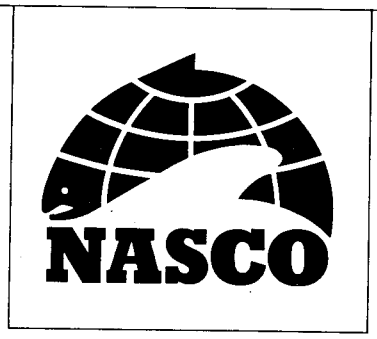
NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

ORGANISATION POUR LA CONSERVATION DU SAUMON DE L'ATLANTIQUE NORD



REPORT OF THE SIXTH ANNUAL MEETINGS OF THE

NORTH AMERICAN COMMISSION

15-16 FEBRUARY 1989
HILTON HEAD, SOUTH CAROLINA, USA

13-16 JUNE 1989
EDINBURGH, UK

NORTH EAST ATLANTIC COMMISSION

13-16 JUNE 1989
EDINBURGH, UK

WEST GREENLAND COMMISSION

13-16 JUNE 1989
EDINBURGH, UK

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CHAIRMAN:	MR HOWARD LARSEN (USA)
VICE-CHAIRMAN:	DR GABY WARD (CANADA)
RAPPORTEUR:	MS LOUISE COTE (CANADA)
SECRETARY:	DR MALCOLM WINDSOR

NAC(89)21

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NAC(89)21

REPORT OF THE SIXTH ANNUAL MEETING OF THE NORTH AMERICAN COMMISSION OF THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION 15-16 FEBRUARY 1989, HILTON HEAD, SOUTH CAROLINA, USA AND 13-16 JUNE 1989, EDINBURGH, UK

1. OPENING OF THE MEETING

1.1 The meeting was opened on 15 February 1989 by Mr Howard Larsen, Chairman of the North American Commission.

1.2 The list of participants is given in Annex 1.

2. ADOPTION OF THE AGENDA

2.1 The Commission adopted its agenda, NAC(89)4, (Annex 2).

3. NOMINATION OF A RAPPORTEUR

3.1 The Commission nominated Ms Louise Cote (Canada) as its rapporteur for the 1989 meeting.

4. ACFM REPORT FROM ICES ON SALMON STOCKS "SALMON IN THE NORTH AMERICAN COMMISSION AREA"

4.1 At the June meeting, the Chairman of the ACFM, Mr Bernard Vaske, presented the 1989 scientific advice from ICES relevant to the North American Commission, CNL(89)10, (Annex 3).

4.2 The Canadian representative asked the ICES representative for clarification of the following:

(1) On page 7 of the ACFM Advice CNL(89)10 a reference to Table 17 of the Working Group Report, (CNL(89)9), is made and again in page 15 a reference is made to Table 34 of that same report. Although these two tables have the same title, the numbers of smolts released, the run size and the 2SW/1SW ratios differ. The ICES representative confirmed that the numbers contained in Table 17 were the correct ones.

(2) Comparability of the estimates of harvest of US fish in Newfoundland and Labrador using CWT and Carlin tags ie. advice says that CWT method usually gave higher estimates. Canadian harvest of US fish in 1987 was approximately 600 fish. In the West Greenland Commission area, it appears that the results of the CWT and Carlin estimates are significantly different for 1987. The ICES representative advised that although the ICES representative agreed that the catch of US-origin fish in West Greenland was greater than the harvest in Canadian waters, he could not confirm a ten-fold order of magnitude.

(3) Conclusions of ICES regarding the US proposal for a quota of 416t in Areas A and B and its effectiveness in reducing or stabilizing the harvest of USA-origin salmon. The ICES representative confirmed that this measure could have had positive impacts on the harvest of US-origin salmon. However he stated that no positive correlation could be established between the total harvest and the harvest of US origin salmon in these areas.

4.4 Clarification was also requested on the potential effects of the NASCO lottery system on the provision of scientific advice. The ICES representative answered that ICES provided an answer for the West Greenland Commission area but not the North American Commission area.

5. REPORT OF THE BILATERAL SCIENTIFIC WORKING GROUP ON SALMONID INTRODUCTIONS AND TRANSFERS

5.1 At the February meeting, the American Co-Chairman of the Bilateral Scientific Working Group on Salmonid Introductions and Transfers presented a report on the activities of the Working Group since the June 1988 NAC meeting, NAC(89)5, (Annex 4). The development of protocols was the primary task of the sub-groups. This exercise has proven to be more problematic than anticipated and still requires a significant amount of negotiations. However, progress is being made and a discussion paper will be developed for bilateral recommendations to be presented at the Edinburgh meeting in June. The Co-Chairman advised the US representative that his concerns regarding hatchery and ranching activities will also be addressed in the development of the various protocols.

5.2 The Canadian representative expressed his appreciation for the excellent work accomplished by this bilateral working group.

5.3 At the June meeting, the Canadian co-chairman of the Bilateral Scientific Group presented the report of the Activities of the Working Group NAC(89)17, (Annex 5). The Canadian representative indicated that Canadian importation of eggs were limited and from a reliable source. However, US importation of salmon eggs from various sources in Europe is of serious concern to Canada.

5.4 The US representative explained that the control of these importations represented substantial changes in federal and state legislation and that the US were taking steps to enforce the situation.

5.5 The Co-chairman brought to the attention of the Commission the fact that the French Islands of St Pierre and Miquelon may be attempting to develop an aquaculture industry and would be importing fish from Europe or the west coast of North America. This could have serious impacts on Atlantic salmon stocks and could threaten the Canadian and American efforts.

5.6 The Canadian representative noted that more factual information was needed, he suggested that this question be undertaken by the US and Canada to obtain additional information on both aquaculture and commercial fishery activities, the US supported strongly this strategy. The US representative agreed with the Canadian suggestion and proposed that some questions be referred to ICES.

5.7 The co-chairman summarised the main elements of the Discussion document on Introductions and Transfers of Salmonids and asked that the NAC endorse the principle of the protocols as recommended by the Working Group ie. divided into three different zones.

5.8 The US representative indicated that he supported the spirit of the recommendation and accepted the four documents and appendices related to the issue of Introductions and Transfers as tabled in the Council ie. NAC(89)13, (Annex 6); NAC(89)14; NAC(89)15; NAC(89)16. He undertook to ensure that the documents will be evaluated through the US review process.

5.9 The Canadian representative advised that he was not in a position to endorse the document at this time but advised that the proposed protocols will also be reviewed in consultation with user groups in Canada.

6. IMPACT OF ACID RAIN ON ATLANTIC SALMON

ACFM Report from ICES

6.1 The Chairman of the ACFM, Mr Vaske, presented a summary of the relevant sections of the ICES report and noted that the 1988 estimated numbers of fish lost ie. 5,600 yearly to acidification in Nova Scotia rivers, has been revised to 8,870 in 1989.

Review of Mitigative Measures

6.2 At the February meeting, the Canadian representative reminded the US that at least 5,600 fish were estimated lost each year due to acid rain emissions and that this figure was a very conservative estimate.

6.3 The American representative advised that the issue of acid rain has been the subject of numerous discussions between the Prime Minister of Canada and the President of the US. The five-year project to evaluate the nature of the various causes responsible for acid rain emissions will end in 1990. He added that on the occasion of his February visit to Canada, President Bush confirmed that new steps were being taken in the US and that a legislation on clean air should be introduced in 1989.

6.4 The Canadian representative acknowledged that the US President's statement represents a much stronger commitment than those made under the previous administration. He nevertheless expressed some concerns regarding the lack of timetable and action plan.

6.5 The effects of regulative measures was further discussed at the June 1989 meeting and the US representative informed the Commission that President Bush had announced on Monday 12 June a five-point environmental strategy that included international cooperation to recover natural areas damaged by pollution.

6.6 The Canadian representative expressed its satisfaction at the US government's announcement on clean air and at seeing measures being taken. He asked if a copy of the US press release could be made available to the Commission.

7. REVIEW OF THE 1988 FISHERY

7.1 The Canadian representative tabled a detailed and comprehensive document on Canadian catch statistics, NAC(89)8, (Annex 7), indicating that 1988 Canadian catches were down by approximately 500t and that the recreational fishery registered its highest percentage of the total fishery since 1983. The Canadian Atlantic Fisheries Scientific Advisory Committee's advice was explained and tabled in NAC(89)7, (Annex 8).

7.2 In addition to the brief overview provided at the February meeting on the 1988 US salmon fishery, the US representative gave, at the June meeting, a detailed presentation on the extensive range of activities undertaken by the US in the last 10 years.

7.3 This Ten Year Review of US Atlantic salmon stocks, NAC(89)12, (Annex 9), provided information and datas on stocking, adult returns, and sport harvest of US Atlantic salmon. Detailed information on US regulations and results of tagging programs were also provided. The US presentation also focused on the projected stock development for the various Maine rivers, the Merrimack River and the Connecticut River.

8. REVIEW AND DISCUSSION OF THE PROPOSED 1989 CANADIAN AND US SALMON MANAGEMENT MEASURES AS THEY RELATE TO THE MANDATE OF THE COMMISSION AND TO THE FINDINGS OF THE ACFM REPORT FROM ICES

8.1 At the February meeting, the Canadian representative explained that Canada was in the process of evaluating the effects of its previous five-year strategy as well as the results of the January Canadian salmon workshop. Canada was therefore not in a position to respond to the US request regarding the establishment of a quota for Canadian salmon fishing areas 3+4. The Canadian decision on the 1989 salmon management plan is to take into account both the domestic management objectives and the Canadian rights and obligations under the NASCO Convention. The Canadian representative further advised that Canada was also awaiting ICES advice regarding the efficiency of the proposed management measure on US salmon interception by Canada.

8.2 The US representative expressed concern that Canada will decide on the proposed quota system for the Newfoundland fishery before the NAC meets again in June. He also stressed that, in the future, US Commissioners would like to be offered the opportunity to attend Canadian seminars and meetings. He further indicated that the US was aware that the Atlantic Salmon Federation was favourable to the establishment of a quota for the Newfoundland fishery.

8.3 Discussion of this issue continued at the June 1989 meetings. The Canadian representative explained the guiding principles and major elements of the 1989 salmon management plan NAC(89)18, (Annex 10), emphasising that this second five-year salmon conservation strategy while recognising the continuing role for the commercial fishery in Newfoundland, still focuses on salmon conservation.

8.4 The Canadian representative also explained that Canada, recognizing its obligations regarding the interception of migratory salmon, has introduced in 1989 the concept of "allowance" in the Newfoundland and Labrador commercial fisheries. Canada has also maintained a closure of the commercial fisheries in the Maritime provinces.

8.5 The US representative congratulated Canada for developing and implementing the new five-year plan which includes the innovative concept of "allowance". He stressed that this new concept, which is a fundamental change, is vital for the future of Atlantic salmon management.

8.6 The US representative indicated that he was nevertheless distressed by the fact that Canada was once more adopting conservation measures which were excellent domestically but did not take into consideration Canada's obligation under the Convention. He stressed that in the US view the consultative process implies also negotiations and was disappointed that a second five-year plan has been established without taking into consideration the US proposals and that Canada's attitude was in its view inconsistent with the Treaty obligation.

8.7 The Canadian representative indicated that Canada was perfectly aware of the US concerns and that these were taken into account in the development of Canadian Atlantic salmon new fishing plan. He explained that Canada is open to consultation, advice and discussions and in light of those the Canadian Minister takes the best possible decision with respect to conservation. He stressed that, as in the past, the positive results of these decisions will continue to be of benefit to the US as well. He reiterated Canada's commitment to maintain the dialogue with the US and continue the consultative process but made clear that Canada will not negotiate its Canadian fishing Atlantic salmon plan with the US.

8.8 The US representative reiterated the desire of the US for more discussions and the need to develop a consultation process which will not interfere with the sovereign process of the Government of Canada.

8.9 The US representative introduced an informal proposal for consideration by Canada:

The United States congratulates the Government of Canada upon its decision "to explore the possibility of developing a plan for the implementation of zonal/river management for the future" and to "identify selected areas where it could be feasible to introduce zonal/river management starting in 1990". The United States therefore proposes that the Department of Fisheries and Oceans select Zones 3 and 4, formerly designated as zones A and B, as one of those in which to introduce for 1990 zonal/river management, and further that, if, for any reason, it should be decided not to select two zones that are contiguous, zone 3 be selected as the index zone. We would also like to offer to assist in any way desirable and feasible in furthering the successful outcome of this worthwhile and forward-looking venture on the part of the Department of Fisheries and Oceans.

8.10 The Canadian representative indicated that the US informal proposal will be considered prior to and discussed at the next meeting of the NAC in February 1990 - prior to taking any decision on the 1990 Atlantic Salmon Regulations.

9. RECOMMENDATIONS TO THE COUNCIL CONCERNING REQUEST TO ICES FOR SCIENTIFIC RESEARCH AND SCIENTIFIC ADVICE

9.1 The Commission reviewed and accepted the relevant section of CNL(89)38, (Annex 11), and agreed to recommend it to Council as part of the annual request for scientific advice to ICES.

10. DATE AND PLACE OF THE NEXT MEETING

10.1 The Commission agreed to hold the first round of its Seventh Annual meeting in Halifax in 1990 at a date to be agreed between the two heads of delegation.

11. OTHER BUSINESS

12. CONSIDERATION OF THE DRAFT REPORT OF THE MEETING

12.1 The Commission considered a draft report of the meeting.

13. ADOPTION OF A PRESS RELEASE

13.1 The Commission agreed to issue press related information in the Council Press Release.

JUNE 1989
EDINBURGH

ANNEX 1

SIXTH ANNUAL MEETING OF THE NORTH AMERICAN COMMISSION 15-16 FEBRUARY 1989, HILTON HEAD, SOUTH CAROLINA, USA AND 13-16 JUNE 1989, EDINBURGH, UK

NAC(89)11

LIST OF PARTICIPANTS

* Denotes Head of Delegation

MEMBERS OF THE COMMISSION:

CANADA

*MR DAVID TOBIN	Representative (February meeting) Department of Fisheries and Oceans, Ottawa, Ontario
*MR WAYNE SHINNERS	Representative (June meeting) 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
MR J MARK MCCREA	NASCO Alternate Representative Patterson Kritz, Truro, Nova Scotia
DR DAVID MEERBURG	Department of Fisheries and Oceans, Ottawa, Ontario
MS LOUISE COTE	Department of Fisheries and Oceans, Ottawa, Ontario
DR REX PORTER	Department of Fisheries and Oceans, St John's, Newfoundland
MR BERNARD VEZINA	Department of Fisheries and Oceans, Ottawa, Ontario
MS EDITH DUSSAULT	Department of Fisheries and Oceans, Ottawa, Ontario
MR YVON COTE	Department of Recreation, Fish and Game, Quebec

MR MALCOLM REDMOND	Department of Natural Resources and Energy, Fredericton, New Brunswick
MR DAVID MACLEAN	Department of Fisheries, Halifax, Nova Scotia
MR GLENN BLACKWOOD	Department of Fisheries, St John's, Newfoundland
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
MR GILBERT RADONSKI	Sport Fishing Institute, Washington DC
DR VAUGHN ANTHONY	National Marine Fisheries Service, Woods Hole, Mass
DR DAVID EGAN	Connecticut River Atlantic Salmon Commission, Amherst, Mass.
MR EDWARD BAUM	Maine Atlantic Salmon Commission, Bangor, Maine
MR HOWARD LARSEN	US Fish and Wildlife Service, Gainesville, Florida
MR DAVID GOLDTHWAITE	US Fish and Wildlife Service, Newton Corner, Mass.
MR BILL GIBBONS-FLY	National Marine Fisheries Service, Silver Spring, Maryland
MR HENRY LYMAN	Atlantic Salmon Federation, Boston, Mass
MR JOHN PHILLIPS	Atlantic Salmon Federation, Ipswich, Mass
DR JAMES WEAVER	US Fish and Wildlife Service, Newton Corner, Mass
MR ROBERT JONES	Connecticut Bureau of Fisheries, Hartford, Connecticut

MR JAMES MCCALLUM	US House of Representatives, Washington DC
MR RICHARD SEAMANS	National Marine Fisheries Service, Gloucester, Mass.

OBSERVERS - PARTIES

EEC (+)

MR ANDREW THOMSON	Directorate-General for External Relations, EEC Commission, Brussels
MR PAULINO PEREIRA	Council of the European Communities, Brussels
MR NICK BROWN	Ministry of Agriculture, Fisheries and Food, London
MR TED POTTER	Ministry of Agriculture, Fisheries and Food, Lowestoft
MS EILEEN TWOMEY	Department of the Marine, Dublin, Ireland
MR RAPHAEL KELLY	Department of the Marine, Dublin, Ireland
DR DICK SHELTON	Department of Agriculture and Fisheries for Scotland, Pitlochry
MR CHARLES R MCCALL	Ministry of Agriculture, Fisheries and Food, London
MR ANTHONY BURNE	Ministry of Agriculture, Fisheries and Food, London

DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

MR KJARTAN HOYDAL	Faroese Home Government, Torshavn, Faroe Islands
MRS KIRSTEN TROLLE	Greenland Home Rule Office, Copenhagen
MR JENS MOELLER-JENSEN	Greenland Fisheries Research Institute, Copenhagen

NORWAY

MR OYVIND VASSHAUG	Hordaland County Administration, Bergen
MR STEINAR HERMANSEN	Ministry of the Environment, Oslo

OBSERVERS - NON PARTIES

ICES

DR EMORY ANDERSON	International Council for the Exploration of the Sea,

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

SECRETARIAT

DR MALCOLM WINDSOR	Secretary
DR PETER HUTCHINSON	Assistant Secretary

(+)NOTE 1: Under Article 11, paragraph 2 of the Convention for the Conservation of Salmon in the North Atlantic Ocean, the EEC has the right to submit and vote on proposals for regulatory measures concerning salmon stocks originating in the territories referred to in Article 18 of the same Convention.

NOTE 2: Not all participants were present at both the Hilton Head and the Edinburgh meetings.

JUNE 1989
EDINBURGH

ANNEX 2

NAC(89)4
SIXTH ANNUAL MEETING OF THE NORTH AMERICAN COMMISSION
15-16 FEBRUARY 1989, HILTON HEAD, SOUTH CAROLINA, USA
AND 13-16 JUNE 1989, EDINBURGH, UK

AGENDA

1. Opening of the meeting
2. Adoption of the agenda
3. Nomination of a rapporteur
4. ACFM report from ICES on salmon stocks "Salmon in the North American Commission area"
5. Report of the Bilateral Scientific Working Group on salmonid introductions and transfers
6. Impact of acid rain on Atlantic salmon
   (a) ACFM report from ICES
   (b) Review of mitigative measures
7. Review of the 1988 fishery
8. Review and discussion of the proposed 1989 Canadian and US salmon management measures as they relate to the mandate of the Commission and to the findings of the ACFM report from ICES.
9. Recommendations to the Council concerning request to ICES for scientific research and scientific advice
10. Date and place of the next meeting
11. Other business
12. Consideration of the draft report of the meeting
13. Adoption of a press release

EDINBURGH
JUNE 1989

ANNEX 3

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

COUNCIL

PAPER CNL(89)10

REPORT OF THE ICES ADVISORY COMMITTEE ON FISHERIES MANAGEMENT (SECTIONS 1-4.6 AND 7-11)

(This paper makes reference to the report of the meeting of the ICES Working Group on North Atlantic Salmon (Copenhagen, 15-22 March 1989). That report is not annexed here but is available on request to the Secretariat).

REPORT TO THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

1. INTRODUCTION

Questions of particular interest to the West Greenland, North East Atlantic and North American Commissions are dealt with in Section 5, 6, and 7 respectively. Questions dealing with homewater fisheries appear in Section 8. Many of the questions posed related to more than one Commission area and these are answered separately. In this report, the tables, figures, references, and appendices referred to are from the Working Group report.

2. CATCHES OF NORTH ATLANTIC SALMON

2.1 Nominal Catches

Nominal catches of salmon by country for 1961-1988 are presented in Table 1. Catches of grilse (1SW) and salmon (MSW) in homewaters are shown in Table 2. Despite the fact that catches from England and Wales, Ireland, Northern Ireland, and Iceland increased from 1987 the provisional figure for 1988 (7,009t) when confirmed is likely to show an overall substantial decrease.

2.2 Catches in Numbers by Sea Age and Weight

Reported national catches for several countries by sea age and weight are given in Table 3. In Canada, a decrease in catch occurred in both 1SW and MSW components, in Norway only the MSW component decreased, while in Scotland a decrease was recorded only with 1SW fish. In Ireland and Iceland, the increase observed was mainly in the 1SW component.

2.3 Unreported Catches

For those countries that provided estimates of unreported catches (one country represented did not provide an estimate), the total was in the order of 2,500t.

It was agreed that the accuracy of unreported catch estimates will continue to be a problem as there were few ongoing studies on methods and for most countries unreported catches are "guess-estimates". Various methods of estimation that could be used in a variety of situations were listed.

3. MODELS OF THE FISHERIES

3.1 Background

NASCO asked ICES to continue the development of models to describe the fishery interactions and stock dynamics. By knowing the contribution that individual stocks make to each fishery and the exploitation rates on stocks in these fisheries, these models can be used to evaluate the effects of new or proposed management measures.

3.2 Models

Three models were presented to demonstrate possible approaches.

3.2.1 Salmon run reconstruction model

The model developed in 1988 was revised so that stock contribution and exploitation rates could be reconstructed. A description of the model and input parameters is provided in Appendix 4. The model was run with data from several indicator rivers; North Esk (Scotland), River Bush (Northern Ireland), River Imsa (Norway), and the Maine (USA) rivers. The input data needed are shown in Table 4 and the results of the model are shown in Table 5. These results are examples of the types of information which can be provided from this run reconstruction model.

With refinement of the input parameters the model can be used to evaluate effects of proposed management measures on the fisheries and spawning stock of specific populations. The extent to which these populations represent other populations within a region or country requires evaluation.

The importance for countries of engaging in tagging and tag-recovery programmes and obtaining reliable estimates of returning adults was pointed out. The work should be carried out on representative stocks.

3.2.2 Optimization model

Linear optimization is defined as the minimizing (or maximizing) of an objective function, subject to a set of constraints. Using multi-objective linear programming the trade-offs inherent in management decisions where competing objectives must be met simultaneously were considered.

The relationship between the objectives of maximizing the savings of USA salmon and minimizing the variability in Canadian catches is illustrated in Figure 1. The shape of the curve suggests that the variability of Canadian landings can be significantly reduced without forgoing much saving of USA salmon. For example, the saving of USA salmon need only drop 0.9% (= X) to affect a reduction in variability of Canadian catches from 99% to 58%.

Small reductions in either objective (either X or Y) (Figure 1) can lead to changes in the value of the other objective. The compromise solution, under a given set of constraints, might be to select a solution near the point circled in Figure 1. At this point each objective has sacrificed very little and yet the gains to the other objective are significant.

Further refinements are required before multi-objective linear programming can be used for scientific management.

3.2.3 Risk analysis model

The Canadian catch data were analysed to assess the risk of not achieving desired reductions in catch with specific closure strategies. The probability of not achieving a target fishery reduction was evaluated by quantifying for each year the percentage of the

catch landed each week. Summaries of the data for the weeks by which 90% and 95% of the catch had been landed are given in Figures 4 and 5, respectively. For example, there would be a 57% chance that the fishery would be closed too early in Area A to catch 90% of the potential catch (a 10% reduction of the fishery), if the fishery were closed after week 28, and a 14% chance if it were closed after 29 weeks.

4. REVIEW OF THE STUDY GROUP ON TOXICOLOGICAL MECHANISMS INVOLVED IN THE IMPACT OF ACID RAIN AND ITS EFFECTS OF SALMON

4.1

The Working Group considered the report of the Study Group on the Toxicological Mechanisms Involved in the Impact of Acid Rain and its effects on Salmon (Anon., 1989b).

4.2 Basis of Toxicological Impact of Acid Rain on Water Quality of Salmonid Habitat

High concentrations of strong acid anions in wet and dry materials deposited from the atmosphere have resulted in changes in water quality of lakes and streams, yielding conditions that are toxic to fish. The most important toxic substances are H^+ and Al. Dissolved organic matter, H^+, and Al interact chemically, and Ca^{2+} modifies their effects on fish, so that mechanisms of toxic action are very complex.

4.3 Differences Between North American and Scandinavian Rivers

The conclusion was that loss of Atlantic salmon from acidic rivers in Nova Scotia has resulted primarily from H^+ toxicity whereas in Scandinavian rivers, it has resulted from both H^+ and exchangeable Al toxicity.

4.4 The Number of Salmon Lost Due to Acidification in the North East Commission Area

The total number of adult salmon lost to fisheries and spawning escapement was estimated to be between 106,000 and 332,000 annually, having an approximate weight of 400 to 1,242t.

Estimates of salmon lost in Norway, Sweden, and UK (England and Wales). No figures were available from other countries.

Country	No. salmon lost	Weight salmon lost (tonnes)
Norway	91,700 - 305,800	344 - 1,147
Sweden	13,870 - 23,125	52 - 87
UK (Engl. & Wales)	1,050 - 2,100	4 - 8
Total	106,620 - 331,025	400 - 1,242

The different assessment methods used were described and the Working Group noted the wide range of the estimates and agreed that more research is required to refine the methods so that estimates could be improved.

4.5 The Effectiveness and Current Use of Mitigation Measures

The Working Group recognized that the only satisfactory permanent solution to the problem of acidification is the elimination of the multiple sources of acidity. Feasible short-term mitigation measures are liming, stocking and the preservation of genetically diverse stocks. Liming of Atlantic salmon rivers has been used successfully in Europe and North America as a mitigation method to reduce juvenile salmon mortality and increase production.

Mitigation measures in current use in several countries were described.

4.6 Salmon Habitat Available, Areas Vulnerable to Acidification, Areas Lost to Productions and Salmon Lost Due to Acidification in the North Commission Area

No new information was available on the amount of salmon habitat available, its vulnerability to acidification nor the areas lost to salmon production.

An estimate of the numbers of salmon lost due to acidification in Nova Scotia in 1988 of 5,600 fish per year (Anon., 1988a) was revised in 1989. If it is assumed that rivers that currently have pH values below 4.7 were once as productive as rivers that are presently above 5.0 then the estimated loss of salmon in Nova Scotia is 8870, which is 58% greater than the previous estimate (Anon., 1989).

The Working Group concurred with the Study Group's recommendation (Anon., 1989a) that additional analyses for estimating productivity weighing factors be conducted.

7. QUESTIONS OF INTEREST TO THE NORTH AMERICAN COMMISSION OF NASCO

7.1 Canada

7.1.1 The fisheries in 1988

Total salmon landings in Canada for 1988 were 1,280t (Tables 2 and 3) of which 80.3% came from commercial fisheries. Landings of 1SW salmon were about equal to the average for the previous 5 years; landings of MSW salmon were 19% below previous 5-year mean. To better account for the diversity of Atlantic salmon populations and fisheries in Canada, landings were sub-divided into geographical regions and three fishery types: recreational, commercial, and native food (Tables 29, 30 and 31).

7.1.2 Composition and origin of the catch

Reported recoveries of Carlin tags in 1988 were 24% of the average number recovered annually between 1974 and 1987. There were 18 Penobscot River tags recovered in Areas A (6), C (1) O (9), and Newfoundland (2).

The recovery programme for CWTs in Canada continued to expand with coverage of 5 Canadian ports. A total of 12,184 salmon were sampled. Of the 26 CWTs recovered,

21 were from USA hatchery releases in Maine and Connecticut and 5 were from Canadian releases.

It would be inappropriate to infer differential exploitation on the USA and Canadian tagged salmon because of differences in timing, location of sampling, and the number of fish scanned for tags.

7.1.3 Status of Canadian stocks

Biological assessment of 6 selected Canadian index rivers revealed that target egg depositions were achieved or exceeded in the Miramichi, Margaree, LaHave, and Conne rivers but not in the Restigouche and St John's rivers. In all of the above rivers, the numbers of 1SW salmon far exceeded target levels. Escapement of 1SW salmon in the Miramichi was nearly 5 times greater than the target value. Returns of MSW salmon were considerably lower than forecast from 1987 returns of 1SW salmon (Table 32).

7.2 France - St Pierre and Miquelon Islands

Mention was made of published reports of commercial landings of Atlantic salmon by residents of the St Pierre and Miquelon Islands. The quantity and significance of these landings remain to be determined.

7.3 USA

7.3.1 The Fisheries in 1988

Maine is the only state in the USA that allows a sport harvest of Atlantic salmon. The total catch in 1988 was 0.9t of which 19% were 1SW.

There was a low harvest of MSW salmon in the Penobscot River due to a season limit of 1 MSW fish per angler and lower returns to the river. Record high river temperatures during June and July also contributed to the low harvest.

The overall catch in Maine rivers (other than the Penobscot) continued to show a decline from 0.25 to 0.33 of the average annual catches recorded during the previous decade. This decline, which began in 1986, is due primarily to an apparent reduction in angling effort caused by low numbers of fish in the rivers.

7.3.2 Composition and origin of the catch

No salmon originating from any other country are taken in USA rivers.

7.3.3 Status of USA stocks

The status of Atlantic salmon stocks in Maine rivers was assessed using long-term angling catches, survival of hatchery-reared stocks, redd counts, juvenile salmon production, and 1SW:MSW salmon ratios in the Penobscot River.

Angling catches in 1987-1988 for Maine rivers with salmon runs that are predominantly of wild origin were 68% below the annual average for the previous 20 years.

Hatchery-reared salmon fry, parr, and smolt releases have more than tripled in the last 10 years (Anon, 1989a) yet adult returns have remained the same or declined in most rivers. Total return rates for Penobscot River smolt releases 1970-1986 are shown in Figure 13. The return rate for the 1985 and 1986 smolt classes were among the lowest observed in the past 18 years.

Juvenile salmon production, measured by electrofishing and expressed as numbers of 1+ and older parr/100 yd2 (unit) was reviewed for five Maine rivers. Unit values for all rivers sampled were lower than previously recorded except for a tributary of the Machias River where unit values have remained stable.

The 1SW:MSW ratio (by smolt class) for Penobscot salmon returns for the period 1970-1988 show that the 1985, 1986 smolt classes yielded the highest ratios since the restoration programme began.

It appears that more 1SW or fewer MSW salmon are returning to Maine rivers. It was concluded that there has probably been a decline in the sea survival of Maine MSW salmon or an increase in the proportion of fish maturing at 1SW.

7.3.4 Exploitation rate of tagged and untagged salmon

In the development of the Carlin tag harvest model for Maine stocks, it was necessary to estimate reporting rates for tagged and untagged salmon returning to Maine rivers. If the reporting rates are accurate, estimates of uncorrected angler exploitation from the return of tagged fish should be higher than those from returns of untagged fish. An examination of the historical time series of exploitation estimates for the two groups, however, showed that estimates were higher for untagged fish (dependent t-test, $p = 0.018$). Possible causes were discussed but it was considered premature to adjust the harvest model parameters.

7.4 Evaluation of the Effectiveness of New, Existing, or Proposed Management Measures for Homewater and Interception Fisheries on Stocks Occurring in the Commission Area

7.4.1 Effect of management measures in Canada on Canadian stocks

No new conservation measures were introduced in Canada in 1988. The impact on spawning escapement and harvests of management measures imposed in 1984 and 1985 were described in Anon 1986a.

Using preliminary figures for 1988 it was estimated that the measure of complete closure of some fisheries resulted in a decreased harvest and an increase in spawning escapement of 175t of MSW and 20t of 1SW salmon.

It was estimated that 55t MSW and 5t 1SW were forgone as a result of the delayed opening of the season in the Newfoundland and Labrador commercial fishing area. Some of these salmon would have been subject to fishing mortality when the season opened; however, this is not quantifiable.

As noted in Anon 1987, the average landing of salmon after 15 October (1981-1983 and 1985) was 7t. Some of these fish not taken because of the early closure may be available

to the fisheries in the following years; however, the majority would probably return to rivers in the USA and Canada.

The mean ratio of total Canadian MSW salmon to 1SW salmon harvests of the same smolt class for the period 1983-1987 (1.14) was significantly lower (P = 0.01) than the mean ratio for the years 1975-1982 (1.97) (Table 33). This indicates that Canada is catching fewer MSW salmon relative to 1SW salmon of the same smolt class than before the 1984 Management Plan.
The impact that recent management measures have had on returns to five rivers of the Gulf of St Lawrence was investigated by an analysis of 1SW:MSW ratios (for the same smolt class) in the Bartholomew, Margaree, Miramichi, Mitis, and Nepisiquit rivers. Regression coefficients for pre-management plan years 1975-1983 and management plan years 1984-1987 indicated the numbers of MSW salmon relative to 1SW salmon returning to those rivers had increased by 60% and that the management plan appeared to have been effective.

The spawning escapements and ratios of MSW spawners to returns increased in the three New Brunswick rivers (Restigouche, Miramichi, St John) in 1984-1988 compared to previous observations due to measures to reduce fishing mortality within the rivers. However, in both 1987 and 1988, estimated returns of MSW salmon to the Miramichi and St John rivers were less than predicted. As most of the predictions are based on 1SW returns it appears that either MSW salmon sustained higher marine mortality, or that 1SW salmon experienced lower marine mortality than in previous years, or the proportion salmon maturing at 1SW increased.

7.4.2 Effectiveness of management measures taken in Canada in reducing the harvest of USA-origin salmon

7.4.2.1 Evaluation of management measures since 1984

In order to assess the combined effects of all measures taken by Canada 1984-1987, the harvest of 1SW salmon of Maine origin in the Newfoundland-Labrador commercial fishery was compared to the Maine run size of 2SW fish in the following year. For the years 1967-1983, the ratio of Newfoundland harvest to homewater run size averaged 0.53 $\pm$ 0.37 (Table 34). The 1987 ratio is less than for any year since 1981.

In order to test the effect of the 15 October closure, the mean ratio of the two most recent years 1986-1987 (0.25) was compared with the previous 18 years (0.518). The difference was not significant. Both harvest levels in 1987 and run size of the same smolt class decreased compared to 1984 and 1985; however, an increase was noted from 1986. The reduced harvest in Newfoundland in both 1986 and 1987 is consistent with the expected impact of the closure of the fall fishery by Canada in 1986.

7.4.2.2 Potential effects of USA proposed managements measures for the Newfoundland-Labrador commercial fishery on Atlantic salmon stocks in North American Commission area

The proposal to impose a quota of 416t in Statistical Areas A and B was examined to determine its effectiveness in reducing or stabilizing the harvest of USA-origin salmon and its impact on the harvest of Canadian-origin stocks.

It was considered that such a measure may result in saving less than 300 USA-origin salmon in years when the quota is attained. These fish would be subject to natural mortality and possibly fishing mortality in other fisheries before they could reach home rivers in approximately 10 months.

The implementation of a quota could have both positive and negative impacts on Canadian-origin salmon and these were listed.

7.4.3 Effect of management measures in USA

The primary new regulations enacted in the State of Maine in 1988 were: the prohibition of the sale of salmon taken by angling and the mandatory registration of all salmon caught in the sport fishery (1SW fish were previously exempt). Since these additional measures did not become effective until August, the impact of these management measures could not be evaluated in 1988.

The management measures taken in 1985 to reduce the fishing mortality in the Penobscot River have resulted in more than a 50% reduction in the exploitation rate of MSW salmon.

7.5 Numbers of USA-Origin Salmon Harvested in Canada

7.5.1 Historical catches in Newfoundland-Labrador commercial fisheries of 1SW salmon which originated in the USA

The time series of tag returns and harvest estimates of the Maine-origin 1SW salmon in Newfoundland and Labrador was updated and data for 1987 and 1988 fisheries added (Table 35). The parameters used in the harvest model remain unchanged from the previous assessment in Anon 1988b.

Summaries of tag returns and harvest estimates by year are in Tables 37 and 38. The 1987 harvest estimates are similar to those for the previous year. Harvest estimate summaries by week and area for years with changes in harvest are in Table 39.

7.5.2 Harvest estimates of USA-origin salmon from CWT and Carlin tag return data in Canada in 1987

Comparison of harvest estimates based on CWT and Carlin tag recoveries for the communities sampled and the neighbouring areas in the Newfoundland-Labrador fishery showed that the ratio between the two estimates varied among locations with usually higher estimates by the CWT method (Anon, 1989a). Concerns over these comparisons were discussed.

7.6 Potential Effects of NASCO's Lottery System on Tag-Return Rates and Provision of Scientific Advice

ICES was requested by NASCO to evaluate the potential effects of the trial 4-year, voluntary lottery on tag return rates and provision of scientific advice.

The intention of the lottery is to encourage and improve the return of tags and recapture information. Based on an analysis of tag releases and recoveries of Maine-origin salmon it was concluded that detection of a statistically significant increase in reporting rates could

take many years. The concern by the Working Group on the potential adverse affects of the lottery were listed. The Working Group concluded that because of the potential problems of interpreting historical data, because of the low likelihood of detecting changes, and the confounding of ongoing programmes, they could not endorse the trial lottery proposal.

ACFM concurs with the Working Group's evaluation of potential problems of the lottery system with respect to detecting reporting rate changes, in estimating the reporting rate and interpreting historical data.

ACFM, however, notes that it was previously shown (Anon, 1985a) that the reporting rates of tags had the greatest influence on the calculation of estimated harvests. It was also mentioned earlier in this report (Section 5.1.4, p.18) that the most likely explanation of the big differences between the harvest of USA fish at West Greenland as calculated from Carlin tag and CWT data was due to the assumed reporting rate (80% being too high) and non-detection of tags. ACFM concludes, therefore, that any increase in tag reporting towards the 80% assumed level will tend to reduce the errors in the existing Carlin tag harvest model rather than continue or add to them.

8. HOMEWATER FISHERIES

Details of homewater fisheries are given in Section 8 of the Working Group report. The descriptions are under 4 main headings, the fishery in 1988, abundance and exploitation, status of stocks, and effectiveness of management measures. For Canada and the USA, these topics are mainly dealt with in Section 7.

9. GENERAL TASKS

9.1 Compilation of Tag Release Data for 1988

Data on tag releases were provided in a prescribed format and have been compiled as a separate report entitled "ICES Compilation of Microtag, Finclips, and External Tag Releases in 1988". An excess of 1.43 million microtags (CWTs) and 0.4 million external tags were applied to Atlantic salmon released in 1988 (Table 41). In addition, 1.46 million salmon were finclipped.

ACFM notes, however, an inconsistency in this information. In two places in the Working Group report comparisons are made between the number of fish with adipose fins clipped and the number of CWTs found. In Section 7.1.2 (p.28), 31% of the salmon with clipped adipose fins also contained CWTs. In Section 5.1.2 (Table 10, p.69), 27.5% of the salmon with clipped adipose fins also contained CWTs. In Anon 1988a, last year's report, 30% of fish with clipped fins also had CWTs. This suggests to ACFM that only 30% of the salmon on average in the ocean that have clipped adipose fins also contain CWTs. If 1.43 million salmon containing CWTs were released in 1988 and 1.3 million were released in 1987 (Anon, 1988a) then 4.8 million and 4.3 million fish with clipped adipose fins should also have been at large.

The North Atlantic Salmon Working Group reported only 2.89 million and 2.40 million fish with clipped adipose fins, or 60% and 55% respectively of the estimated releases. ACFM encourages Member Countries to make every attempt to report all of the Atlantic salmon that have clipped adipose fins.

9.2 ICES Data Base

The Working Group now feels that the need for this type of data compilation has been superseded by the progress on modelling.

10. DATA REQUIREMENTS AND RESEARCH NEEDS

ACFM endorses the 6 data requirements and research needs as listed in this report.

11. RECOMMENDATION

ACFM endorses the recommendations of the Working Group and of the three Study Groups.

EDINBURGH
JUNE 1989

ANNEX 4

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

NORTH AMERICAN COMMISSION

PAPER NAC(89)5

PROGRESS REPORT OF ACTIVITIES OF NAC'S BILATERAL SCIENTIFIC WORKING GROUP ON SALMONID INTRODUCTIONS AND TRANSFERS

NAC(89)5

PROGRESS REPORT OF THE ACTIVITIES OF NAC'S BILATERAL SCIENTIFIC WORKING GROUP ON SALMONID INTRODUCTIONS AND TRANSFERS

Presented at the Sixth Annual Meeting of
the North American Commission of NASCO
February 15-16 1989
Mariner's Inn, Hilton Head, S.C., USA

The Bilateral Scientific Working Group on Salmonid Introductions and Transfers met once since its April 14 1988 meeting in Halifax, N.S. This meeting was held on January 24-25 1989 in Newton Corner, Mass. The action items identified during the April 1988 meeting formed the basis of the agenda of this January meeting and progress is discussed in the items below.

1. UPDATE ON ACTIVITIES OF NAC, ICES, AND THE GLFC RELATED TO INTRODUCTIONS AND TRANSFERS

The chairman, (D. Goldthwaite), gave an update on the annual meeting of NASCO, June 1988. The report of the working group was well received and NAC reconfirmed its interest in completion of the protocols for the introductions and transfers of salmonids. NASCO plans to make introductions and transfers as a theme of the annual meeting in Edinburgh in June 1989.

