota was 1,190t.

7. HOMEWATER FISHERIES

Section 7 of the Working Group report describes the various homewater fisheries.

The information from most countries allows a description of the fishery according to the various types of gear, contribution of fish from other countries, and status of stocks. Some countries were able to provide exploitation rates in some fisheries.

Effectiveness of management measures is commented on for most countries. For Canada, this is dealt with specifically in Section 6.2 above.

It is envisaged that the information in this section could be helpful in building a descriptive model of salmon in the North Atlantic.

8. GENERAL TASKS

8.1 Compilation of tag data

NASCO requested ICES to compile information on tagging carried out on Atlantic salmon.

8.1.1 Compilation of tag release data for 1987

About 1.2 million microtags and 0.4 million external tags were applied to Atlantic salmon in 1987 (Table 43). In addition, 1.3 million salmon were finclipped. Thus, more than 2.9 million fish were marked.

The Working Group prepared a separate report on salmon tagged or marked in 1987.

8.1.2 Tagging data base

ACFM notes the progress made by the Working Group in assembling tagging data, and endorses the Working Group's conclusion that there is no need for NASCO to develop a tagging data base as long as the Working Group can continue to provide this service.

ANNEX 4

FEBRUARY 1988
MONTREAL

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

NORTH AMERICAN COMMISSION

NAC(88)3

1987 STATISTICS ON CANADIAN SALMON

(January 25, 1988)

Table 1

Preliminary 1987 Commercial Atlantic Salmon Catch by Weight and Numbers

Zone	Grilse (kg)	#	Salmon (kg)	#	Total (kg)
(NFLD.)					
1	12,507	6,260	62,086	12,823	74,593
2	128,878	65,024	243,718	49,811	372,596
3	188,452	95,457	178,772	38,151	367,224
4	111,102	55,896	72,913	15,442	184,015
5	39,155	21,528	20,855	5,786	60,010
6	26,520	14,685	20,214	4,389	46,734
7	8,945	4,484	14,889	3,244	23,834
8	8,061	4,239	12,072	2,627	20,133
9	3,993	2,121	1,470	309	5,463
10	17,913	9,434	8,596	1,858	26,509
11	24,541	13,218	25,553	5,609	50,094
12	0	0	0	0	0
13	57,582	25,110	21,169	4,660	78,751
14	66,613	30,964	65,579	14,180	132,192
Nfld. Sub-Total	694,262	348,420	747,886	158,889	1,442,148
(N.B.)					
15	0	0	0	0	0
16	0	0	0	0	0
23	0	0	0	0	0
N.B Sub-Total	0	0	0	0	0
(P.E.I.)					
7	0	0	0	0	0
(N.S.)					
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	0	0	0	0	0
22	0	0	0	0	0
N.S. Sub-Total	0	0	0	0	0
Quebec	4,467	2,978	92,820	20,494	97,287
TOTAL	698,729	351,398	840,706	179,383	1,539,435

(January 25, 1988)

Table 2

Preliminary 1987 Recreational Atlantic Salmon Catch by Weight and Numbers

	Grilse (kg)	#	Salmon (kg)	#	Total (kg)
Nfld. Region	27,508	16,492	1,864	418	29,372
Gulf Region					
a) Nfld.	18,056	13,277	812	223	18,868
b) P.E.I.	865	476	0	0	865
c) N.B.	33,142	20,329	0	0	33,142
d) N.S.	1,811	1,066	0	0	1,811
Scotia-Fundy Region					
a) N.B.	5,897	3,250	0	0	5,897
b) N.S.	14,926	8,362	0	0	14,926
Quebec	10,218	6,812	53,911	9,802	64,129
TOTAL	112,423	70,064	56,587	10,433	169,010

Table 3

Preliminary 1987 Atlantic Salmon Native Food Fishery Catch by Weight and Numbers

	Grilse (kg)	#	Salmon (kg)	#	Total (kg)
Nfld. Region	31	18	0	0	31
Gulf Region					
a) Nfld.	0	0	0	0	0
b) P.E.I.	0	0	0	0	0
c) N.B.	2,652	1,725	7,211	1,399	9,863
d) N.S.	0	0	0	0	0
Scotia-Fundy Region					
a) N.B.	635	280	6,048	1,120	6,683
b) N.S.	0	0	426	94	426
Quebec	427	213	5,173	729	5,600
TOTAL	3,745	2,236	18,858	3,342	22,603

TABLE (January 25, 1988)

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	
1961	-		-		1,719	
1963	-		-		1,861	
1964	-		-		2,069	
1965	-		-		2,116	
1966	-		-		2,369	
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		2,434	
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	780	417,269	779	162,305	1,559	579,574
1987	815	423,698	916	193,168	1,731	616,866

The 1987 total catch of salmon (1,731 tonnes) is:

- 23.2% above the previous 5 year mean (1,405.2)
- 1.2% below the previous 10 year mean (1,752.0)
- 11.2% below the previous 15 year mean (1,949.5)
- 15.0% below the previous 20 year mean (2,036.7)

The 1987 total catch of MSW salmon only (916 tonnes) is:

- 15.7% above the previous 5 year mean (791.4)
- 17.9% below the previous 10 year mean (1,115.2)
- 27.3% below the previous 15 year mean (1,259.1)

The 1987 total catch of grilse only (815 tonnes) is:

- 32.8% above the previous 5 year mean (613.8)
- 28.0% above the previous 10 year mean (636.8)
- 18.0% above the previous 15 year mean (690.4)

NOTE: ALL CATCH FIGURES FOR 1987 ARE PRELIMINARY

* Numbers for 1982-84 are estimated (assuming 2.0kg for average grilse; 4.5kg for average salmon)

(January 25, 1988)

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)	1987* Catch (Tonnes)	1987 Compared to 1978-82 Average %
1	124	81	51	72	89	75	-40
2	485	286	211	139	309	373	-23
3	257	191	134	123	192	367	+43
4	166	125	128	111	200	184	+11
5	70	58	60	72	61	60	-14
6	57	30	35	65	54	47	-18
7	45	23	20	25	19	24	-47
8	40	24	32	31	24	20	-50
9	17	9	12	11	8	5	-71
10	36	22	28	51	49	27	-25
11	54	44	34	101	67	50	-7
12	79	53	0	0	0	0	-100
13	40	33	43	32	79	79	+98
14	36	37	33	30	79	132	+267
Total	1,504	1,016	821	862	1,230	1,442	-4
Insular Nfld. only	895	649	559	651	832	995	+11

* All figures for 1987 are preliminary

(January 25, 1988)

NOMINAL CATCHES (PROVISIONAL) OF ATLANTIC SALMON IN CANADA FOR 1987 (IN KG ROUND FRESH WEIGHT)

	GRILSE	% OF TOTAL	SALMON	% OF TOTAL	TOTAL	% OF TOTAL
QUEBEC						
R	10,218	1.3	53,911	5.9	64,219	3.7
C	4,467	0.5	92,820	10.1	97,287	5.6
Total	14,685	1.8	146,731	16.0	161,506	9.3
NFLD.						
R	45,564	5.6	2,676	0.3	48,240	2.8
C	694,262	85.2	747,886	81.6	1,442,148	83.3
Total	739,826	90.8	750,562	81.9	1,490,388	86.1
MARITIMES						
R	56,641	7.0	0	0	56,641	3.3
C	0	0.0	0	0	0	0.0
Total	56,641	7.0	0	0	56,641	3.3
NATIVE FOOD FISHERY (ALL AREAS)	3,745	0.4	18,858	2.1	22,603	1.3
TOTAL	814,897	100.0	916,151	100.0	1,731,138	100.0

R = Recreational (TOTAL = 169,100 kg or 9.8%)

C = Commercial (TOTAL = 1,539,435 kg or 88.9%)

NOTE: ALL CATCH FIGURES FOR 1987 ARE PRELIMINARY

(January 25, 1988)

TABLE: A COMPARISON OF THE OVERALL 1983, 1984, 1985, 1986 AND 1987 ATLANTIC SALMON FISHERIES* (IN TONNES)

AREA	GRILSE					SALMON					TOTAL				
	1983	1984	1985	1986	1987	1983	1984	1985	1986	1987	1983	1984	1985	1986	1987
QUEBEC															
R	4.2	4.0	7.1	9.3	10.2	46.6	37.8	47.7	61.5	53.9	50.8	41.8	54.8	70.8	64.1
C	6.4	1.5	4.2	7.4	4.5	88.1	60.6	65.5	68.5	92.8	94.5	62.1	69.8	75.9	97.3
TOTAL	10.6	5.5	11.3	16.7	14.7	134.7	98.4	113.2	130.0	146.7	145.3	103.9	124.6	146.7	161.4
NFLD.															
R	55.8	63.0	61.7	62.9	45.6	8.0	3.4	1.2	1.9	2.7	63.8	66.4	62.9	64.8	48.2
C	401.5	346.3	464.0	608.3	694.3	615.0	475.1	398.8	621.8	747.9	1016.5	821.4	862.9	1230.1	1442.1
TOTAL	457.3	409.3	525.7	671.2	739.9	623.0	478.5	400.1	623.7	750.6	1080.3	887.8	925.8	1294.9	1490.4
MARITIMES															
R	29.5	34.8	52.9	86.4	56.6	37.5	2.0	0	0	0	67.0	36.8	52.9	86.4	53.3
C	15.6	14.9	0	0	0	115.8	41.0	0	0	0	131.4	55.9	0	0	0
TOTAL	45.1	49.7	52.9	86.4	56.6	153.3	43.0	0	0	0	198.4	92.7	52.9	86.4	56.6
NATIVE	?	2.1	2.5	5.7	3.7	?	25.0	26.3	25.3	18.9	?	27.1	28.9	31.0	22.6
TOTAL	513.0	466.6	592.6	780.0	814.9	911.0	644.9	539.7	779.0	916.2	1424.0	1111.5	1132.3	1559.0	1731.1

* Numbers may not add directly due to rounding process

R = Recreational
C = Commercial

NOTE: ALL CATCH FIGURES FOR 1987 ARE PRELIMINARY

ANNEX 5

FEBRUARY 1988

MONTREAL

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

NORTH AMERICAN COMMISSION

NAC (88)4

CAFSAC ADVICE FOR 1988

The Status of Atlantic Salmon Stocks in Atlantic Canada and Advice for their Management in 1988

At its meeting of 27 November, 1987, 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 the Miramichi, Restigouche, Saint John, Margaree, LaHave and Conne rivers.