R. Cutting gave an update of the May 31 - June 3 1988 joint meeting of the NAC Bilateral Scientific Working Group and the ICES Working Group on Introductions and Transfers of Marine Organisms. The ICES Working Group welcomed the opportunity to liaise with the NAC Working Group and felt that this could continue by the presence of the NAC Working Group representative, R. Cutting, on their Working Group. The ICES Working Group invited NAC to refer the draft protocols to the individual ICES Working Group members for comments if the protocols were not available for the Working Group's annual meeting. R. Cutting, and possibly H. Booke and R. Porter, will be attending joint meetings of NASCO and ICES Working Groups on Introductions and Transfers of Marine Organisms in Dublin in May 1989.

D. Goldthwaite indicated that the Great Lakes Fish Disease Control Committee (GLFC) had completed a draft document for procedures on importation of fish into the Great Lakes Basin. The final revisions will be discussed at a meeting scheduled for late February. Copies were made available to members of the Working Group. The GLFC Ad Hoc Committee on Introduction of Exotic Species into the Great Lakes is making slow progress in developing protocols due to increased attention on major problems dealing with accidental introduction as well as problems with the release of ballast water into the Great Lakes by ocean-going vessels.

2. DEVELOPMENT OF PROTOCOLS - STATUS REPORT

It should be noted at the outset that this initiative has proven to be more problematic

than anticipated. Three (Ecological, Genetic, and Composite) of the following four protocol initiatives are basically new activities to be dealt with in this fashion. Each of these requires a significant amount of negotiation for consensus. In some cases, the commitment and initial excitement (generated last year) may have waned a bit at the Subgroup level. In others, a lack of clarifying guidance and/or consensus has impeded progress. Nevertheless, progress is being made, albeit more slowly than originally planned.

(a) Ecological Interactions Subgroup:

The Ecologic Subgroup has completed a scientific review of the possible intra- and inter-specific competition which could occur as documented in the literature. Reference was made to transfers and introduction of both salmonid and non-salmonid fish. After considerable discussion, the following guidance for the development of protocols was given to the Ecologic Subgroup:

(1) Protocols should be developed for each of the following species:

- Atlantic Salmon (anadromous and non-anadromous)
- Pacific Salmon (coho, chinook, chum, pink, and sockeye)
- Rainbow Trout (anadromous and non-anadromous)
- Brook Trout
- Brown Trout
- Arctic Charr
- Certain Appropriate Non-salmonids (including bait fish)
- Genetically engineered fish (super fish)

(2) Begin the text for each species with a brief description of where the interaction is expected to occur (if at all);

(3) Consider setting up a matrix for each species showing ecological interaction;

(4) Define under which criteria the transfer of introduction would be (a) acceptable, (b) non-acceptable, (c) acceptable with conditions;

(5) Consider possible interactions at all life stages;

(6) If possible, develop a procedure to estimate the degree of interaction (adverse effect on production) either quantitatively or qualitatively;

(7) Develop a procedure to evaluate the introduction of exotic species where no information is available (ie. data collection and analysis);

(8) Develop a protocol that should be followed to introduce a non-indigenous species. The Proponent should have to go through a review process and prove a need for introduction or transfer of non-indigenous species or stock that cannot be met with native stock.

(b) Fish Health Subgroup:

The Fish Health Subgroup had three tasks:

(1) Develop an inventory of the disease status of public and private hatcheries and federal stocks.

This has proven to be a monumental task. The Subgroup is unlikely to be successful in developing a current inventory. Information on disease status would be available from government operated hatcheries in Canada and the USA, from private hatcheries in Canada and the USA which have been checked for certification and from hatcheries which are supplying fish for inter-state transfers. Private hatcheries are not always compelled to provide disease status. Also, information from the private sector would have to be treated as confidential. It would appear that the only meaningful approach would be for each state, province or federal agency to keep an inventory for its area of responsibility. Information exchange would then occur between those entities needing it. Further discussions on this issue will be held within the Subgroup.

(2) List major diseases of potential impact to Atlantic salmon.

A list of major diseases has been completed except for some potential minor revisions. (This is included as Attachment 1). The Working Group suggested that the final table define the terms such as "direct threat" and "potential threat". It might also be desirable to group the diseases for which there are insufficient knowledge for identification and/or for the determination of the potential adverse effects.

(3) Draft model protocols.

The Subgroup is well advanced in this task. Members have submitted draft protocols. The next task is to consolidate the submissions. A meeting or two would be necessary for this activity. In general, the Fish Health Subgroup considered the requirements to transfer fish (cultured and feral) for five regions: (1) state/provinces; (2) eastern USA and eastern Canada; (3) western North America; (4) IHN - free zones in Western North America; (5) outside North America.

(c) Genetics Subgroup:

The outline and task of various members have been defined; however, considerable material has yet to be written. The Working Group agreed that the outline (Attachment 2) appeared to cover the main items which should be included in the protocols. A discussion occurred on whether the subgroup should consider procedures to restore genetic variability. It was felt that this would be partially addressed in Section IV, but the Subgroup has only been charged with the task of developing procedures for maintenance of genetic variation. Therefore, procedures for restoring genetic variability would not be addressed extensively at this time. A brief discussion occurred on the status of registry of identifiable populations or strains of Atlantic Salmon stocked historically in various river systems. It was noted that this registry is of great interest to the Working Group but is secondary to the completion of a consensus genetics protocol document at this time.

(d) Composite Protocols (by the Bilateral Work Group):

The Working Group cannot develop a composite protocol until Subgroups had provided draft documents. It was recognised that in order to provide a draft to the Annual Meeting of NASCO in June, a considerable amount of work was still required by the Ecologic and Genetics Subgroups. Therefore, the Working Group decided that the best approach should be to provide a Discussion Document to NAC at its upcoming Edinburgh meeting. The Discussion Document would identify the protocols having commonalty and those that need to be resolved. A full meeting of the NAC Working Group and Subgroups will be held during the week of April 10 1989. The members of each Subgroup will bring their submissions to the meeting where they will be developed into draft protocols for their respective subgroups. Final drafts from three subgroups will be provided to the Working Group by May 8.

3. STATUS OF REVIEW OF REGULATIONS IN PLACE

The federal regulations governing eastern Canada, and federal and state regulations were tabled. T. Carey is to provide to D. Goldthwaite a copy of the Quebec provincial legislation which deals with introductions and transfers of fish. D. Goldthwaite is to develop a composite of all available regulations for tabling at the April meeting.

4. STATUS OF INTRODUCTIONS AND TRANSFERS INVENTORY

The Canadian inventory for introductions and transfers salmonid for 1988 had been submitted to D. Cutting. It was noted that there was an absence of proposed introductions for 1989, except for those in Ontario. Canadian representatives are to follow up on this. D. Goldthwaite had not received any inventory items from the US states. He will make a request for this information. All material will be reviewed at the April meeting.

5. OTHER ISSUES

(a) Recommended name change for the Working Group:

The Working Group recommends that it would be appropriate to replace the word "Bilateral" with "NAC" in the name of its working group. The name of the group would then be "NAC Scientific Working Group on Salmonid Introductions and Transfers".

(b) Upcoming Meetings:

(1) Joint meeting of the NAC Working Group and the three Subgroups - April 10-14 1989, scheduled for St Andrews, N.B. Activities will focus on completion of draft protocols by the Subgroups.

(2) NAC Scientific Working Group meeting, May 15-18 1989, is tentatively scheduled for Newton Corner, Mass. Activities will focus on initiation of composite protocols and the Discussion Document that will be presented in Edinburgh in June 1989.

Attachment 1

DISEASES THAT CAN IMPACT TRANSFER OF STOCKS OF FISH BETWEEN THE UNITED STATES AND CANADA

Disease	Agent	Direct Threat	Potential Threat
Furunculosis	Aeromonas salmonicida	+	
Enteric Redmouth	Yersinia ruckeri	+	
Bacterial Kidney Disease	Renibacterium salmoninarum	+	
Hitra Disease	Vibrio salmonicida		+
Infectious Pancreatic Necrosis	Birnavirus	+	
Infectious Hemotopoietic Necrosis	Rhabdovirus	+	
Viral Hemorrhagic Septicemia	Myxovirus	+	
Other Filterable Agents	-		+
Viral Erythrocytic Necrosis	Viral		+
Lake Trout Agent	Unknown		+
Oncorhynchus Masou Virus	Herpesvirus		+
Whirling Disease	Myxobolus cerebralis	+	
Ceratomyxosis	Ceratomyxa shasta		+
Proliferative Kidney Disease	PKDX		+
Pancreas Disease	?		+
Lake Trout Coldwater Disease	Cytophaga-Flexibacter		+

Identification of the above disease agents to be carried out according to procedures listed in: Fish Health Protection Regulations Manual of Compliance, Miscellaneous Special Publications (Revised) 1984; Procedures for the Detection and Identification of Certain Fish Pathogens (Fish Health Blue Book) Third Edition, Fish Health Section American Fisheries Society 1985, Kevin Amos, Editor. New procedures not listed in these publications may be used but such procedures must be noted on the inspection form.

Although the listed disease agents are of prime interest, the Fish Health Inspector has the obligation to list on the inspection form other bacterial parasites, viruses or other agents that are found and may impact stock transfer.

Attachment 2

TOPIC: MAINTENANCE OF ATLANTIC SALMON GENETIC VARIATION

(To be done by: H E Booke)

I. INTRODUCTION

A. Definition

1. STOCK
2. STRAIN
3. POPULATION

B. The harmful effects of loss of genetic variation can affect fitness today or tomorrow, can lead to inbreeding, and limitation on genetic diversity. We need new information on how genetic variation loss will affect North American Atlantic salmon regarding the ecology and breeding population units. Economic effects will also have to be evaluated.

Note: Keywords are underlined since they were originally chosen in our December 1987 discussion and put on chart paper for later transcription into the present format.

II. FISHERY HARVEST - (To be done by: J Ritter/C Kreuger)
(Refer to Vaughn (1947) Copeia)

A. The timing of harvest may affect genetic diversity by eliminating important life stages especially if life stage harvest is only encouraged.

B. The harvest selection by size may select against a particular sex.

C. The harvest by zone/quota may select against important life stages.

D. The catch distribution relative to stock abundance (age distribution, etc) may favour certain genotypes.

E. Fishery harvest can affect the kind of fish which are used in hatchery assist programs.

III. AVOIDANCE OF SELECTION GUIDELINES FOR HATCHERY MANAGEMENT - (To be done by: Ray Simon) (Refs. by H Kincaid from R.O.-5 Conf. sent to Ray Simon)

A. The qualitative and quantitative collection of gametes may affect genetic variation.

B. The selection of hatchery fish by run sampling, age selection and maturation of individuals may affect genetic variation.

C. Haphazard or inadvertent selections such as repeated use of the better looking fish should be avoided.

D. The design of the hatcheries especially to maintain particular lots of eggs should be a consideration when establishing breeding schemes.

E. The minimum number of fish and gametes thereof to maintain effective Ne for populations should be considered. Should precocious males be used?

IV. RE-ESTABLISHMENT - (To be done by: H E Booke/C Kreuger)
RESTORATION
REHABILITATION

A. Definition - Differentiate between the zero fish situation and those habitats which have wild or hatchery fish or a mixture in them.

B. The neighbouring wild populations should be considered especially if straying is possible.

C. The choice of fish to introduce if adjacent populations are evident.

1. Use should be made of adjacent populations for propagation purposes.

a. Fish should be used which are acceptable if straying is possible.

b. Fish that would have the best characteristics for the habitat should be chosen.

c. Stocking practice/s should be maintained to minimize straying tendencies, increase returns, and increase the effects of natural selection. Scales of adjacency such as (1) nearest neighbour (2) next nearest and (3) continent source of fish must be considered. The use of measures

of genetic variance and habitat match of stocks are a part of good stocking practice. The use of wild stock sperm should be considered for match against eggs from hatchery (captive) sources.

D. The assessment of straying, reproduction and return rates should be requisite to a restoration programme.

V. ENHANCEMENT - (To be done by: J Ritter)
and/or SUPPLEMENTATION

A. The subject topic needs to be treated in a more resolved manner than in rehabilitation/restoration.

B. The stock within the system (basin, river, etc) should be used with use of gametes from all size fish.

C. Enhancement must be dependent on the percent returns due to stocking.

D. Risks should be identified to other stocks by first evaluating different enhancement strategies before starting an enhancement programme.

E. The assessment of an enhancement programme can be measured by means of gene frequency counts in the resident population/s and by measure of particular traits.

VI. AQUACULTURE - (To be done by: J Bailey)

A. The role of escapees in aquaculture

B. The importance of locations of wild or relatively wild populations.

C. The information needs required by aquaculture personnel.

D. The regulation of use of sterile fish, polyploids, and those fish which do not fit the normally breeding types.

E. Aquaculturists face similar problems as evident in enhancement programmes such as:

1. use of adjacent populations.
2. to minimise escapees or encourage escapement.

F. Sea-ranching may cause greater risks from straying, by not being done on a river with a native stock, and the capture (accidental) of wild fish.

G. The principles of genetic engineering may be applied by aquaculturists.

H. The use of gene banks may be required as we deplete stocks.

VII. SUMMARY - (To be done by: Co-chairs)

A. The importance of gene banks and habitat preservation.

B. The information needs required in monitoring populations and possible research questions to protect/conserve genetic variation. For example, what are the effects of cage culture escapees on wild populations? What are the genetic effects of "sneakers" on a population?

EDINBURGH
JUNE 1989

ANNEX 5

NORTH AMERICAN COMMISSION

PAPER NAC(89)17

REPORT OF ACTIVITIES OF NAC SCIENTIFIC WORKING GROUP ON SALMONID INTRODUCTIONS AND TRANSFERS

NORTH AMERICAN COMMISSION
NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

Report of Activities
of
NAC Scientific Working Group on
Salmonid Introductions and Transfers

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INTRODUCTION

The Terms of Reference for the NAC, Scientific Working Group are in Appendix I. During the past year, 1988/89 the Working Group focused its attention primarily on four activities, (1) the development of protocols for the introductions and transfers of salmonids; (2) review all non-indigenous salmonid introductions in relation to the ICES code of practice; (3) maintain an inventory on all introductions and transfers; and (4) prepare a compendium on regulations and penalties with respect to introductions and transfers of fishes in the Commission Area.

Three meetings were held (January 24-25, 1989, Newton Corner, MA; April 10-13, 1989, St Andrews, NB; and May 15-18, 1989 Newton Corner, MA).

T R Porter, Canadian Co-Chairman, attended the Joint NASCO/ICES Meeting on the Genetic Effects of Aquaculture on Wild Atlantic Salmon, and the ICES Working Group on Introductions and Transfers of Marine Organisms.

ACTIVITIES OF THE WORKING GROUP

1. Development of protocols:

The NAC Scientific Working Group, in its 1987 report, identified a potential for adverse effects on the productivity of Atlantic salmon stocks from introductions and transfers of salmonids. These effects could be related to changes in genetic composition due to hybridization, introduction or spread of pathogens, and/or ecological interactions. The Working Group was given the task (Terms of Reference, No. 2) of developing protocols which would reduce the risk of adverse effects on the productivity of existing salmonid populations from introductions and transfers.

The Working Group has developed a Discussion Document which outlines draft protocols formulated from reports submitted by our Fish Health, Genetics, and Ecologic Subgroups. This report is presented under separate cover for your consideration.

2. Review of all non-indigenous salmonid introductions:

Reports were received from all agencies except Rhode Island, Vermont, and Connecticut. Coho and chinook salmon introductions continued in 1988 in Massachusetts, New Hampshire, and Ontario; as well as the chinook salmon program in New Jersey. However, all eggs were obtained from the northeast USA or the Great Lakes drainage. There were no reports of any further sightings of Pacific salmonids in rivers containing Atlantic salmon in Quebec or the Maritimes. It was noted that New Hampshire has proposed to terminate its coho program in favour of a chinook program.

Four shipments of rainbow trout, totalling 775,000 eggs, were introduced to eastern Canada (2 to PEI, 1 to NS, and 1 to NB) from Bietey's resort in Washington. This is contrary to the recommendations of NAC; however it was noted that the donor facility has been free of diseases listed in Schedules II and IV of the FHPR for the past 12 years. Although no reports were received, the Working Group believes that shipments of rainbow trout eggs from west of the Continental Divide are annually received in the northeastern USA.
Of particular concern to the Working Group were importations of about 2.8 million Atlantic salmon eggs to Maine from outside North America. Two shipments were received from

Iceland, 1 from Finland and 1 from Scotland. All of the eggs were destined for private aquaculture. The Working Group voiced strong concern over the apparent expansion of importation from Europe. In addition to the potential for adverse genetic effects escapees may have on wild stocks in both USA and Canada, hybridization with USA stocks may be detrimental to restoration programs.

Importation of Atlantic salmon eggs from Europe and salmonids from west of the Continental Divide, is contrary to recommendations which were accepted by NAC.

The Working Group also noted that few agencies were submitting their proposed introductions for review. Also, we are not being informed if proposed introductions have been carried out. It is recommended that NAC remind agencies of the importance of submitting their plans for introductions and transfers.

3. Inventory on introductions and transfers:

The inventory (1975-88) has been updated and is attached (Appendix II). As previously agreed, introductions of rainbow trout and brown trout from sources east of the Continental Divide to the northeastern USA are not included. Likewise, rainbow trout introductions in Ontario from Ontario sources, are not reported. The Working Group noted that agencies were not identifying if proposed introductions actually occurred. A new reporting form is being developed to overcome this problem.

4. Report on Regulations and Penalties Governing Introductions and Transfers:

A draft report was prepared and reviewed. The final document will be available for the Annual Meeting of NAC, 1990.

CONSIDERATIONS FOR NAC

1. Acceptance in principle of the draft protocols in the Discussion Document and for member countries to begin the consultation process.

2. Members countries to strongly urge agencies responsible for introductions and transfers to; (i) submit their plans for introductions and transfers to the NAC Working Group; (ii) to submit an inventory of introductions and transfers which have been carried out.

3. NAC should use its influence to eliminate importations of Atlantic salmon from Europe and Iceland; and to eliminate introductions and transfers from west of the Continental Divide.

4. The Working Group points out that the government of the Islands of St Pierre and Miquelon (off the south coast of Newfoundland) has been interested in developing an aquaculture industry. Therefore, they may import salmonids from Europe or west of the Continental Divide. We have very little information on their industry. Since France is not part of the NAC, they have no obligation to provide information to the Working Group or to support protocols being developed by NAC. We recommend that NAC request information on introductions and transfers of fishes to St Pierre and Miquelon and that scientific experts representing the interest of St. Pierre and Miquelon participate in the Working Group.

APPENDIX I

TERMS OF REFERENCE
NAC Scientific Working Group
on Salmonid Introductions and Transfers

1. Advise on matters related to the introductions or transfer of salmonids species which may potentially affect the health and genetic stability of Atlantic salmon stock in Canada and the United States of America.

2. Develop and review, on demand, existing or proposed policies and protocols relating to the introduction or transfer of salmonids in Canada and the United States of America with respect to their potential impacts, both positive and negative, on existing salmonid populations.

3. Review all non-indigenous salmonid introductions in relation to the ICES "Revised Code of Practice to Reduce the Risks of Adverse Effects Arising from Introduction on Non-indigenous Marine Species".

4. Evaluate existing mechanisms and advise on new mechanisms that might be put in place to ensure adherence to the above-mentioned ICES Revised Code of Practice in future programs by member nations.

5. Maintain an inventory on all introductions and transfers of all salmonids into the Great Lakes and the Atlantic coast of North America since 1975.

6. Comment on the potential for adverse genetic and disease impacts on wild Atlantic salmon stocks resulting from proposed introductions of Pacific salmonids and proposed transfers or introductions of Atlantic salmon.

7. Recommend terms of reference or questions which might be referred to the ICES Working Group on Introductions and Transfers of Marine Organisms or the ICES Working Group on Genetics, and, if required, cooperate in joint meetings with the ICES Working Group to consider questions of mutual interest.

APPENDIX II

SUMMARY

OF

SALMONID INTRODUCTIONS AND TRANSFERS

IN

EASTERN NORTH AMERICA

(1975-1988)

Prepared by

North American Commission (NASCO) Scientific Working Group

on Introductions and Transfers of Salmonids

May 1989

SALMONID INTRODUCTION AND TRANSFER INVENTORY

The Bilateral Scientific Working Group on Salmonid Introductions and Transfers was tasked with developing an inventory of all salmonid introductions and transfers into the Great Lakes and the Atlantic coast of North America beginning with 1975. Since the task of documenting all transferred species into these areas was considered impractical, the Working Group, with the consent of the North American Commission, limited its inventory to introduction and transfers of (1) all salmonid movement from west of the continental divide, (2) all Pacific salmonid movements originating east of the continental divide, including steel-head rainbow trout, but excluding domestic non-migratory rainbow trout strains, and (3) all international salmonid movements.
Data for the inventory was collected from states and provinces using a form designed by the Working Group to capture those items felt essential for this initial inventory. Response to the request for data was quite encouraging, although the inventory cannot be considered complete at this time. Further data are to be sought from some states and provinces and the inventory will then be updated.

Data tabled is basic in nature and should serve as an initial exposure to an introduction or transfer; detailed information on a particular movement would then be pursued by contacting agencies in the appropriate state or province. Definitions of introduced or transferred species adopted by ICES (anon. 1984) were utilized, ie, an introduced species (non-indigenous species) is any species intentionally or accidentally transported or released by man into an environment outside its present range: a transferred species (transplanted species) is any species intentionally or accidentally transported and released within its present range. Inventory data has been entered on an HP 1000 mini-computer, in Department of Fisheries and Oceans offices in Halifax. Conversion of data to appropriate micro- or mini-computers at government agencies in Canada and the USA is possible, should the need arise.

Definitions of Table Headings

File:	Code used to designate the file containing material displayed in the tables.
Species:	Common and scientific name.
Stage:	Gametes, eggs, juveniles, adults, not specified, and various (a combination of the above)
Release Site:	State or province and river system or lake where fish are released after quarantine.
Original Receiving Facility:	Province or state, and hatchery or river where fish are first maintained in receiving country.
Stock Origin (source):	State, province, country and river or lake where introduction or transfer originated. This site is not necessarily the historic (original) source of stock, ie, not the genetic stock origin.
Year:	This is the year the introduction or transfer for a particular project or undertaking first entered the receiving facility.

ABBREVIATIONS USED IN TABLES

PROVINCES/STATES/COUNTRIES

AK	ALASKA
BC	BRITISH COLUMBIA
CAN	CANADA
CA	CALIFORNIA
CO	COLORADO
CT	CONNECTICUT
ID	IDAHO
IN	INDIANA
LAB	LABRADOR
ME	MAINE
MAN	MANITOBA
MA	MASSACHUSETTS
MI	MICHIGAN
MT	MONTANA
NB	NEW BRUNSWICK
NFLD	NEWFOUNDLAND
NH	NEW HAMPSHIRE
NJ	NEW JERSEY
NY	NEW YORK
NS	NOVA SCOTIA
ONT	ONTARIO
OR	OREGON
PA	PENNSYLVANIA
PEI	PRINCE EDWARD ISLAND
QUE	QUEBEC
RI	RHODE ISLAND
TN	TENNESSEE
US	UNITED STATES
VT	VERMONT
WA	WASHINGTON
WV	WEST VIRGINIA
WY	WYOMING

OTHER TERMS

ATL	ATLANTIC
AQC	AQUACULTURE
BK	BROOK
CK	CREEK
CM	CENTIMETRE(S)
E EGGS	EYED EGGS
ENY	ENVIRONMENT
EXP	EXPERIMENTAL/RESEARCH
FCS	FISH CULTURE STATION
FF	FISH FARM
FING	FINGERLING(S)
H	HATCHERY
IS	ISLAND
LK	LAKE
NW	NORTHWEST
P/S	PARR/SMOLT TRANSITION
REV	REVISION
R	RIVER
RET	RETURN(ING)
SJR	SAINT JOHN RIVER
SKAM	SKAMANIA
SS	STEELHEAD STRAIN
SP	SPRING(S)
STR	STRAIN
TR	TRIPLOID
UY PARR	UNDERYEARLING PARR
UNK	UNKNOWN
U	UNIVERSITY
W	WILD
WS	WATERSHED

ORGANIZATIONS

ASF	ATLANTIC SALMON FEDERATION
ASRSC	ATLANTIC SEA RUN SALMON COMMISSION
DEC	DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DFO	DEPARTMENT OF FISHERIES AND OCEANS (CANADA)
EPS	ENVIRONMENTAL PROTECTION SERVICE (CANADA)
MSRL	MARINE SCIENCES RESEARCH LABORATORY
NHFG	NEW HAMPSHIRE FISH AND GAME
NMFS	NATIONAL MARINE FISHERY SERVICE
NSDF	NOVA SCOTIA DEPARTMENT OF FISHERIES
NWAFC	NORTHWEST ATLANTIC FISHERIES CENTRE
USFWS	UNITED STATES FISH AND WILDLIFE SERVICE

SUMMARY OF SALMONID INTRODUCTIONS/TRANSFERS, 1975-1988

CONNECTICUT

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALMO SALAR							
U3	Atlantic Salmon	Eggs	Iceland, Reykjavik (Paulson)	117000	CT, Streams in NW State	1983	CT, Not Specified
U3	Atlantic Salmon	Eggs	Iceland, Reykjavik (Paulson)	117000	CT, Streams in NW State	1981	CT, Not Specified
U3	Atlantic Salmon	Eggs	WA, NMFS	42000	CT, Connecticut River System	1981	CT, Not Specified
U3	Atlantic Salmon	Eggs	Iceland, Reykjavik (Paulson)	117000	CT, Streams in NW State	1980	CT, Not Specified
U3	Atlantic Salmon	Eggs	Iceland, Reykjavik (Paulson)	117000	CT, Streams in NW State	1979	CT, Not Specified
SALMO TRUTTA							
U3	Brown Trout	Eggs	Mt, Harriman Trout Hatchery	10000	CT, Statewide Streams	1978	CT, Not Specified
ONCORHYNCHUS NERKA KOKANEE							
U3	Kokanee Salmon	Eggs	CO, Unknown landlocked	100000	CT, Lakes in NW State	1981	CT, Not Specified
ONCORHYNCHUS MYKISS							
U3	Rainbow Trout	Eggs	WY, USFWS (Stock #15)	15000	CT, Statewide Lakes & Streams	1975	CT, Not Specified
U3	Rainbow Trout	Eggs	WA, Trout Lodge (Kamaloop)	50000	CT, Statewide Lakes & Streams	1975	CT, Not Specified

SUMMARY OF SALMONID INTRODUCTIONS/TRANSFERS, 1975 - 1988

MAINE

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALMO SALAR							
U7	Atlantic Salmon	Eggs	NB, Saint John River	100000	ME, Aroostook River (Fry, 1988)	1988	ME, Green Lake Hatchery
U7	Atlantic Salmon	Adults	NB, Saint John River	100	ME, Aroostook River (Ashland)	1988	ME, ASRSC
U7	Atlantic Salmon	Fry	NB, Florenceville Hatchery	27000	ME, Upper Saint John River	1988	ME, Salen Inc
U7	Atlantic Salmon	UY Parr	NB, Florenceville Hatchery	20000	ME, Upper Saint John River	1988	ME, Salen Inc
U7	Atlantic Salmon	UY Parr	NB, Sea Farms CAN (SJR Strain)	350000	ME, Upper Saint John River	1988	ME, Salen Inc
U7	Atlantic Salmon	Smolts	NB, Sea Farms CAN (SJR Strain)	99300	ME, Lubec (Sea Cages)	1988	ME, Sea Farms Ltd (Lubec)
U7	Atlantic Salmon	Smolts	NB, Sea Farms CAN (SJR Strain)	30000	ME, Lucec (Sea Cages)	1988	ME, Rogers Is Salmon Co
U7	Atlantic Salmon	Eggs	Scotland, (Norwegian Strains)	1000000	ME, Not yet released (Feb/89)	1988	ME, Oquossoc Hatchery
U7	Atlantic Salmon	Eggs	Scotland, (Norwegian Strains)	1000000	ME, Not yet released (Feb/89)	1988	ME, Oquossoc Hatchery
U7	Atlantic Salmon	Eggs	Finland, (Late run)	311566	ME, Not yet released (Feb/89)	1988	ME, Mariculture Products Ltd
U7	Atlantic Salmon	Eggs	Iceland, (Isno sea cages)	305000	ME, Not yet released (Feb/89)	1988	ME, Mariculture Products Ltd
U7	Atlantic Salmon	Eggs	Iceland, (Eldi Fish Farms)	156000	ME, Not yet released (Feb/89)	1988	ME, Mariculture Products Ltd
U7	Atlantic Salmon	Fry	NB, Saint John River	150000	ME, Upper Saint John River	1987	ME, ASRSC
U7	Atlantic Salmon	Smolts	NB, Sea Farms Canada	18000	ME, Lubec (Cages)	1987	ME, Frank Rier
U7	Atlantic Salmon	Eggs	Finland, Broodstock	500000	ME, Eastport (Cages)	1987	ME, Ocean Products Inc
U7	Atlantic Salmon	Smolts	NB, Sea Farms Canada	25000	ME, Eastport (Cages)	1987	ME, Ocean Products Ltd
U7	Atlantic Salmon	Eggs	Scotland, Broodstock	500000	ME, Winter Harbour (Cages)	1987	ME, Oquossoc Hatchery
U7	Atlantic Salmon	Grilse	NB, Saint John River	55	ME, Aroostook River	1987	ME, ASRSC
U7	Atlantic Salmon	UY Parr	NB, Saint John River	40000	ME, Upper Saint John River	1987	ME, Salen Inc
U7	Atlantic Salmon	Adults	NB, Saint John River	200	ME, Aroostook River	1986	ME, ASRSC
U7	Atlantic Salmon	Eggs	NB, Saint John River	106000	ME, Aroostook River	1986	ME, Green Lake Hatchery
U7	Atlantic Salmon	Eggs	Scotland, River Aray	50000	ME, Unknown	1986	ME, Dead River Hatchery
U6	Atlantic Salmon	Smolts	NB, Saint John River	25000	ME, Eastport (Cages)	1986	ME, Ocean Products Inc
U7	Atlantic Salmon	Adults	NB, Saint John River	200	ME, Aroostook River	1985	ME, ASRSC
U7	Atlantic Salmon	Smolts	Scotland, River Conon	2000	ME, Eastport (Cages)	1985	NH, New, Eng, Fish Farm Ent
U7	Atlantic Salmon	Smolts	Norway (Unknown Strain)	7000	ME, Eastport (Cages)	1985	NH, New, Eng, Fish Farm Ent
U7	Atlantic Salmon	Adults	NB, Saint John River	200	ME, Aroostook River	1984	ME, ASRSC
U7	Atlantic Salmon	Eggs	NB, Saint John River	2000000	ME, Eastport (Cages)	1983	ME, Ocean Products Inc
U7	Atlantic Salmon	Adults	NB, Saint John River	100	ME, Aroostook River	1983	ME, ASRSC
U7	Atlantic Salmon	Adults	NB, Saint John River	4793	ME, Eastport (Cages)	1983	ME, Ocean Products Inc
U7	Atlantic Salmon	Eggs	MB, Mar Pro, Inc (Unk Strain)	500000	ME, Eastport (Cages)	1983	ME, Ocean Products Inc
U7	Atlantic Salmon	Parr	NB, NASRC (Unk Strain)	100000	ME, Unknown	1983	ME, Ocean Products Inc
ONCORHYNCHUS GORBUSCHA							
U7	Pink Salmon	Eggs	AK, Sheldon Jackson Coll	2000000	ME, Casco Bay (Sea Ranching)	1982	ME, Beau Valley Trout Farm
U7	Pink Salmon	Eggs	AK, Sheldon Jackson Coll	1000000	ME, Casco Bay (Sea Ranching)	1981	ME, Beau Valley Trout Farm

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
ONCORHYNCHUS MYKISS							
U7	Rainbow Trout	Eggs	CA, Domestic BroodstocK	1000000	ME, Unknown (Marine Env)	1983	ME, Beau Valley Trout Farm
U7	Rainbow Trout	Eggs	CA, Domestic BroodstocK	70000	ME, Unknown (Marine Env)	1982	ME, Beau Valley Trout Farm
U7	Rainbow Trout	Eggs	CA, Domestic Broodstock	600000	ME, Unknown (Marine Env)	1981	ME, Beau Valley Trout Farm
U7	Rainbow Trout	Eggs	CA, Domestic Broodstock	50000	ME, Unknown (Marine Env)	1980	ME, Mineral Sps Trout Ponds
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	500000	ME, Unknown (Marine Env)	1980	ME, Beau Valley Trout Farm
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	50000	ME, Unknown (Marine Env)	1979	ME, Sea Run Inc
U7	Rainbow Trout	Eggs	CA, Domestic Broodstock	200000	ME, Unknown (Marine Env)	1979	ME, Sea Run Inc
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	150000	ME, Unknown (Marine Env)	1978	ME, Sea Run Inc
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	1000000	ME, Unknown (Marine Env)	1978	ME, Beau Valley Trout Farm
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	300000	ME, Unknown (Marine Env)	1977	ME, Beau Valley Trout Farm
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	1200000	ME, Unknown (Marine Env)	1977	ME, Beau Valley Trout Farm
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	50000	ME, Unknown (Marine Env)	1977	ME, R T Hinckley (Aquaculture)
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	25000	ME, Unknown (Marine Env)	1977	ME, R T Hinckley (Aquaculture)
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	750000	ME, Unknown	1976	ME, Beau Valley Trout Farm
U7	Rainbow Trout	Eggs	ID, Domestic Broodstock	300000	ME, Unknown (Marine Env)	1975	ME, Beau Valley Trout Farm
ONCORHYNCHUS KETA							
U7	Chum Salmon	Eggs	WA, Minter Creek (Wild)	500000	ME, Casco Bay (Sea Ranching)	1986	ME, Dead River Hatchery
S1	Chum Salmon	Eggs	Japan, (Tsugaruishi Hatchery)	1500000	ME, Casco Bay (Sea Ranching)	1985	ME, Beau Valley Trout Farm
S1	Chum Salmon	Juv	WA, Puget Sound	500000	ME, Gulf of Maine	1985	ME, Sea Run Inc
U7	Chum Salmon	Eggs	WA, Hood Canal	600000	ME, Casco Bay (Sea Ranching)	1985	ME, Dead River Hatchery
S1	Chum Salmon	Juv	Japan, (Hokkaido Hatchery)	1000000	ME, Gulf of Maine	1985	ME, Dead River Hatchery
U7	Chum Salmon	Eggs	Japan, (Tsugaruishi Hatchery)	1500000	ME, Casco Bay (Sea Ranching)	1984	ME, Beau Valley Trout Farm
U7	Chum Salmon	Eggs	Japan, (Hokkaido Hatchery)	350000	ME, Casco Bay (Sea Ranching)	1983	ME, Beau Valley Trout Farm
U7	Chum Salmon	Eggs	WA, Chambers Creek	100000	ME, Casco Bay (Sea Ranching)	1983	ME, Beau Valley Trout Farm
U7	Chum Salmon	Eggs	WA, Johns Creek	100000	ME, Casco Bay (Sea Ranching)	1981	ME, Sea Run Inc
ONCORHYNCHUS KISUTCH							
U7	Coho Salmon	Eggs	WA, Skagit River	700000	ME, Brooksville (Cages)	1978	ME, Maine Sea Farms
U7	Coho Salmon	Eggs	WA, Skagit River	500000	ME, Brooksville (Cages)	1977	ME, Maine Sea Farms
U7	Coho Salmon	Fry	OR, Sandy River	140000	ME, Wiscasset (Cages)	1976	NH, New Hampshire University
U7	Coho Salmon	Eggs	WA, Cowlitz River	500000	ME, Brooksville (Cages)	1976	ME, Maine Salmon Farms
U7	Coho Salmon	Eggs	WA, Skagit River	160000	ME, Vinalhaven (Cages)	1975	ME, Cedar Springs Trout Farm
U7	Coho Salmon	Eggs	WA, Kalama River	40000	ME, Vinalhaven (Cages)	1975	ME, Cedar Springs Trout Farm
U7	Coho Salmon	Eggs	OR, Sandy River	200000	ME, Wiscasset (Cages)	1975	ME, Maine Salmon Farms
U7	Coho Salmon	Fry	NH, U of NH (Toutle R Stock?)	140000	ME, Wiscasset (Cages)	1975	ME, Maine Salmon Farms

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALVELINUS FONTINALIS							
U6	Brook Trout	Fing	RI, AM Fish Co (Unk Strain)	50	MA, Ponds at Attleboro	1982	MA, R Deblois (Aquaculture)
SALMO GAIRDNERI							
U6	Kamloops Trout	Eggs	WA, Trout Lodge (Unk Strain)	10000	MA, Ponds at S Egermont	1986	MA, Candees Trout Hatchery
ONCORHYNCHUS MYKISS							
U6	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	50000	MA, Ponds at Sutherland	1986	MA, Mohawk Trout Hatchery
U6	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	50000	MA, Ponds at Sutherland	1985	MA, Mohawk Trout Hatchery
U6	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	25000	MA, Pools at Spencer	1985	MA, A J Gautier (Aquaculture)
U6	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	25000	MA, Pools at Spencer	1984	MA, A J Gautier (Aquaculture)
U6	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	25000	MA, Pools at Spencer	1981	MA, A J Gautier (Aquaculture)
ONCORHYNCHUS KISUTCH							
U6	Coho Salmon	?	NY, Salmon River Hatchery	50000	MA, North River (Proposed)	1989	MA, Sullivan Hatchery
U6	Coho Salmon	?	MI, Platte River Hatchery	50000	MA, North River (Proposed)	1989	MA, Sullivan Hatchery
U6	Coho Salmon	Juv	MA, North River	21000	MA, North River (At Pembroke)	1988	MA, Sullivan Hatchery
U6	Coho Salmon	Juv	MI, Platte River Hatchery	30000	MA, North River (At Pembroke)	1988	MA, Sullivan Hatchery
U6	Coho Salmon	Eggs	OR, Ore Aqua (Unk Strain)	35000	MA, Tanks at Hinsdale	1987	MA, R T Capeless (Aquaculture)
U6	Coho Salmon	Smolt	MA, North River (WA Stock)	24942	MA, North River	1986	MA, Sullivan & Sandwich Hatch
S1	Coho Salmon	Juv	MA, Returning Adults	30000	MA, North River	1986	MA, Not Specified
U6	Coho Salmon	Eggs	OR, Ore Aqua (Unk Strain)	25000	MA, Laboratory at Salem	1986	MA, S P Inc (Aquaculture)
S1	Coho Salmon	Juv	MA, Returning Adults	98000	MA, Not Released	1985	MA, Not Specified
U6	Coho Salmon	Smolt	MA, North River (WA Stock)	97931	MA, North River	1985	MA, Sullivan Hatchery
U6	Coho Salmon	Eggs	WA, Fish Pro Inc (Unk Stock)	25000	MA, Tanks at Hinsdale	1985	MA, R T Capeless (Aquaculture)
U6	Coho Salmon	Juv	MA, North River (WA Stock)	148012	MA, Town, Scorton & North Riv	1984	MA, Sullivan & Sandwich Hatch
U6	Coho Salmon	Smolt	WA, Minter Creek Hatchery	90531	MA, Scorton Ck & North Riv	1983	MA, Sullivan & Sandwich Hatch
U6	Coho Salmon	Smolt	MA, North River (WA Stock)	70147	MA, North River	1982	MA, Sullivan & Sandwich Hatch
U6	Coho Salmon	Smolt	MA, North River (WA Stock)	66985	MA, North River	1981	MA, Sandwich Hatchery
U6	Coho Salmon	Smolt	MA, North River (WA Stock)	11000	MA, North River	1980	MA, Sandwich Hatchery
U6	Coho Salmon	Smolt	MA, North River	46439	MA, North River	1979	MA, Sandwich Hatchery
U6	Coho Salmon	Smolt	MA, North River (WA Stock)	30269	MA, North River	1978	MA, Sandwich Hatchery
U6	Coho Salmon	Smolt	MA, North River (WA Stock)	4575	MA, North River	1977	MA, Sandwich Hatchery
U6	Coho Salmon	Smolt	MA, North River (WA Stock)	48132	MA, North River	1976	MA, Div of Marine Fisheries
U6	Coho Salmon	Smolt	MA, North River (WA Stock)	3434	MA, North River	1975	MA, Sandwich Hatchery

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALMO SALAR							
U6	Atlantic Salmon	Smolt	CT, Connecticut River	20000	MA, Millers River	1989	MA, Reed Hatchery
U6	Atlantic Salmon	Smolt	CT, Connecticut River	20000	MA, Deerfield River	1989	MA, Reed Hatchery
U6	Atlantic Salmon	Fry	CT, Connecticut River	120000	MA, Deerfield River Tribs	1989	MA, Reed Hatchery
U6	Atlantic Salmon	Parr	ME, Union River	2700	MA, Millers River	1988	MA, Reed Hatchery
U6	Atlantic Salmon	Parr	ME, Union River	2300	MA, Deerfield River	1988	MA, Reed Hatchery
U6	Atlantic Salmon	Smolt	ME, Union River	22800	MA, Millers River	1988	MA, Reed Hatchery
U6	Atlantic Salmon	Smolt	ME, Union River	22600	MA, Deerfield River	1988	MA, Reed Hatchery
U6	Atlantic Salmon	Fry	ME, Union River	12000	MA, Deerfield River (South R)	1988	MA, Reed Hatchery
U6	Atlantic Salmon	Fry	ME, Union River	23430	MA, Deerfield River (Cold R)	1988	MA, Reed Hatchery
U6	Atlantic Salmon	Fry	ME, Union River	14969	MA, Deerfield River (Bear R)	1988	MA, Reed Hatchery
U6	Atlantic Salmon	Fry	ME, Union River	27467	MA, Manhan River (North Br)	1988	MA, Reed Hatchery
U6	Atlantic Salmon	Fry	ME, Union River	6033	MA, Westfield R (Potash Bk)	1988	MA, Reed Hatchery

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALVELINUS NAMAYCUSH X SALVELINUS FONTINALIS							
	Splake	Juv	NB, Clearwater X Phillips	150	NB, Goldsmiths L (Proposed)	1989	NB, Flowers Cove Hatchery
	Splake	Juv	NB, Clearwater X Phillips	5000	NB, Utopia Lake (Proposed)	1989	NB, Flowers Cove Hatchery
C1	Splake	Juv	NB, Clearwater X Phillips	2000	NB, Mullin Stream	1988	NB, Flowers Cove Hatchery
C1	Splake	Juv	NB, Clearwater X Phillips	2000	NB, NL River Lake	1988	NB, Flowers Cove Hatchery
C1	Splake	Juv	NB, Clearwater X Phillips	5000	NB, Grand Lake	1988	NB, Flowers Cove Hatchery
C1	Splake	Juv	NB, Clearwater X Phillips	700	NB, Glen Severn	1987	NB, Flowers Cove Hatchery
C1	Splake	Juv	NB, Clearwater X Phillips	175	NB, Harris Lake	1987	NB, Flowers Cove Hatchery
C1	Splake	Juv	NB, Clearwater X Phillips	150	NB, Grand Manan	1987	NB, Flowers Cove Hatchery
C1	Splake	Juv	NB, Clearwater X Phillips	2000	NB, Mullin Stream	1987	NB, Flowers Cove Hatchery
C1	Splake	Juv	NB, Clearwater X Phillips	500	NB, Big Meadow Pond	1987	NB, Flowers Cove Hatchery
C1	Splake	Juv	NB, Clearwater X Phillips	2000	NB, NL River Lake	1987	NB, Flowers Cove Hatchery
C1	Splake	Year	NB, Clear LK X Phillips	550	NB, Peabody Lake	1986	NB, Flowers Cove Hatchery
C1	Splake	Year	NB, Clear LK X Phillips	100	NB, Blind Lake	1986	NB, Flowers Cove Hatchery
C1	Splake	Year	NB, Clear LK X Phillips	100	NB, North Lake	1986	NB, Flowers Cove Hatchery
C1	Splake	Fing	NB, Clear LK X Phillips	3000	NB, Grand Lake	1983	NB, Grand Lake Hatchery
C1	Splake	Year	NB, Clear LK X Phillips	800	NB, McKendrick Lake	Unk	NB, Flowers Cove Hatchery
C1	Splake	Year	NB, Clear LK X Phillips	500	NB, Harris Lake	Unk	NB, Flowers Cove Hatchery
C1	Splake	Year	NB, Clear LK X Phillips	550	NB, Whitney Road	Unk	NB, Flowers Cove Hatchery
SALVELINUS NAMAYCUSH							
C1	Lake Trout	E Eggs	MI, Marquette Hatchery	100000	NB, Not Released	1985	NB, Flowers Cove Hatchery
C1	Lake Trout	Year	MAN, Clearwater Lake	3000	NB, Belleisle Bay	1980	Not Identified
C1	Lake Trout	Juv	MAN, Clearwater Lake	2800	NB, Loch Alva	1979	NB, Flowers Cove Hatchery
C1	Lake Trout	Juv	MAN, Clearwater Lake	27651	NB, Grand Lake	1979	NB, Flowers Cove Hatchery
C1	Lake Trout	E Eggs	MAN, Clearwater Lake	100000	NB, Not Released	1979	NB, Flowers Cove Hatchery
C1	Lake Trout	E Eggs	MI, Marquette Hatchery	100000	NB, Not Released	1976	NB, Flowers Cove Hatchery
C1	Lake Trout	Eggs	MI, Marquette Hatchery	100000	NB, Not Specified	1976	NB, Florenceville Hatchery
C1	Lake Trout	Year	MI, Marquette Hatchery	20000	NB, Grand Lake	1976	Not Identified
C1	Lake Trout	Year	NB, FLorencevill Hatchery	15000	NB, Lake Alva	1976	NB, Not Identified (Dnre)
SALVELINUS FONTINALIS X SALVELINUS ALPINUS							
C1	Charbrook	Juv	NB, Walton X Phillips	10000	NB, Mine Ponds (Proposed)	1988	NB, Flowers Cove Hatchery
ONCORHYNCHUS GORBUSCHA							
C1	Pink Salmon	Juv	Not Specified	1	NB, Miramichi River (Redbank)	1983	Unknown
C1	Pink Salmon	Juv	Not Specified	1228	NB, Deer Island	1979	NB, St Andrews

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALMO SALAR							
S8	LL Atlantic Salmon	Eggs	ME, Grand Lake Str Hatchery	35000	NB, Various Waters	1988	NB, Saint John Hatchery
C1	LL Atlantic Salmon	Fing	NB, Skiff Lake	1013	NB, Yoho Lake	1984	NB, Saint John Hatchery
C1	LL Atlantic Salmon	Fing	NB, Skiff Lake	998	NB, Bocabec Lake	1984	NB, Saint John Hatchery
C1	LL Atlantic Salmon	Year	NB, Skiff Lake	1308	NB, Belleisle Bay	1983	NB, Flowers Cove Hatchery
C1	LL Atlantic Salmon	Year	NB, Skiff Lake	999	NB, Serpentine Lake	1982	NB, Saint John Hatchery
C1	LL Atlantic Salmon	Year	NB, Skiff Lake	1500	NB, Unique Lake	1981	NB, Saint John Hatchery
C1	LL Atlantic Salmon	Year	NB, Skiff Lake	8986	NB, Oromocto Lake	1979	NB, Saint John Hatchery
C1	LL Atlantic Salmon	Year	NB, Skiff Lake	8474	NB, Sisson Reservoir	1977	NB, Saint John Hatchery
C1	LL Atlantic Salmon	Year	NB, Skiff Lake	500	NB, East Long Lake	Unk	NB, Saint John Hatchery
C1	LL Atlantic Salmon	Year	NB, Skiff Lake	1500	NB, Trousers Lake	Unk	NB, Saint John Hatchery
C1	LL Atlantic Salmon	Year	NB, Skiff Lake	400	NB, Lake Anthony	Unk	NB, Flowers Cove Hatchery
SALYELINUS FONTINALIS							
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	50000	NB, Aquaculture	1988	NB, William Know
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	200000	NB, Aquaculture	1988	NB, Green Acres Trout Farm
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	200000	NB, Aquaculture	1988	NB, Reginald Bosse
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	75000	NB, Aquaculture	1988	NB, Noel Bosse
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	300000	NB, Aquaculture	1988	NB, Douglas Daigle
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	75000	NB, Aquaculture	1988	NB, Alvin Craft
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	20000	NB, Aquaculture	1988	NB, James Macrae
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	100000	NB, Aquaculture	1988	NB, Ronald Nowlan
S8	Brook Trout	Eggs	ME, Phillips Hatchery	150000	NB, Various Waters	1988	NB, Flowers Cove Hatchery
S8	Brook Trout	Fing	QUE, Pisciculture Alleghanys	4000	NB, Aquaculture	1988	NB, Gilles Cormier
S8	Brook Trout	Fing	QUE, Pisciculture Alleghanys	30000	NB, Aquaculture	1988	NB, Pierre Morin
S8	Brook Trout	Fing	QUE, Pisciculture Alleghanys	130000	NB, Aquaculture	1987	NB, Pierre Morin
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	180000	NB, Aquaculture	1987	NB, Douglas Daigle
S8	Brook Trout	Eggs	QUE, Pisciculture Alleghanys	100000	NB, Aquaculture	1987	NB, Atlantis Sea Farms
C1	Brook Trout	Eggs	WY, Ohio	20000	NB, Not Specified	1979	NB, Florenceville Hatchery
C1	Brook Trout	E Eggs	WA, Phillips	Unknown	NB, Not Released	1979	NB, Flowers Cove Hatchery
C1	Brook Trout	E Eggs	WA, Phillips	Unknown	NB, Not Released	1977	NB, Flowers Cove Hatchery
C1	Brook Trout	Unk	NB, Upsalquitch River	600	NB, Akroyd Lake	1976	Not Recorded
C1	Brook Trout	Year	WA, Phillips	Unknown	NB, Minto Strip-Mine Ponds	1975	NB, St John Hatchery
C1	Brook Trout	Fing	NB, Not Specified	4000	NB, Pabineau Lake	1975	NB, Florenceville Hatchery
C1	Brook Trout	Juv	NB, NW Miramichi River	50	NB, Dalhousie (Sea Cages)	Unk	Not Recorded

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
ONCORHYNCHUS MYKISS							
S8	Rainbow Trout	Eggs	WA, Beiteys Resort	125000	NB, Aquaculture	1988	NB, Edward Eustace
S8	Rainbow Trout	Eggs	QUE, Pisciculture Alleghanys	100000	NB, Aquaculture	1988	NB, Green Acres Trout Farm
S8	Rainbow Trout	Fing	PEI, Int Aqua Systems	4300	NB, Aquaculture	1988	NB, Lloyd Cook
S8	Rainbow Trout	Fing	QUE, Pisciculture Alleghanys	800	NB, Aquaculture	1988	NB, Gilles Cormier
S8	Rainbow Trout	Fing	ONT, Rainbow Springs Hatchery	10000	NB, Aquaculture	1988	NB, William Know
C1	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	20000	NB, Aquaculture	1987	NB, Siscor Corp
C1	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	50000	NB, Aquaculture	1987	NB, Atlantic Smolts Ltd
C1	Rainbow Trout	Eggs	ONT, Aquafarms Canada Ltd	20000	NB, Aquaculture	1987	NB, Meadow Lake Farms
C1	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	177000	NB, Aquaculture	1987	NB, Atlantic Sea Farms
C1	Rainbow Trout	Fing	PEI, Integrated Aquatics	3000	NB, Aquaculture	1987	NB, Lloyd Cook
C1	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	40000	NB, Aquaculture	1987	NB, Oak Bay Hatchery
C1	Rainbow Trout	Eggs	ONT, Aquafarms Canada Ltd	100000	NB, Aquaculture	1987	NB, A Croft
C1	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	50000	NB, Aquaculture	1987	NB, Purtill SP Hatchery
C1	Rainbow Trout	Eggs	QUE, Pisciculture Alleghanys	200000	NB, Aquaculture	1987	NB, Atlantic Sea Farms
C1	Rainbow Trout	Fing	QUE, Pisciculture Alleghanys	6000	NB, Aquaculture	1987	NB, Atlantic Sea Farms
C1	Rainbow Trout	Fing	PEI, Integrated Aquatics	3600	NB, Aquaculture	1987	NB, Mari-Mer Ocean Products
C1	Rainbow Trout	Fing	QUE, Pisciculture Alleghanys	1300	NB, Aquaculture	1987	NB, G Cormier
C1	Rainbow Trout	Fing	ONT, Aquafarms Canada Ltd	15000	NB, Aquaculture	1987	NB, Fundy Marine Sur
C1	Rainbow Trout	Eggs	WA, Beiteys Hatchery	75000	NB, Aquaculture	1987	NB, Purtill SP Hatchery
C1	Rainbow Trout	Fing	PEI, Ingegrated Aquatics	4000	NB, Aquaculture	1987	NB, Don Chapman
C1	Rainbow Trout	Fing	ONT, Rainbow Springs Hatchery	4000	NB, Aquaculture	1987	NB, A Phillips
C1	Rainbow Trout	Fing	QUE, Pisciculture Alleghanys	3000	NB, Aquaculture	1987	NB, D Wolverton
C1	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	2000	NB,	1987	NB, St Andrews Biol Stn
C1	Rainbow Trout ?	Juv	Not Specified	4000	NB, Tobique River	1985	NB, Private Pond
C1	Rainbow Trout ?	Juv	Not Specified	7000	NB, Saint John	1985	NB, Private Pond
C1	Rainbow Trout ?	Unk	Not Specified	Unknown	NB, Bartibog River	1985	NB, Not Specified
C1	Rainbow Trout ?	Juv	Not Specified	3000	NB, Grande River	1985	NB, Private Pond
C1	Rainbow Trout	Eggs	TN, Erwin Hatchery	75000	NB, Private Farms	1979	NB, Wolverton Fish Farms
C1	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	25000	NB, Private Farms	1978	NB, Wolverton Fish Farms
C1	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	100000	NB, Private Farms	1977	NB, Wolverton Fish Farms
SALMO TRUTTA							
C1	Brown Trout	Juv	NB, Loch Lomond	10000	NB, East Musquash (Proposed)	1988	NB, Flowers Cove Hatchery
C1	Brown Trout	Juv	NB, Loch Lomond	10000	NB, East Musquash	1987	NB, Flowers Cove Hatchery
C1	Brown Trout	Juv	NB, Ratcliffe Brook	1400	NB, East Musquash Reservoir	1984	NB, Flowers Cove Hatchery

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALVELINUS ALPINUS							
	Arctic Char	Juv	NB, Walton Lake	1000	NB, Second Kedron L (Proposed)	1989	NB, Flowers Cove Hatchery
S8	Arctic Char	Eggs	MAN, Rockwood Hatchery	3000	NB, Aquaculture	1988	NB, Bouctouche Micmac Band
S1	Arctic Char	Eggs	LAB, Fraser River	2000	NB, Aquaculture	1984	NB, St Andrews

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
ONCORHYNCHUS MYKISS							
C5	Rainbow Trout	TR Fin	ONT, Not Identified	600	NFLD, Aquaculture	1989	NFLD, Bay D'Espoir Hatchery
C5	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	10000	NFLD, Incinerated	1988	NFLD, MSRL
C5	Rainbow Trout	TR Egg	ONT, Rainbow Springs Hatchery	125000	NFLD, Aquaculture	1988	NFLD, Bay D'Espoir Hatchery
C5	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	30000	NFLD, Stock Destroyed	1988	NFLD, Bay D'Espoir Hatchery
C5	Rainbow Trout	Fry	ONT, Rainbow Springs Hatchery	2000	NFLD, Stock Destroyed	1988	NFLD, NWAFC (EPS)
C5	Rainbow Trout	Fry	ONT, Rainbow Springs Hatchery	2000	NFLD, Biomonitoring	1988	NFLD, NWAFC (EPS)
C5	Rainbow Trout	Fry	ONT, Rainbow Springs Hatchery	2000	NFLD, Stock Destroyed	1988	NFLD, NWAFC (EPS)
C5	Rainbow Trout	7cm	ONT, Rainbow Springs Hatchery	500	NFLD, Stock Destroyed	1988	NFLD, NWAFC (DFO)
C5	Rainbow Trout	10cm	ONT, Rainbow Springs Hatchery	500	NFLD, Stock Destroyed	1988	NFLD, NWAFC (DFO)
C5	Rainbow Trout	15cm	ONT, Rainbow Springs Hatchery	500	NFLD, Stock Destroyed	1988	NFLD, NWAFC
C5	Rainbow Trout	15cm	ONT, Rainbow Springs Hatchery	150	NFLD, Stock Destroyed	1988	NFLD, MSRL
C5	Rainbow Trout	Juv	ONT, Rainbow Springs Hatchery	300	NFLD, Stock Destroyed	1987	NFLD, NWAFC
C5	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	10000	NFLD, Not yet determined (1987)	1987	NFLD, Bay D'Espoir Hatchery
C5	Rainbow Trout	Juv	ONT, Aquafarms Canada	300	NFLD, Stock Destroyed	1987	NFLD, MSRL
C5	Rainbow Trout	Juv	ONT, Rainbow Springs Hatchery	900	NFLD, Stock Destroyed	1987	NFLD, MSRL
C5	Rainbow Trout	Juv	ONT, Rainbow Springs Hatchery	4000	NFLD, Stock Destroyed	1987	NFLD, NWAFC
C5	Rainbow Trout	Juv	ONT, Ringwood Hatchery (?)	6700	NFLD, Hopeall (Cages)(?)	1986	NFLD, Not Identified
C5	Rainbow Trout	5cm	ONT, Rainbow Springs Hatchery	5000	NFLD, Hopeall (Cages)	1986	NFLD, Not Identified
C5	Rainbow Trout	12cm	PEI, Integrated Aquatics	4000	NFLD, Stephenville (Harmon)	1985	NFLD, Not Identified
C5	Rainbow Trout	Fry	ONT, Rainbow Springs Hatchery	50000	NFLD, Hopeall (Cages)	1985	NFLD, Not Identified
C5	Rainbow Trout	9in	PEI, Integrated Aquatics	2000	NFLD, Stephenville (Harmon)	1984	NFLD, Not Identified
C5	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	150000	NFLD, Hopeall (Cages)	1984	NFLD, Not Identified
C5	Rainbow Trout	Fing	ONT, Rainbow Springs Hatchery	2000	NFLD, Murrys Pond (Port Cove)	1984	NFLD, Not Identified
C5	Rainbow Trout	Juv	Unknown Hatchery Stock	Unknown	NFLD, West Coast Rivers	1983	NFLD, Not Identified
C5	Rainbow Trout	Unk	ONT, Goossens Trout Farm	2000	NFLD, Stephenville (Harmon)	1982	NFLD, Not Identified
C5	Rainbow Trout	Fing	ONT, Rainbow Springs Hatchery	3400	NFLD, Hopeall (Cages)	1982	NFLD, Not Identified
C5	Rainbow Trout	Juv	Not Specified	Unknown	NFLD, Not Released	1981	NFLD, Pulp & Paper Res Ind
C5	Rainbow Trout	1-2in	ONT, Goossens Trout Farm	8000	NFLD, Stephenville (Harmon)	1981	NFLD, Not Identified
C5	Rainbow Trout	2in	ONT, Rainbow Springs Hatchery	1500	NFLD, Stephenville (Harmon)	1981	NFLD, Not Identified
C5	Rainbow Trout	Fing	ONT, Shamrock Hatchery	1500	NFLD, Stephenville (Harmon)	1981	NFLD, Not Identified
C5	Rainbow Trout	2in	ONT, Glenbrook Trout Hatchery	1500	NFLD, Stephenville (Harmon)	1981	NFLD, Not Identified
SALVELINUS FONTINALIS							
C5	Brook Trout	2-3in	ONT, Goossens Trout Farm	5000	NFLD, Bay D'Espoir (Cages)	1979	NFLD, Not Identified

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALMO SALAR							
C5	Atlantic Salmon	Eggs	NB, Bay of Fundy (Cages)	120000	NFLD, Bay D'Espoir Hatchery	1988	NFLD, Not Identified
SALVELINUS ALPINUS							
C5	Arctic Char	Eggs	LAB, Ikinet Brook	5000	NFLD, Aquaculture	1988	NFLD, Bay D'Espoir Hatchery
C5	Arctic Char	Eggs	MAN, DFO (Winnipeg)	10000	NFLD, Aquaculture	1988	NFLD, Bay D'Espoir Hatchery
C5	Arctic Char	Eggs	NB, Huntsman Marine Lab	30000	NFLD, Aquaculture	1988	NFLD, Bay D'Espoir Hatchery
C5	Arctic Char	Eggs	MAN, DFO (Winnipeg)	30000	NFLD, Aquaculture	1988	NFLD, Aqua Blue Farms
C5	Arctic Char	Eggs	LAB, Fraser River	60000	NFLD, Stock Destroyed	1987	NFLD, Bay D'Espoir Hatchery
C5	Arctic Char	Eggs	LAB, Fraser River	10000	NFLD, Stock Destroyed	1987	NFLD, MSRL
C5	Arctic Char	Eggs	LAB, Fraser River	54500	NFLD, Not Yet Released	1986	NFLD, MSRL
ONCORHYNCHUS GORBUSCHA							
C5	Pink Salmon	50-60gr	BC, Not Specified	App 6000	NFLD, Conne R (Cage Escapees)	1979	NFLD, Not Identified

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALVELINUS NAMAYCUSH							
U11	Lake Trout	Eggs	MAN, Via Vermont	10000	Not Specified	1984	NH, Not Specified
ONCORHYNCHUS KISUTCH							
U5	Coho Salmon	Smolt	NY, Salmon River (Fall Run)	99411	NH, Lamprey River	1988	NH, Twin Mountain Hatchery
U5	Coho Salmon	Smolt	NY, Salmon River	90000	NH, Lamprey River (Proposed)	1988	NH, Twin Mountain Hatchery
U5	Coho Salmon	Smolt	NH, Lamprey River	151000	NH, Lamprey River	1987	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	150000	NH, Lamprey River (Proposed)	1987	NH, Milford Hatchery
S1	Coho Salmon	Smolt	NH, Returning Adults	129665	NH, Great Bay Estuary	1986	NH, Not Specified
U5	Coho Salmon	Parr	NH, Lamprey River	61745	NH, Lamprey River	1986	NH, Milford Hatchery
U5	Coho Salmon	Smolt	NH, Lamprey River	130000	NH, Lamprey River	1986	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	210000	NH, Lamprey River (Proposed)	1986	NH, Milford Hatchery
S1	Coho Salmon	Fry	NH, Returning Adults	30000	NH, Great Bay Tributaries	1986	NH, Not Specified
S1	Coho Salmon	Smolt	NH, Ret Adults (WA/OR Stock)	118000	NH, Great Bay Estuary	1985	NH, Not Specified
U5	Coho Salmon	Juv	NH, Returning Adults	108000	NH, Lamprey River	1985	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	229000	NH, Lamprey River	1984	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	355000	NH, Lamprey River	1983	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	331689	NH, Lamprey & Exeter Rivers	1982	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	236637	NH, Lamprey River	1981	NH, Milford Hatchery
U5	Coho Salmon	Juv	OR, Klamath River	222704	NH, Lamprey River	1980	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	57413	NH, Lamprey River	1980	NH, Milford Hatchery
U5	Coho Salmon	Juv	WA, Green River	221481	NH, Lamprey & Exeter Rivers	1979	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	27110	NH, Lamprey & Exeter Rivers	1979	NH, Milford Hatchery
U5	Coho Salmon	Juv	Beaver Creek	152740	NH, Lamprey & Exeter Rivers	1978	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	39328	NH, Lamprey & Exeter Rivers	1978	NH, Milford Hatchery
U5	Coho Salmon	Juv	OR, Klamath River	73453	NH, Lamprey & Exeter Rivers	1977	NH, Milford Hatchery
U5	Coho Salmon	Juv	NH, Returning Adults	74834	NH, Lamprey & Exeter Rivers	1977	NH, Milford Hatchery
U5	Coho Salmon	Juv	WA, Skagit & Toutle Strains	78912	NH, Not Specified	1976	NH, Not Specified (NHFG)
U5	Coho Salmon	Juv	NH, Returning Adults	23621	NH, Not Specified	1976	NH, Not Specified (NHFG)
U5	Coho Salmon	Juv	NH, WA, Mixed Stocks?	103165	NH, Lamprey & Exeter Rivers	1975	NH, Milford & N H Hatcheries
U5	Coho Salmon	Juv	WA, Green River	78600	NH, Lamprey & Exeter Rivers	1975	NH, Milford & N H Hatcheries
ONCORHYNCHUS MYKISS							
U5	Steelhead Trout	?	NY, Salmon River	37000	NH, Lamprey River	1987	NH, Not Specified
U5	Steelhead Trout	?	NY, Salmon River	47000	NH, Lamprey River	1986	NH, Not Specified
S1	Steelhead Trout	Smolt	NY, Lake Ontario	47215	NH, Great Bay Estuary	1986	NH, Not Specified
S1	Steelhead Trout	Smolt	NY, Lake Ontario	30000	NH, Great Bay Estuary	1985	NH, Not Specified

File	Species	Stage	Stock Origin	Number	Release Site		Year	Original Receiving Facility
SALMO TRUTTA								
U5	Brown Trout	Smolt	NH, Domestic Stock	9850	NH, Various Rivers (Proposed)		1987	NH, Milford Hatchery
U5	Brown Trout	Smolt	NH, Domestic Stock	9850	NH, Various (8) Rivers		1986	NH, Milford Hatchery
U5	Brown Trout	Smolt	NH, (VT & MA Strains)	9850	NH, Various (8) Rivers		1985	NH, Milford Hatchery
ONCORHYNCHUS TSHAWYTSCHA								
U5	Chinook Salmon	IO/LB	NY, Salmon River	400000	NH, Lamprey River (Proposed)		1989	NH, Milford Hatchery
U5	Chinook Salmon	Fry	NY, Salmon River	431460	NH, Lamprey River		1988	NH, Twin Mountain Hatchery
U5	Chinook Salmon	Age 1	NY, Salmon River	110918	NH, Lamprey River		1988	NH, Twin Mountain Hatchery
U5	Chinook Salmon	Age 1	NY, Salmon River	100000	NH, Lamprey River (Proposed)		1988	NH, Twin Mountain Hatchery
U5	Chinook Salmon	Smolt	MI, (Fall Run)	95000	NH, Lamprey River		1982	NH, Milford Hatchery
U5	Chinook Salmon	Smolt	MI, (Fall Run)	14000	NH, Exeter River		1982	NH, Milford Hatchery
U5	Chinook Salmon	Smolt	WA, NMFS (Fall Run)	97000	NH, Lamprey River		1981	NH, Milford Hatchery
U5	Chinook Salmon	Smolt	WA, NMFS (Fall Run)	112000	NH, Lamprey River		1980	NH, Milford Hatchery
U5	Chinook Salmon	Smolt	WA, NMFS (Fall Run)	119000	NH, Lamprey River		1979	NH, Milford Hatchery
U5	Chinook Salmon	Smolt	WA, NMFS (Fall Run)	105000	NH, Lamprey River		1978	NH, Milford Hatchery

ONCORHYNCHUS MYKISS								
U4	Steelhead Trout	Smolt	NY, Altmar Fish Hatchery	1128	NJ, Raritan River		1988	NJ, Hayford Hatchery
U4	Steelhead Trout	E Eggs	NY, Salmon River	53000	NJ, Not Yet Released		1987	NJ, Hayford Hatchery
ONCORHYNCHUS TSHAWYTSCHA								
U4	Chinook Salmon	Smolt	NY, Altmar Fish Hatchery	91170	NJ, Raritan River		1988	NJ, Hayford Hatchery
U4	Chinook Salmon	E Eggs	NY, Salmon River (Fall Run)	95000	NJ, Not Yet Released		1987	NJ, Hayford Hatchery
U4	Chinook Salmon	Eggs	NY, Lake Ontario (Fall Run)	59705	NJ, Raritan River (1987)	Rev	1986	NJ, Hayford Hatchery
U4	Chinook Salmon	Eggs	NY, Lake Ontario (Fall Run)	50000	NJ, To be determined		1986	NJ, Hayford Hatchery

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALVELINUS NAMAYCUSH							
U2	Lake Trout	Year	PA, Lake Ontario	767500	NY, Lake Ontario	1988	Not Specified
U2	Lake Trout	Fing	PA, Lake Ontario	247100	NY, Lake Ontario	1988	Not Specified
U2	Lake Trout	Year	PA, Lake Ontario (Fall Run)	818100	NY, Lake Ontario	Rev 1987	Not Specified
U2	Lake Trout	Fing	PA, Lake Ontario (Fall Run)	366300	NY, Lake Ontario	Rev 1987	Not Specified
U2	Lake Trout	Juv	PA, Lake Ontario (Fall Run)	1382000	NY, Lake Ontario	1986	Not Specified
U11	Lake Trout	Eggs	MAN, Via Vermont	16000	Not Specified	1985	Not Specified
SALMO SALAR							
U2	Atlantic Salmon	Year	NY, (Little Clear Strain)	31900	NY, Lake Ontario Tributaries	1988	NY, Various Hatcheries
U2	Atlantic Salmon	Fing	NY, (Penobscot Strain)	5530	NY, Lake Ontario Tributaries	1988	NY, Various Hatcheries
U2	Atlantic Salmon	Year	NY, (Little Clear Strain)	49000	NY, Lake Ontario Tributaries Rev	1987	NY, Various Hatcheries
U2	Atlantic Salmon	Year	NY, (Penobscot Strain)	9130	NY, Lake Ontario Tributaries Rev	1987	NY, Various Hatcheries
U2	Atlantic Salmon	Juv	NY, (Penob & LT Clear Strains)	55000	NY, Lake Ontario	1986	NY, Various Hatcheries
ONCORHYNCHUS NERKA KOKANEE							
U2	Kokanee Salmon	Fry	CT, East Twin Lake	90300	NY, 8 Inland Lakes (Proposed)	1987	NY, Rome Hatchery
U2	Kokanee Salmon	Eggs	CT, East Twin Lake	197000	NY, Not yet released (Proposed)	1987	NY, Catskill Hatchery
U2	Kokanee Salmon	0+	CT, East Twin Lake	165090	NY, Several (6-10) Inland Lakes	1986	NY, Rome Hatchery
U2	Kokanee Salmon	0+	CT, East Twin Lake	109700	NY, Not Specified	1985	NY, 5 Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	69600	NY, Several (6-10) Inland Lakes	1984	NY, Several Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	125770	NY, Several (6-10) Inland Lakes	1983	NY, Several Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	55364	NY, Several (6-10) Inland Lakes	1982	NY, Several Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	114520	NY, Several (6-10) Inland Lakes	1981	NY, Several Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	33004	NY, Several (6-10) Inland Lakes	1980	NY, Several Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	39075	NY, Several (6-12) Inland Lakes	1979	NY, Several Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	70200	NY, Several (6-10) Inland Lakes	1978	NY, Several Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	99480	NY, Several (6-12) Inland Lakes	1977	NY, Several Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	64640	NY, Several (6-10) Inland Lakes	1976	NY, Several Dec Hatcheries
U2	Kokanee Salmon	0+	CT, East Twin Lake	157854	NY, Several (6-12) Inland Lakes	1975	NY, Several Dec Hatcheries
ONCORHYNCHUS MYKISS							
U2	Steelhead Trout	Fing	NY, Unidentified	308050	NY, Lake Ontario Tributaries	1988	NY, Various Hatcheries
U2	Steelhead Trout	Year	NY, (Washington Strain)	293700	NY, Lake Ontario Tributaries	1988	NY, Various Hatcheries
U2	Steelhead Trout	Year	NY, (Skamania Strain)	107000	NY, Lake Ontario Tributaries	1988	NY, Various Hatcheries
U2	Steelhead Trout	Year	NY, (Finger LK X Domestic)	6780	NY, Lake Ontario Tributaries	1988	NY, Various Hatcheries
U2	Steelhead Trout	16 Mo	NY, (Washington Strain)	23700	NY, Lake Erie (18 Mile Creek)	1988	NY, Caledonia Hatchery

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
ONCORHYNCHUS MYKISS (CONT)							
U2	Steelhead Trout	16 Mo	NY, (Washington Strain)	37000	NY, Lake Erie (Cattaraugus Cr)	1988	NY, Caledonia Hatchery
U2	Steelhead Trout	16 Mo	NY, (Washington Strain)	18000	NY, Lake Erie (Chautauqua Cr)	1988	NY, Caledonia Hatchery
U2	Steelhead Trout	16 Mo	NY, (Skamania Strain)	18000	NY, Lake Erie (Chautauqua Cr)	1988	NY, Caledonia Hatchery
U2	Steelhead Trout	16 Mo	NY, (Skamania Strain)	10100	NY, Lake Erie (Cattaraugus Cr)	1988	NY, Caledonia Hatchery
U2	Steelhead Trout	6 Mo	NY, (Washington Strain)	50000	NY, Lake Erie (Clear Cr)	1988	NY, Salmon River Hatchery
U2	Steelhead Trout	6 Mo	NY, (Washington Strain)	50000	NY, Lake Erie (Spooner Brook)	1988	NY, Salmon River Hatchery
U2	Rainbow Trout	Year	NY, Domestic (Spring) Stock	77370	NY, Lake Ontario	1988	NY, Caledonia Hatchery
U2	Rainbow Trout	Fing	NY, Domestic (Spring) Stock	227870	NY, Lake Ontario	1988	NY, Caledonia Hatchery
U2	Rainbow Trout	Fing	NY, Domestic (Spring) Stock	150500	NY, Lake Ontario	1988	NY, Caledonia Hatchery
U2	Rainbow Trout	14 Mo	NY, Domestic (Nashua Strain)	5000	NY, Lake Erie (Buffalo Harb)	1988	NY, Randolph Hatchery
U2	Rainbow Trout	16 Mo	NY, Domestic (Nashua Strain)	11600	NY, Lake Erie (Sturgeon Point)	1988	NY, Caledonia Hatchery
U2	Rainbow Trout	14 Mo	NY, Domestic (Nashua Strain)	17800	NY, Lake Erie (Eagle Bay)	1988	NY, Caledonia Hatchery
U2	Rainbow Trout	10 Mo	NY, Domestic (Nashua Strain)	5000	NY, Lake Erie (Cattaraugus Ck)	1988	NY, Caledonia Hatchery
U2	Rainbow Trout	10 Mo	NY, Domestic (Nashua Strain)	5000	NY, Lake Erie (Canadaway Ck)	1988	NY, Caledonia Hatchery
U2	Rainbow Trout	10 Mo	NY, Domestic (Nashua Strain)	7500	NY, Lake Erie (18 Mile Creek)	1988	NY, Caledonia Hatchery
U2	Rainbow Trout	10 Mo	NY, Domestic (Nashua Strain)	5000	NY, Lake Erie (Buffalo Creek)	1988	NY, Caledonia Hatchery
U2	Steelhead Trout	Year	NY, (Wash or Skamania Strain)	443340	NY, Lake Ontario Tribs Rev	1987	NY, Various NY Hatcheries
U2	Steelhead Trout	Fing	NY, (Finger Lakes Strain)	69350	NY, Lake Ontario Tribs Rev	1987	NY, Various NY Hatcheries
U2	Steelhead Trout	Fing	NY, (Wash or Skamania Strain)	60000	NY, Lake Ontario Tribs Rev	1987	NY, Various NY Hatcheries
U2	Rainbow Trout	Year	NY, Domestic (Spring) Stock	90600	Unidentified Rev	1987	NY, Salmon River Hatchery
U2	Rainbow Trout	Fing	NY, Domestic (Wytheville)	17200	Unidentified Rev	1987	NY, Salmon River Hatchery
U2	Rainbow Trout	Fing	NY, Domestic (WFC Strain)	23000	Unidentified Rev	1987	NY, Salmon River Hatchery
U2	Steelhead Trout	Year	IN, Lake Michigan (Skam Str)	20000	NY, Lake Erie (Chautauqua Cr)	1987	NY, Various NY Hatcheries
U2	Steelhead Trout	Juv	NY, Lake Ontario	130000	NY, Lake Erie Tribs (4)	1987	NY, Salmon River Hatchery
U2	Steelhead Trout	Year	NY, Salmon River	412000	NY, Not Specified (Proposed)	1987	NY, Salmon River Hatchery
U2	Steelhead Trout	Year	MI, In, Lake Michigan (Skam)	17950	NY, Lake Erie	1986	NY, Salmon River Hatchery
U2	Steelhead Trout	1+	NY, Salmon River (WA Strain)	335000	NY, Lake Ontario	1986	NY, Salmon River Hatchery
U2	Steelhead Trout	Year	NY, Salmon River (WA Strain)	100000	NY, Lake Erie	1986	NY, Salmon River Hatchery
U2	Rainbow Trout	Juv	NY, Domestic Stock	103000	NY, Lake Ontario	1986	NY, Caledonia Hatchery
U2	Steelhead Trout	Year	NY, Salmon River	100000	NY, Lake Erie	1985	NY, Salmon River Hatchery
U2	Steelhead Trout	0+ 1+	NY, Salmon River	346000	NY, Lake Ontario	1985	NY, Salmon River Hatchery
U2	Steelhead Trout	Juv	NY, Salmon River (WA Strain)	80570	NY, Lake Erie	1984	NY, Salmon River Hatchery
U2	Steelhead Trout	Fing	NY, Salmon River (WA Strain)	38250	NY, Lake Erie	1984	NY, Salmon River Hatchery
U2	Steelhead Trout	1+	NY, Salmon River (WA Strain)	292600	NY, Lake Ontario	1984	NY, Salmon River Hatchery

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALMO TRUTTA							
U2	Brown Trout	Year	NY, Domestic or Skamania	404310	NY, Lake Ontario	1988	NY, Various Hatcheries
U2	Brown Trout	Fing	NY, Domestic or Skamania	26370	NY, Lake Ontario	1988	NY, Various Hatcheries
U2	Brown Trout	Fing	NY, (Seeforellen Strain)	20000	NY, Lake Ontario	1988	NY, Various Hatcheries
U2	Brown Trout	17 Mo	NY, Various Strains	19000	NY, Lake Erie (Dunkirk Harb)	1988	NY, Various Hatcheries
U2	Brown Trout	17 Mo	NY, Rome Lab Strain	19000	NY, Lake Erie (Silver Creek)	1988	NY, Caledonia Hatchery
U2	Brown Trout	10 Mo	NY, Domestic (Randolph) Strain	5000	NY, Lake Erie (Cattaraugus Cr)	1988	NY, Randolph Hatchery
U2	Brown Trout	10 Mo	NY, Domestic (Randolph) Strain	5000	NY, Lake Erie (Canadaway Ck)	1988	NY, Randolph Hatchery
U2	Brown Trout	10 Mo	NY, Domestic (Randolph) Strain	7400	NY, Lake Erie (18 Mile Creek)	1988	NY, Randloph Hatchery
U2	Brown Trout	10 Mo	NY, Domestic (Randolph) Strain	5000	NY, Lake Erie (Buffalo Cr)	1988	NY, Randloph Hatchery
U2	Brown Trout	3 Mo	NY, W German Strain	20020	NY, Lake Erie (Canadaway Ck)	1988	NY, Caledonia Hatchery
U2	Brown Trout	Year	NY, Domestic (Fall Run)	417760	NY, Lake Ontario Rev	1987	NY, Various Hatcheries
U2	Brown Trout	Year	NY, Various Domestic Stocks	50000	NY, Lake Erie	1987	NY, Dec Hatchery
U2	Brown Trout	1+	W Germany (Seeforellen)	12000	NY, Several (3) Lakes	1986	NY, Catskill Hatchery
U2	Brown Trout	Eggs	W Germany (Sea Run)	20000	NY, Not yet released (Proposed)	1986	NY, Cold Springs Hatchery
U2	Brown Trout	Year	NY, Various Domestic Stocks	442000	NY, Lake Ontario	1986	NY, Various Hatcheries
U2	Brown Trout	Eggs	W Germany (Sea Run)	5000	NY, Not yet released (Proposed)	1985	NY, Cold Springs Hatchery
U2	Brown Trout	1+	W Germany (Seeforellen)	12300	NY, Several (3) Lakes	1985	NY, Catskill Hatchery
U2	Brown Trout	Eggs	W Germany (Sea Run)	12000	NY, Not yet released (Proposed)	1985	NY, Cold Springs Hatchery
U2	Brown Trout	1+	W Germany (Seeforellen)	89	NY, Mountain Pond	1980	NY, Rome Hatchery
U2	Brown Trout	0+	W Germany (Seeforellen)	2990	NY, Mountain Pond	1979	NY, Rome Hatchery