1.0 STATUS OF SPECIFIC STOCKS

1.1 Miramichi River

As in the previous two years, there was no drift net or trap net fishery; anglers were required to release all multi-sea-winter (MSW) salmon (determined as fish 63cms or longer) but, as in previous years, native fisheries were not restricted by quota. Extraordinary measures were introduced, however, because of extremely low water conditions and five major tributaries were closed to angling July 15-27.

Total annual catches in the period 1951-1970 were about 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 about 37,000 annually. Catches in 1985, 1986 and 1987 are given below (numbers of fish):

	1985		1986		1987	
Fishery	MSW	1SW	MSW	1SW	MSW	1SW
Native	327	546	641	1,988	898	1,274
Angling*	289a	18,439	428a	26,163	127a	16,590
Total	616	18,985	1,069	28,151	1,025	17,864

* - Estimates
a - Assuming catch-and-release mortality rate of 0.03
MSW = Multi-sea-winter salmon
1SW = 1-sea-winter i.e. grilse

Two methods have been used to estimate the spawning escapement, both based on catches at the Millbank trap. The first method relates the catches in the trap to the number of salmon that spawn in the same year as judged subsequently by the number of young salmon (parr) that result from the spawning. The second method relates the catches in the trap to the total number of adults that pass the trap on the basis of the "efficiency" of the trap. This efficiency is estimated from the proportion of recaptures up river of salmon that were released from the Millbank trap after being tagged. There has been concern that the efficiency of the trap may have changed since 1981 as a result of dredging operations, and although the results of tagging experiments carried out in 1985, 1986 and 1987 are quite consistent with each other, they are much lower than the efficiency as measured in 1973. In estimating spawning escapement, CAFSAC has therefore used the 1973 measurement of efficiency for the period prior to 1981, the year specific results for 1985-87, and an historical relationship between Millbank catches and angler catches, to estimate efficiency for 1981-1984.

Based on estimates of the number of 1SW and MSW fish surviving to spawn in 1987, the number of eggs deposited was 78% of the target (132 million eggs), or 18% above the target, depending on whether the escapement was based on the relationship of Millbank catches to subsequent parr densities or on the estimate of trap efficiency. The latter figure would be an over estimate if mortality due to poaching or disease were higher than assumed, or if catches were under reported.

These calculations imply that total returns (Figure 1) to the Miramichi were very much less (13,500 fish) for MSW salmon than had been forecast (54,200) last year on the basis of the number and sex ratio of 1SW returns in 1986. It is noted that the returns of MSW salmon to most rivers in 1987 were much below predicted values, which suggest that some unusual event affected returns on a wide geographical scale, particularly since the success of the West Greenland fishery in 1986 indicated that 1987 should be a year of good returns of MSW salmon to Canadian rivers. It is noted also that in the previous four years, MSW returns have been estimated to be 56-133% of predicted values in comparison to the 1987 performance of 25%. The returns (97,100 fish) of 1SW salmon, on the other hand appear to have been very much better than average (48,500 fish).

Forecasting the return of MSW salmon in 1988 using the same relationship that was used to forecast the 1987 returns, would indicate a return of 36,400 MSW salmon or some 12,800 salmon in excess of spawning requirements.

The returns of 1SW fish cannot be forecast, but the average return for the years 1983 to 1987 is 61,900 fish, which is 39,300 more than are estimated as necessary to meet spawning requirements.

In addition to the general difficulties in assessing salmon stocks, as noted in the final paragraph of this Advisory Document, CAFSAC notes that estimates of returns to the Miramichi are based on the efficiency of the Millbank trap as deduced by the proportion of fish recaptured further up the river. This proportion is, however, based on relatively few recoveries (20 in 1987) and consequently the estimates of trap efficiency are subject to some uncertainty, although the estimates for 1985 to 1987 are similar.

1.2 Restigouche River

Restrictions on the harvest of Atlantic salmon from the Restigouche River in 1987 were similar to those in 1985 and 1986: 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 (fish less than 63cm in length), with bag limits of two such fish per day and 10 per season; anglers on Restigouche tributaries in Quebec could land both 1SW and MSW salmon with 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 Restigouche, Quebec, were restricted by quota (6,995kg). Native fishermen at Eel River Bar, N.B. were however 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. Estimates of catches in 1985, 1986 and 1987 are given below (numbers of fish):

Fishery	1985 MSW	1985 1SW	1986 MSW	1986 1SW	1987 MSW	1987 1SW
Native						
Restigouche	976	35	1,145	4	986	5
Eel River Bar	241	0	431	26	501	451
Angling						
New Brunswick	--	3,258	--	4,915	--	4,477
Quebec	752	259	1,418	498	873	591
TOTAL	1,969	3,552	2,994	5,443	2,360	5,524

Homewater returns in 1987 were estimated from two methods. The first method, based on an angling exploitation rate of 20%, was considered optimistic. According to this method, the number of eggs deposited would have been about twice the target (71.4 million eggs). The second method which related angling catches to spawning escapement as judged from subsequent parr densities, indicated that the number of eggs would have been only 60% of the target. Total estimated returns 1970-86 are shown in Figure 1, on the basis of the second method, which may be more reliable. The figure indicates that returns of MSW salmon (11,300 fish) in 1987 were only half the number (21,900) predicted, while the returns of 1SW salmon (10,500) were similar to 1986 and in both years were 25% higher than the 1981-85 average.

The forecast of returns of MSW salmon in 1987 was based on a relationship between the sport catch of 1SW salmon at Kedgwick Lodge, and total returns of MSW salmon to the Restigouche River in the following year. This relationship no longer appears to be valid for forecasting the return of MSW salmon, and CAFSAC has no basis for forecasting the returns in 1988. It is noted that the average return of MSW and 1SW salmon in 1983-1987, has been 12,900 and 8,500 fish respectively. Such returns approximate the estimated spawning requirement for MSW salmon but are nearly 6,000 fish above the requirement for 1SW fish.

1.3 Saint John River

The management plan was similar to that in 1986; there were no closed periods within the June 1 and October 15 open season for the Kingsclear food fishery (the quota remained at 900 fish), a licence was again granted to the Oromocto Band for the capture of 150 salmon, and anglers were required to release MSW salmon (judged as those 63cms or longer). Most tributaries were, however, closed to angling during parts of July and August because of unusually low water levels.

Catches in the period 1970-83 have varied widely (3,100-15,600) with an average catch of about 10,000 fish. Catches in 1985 and 1986, and preliminary estimates for 1987 are given below (numbers of fish):

	1985		1986		1987	
Fishery	MSW	1SW	MSW	1SW	MSW	1SW
By-catch*	2,294	531	563	329	408	340
Native*	2,517	483	2,400	600	1,120	280
Sport**	367	3,402	248	3,742	122	2,815
TOTAL	5,178	4,416	3,211	4,671	1,650	3,435

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

There is less uncertainty about the estimates of salmon returns to the Saint John River than for other rivers because the number of fish passed over the Mactaquac Dam is known. To this must be added not only known or estimated catches and an allowance for poaching, disease and other deaths, but also an estimate of the number of salmon that utilize the river system below the dam. The only means of estimating this component is to use the ratio of historical returns below Mactaquac (as estimated from the recreational catch and the assumed exploitation rate) to the returns above Mactaquac, on the assumption that the ratio of production above and below the dam does not vary between years. Better measures of the relative production below the dam would require an in-season tagging programme below Mactaquac.

The estimates of total returns in 1987 are 8,000 MSW salmon and 16,700 1SW salmon, which are respectively 55% below and 27% above the forecasts. The returns of MSW salmon in 1985 and 1986 were in contrast, 83% and 95% of the values forecast. Estimates of returns for the period 1975-87 are shown in Figure 1. The reasons for the much lower return of MSW salmon are not known, but as noted for the Miramichi, this was a general trend for many rivers in 1987. The pattern of recaptures of fish tagged before release from the Mactaquac hatchery does not suggest unusually high harvest in distant waters. The relatively small numbers of MSW salmon in 1987 does mean that spawning escapement was well below target levels both above (63% of requirement) and below (52%) Mactaquac.

Returns of wild (as compared to hatchery production) large (MSW) salmon originating above Mactaquac Dam are forecast from an historical (1970-1986) relationship between wild 1SW salmon returns and wild MSW salmon returns in the following year. Returns of wild 1SW salmon originating above Mactaquac, are forecast from an historical (1968-81) relationship between egg densities in the Tobique River and the subsequent production of 1SW salmon. Returns of wild 1SW salmon and MSW salmon produced below Mactaquac are forecast using the forecasts for returns to the river system above Mactaquac and the historical (1970-86) relationship between returns above Mactaquac Dam and returns below. Forecasts of the return of hatchery-reared 1SW and MSW salmon are based on return rates from previous releases of smolts, parr and fingerlings.

The forecast total returns are 15,200 MSW and 14,900 1SW salmon. These would represent 3,000 MSW and 5,000 1SW salmon surplus to minimum spawning requirements above Mactaquac and 1,500 MSW and 2,300 1SW salmon below.

1.4 Margaree River

Anglers have been required to release MSW salmon during the early part of the run (before September 1) since 1979, but since 1985, all MSW salmon (judged as fish 63cm or longer) were to be released regardless of date caught. There has been no commercial fishery since 1985. 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.

Historical catches in the recreational fishery have been variable but averaged around 300 fish, about two-thirds of which were MSW salmon. The 1985, 1986 and 1987 recreational catches (all MSW salmon released), as estimated by DFO Fisheries Officers, are compared below:

	1985	1986	1987
1SW salmon	223	295	353
MSW salmon	(312)	(754)	(408)

These estimates are considered to be less than actual catches whereas an alternative source of information, provincial licence stubs, appears to over estimate the catch. A creel census and a voluntary log book program carried out in 1987, supported this view and suggest initial adjustment of the DFO estimates of the catch of 1SW and MSW salmon by factors of 1.2 and 2.0. The difference between these adjusted values and licence stub values have yet to be resolved. Escapement has been calculted on the basis of the assumptions that the recreational fishery catches either 20.6% or 37.9% of the available population. Under either assumption of exploitation rate, spawning requirements were met (estimates of egg deposition for 1947-86, under either assumption, are shown in Figure 2). The egg deposition values shown for 1985 to 1987 make use of the adjusted DFO catch estimates but even if the adjustments are not made, spawning requirement would still have been met.

The indicator that has been used to forecast MSW returns 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. Since, however, MSW salmon must now be released, it is likely that the angling "catch" is not the same measure as in the past. Consequently CAFSAC has no basis for a forecast of returns in 1988, and notes that the average catch of MSW salmon in 1984-1987 has been 399 fish, while allowing spawning requirements to be met. It is hoped that once uncertainties about the catch statistics have been resolved, a new index may be available for forecasting returns.

1.5 LaHave River

More information and analyses are available this year for salmon in this river and specific commentary is thus provided for the first time.

The river has been subject to a salmon development program above Morgan Falls since 1969, and in 1987 (as in 1986) commercial fishing was prohibited, anglers were required to release any fish 63cm or longer (approximately the division between 1SW and MSW salmon), and no angling was permitted in the upper reaches. In addition because of the unusually low water conditions, the angling season was closed early (29 July).

Annual salmon catches since 1970 have varied between 538 (1983) and 2,967 (1980), with MSW salmon varying 247-739 except for 1980 when 1,489 MSW salmon were caught due to an unusually high reported commercial by-catch. The angling catch in 1987 is not available, but based on the relationship between angling catches and the counts of salmon passing the Morgan Falls fishway in each year, it is estimated that the catch was 1,575 1SW and 399 MSW salmon. Recent catches have been (numbers of fish):

	1985		1986		1987	
	MSW	1SW	MSW	1SW	MSW	1SW
Catch	517	741	(382)a	1,092a	(399)a	1,575a

a - estimate of releases

Wild returns to the LaHave are estimated by two methods, one being based on the angler exploitation rate, as determined by tag returns from hatchery reared smolts and the other being based on extrapolating the counts of returning fish at Morgan Falls to the rest of the river system on the basis of relative rearing areas. The first method indicates 1,620 MSW and 8,610 1SW salmon returned in 1987, the other 2,250 MSW and 10,690 1SW salmon. Returns as estimated by method 1, for the period 1973-1987 are shown in Figure 1. Allowing for the angling catch of 1SW salmon and a loss of 300 fish to various causes, the spawning escapement is estimated to have been 3 to 4 times the minimum target requirement.

A forecast of the 1988 return of MSW salmon has been made on the basis of comparison of wild MSW returns in each year and the wild 1SW returns of one year earlier (excluding hatchery production). This relationship suggests 3,040 wild MSW salmon will return, an estimate that is more than twice what the relationship would have predicted for 1987 returns (1,067 fish predicted; 1,174 fish observed). The return of wild 1SW salmon to Morgan Falls in 1988, as suggested by the estimated number of eggs deposited in 1984 and similar comparisons for previous years, would be 1,730 fish (the estimate would have been 1,760 for 1987 and the observed return was 2,529). These forecasts refer to wild fish and an additional 160 MSW and 1,210 1SW salmon may be expected from hatchery releases. Thus total MSW returns to the LaHave may be higher in 1988 than in 1987, while total 1SW returns will be about the same.

1.6 Conne River

The native food fishery which was first authorised in 1986, was assigned the same quota (1,200 salmon less than 63cm in length i.e. predominantly 1SW fish) but the gear permitted was changed from a trap net to gill nets. Anglers were prohibited from retaining salmon over 63cm in length. The angling season was closed early on 15 July (rather than 7 September) because of low water conditions. In addition to catches in the river and estuary, part of the commercial salmon catch in Statistical Section 36, is of Conne River origin.

Recent catches have been: (numbers of fish except for commercial catch which is in tons)

	1985		1986		1987	
	63cm or longer	Less than 63cm	63cm or longer	Less than 63cm	63cm or longer	Less than 63cm
Angling	--	2,729	--	2,060	--	1,598
Native	--	--	3a	519	--	18
Commercial catch in Stat Section 36	23.9	14.8	11.4	17.6	(not available)	

a - Dead in trap

The low catch in the native food fishery was due to loss of the trap net in a fire, and the delay in obtaining gill nets.

The total return to the Conne River estuary was estimated on the basis of subsequent recaptures of salmon tagged near the river mouth. The results indicate a return in 1987 of 512 larger salmon (63cm or longer) and 9,936 fish less than this length. Making allowance for angling catches and other losses (natural and poaching) it is estimated that spawning requirements were exceeded by 80%, although it is noted that the recreational fishery was cut short and the native food fishery took few fish. The spawning requirement for this river cannot be estimated on the basis of eggs per unit area of total rearing habitat because the young salmon also utilize lakes, the capacity of which to support young salmon has not yet been determined. Instead, an attempt has been made to estimate the number of eggs that would be needed to maintain the total returns as calculated, and also the catch of Conne River salmon in the commercial fisheries in Statistical Section 36. The contribution of Conne River salmon to this commercial catch has been assumed to be either 25 or 50%, but for the purpose of calculating spawning requirements, a value mid-way between these two assumptions has been used. The resultant estimate of the spawning requirement is 7.8 million eggs, or about 4,000 salmon smaller than 63cm. This is higher than the 3,000 salmon estimated last year, due to a reduction in the number of eggs it is thought can be deposited by a single fish.

A forecast for 1988 of the return of small salmon has been based on an estimate of the total run of smolts going to sea. This estimate of smolt production was based on the results of tagging smolts upstream and determining the proportion of tagged smolts in the run through a trap downstream. This suggests a total return of 12,600-14,000 salmon, before the commercial fisheries and thus a return of about 7,900-8,800 salmon to the Conne River, a surplus of 3,900-4,800, relative to spawning requirements.

2.0 GENERAL STATUS OF ATLANTIC SALMON STOCKS IN 1987

The overall catches of salmon in Atlantic Canada are presented in Figure 4 (recreational landings) and in Figure 5 (commercial landings in Newfoundland and Labrador). In addition, recent counts of returning salmon at fishways are presented in Figure 6.

2.1 Newfoundland Region

No changes were made to the 1986 version of the Atlantic Salmon Management Plan, that was first implemented in 1984. The commercial fishing seasons remained the same, and in most Salmon Fishing Areas (SFA), the opening was 5 June and the closure was 15 October. In the recreational fishery, mandatory release of MSW fish (determined as fish 63cm or longer) continued in insular Newfoundland (retention allowed in Labrador) and the season bag limit on fish less than 63cm remained at 15.

CAFSAC could not examine the status of stocks in 1987 because commercial and complete recreational data were not available. Furthermore, even if recreational catch statistics were available, they may not be indicative of overall abundance in 1987 owing to low water levels and river closures. Counts of fish from rivers with fishways and counting fences, (Figure 6) for SFAs (Figure 3) of insular Newfoundland as well as angling catches in a few selected rivers, indicate however, a lower abundance of both small and large salmon in 1987 compared to 1986 and the 1982-86 mean value. For Labrador, drought conditions were not a factor in 1987, and no rivers were closed to angling. In general, 1987 catches of salmon less than 63cm for Labrador rivers were apparently higher than the values for 1986 and the 1981-85 mean.

2.2 Gulf Region

2.2.1 Newfoundland and Labrador

Commercial regulations in 1987 were similar to those in effect for 1986. SFA 12 (Figure 3) remained closed, SFA 13 was open from June 5 - July 10, and SFA 14 was open from June 5 - October 15. No new licenses were issued in 1987. In 1986, there were 403 licenses in the Gulf Region which included 61 in southern Labrador. Recreational fishery regulations were also similar to 1986, with local seasons subject to variation orders. Anglers were required to release salmon larger than 63cm in insular Newfoundland, but not in southern Labrador. The seasonal bag limit of 15 fish, the daily limit of two retained, and the daily limit of 4 hooked and released as introduced in 1986, remained in effect for 1987.

Commercial landings in 1987 of small salmon (56,100 fish) were the highest since 1976, and of large salmon (18,900 fish) were the highest since 1983. Recreational catches of 1SW salmon (13,300 fish) were close to recent averages.

Based on the observations at counting facilities (Figure 6), 1SW returns in 1987 to Lomond River Fishway (SFA 14) were equal to 1986, but the 11 MSW fish counted were only 30% of the count in 1986. One-sea-winter salmon returns to Torrent River (SFA 14) fishway were 89% of those of 1986; MSW fish were 76%. Returns to Western Arm Brook fence were the highest since 1983, although counts in 1985 and 1986 may have been biased by low water affecting the passage of fish through the fence. Total 1987 returns to Western Arm Brook, including angled fish, were 447 1SW and a single MSW salmon.

Low water levels in 1987 delayed run-timing and may have decreased the recreational catch. The run at Western Arm Brook did not reach its maximum until the last week of September - an appreciable delay from typical June-July peaks. The Lomond River fishway was dry for much of the summer, yet 1SW returns were similar to 1986 and the Torrent River returns do not appear to have been adversely affected by low water levels. In the latter case this is likely to be due to the large lake upstream from the fishway which may provide a sufficient reservoir to alleviate otherwise severe effects of low water.

The only forecasts that can be made are for Section 50 (Labrador) of SFA14, where the numbers of large salmon in the commercial catch can be predicted from the numbers of small salmon caught in the previous year. The 1987 catch of small salmon in this area was 10,975 fish, and the forecast catch in 1988 of large salmon is 12,930, which would be similar to 1987 and above the recent annual average catch. No other forecasts can be made because although estimates of smolt production are available for Western Arm Brook, these do not correlate well with subsequent catches.

2.2.2 New Brunswick and Nova Scotia (see also sections on Restigouche, Margaree and Miramichi rivers)

Angling catches of 1SW salmon in Prince Edward Island were the highest on record since 1974. Increased catches resulted from enhancement activities on the Morell River, as evidenced by returns of 1SW salmon of hatchery origin to the Morell fishway. MSW salmon counts at the fishway were also substantially higher than in 1986 (64 versus 4 salmon).

Along the Gulf shore of Nova Scotia, counting fence observations (Figure 6) indicated MSW salmon returns to the Cheticamp and South rivers were below 1986, while 1SW returns were similar or higher.