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
ONCORHYNCHUS MYKISS							
S8	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	200000	NS, Aquaculture	1988	NS, Nova Aqua Smolt
S8	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	250000	NS, Local Stocking	1988	NS, NSDF (St Andrews)
S8	Rainbow Trout	Eggs	ONT, Aquafarms Canada Ltd	100000	NS, Local Stocking	1988	NS, NSDF (St Peters)
S8	Rainbow Trout	Eggs	ONT, Aquafarms Canada Ltd	30000	NS, Local Stocking	1988	NS, NSDF (St Andrews)
S8	Rainbow Trout	Eggs	ONT, Spring Valley Hatchery	250000	NS, Local Stocking	1988	NS, NSDF (St Andrews)
S8	Rainbow Trout	Fry	WA, Beiteys Resort	200000	NS, Aquaculture	1988	NS, Nova Aqua Smolt
S8	Rainbow Trout	Fry	ONT, Rainbow Springs Hatchery	35000	NS, Aquaculture	1988	NS, Nova Aqua Smolt
S8	Rainbow Trout	Fing	ONT, Rainbow Springs Hatchery	2000	NS, Research	1988	NS, EPS (Dartmouth)
C3	Rainbow Trout	Fing	PEI, Integrated Aquatics	45000	NS, Aquaculture	1987	NS, Ostred Sea Farms
C3	Rainbow Trout	Eggs	WA, Beiteys Resort	100000	NS, Aquaculture	1987	NS, Merlin Fish Farms
C3	Rainbow Trout	Eggs	WV, Wytheville	250224	NS, Local Stocking	1987	NS, Antigonish FCS
C3	Rainbow Trout	Eggs	ONT, Aquafarms Canada Ltd	50000	NS, Aquaculture	1987	NS, Merlin Fish Farms
C3	Rainbow Trout	Eggs	ONT, Spring Valley Hatchery	150000	NS, Aquaculture	1987	NS, NSDF (St Peters)
C3	Rainbow Trout	Eggs	WA, Beiteys Resort	550000	NS, Aquaculture	1987	NS, NSDF (St Peters)
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	100000	NS, Local Stocking	1986	NS, NSDF (St Peters)
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	50000	NS, Local Stocking	1986	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	100000	NS, Private Fish Farm	1986	NS, Merlin Fish Farms
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	250000	NS, Local Stocking	1985	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	250000	NS, Local Stocking	1984	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	201000	NS, Local Stocking	1983	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	200000	NS, Local Stocking	1982	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	240000	NS, Local Stocking	1981	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	10000	NS, Private Aquaculture	1981	NS, IM Associates
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	250000	NS, Local Stocking	1980	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	TN, Erwin Hatchery	20000	NS, Private Fish Farm	1979	NS, Merlin Fish Farms
C3	Rainbow Trout	Eggs	TN, Erwin Hatchery	125500	NS, Metro Stocking	1979	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	15000	NS, Private Fish Farm	1978	NS, Merlin Fish Farms
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	127500	NS, Metro Stocking	1978	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	143000	NS, Metro Stocking	1977	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	27000	NS, Metro Stocking	1976	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	125000	NS, Metro Stocking	1975	NS, Coldbrook FCS
C3	Rainbow Trout	Eggs	NH, Nashua Hatchery	109000	NS, Metro Stocking	1975	NS, Coldbrook FCS
SALVELINUS ALPINUS							
C3	Arctic Char	Eggs	MAM, Rockwood Hatchery	1600	NS, Aquaculture (Proposed)	1988	NS, Nova Aqua Smolt

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALVELINUS FONTINALIS							
S8	Brook Trout	Eggs	ME, Phillips Hatchery	100000	NS, Various Waters	1988	NS, Frasers Mills Hatchery
C3	Brook Trout	Eggs	ME, Assiwica	80000	NS, Not Specified	1980	NS, Antigonish Hatchery
C3	Brook Trout	Eggs	WV, Ohio	206700	NS, Not Specified	1979	NS, Federal Hatcheries
C3	Brook Trout	Eggs	WV, Ohio	15000	NS, Private Fish Farm	1979	NS, Merlin Fish Farms
SALMO SALAR							
S8	Atlantic Salmon	Eggs	NB, Mactaquac Hatchery	50000	NS, Aquaculture Broodstock	1988	NS, Coldbrook FCS
S8	Atlantic Salmon	Fry	NB, Huntsman Lab (SJR Strain)	50000	PEI, Aquaculture	1988	NS, Nova Aqua Smolt
SALMO SALAR							
	LL Atlantic Salmon	Eggs	ME, Grand Lake Str Hatchery	25000	NS, Aquaculture	1988	NS, Michael Mullen
ONCORHYNCHUS KISUTCH							
C3	Coho Salmon	Adult	Unknown	Unknown	NS, Cornwallis River	1978	Unknown
ONCORHYNCHUS TSHAWYTSCHA							
C3	Chinook Salmon	Adult	Unknown	3	NS, Nictaux River	1985	Unknown

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALMO SALAR							
S8	LL Atlantic Salmon	Eggs	ME, West Grand Lake	60000	ONT, Lk Ontario WS (1990 Pro)	1989	ONT, Normandale Hatchery
S8	LL Atlantic Salmon	Eggs	ME, West Grand Lake	75000	ONT, Lk Ontario WS (1989)	1988	ONT, Normandale Hatchery
C6	LL Atlantic Salmon	Eggs	ME, Grand Lake Stream	75000	ONT, Lk Ontario WS (Proposed)	1988	ONT, Not Specified
C6	LL Atlantic Salmon	Eggs	NY, Adirondack Hatchery	3000	ONT, Lk Ontario (Proposed)	1986	ONT, Normandale Hatchery
SALMO SALAR							
S8	Atlantic Salmon	Eggs	NS, Lahave River		ONT, Lk Ontario WS (1991 Pro)	1989	ONT, Normandale Hatchery
S8	Atlantic Salmon	Eggs	NS, Lahave River	60000	ONT, Lk Ontario WS (1989)	1988	ONT, Normandale Hatchery
C6	Atlantic Salmon	Eggs	NS, Lahave River	50000	ONT, Lk Ontario WS	1988	
C6	Atlantic Salmon	Eggs	NB, Saint John River		ONT, Lk Ontario Ws	1987	
C6	Atlantic Salmon	Eggs	NFLD, Exploits River		ONT, Lk Ontario WS (Proposed)	1987	
C6	Atlantic Salmon	Eggs	NB, St John River (Late Run)	15150	ONT, Private grow-out	1987	ONT, Normandale Hatchery
C6	Atlantic Salmon	Eggs	NB, St John River (Late Run)	15150	ONT, Lake Ontario WS	1987	ONT, Normandale Hatchery
C6	Atlantic Salmon	Eggs	Scotland (Alt Mohr Hatchery)	30000	ONT, Private Aquaculture	1987	ONT, Normandale Hatchery
C6	Atlantic Salmon	Eggs	ME, Penobscot River	50000	ONT, Not yet released	1987	ONT, Normandale Hatchery
C6	Atlantic Salmon	Eggs	NS, Lahave River	48450	ONT, Lake Ontario WS	1987	ONT, Normandale Hatchery
C6	Atlantic Salmon	Eggs	ME, Union River	50000	ONT, Lake Ontario WS	1987	ONT, Normandale Hatchery
C6	Atlantic Salmon	Eggs	Scotland (Alt Mohr Hatchery)	3000	ONT, Not Specified	1986	Not Specified
C6	Atlantic Salmon	Eggs	NY, Little Clear Pond	3000	ONT, Not yet released	1986	ONT, Normandale Hatchery
C6	Atlantic Salmon	Eggs	Not Specified	10000	ONT, Not released	1985	Not Specified
C6	Atlantic Salmon	Juv	Not Specified	2000	ONT, Not released	1985	Not Specified
SALVELINUS FONTINALIS							
S8	Brook Trout	Fing	QUE, Silver Springs Hatchery	500	ONT, Incineration	1988	ONT, U of Ottawa
ONCORHYNCHUS MYKISS							
S8	Rainbow Trout	Eggs	IN, (Skamania Strain)	56000	ONT, Lake Huron WS (Pro)	1989	ONT, Normandale Hatchery
S8	Rainbow Trout	Eggs	MAN (Tigwerker Strain)	25000	ONT, Aquaculture Broodstock	1988	ONT, Pine Valley Hatchery
S8	Rainbow Trout	Eggs	IN, (Skamania Strain)	56000	ONT, Lake Huron WS (1989)	1988	ONT, Normandale Hatchery
C6	Steelhead Trout	Eggs	IN, St Joseph River	80000	ONT, Lake Huron WS (Pro)	1988	ONT, Normandale Hatchery
C6	Steelhead Trout	Eggs	WA, Skamania River	50000	ONT, Not yet released	1987	Not Specified
SALVELINUS ALPINUS							
S8	Arctic Char	Eggs	LAB, Via Rockwood Hatchery	500	ONT, Aquaculture Broodstock	1989	ONT, Bay North Fish Farms
S8	Arctic Char	Eggs	LAB, Via Rockwood Hatchery	500	ONT, Aquaculture Broodstock	1988	ONT, Pine Valley Hatchery

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALVELINUS ALPINUS (CONT)							
C6	Arctic Char	Fing	NB, Huntsman Marine Lab	200	ONT, Not Specified	1987	ONT, U of Guelph
C6	Arctic Char	Eggs	Iceland	3000	ONT, To be destroyed	1987	ONT, U of Guelph
	Arctic Char	Fing	NB, Huntsman Marine Lab	30	ONT, TO be destroyed	1987	ONT, Sir Wilfred U
ONCORHYNCHUS KISUTCH							
C6	Coho Salmon	Juv	BC/ONT, Capilano R X Credit R	273000	ONT, Lake Ontario	1986	ONT, Ringwood Hatchery
C6	Coho Salmon	Juv	WA/ONT, Skagit R X Credit R	191000	ONT, Lake Ontario	1985	ONT, Ringwood Hatchery
C6	Coho Salmon	Juv	BC/ONT, B Qualicum X Credit	132000	ONT, Lake Ontario	1984	ONT, Ringwood Hatchery
C6	Coho Salmon	Juv	BC/ONT, Capilano R X Credit R	218000	ONT, Lake Ontario	1983	ONT, Ringwood Hatchery
C6	Coho Salmon	Juv	WA/ONT, Skagit R X Credit R	112000	ONT, Lake Ontario	1982	ONT, Ringwood Hatchery
C6	Coho Salmon	Juv	BC/ONT, B Qualicum X Credit	155000	ONT, Lake Ontario	1981	ONT, Ringwood Hatchery
C6	Coho Salmon	Juv	BC, Capilano River	77000	ONT, Lake Ontario	1980	ONT, Ringwood Hatchery
C6	Coho Salmon	Juv	WA, Skagit River	286000	ONT, Lake Ontario	1979	ONT, Chatsworth Hatchery
C6	Coho Salmon	Juv	BC, Big Qualicum River	201000	ONT, Lake Ontario	1978	ONT, Chatsworth Hatchery
C6	Coho Salmon	Juv	BC, Capilano River	313000	ONT, Lake Ontario	1977	ONT, Chatsworth Hatchery
C6	Coho Salmon	Juv	WA, Skagit River	166000	ONT, Lake Ontario	1976	ONT, Chatsworth Hatchery
C6	Coho Salmon	Juv	WA, Green River	226000	ONT, Lake Ontario	1975	ONT, Chatsworth Hatchery
ONCORHYNCHUS TSHAWYTSCHA							
C6	Chinook Salmon	Juv	ONT, Lake Ontario (Credit R)	598000	ONT, Lake Ontario	1986	ONT, Ringwood Hatchery
C6	Chinook Salmon	Juv	ONT, Lake Ontario (Credit R)	703000	ONT, Lake Ontario	1985	ONT, Ringwood Hatchery
C6	Chinook Salmon	Eggs	Not Specified	30000	ONT, Not Released	1985	Not Specified
C6	Chinook Salmon	Juv	ONT, Lake Ontario (Credit R)	662000	ONT, Not Specified	1984	ONT, Ringwood Hatchery
C6	Chinook Salmon	Juv	ONT, Lake Ontario (Credit R)	125000	ONT, Lake Ontario	1983	ONT, Ringwood Hatchery
C6	Chinook Salmon	Juv	ONT, Lake Ontario (Credit R)	270000	ONT, Lake Ontario	1982	ONT, Ringwood Hatchery
C6	Chinook Salmon	Juv	ONT, Lake Ontario (Credit R)	8000	ONT, Lake Ontario	1981	ONT, Ringwood Hatchery
C6	Chinook Salmon	Juv	ONT, Lake Ontario	18000	ONT, Lake Ontario	1980	ONT, Ringwood Hatchery
C6	Chinook Salmon	Juv	ONT, Not Specified	147000	ONT, Lake Ontario	1979	ONT, Chatsworth Hatchery
C6	Chinook Salmon	Juv	ONT, Not Specified	393000	ONT, Lake Ontario	1978	ONT, Chatsworth Hatchery

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
ONCORHYNCHUS MYKISS							
S8	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	25000	PEI, Aquaculture	1988	PEI, Glynde R Aquaculture
S8	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	125000	PEI, Aquaculture	1988	PEI, Glynde R Aquaculture
S8	Rainbow Trout	Eggs	WA, Beiteys Resort	250000	PEI, Aquaculture	1988	PEI, Int Aqua Systems
S8	Rainbow Trout	Eggs	WA, Beiteys Resort	200000	PEI, Aquaculture	1988	PEI, Brook Valley Marine
S8	Rainbow Trout	Fing	QUE, Pisciculture Alleghanys	50000	PEI, Aquaculture	1988	PEI, Edward Murphy
C2	Rainbow Trout	Eggs	ONT, Aquafarms Canada	30000	PEI, Aquaculture (Proposed)	1988	PEI, Brook Valley Marine
C2	Rainbow Trout	Fing	ONT, Rainbow Springs Hatchery	50000	PEI, Aquaculture	1987	PEI, Brook Valley Marine
C2	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	50000	PEI, Aquaculture	1987	PEI, Glynde R Aquaculture
C2	Rainbow Trout	Fing	WA, Beiteys Resort	200000	PEI, Aquaculture	1987	PEI, Integrated Aquatics
C2	Rainbow Trout	Fing	QUE, Pisciculture Alleghanys	15000	PEI, Aquaculture	1987	PEI, Edward Murphy
C2	Rainbow Trout	Fing	ONT, Aquafarms Canada	25000	PEI, Aquaculture	1987	PEI, Brook Valley Marine
C2	Rainbow Trout	Eggs	ONT, Van-Aqua Inc	250000	PEI, Aquaculture	1987	PEI, Brook Valley Marine
C2	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	75000	PEI, Aquaculture	1987	PEI, Glynde R Aquaculture
C2	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	100000	PEI, Aquaculture	1987	PEI, Integrated Aquatics
C2	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	50000	PEI, Private Aquaculture	1987	PEI, Paul Bell
C2	Rainbow Trout	Juv	ONT, Rainbow Springs Hatchery	80000	PEI, Private Aquaculture	1987	PEI, Sefton Dixon
C2	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	100000	PEI, Private Aquaculture	1987	PEI, Wayne Vantover
C2	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	100000	PEI, Aquaculture	1987	PEI, Glynde R Aquaculture
C2	Rainbow Trout	Juv	ONT, Aquafarms Canada	25000	PEI, Private Aquaculture	1987	PEI, Sefton Dixon
C2	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	50000	PEI, Private Aquaculture	1987	PEI, Paul Bell
C2	Rainbow Trout	Fing	ONT, Rainbow Springs Hatchery	50000	PEI, Aquaculture	1987	PEI, Silver Sea Aquaculture
C2	Rainbow Trout	Eggs	ONT, Rainbow Springs Hatchery	50000	PEI, Private Aquaculture	1986	PEI, Paul Bell
C2	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	52000	PEI, Local Stocking	1983	PEI, Cardigan Hatchery
C2	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	50000	PEI, Local Stocking	1982	PEI, Cardigan Hatchery
C2	Rainbow Trout	Eggs	TN, Erwin Hatchery	7500	PEI, Experimental (Ark)	1979	PEI, Ark Project
C2	Rainbow Trout	Eggs	TN, Erwin Hatchery	22500	PEI, Local Stocking	1979	PEI, Cardigan Hatchery
C2	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	7500	PEI, Experimental (Ark)	1978	PEI, Ark Project
C2	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	25400	PEI, Local Stocking	1978	PEI, Cardigan Hatchery
C2	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	22800	PEI, Local Stocking	1977	PEI, Cardigan Hatchery
C2	Rainbow Trout	Eggs	WV, White Sulphur SP Hatchery	110000	PEI, Local Stocking	1976	PEI, Cardigan Hatchery
SALMO SALAR							
S8	Atlantic Salmon	Fry	NB, Huntsman Laboratory	45000	PEI, Aquaculture	1988	PEI, Atlantic Vet College

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALVELINUS FONTINALIS							
C2	Brook Trout	Juv	ONT, Wildcat Trout Farm	20000	PEI, Aquaculture	1987	PEI, Glynde R Aquaculture
C2	Brook Trout	Juv	ONT, Wildcat Trout Farm	20000	PEI, Private Aquaculture	1987	PEI, Paul Bell
C2	Brook Trout	Eggs	WV, Ohio	15500	PEI, Local Stocking	1979	PEI, Cardigan Hatchery
SALVELINUS ALPINUS							
S8	Arctic Char	Fing	NB, Huntsman Laboratory	500	PEI, Aquaculture	1988	PEI, Int Aqua Systems
C2	Arctic Char	Eggs	MAN, Rockwood Hatchery	5000	(Proposed)	1988	PEI, Atlantic Vet College

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALMO TRUTTA							
Q1	Brown Trout	Juv	QUE, Not Specified	46800	QUE, St Lawrence & Tribs	1984	QUE, Quebec Hatcheries
Q1	Brown Trout	Juv	QUE, Not Specified	47500	QUE, St Lawrence & Tribs	1983	QUE, Quebec Hatcheries
ONCORHYNCHUS MYKISS							
S8	Rainbow Trout	Eggs	ONT, Spring Valley Hatchery	600000	QUE, For Table Market	1988	QUE, Ferme FTS
S8	Rainbow Trout	Fing	ONT, Aberfoyle Fisheries	80000	QUE, For Table Market	1988	QUE, Ferme FTS
S8	Rainbow Trout	Fing	ONT, Redbow Farms	80000	QUE, For Table Market	1988	QUE, Ferme FTS
S8	Rainbow Trout	Fing	PEI, Glynde River Aquaculture	80000	QUE, For Table Market	1988	QUE, Ferme FTS
Q1	Rainbow Trout	Eggs	ONT, Aquafarms Canada	50000	QUE, Not Identified	1987	QUE, Bill Nowell AF
Q1	Rainbow Trout	Juv	QUE, Not Specified	75000	QUE, St Lawrence & Tribs	1984	QUE, Quebec Hatcheries
Q1	Rainbow Trout	Juv	QUE, Not Specified	4200000	QUE, Not Specified	1984	QUE, Private Hatcheries
Q1	Rainbow Trout	Juv	QUE, Not Specified	87500	QUE, St Lawrence & Tribs	1983	QUE, Quebec Hatcheries
Q1	Rainbow Trout	Juv	QUE, Not Specified	2900000	QUE, Not Specified	1983	QUE, Private Hatcheries
ONCORHYNCHUS KISUTCH							
Q1	Coho Salmon	Juv	BC, Rosewald Creek Hatchery	150	QUE, To Be Destroyed	1987	QUE, Laval University
ONCORHYNCHUS GORBUSCHA							
Q1	Pink Salmon	Unspec	NFLD ?	1	QUE, Taken in Natashquan R	1975	From NFLD Stocking ?
ONCORHYNCHUS TSHAWTSCHA							
Q1	Chinook Salmon	Unspec	ONT, Great Lakes?	Unknown	QUE, Taken at Cap Rouge	1981	From Great Lakes Stocking ?
COREGONUS CLUPEAFORMIS							
S8	Lake Whitefish	Fing	ONT, Whitelake Hatchery	700	QUE, Research	1988	QUE, Laval University
COREGONUS LAVARETUS							
S8	Lake Whitefish	Eggs	Finland (Vaasa)	150	QUE, Research	1988	QUE, Laval University

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
ONCORHYNCHUS MYKISS							
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	150000	RI, Statewide Stocking, 2+ fish	1987	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	150000	RI, Statewide Stocking, 2+ fish	1986	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1985	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1984	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1983	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1982	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1981	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1980	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1979	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1978	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1977	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1976	RI, Unidentified
U10	Rainbow Trout	Eggs	WA, Trout Lodge (Unk Strain)	100000	RI, Statewide Stocking	1975	RI, Unidentified

File	Species	Stage	Stock Origin	Number	Release Site	Year	Original Receiving Facility
SALVELINUS NAMAYCUSH							
U11	Lake Trout	Eggs	MAN, Clearwater Lake	135000	VT, 10 Lakes and Ponds	1985	VT, Not Specified
U11	Lake Trout	Eggs	MAN, Clearwater Lake	100000	VT, 24 Lakes and Ponds	1984	VT, Not Specified
U11	Lake Trout	Eggs	MAN, Clearwater Lake	86100	VT, 22 Lakes and Ponds	1982	VT, Not Specified
U11	Lake Trout	Eggs	MAN, Clearwater Lake	103200	VT, 21 Lakes and Ponds	1981	VT, Not Specified
U11	Lake Trout	Eggs	MAN, Clearwater Lake	100000	VT, 19 Lakes and Ponds	1980	VT, Not Specified
U11	Lake Trout	Eggs	MAN, Clearwater Lake	97500	VT, 22 Lakes and Ponds	1979	VT, Not Specified
U11	Lake Trout	Eggs	MAN, Clearwater Lake	100000	VT, 20 Lakes and Ponds	1978	VT, Not Specified
U11	Lake Trout	Eggs	MAN, Clearwater Lake	80400	VT, 13 Lakes and Ponds	1977	VT, Not Specified
U11	Lake Trout	Eggs	MAN, Clearwater Lake	200000	VT, 14 Lakes and Ponds	1976	VT, Not Specified
U11	Lake Trout	Eggs	MAN, Clearwater Lake	200000	VT, 23 Lakes and Ponds	1975	VT, Not Specified
ONCORHYNCHUS MYKISS							
U11	Steelhead Trout	Eggs	MI, Harrietta Hatchery	51787	VT, Winooski River Etc	1984	VT, Not Specified
U11	Steelhead Trout	Eggs	MI, Harrietta Hatchery	200100	VT, Winooski River Etc	1984	VT, Not Specified
U11	Steelhead Trout	Eggs	MI, Wolfe Lake Hatchery	100120	VT, Winooski River Etc	1983	VT, Not Specified
U11	Steelhead Trout	Eggs	MI, Platte River Hatchery	100000	VT, 3 Rivers	1982	VT, Not Specified
U11	Steelhead Trout	Eggs	WA, Washougal Stock (Summer)	208640	VT, Winooski River Etc	1980	VT, Not Specified
U11	Steelhead Trout	Eggs	WA, Washougal Stock	213856	VT, Winooski River Etc	1979	VT, Not Specified
U11	Steelhead Trout	Eggs	WA, Mossy Rock H (Winter)	224640	VT, 3 Rivers	1978	VT, Not Specified
U11	Steelhead Trout	Eggs	WA, Cowlitz Strain (Winter)	193320	VT, Winooski River Etc	1977	VT, Not Specified
U11	Steelhead Trout	Eggs	OR, Eagle Creek Hatchery	242176	VT, Winooski River Etc	1976	VT, Not Specified
U11	Steelhead Trout	Eggs	OR, Not Specified	160500	VT, Winooski River Etc.	1975	VT, Not Specified
U11	Steelhead Trout	Eggs	WA, Olympia Hatchery	76500	VT, Winooski River	1975	VT, Not Specified
U11	Steelhead Trout	Eggs	MI, Not Specified	162400	VT, Winooski River	1975	VT, Not Specified
SALVELINUS FONTINALIS							
U11	Brook Trout	Eggs	COL, Four Seasons Trout Farm	138000	VT, Unknown	1976	VT, Not Specified

EDINBURGH
JUNE 1989

ANNEX 6

NORTH AMERICAN COMMISSION

PAPER NAC(89)13

DISCUSSION DOCUMENT

INTRODUCTIONS AND TRANSFERS OF SALMONIDS: THEIR IMPACTS ON NORTH AMERICAN ATLANTIC SALMON AND RECOMMENDATIONS TO REDUCE SUCH IMPACTS

by

NAC Scientific Working Group
on Salmonid Introductions and Transfers

Members:

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	R Cutting

DISCUSSION DOCUMENT

Introductions and Transfers of Salmonids - Their Impact on North American Atlantic Salmon and Recommendations to Reduce Such Impacts

1. INTRODUCTION

Issues facing North American fishery managers and aquaculturists concerning introductions and transfers of fish stocks have created significant international concerns. Specific issues include the loss of genetic variance within wild populations and the necessity to increase such variation within stocks cultured for rehabilitation and enhancement. Genetic variance enables a population to adapt to changing environmental conditions.

Other issues of long-standing concern center on the application of sound principles of fish health management. Most regulatory agencies have enacted laws or regulations, and/or developed policies intended to minimize risks associated with introduction or dissemination of fish diseases incidental to introductions and transfers of fish stocks. Other issues relate to various ecological impacts that non-indigenous Atlantic salmon stocks or other species bring to an environment, including predation and the ability to out-compete indigenous stocks for spawning and/or rearing habitat at certain life stages. From an ecological perspective, intra-specific effects from transfer of Atlantic salmon are probably minor in most circumstances. However, introductions of other salmonids or non-salmonids can result in serious consequences depending on the extent that habitats are jointly occupied. Some species could displace salmon from their habitats. Theoretical ad empirical data suggest that fish introductions are most likely to be successful where the ecosystem has been perturbed and salmon densities are low.

In recognition of these various factors as well as questions being raised by various entities, the North American Commission (NAC) of the North Atlantic Salmon Conservation Organization (NASCO) decided to initiate a study of potential adverse effects of the movement of all salmonid stocks. Such questions are being raised by a broad spectrum of people including the recreational and commercial Atlantic salmon fishermen, fishery scientists and managers, and salmonid aquaculturists.

In May, 1984, the NAC named Dr I Pritchard (DFO) and Mr D Goldthwaite (USFWS) as a committee of two (known as the Bilateral Scientific Working Group on Salmonid Introductions and Transfers [BSWG]) to make an initial attempt to determine the then-current extent as well as the future potential for adverse impacts that introduced salmonids could have on wild Atlantic salmon resources in North America. After an initial report delineating the strong potential for such impacts, especially in the face of a rapidly expanding aquacultural industry on both sides of the US/Canada border, the activities of the group and its membership expanded. It is now known as the Scientific Working Group (Group). The Group prepared and presented a subsequent document at the North American Commission's 1987 meeting that contained additional support for the previous concerns, as well as interim recommendations to lessen the impacts associated with introductions and transfers of salmonids. This discussion document now identifies more permanent measures to provide a rational and strong measure of protection for North American Atlantic salmon stocks.

In the development of this discussion document, the Scientific Working Group identified some issues acknowledged to be of major concern in the overall Atlantic salmon picture, but outside the scope of the Group's charge. These included: the potential impacts on species other than Atlantic salmon (salmonids in particular) by introductions and transfers of fish species (including Atlantic salmon); the excessive pressures put on the Atlantic salmon resource through habitat degradation and/or alteration; and the strong selective pressure imposed by selective harvest regulations. The Scientific Working Group wishes to call attention to these other issues which, in certain circumstances, may be as important to the survival of Atlantic salmon as anything addressed in this document.

These concerns are exacerbated by the constant diminishment of desirable wild populations that are under ever-increasing pressure by world-wide expansion of demand for high quality protein and health benefits (both perceived and real) associated with fish consumption. Fisheries managers are facing a unique, and perhaps extremely important, situation. Nowhere has a previous agricultural enterprise had the potential for such major and direct impacts to very important wild stocks. Mismanagement of the issue could jeopardize the future existence of the Atlantic salmon throughout its North American range. Wild stocks of Atlantic salmon in the North Atlantic have strong commercial and recreational (sport) fishing values. The species also has intrinsic value as an indicator of improved habitat quality in most sections of its range.

The Atlantic salmon is the focus of major aquacultural capitalization, primarily profit-motivated. Expansion of salmon culture efforts have coincidentally occurred with the restoration and/or enhancement of wild, self-sustaining populations. Simultaneously, demand for the species for sport fishing is increasing. Thus, economic incentives for various management schemes are resulting in strong political pressures to contravene measures that would otherwise protect the species throughout its range into the 21st Century.

Previous protection of wild (and cultured) stocks has concentrated on issues relating to fish health. Undoubtedly, this circumstance has been due, in strong measure, to the fact that fish culture has been a science temporarily advanced over other facets of fishery management. As a result, fish health management is well in advance of protection of genetic resources and reduction of ecological impacts on indigenous fishes that can result from introduction of non-indigenous species or stocks.

These two latter issues have a significantly different focus than fish health. Fish health, in the past, has focused directly on the relatively short term management of fish diseases in the hatchery situation, with lesser concern on diseases in the wild, while impacts associated with genetics and ecological interactions affect wild stocks primarily. The scientific basis for addressing these issues is less precise, and long-term concerns are more at stake. The magnitude of the potential for adverse effects on wild Atlantic salmon stocks is just being realized and is evidenced by the large numbers of escapees from cage culture facilities entering rivers in Norway and Scotland, as well as strong concerns relating to the potential problems associated with using non-indigenous stocks and species of salmonids in aquaculture.

There is also the growing realization that hatchery stocking programs along the Atlantic coast, which have been undertaken for many decades, could have affected wild Atlantic salmon stocks. There was little concern in the past with transferring stocks from a single source to numerous other river systems, and the numbers of fish released and introduction,

in some areas, of non-indigenous species could have resulted in competition with wild stocks for food and space. While it is difficult to assess the extent of damage to natural populations that these programs may have caused, there is an urgent need to develop scientifically-based hatchery programs which minimize impacts on wild stocks.

The purpose of this discussion paper is to stimulate comment from the scientific community, fisheries managers, and client groups in North America and from interested parties throughout the range of Atlantic salmon. The paper provides a review of previous recommendations by the Scientific Working Group and actions taken on these recommendations, proposes a zoning concept for Atlantic salmon river systems in North America, summarizes the proposed protocols to minimize impact of introductions and transfers on Atlantic salmon populations, and outlines administrative procedres for preparation, evaluation and approval of proposals for introductions and transfers. Finally, a glossary of terminology as it has been utilized in this paper is provided (Appendix I).

2. PREVIOUS RECOMMENDATION AND POLICY

Since the NAC has expressed concern on the matter of introductions and transfers and since the BSWG has not yet had sufficient time to develop adequate scientific basis for proper protocols, in 1987, the latter group developed interim recommendations for consideration by the NAC pending a finalized listing of such protocols. Specific items of concern were identified by the Scientific Working Group in recommendations presented to the NAC in the 1987 Report of Activities (Annex 13 to NAC(87)20).

As a result of those recommendations, the NAC commissioners endorsed an interim position entitled "Policy Statement on Introductions and Transfers of Salmonids" on 10 June, 1987. That document did not specifically call for prohibition of importations/transfers of either eastern hemisphere and Icelandic Atlantic salmon or salmonids from west of the Continental Divide as was recommended by the Scientific Working Group in its 1987 recommendations. However, it did state that the various agencies "are encouraged...to prevent the introduction and/or transfer of fish, (i) infected with disease agents of concern, (ii) which may have adverse genetic or ecological impact;" and "to use local origin salmonid stocks in aquaculture and restoration and other enhancement projects wherever possible:" Such language was neither strong nor definitive enough to accomplish what was originally recommended by the Scientific Working Group. Review of the importation history of certain of the affiliated agencies shows that the situation has deteriorated to an unacceptable level in the movement of European Atlantic salmon stocks, in particular, as well as the movement of salmonids from west of the Continental Divide.

Both the Fish Health and Genetics Advisory Subgroups (of the Scientific Working Group) have come forward with strong protocols that call for elimination of such sources of stock for any activity that would place such fish in contact with wild Atlantic salmon. In the first instance, the Fish Health Subgroup called for prohibition of salmonid importations from west of the Continental Divide primarily due to concerns of transfer of infectious haematopoietic necrosis, while the Genetics Subgroup recommended the elimination of importations of Atlantic salmon from Europe to protect the genetic diversity of North American stocks. This recommendation would certainly have direct application to efforts in fish culture both for profit and for fishery management. We at the Scientific Working Group level agree and frame this document with the understanding that such restrictions will be instituted.

3. ZONING OF RIVER SYSTEMS

Atlantic salmon populations on the east coast of North America have been variously affected by civilization. Overharvesting, and degradation and loss of habitat due to human industrial and development activities have depressed levels of salmon stocks in many rivers; selective fishing pressures have changed composition of populations; enhancement and repopulation efforts have resulted in mixing of stocks; non-indigenous salmonid species have been introduced to increase salmonid production; and most recently commercial salmon farming, with its attendant risks of disease spread and dilution of wild gene pools, has reached a production level that now supersedes harvest levels of wild stocks.

Not all river systems and salmon populations have been affected equally by these activities, however. Many rivers in Newfoundland/Labrador and Northern Quebec have been unaffected by habitat perturbation by humans, other than commercial fishing in coastal waters and sportfishing in freshwater, and are unique in that they contain most of the remaining pristine Atlantic salmon populations in the world. Conversely, in the Maritime provinces of Canada and the Northeast USA, habitat alterations (eg dams, pollution) in certain rivers have had significant impact on natural populations. Remedial measures and alternative developments that have been initiated include enhancement with hatchery-reared stocks, introduction of non-indigenous salmonid species, and commercial aquaculture.

Given the mounting pressures to further introduce and/or transfer salmonid stocks to support fisheries development and commercial aquaculture, the Scientific Working Group recommends designation of three zones in eastern North America based on the degree of impact by man on wild Atlantic salmon populations. The Scientific Work Group further recommends that government agencies adopt fisheries management measures in each zone that will: (a) Protect selected salmon stocks in order to maintain valuable gene pools over the long term; and (b) Facilitate fishery restoration, enhancement, and aquaculture developments so that impact on existing salmon stocks will be minimized.

These measures are based on application of the "stock concept", which recognizes the individuality of groups of Atlantic salmon sharing a common environment and a gene pool which permits self-perpetuation. There may be one or several "stocks" of Atlantic salmon in a given river system, each of which can be deleteriously affected by even subtle changes to the environment or the gene pool.

The proposed geographic areas to be included in each zone (see Appendix II), a general description of types of river systems in the zones, and recommended management measures to be applies in each zone are as follows:

Zone I - Geographic Area: Northern Quebec, Labrador, Newfoundland (west coast) and Anticosti Island.

Description of Rivers: Generally pristine rivers with no manmade habitat alterations, no history of transfers of fish into the watersheds, and no culture operations in the watersheds.

Management: Protect river and manage fisheries to ensure a minimum effective size of breeding population of Atlantic salmon; no fish from culture facilities will be stocked; and no cage culture permitted in marine waters; enhancement of populations only permissible by moving juveniles or broodstock

from within the same watershed; establishment or re-establishment of Atlantic salmon populations only permissible by moving juveniles or broodstock from nearby watersheds having similar habitat characteristics, and then only if a minimum effective breeding population is maintained.

Zone II

Geographic Area: Quebec rivers flowing into Gulf of St Lawrence south of Pte. des Monts, Gaspe region of Quebec, Magdalen Islands, Price Edward Island, New Brunswick, Nova Scotia, Newfoundland (except west coast), St Pierre and Miquelon Islands, Maine - east of Rockland.

Description of Rivers: Watersheds in which habitat has been altered, where wild salmon stocks or hatchery-reared fish not native to the watershed have been released, and/or where mariculture is conducted; but where only native Atlantic species are present in cage culture (introduced species such as rainbow trout would be treated as indigenous if a population has been established for ten or more years, and have had no impact on Atlantic salmon stocks).

Management: Permit enhancement and aquaculture activities in freshwater and the marine environment, but with native Atlantic species only (preferably local stocks); permit culture of non-indigenous species in land-based facilities having minimal risk of escapement.

Zone III

Geographic Area: Great Lakes drainage, southern Quebec draining to St Lawrence River, Maine west of Rockland, New Hampshire, New York, Connecticut, Massachusetts, New Jersey, Rhode Island, and Vermont.

Description of Rivers: Rivers where habitat may have been altered, where fish communities are destabilized, and exotic species may be present.

Management: Use of non-indigenous species may be permitted, provided that their introduction of transfer meets the requirements that follow.

Within each zone, river systems are generally similar and could be assigned the same class as the zones. For example, in Zone II, river systems would be categorized as Class II. It is proposed that there be flexibility, however, in assigning a higher classification to a river system than the zone in which it is located, to allow additional protection for valuable Atlantic salmon stocks. Over the long term, as detailed inventories of rivers and their Atlantic salmon populations become available, the principles of the zoning system could be succeeded by a more sophisticated classification of individual watersheds based on management needs.

4. SUGGESTED PROTOCOLS

The recommended protocols developed by the Scientific Working Group and its Subcommittees on fish health, genetic and ecological concerns with salmonid introductions and transfers are given in papers NAC(89)14, NAC(89)15 and NAC(89)16 respectively. The basic premises used in preparing these protocols were:

(a) To minimize the risk of introduction and spread of infectious disease agents (fish health);
(b) To conserve genetic variance in North American Atlantic salmon stocks (genetics);

and

(c) To minimize the intra and interspecific impacts of introductions and transfers on Atlantic salmon stocks (ecology).

To facilitate review of the potential impact of these protocols on ongoing salmonid management, development and aquaculture activities in eastern Canada and north east USA, a synopsis is presented below of protocols applicable universally throughout the region, and those protocols that are specific to each of the three Zones described in Section 3.

A. Suggested Protocols Applicable to all Three Zone Classifications:

(1) To protect genetic variance, do not allow importation of Atlantic salmon stocks from Europe (including Iceland). Also, manage salmon harvest to be stratified with respect to fish size, age, sex and seasonality.

(2) To protect against inadvertent introduction of "emergency" diseases (IHN, PKD, VHS, Ceratomyxosis, and Whirling Disease): do not allow transfer of salmonid fish or eggs from west of the Continental Divide or IHN endemic areas. Require complete fish health inspection reports (minimum of three inspections over a twenty-four month period) prior to movement of any stocks.

(3) To protect against interspecific competition (ecological impact), review and evaluate fully the potential for such impact prior to any movement of non-native fish into an area inhabited by Atlantic salmon. Be aware that perturbed ecosystems pose the greatest potential for successful colonization by exotics.

(4) Hatcheries are used widely in producing stocks for the introduction, re-establishment, rehabilitation and enhancement of Atlantic salmon. Hatchery rearing programs to support these activities must be carefully managed to minimize impact of wild populations, including the following measures:

a. Use only F1 progeny from wild stocks;
b. Select broodstock from all phenotypes, ages, and representatives of the entire spawning run of a donor population;
c. Avoid selection of the "best" fish during the hatchery rearing period; and
d. During spawning, make only single pair matings from a broodstock population of no less than 100 parents.

B. Zone I

Zone I consists of Class I watersheds where every effort must be made to maintain the genetic integrity of Atlantic Salmon stocks. The following summary protocols apply:

(1) General within the Zone

- no fish which have been reared in a fish culture facility are to be released into the wild.

- no non-indigenous salmon stock or species may be introduced into a Class I watershed.

(2) Rehabilitation:

- fisheries management techniques will be used to ensure sufficient spawners such that spawning escapement exceeds a minimum target level to maintain an effective breeding population.
- habitant that becomes degraded will be restored to the extent possible.

(3) Establishment or re-establishment of Atlantic salmon in a river or part of a watershed where there are no salmon:

- use transfers of adults or juvenile salmon from the residual population in other parts of the watershed.

- if there is no residual stock, a near-by salmon stock which has similar phenotypic characteristics to the lost stock should be transferred (provided an effective breeding population is maintained in the donor watershed).

- if biological characteristics of original stock are not known or there was no previous stock in recipient watershed, then transfer broodstock or early life stages from a nearby river having similar habitat characteristics.

(4) Aquaculture:

- aquaculture is restricted to land based facilities and the rearing of reproductively sterile fish, or indigenous fish species such as brook trout or arctic charr.

- no cage culture is permitted.

(5) Commercial Salmon ranching:

- no commercial salmon ranching is permitted.

C. Zone II

Zone II is an area where only species indigenous to the Atlantic Coast are present, where there has been alteration of the habitat, where restoration and enhancement of salmon populations have taken place, involving the release of non-indigenous stocks, and/or where cage culture is practised. The following protocols apply:

(1) General within the Zone:

- Introduction of non-indigenous species is not permitted, except reproductively sterile fish or introductions to adequately contained land-based facilities where risk of escapement is minimal.

- Restoration, enhancement and aquaculture activities are permitted in the freshwater and marine environments, but with native Atlantic coast species only (preferably local stocks).

(2) Rehabilitation and Enhancement

- The preferred methods are: to improve degraded habitat and ensure escapement of sufficient spawners through fisheries management.

- If further measures are required, use residual stocks for rehabilitation and enhancement. If the residual stock is too small, select a donor stock having similar life history and biochemical characteristics from a tributary of near-by river.

- Stocking of hatchery-reared smolts is preferred, to reduce competition with juveniles of the natural stocks.

(3) Establishment or re-establishment into rivers having no salmon populations

- To establish a stock, use a salmon stock from a nearby river having similar stream habitat characteristics.

- If re-establishing a stock, use a stock from a nearby river which has similar characteristics to the original stock.