2.3 Scotia-Fundy Region

The Atlantic Salmon Management Plan implemented in 1984, and modified in 1985, was continued virtually unchanged through 1986 and 1987. Key elements of the plan have been the closure of the commercial fisheries and mandatory release of sport-caught MSW salmon in SFA 19 (Cape Breton East), SFA 20 (Eastern Shore, N.S), SFA 21 (Southwest N.S), SFA 22 (Upper Bay of Fundy, N.S) and SFA 23 (Southwestern, N.B) (Figure 3).

Attrition and voluntary buy-back have reduced the eligible commercial salmon fishermen from 290 in 1982 to 41 in 1988, i.e. 8, 3, 5, 1, and 24 fishermen in SFAs 19, 20, 21, 22 and 23 respectively. Commercial landings, 1974-1984, had averaged 5,156 1SW and 11,416 MSW fish.

Sport fishery regulations in 1987 remained virtually unchanged from those of 1986; daily and seasonal possession limits were 2 and 10 1SW fish (less than 63cm) respectively. However, a dry summer caused unusually low river levels and resulted in shortened fishing seasons or in-season closures. These generally restricted "successful" fishing to the pre-July and post-August periods.

The sport fishery data for SFAs 19-22 (Nova Scotia) that are available for 1987, are the result of a preliminary analysis of licence stubs voluntarily returned by anglers. The analysis involved about 1,800 stub returns (about 25% of total licence sales) and judged from experience in 1983-1986, should estimate total catch by SFA within ± 15%. Landings in SFA 23 (Southwestern, N.B) 1987 are also preliminary and are based on the sum of estimates by individual DFO Fishery Officers and N.B Department of Natural Resources and Energy biologists.

Estimates of recreational landings (fish retained) during 1974-1986 are shown in Figure 4 for all SFAs in the Scotia-Fundy Region, Nova Scotia.

Monitoring of salmon at trapping facilities in the Scotia-Fundy Region over a significant time frame is restricted to four facilities: Liscomb River (SFA 20), LaHave and Tusket rivers (SFA 21), and the Saint John River (SFA 23). Counts of wild fish are shown in Figure 6. Each river has been the object of varying degrees of development and therefore may not necessarily reflect the dynamics of other wild stocks.

Eastern Cape Breton (SFA 19) with some 29 salmon producing rivers, yielded an estimated 913 1SW fish to the 1987 sport fishery - 14% more than in 1986 but only 4% more than the mean of the previous three years. It is estimated that 1,164 MSW salmon were hooked and released.

Eastern Shore, N.S (SFA 20) with some 32 salmon producing rivers, yielded an estimated 1,477 1SW fish to the sport fishery - down 35% from 1986 and 33% from the 1984-86 mean. The count of 1SW fish at the Liscomb fishway, where the stock is being rebuilt, at 1,614 fish, was the highest in the nine years on record, and was double that of 1986. The hatchery 1SW return rate (2.75%) to Liscomb was also the highest on record. Hence, it is likely that the low sport catch of 1SW fish reflects the low summer water conditions and shortened seasons rather than fish numbers. The count (88 fish) of MSW fish at the Liscomb fishway was down approximately 25% from the 1986 return. Based on the relationship between counts of MSW fish and 1SW fish each previous year at Liscomb, MSW returns in 1988 are forecast to be 235 fish - double the best ever returns (117 in 1986).

In southwestern Nova Scotia (SFA 21) there are fewer than 20 salmon rivers, but these include the LaHave River and support significant sport fisheries. The estimate from licence stubs of the sport catch (4,993 1SW fish) in 1987 is the highest on record - some 60% higher than 1986 and 85% higher than the 1984-1986 mean. The count of 1SW fish at Morgan Falls (LaHave) was 2,529 fish; also 60%

previous year (Figure 7). This would suggest that the abundance of MSW salmon in Canada in 1988 should be higher than in 1984, 1985 or 1986. However, it should be noted that this relationship did not appear to function well with respect to the return of MSW salmon in 1987.

3. IMPACT OF ENVIRONMENTAL CONDITIONS ON STOCK STATUS IN 1987

In general, water flows in Atlantic Canada's salmon rivers other than in parts of Quebec and in Labrador were abnormally low in 1987 due to reduced rainfall. As well, there were many cases where water temperatures were measured that equalled or exceeded lethal values for Atlantic salmon. Low water flows were noted mainly in the months of June through August, and recreational fisheries were closed in many areas for part of the summer.

CAFSAC notes that the unusual environmental conditions could have affected both the status of the stock as well as our capability to assess the stocks. Concerns were expressed that adult returns (both timing, numbers, and in-river survival) could have been affected as may the juvenile populations in the river. Lack of "normal" recreational fishing seasons also made interpretation of recreational catch statistics (where they were available) difficult. Furthermore, even when rivers were not closed, low flows and high temperatures may have affected angling success.

River discharge data are available for many areas. In New Brunswick, both the Miramichi and Restigouche river discharges in May were about 40% of the long term average, while June, July and August discharges were about 60% of the long term values. In the Tobique River (St. John tributary) June, July and August flows were the lowest for the 32 years on record, while Mactaquac flows in June were about 50% of the 20-year mean, although not the lowest on record. In Nova Scotia, most river discharges in July and August were about 10-15% of the mean. In insular Newfoundland, the lowest summer precipitation in about 40 years was noted. Rivers in Labrador, however, did not seem to exhibit low summer flows, although only qualitative data are available.

High temperature (in the upper 20s° C) would normally be lethal to both juvenile and adult Atlantic salmon. Temperatures up to 29° C were recorded at Morgan Falls on the LaHave River in Nova Scotia, although few mortalities were noted. Field estimates indicated that, in some rivers (e.g. St. Mary's, N.S; Miramichi, N.B), adult mortalities numbered in the hundreds, and, in the Miramichi River, similar mortalities of juveniles were estimated. As this mortality information was primarily qualitative it cannot be used to modify the forecasts. It was noted, however, that in some rivers including the Miramichi, which were sampled at standard sites both during and after the periods of high temperature, densities of both age 0+ and 1+ parr were highest (or equivalent to the highest) in the 16 years on record. Monitoring of densities at these standard sites will be necessary for at least the next two years in order to assess the impact of the poor water conditions on juvenile survival and 1987 spawning success. It has been noted that low summer flows have been related to poor adult recruitment in upper Bay of Fundy rivers, accordingly recruitment in this area in 1989 may be reduced. It is also possible that similar effects occur in other rivers but information is not adequate to verify this.

higher than 1986 and some 50% higher than the previous 3-year mean. Return rates (3.39% and 1.32%) for hatchery produced smolts as 1SW fish to both the LaHave and Tusket in 1987 were also the highest on record.

In the upper Bay of Fundy on the Nova Scotian side (SFA 22), there are some 28 salmon rivers. Most are in the "Inner" Bay of Fundy and produce predominantly 1SW stocks of limited marine migration. Initial sport catch data for 1987 indicate that only about 104 1SW fish were retained - one-eighth the number angled in 1986 (which was also a low year) and the lowest in a 14-year history. Virtually all rivers are late-run and contributed to fall angling when water levels rebounded from summer lows. The sport catch in the Stewiacke River of 72 fish in 1988, as estimated from licence stubs, was only one-third of the forecast which itself was low. The forecast technique which is based on July to October precipitation at Upper Stewiacke and which predicted the reduced yields in 1986, suggests that the sport catch in 1988 will, at 535 1SW fish, be similar to the long-term annual average.

Southwestern New Brunswick (SFA 23) contains small "Inner" Fundy rivers with stocks similar in characteristics to those of SFA 22, as well as the larger "Outer" Fundy rivers, i.e., Saint John River and those to the west. Statistics for the "Inner" Fundy 1987 sport catches are incomplete but, as in SFA 22, catches were very low. A preliminary estimate that only 31 1SW fish were caught in the Big Salmon River in 1987 is supported by observation of extremely low 1SW returns. The forecast for the Big Salmon River in 1987 was that the sport catch would be very low (69 1SW fish). The same predictor, based on the September discharge at Point Wolfe and July sea surface temperature at St Andrews, indicates that a more normal sport catch of 398 1SW fish can be anticipated in 1988.

"Outer" Fundy stocks are largely represented by those of the Saint John River which is discussed earlier.

2.4 Gaspe Quebec

Management measures in 1987 were the same as those in 1986, which included the ban in the Gaspe area on commercial fishing instituted in 1984 and the daily retention of only one fish in the recreational fishery. The seasonal limit in the Gaspe sport fishery was 7 salmon in any combination of 1SW and MSW fish. River flows were near normal in 1987, unlike in most other parts of eastern Canada, and sport landings in 1987 (1,879 1SW fish) were similar to 1986 catches but up 87% over mean landings, 1982-1986. The MSW sport catch of 4,046 fish in 1987 was 16% less than in 1986, but 5% more than the 1982-1986 mean. Angler effort increased over the 1982-1986 mean. Counts at fishways (Figure 6) on the Mitis, Matane and Madeleine rivers (Zone Q3, Figure 3) in 1987 exceeded long term means for both 1SW and MSW fish. These may reflect stock development initiatives, and thus not totally reflect "wild" stock performance. Relationships between MSW fish returns, (2SW in the Mitis) and those of 1SW fish in each previous year for the Mitis, Madeleine, and Bonaventure (Zone Q1) rivers, suggest that MSW returns in 1988 will be higher than the recent average returns.

2.5 West Greenland

At West Greenland in 1987, the catch was 930t, which met the quota for the third year although, in 1986 the quota (909t) was somewhat exceeded (960t). The 1985 quota was 852 tons and the catch was 864t. This compares with the low catches of 310t and 297t in 1983 and 1984, respectively when the quotas (1,190t and 870t) were not taken. The 1987 catch rate of about 85t per day for the first 8 days of fishing was close to that in 1986, which was the highest on record. This indicates a higher abundance of salmon and/or a higher availability to the gear than in the years previous to 1986. Analysis has demonstrated that landings of MSW salmon in Canadian waters are positively correlated to catches at West Greenland in the

4. GENERAL COMMENTS

CAFSAC notes that timely estimation of the returns of salmon to Canadian rivers, and consequently also the forecast of future returns, is hampered by poor documentation of removals e.g. delays in the provision of sport and commercial catch statistics, uncertain statistics for native landings and absence of any information on by-catch mortalities. There are furthermore some uncertainties about the criteria used in the estimation process. Recent statistics for MSW salmon released from the sport fishery may not be comparable to pre 1984 statistics which referred to MSW salmon retained. Similarly, mortalities due to poaching and disease may be different from those assumed. The likelihood that estimates of actual returns since the implementation of the 1984 Management Plan may not be on the same basis as for the previous period may be the reason that these recent estimates have not improved the relationships used in the predictive models.