- It is preferable to stock rivers with broodstock or early life history stages (eggs and fry).

- If eggs are spawned artificially, use single pair matings and optimize the effective number of parents.

(4) Cage Culture/Marine Enclosures

- It is important to apply methods which minimize escapees.

- Develop domesticated broodstock based on local stocks; or, if local stocks are limited, on nearby stocks.

(5) Commercial Salmon Ranching

- Commercial salmon ranching will only be permitted if it is demonstrated that the activity will not negatively affect wild Atlantic salmon stocks.

D. Zone III

Zone III is an area where most rivers are Class III, having been subject to the highest degree of environmental and biological change from the pristine conditions, as a result of man's activities. These watersheds usually have undergone changes which have diminished the productive capacity for Atlantic salmon by alteration of the habitats and/or by change in the fish fauna from the historical compositions. The residual salmon production potential can be preserved for optional enhancement if the following considerations involving introductions and transfers of fishes are used to limit the biological impacts of fish movements:

(1) General - within the Zone

- Indigenous and non-indigenous salmonid and non-salmonid fishes may be considered for introduction or transfer if fish health and genetic protocols are followed and negative impacts on Atlantic salmon can be shown to be minimal using careful ecological impact evaluation.

(2) Rehabilitation

- Habitat quality should be upgraded wherever possible.

- Rebuilding stocks can be achieved by controlling exploitation and by stocking cultured fish.

(3) Establishment or re-establishment

- Transfer source stocks from nearest rivers having similar habitats.

- Stock with juvenile stages (eggs, fry and/or parr).
  If eggs are spawned artificially, use single pair matings and optimize the effective number of parents.

(4) Aquaculture

- Use of local stocks is preferred but non-indigenous stocks may be cultured.

- Marine cage culture can be widely practised but preferred locations are distant from watersheds with residual potential for Atlantic salmon production.

- Culture of non-indigenous species in land-based facilities on Class II watersheds is permitted in adequately controlled facilities where risk of escapement is minimal.

(5) Commercial Salmon Ranching

- Commercial salmon ranching is permitted if it is demonstrated that the activity will not negatively affect Atlantic salmon rehabilitation or enhancement programs or the development of wild Atlantic salmon stocks.

5. GUIDELINES FOR APPROVAL OF INTRODUCTIONS AND TRANSFERS

Clear, concise guidelines for approval of proposals for the introductions and transfers of salmonids are fundamental to maintaining productivity of wild stocks. Both proponents and agencies responsible for managing the Atlantic salmon have a responsibility for ensuring that risk of adverse effects on Atlantic salmon stocks from introductions and transfers of salmonids and other fishes is low. The importance for member countries and their cooperating agencies to enact adequate laws to control introductions and transfers cannot be over emphasized. Present laws need to be modified and/or enacted to support implementation of the protocols in this document. Enacting the appropriate laws is a lengthy process and should be initiated immediately.

A. Responsibility of Proponent

The proponent must submit a request for introduction or transfer of fishes to the permit-issuing agency. This request must provide a full justification for the introduction or transfer such that its complete evaluation will be possible prior to issuance of a permit. The list of information to be included in the justification for introductions and transfers is in Section 5C, below. The lead time required for notice and justification of introductions and transfers will be determined by the permit issuing agency. However, a minimum of one year notice is required for introductions and international transfers since these are also to be reviewed by NAC/NASCO. Proponents should be aware of the protocols established for introductions and transfers.

B. Responsibility of Government Agencies Having the Authority to Issue Permits

These agencies shall be those entities having the responsibility for management and maintenance of wild Atlantic salmon resources within the receiving area. The responsibilities of the agency shall include:

(1) Establish, maintain, and operate a permit system and inventory for all introductions and transfers of fishes.

(2) Enact regulations required to control the introductions and transfers of fishes as per established protocols.

(3) Establish a formal scientific evaluation process to review applications and recommend conditional acceptance or rejection of the proposed introductions and transfers based on the potential impact on the productivity of Atlantic salmon.

(4) Within the zones each agency may be more restrictive in classifying individual watersheds.

(5) Submit to the NAC Scientific Working Group a list of introductions and/or international transfers proposed for their jurisdiction, one year prior to the planned activity.

(6) Prevent the release of fish which will adversely affect the productivity of wild Atlantic salmon stocks.

C. Preparation of Proposals

The following information is required with applications involving introductions and transfers of fishes. This information will be used to evaluate the risk of adverse effects on Atlantic salmon stocks.

(1) Name the species, strain and quantity to be introduced or transferred, and include:

a. Time of introduction or transfer.
b. List anticipated future introductions or transfers.
c. List previous introductions and/or transfers.

(2) Area, place, river or hatchery from which the fish will be obtained.

(3) Proposed place of release and any interim rearing sites.

(4) Disease status of donor hatchery, river or other location from which fish are obtained.

(5) Disease status of recipient facility or stream (where available).

(6) Objectives of the introduction or transfer and the rationale for not using local stock or species.

(7) For non-indigenous species, available information should be presented on the proposed species' life history, preferred habitat, potential parasites and disease agents, potential for competition with indigenous species or stocks in the recipient waters or nearby waters.

(8) Information on similar transfers or introductions should be reported.

(9) Proposed procedure for transportation from donor to recipient site.

(10) List measures to be taken to prevent transmission of disease agents and to reduce the risk of escape of fish.

(11) Species composition at proposed site of introduction and adjacent rivers.

(12) Climatic regime and water chemistry, including pH of waters at the site of proposed introduction and of adjacent rivers.

(13) For indigenous species determine the history and biological characteristics of donor stock.

(14) Potential of introduced or transferred fish to disperse to nearby streams.

(15) A bibliography of pertinent literature should be appended to the proposal.

D. Evaluation of Proposals

The evaluation of proposals will focus on the risk to Atlantic salmon production potential associated with the proposed introductions and transfers. It will be based on the classification of the recipient watershed. All requests for introduction or transfers must provide sufficient detail (Section 5C, above) that the potential risk of adverse effects to Atlantic salmon stocks can be evaluated. The evaluation of potential adverse effects of fish health will consider the disease history of the donor and recipient facility and/or watershed with specific reference to the potential for transferring emergency diseases. The risk of detrimental genetic effects of introducing a non-indigenous stock into a river will be evaluated taking into consideration the classification of the Watershed, the phenotypic and life history characteristics of the donor stock, the biochemical information (mitochondrial/nuclear DNA and enzyme frequencies), and geographic distance between donor and recipient locations.

The evaluation of the risk of ecological effects on Atlantic salmon populations is more involved. Introduction of non-indigenous Atlantic salmon stocks and/or indigenous species will be evaluated by considering the quantity and size of the transferred fish in relation to

the indigenous population and the habitat in which the competition and/or predation interactions could occur.

The introduction of non-indigenous species poses the greatest risk to the productivity of the Atlantic salmon stocks. Evaluation will be by comparison of the habitat requirement and behaviour of both the proposed introduced species and the indigenous Atlantic salmon stock at all life stages. The habitat requirements and areas of possible interactions with Atlantic Salmon has been described for 14 fish species (see Ecologic Subgroup report, NAC(89)16). These can be used to provide a cursory evaluation of the life history stage at which interactions would occur. However, more detailed information on stocks and habitats in both donor and recipient locations would be required in the form of an envirogran (example is provided in Ecologic Subgroup report). Where insufficient data are available, research will be required prior to permitting the introduction or transfer.

An example of the type of information which is available in the species summaries (produced by the Ecologic Subgroup) is presented below for Rainbow Trout.

(1) Conditions under which interactions will occur:

- spawning - rainbow may dig up salmon redds
- interaction of yearlings - compete for space
- rainbow trout juveniles more aggressive in pools
- large trout - predator

(2) Low interaction:

- in streams where Atlantic Salmon do not utilize ponds or lakes
- salmon well established
- aquaculture using sterile fish or land based facilities

(3) Conditions under which no interaction will occur. It would be permissable to use reproductively viable rainbow trout:

- habitat with pH less than 5.5
- rainbow already present in recipient stream
- disturbed ecosystems where Atlantic Salmon are absent and sport fishing would be improved

6. RECOMMENDED ACTIONS

This discussion paper represents the distillation of a serious collaborative effort between representatives from Canada and the USA to identify measures needed to minimize the impact of introductions and transfers on Atlantic salmon stocks along the eastern seaboard of North America.

The Scientific Working Group requests endorsement of the discussion paper by the North American Commission of NASCO and recommends that member agencies facilitate follow-up consultation with the appropriate government agencies and client groups to solicit comments on the protocols. On receipt of feedback from these consultations, the Scientific Working Group will further refine and prepare the final protocols covering introductions and transfers in the North American Commission region.

APPENDIX I

GLOSSARY

Applicant: See proponent.

Aquaculture: The culture or husbandry of aquatic fauna other than in research, in hobby aquaria, or in governmental enhancement activities.

Commercial Salmon Ranching: Release of juvenile salmon from a fish culture facility to range freely in the ocean for harvest, for profit.

Competition: Demand by two or more organism or kinds of organisms at the same time for some environmental resource in excess of the available supply.

Containment: Characteristic of a facility which has an approved design which minimizes operator error to cause escape of fish, or unauthorized persons to release contained fish.

Diversity: All of the variations in an individual population, or species.

Enhancement: The enlargement or increase in number of individuals in a population by providing access to more or improved habitats or by using fish culture facility production capability.

Exotic: See introduced species.

Fish: A live finfish.

Fish Culture Facility: Any fish culture station, hatchery, rearing pond, net pen, or container holding, rearing, or releasing salmonids.

Gamete: Mature germ cell (sperm or egg) possessing a haploid chromosome set and capable of formation of a new individual by fusion with another gamete.

Genetics: A branch of biology that deals with the heredity and variation of organisms and with the mechanisms by which these are effected.

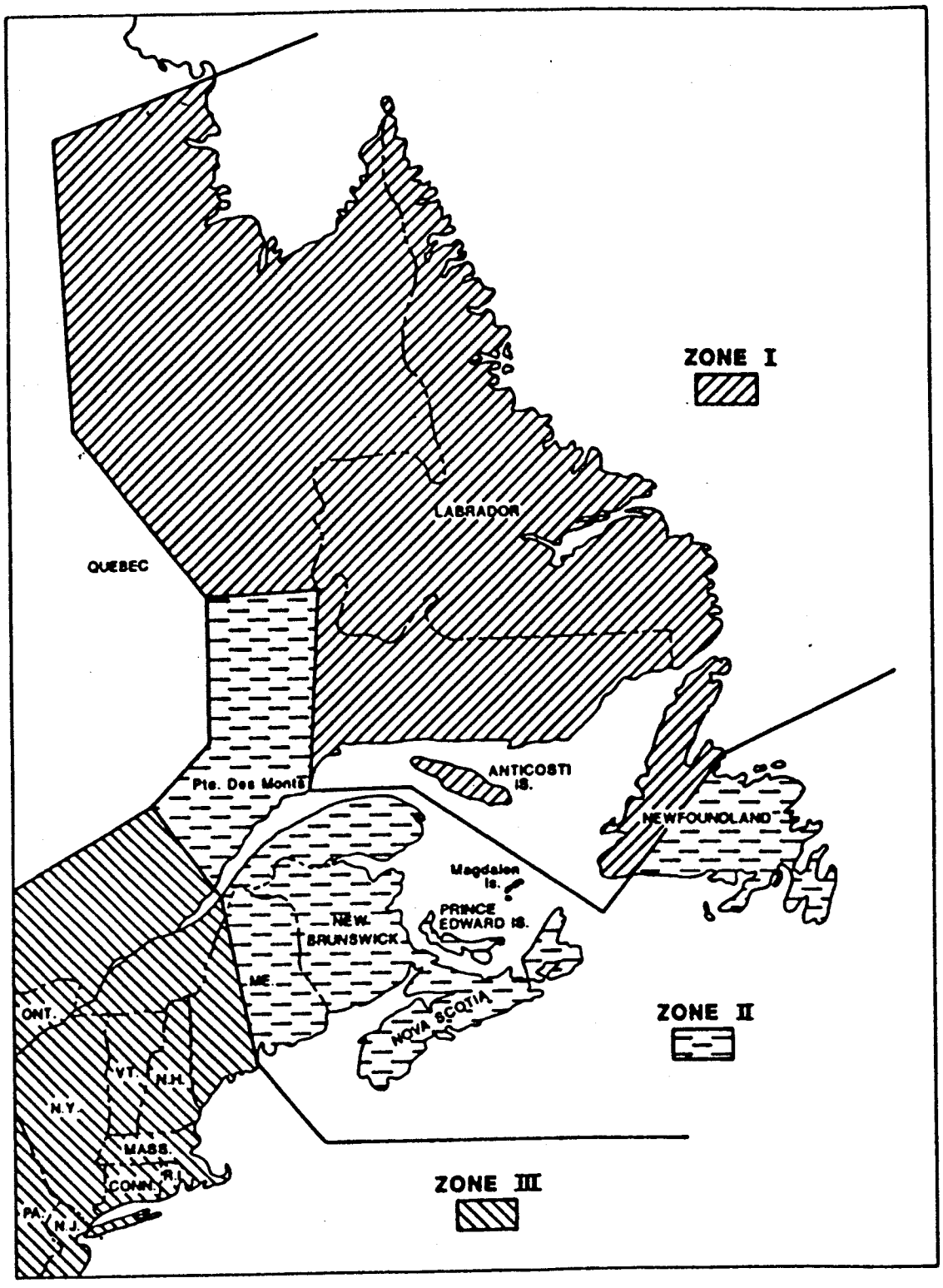
Indigenous: Existing and having originated naturally in a particular region or environment.

Introduced Species: Any finfish species intentionally or accidentally transported or released by Man into an environment outside its historical or present range.

Introduction: A planned or accidental event which moves a finfish into waters outside its historical or present range.

Mariculture: Aquaculture in sea water.

Native:	See indigenous.
Niche:	A site or habitat supplying the sum of the physical and biotic life-controlling factors necessary for the successful existence of a finfish in a given habitat.
Non-indigenous:	Not originating or developing or produced naturally in a particular environment or introduced from outside into a region or environment.
Population:	A group of organisms or a species occupying a specific geographic area.
Predator:	The preying upon and eating of one species by another individual, usually by another species.
Proponent:	A private or public group which requests permission to introduce or transfer any finfish within or between countries and lobbies for the proposal.
Quarantine:	A facility limiting freedom of movement of finfish for a period of time sufficient to test for the presence of a disease.
Rehabilitation:	The rebuilding of a diminished population of a finfish species, using a remnant reproducing nucleus, toward the level that its environment is now capable of supporting.
Restoration:	The re-establishment of a finfish species in waters occupied in historical times.
Salmonid:	All species and hybrids of the Family Salmonidae covered by the AFS checklist special publication No. 12 "a list of Common and Scientific Names of Fishes from the United States and Canada".
Species:	A group of interbreeding natural populations that are reproductively isolated from other groups.
Stock:	A population of organisms sharing a common gene pool which is sufficiently discrete to warrant consideration as a self perpetuating system which can be managed.
Strain:	A group of individuals with a common ancestry that exhibit genetic, physiological, or morphological differences form other groups as a result of husbandry practices.
Transfer:	The deliberate or accidental movement of a species between waters within its present geographic range, usually with the result that a viable population results in the new locations.
Transferred Species:	Any finfish intentionally or accidentally transported and released within its present geographic range.



APPENDIX II: Map of eastern Canada and northeastern USA showing the 3 zones proposed for implementation of protocols.

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ANNEX 7

NORTH AMERICAN COMMISSION

PAPER NAC(89)8

CANADIAN ATLANTIC SALMON CATCHES

TABLE A: (January 30, 1989)

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	1SW Salmon		MSW Salmon		Total	
	Tonnes	Numbers	Tonnes	Numbers	Tonnes	Numbers
1960	-		-		1,636	
1961	-		-		1,583	
1962	-		-		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	833	435,799	951	203,731	1,784	639,530
1988	658	361,211	622	134,217	1,280	495,428

The 1988 total catch of salmon (1,280 tonnes) is:

- 8.7% below the previous 5 year mean (1,402.4)
- 23.6% below the previous 10 year mean (1,675.9)
- 34.4% below the previous 15 year mean (1,951.2)
- 35.4% below the previous 20 year mean (1,982.8)

The 1988 total catch of MSW salmon only (622 tonnes) is:

- 18.7% below the previous 5 year mean (765.2)
- 39.1% below the previous 10 year mean (1,022.0)
- 44.9% below the previous 15 year mean (1,242.5)

The 1988 total catch of 1SW only (658 tonnes) is:

- 3.3% above the previous 5 year mean (637.2)
- 0.6% above the previous 10 year mean (653.9)
- 7.2% below the previous 15 year mean (708.7)

NOTE: ALL CATCH FIGURES FOR 1987 ARE PRELIMINARY

* Numbers for 1982-84 are estimated (assuming 2.0kg for average 1SW salmon; 4.5kg for MSW salmon)

January 30, 1989

Table B: Nominal Catches (Provisional) of Atlantic Salmon in Canada for 1988 (in kg round fresh weight)

	1SW SALMON	% OF TOTAL	MSW SALMON	% TOTAL	TOTAL	% OF TOTAL
QUEBEC						
R	15,276	2.3	61,520	9.9	76,796	6.0
C	9,634	1.5	82,386	13.3	92,020	7.2
TOTAL	24,910	3.8	143,906	23.2	168,816	13.2
NFLD						
R	74,135	11.3	2,949	0.5	77,084	6.0
C	486,663	73.9	448,783	72.2	935,446	73.1
TOTAL	560,798	85.2	451,732	72.7	1,012,530	79.1
MARITIMES						
R	66,526	10.1	0	0	66,526	5.2
C	0	0.0	0	0	0	0.0
TOTAL	66,526	10.1	0	0	66,526	5.2
NATIVE FOOD FISHERY (ALL AREAS)	6,140	0.9	26,015	4.2	32,155	2.5
TOTAL	658,374	100.0	621,653	100.0	1,280,027	100.0

R = Recreational (Total = 220,406kg or 17.2%)
C = Commercial (Total = 1,027,466 kg or 80.3%)

NOTE: All catch figures for 1988 are preliminary

(January 30, 1989)

TABLE C: A COMPARISON OF THE OVERALL 1983 THROUGH 1988 ATLANTIC SALMON FISHERIES* (IN TONNES)

AREA	1SW SALMON						MSW SALMON						TOTAL					
	1983	1984	1985	1986	1987	1988	1983	1984	1985	1986	1987	1988	1983	1984	1985	1986	1987	1988
QUEBEC																		
R	4.2	4.0	7.1	9.3	13.1	15.3	46.6	37.8	47.7	61.5	47.2	61.5	50.8	41.8	54.8	70.8	60.4	76.8
C	6.4	1.5	4.2	7.4	6.0	9.6	88.1	60.6	65.5	68.5	96.9	82.4	94.5	62.1	69.8	75.9	103.0	92.0
TOTAL	10.6	5.5	11.3	16.7	19.1	24.9	134.7	98.4	113.2	130.0	144.1	143.9	145.3	103.9	124.6	146.7	163.4	168.8
NFLD.																		
R	55.8	63.0	61.7	62.9	48.8	74.1	8.0	3.4	1.2	1.9	2.6	2.9	63.8	66.4	62.9	64.8	51.5	77.0
C	401.5	346.3	464.0	608.3	702.1	486.7	615.0	475.1	398.8	621.8	770.5	448.8	1016.5	821.4	862.9	1230.1	1472.7	935.4
TOTAL	457.3	409.3	525.7	671.2	750.9	560.8	623.0	478.5	400.1	623.7	773.1	451.7	1080.3	887.8	925.8	1294.9	1524.2	1012.5
MARITIMES																		
R	29.5	34.8	52.9	86.4	56.8	66.5	37.5	2.0	0	0	0	0	67.0	36.8	52.9	86.4	56.8	66.5
C	15.6	14.9	0	0	0	0	115.8	41.0	0	0	0	0	131.4	55.9	0	0	0	0
TOTAL	45.1	49.7	52.9	86.4	56.8	66.5	153.3	43.0	0	0	0	0	198.4	92.7	52.9	86.4	56.8	66.5
NATIVE	?	2.1	2.5	5.7	6.2	6.1	?	25.0	26.3	25.3	33.7	26.0	?	27.1	28.9	31.0	39.9	32.2
TOTAL	513.0	466.6	592.6	780.0	833.2	658.4	911.0	644.9	539.7	779.0	951.1	621.7	1424.0	1111.5	1132.3	1559.0	1784.3	1280.0

* Numbers may not add directly due to rounding process

R = Recreational
C = Commercial

NOTE: ALL CATCH FIGURES FOR 1988 ARE PRELIMINARY

(January 30, 1989)

Table D: Harvest (tonnes) by Zone in the Newfoundland Commercial Salmon Fisheries, 1978-82, Average and Yearly since 1983

Zone	1978-82 Average Catch	1983 Catch (Tonnes)	1984 Catch (Tonnes)	1985 Catch (Tonnes)	1986 Catch (Tonnes)	1987 Catch (Tonnes)	1988* Catch (Tonnes)	1988 Compared to 1978-82
1	124	81	51	72	89	75	64	-48
2	485	286	211	139	309	407	292	-40
3	257	191	134	123	192	369	173	-33
4	166	125	128	111	200	180	101	-39
5	70	58	60	72	61	60	37	-47
6	57	30	35	65	54	48	22	-61
7	45	23	20	25	19	26	16	-64
8	40	24	32	31	24	23	19	-53
9	17	9	12	11	8	7	8	-53
10	36	22	28	51	49	28	13	-64
11	54	44	34	101	67	53	18	-67
12	79	53	0	0	0	0	0	-100
13	40	33	43	32	79	66	78	+95
14	36	37	33	30	79	132	94	+161
Total	1,504	1,016	821	862	1,230	1,472	935	-38
Insular Nfld. only	895	649	559	651	832	991	579	-35

* All figures for 1988 are preliminary

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ANNEX 8

NORTH AMERICAN COMMISSION

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THE STATUS OF ATLANTIC SALMON STOCKS IN ATLANTIC CANADA AND ADVICE FOR THEIR MANAGEMENT IN 1989 (CAFSAC 88/26)

NAC(89)7

THE STATUS OF ATLANTIC SALMON STOCKS IN ATLANTIC CANADA AND ADVICE FOR THEIR MANAGEMENT IN 1989 (CAFSAC 88/26)

At a meeting on 30 November 1988, 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, and Conne rivers. Consideration of salmon in the LaHave River had to be postponed until February because of difficulty in separating wild and hatchery returns.

1. INTRODUCTION

There are many uncertainties about the actual number of salmon that are caught, since there are no statistics on poaching, while legitimate catches by anglers must be estimated either by sample observation or from reports completed and mailed by the anglers themselves. A further uncertainty has been added by the compulsory release of large salmon, since many fish that are hooked but lost may be counted as "released" since anglers will be less careful not to lose a fish if they must release it. Indeed, it is preferable that anglers do attempt to release the fish quickly so that it will suffer less stress.

Despite the uncertainties, the estimates of the angler catch are often a major, if not the only, means of evaluating the total numbers of returning salmon. Alternative more reliable means of estimating these numbers involve counting fences and/or tagging programs. CAFSAC notes in particular the new information in 1988 from the Margaree River and the initiation of more detailed study of the results of the Millbank trap (Miramichi River) with respect to separating data on the early and late runs.

2. STATUS OF SPECIFIC STOCKS

2.1 Miramichi River

Management measures during 1988, the final year of the 5 year plan, were unchanged from the previous three 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); and native fisheries continued without quota restriction.

Total annual catches in the period 1951-1970 averaged about 77,000 fish but were much higher in 1964-67, the largest catch being about 162,000 fish in 1967. Catches in the period 1971-83 were about 37,000 fish annually. Catches in 1985-87, and the provisional estimates for 1988 are given below (numbers of fish):

	1985		1986		1987		1988	
Fishery	MSW	1SW	MSW	1SW	MSW	1SW	MSW	1SW
Native	327	546	641	1,988	898	1,274	348	944
Angling*	289[a]	18,439	428[a]	26,163	(358)[a]	20,765	(283)[ab]	18,171[b]
Total	616	18,985	1,069	28,151	1,256	22,039	631	19,115

* Estimates by New Brunswick Department of Natural Resource and Energy
[a] Assuming catch-and-release mortality rate of 0.03
[b] Provisional estimates based on DFO observations
MSW = Multi-sea-winter salmon
1SW = 1-sea-winter salmon ie. grilse

Despite the lower apparent catches in 1988, counts of returning fish at the Millbank trap indicated an increase of 44% in 1SW salmon and 12% for MSW salmon compared to 1987. These increases were due to greater numbers of late run fish which therefore comprised a much greater proportion of the returns than is usual. About half the total returns (52% for 1SW and 47% of MSW fish) were late run in 1988 in comparison to the average of 20% and 35% respectively.

Two methods have been used in the past to estimate the spawning escapement in the current year, both based on the numbers of fish caught in the Millbank trap. The first method relates historical catches in the trap to the number of spawners as judged subsequently from the number of young salmon (parr) that result from that 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 upriver 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 average of the 1985-87 results for 1985-88, and an historical relationship between Millbank catches and angler catches for 1981-1984.

Changes in the relative proportions of early and late run salmon in different years suggest that this factor should be incorporated into the estimation of the efficiency of the Millbank trap. It is for example relevant to note that the proportion of early run 1SW salmon in 1973, as in 1988, was unusually low relative the late run fish. This was the year in which the estimate of efficiency was made that has been used for all years prior to 1981. Further work is needed to determine whether the catching efficiency of the trap is different for early and late run fish. The uncertainty applies more to the estimates of the number of returning fish in the earlier years than to the estimates for recent years. In recent years, the release of tags has been more even over the season, and the efficiency measurements will consequently be a better estimate of the average value.

A third method for estimating the spawning escapement has been introduced this year that makes use of the recapture by anglers of the tagged fish released fro the Millbank trap. This provides a measure of the proportion of the population that is taken by anglers and hence given the total angler catch, an estimate of the population. CAFSAC considers that the methods based on trap efficiency and on angler harvest rates are likely to be the most reliable. The numbers of salmon that are estimated to have survived to spawn in 1988, are 63,000-99,000 1SW and 13,600-20,000 MSW fish. The number of eggs deposited would have been between 100% and 150% respectively of the target (132 million eggs).

These calculations imply that total MSW returns, as judged from the trap efficiency method were for the second year in a row much less than had been forecast on the basis of the number and sex ratio of 1SW returns in the previous year. The forecast for 1988 was 36,400 fish, but actual returns are estimated to have been 21,700. It is noted that the returns of MSW salmon to most rivers in 1987 and 1988 were below predicted values, which suggests that some unusual event has affected returns on a wide geographical scale, particularly since the success of the West Greenland fishery in 1986 and 1987 indicated that the following years should show good returns of MSW salmon to Canadian rivers. The return of 121,900 1SW salmon in 1988, on the other hand, appears to have been very much better than average (48,500 fish). Total returns in 1971-88 are shown in Figure 1.

The relationship between returns of 1SW fish in any year and the return the next year of MSW fish has been used in the past to predict returns in the coming year. The uncertainty about the 1973 measure of the efficiency of the Millbank trap, as reported above, implies that the relationship may have been based on incorrect numbers in earlier years. In consequence, and in light of the recent poor performance of the model, CAFSAC considers that it would be inappropriate to provide a forecast until the uncertainty has been investigated further. It is hoped that a forecast of MSW returns will be available by late March 1989. In the meantime, CAFSAC notes that parr densities contributing to the 1987 smolt class (2SW salmon in 1989), and the return of this smolt class as 1SW fish were above the 1970-87 average, and thus there is some expectation that returns of MSW salmon in 1989 will be at least average.

The number of fish that will return after one winter at sea cannot be forecast, but the average return for the years 1984 to 1988 has been 83,000 fish, which is some 60,000 more than are estimated as necessary to meet spawning requirements. The information on the success of spawning in 1984 and 1985, the young from which will be returning as 1SW fish in 1989, is that the resultant juveniles were more numerous in freshwater than during the previous five year average. Thus, at least average returns of 1SW salmon in 1989 might be expected.

2.2 Restigouche River

Restrictions in 1988 on the harvest of Atlantic salmon from the Restigouche River were similar to those in 1985-87: there was 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 they were required to release all MSW fish; and native fishermen at Restigouche, Quebec, were restricted by quota (6,995 kg). As in previous years, however, 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. Estimates of catches in 1985-88 as provided by the provinces of Quebec and New Brunswick or by DFO, are given below (numbers of fish):

	1985		1986		1987		1988	
Fishery	MSW	1SW	MSW	1SW	MSW	1SW	MSW	1SW
Native								
Restigouche	976	35	1,145	4	986	5	921	3
Eel River Bar	241	0	431	26	916	95	509	70
Angling								
New Brunswick*	(3,563)	3,258	(4,763)	4,915	(3,203)	4,414	(4,546)	6,084
Quebec	752	259	1,418	498	873	591	963	692
TOTAL	1,969	3,552	2,994	5,443	2,775	5,105	2,393	6,849

* Released

Estimation of the number of MSW salmon caught and released has been attempted by a number of methods. Recently (1984-87) the reports from four sport camps were used as an index of catch, but these values are much higher than those obtained by DFO fisheries officers or N.B.'s DNRE. The assessment this year has been based on the estimates made by DFO staff of the catch and release of MSW fish in each year 1984-88. The estimates of MSW fish retained prior to 1984 are also based on DFO figures.

The angler catch of 1SW fish in 1988 was the highest in the 29 years on record. It was achieved both as a result of increased effort (Quebec 10% and N.B. 9%) and increased catch rates in N.B. waters (up 25%).

Homewater returns in 1987 were estimated by three methods. The first method, based on assumptions as to the proportion (20-40%) of the population that was landed (or would have been landed by anglers in the case of MSW fish) was considered optimistic. A second method related historical angling catches to spawning escapement in each year, as judged from subsequent parr densities. The method indicated the return of 12,600 MSW salmon and 13,500 1SW fish before any removals and this suggests that the number of eggs deposited in 1988 would have been only 68% of the target (71.4 million eggs). This value was similar to that (79%

of target) provided by the third method - field counts of spawners by staff of N.B.'s DRNE and Quebec's MLCP. It is not clear as yet, however, whether there are potential biases or other uncertainties associated with counting spawning numbers from such direct observation. Returns 1970-88 are shown in Figure 1, on the basis of the second method, which may be more reliable.

The method used up to 1986 to forecast returns of MSW salmon was judged last year to be no longer valid, and CAFSAC has no basis for forecasting the returns in 1989. It is noted that the average return in 1986-88 of MSW and 1SW salmon has been 12,300 and 11,400 fish respectively. There is some basis for assuming that returns in 1989 will be at least average, since the estimates of the numbers of juveniles of the appropriate ages, prior to their going to sea, were above the previous three year average for each year-class. Average returns approximate the estimated spawning requirement for MSW salmon (12,600), but are nearly 10,000 fish above the requirement (2,600) for 1SW fish. Thus any harvest of MSW fish would mean the spawning target would not be met.

2.3 Saint John River

The management plan was similar to that in 1986-87; there was no commercial fishery, the Kingsclear food fishery had a quota of 900 fish, the Oromocto Band was licensed to take 150 salmon, and anglers were required to release MSW salmon (judged as those 63 cms or longer). In 1988, however, the Tobique band fished without a permit.

Catches in the period 1970-83 have varied widely (3,100-15,600) with an average catch of about 10,000 fish. Catches in 1985-87 and preliminary estimates for 1988 are given below (numbers of fish):

	1985		1986		1987		1988	
Fishery	MSW	1SW	MSW	1SW	MSW	1SW	MSW	1SW
By-catch*	2,294	531	563	329	408	340	325	384
Native*	2,517	483	2,400	600	1,120	280	1,200	300
Sport*	367	3,402	248	3,742	122	2,815	92	2,705
TOTAL	5,178	4,416	3,211	4,671	1,650	3,435	1,617	3,389

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

There is less uncertainty about the estimates of salmon returns to the Saint John River than there is for other rivers because the number of fish passed over the Mactaquac Dam is known. To this figure must be added, however, not only the known or estimated catches below the dam 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 latter 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, and to assume that the relative production of salon 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. Observations suggest that losses to disease in 1988 may have been higher than in the past, and greater allowance was included in the estimates of the returns.

The estimates of total returns in 1988 are 6,500 MSW salmon and 19,300 salmon, whether of wild stock or hatchery origin. Returns for the period 1975-88 are shown in Figure 1. The 1988 values are less than half the number of MSW fish forecast (15,200) but are 30% more than forecast (14,800) for 1SW fish. This is the second successive year that returns of MSW salmon have been much below forecast values. It is noted however that the recaptures in distant fisheries of tagged Saint John River salmon formed the highest percentage of total captures on record. Such unusually large catches elsewhere may be part of the explanation for the low returns in 1988 but they were not evident with respect to 1987 returns. The relatively small numbers of MSW returns in 1988 means that spawning escapement was well below target levels both above Mactaquac (only 35% of requirement) and below (46%).

Forecasts of the returns of wild (as compared to hatchery produced) MSW salmon that were spawned above the Mactaquac Dam are derived from the average ratio between wild 1SW salmon returns in any year and wild MSW salmon returns in the following year. Returns of wild 1SW salmon originating above Mactaquac are forecast from an historical (1968-82) relationship between egg densities in the Tobique River and the subsequent production of 1SW salmon. Forecasts of the returns of wild 1SW salmon and MSW salmon produced below Mactaquac are based on the expected returns to the river system above Mactaquac. 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 in 1989 are 12,100 MSW and 19,000 1SW salmon of both wild and hatchery production. These would represent about 2,700 MSW salmon surplus to minimum spawning requirements above Mactaquac but a deficit of about 730 MSW fish below the Dam. 1SW fish are forecast to exceed spawning requirements both above and below Mactaquac, by about 7,100 and 2,200 fish respectively. CAFSAC notes however that only in 1984 have actual MSW returns exceeded the forecasts, but that although 1SW forecasts initially (1982-85) were not matched by returns, they have been underestimates since 1986. CAFSAC has no explanation of these patterns of return relative to forecast levels, nor any indication that they might change.

2.4 Margaree River

Margaree River Salmon stocks comprise two runs: the summer run that enters the river up to the end of August, and the autumn run in September and October. Anglers have been required to release MSW salmon during the early 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.

Historical catches in the recreational fishery have been variable but averaged around 300 fish, about two-thirds of which were MSW salmon. The 1985-88

recreational catches (with all MSW salmon released), as estimated by DFO Fishery Officers, are compared below:

	1985	1986	1987	1988
1SW salmon	223	295	353	435
MSW salmon	(312)	(754)	(408)	(580)

These estimates are considered to be less than actual catches, whereas an alternative source of information (provincial licence stubs) appears to overestimate the catch. A creel census and voluntary log book program carried out in 1987-88 has indicated that the DFO estimates of the catch of 1SW salmon should be increased by factors of 1.3 and 1.5 for the summer and autumn runs respectively. The 1988 program suggests that DFO figures overestimate by about 50% the number of MSW salmon that would actually have been landed if release was not compulsory. The 1987 creel census had suggested that DFO was underestimating these catches by a factor of two. There remains a significant difference between these adjusted values and the licence stub values which has yet to be resolved. Escapement has been calculated in the past on the basis of the assumptions that the recreational fishery catches either 20.6% or 37.9% of the available population. These values were derived from mark/recapture experiments conducted a number of years ago. Under the assumption of 20.6% exploitation rate, spawning requirements were met two fold in 1988, but if anglers took the higher proportion (37.9%) of the run, then egg deposition was slightly below target (estimates of egg deposition for 1947-88, under either assumption, are shown in Figure 2).

In 1988, a significant new study has provided data to allow a more direct estimate of the autumn run. Two trap nets were operated in the estuary, 2 September-October 15. Tags were applied to fish taken in the trap further down the estuary and population estimates can be based on recaptures made in the upper net and by anglers. The estimates using this approach were that there were 1,440 MSW and 1,360 1SW fish in the autumn run. Exploitation rates implied by these numbers were lower than the historical estimates: 12% for MSW and 16% for 1SW. Using these population estimates and increasing them to incorporate the summer run on the ratio of angler catches, suggests that spawning would have produced three times the target number of eggs.

Following the discontinuation of the previous means of forecasting returns because the measure of angling success ("number of MSW salmon caught") has likely changed following introduction of mandatory release (see introduction, page 1), CAFSAC has as yet no replacement. Other techniques, such as the relationship between the autumn catch of 1SW fish in one year and the autumn catch of MSW salmon in the next year may prove useful.

2.5 LaHave River

Consideration of this stock has been postponed until February because separate counts of wild and hatchery returns were not available.

2.6 Conne River

Management measures were as in 1987; the quota assigned to the native food fishery was 1,200 small salmon (less than 63 cm in length, ie. predominantly 1SW fish); anglers were prohibited from retaining salmon over 63 cm in length; and the commercial salmon catch in SFA11, which takes some Conne River salmon, was limited by season (5 June - 10 July).

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

	1986		1987		1988	
	63 cm or longer	Less than 63 cm	63 cm or longer	Less than 63 cm	63 cm or longer	Less than 63 cm
Angling	-	2,060	-	1,598	-	1,544
Native	3a	519	-	18	-0	608
Commercial catch in Stat section 36	11.4	17.6	7.7	8.5	(not available)	

a Dead in trap

The low catch in the native food fishery in 1987 was due to loss of the trap net in a fire, and the delay in obtaining replacement gear (gillnets).

The number of salmon returning to the Conne River estuary was estimated from numbers observed at a counting fence near the mouth of the river and the assumption that the proportion of Conne River origin fish in the native catch was the same as measured in previous years, when tagging had been conducted. The results indicate a return in 1988 of 418 larger salmon (63cm or longer) and 7,627 fish less than this length. The spawning requirement for this river cannot be estimated on the basis of the 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 to the river, 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 between 25 or 50%, and for the purpose of calculating spawning requirements, a mid value (37.5%) has been used. The resultant estimate of the spawning requirement is 7.8 million eggs, or

about 4,000 salmon smaller than 63cm. Making allowance for angling catches and other losses (natural and poaching) it is estimated that spawning requirements were exceeded by 49% in 1988.

Forecasts of the numbers of small salmon (fish less than 63cm) that will return the following year are based on an estimate of the total run of smolts going to sea. The estimate of smolt production is based on a program of tagging smolts upstream and determining the proportion of tagged smolts in the run through a trap downstream. The prediction for returns to the river in 1988 was for 7,900-8,800 salmon which can be compared to the estimate of 8,000 actual returns. The forecast for 1989 is 6,200-6,8000000 fish which would mean that current harvest levels would take most if not all the numbers of fish surplus to the target spawning level.

3.0 Regional Assessments

Recreational and commercial catches by SFA (Fig. 3) are depicted graphically in Figs. 4 & 5 respectively, while numbers of returning salmon, as observed at the various counting facilities, are illustrated in Fig. 6.

3.1 Newfoundland Region

The commercial fishery remained unchanged from that of 1987, seasons mostly opened on June 5 and closed on October 15. In the recreational fishery, a mandatory tagging program was initiated in 1988. The mandatory release of MSW salmon continued in insular Newfoundland (retention allowed in Labrador) and the season bag limited remained at 15 fish.

It was not possible to consider fully the status of stocks in 1988 because commercial catch data were not available. Information on recreational catches however showed that for the insular portion of the Newfoundland Region in 1988 these were generally higher than in 1987 (Fig. 4). In that year (1987), however, most rivers were closed for nearly the entire angling season, as a result of drought conditions, and it is more appropriate to compare catches in 1988 to years prior to 1987. In this context, 1988 catches were average, even though they were most likely hampered to some extent by extremely high water levels experienced from the opening of the season to around mid-July. In Labrador, overall catches of grilse and large salmon improved over 1987 values and over the 1974-87 and 1983-87 means.

Counts of grilse at fishways and counting fences in 1988 (Fig 6) increased over those of 1987, but principally because drought conditions in 1987 had resulted in incomplete counts at most counting facilities. The count at the lower Terra Nova River fishway was the highest on record and that on the Northeast River, Placentia was the second highest recorded; the count at Salmon Brook (Gander River) was also among the highest on record. Counts of grilse for most of the remaining rivers were generally down compared to levels in the five or more years immediately preceding 1987. For many rivers, counts of large salmon in 1988 were down even lower than the low numbers seen in the drought of 1987. In contrast the count of large salmon for the lower Terra Nova River was the highest recorded in recent years.

3.2 Gulf Region

3.2.1 Newfoundland and Labrador

Commercial regulations in 1988 were similar to those in effect for 1987; SFA 12 (Fig. 3) remained closed, SFA 13 was open from June 5 - July 10 (as also in 1984-1986), and SFA 14 was open from June 5 - October 15. No new licences were issued in 1988. In 1987, there were 403 licences in the Gulf Region which included 61 in southern Labrador.

Recreational fishery regulations were also similar to those in 1987, with local seasons subject to variation orders, and all retained salmon required to be tagged.

Anglers were required to release salmon 63cm in length or longer in insular Newfoundland, but could keep them in southern Labrador. The seasonal limit of 15 fish, and the daily limits of two kept and four released, remained in effect for 1988.

Commercial landings of 61,000 small salmon were the highest since 1976 and exceeded those of 1987 by nine percent and the mean catch, 1984-1987, by 77%. The commercial catch of 12,400 large salmon was below 1987 and below 1984-1987 means. The recreational catch of 18,300 salmon (95% 1SW) was 31% above 1987.

Based on observations at counting facilities, total adult returns to Hughes Brook (SFA 13) and Lomond River (SFA 14)(Fig. 6) were above average in 1988, but at the more northern facilities (Torrent River and Western Arm Brook) counts were below 1987 returns. Counts at Western Arm Brook were in fact below average.

Counts at Fischell's Brook, in conjunction with electrofishing data from Harry's River, were used to assess the status of Area K (southern half of SFA 13) salmon stocks. Counts of 593 1SW salmon and 9 MSW salmon were obtained at the fence. Anglers caught 251 1SW salmon below the fence and released 8 MSW fish, while 123 1SW salmon were caught above the fence. The angling season began before the fence was in place and continued after the fence was removed. Hence, it was necessary to adjust fence returns for possible missed fish, on the basis of historic data. The estimates are that 685 1SW and 20 MSW salmon passed the fence and thus that 936 1SW and 20 MSW fish returned to the river but that the escapement allowed only 27% of the target number of eggs to be deposited in Fischell's Brook.

In Harry's River average age 1+ parr densities from eight sites were lower than those that would be appropriate to the target spawning level, which suggests that spawning requirements have not been met in recent years.

The angling catch at Fischell's Brook and Harry's River for both 1SW and MSW salmon was found to be significantly correlated with the angling catch for in the rest of Area K. In addition, the proportion of catches accounted for by each river is similar to the drainage area for each river. For example, Fischell's Brook accounts for 5% of Area K catch and 6.4% of its drainage area. Harry's River accounts for 25% of catch and has 15% of the Area K drainage area. As a result, it was concluded that spawning escapement in the two rivers is representative of that in all

rivers in Area K and that all rivers are currently below requirements.
The only forecasts possible for the rivers of Newfoundland and Labrador which run into the Gulf of St Lawrence, refer to Section 50 (Labrador) and Areas M and N of SFA 14. The commercial catch of large salmon in 1988 in Section 50 was forecast to be 12,932 fish. The actual catch was only 4,581 salmon, but despite this, a forecast has again been made on the basis of the numbers of small salmon caught in 1988. The prediction is that 8,566 large salmon will be caught in Section 50. A forecast of the commercial sport catch of 1SW salmon in areas M and N has been attempted for the first time. Using the information that 22,000 smolts left Western Arm Brook in 1988 (which is above the average of 18,000), a catch of 22,000 1SW fish in 1989 is forecast, which would be above recent average catches. Areas M and N account for 73% of the commercial catch and 78% of sport catch of small salmon in SFA 14.

3.2.2 New Brunswick and Nova Scotia

(See also section on Restigouche, Margaree and Miramichi rivers).

Restigouche River - Chaleur Bay (SFA 15): Angling catches of 7,254 salmon in SFA 15 in 1988 were the highest reported since records have been documented (1974 to 1988: Fig 4). Counts of 1SW salmon at the Upsalquitch barrier (Restigouche River) were less than in 1987, but slightly higher than the previous five-year mean. Counts of MSW salmon at Upsalquitch barrier were similar to 1987, but 35% greater than the previous five-year average. Counts of 1SW and MSW salmon at the Nepisiguit River fence were higher in 1988 than 1987, and substantially higher (141%) than the previous five-year mean. Natural salmon production in the Nepisiguit River has been augmented by hatchery stocking in recent years.

The Restigouche River comprises about 80% of the total rearing area available to salmon in SFA15. Total returns of salmon to Restigouche River, as estimated using angling catches, were 13,468 1SW salmon and 12,579 MSW salmon. Returns of 1SW salmon were the highest recorded in recent years (1970 to 1988). Returns of MSW salmon were 20% above the previous five-year average. Electrofishing surveys have indicated above average densities of juvenile Atlantic salmon in the years since the management plan was initiated in 1984, confirming that spawning levels have increased since the introduction of the management plan.

Miramichi, N.B. (SFA 16): The angling catch of 16,843 bright 1SW fish in SFA Area 16 in 1988 was 40% greater than in 1987 and 19% greater than the previous five-year mean (Fig 4). Angling catches of 1SW kelts in 1988 were 4,322 fish, which were 44% greater than in 1987, and 98% greater than the previous five-year average (2,181). Counts of both 1SW and MSW salmon at Millbank trap were above 1987 counts (Fig. 6). Counts of MSW salmon were about equal to the previous five-year mean, while counts of 1SW salmon were 59% greater than the five-year mean.

The Miramichi River comprises greater than 80% of the total salmon rearing area of SFA 16. Estimated total returns of salmon to the Miramichi in 1988 were 21,745 MSW salmon (about equal to the previous five-year mean) and 121,919 1SW salmon (about twice the previous five-year average). Electrofishing surveys have indicated

greater than average densities of juvenile salmon in recent years, confirming that spawning levels have increased since the introduction of the management plan.

PEI (SFA 17): Angling catches of 643 salmon in Prince Edward Island were the highest in 15 years. Increased catches are the result of enhancement activities on Morell River, as evidenced by hatchery returns to the Morell fishway. MSW counts at the fishway were also substantially higher than in 1987 (78 versus 64 salmon)(Fig. 6).

Gulf Shore, NS (SFA 18): Angling landings of 998 1SW salmon, and catch-and-release of 2,466 MSW salmon were higher than in 1987 (17% for 1SW and 13% for MSW salmon); in addition both totals were above the previous five-year averages (Fig. 4). Counting fence observations indicated MSW salmon returns to Cheticamp River were more than in 1987. More detailed summaries of returns of salmon to the Margaree River in SFA 18 are provided in Section 1.4.

3.3 Scotia-Fundy Region

Commercial landings, 1974-1984, had averaged 5,186 1SW and 11,416 MSW fish. The management plan has resulted in a reduction in the number of commercial fishermen entitled to receive salmon licences to a regional total of 41, (8,3,5,1 and 24 fishermen in SFA's 19,20, 21, 22 and 23, respectively).

The 1988 sport fishery was conducted under the same restrictions as those of 1987; retention of MSW salmon was prohibited, retained 1SW fish (less than 63cm) had to be tagged, and daily and season possession limits were two and ten 1SW fish respectively. Despite unusually low river discharges in New Brunswick, there were no in season closures.

Cape Breton East (SFA 19): Some 19 salmon-producing rivers in the area yielded an estimated 645 1SW fish to the 1988 sport fishery - 28% less than that in 1987 and 29% below the average catch in 1984-86. MSW salmon released after being hooked were estimated at 1,182 fish in 1988, essentially unchanged from 1987.

Eastern Shore, NS (SFA 20): The 19 principal salmon-producing rivers of SFA 20 (there are about 32 in total) yielded an estimated 2,632 1SW fish to the sport fishery - 48% higher than in 1987 and 20% above the 1985-1987 average. The number of 1SW fish counted at the Liscomb fishway, although the river is under enhancement, decreased 70% from 1987, but the returns in that year were the highest number in the ten year record. The percentage of hatchery smolts returning as 1SW fish was 21% below that seen in 1987, which suggests that unless there is an increase in the return of MSW fish in 1989, the low return of wild 1SW fish may reflect increased mortality in freshwater. The count of wild MSW fish at the Liscomb fishway was 14% below the 1987 level. The return rate of hatchery smolts returning as MSW fish in 1988 declined 28% from that of 1987.

The relationship between wild MSW returns and 1SW returns to Liscomb fishway the previous year, suggests the return of 64 MSW fish in 1989, although it is noted that the 1988 return (76 fish) was much below that forecast (235).

Southwest NS (SFA 21): There are only about 8 salmon producing rivers remaining in this SFA, as the others are seriously affected by acidification. The estimated sport catch of 1SW fish in 1988 was 2,715 - 38% down from the record catch in 1987 and 21% below the 1985-1987 mean catch. It is estimated that 353 MSW salmon were hooked and released in the LaHave River in 1988, or about 88% of the total in 1987.

The count of wild 1SW fish at the Morgan Falls fishway on the LaHave River was 2,464 (Fig 6) similar to 1987 but 31% higher than the mean for 1985-1987. The hatchery return rate for 1SW fish decreased noticeably from that seen in 1987 but the calculation is not final. The count of MSW fish at Morgan Falls was 386 fish - 27% below that in 1987 and 28% below the previous four year mean. The MSW count was only 55% of the forecast (700 MSW salmon) that had been based on the relation between MSW counts in one year and 1SW counts the year before. The forecast for 1989 is that 588 MSW salmon will return to Morgan Falls. This assessment will be verified in February.

Upper Bay of Fundy, NS (SFA 22): Most of the approximately 20 salmon rivers produce 1SW (and repeat spawning) salmon of limited marine migration. The 1988 recreational catch cannot be estimated as yet because the season is open longer than in other SFAs and anglers' reports are not received until later in the year. It would appear that catches will be low, partly as a result of reduced fishing effort due to low expectations in the Stewiacke River, despite good-to-excellent water conditions. While juvenile densities in the Stewiacke River remained relatively stable for the years contributing adults in 1986-1989, confidence is waning in the forecast indicator (July-October rainfall) used in recent years. Most other salmon stocks in the inner Bay of Fundy are experiencing similar drastic declines in returns, suggesting that a wide-spread factor is affecting returns to many rivers.

Southwestern NB (SFA 23): The 7 or 8 small "inner" Fundy rivers have salmon with stock characteristics more similar to those of SFA 22 than to the 7 or 8 larger "outer" Fundy rivers, (Saint John River and those to the west).

The inner Fundy rivers like these in SFA 22, produced low sport catches in 1988. Fall observations in the Big Salmon River indicated a total escapement under 400 fish - only 40% of the usual 1,000 or more spawners. The forecast for 1988 that 398 fish would be caught, was also much too optimistic.

The outer Bay of Fundy rivers, especially the Saint John River, experienced low summer discharges and lower sport catches in 1988.

Scotia-Fundy Synopsis

The higher marine survival of the 1986 smolt class, demonstrated by the improved 1SW returns in 1987 in SFAs 20 and 21, was not reflected in the 1988 MSW returns. Counts at three enumerating facilities were 19-62% of the forecast levels. Recreational catches of MSW salmon were equal to the 1985-1987 average catch in SFA 19, 31% below that average in SFA 20, 43% below in SFA 21, and as yet uncertain in SFA 22 and 23.

Survival of hatchery-reared smolts in the period between their release in 1987 and the return to counting facilities as 1SW fish in 1988 was lower than that observed

in 1986 and 1987. Actual counts of wild 1SW fish were 45% below the 1984-1987 average at Liscomb, but 31% above average at LaHave and 34% above at Mactaquac. Recreational catches of 1SW fish were 16% above the 1985-1987 average in SFA 19, 30% above in SFA 20, 20% above in SFA 21, 93% below in SFA 22 and 9% above in SFA 23.

Forecasts of the numbers of MSW salmon that will return to counting facilities in 1989 are generally higher than the actual returns in 1988. However it remains to be seen if returns in 1989 will be consistent with expectations. Such was not the case in 1988.

The low catches from the inner Bay of Fundy stocks are notable since environmental factors considered to have influenced survival in recent years had shown signs of improving. Indications are, however, that sea surface temperatures in the Bay of Fundy in 1988 were the highest of recent years, and this factor has been associated with reduced marine survival of these stocks in the past.

4.4 Quebec

Much additional information was made available this year by scientists from Ministère du Loisir, de la Chasse et de la Pêche. The following summary is based on this information.

Gaspe (Q1-03): Management measures in 1988 were the same as those in 1987 which included the ban on commercial (Gaspe only) fishing instituted in 1984, and the daily retention of one fish in the recreational fishery. MSW and 1SW salmon could be retained in the Gaspe sport fishery up to a total of 7 for the season, whatever the size.

Sport landings in 1988 (2,676 1SW fish) were 40% above 1987 catches and more than double the average 1983-1987 landings. The MSW sport catch of 6,016 fish was 45% more than in 1987 and represented a 58% improvement over the 1983-1987 average. Angler effort was also above average.

Counts at fishways on the Mitis, Matane and Madeleine rivers in Zone 3 (Q3) in 1988 exceeded long-term means for both 1SW and MSW fish. It is possible that due to enhancement activities, counts at these fishways may not reflect abundance of wild stocks, however, counts of spawners in other Gaspe rivers indicated that the counts of wild fish in 1988 were the highest since 1972.

The abundance of 1SW fish in 1988 in the Madeleine and Bonaventure rivers and of 2SW salmon in the Mitis, indicate that MSW returns to these rivers in 1989 can be expected to again be above recent average levels.

Anticosti Island (Q10): Only sport fisheries occur on Anticosti Island. MWS and 1SW can be retained to a limit of 2 fish a day and a limit of 10 fish a year.

Landings in 1988 were 59 MSW and 613 1SW salmon. This is an overall improvement of 13% over 1987, but still 20% below the average catch of 1983-1987. There is no apparent explanation for the lower catch, except that the summers in the

last two years have been very dry.

North Shore (Q5-Q9): Management measures in 1988 were the same as those since 1984 including: a ban on commercial fisheries west of Franquelin (approximately midway along the coast of Zone Q7); individual quotas for commercial fishermen east of Franquelin, based on their highest declared catch in the 1979-1983 period; and retention limits in the sport fishery of one to three salmon per day and 7 to 10 salmon (MSW or 1SW) per season depending on locality.

Commercial landings were 22,628 salmon (average weight of 3.89 kg) which is 4% lower than in 1987 but 26% higher than the 1983-1987 average. This number of fish represents 68% of the 33,500 overall quota although many fishermen attained their individual quota. The sport catch in 1988 was 4,760 MSW and 3,699 1SW fish, representing an overall increase of 45% above that of 1987 and 64% above the 1983-1987 average.

Ungava (Q11): Sport, commercial and food fisheries occur in Ungava Bay. There is no quota on commercial and food fisheries. Sport fishermen can retain four salmon a day; the seasonal limit is 10 fish.

Data for commercial and food fisheries are not yet available. The sport catch of 2,406 salmon was equal to that in 1987 but 69% more than the 1983-1987 mean.

5.5 West Greenland

In 1988 the salmon fishery at West Greenland was limited to a quota of about 910 t, given the accepted seasonal adjustments to the agreed TAC of 850 t. The season opened on August 25 in most communities (except for three communities in the south where it opened on August 1) and closed much later than in recent years, at the end of November. The extended season is believed to be the result of a system of individual enterprise allocations (as opposed to the usual single competitive quota) which allowed fishermen to increase incomes by providing higher quality salmon to fish plants over an extended period. It is not known whether this would have resulted in any change in the percentage of fish that might have been discarded as unsuitable for sale.

It appears that the extra 10 to 12 weeks required to attain the quota in 1988 was more a function of the "system" than the abundance of salmon. Hence, former indices of abundance such as daily nominal landings during the first days/weeks of August and, to some extent, the total nominal landings, will not be comparable to the value for 1988. The total landings have been used in the past as an index of MSW returns to Canada in the following year (Advisory Document 87/24).

There is reason to expect that the recent trend to a later opening date will have increased the catch of North American salmon because the proportion of such fish increases as the summer advances. The extension of the season such as occurred in 1988, so that fish can be caught even later in the year, is likely to magnify this effect.

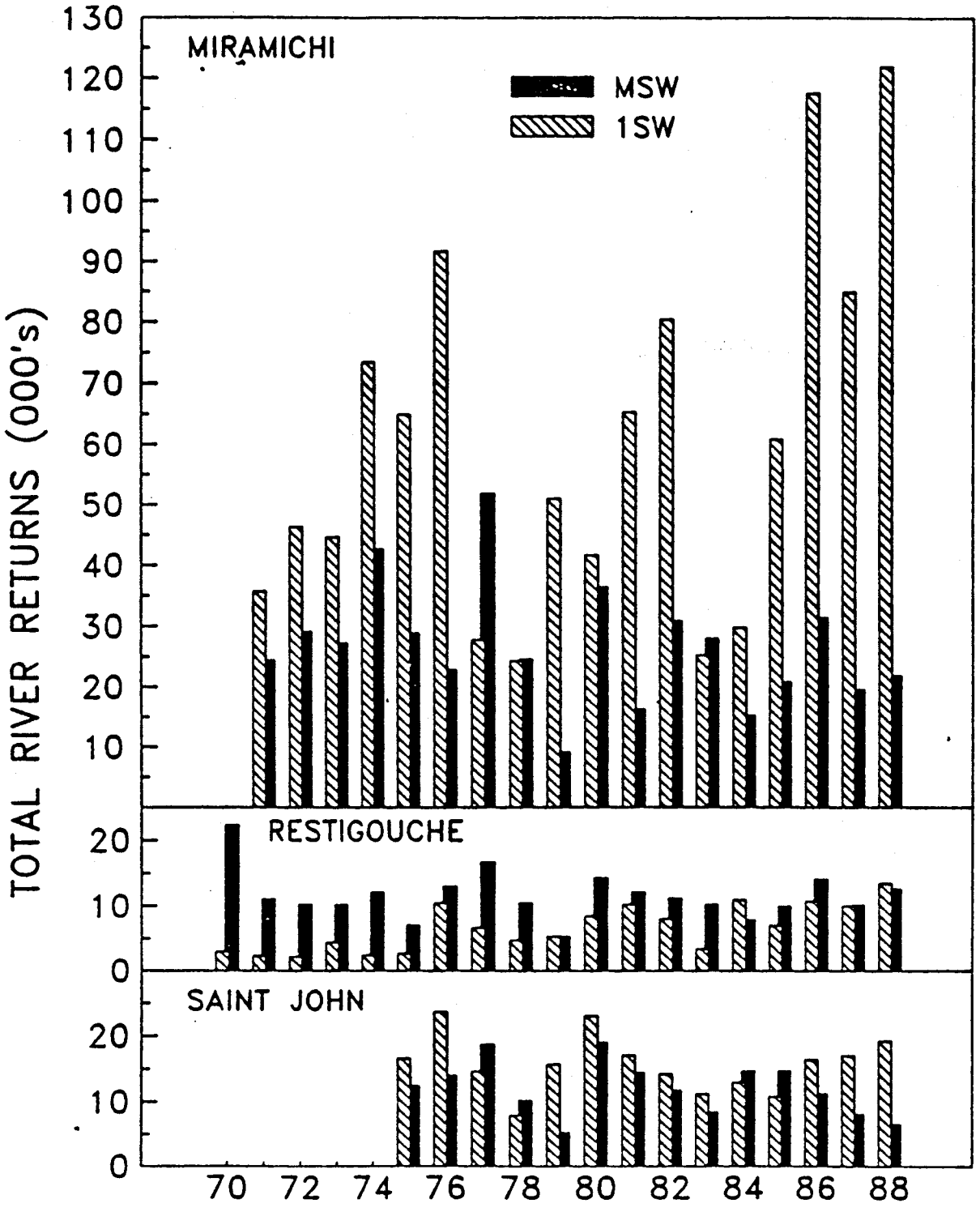


Fig. 1. Estimated total river returns to major rivers of New Brunswick.

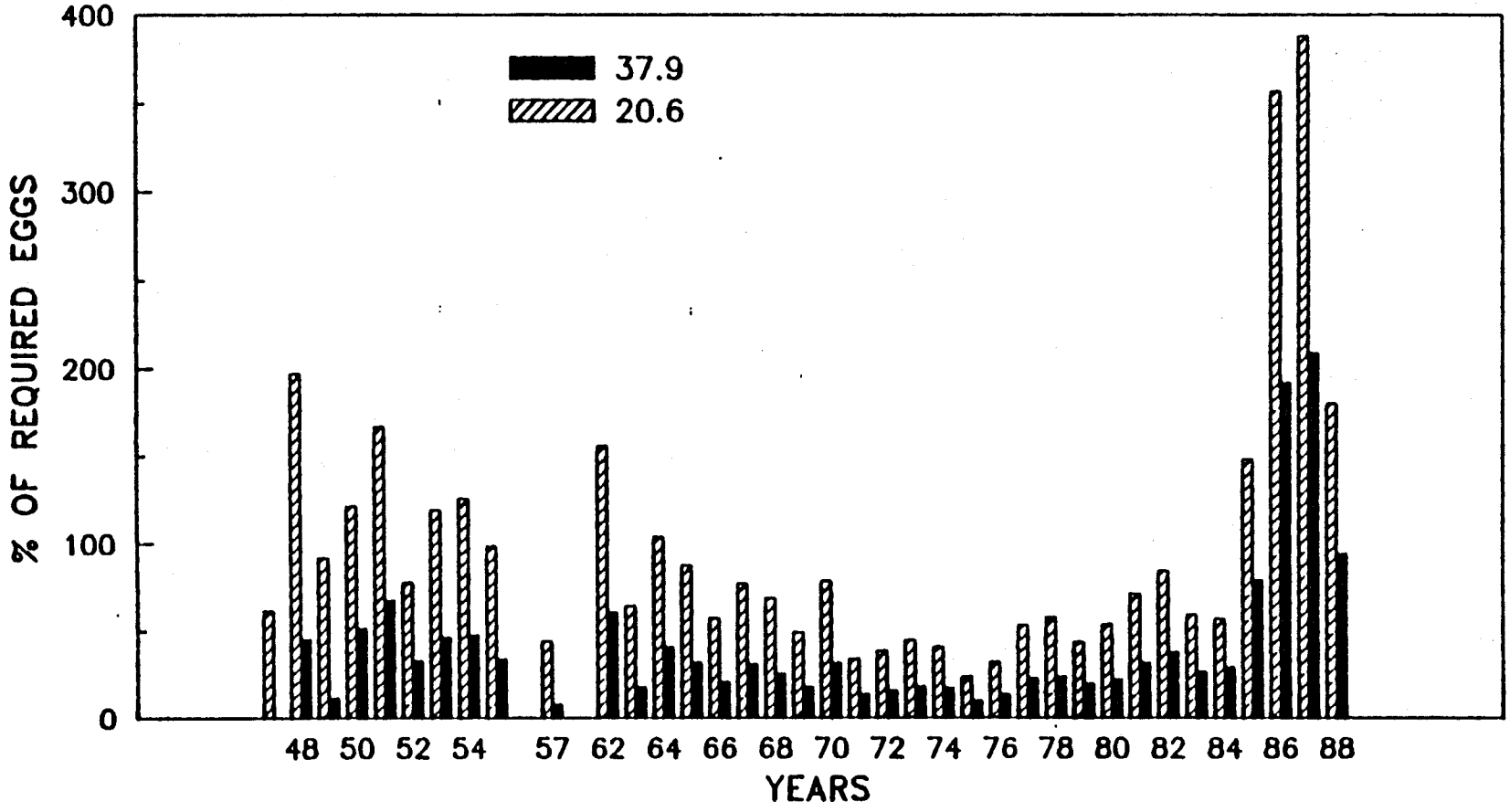


Fig. 2. Margaree River, percent of required egg deposition at angler exploitation rates of either 20.6% or 37.9% of returns. (1987–1988 based on adjusted DFO estimates.)

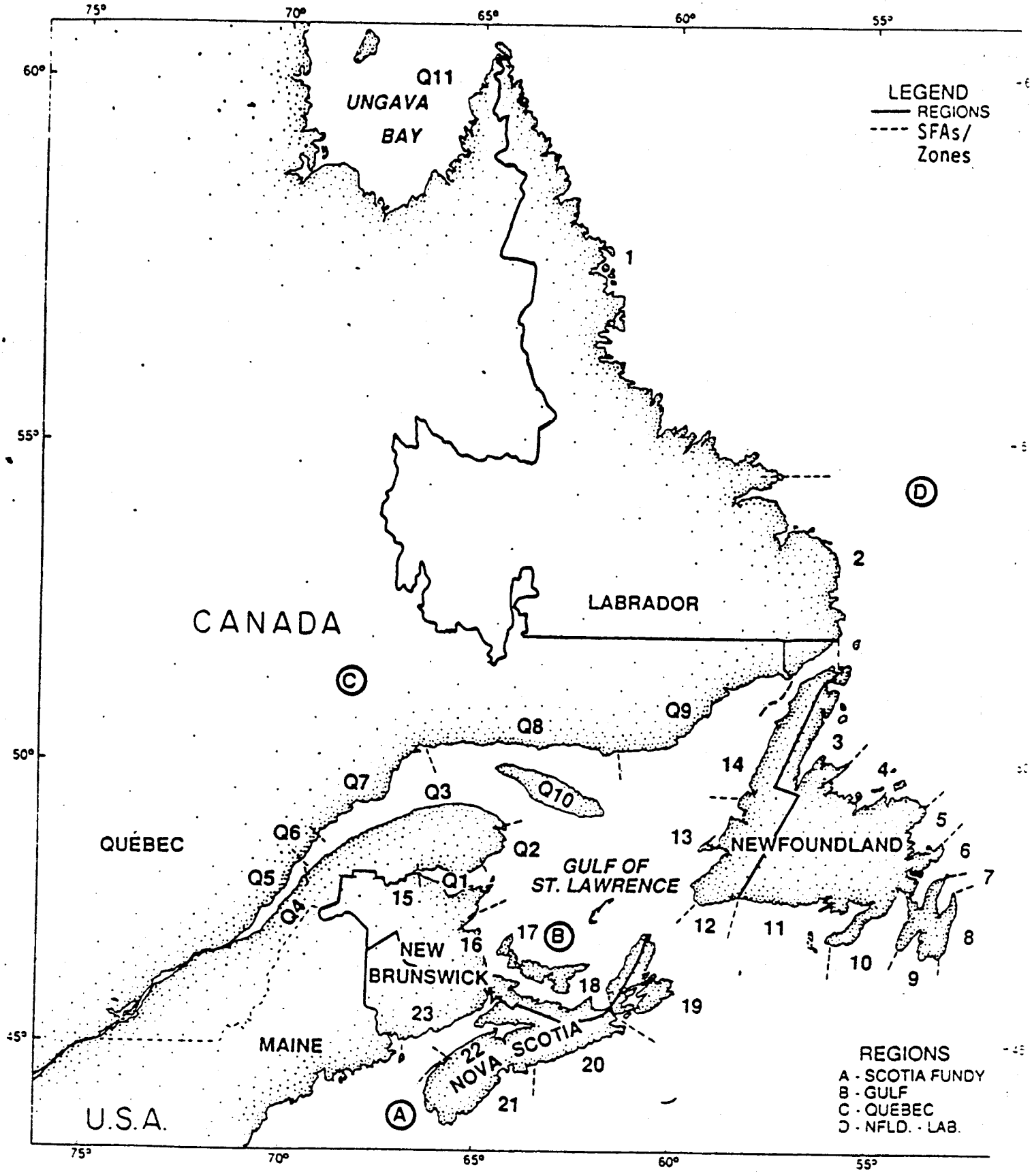


Fig. 3. Map of Atlantic provinces showing Salmon Fishing Areas (SFA's) 1-23, Salmon Management Zones of Quebec (Q's) 1-11, provincial and DFO Regional boundaries.

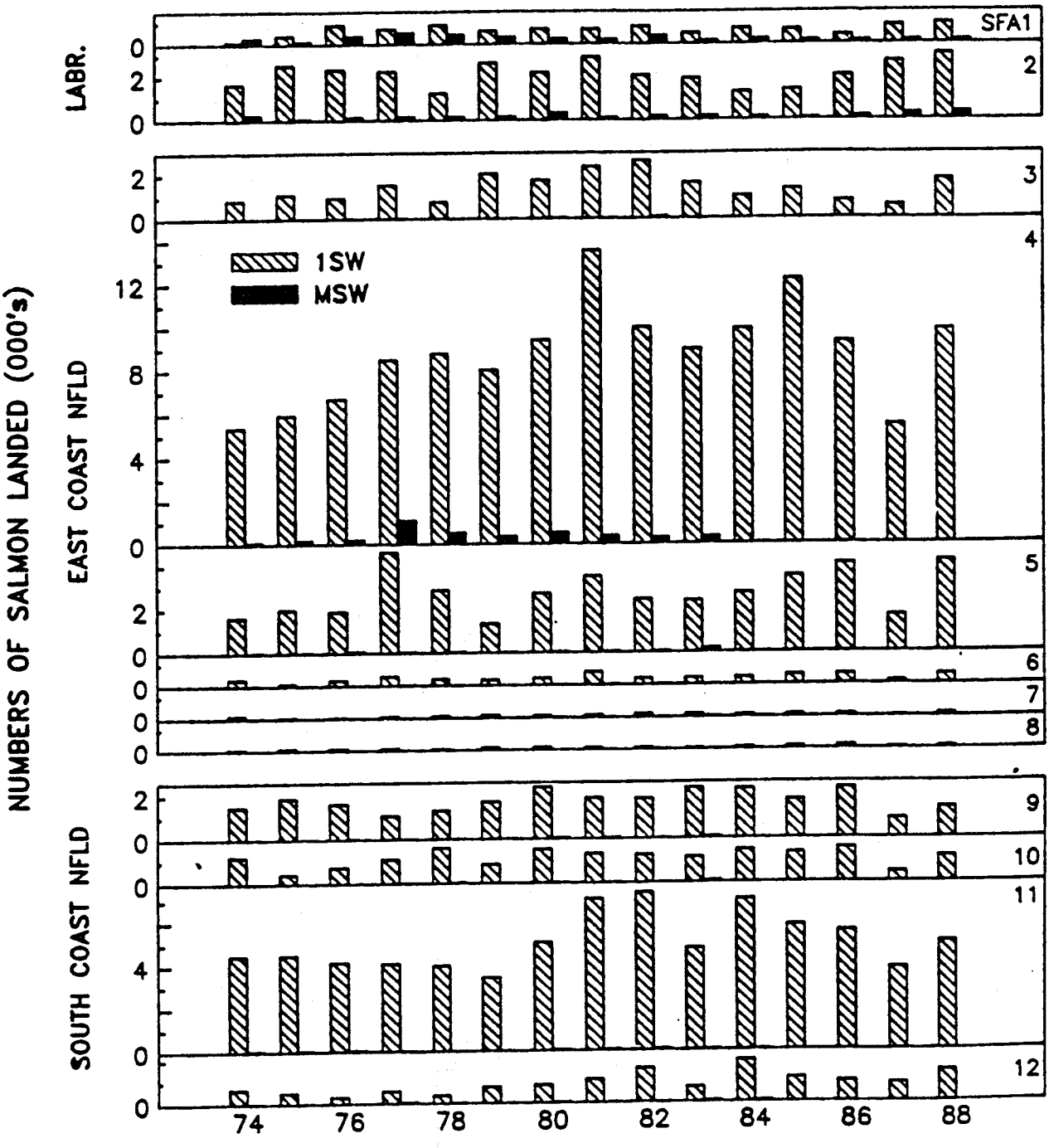


Fig. 4. Recreational landings, SFA's 1–12.

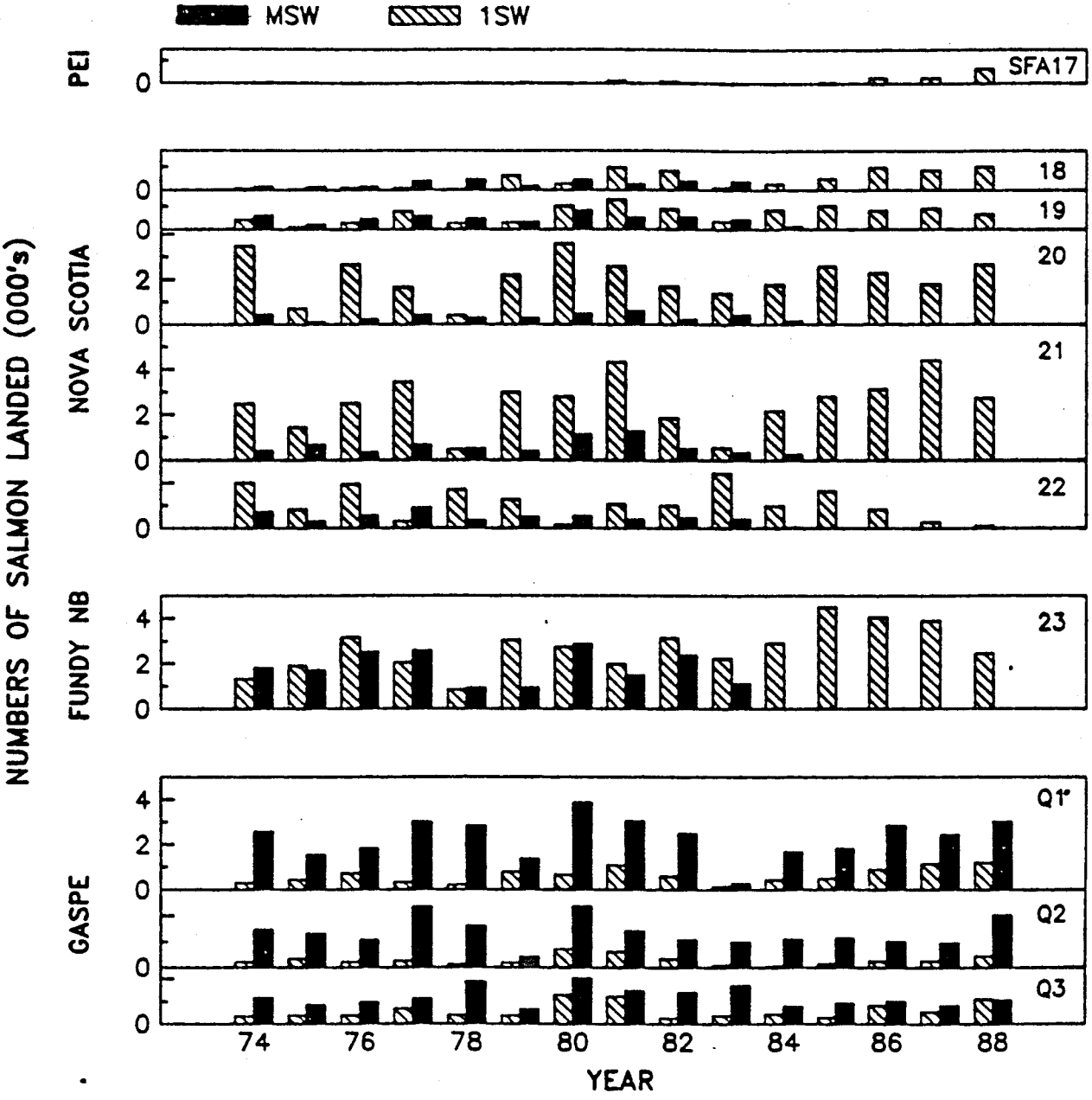


Fig. 4, cont'd. Recreational landings, SFA's 17–23 and Q1–Q3.

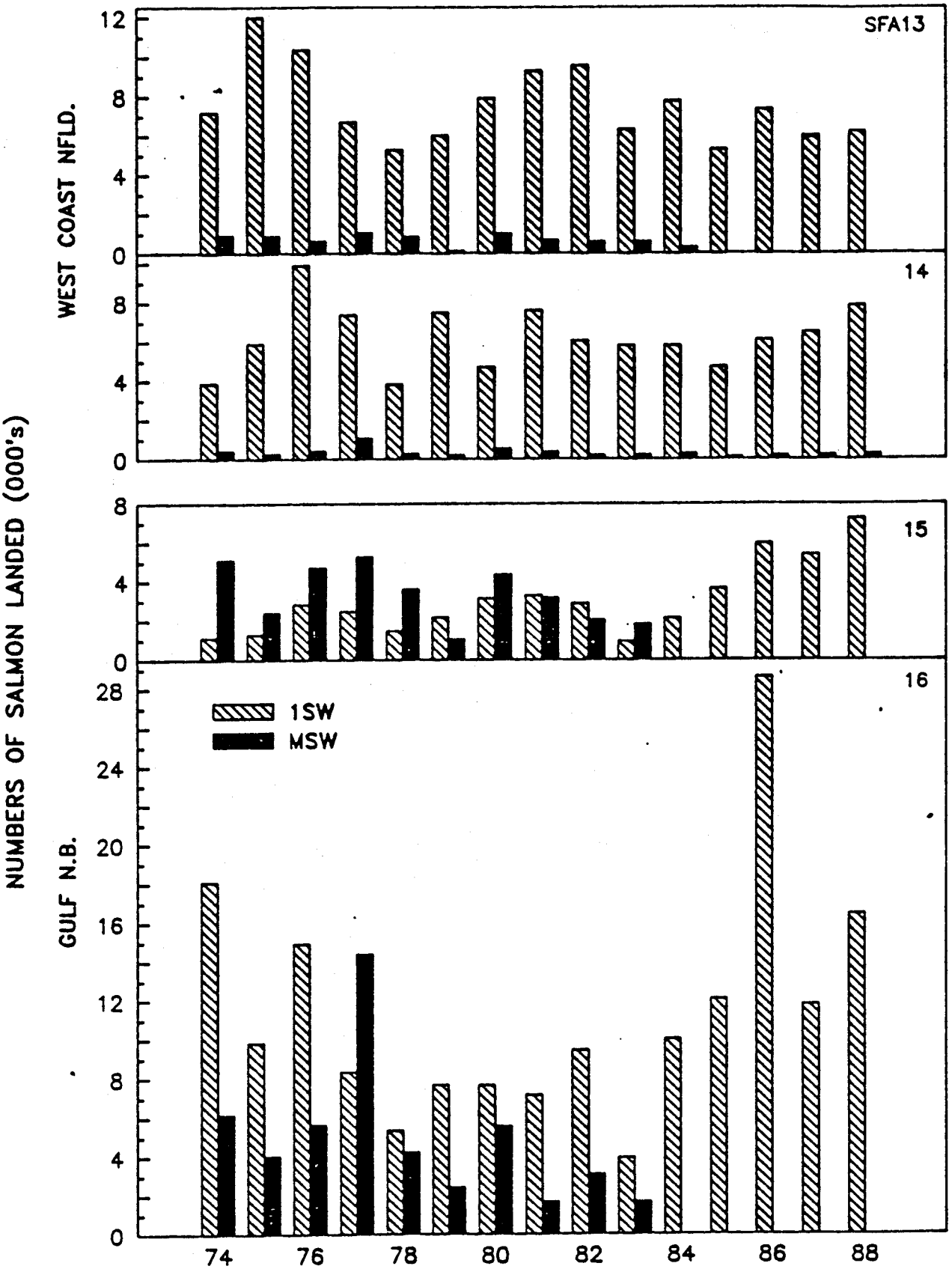


Fig. 4. cont'd. Recreational landings, SFA's 13–16.

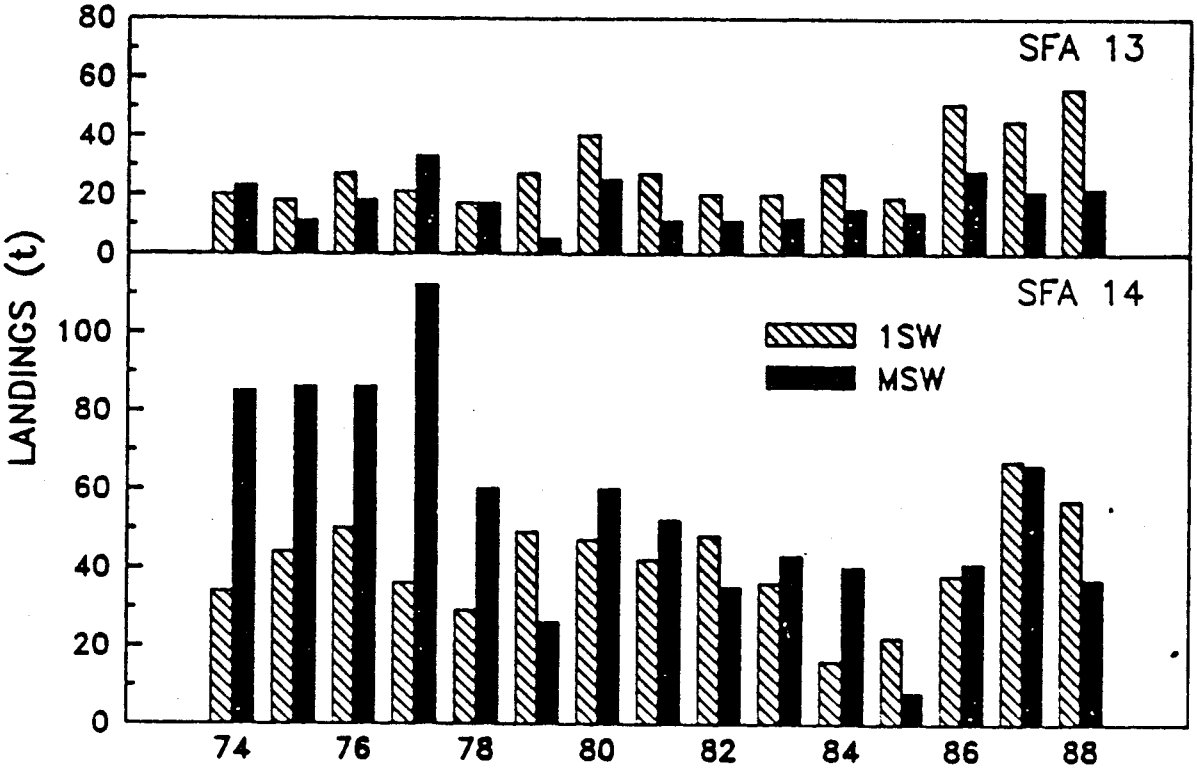


Fig. 5. Commercial landings west Newfoundland and south Labrador, SFA's 13 and 14, 1974–1988.