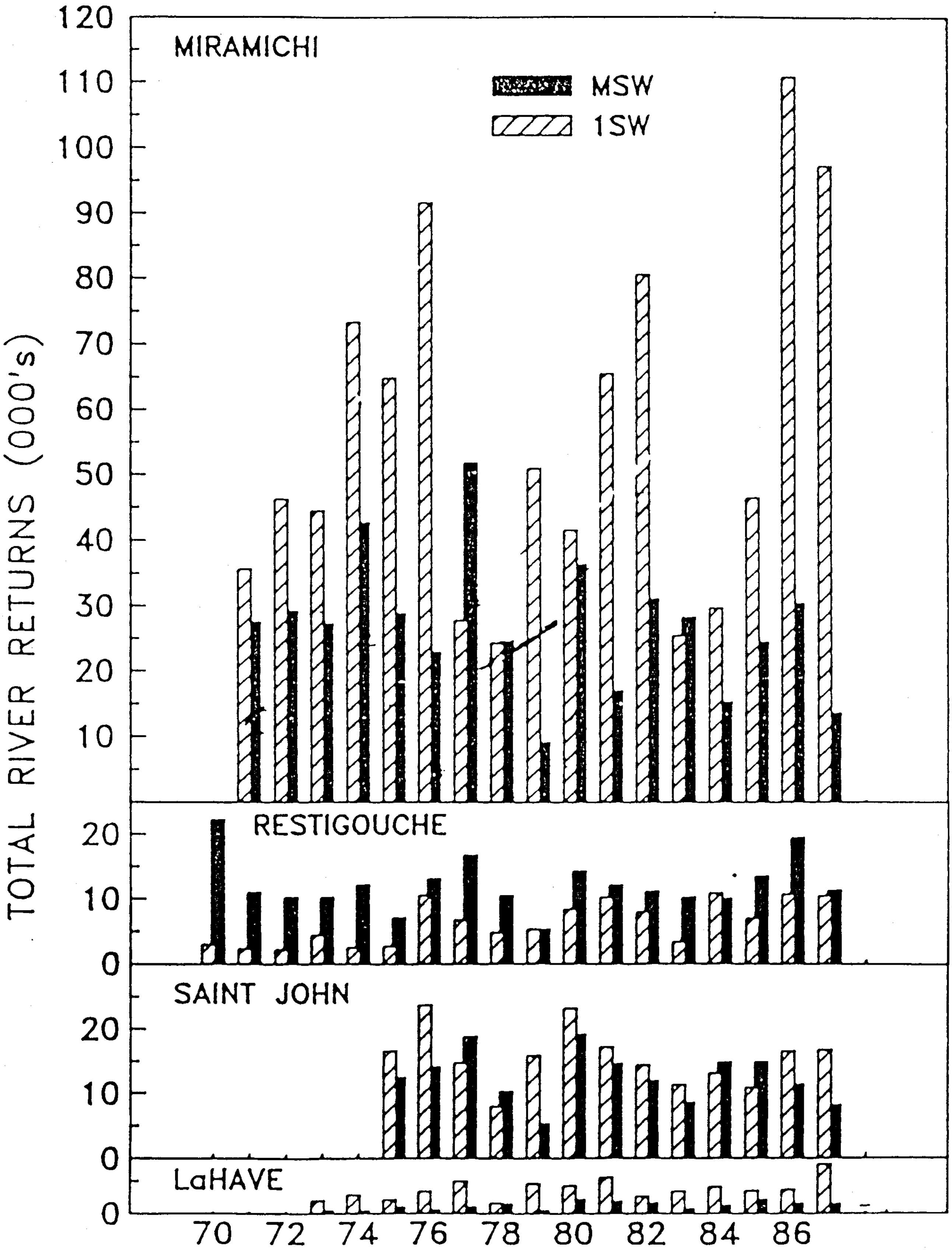


Fig. 1. Estimated total river returns.

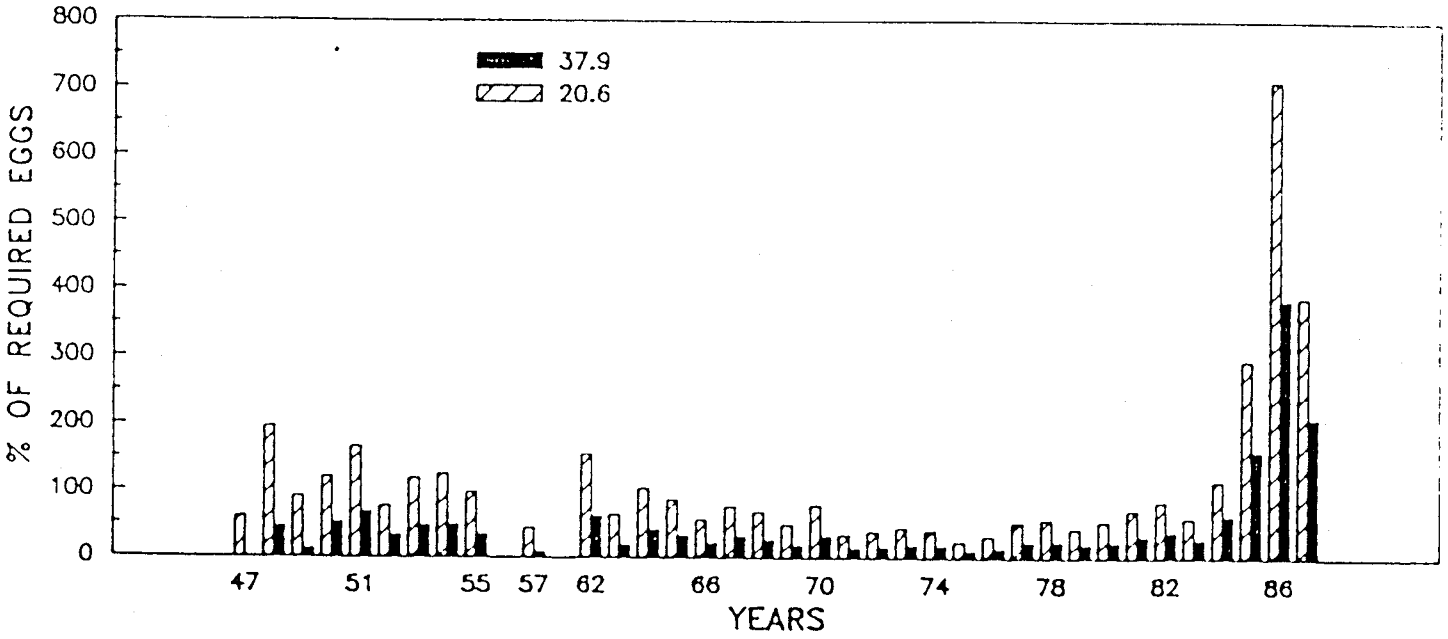


Fig. 2. Margaree, percent of required egg deposition at angler exploitation rates of either 20.6% or 37.9% of returns. (1985–1987 based on adjusted DFO estimates.)

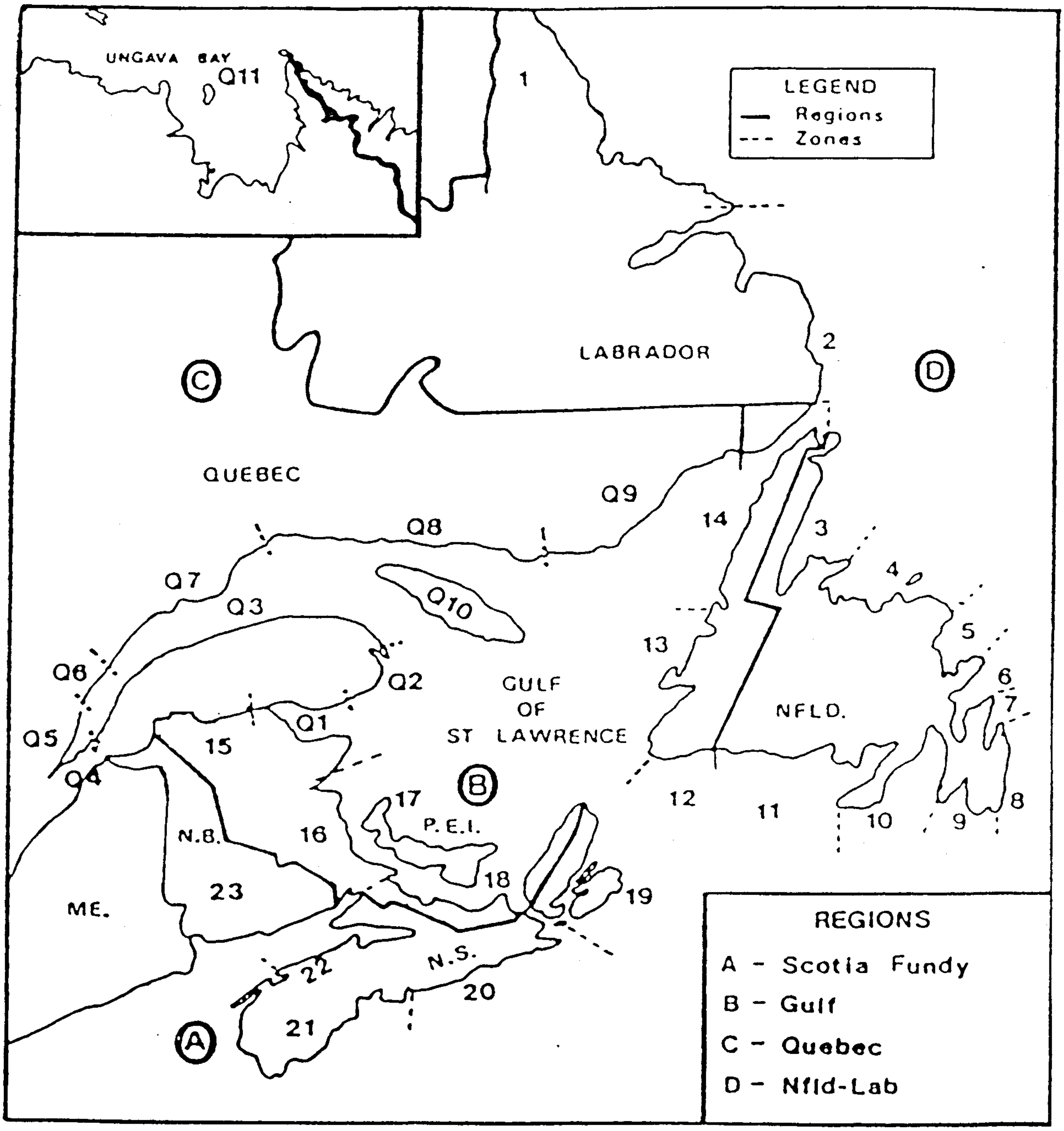


Fig 3. Map of Atlantic provinces showing Salmon Fishing Areas (SFA's) 1-23, Salmon Management Zones of Quebec (Q's) 1-11, provincial and DFO Regional boundaries.