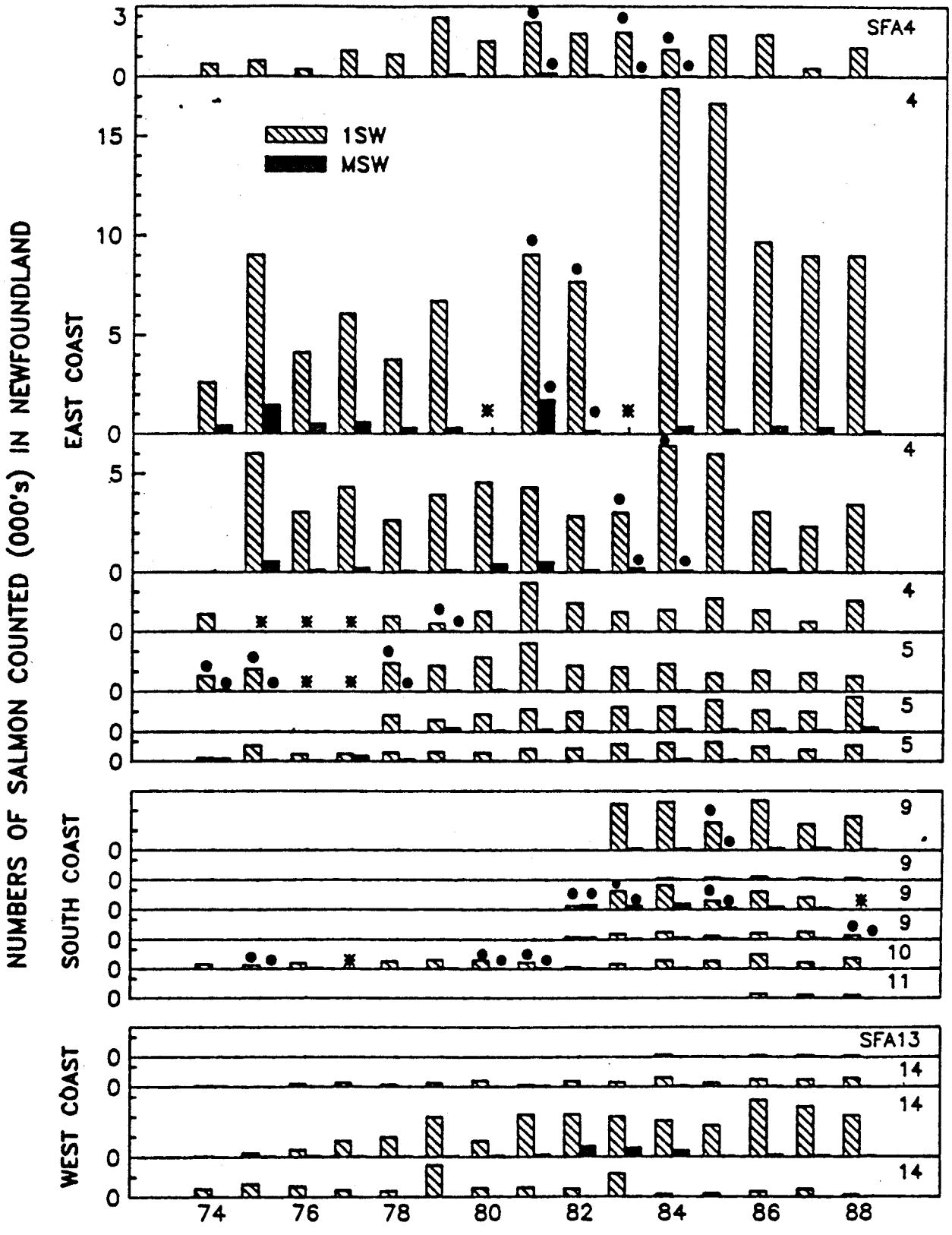


Fig. 6.. Fishway counts, top to bottom: Indian, Exploits (Bishop), Exploits (Rattling), Gander Middle, L. Terra Nova, U. Terra Nova, Biscay Bay, Northeast (Trepassey), Little Salmonier, Colinet, Northeast (Placentia), Grand Bank, Hughes, Lomond, Torrent and Western Arm. A dot (●) denotes a partial count; an astersisk (✱) indicates not operated.

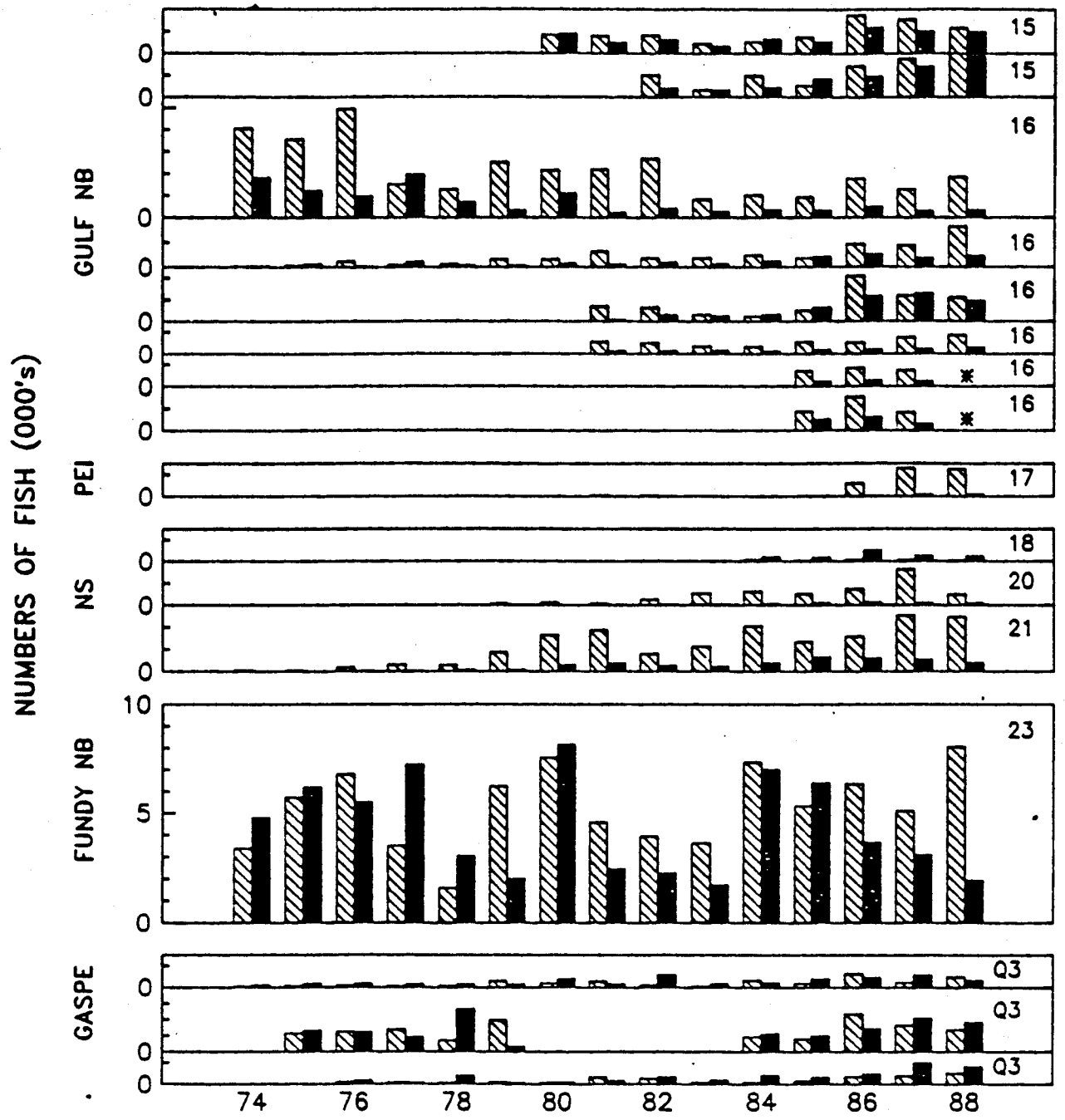


Fig. 6. cont'd. Upsalquitch, Nepisiguit, Miramichi (Millbank), Bartholomew, North Branch, Dungarvon, Northwest Mir. trap, Southwest Mir. trap, Morell, Cheticamp, Liscomb, LaHave, Saint John (Mact.) Mitis, Madeleine. An asterisk (*) indicates not operated.

EDINBURGH
JUNE 1989

ANNEX 9

NORTH AMERICAN COMMISSION

PAPER NAC(89)12

US ATLANTIC SALMON STOCKS - A TEN YEAR REVIEW

U S Atlantic Salmon Stocks

A Ten-Year Review

1979 - 1988

- Stocking

- Adult Returns

- Sport Harvest

- Regulations

Prepared By:

Dan C Kimball, U S Fish and Wildlife Service

..... Ten-Year Summary

Gerald Marancik, U S Fish and Wildlife Service
Edward Baum, Maine Atlantic Sea-Run Salmon Commission

..... Maine Rivers Summary

Lawrence Stolte, U S Fish and Wildlife Service

..... Merrimack River Summary

Lawrence Bandolin, U S Fish and Wildlife Service
Stephen Amaral, University of Massachusetts

..... Connecticut River Summary

- MAY 1989 -

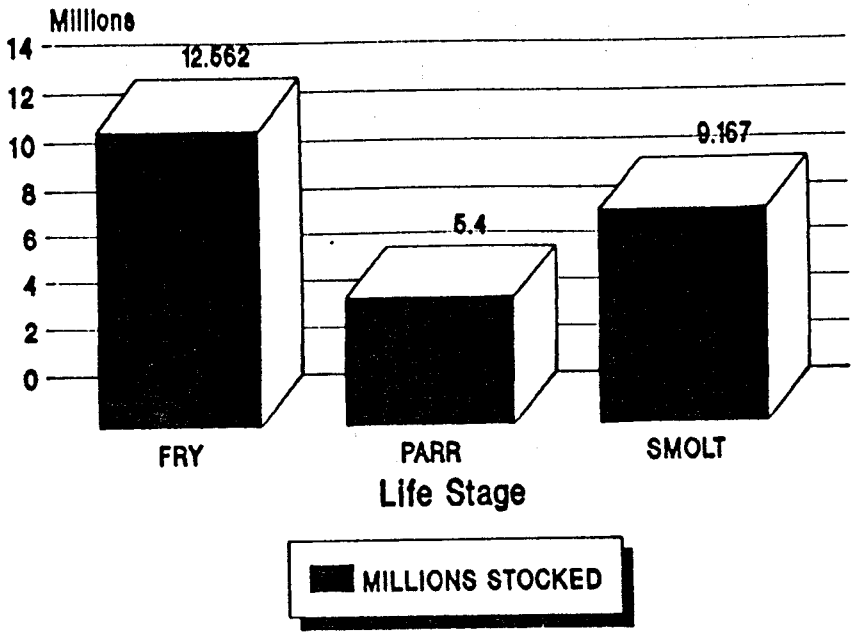
Total Atlantic Salmon Stocked
in U.S. Waters 1979-1988

9,167,400	SMOLT
5,399,800	PARR
12,562,000	FRY

27,129,200	TOTAL

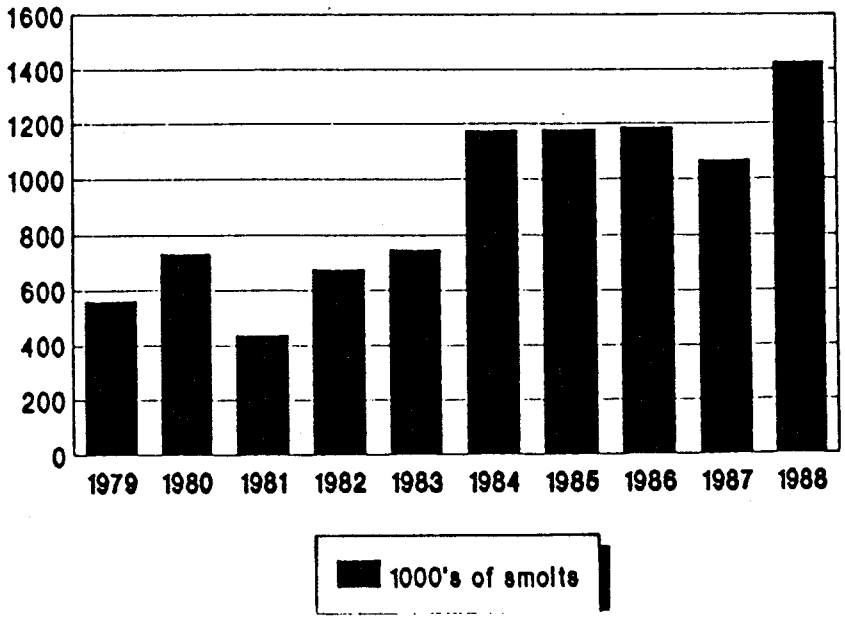
LIFE STAGES OF ATL. SALMON

Stocked in U.S. from 1979 thru 1988

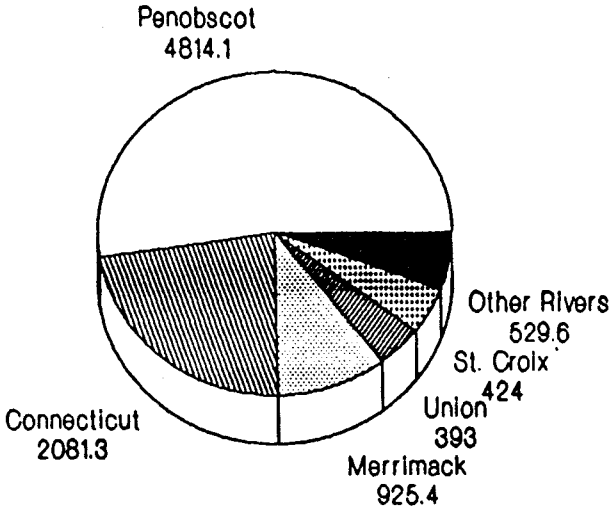


ATLANTIC SALMON SMOLTS

Stocked in U.S. Waters 1979-1988

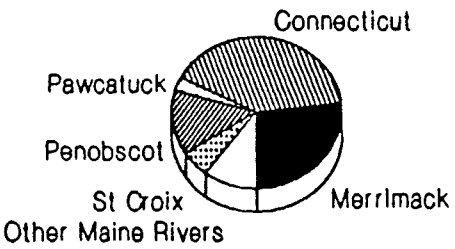


SMOLT ALLOCATION
Among U.S. Rivers 1979-1988

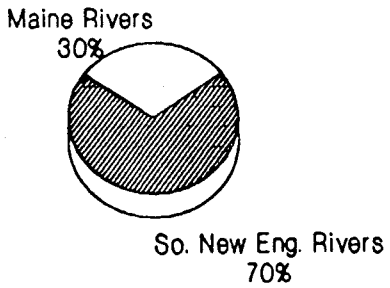


"Other Rivers" = one RI and 10 ME Rivers

Distribution of Fry and Parr
Among River Systems 1979-1988



By River



By Region

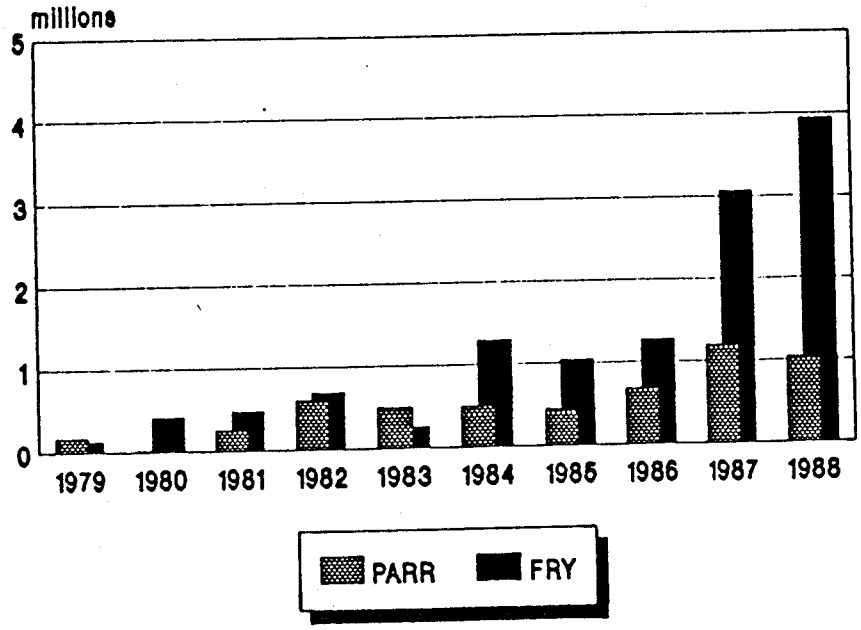
17.96 MILLION FRY & PARR DISTRIBUTED

Salmon Stocking Strategies

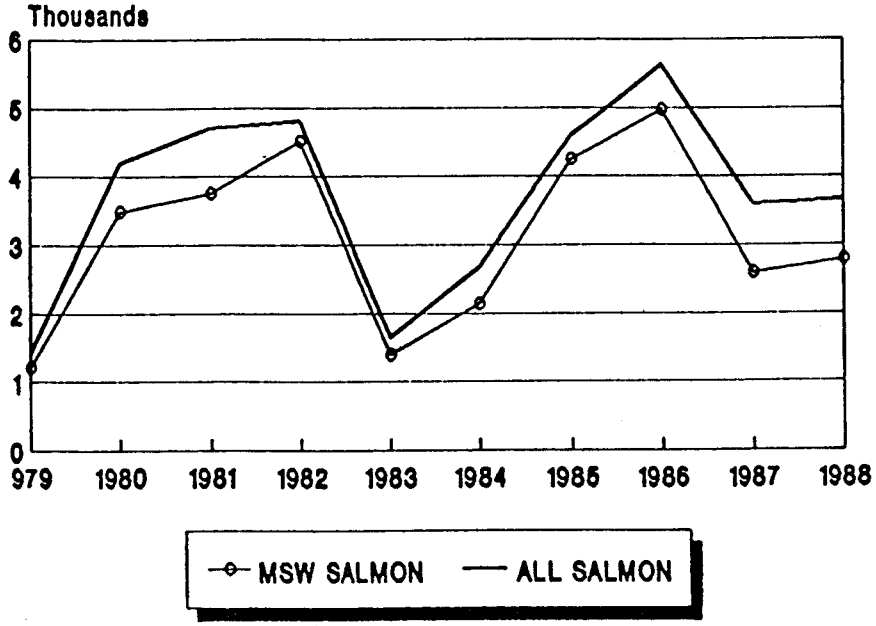
- Emphasis on five rivers: Penobscot, St Croix, Union, Merrimack, and Connecticut
- Focus production on 1-yr. old smolt (parr being a bi-product)
- Growing emphasis on fry stocking
- Priority of broodstock sources:
  1. Sea-run adults
  2. Reconditioned kelts (So. New Eng.)
  3. Domestic (hatchery-reared)

SALMON FRY & PARR STOCKED

in New England 1979-1988

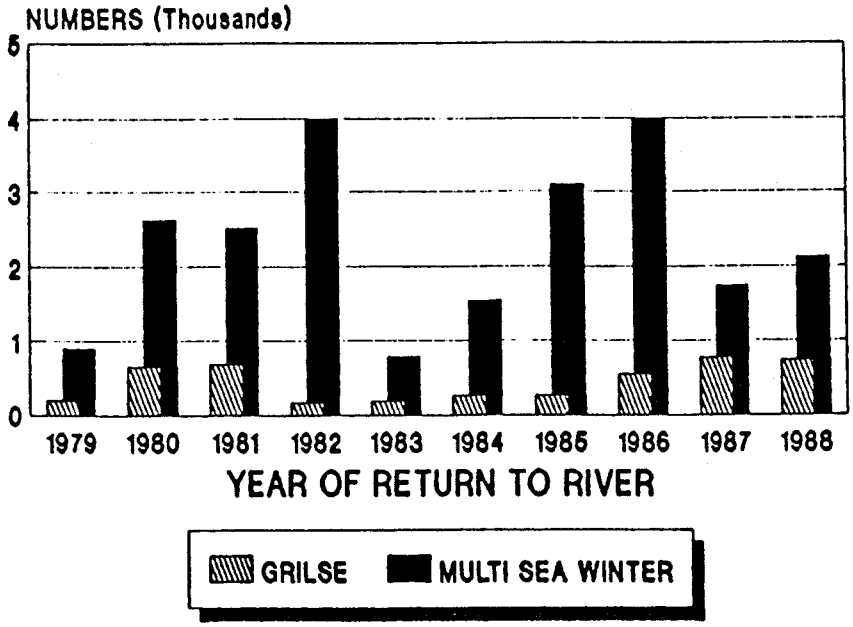


ATLANTIC SALMON RETURNS
U.S. Rivers 1979-1988



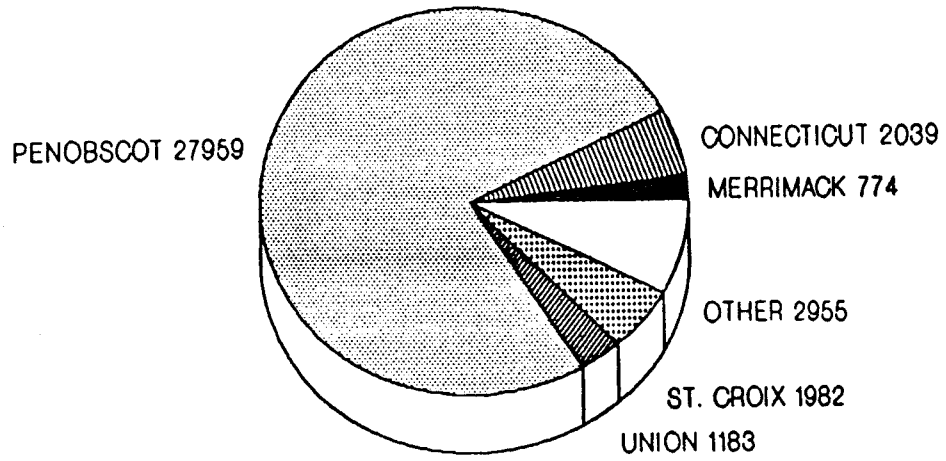
ONLY INCLUDES KNOWN RETURNS

PENOBSCOT SALMON RETURNS
Grilse and MSW 1979-1988



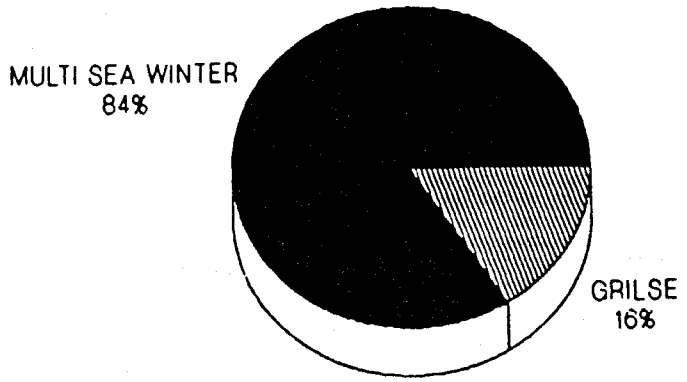
Data from Me. Sea-Run Sal. Com.

U.S. ATL. SALMON RETURNS
Known Returns of All Ages 1979-1988



'OTHER' includes ten rivers

GRILSE & MSW SALMON RATIO
U.S. Returns for 1979-1988



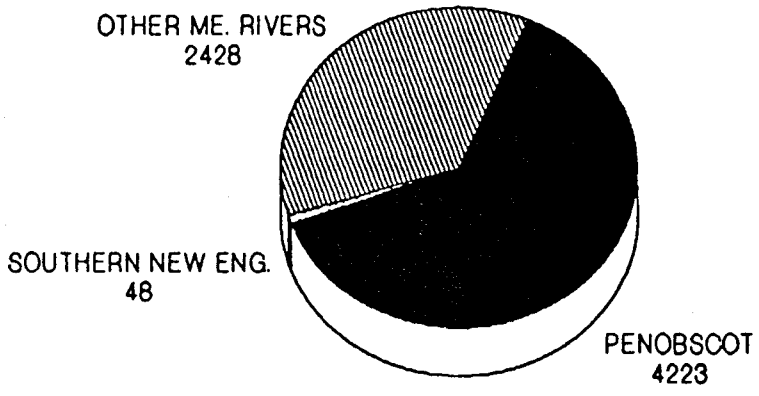
Based on 36,892 returns

U. S. Sport Harvest
1979 - 1988

- Total 10-Year Rod Kill: 6,699
- 99% occurred in Maine; 63% in Penobscot
- Trend is downward

Includes only reported harvest

DISTRIBUTION OF U.S. CATCH
HARVEST BY AREA 1979-1988



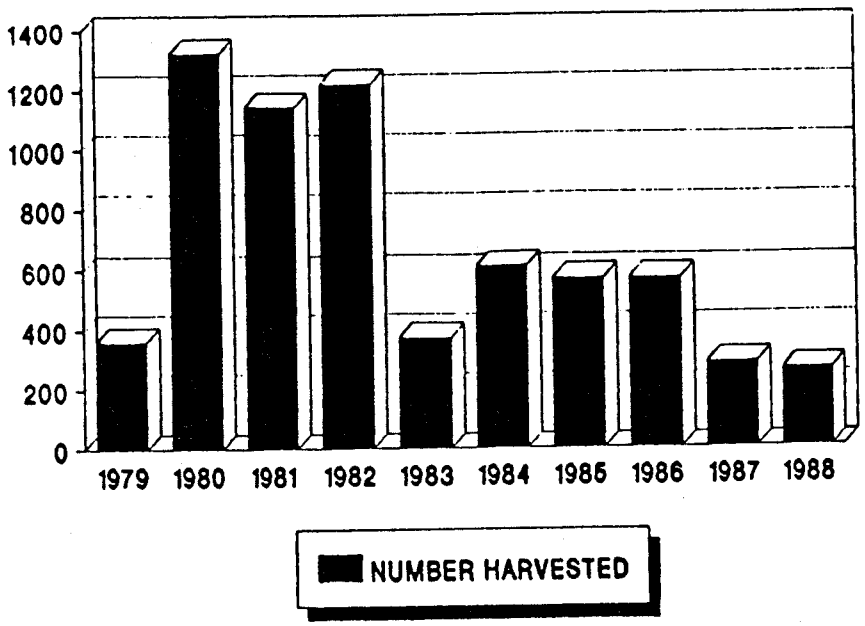
DATA INCLUDES ONLY REPORTED HARVEST

Adult Returns 1979 - 1988

- Total Known Returns: 36,892
- Annual Range: 1,423 to 5,624
- Predominantly MSW runs in all rivers
- Penobscot produced 75% of all MSW returns
- Grilse component variable

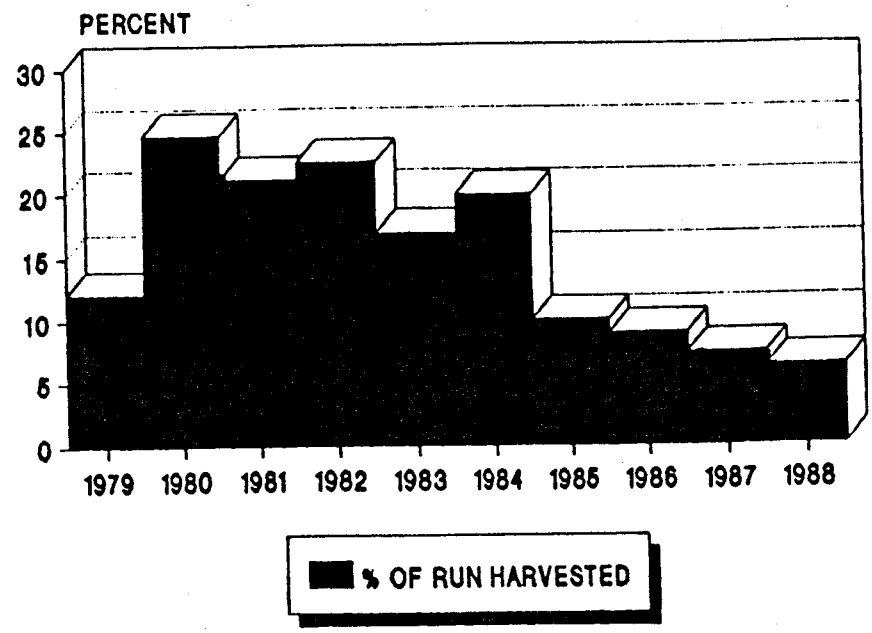
ATL. SALMON SPORT CATCH

Known U.S. Rod Kill 1979-1988



PENOBSCOT ROD KILL

As a Percent of Run



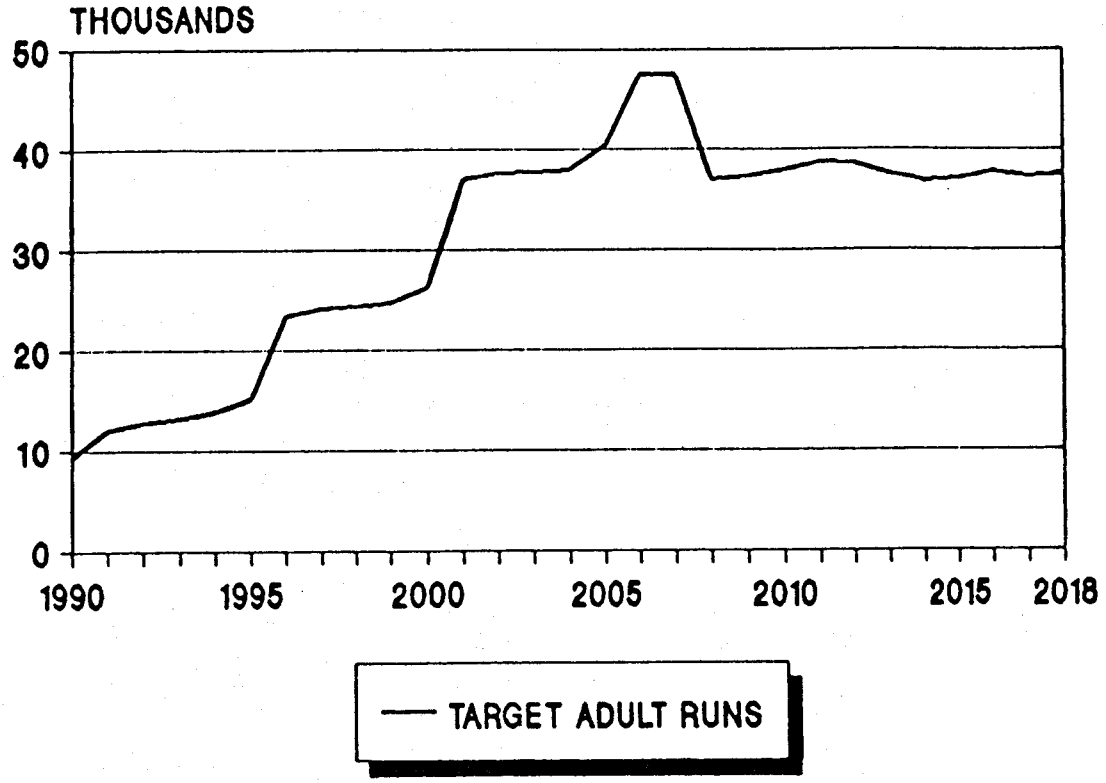
Me. Atl. Sea-Run Sal. Com. data (Apr 89)

Regulation of U.S. Fishery

1979 - 1988

- No directed commercial fishery
- Ocean fishery regulated by:
  - » NASCO (beyond 12 miles)
  - » New Eng. FMC (3-12 miles)
  - » States (0-3 miles)
- Inland fishery regulated by states
- Trend towards increasing restrictions

30 YEARS INTO THE FUTURE ?
PROJECTED U.S. STOCK DEVELOPMENT



US ATLANTIC SALMON STOCK STATISTICAL SUMMARY 1979-1988

	Adult Returns			Stocking (1,000's)			Harvest
Year	1SW	MSW	Total	Smolt	Parr	Fry	Rod Kill
1979	210	1,213	1,423	556.3	174.4	131.2	361
1980	699	3,482	4,181	730.1	11.5	411.2	1,323
1981	967	3,741	4,708	435.2	258.2	477.6	1,141
1982	306	4,499	4,805	671.4	601.3	690.7	1,218
1983	251	1,403	1,654	745.4	501.3	254.8	371
1984	540	2,129	2,669	1,175.6	502.6	1,278.4	608
1985	345	4,240	4,585	1,178.0	446.0	1,042.9	567
1986	659	4,965	5,624	1,182.8	678.9	1,261.8	567
1987	1,008	2,584	3,592	1,066.2	1,185.0	3,069.9	283
1988	868	2,783	3,651	1,426.4	1,040.6	3,943.5	260
Total	**5,853**	**31,039**	**36,892**	**9,167.4**	**5,399.8**	**12,562.0**	**6,699**

MAINE RIVERS SUMMARY

General Comments on the Maine Program

General

The Maine Atlantic salmon program includes, to varying degrees, 14 different river systems. Emphasis ranges from the priority Penobscot River restoration program and maintenance of existing populations in the "downeast" rivers to experimental assessment Programs on the Saco and passive programs on the Kennebec and Androscoggin Rivers. The priorities, strategies and allocation of available funds, manpower and hatchery stocks also vary with these programs.

Stocking Strategy

In general, emphasis is placed on the stocking of smolts in the Maine salmon programs. Atlantic salmon fry and parr are produced at the hatcheries if eggs are available and as a "by-product" of the smolt program. The hatchery programs are aimed at producing 1 year old smolts, although approximately 30% of production at Craig Brook NFH is 2 year old smolts.

Assessment programs are being conducted in most of the river programs to determine in-river smolt mortalities, effects of hydroelectric dams, production potential etc. The stocking strategies for many of the programs are based on these studies.

Fishing Regulations

General angling regulations in Maine differentiate between angling in tidal waters and non-tidal waters. Regulations in tidal waters limit the season to angling between May 1 and October 15 inclusive. Gear is limited to rod and reel with a 5 salmon per season limit. In inland waters, the angling season is May 1 to September 15 inclusive. Gear is restricted to fly fishing only with a 5 fish per season limit. All salmon lawfully taken must be registered at designated registration stations. The Penobscot, St Croix, Pleasant, Dennys and Aroostook Rivers have special, more restrictive regulations.

Adult Returns

It is difficult to make general statements regarding adult returns to Maine rivers due to the age of some of the programs and the emphasis that they have received. It can be said, however, that returns in many of the programs have been lower than expected in recent years.

Tagging Program

The Penobscot River is the only river in the Maine program with a tagging program. Details are provided in the Penobscot River section.

ST. CROIX RIVER

Stocking Strategy

Atlantic salmon smolts, parr and fry have been stocked in the St. Croix River since 1981 to restore anadromous populations. Beginning in 1984, paired groups of finclipped smolts have been stocked to assess the effects of the hydroelectric dams on the return rates to the river as adults. Fry have been stocked in various locations in order to aid restoration efforts and to provide an estimate of potential production. Beginning in 1988, parr stockings were discontinued in order to eliminate some confusion regarding the origin of returning adults. Stocking levels have not reached the full allocation due to disease considerations regarding the Canadian hatcheries. As this situation is changed, stocking levels in the St. Croix will increase. Maine has limited stocking of smolts to one half of the program requirements.

Fishing Regulations

The Atlantic salmon fishery on the St. Croix is limited to a "grilse only" fishery with a season limit of 5 fish, none of which may exceed 25 inches in length.

Adult Returns

Returning adults have been enumerated at the Milltown trap since 1981. It is not possible to determine the exact origin of the adults until scale samples can be examined since many of these did not have any identifying marks. Estimates made on the 1988 returnees classify 51% of the run as hatchery origin, while the remaining 49% is attributed to a combination of hatchery and wild production.

There are not enough data to determine trends in age structure, origin, etc.

Tagging

There is no tagging program on the St. Croix, although between 1981 and 1983, a total of 60,000 Carlin tagged smolts were released into the St. Croix to evaluate the effects of release sites upon smolt survival through the adult stage. Transit mortality (including downstream passage losses at Woodland and Grand Falls) was estimated to be 38% and 23% respectively.

PENOBSCOT RIVER

Stocking Strategy

Juvenile Atlantic salmon have been stocked in the Penobscot River since 1962 in the current program to restore anadromous runs. The stocking strategy has changed from the early part of the program when all smolts were stocked below the lowermost dam in Bangor. Between 1979 and 1988, smolts were stocked throughout the basin in an attempt to induce the returning adults upriver for spawning. In 1989, smolts will be stocked in the upriver mainstem areas in an attempt to increase returns while inducing them to migrate above the dams to the spawning areas. Emphasis is placed on stocking smolts, with fry and parr as a secondary product of the hatcheries.

Fishing Regulations

Since 1982, the fishing regulations on the Penobscot River have become increasingly more restrictive. The angling limits have gone from no limit in 1981 to 2 salmon per day to 5 per season to 1 large salmon and 4 grilse limit per season. In 1982 the opening of the season was changed from April 1 to May 1. The more restrictive limits have reduced the harvest from approximately 20% in the early 1980's to 10% or less since 1985.
There is no commercial fishery for salmon permitted within Maine coastal waters.

Adult Returns

In 1978, the trapping facility on the Penobscot River was moved from the Bangor Dam to the Veazie Dam. This allowed a more complete count of all salmon entering the river.

It appears that the component of wild fish in the run has been increasing slowly over the last 10 years, but in recent years has remained approximately 8% of the total run.

In 1987 and 1988 the grilse component of the run was 27%, which far exceeds the long term average of 11%.

Tagging Program

The smolt tagging program on the Penobscot River has been used as a tool to assess various parts of the program such as smolt mortalities due to dams, survival of upriver VS downriver releases and to determine the impacts of the high seas commercial fisheries on US stocks. There has been increased emphasis placed on coded wire microtags (CWT) in lieu of Carlin tags. Studies indicate that smolts fitted with CWT have a greater rate of return to homewaters. Monitoring programs of the commercial fisheries estimate that as 50% or more of the fish destined to return to the Penobscot River are taken in these fisheries.

UNION RIVER

Stocking Strategy

The Union River is stocked with smolts below the Ellsworth Dam at the head of tide to produce an additional source of broodstock for the Maine program. Broodstock are trapped at the Ellsworth facility and transported to the Craig Brook NFH. This has been the goal of the program since the trap was completed in 1974.

Fishing Regulation

General coastal regulations apply downstream from the Route 1 bridge in Ellsworth; general inland regulations apply above Route 1 bridge; 5 salmon per season limit.

Adult Returns

All of the adults returning to the Union River are the result of hatchery released smolts. There is no natural reproduction. Adult returns have decreased dramatically since 1983 after the peak years of 1980 to 1983 even though stocking levels have increased. The reasons for the decrease, as with many other rivers, is not known.

The reason for the low numbers of 1SW salmon returns in recent years is also not known.

Tagging Program

There is currently no tagging program in the Union River.

SACO RIVER

Stocking Strategy

The stocking program on the Saco River began in 1982 and 1983 with the release of Atlantic salmon parr and smolts respectively. The purpose of these releases was to generate interest in a future restoration program. Smolt stocking since 1983 has been at a relatively low level and aimed principally at determining in-river mortalities of migrating smolts and the potential for getting adult returns. With the promise of improved smolt and adult fish passage facilities, the present philosophy is leaning more towards restoration of the salmon runs. Juvenile salmon available from the hatchery system for the Saco River is limited and low on the priority list. The Saco is scheduled to receive 25,000 smolts per year through 1992 to continue assessing fish passage, adult returns, spawning success and juvenile production.

Fishing Regulations

The Saco River is under general state regulations: May 1 through October 15 with rod and reel in tidal water; May 1 through October 15 fly fishing only in inland water; season limit of 5 salmon.

Adult Returns

The exact numbers of returning adult salmon cannot be determined because of poor fish passage efficiencies and inadequate trapping facilities. The trap at the lower dam can be bypassed at certain flows. Since adults returning to the Saco have been monitored only since 1985, and the numbers have been low, there is insufficient data to determine trends. In 1988, traps were operated at the Upper York and Skelton Dams. All 35 of the salmon trapped were of hatchery origin, either from the Saco River smolt and parr stockings or strays from other river systems.