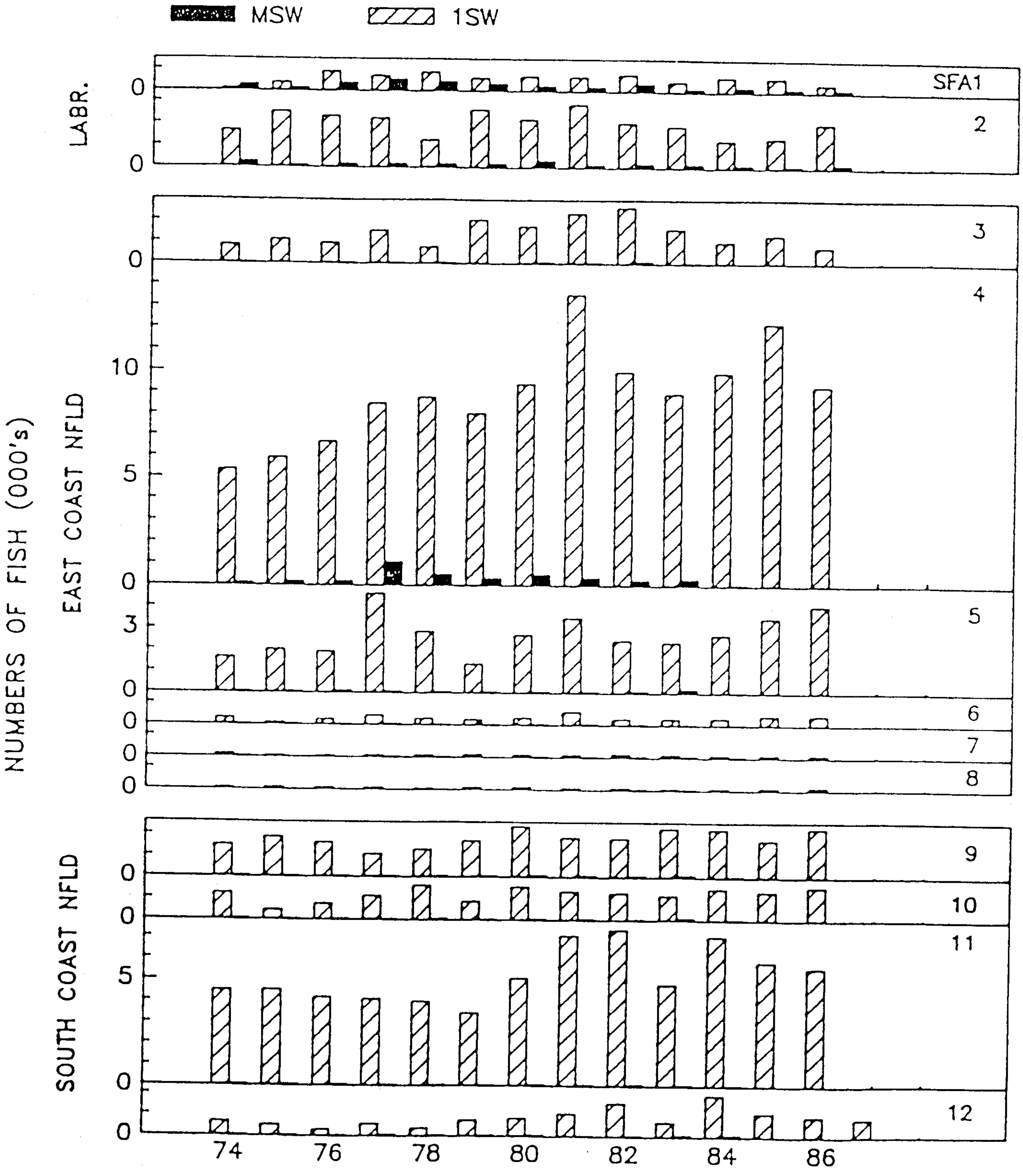


Fig. 4. Recreational landings by Salmon Fish Area (SFA).

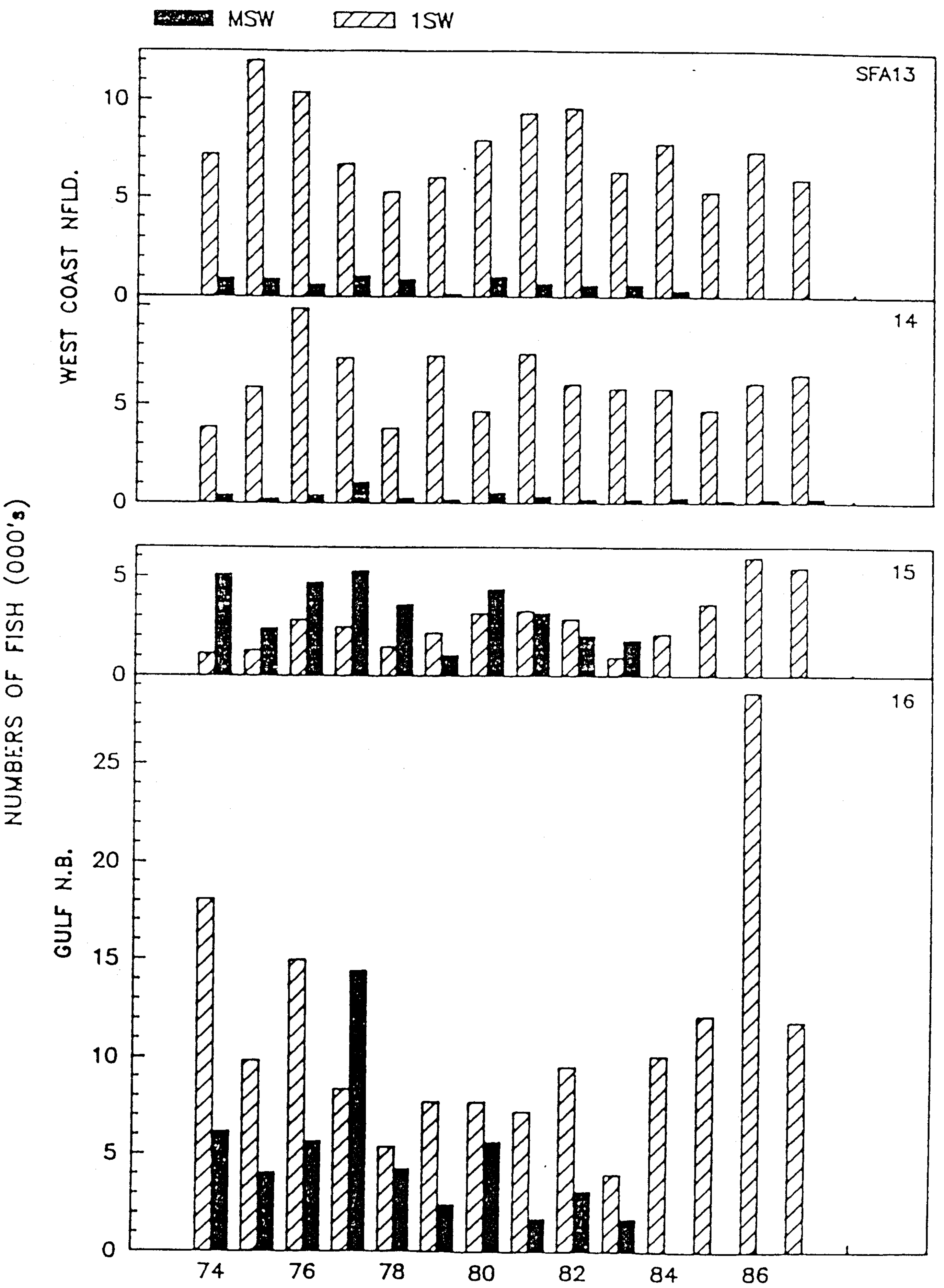


Fig. 4 cont'd. Recreational landings by Salmon Fishing Area (SFA).

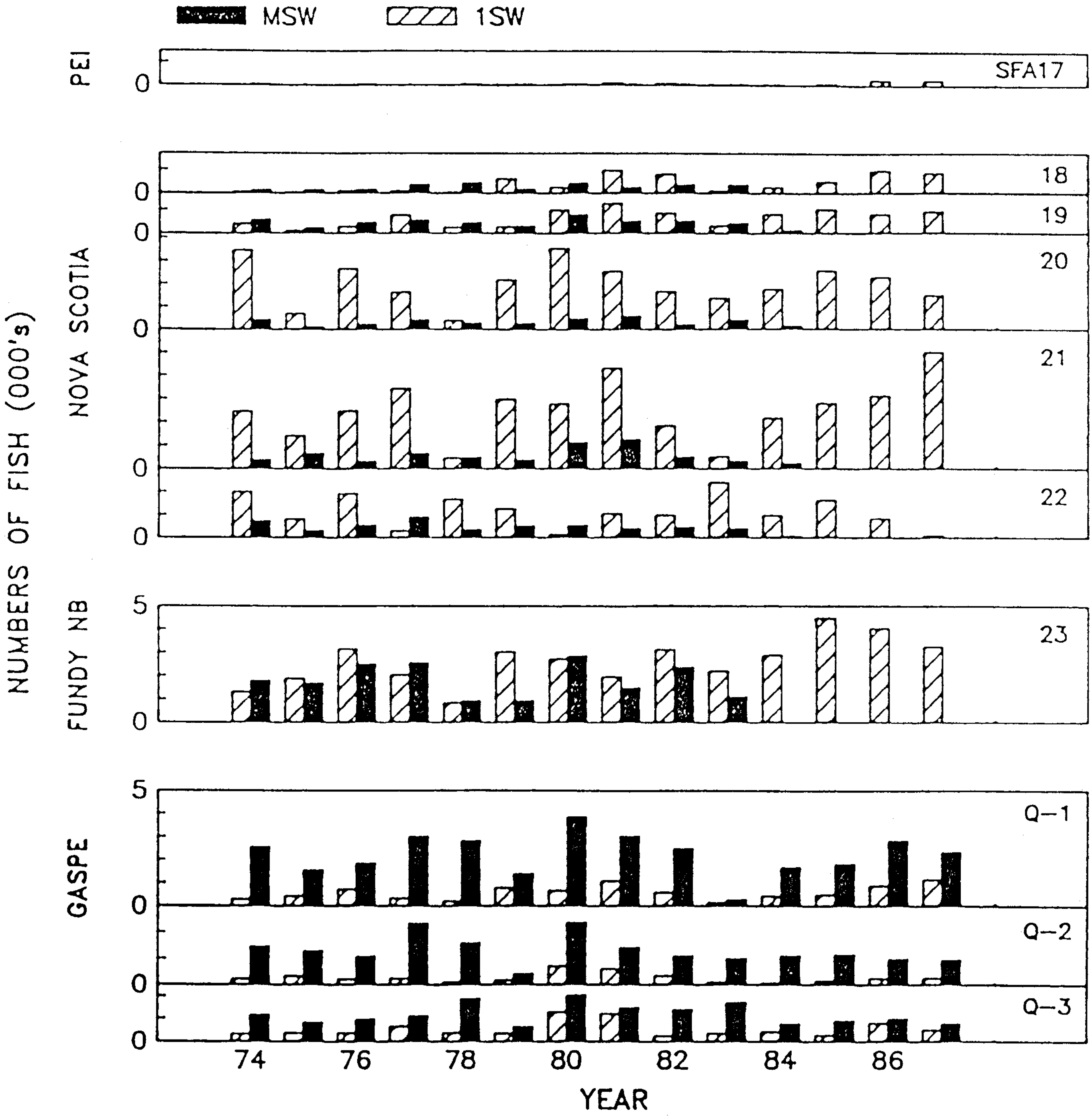


Fig. 4 cont'd. Recreational landings by Salmon Fishing Area (SFA).

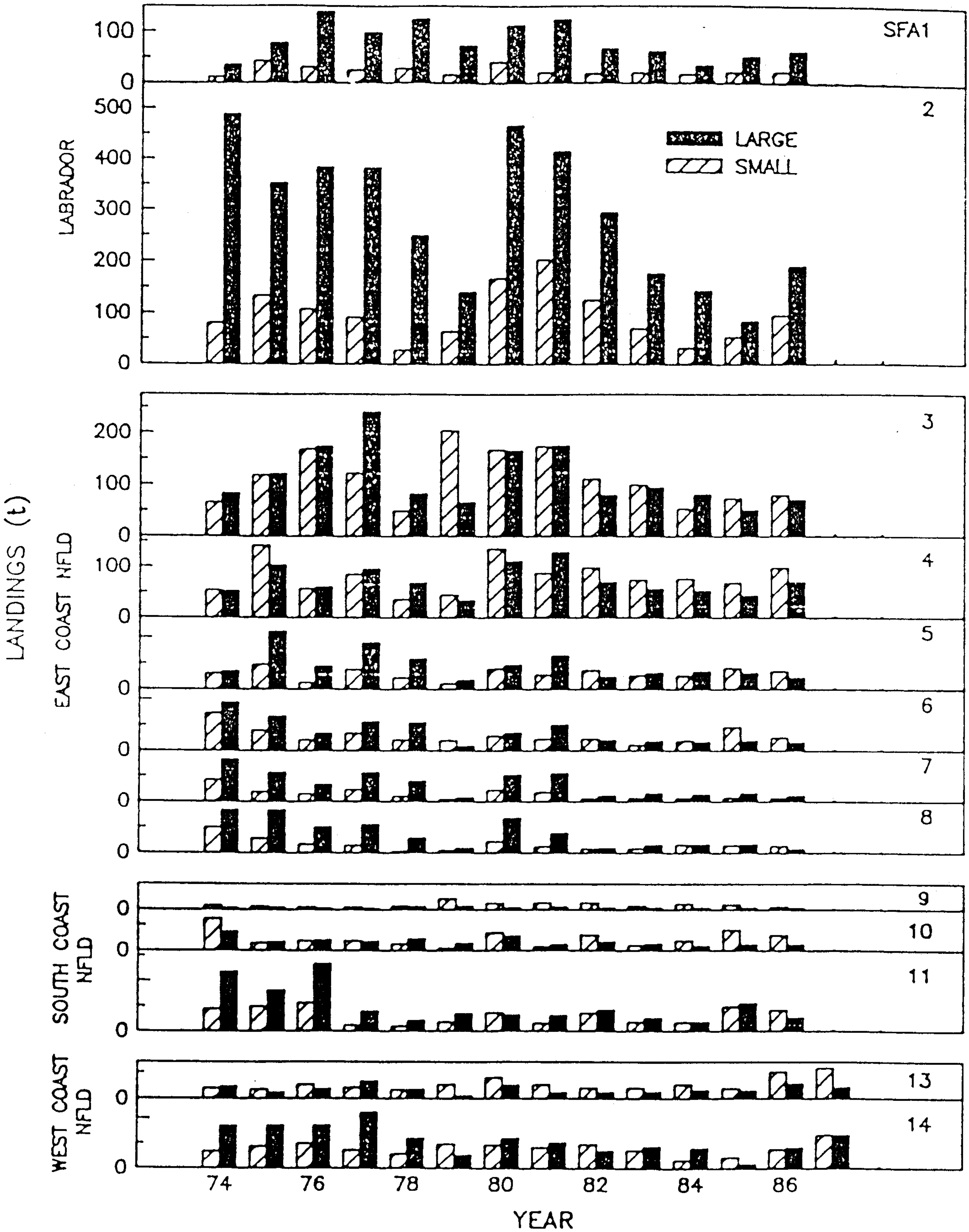


Fig. 5. Commercial landings (t) Newfoundland and Labrador by Salmon Fishing Area (SFA).

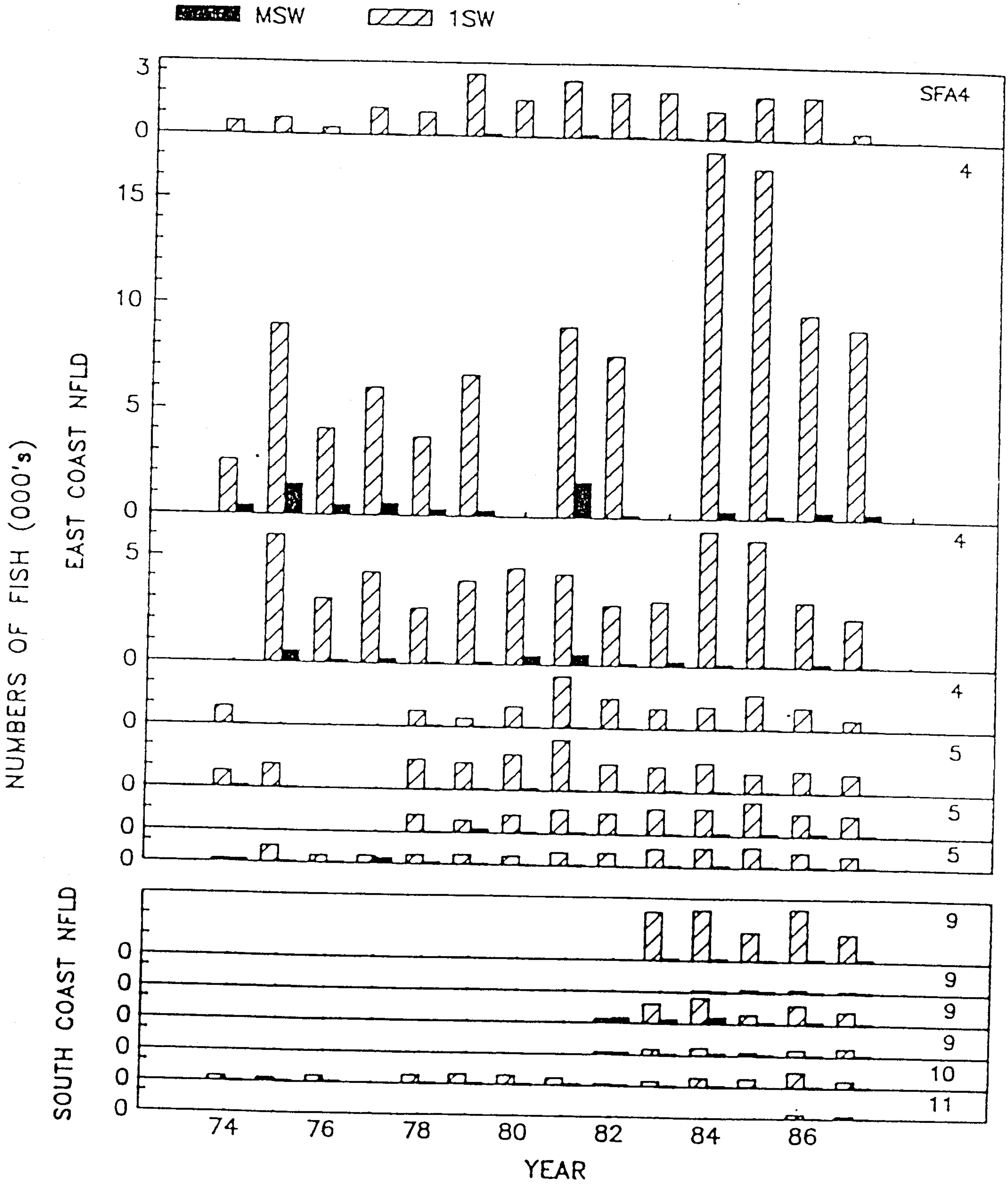


Fig. 6. Fishway counts, top to bottom: Indian, Exploits (Bishop), Exploits (Rattling), Gander, Middle, L. Terra Nova, U. Terra Nova, Biscay Bay, Northeast (Trepassey), Little Salmonier, Colinet, Northeast (Placentia), Grand Bank.

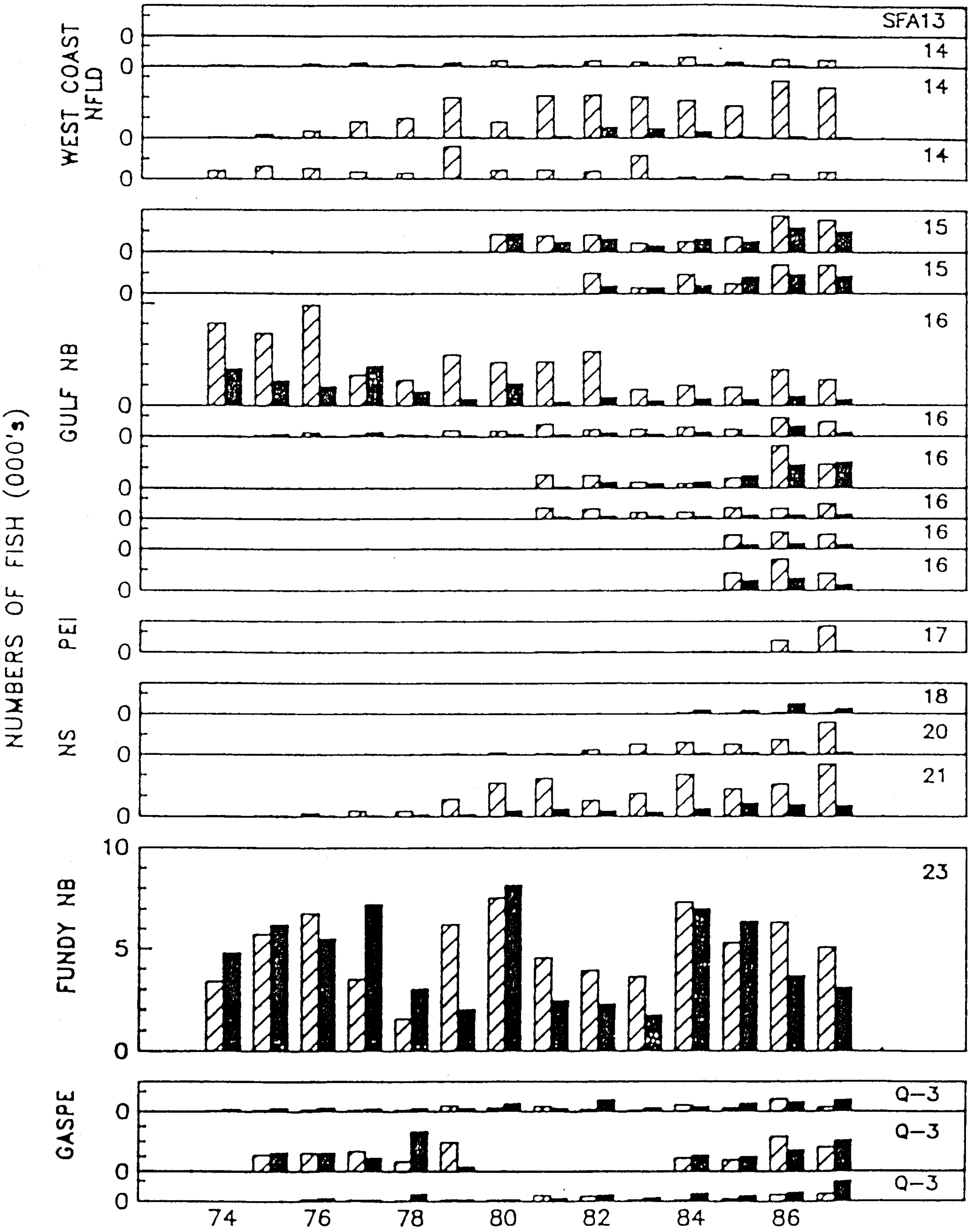


Fig. 6 cont'd. Hughes, Lomond, Torrent, Western Arm, Upsalquitch, Nepisiguit, Miramichi (Millbank), Bartholomew, North Branch, Dungarvon, Northwest Mir. trap, Southwest Mir. trap, Morell, Cheticamp, Liscomb, LaHave, Saint John (Mact.), Mitis, Matane, Madeleine.

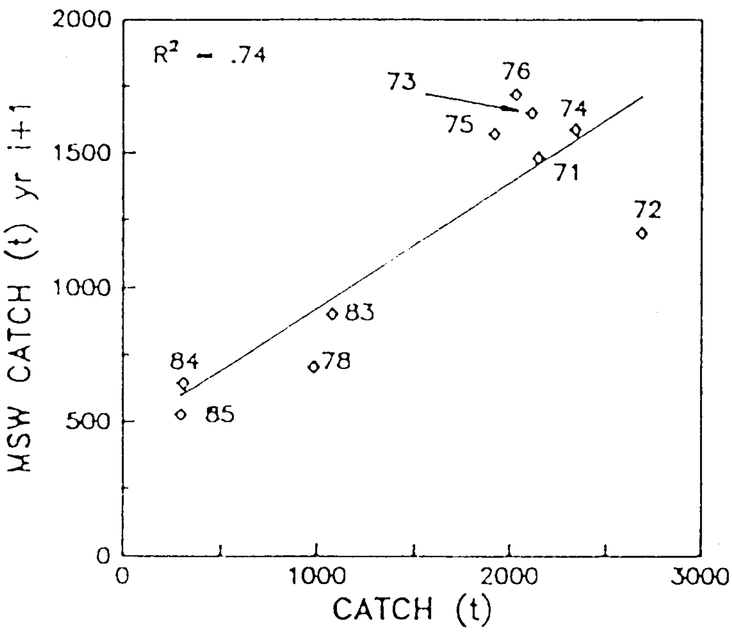


Fig. 7. Canadian MSW catch on Greenland catch. (Excludes years in which Greenland quota constrained catches).

JUNE 1988
REYKJAVIK

ANNEX 6

WEST GREENLAND COMMISSION

PAPER WGC(88)5

DRAFT REGULATORY MEASURE FOR THE WEST GREENLAND SALMON FISHERY PROPOSED BY THE REPRESENTATIVE OF CANADA

The TAC for West Greenland salmon fishery shall not exceed:

1. 740 tonnes in 1988 based upon an opening date of 1 August
2. 740 tonnes in 1989 based upon an opening date of 1 August
3. Greenland authorities will regulate this fishery such that the harvest, as estimated by ICES, does not exceed 292000 North American salmon for the two combined years.

Note: If the fishing season begins other than on 1 August, the above catch limits would be adjusted in accordance with ICES advice of 1987.

JUNE 1988
REYKJAVIK

ANNEX 7

WEST GREENLAND COMMISSION

PAPER WGC(88)4

DRAFT REGULATORY MEASURE FOR THE WEST GREENLAND SALMON FISHERY PROPOSED BY THE REPRESENTATIVE OF DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

The catches of salmon at West Greenland shall, for each of the calender years 1988 and 1989, not exceed 1000 tonnes.

These quantities are based upon opening the fishery on 1 August. If the fishing season is opened at a later date the above mentioned quantities shall be adjusted accordingly.

WEST GREENLAND COMMISSION

PAPER WGC(88)6

DRAFT EMERGENCY REGULATORY MEASURE FOR THE WEST GREENLAND SALMON FISHERY PROPOSED BY THE CHAIRMAN OF THE COMMISSION

The catches of salmon at West Greenland shall, for the calender years 1988, 1989 and 1990, not exceed a total of 2,520 tonnes.

However, in any given year, the annual catch shall not exceed the annual average by more than 10%.

These quantities are based upon opening the fishery on 1 August. If the fishing season is opened at a later date the above mentioned quantities shall be adjusted accordingly.

JUNE 1988
REYKJAVIK

ANNEX 9

CNL(88)40

DRAFT DECISION OF THE COUNCIL TO REQUEST SCIENTIFIC ADVICE FROM ICES

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

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

   (a) describe events of the 1988 fisheries with respect to gear, effort, exploitation rate, composition and origin of the catch, and assess the status of the stocks;

   (b) evaluate the effectiveness of new, existing, or proposed management measures for home waters and interception fisheries on stocks occurring in the Commission area;

   (c) continue the development of models to describe the fishery interactions and stock dynamics in order to estimate the effects of management measures;

   (d) specify data deficiencies and research needs.

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
FIFTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION
13-17 JUNE 1988, REYKJAVIK, ICELAND

LIST OF WEST GREENLAND COMMISSION PAPERS

PAPER NO	TITLE
WGC(88)1	Provisional Agenda
WGC(88)2	Draft Agenda
WGC(88)3	Election of Officers
WGC(88)4	Draft Regulatory Measure for the West Greenland Salmon Fishery proposed by the Representative of Denmark (in respect of the Faroe Islands and Greenland)
WGC(88)5	Draft Regulatory Measure for the West Greenland Salmon Fishery proposed by the Representative of Canada
WGC(88)6	Draft Emergency Regulatory Measure for the West Greenland Salmon Fishery proposed by the Chairman of the Commission
WGC(88)7	Not issued
WGC(88)8	Report of the West Greenland Commission
WGC(88)9	Agenda
WGC(88)10	Draft Report of the West Greenland Commission
CNL(88)14	Scientific advice from ICES - Report of the ACFM
CNL(88)40	Draft Decision of the Council to request scientific advice from ICES
NAC(88)3	1987 Statistics on Canadian salmon
NAC(88)4	CAFSAC advice for 1988

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.