Tagging

There is no tagging program in the Saco River.

AROOSTOOK RIVER

Stocking Strategy

The Aroostook River program, gained increased status 1986 and is relatively new to the Maine program. Since 1980, much of the juvenile salmon production was the result of adult salmon being obtained from the Mactaquac Hatchery and released in the Aroostook River. The Canadian Department of Fisheries and Oceans stocks 10,000 tagged smolts

in the St. John River below Mactaquac to provide adults for these releases.

Smolts have not been stocked in the Aroostook since 1980. In 1987 and 1988, eggs were incubated at the Mactaquac Hatchery until the eyed stage while disease surveys were conducted on the broodstock. They were then transferred to the Green Lake NFH to complete development for fry stocking. The Aroostook program is complicated by a lack of suitable St John River strain eggs and incubation sites.

Fishery Regulations

Prior to 1988, there was no chance for a major sport fishery due to the lack of fish passage at the Tinker Dam. With the completion of the fish trap, special regulations were instituted for the 1989 season. Salmon fishing is permitted May 1 to September 30 with a 5 grilse per season limit (all salmon over 25 inches must be released).

Adult Returns

The first Atlantic salmon to return to the Aroostook River in recent years were captured in 1988 at the Tinker trap/sorting facility. The facility was financed almost solely by private donations raised by the organization Atlantic Salmon for Northern Maine. A total of 56 salmon (24 grilse and 32 MSW) were passed above the dam. Fifty one of the 56 fish were trapped in September and October. These fish were almost certainly strays from the St John River resulting from smolts released at Mactaquac. Since the program is young and returns have been counted for only 1 year, there is insufficient data to determine trends.

Tagging

There is no tagging program on the Aroostook River.

OTHER MAINE RIVERS

Stocking Strategy

Included in this category are primarily the Machias, East Machias, Dennys, Narraguagus, Pleasant, Ducktrap and Sheepscot Rivers. These rivers support the only self sustaining populations of Atlantic salmon in the United States. Atlantic salmon smolts, parr, and fry have been stocked to offset inadequate spawning escapement and to maintain a sport fishery. The Dennys River is scheduled to receive 12000 and 25000 smolts in alternating years as part of a study to determine the relationship between spawning escapement, redd counts and parr production.

Fishing Regulations

These rivers are under general state Atlantic salmon angling regulations except that the Pleasant River is closed to angling, and the Dennys River is open to angling from May 1 to June 30 in the headwater areas.

Adult Returns

The exact numbers of adults returning to these rivers in the last ten years in not known. Except in isolated instances, there have not been any traps or counting weirs in place.

Returns have been tabulated using angler catches and, at times, estimates based on redd counts and trap catches.

Estimates indicate that the number of adults has decreased in the last five years, although it is not known if this is natural fluctuation or a long term decline. Near record low angler catches have been recorded in some rivers.

Tagging

There has been no tagging program in these rivers between 1979 and 1988.

MERRIMACK RIVER ATLANTIC SALMON PROGRAM

A SUMMARY - 1979 THROUGH 1988

Stocking Strategy

The Atlantic salmon stocking target for the Merrimack River is 125,000 smolts and 1,800,000 fry released annually. During the ten-year period 925,400 smolts, 514,400 parr, 4,306,500 fry were actually released into the river system.

In two of the ten years (1985 and 1987) the smolt target was actually exceeded while the additional eight years witnessed stocking levels below the target. The fry stocking target has yet to be reached although the 1988 fry-release (1,717,700) did approach the desired level. The parr stocking program does not occur by design but is merely a bi-product of the smolt stocking program. Initially, the smolt stocking program utilized two-year-old fish followed later by a mixture of both yearlings and two-year-olds. Beginning in 1987 only yearling smolts were reared and released. Fish not reaching what was considered smolt size were released as parr. In 1988 only those fish equal to or greater than 16cm total length were released as smolts. Fish less than the 16cm total length were released as parr.

Smolt stocking has normally occurred in the main stem upstream of the two lower-most dams. However, in the last several years, in an effort to decrease the suspected impact of the hydro-electric dams, approximately one-half of the smolt production has been released downstream from the lower-most dam.

The fry-stocking program addresses approximately 82,000 one-hundred square meter units considered to be salmon nursery habitat throughout the basin. Stocking densities vary between 18 and 48 fry/unit depending on the quality of the habitat.

Fishery Regulation

At the present time, the taking of Atlantic salmon in the coastal waters of New Hampshire and Massachusetts as well as in the Merrimack River is highly restricted. In New Hampshire Atlantic salmon can only be taken within the coastal water by hook-and-line and cannot be sold. In 1988 the Atlantic salmon was given total protection within the coastal waters of Massachusetts (they cannot be possessed). Within the Merrimack River itself, Atlantic salmon are fully protected from the mouth of the river to the first upstream dam and fish passage facility in Lawrence, MA. Immediately, upstream from the dam in

Lawrence to the MA/NH border Atlantic salmon can be taken by hook-and-line. The daily bag limit is one fish not less than 15 inches (36cm) length. Within the Merrimack River upstream from the MA/NH border to the Ayers Island dam on the Pemigewasset River Atlantic salmon can be taken by fly-fishing or single-hook artificial lure from April 1 through September 30. The daily bag limit is one fish not less than 15 inches in length. Upstream from the Ayers Island dam, throughout the Pemigewasset River system (that portion of the Merrimack River basin containing the bulk of the salmon habitat), the Atlantic salmon is fully protected. The number of salmon permitted to enter the section of river open to fishing is completely controlled by the state fishery agencies by means of the trap facility at the first dam. In 1983, the year preceding the enactment of the regulations addressing the Merrimack River, the known sport harvest of Atlantic salmon amounted to 28 fish. This represented over 25% of the total returns. Documented illegal sport harvests thereafter have amounted to eight fish in 1984, one in 1985, four in 1986, one in 1987, and one in 1988. These kinds of losses are considered tolerable.

Adult Returns

Prior to the fall of 1982, it was impossible for the Fisheries agencies to measure the size of each year's adult salmon return. Beginning in the fall of 1982, with the completion of the fish passage facility of the Essex dam in Lawrence, MA (first dam on the river's main stem), it was possible to document adult returns with a great deal of reliability. From 1982 through 1988 a total of 774 salmon (rod catches, poaching, and fish passage counts) have returned to the Merrimack River.

Rates of return (number of adults per 1,000 fish stocked) have varied considerably from year to year. The fry stocking program (lots for which the life cycle has been completed) has yielded rates that range from 0.12 to as high as 1.33. The smolt stocking program (lots for which the life cycle has been completed) has yielded rates that range from 0.13 to as high as 1.57. The low rates of return are believed to be related to environmental conditions that occur during the smolt migration, the operations regime of the hydro-electric dams during smolt migration, and a host of unknown marine factors. Very little information at this time is available relative to the contribution of the parr plants.

The timing of the fish passage has been rather consistent from year to year with approximately 20% of the returns occurring in May, 50% occurring in June, 25% occurring in July, and the remainder occurring in September and October. The bulk of the grilse arrive in July while the two-sea-winter fish dominate the returns in June.

All age components of the stocking program have contributed to the adult returns each year since 1982. Over the 10-year time period 88% of the returns are of known stocking origin. The smolt plants have contributed 55%, the parr plants have contributed 5%, and the fry plants have contributed 40%.

Each years adult run has also been composed of grilse and multi-sea-winter salmon. For the entire period 19% of the returns have come from the grilse, 77% from the two-sea-winter fish, with the remaining 4% coming from 3-sea-winter fish and repeat spawners. On the average, returns originating from the fry plants tend to have fewer grilse than returns originating from the smolt plants.

Tagging Program and Results

The Atlantic salmon marking program is presently aimed at providing information relative to the ocean commercial harvest of Merrimack River salmon and to providing a visual means of identifying returning adults as to age at stocking (fry, parr, or smolt releases). Initially, the marking program was designed to identify the parental origin of the returning adults, and to provide information on a number of smolt-release techniques. Although fin removal has been utilized on a regular basis, the marking program is now centered around utilizing coded-wire-tags or coded-wire -tags in combination with fin removal. From 1982 through 1988 a total of 555,300 smolts and 287,000 parr have been marked.

Thus far, little definitive information has been obtained in the studies addressing smolt stocking techniques. Little differences in adult returns have been noted between smolts migrating voluntarily from smolt release ponds and those transported and released directly into the river. Important information has come from the coded-wire-tagging program relative to the ocean commercial fishery.

In 1986, eight fish of Merrimack River origin were identified in the ocean commercial fishery (seven from West Greenland and one from Labrador). The estimated harvest of Merrimack River one-sea-winter salmon amounted to 90 fish. This corresponded to a two-sea-winter salmon return to the Merrimack River in 1987 of 119 fish. The commercial harvest was roughly 76% of the home river return. In 1987 two fish of Merrimack River origin were identified in the ocean commercial fishery (from West Greenland). The estimated harvest of one-sea-winter salmon amounted to 52 fish which was nearly equal to the 53 two-sea-winter salmon that returned in 1988.

CONNECTICUT RIVER SUMMARY

A. Connecticut River Stocking Strategy

Smolt stocking has switched from two year smolts to one year smolts. Due to lower return rates for smolts stocked above hydro electric facilities the emphasis has switched from upper tributary stocking to below most or all hydro electric facilities.

Parr stocked are a result of fall hatchery grading of fish that are either not expected to smolt the next spring or from spring grading of fish that have not reached accepted smolt size. Recent results of studies done on both migrating smolts and back calculation of smolt length from returned adults indicated that for hatchery smolts a minimum of 150mm total length must be attained. Prior to 1985 juveniles stocked were considered to be smolts if they attained 135mm. Lower than expected return rates in past years may be the result of over estimates of the number of smolts stocked.

As egg supplies have increased, mainly from domestic broodstock, which are progeny of sea-run adults; fry stocking has increased significantly. Monitoring of survival and growth of fry through the fall prior to smoltification shows the majority of fry stocked become smolts 2 years after stocking. Densities of 1+ parr range from 1 to 20 per 100 square meters; with average parr density of 6.4.

B. Fishery Regulation

The taking of Atlantic salmon by any means is illegal in the mainstem and tributaries of Connecticut river. There are adult salmon angled mainly by anglers fishing for American shad, Alosa sapidissima; but these salmon must be released without undue injury. Anglers

mainly fishing for trout do capture juvenile salmon but these too must be released without undue injury.

There is a commercial gillnet fishery for adult American shad in the lower river. Salmon are captured in this fishery although no reliable estimates of the numbers caught are available. These salmon must be released regardless of their condition.

C. Connecticut River Adult Returns

Adult returns have fluctuated by better than an order of magnitude in the last ten years. The reasons for these fluctuations is difficult to determine. Hatchery practices, strains used and stocking locations have changed significantly.

Hatcheries have switched from two year smolts to one year smolts, diets have changed, feeding techniques as well as other hatchery practices are still evolving, although presently at a slower rate, than in past years. Various strains of adults are used to produce eggs for the hatchery program. Eggs from sea-run adults is preferred, however, eggs from kelts and domesticated broodstocks have made up a large portion of the total supply. Studies are underway to test returns of smolts from various egg sources.

Returns from upriver stocking are much less than returns from smolts stocked below most or all hydro-electric facilities (Table 3). Stocking of hatchery smolts has been below all or most hydro-electric facilities in recent years.

D. Connecticut River Tagging Program and Results Coded Wire Tags

Coded wire tags have been used to mark various lots of salmon smolts since 1982; to evaluate strains used and release locations. Initially, flat-wire tags were used but round-wire tags have been used since 1986 as the flat-wire tags proved to be unreadable with x-ray technology.

There were 1,010,100 smolts released with coded wire tags between 1982 and 1988 (Table 2). At the end of 1988, a total of 309 tags have been recovered (Table 2). Some tags remain in kelts being reconditioned. In general, the percentage of tag returns by stocking location and strain does not change from observations made on initial recoveries when additional tags from reconditioned kelts are subsequently added to the data base, if the total number of initial tags analyzed is at least 40 - 50.

In 1983 and 1988 single recoveries from one sea winter homewater returns were reported, all other recoveries have been from two sea winter adults.

Carlin Tags

Over 129,000 smolts were carlin-tagged and released between 1984 and 1986 (Table 5). Through 1988, these fish have yielded 37 tag returns, with slightly less than half coming from home water returns. The 1984 release resulted in grilse recaptures, all in Canadian and Greenland waters. A similar release in 1985 resulted in only five returns from these fisheries, and no tags were returned in 1987 from the 1986 releases. Home water returns reached a high of eight in 1986 from the 1984 releases and the low was two from 1986 releases recovered in 1988. Due to poor returns from these tagging efforts has been discontinued with the 1987 releases, for a period of at least three years.

Table 1. Numbers of fry, parr, and smolts released during 1979-1988.

Year	# Released Fry	Parr	Smolt	Total
1979	53,500	38,400	145,100	237,000
1980	285,700	11,500	51,800	349,000
1981	168,300	187,500	78,600	434,400
1982	291,500	44,100	208,900	544,100
1983	226,400	398,600	98,000	723,000
1984	625,100	391,400	312,300	1,328,800
1985	422,300	226,300	283,300	931,000
1986	162,000	471,200	302,200	935,400
1987	1,101,300	728,500	205,800	2,035,600
1988	1,301,400	140,100	395,300	1,836,800
Total	**2,078,300**	**2,637,600**	**4,637,500**	**9,350,400**

Table 2. The number of coded wire tags recovered in relation to release year and number.

Stock Year	Number Released	1983	1984	1985	1986	1987	1988	Total
1982	113,000	1	21	2	-	-	-	24
1983	85,800	-	-	192	3*	-	-	195
1984	99,700	-	-	-	61	-	-	61
1985	34,900	-	-	-	-	-	-	0
1986	146,900	-	-	-	-	4	14	18
1987	176,000	-	-	-	-	-	11	11
1988	353,800	-	-	-	-	-	-	-
Total	**1,010,100**	**1**	**21**	**194**	**64**	**4**	**25**	**309**

* These three tags resulted from the release of 55,000 yearling parr in 1983 in the White River that migrated as smolts in 1984.

Table 3. Coded wire tag recoveries by release year and location.

Release Location	Release Year						
	1982	1983	1984	1985	1986	1987	Total
Salmon/Farmington Rivers	1	0	0	0	0	0	1
Farmington River	6	32	0	0	0	0	38
Salmon River	6	0	0	0	0	0	6
Holyoke	8	9	11	0	0	0	28
Deerfield River	0	0	0	0	7	4	11
Millers River	0	0	0	0	3	3	6
Turners Falls	3	124	37	0	8	2	174
White River	0	30	13	0	0	2	45
Total	**24**	**195**	**61**	**0**	**18**	**11**	**309**

Table 4. Coded wire tag recoveries by strain and release year.

Strain	Release Year						
	1982	1983	1984	1985	1986	1987	Total
Connecticut	8	195	11	0	8	4	226
Penobscot	16	0	30	0	10	0	56
Union	0	0	20	0	0	7	27
Total	**24**	**195**	**61**	**0**	**18**	**11**	**309**

Table 5. Carlin tag recoveries and releases from 1984 to 1988.

Tag Year	Number Tagged	Return Year	Recovery Location: Canada	Greenland	Homewaters	Total
1984	44,364	1985	12	2	0	14
		1986	0	0	8	8
1985	45,185	1986	5	0	0	5
		1987	0	0	8	8
1986	40,302	1987	0	0	0	0
		1988	0	0	2	2
Total	**129,851**		**17**	**2**	**18**	**37**

EDINBURGH
JUNE 1989

ANNEX 10

NORTH AMERICAN COMMISSION

PAPER NAC(89)18

1989 ATLANTIC SALMON MANAGEMENT PLAN

Guiding Principles and Major Elements

Atlantic Fisheries Service
Department of Fisheries and Oceans
May 1989

INDEX

1989 ATLANTIC SALMON MANAGEMENT PLAN

The 1989 Atlantic Salmon Management Plan is divided into major components. This permits easier reference to the appropriate measures applicable in each geographic region and Atlantic Salmon Management Zones.

The News Release of the plan is contained in the first section which is followed by sections on the principles and objectives adopted for the management of the salmon fishery, after consultation with all parties involved. The next section presents the major elements contained in the 1989 Atlantic Salmon Management Plan followed by the general policies and measures regarding licensing, tagging, gear, enforcement, habitat and enhancement in Gulf, Scotia-Fundy, and Newfoundland regions. Specific management initiatives and guidelines for particular salmon management zones are also included.

Fisheries and Oceans

NEWS RELEASE

For immediate release, May 5 1989

1989 ATLANTIC SALMON MANAGEMENT PLAN ANNOUNCED

Ottawa - Fisheries and Oceans Minister Tom Siddon today announced details of the 1989 Atlantic Salmon Management Plan.

As in other years, the plan was developed in consultation with the Atlantic Salmon Advisory Board. In addition, a special Atlantic Salmon Workshop was held in January 1989 to discuss measures for the future management, stock enhancement and conservation of the resource.

"We have made important steps toward rebuilding the Atlantic salmon stocks and we must continue to do so", Mr Siddon said. "For this reason, I am announcing today a second five-year salmon conservation strategy that will be in effect beginning this year".

Conservation of salmon stocks remains the priority in the new plan which recognises the continuing role for the commercial fishery in Newfoundland and provides management flexibility for the Atlantic provinces as the resource improves.

The 1989 plan retains the previously established recreational salmon fishing seasons in the Maritime provinces as well as in Newfoundland and Labrador, allowing for minor adjustments at the local level. Again, resource protection and conservation measures will be strictly enforced, and anglers will not be permitted to keep large salmon. Large salmon, including repeat spawners, must be allowed to return to spawning areas.

The two-grilse-a-day limit will remain in force, and under the hook-and-release program, anglers will continue to be encouraged to use barbless hooks. Bag limits will remain unchanged in all provinces.

Returns of large salmon in 1987 and 1988 were less than projected in most rivers and the commercial fishery will remain closed in the Maritime provinces.

The new five-year strategy continues to recognise that, in Newfoundland and Labrador, there is a much greater economic dependence upon the commercial fishery than upon the recreational fishery. However, the interception of migrating salmon needs to be further addressed. For this reason, the concept of an "allowance" will be introduced this year in the Newfoundland and Labrador commercial fisheries. After extensive consultations with the various user groups and other interested parties, allowances for 1989 have been set in the following manner:

Zone	Allowance (M.T.)
1	80
2	350
3	270
4	170

5	55
6	45
7	25
8	25
9	10
10	35
11	50
12	Closed
13	75
14	110
TOTAL	1,300

"I am aware most user groups support the introduction of zonal or river management", the Minister said, "and I have instructed my officials to explore the possibility of developing a plan for the implementation of zonal/river management in the future".

In 1989 the Department of Fisheries and Oceans will, in cooperation with various representative organizations and provincial governments, identify selected areas where it could be feasible to introduce zonal/river management starting in 1990. "This approach could be gradually introduced in other areas of the Atlantic Provinces, should evaluations of this management scheme show it to be an effective management conservation technique," Mr Siddon added.

After conservation, the social and cultural importance of native fisheries continues to be the second guiding principle in the 1989-1993 salmon conservation strategy.

"I encourage Indian Bands to contribute to conservation and enhancement policies and measures", Mr Siddon said. "In addition, I encourage them to cooperate with the Department of Fisheries and Oceans with regard to the management of Atlantic salmon. My officials will be discussing with Indian Bands ways of greater cooperation".

The salmon conservation strategy of the past five years has contributed significantly to the regeneration of the Atlantic salmon fishery and it is anticipated that the 1989-1993 strategy will continue to benefit this precious resource.

Canada's continued role in the North Atlantic Salmon Conservation Organization (NASCO) has ensured that Canadian efforts to restore the salmon stocks were not undermined by overfishing outside Canadian waters.

For further information:

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(613) 990-0091

1989 ATLANTIC SALMON MANAGEMENT PLAN

The 1989 Atlantic Salmon Management Plan is guided by the principles adopted by the Department of Fisheries and Oceans through consultations with the Atlantic Salmon Advisory Board and the three provincial governments. It incorporates the three Regional Atlantic Salmon Management Plans which are developed in consultation with Regional Zone Management Advisory Committees. In addition, representations from interested associations and organizations were taken into consideration.

In the province of Quebec the provincial government has delegated authority for the management of the salmon stocks in that province.

A. Principles

1. Conservation of Atlantic salmon stocks, particularly the large salmon component, remains the overriding priority in the management of this fishery.

2. The social and cultural importance of fishing to native communities which have traditionally harvested the resource for their own consumption is recognized and is given priority after conservation.

3. The limited fishery for Atlantic salmon will be managed so as to distribute the benefits most effectively among the largest number of Canadians.

4. In the Maritime provinces, the importance of the recreational fishery is given greater recognition based on the relatively larger potential benefits to be generated. However, there will be a continuing role for the commercial fishery. In Newfoundland and Labrador, it is recognized that there is much greater economic dependence upon the commercial fishery than upon the recreational fishery.

5. Allocation of Atlantic salmon stocks will be made by Management Zones and/or river system and according to interests and/or dependence of user groups and that of industries and communities deriving benefit from the harvestable resource.

6. Interception of migrating salmon in mixed-stock fisheries will be minimized where practical and feasible, by adjusting seasons, gear, fishing area and the introduction of "allowances".

7. Harvesting of salmon by commercial fishing gear not licensed for salmon will be minimized by adjusting seasons, gear and area of fishing, and the retention of salmon caught under these circumstances will be illegal.

8. Access to Atlantic salmon stocks will be regulated by all or a combination of the following: seasons, quotas, gear and licensing restrictions.

9. Atlantic salmon enhancement plans will be developed in concert with Atlantic Salmon Management Plans.

10. Atlantic salmon habitat will be protected and improved to allow for maximum stock production.

11. The practice of tagging salmon catches will be maintained.

B. Objectives

The main objective of the five-year salmon conservation strategy, which ended in 1988, was to increase spawning levels, mostly in the Maritime provinces and, incidentally, in Quebec rivers by minimizing the harvest of multi-sea-winter (MSW) salmon.

The objectives of the 1989-1993 management strategy are as follows:

1. Ensure that target spawning requirements are met in the Maritime provinces, and that spawning levels increase in insular Newfoundland rivers.

2. Explore the possibility of implementing zonal/river management in cooperation with user groups and provincial governments.

C. Major Elements

1. In 1989, the Department of Fisheries and Oceans will, in cooperation with user groups and provincial governments, explore the possibility of developing a plan for the implementation of zonal/river management in selected areas starting in 1990. This approach could be gradually introduced in other areas of the Atlantic Provinces if evaluations of this management scheme reveal positive results.

2. In 1989, the concept of an "allowance" will be introduced in the Newfoundland and Labrador commercial fisheries. For 1989, allowances are set as follows:

Zone	Allowance (M.T.)
1	80
2	350
3	270
4	170
5	55
6	45
7	25
8	25
9	10
10	35
11	50
12	Closed
13	75
14	110
TOTAL	1,300

3. The 1989 commercial fishing seasons for the province of Newfoundland and Labrador will remain as in 1988. The fall fishery will again be closed on October 15. The fishing seasons will be:

- Zones 1-2 (Labrador), 3-10, 11 (east), 14: June 5-October 15

- Zone 13 and that portion of Zone 11 lying between Pass Island and Fox Point: June 5-July 10

- Zone 12 Closed

All other existing regulations and weekend closures will apply.

4. Only full-time fishermen will be eligible to hold salmon licences. In the future, fishermen who may be down-graded to the part-time categorization will have to regain their full-time categorization within two years in order to retain their eligibility to their salmon licence. During this two-year period, fishermen down-graded to part-time will be eligible to hold their salmon licence.

5. The commercial salmon fisheries in the Maritime Provinces will remain closed.

6. There will be no new commercial salmon fishing licences issued on an Atlantic-wide basis.

7. Transfers of commercial fishing licences will be allowed in the Maritime Provinces and in Newfoundland and Labrador among immediate family members on the condition that the recipients be full-time fishermen.

8. Only the retention of grilse will be permitted in the recreational fisheries for the provinces of New Brunswick, PEI, Nova Scotia and Newfoundland (excluding Labrador). All multi-sea winter salmon (63cm and greater in length) hooked by anglers will be required to be released immediately with the least possible harm to the fish. The Province of Quebec will maintain this restriction for the bordering rivers within the Restigouche system as has been done since 1984.

9. Recreational fishing seasons in all Atlantic Provinces may be adjusted where stock conditions permit.

10. The seasonal bag limits along with the possession and daily limits in Nova Scotia and New Brunswick will be maintained at 10, 6 and 2 respectively which will be required to be grilse. In P.E.I., the bag limits will remain at 5,1,1. In Newfoundland and Labrador, the bag limits will remain at 15 and 2 per day; the possession limit will remain at twice the daily catch limit.

11. The daily and seasonal salmon bag limits do not include any salmon that are hooked and subsequently released. However, on a daily basis, fishermen must stop fishing for salmon once they have retained the daily limit or have released a maximum number of fish equal to twice the daily bag limit.

12. During 1989, the tagging systems will be maintained in the Atlantic Provinces for all fisheries.

13. It will be illegal to retain, or be in possession of, salmon captured incidentally in non-salmon commercial gear. The Department of Fisheries and Oceans will review its priorities for inland and coastal enforcement to restrain any increase in poaching

activity and to monitor other commercial fisheries which may be susceptible to incidental catches of Atlantic salmon. Innovative low cost and efficient enforcement activities are encouraged. Interest groups will be asked to assist enforcement personnel in this regard.

14. Negotiations will continue with native groups to review existing fishing operations and catch limitations, to ensure the enforcement of regulations, and encourage the use of trap nets. Indian Bands are asked to share in conservation efforts. Where possible, alternatives to traditional salmon fishing will be considered. In New Brunswick, the Indian Bands who participated in a food fishery in 1988 will be offered the opportunity to change fishing gear to trapnets where feasible. Indian fisheries development projects will also be considered where these projects are deemed to be economically viable and directly contribute to conservation of salmon stocks.

15. During 1989 salmon enhancement activities will continue to be discussed with Provinces and user groups in the context of available funding.

16. The Department of Fisheries and Oceans maintains its commitment to cooperate within the North Atlantic Salmon Conservation Organization (NASCO). Specifically, Canada will resist any attempts to increase the catch in West Greenland of North American salmon above the three-year quota of 2570t (ie. 840t yearly average) established by NASCO for 1988, 1989, and 1990. Canada will maintain the closure date of the Newfoundland Labrador fishery of October 15. This initiative is consistent with Canada's obligations under the North American Commission of NASCO.

1989 ATLANTIC SALMON MANAGEMENT PLAN

Regional Management Measures

A. LICENSING POLICIES

(a) Scotia-Fundy and Gulf Regions (excluding Western Newfoundland and Labrador) - Zones 15, 16, 17, 18, 19, 20, 21, 22, 23

1. Commercial salmon fishermen will not be required to renew their licences in 1989.

2. Transfer of licences to another individual will not be permitted in 1989, except to immediate family members who are bona-fide or full-time fishermen. For purposes of this policy, immediate family members are husband/father, wife/mother, son/daughter and brother/sister.

3. Licences are not available for new entrants in this fishery.

4. Licences are only valid for the Management Zone specified.

(b) Newfoundland Region and Western Newfoundland and Labrador Portion of Gulf Region - Zones 1-14

1. In 1989, licences may be issued to those persons who, in 1988:

   (a) held commercial fishing licences; and

   (b) personally operated their specified commercial salmon fishing gear; and

   (c) were categorized as full-time fishermen or part-time fishermen since the 1986 season; and

   (d) were and still are full-time residents of the Salmon Management Zone in which they fished unless otherwise specified.

   Note: Participation in the 1989 salmon fishery will not be a prerequisite to be eligible for a salmon licence in 1990. However, all fishermen will be required to renew their salmon fishing licences and meet the criteria outlined in (c) and (d) above.

2. Licences are only valid for the Fishing Area specified.

3. Transfer of licences to another individual will not be permitted in 1989, except between immediate family members who are full-time fishermen. For purposes of this policy, immediate family members are husband/father, wife/mother, son/daughter and brother/sister.

4. Fishing effort limits for each licensed fisherman will remain at 200 fathoms per licence in 1989.

5. Licences are not available for new entrants in this fishery in 1989.

6. On application, the holder of set-net licence (fixed gillnet, trap net) may be permitted to move his gear to a new location provided it can be shown that circumstances have arisen which render the current location useless (ie. wharf construction, dredging) and provided further that the new location will not adversely affect the fishery and/or salmon fishing set-net licences presently located in the area.

B. MEASURES TO PREVENT ATLANTIC SALMON BY-CATCH IN NON-SALMON COMMERCIAL GEAR

In all Atlantic provinces, it will be illegal to retain or be in possession of Atlantic Salmon caught by non-salmon commercial gear

(a) Provinces of New Brunswick, Nova Scotia and Prince Edward Island

1. Non-salmon commercial fishing gear includes all traps, weirs and gillnets used to fish for all finfish species.

2. All salmon caught incidentally in the above gear must be released immediately to the water.

3. In areas where the by-catch of salmon is significant, the commercial gear shall be re-located voluntarily and/or as instructed by a fishery officer.

(b) Province of Newfoundland and Labrador

1. As in 1988, the incidental catch of salmon in traps and nets will be minimized by seasonal and area variations as required.

2. In cod traps, the seven inch (178mm) mesh size for leaders and the prohibition of the use of monofilament will be strictly enforced. The top portion of groundfish gillnets has to be at least 5m underneath the surface of the water.

C. RECREATIONAL FISHERY

1. Size restrictions - For the recreational fisheries Atlantic-wide (excluding Labrador and most of Quebec), the retention of multi-sea winter salmon will be prohibited (salmon 63cm or greater in length). However, anglers will be permitted to hook and release multi-sea winter salmon.

Regions will continue media programs in cooperation with anglers' associations to ensure anglers are aware of proper release methods in order to ensure that the fish are released with the least possible harm. The use of barbless hook is encouraged.

2. Bag Limits - In 1989 the bag limits will be:

	N.B.	N.S.	P.E.I.	Nfld. and Labrador*
Season	10	10	5	15

Possession	6	6	1	2-day limit
Daily	2	2	1	2

* In Labrador, anglers are allowed to retain large MSW salmon.
The daily and seasonal salmon bag limits do not include any salmon that are hooked and subsequently released. However, on a daily basis, fishermen must stop fishing for salmon once they have retained the daily limit or have released a maximum number of fish equal to twice the daily limit.

Bag limits which were previously restricted to lower levels because of specific conditions will be maintained as such.

Anglers exhausting these daily or seasonal limits will not be permitted to fish for Atlantic salmon for the remaining portion of the period associated with the limit reached.

3. Black salmon fishery - The grilse-only restriction will apply again in 1989. The season will remain April 15 to May 15 in New Brunswick.

4. Season - Recreational fishing seasons in all Atlantic Provinces will remain as in 1987, subject to minor adjustment due to local conditions.

D. TAGGING PROGRAM

During 1989, the tagging systems will be maintained in all the Maritime Provinces and in the commercial and native food fisheries of Newfoundland and Labrador. For 1989, all salmon exported from Newfoundland and Labrador to other eastern provinces will have to be tagged before leaving the province. Mandatory tagging will be maintained in the Newfoundland and Labrador recreational fishery.

Where applicable, all salmon caught by licensed salmon fishermen will be tagged by applying a self-locking, tamper-proof plastic tag through the mouth and gill cavity of the fish. Each tag number will be recorded with the licence number issued to the fisherman for immediate identification of all legally harvested salmon.

The tags will be colour coded for each fishery. Blue tags will be used for the licensed recreational salmon fishery; red tags for the licensed commercial salmon fishery; and orange tags (yellow in Quebec) for the licensed Indian food fishery. Brown tags (green in Quebec) must be applied to fish caught for scientific-research purposes and for fish farming operations. A green tag (white in Quebec) will be used for Atlantic salmon imported into New Brunswick, Nova Scotia, and Prince Edward Island from areas outside these provinces. A green export tag will be applied to salmon being exported from the Province of Newfoundland and Labrador and which are not yet tagged. A yellow tag issued by parks Canada will be used for salmon captured in waters within national parks.

E. ENFORCEMENT ACTIVITIES

Where feasible in 1989, emphasis will be placed on protection and conservation of

Atlantic salmon in both the marine and freshwater environment. Particular attention will be directed to the following:

1. commercial salmon log record reporting (where applicable);

2. salmon by-catch restrictions;
3. poaching activity in inland waters;

4. fish habitat protection;

5. salmon tagging requirements;

6. strict observance of closed times and closed areas.

In the Western Newfoundland portion of the Gulf Region, the "Dial-a-Poacher" program will be continued in 1989. A toll-free number (ZENITH-07057) has been established, and phones will be answered twenty-four hours a day.

The Newfoundland Region is also continuing its "Report-a-Poacher". Individuals can report suspected illegal fishing activity by dialling the 24-hour answered toll free number (1-800-563-7277).

F. RESOURCE ENHANCEMENT

In 1989, enhancement projects will be maintained with the objective of expanding and increasing efficiency where possible. The Department will continue to investigate enhancement potential and upgrade fishways.

G. INTERCEPTION

Measures previously introduced to reduce the interception of mainland salmon will be maintained in 1989.

H. NATIVE FISHERY

Discussions with Maritimes Indian Bands are planned and will focus on their involvement in Atlantic salmon management and their participation in conservation efforts. Negotiations will also involve the possible conversion of gillnets to trapnets, and the generating of increased economic benefits from their salmon harvest, such as the establishment of outfitting businesses. The expansion of food fisheries on a selected basis and where stocks permit will also be discussed.

I. INTERNATIONAL NEGOTIATIONS

The Department of Fisheries and Oceans will maintain its commitment to cooperate within the North Atlantic Salmon Conservation Organization (NASCO). Specifically, Canada will resist any attempts to increase the catch of North American salmon above the three-year quota of 2,570t (ie. 840t yearly average) in West Greenland established

by NASCO for 1988, 1989 and 1990. Canada will maintain the October 15 closure date for the Newfoundland Labrador fishery. This initiative is consistent with Canada's obligations under the North American Commission of NASCO.

MANAGEMENT ZONES
ZONE 15 - RESTIGOUCHE RIVER SYSTEM

Commercial Fishery

Gear	Season
Trap nets	
- New Brunswick	- Closed
- Quebec	- No commercial fishery

1. Licensing

   The Gulf Region Licensing Policy will apply.

2. By-catch

   Further to imposing the restriction of no salmon by-catch throughout the Atlantic, regulations to eliminate by-catch in non-salmon commercial gear will apply in Zone 15:

   (a) No person shall set or use any gillnet in those waters of the Chaleur Bay that are closed to gillnetting of any kind between June 8 to December 31 in any year.

   (b) Groundfish gillnets bait permits will be issued for 1989 in the waters of Bay of Chaleur, on a controlled basis only.

Recreational Fishery (Grilse Only)

Season bag limit - 10 fish
Possession limit - 6 fish
Daily bag limit - 2 fish
Hook and release - 4 fish

Seasons

River	Opening/Closing Dates
Bright Salmon	
Rivers in Zone 15 tributary to the Bay of Chaleurs with the following exceptions:	June 1 - October 15

Benjamin	July 1 - October 15
Caraquet	July 1 - October 15
Charlo	July 1 - October 15
Eel River	July 1 - October 15
Jacket	July 1 - October 15
Nepisiguit	June 1 - October 7
Pokemouche	July 1 - October 15
Restigouche System	June 1 - August 31
Tetagouche	July 1 - October 15
Tracadie	July 1 - October 15
Middle River (Gloucester County)	July 1 - October 15
Kedgwick	June 1 - August 31

Native Fishery

In Zone 15, the following Indian bands will be authorized to conduct a food fishery under authority of a special licence:

Eel River Bar Indian Band

The terms and conditions of the special licence are subject to negotiation between the Department of Fisheries and Oceans and the Band Chief and Council. Negotiations are underway to redirect the salmon food-fishery from gillnets to trapnets.

ZONE 16 - MIRAMICHI RIVER

Commercial Fishery

Gear	Season
Trap Nets	Closed
Drift Nets	Closed

1. Licensing

   The Gulf Region Licensing Policy will apply.

2. By-catch

   General measures to eliminate Atlantic salmon by-catch in non-salmon commercial gear will apply. The following measures will also apply in Zone 16:

   (a) An area closure to groundfish gillnetting will apply to Canadian fisheries waters off the coast of New Brunswick west of a line beginning at Pointe à Barreau. Northumberland County, at 47 degrees 26'00"N latitude, 64 degrees 53'1"W longitude, thence to a point at 47 degrees 04'24"N latitude, 64 degrees 21'45"W longitude, thence to a point on the shoreline of Kent County at 47 degrees 00'48"N latitude, 64 degrees 49'40" longitude.

   (b) An area closure to gillnetting of any kind will apply to those waters of the

Miramichi Bay lying to the west of a line drawn from the lighthouse on Escuminac Point to a point at Pointe à Barreau at latitude 47 degrees 26'00"N and longitude 64 degrees 53'12"W.

(c) Groundfish gillnet bait permits will not be issued in 1989 for a bait fishery in the waters of the Miramichi Bay.

Recreational Fishery (Grilse Only)

Season bag limit - 10 fish
Possession limit - 6 fish
Daily bag limit - 2 fish
Hook and release - 4 fish

Seasons

River	Opening/Closing Dates
Black Salmon	
Miramichi	April 15 - May 15
Bright Salmon	
Miramichi System, with the following exceptions:	June 8 - Sept 30
Bartholomew	Closed
Bartibog	June 1 - October 15
Buctouche	July 1 - October 15
Cains	June 8 - October 15
Cocagne	July 1 - October 15
Dungarvin (above Underwood Brook)	June 8 - Sept 15
Little Southwest Miramichi (above Catamaran Brook)	June 8 - Sept 15
Main Southwest Miramichi (above McKeil Brook)	June 8 - Sept 15
Northwest Miramichi (above Little River)	June 8 - August 31
Renous (above North Renous)	June 8 - Sept 15
Rocky Brook	June 1 - August 31
Sevogle (above Square Forks)	June 8 - Sept 15
Tabusintac	July 1 - October 22
Eel River	July 1 - October 15
Other tributaries of Main Southwest Miramichi (above Cains River - except Rocky Brook)	June 8 - Sept 15

Native Fishery

In Zone 16, the following Indian bands will be authorized to conduct a food fishery under authority of a special licence:

(1) Red Bank Indian Band

(2) Big Cove Indian Band
(3) Burnt Church Indian Band
(4) Eel Ground Indian Band

The terms and conditions of the special licence are subject to negotiations between the Department of Fisheries and Oceans and the Band Chiefs and Councils. Negotiations are underway to redirect the food-fishery from gillnets to trapnets.

ZONE 17 - PRINCE EDWARD ISLAND

Commercial Fishery

Fishery	Season
St Peters' Bay	Closed
Morrell river stocks (Northeast shore)	Closed

1. Licensing

The Gulf Region Licensing Policy will apply.

Recreational Fishery (Grilse only)

Season bag limit - 5 fish
Possession limit - 1 fish
Daily bag limit - 1 fish
Hook and release - 2 fish

Season

River	Opening/Closing Dates
All PEI Rivers	July 1 - September 30
All PEI Rivers (Hook and Release only)	October 1 - October 15

ZONE 18 - NORTHUMBERLAND

Commercial Fishery

Waters	Season
All waters within Zone 18, Gulf shore of Nova Scotia	Closed

1. Licensing

The Gulf Region Licensing Policy will apply.

Recreational Fishery (Grilse only)

Season bag limit - 10 fish
Possession limit - 6 fish
Daily bag limit - 2 fish
Hook and release - 4 fish

Season

River	Opening/Closing Dates
All waters of Salmon Management Zone 18 with the exception of the following:	September 1 - Oct 31
Margaree River (downstream from the Big Interval Bridge)	June 1 - October 15
Margaree River (upstream from the Big Interval Bridge)	Closed all year

ZONE 19 - CAPE BRETON EAST

Commercial Fishery

Waters	Season
All coastal waters	Closed

1. Licensing

The Scotia-Fundy Region Licensing Policy will apply.

Recreational Fishery (Grilse only)

Season bag limit - 10 fish
Possession limit - 6 fish
Daily bag limit - 2 fish
Hook and release - 4 fish

Season

Rivers	Opening/Closing Dates
All the waters of any rivers and tributaries which flow into the Atlantic Ocean bounded by Cape Breton and Richmond Counties and that portion of Victoria County south of Cape North, with the exception of the following:	June 15 - October 15
Inhabitants River	June 15 - October 31
North River	June 1 - October 15
Middle River	June 1 - October 15
Mira River	June 15 - October 15

Native Food Fishery

Wagmatcook Reserve

Food fishery to be conducted as outlined in a licence issued pursuant to Section 6(1) of the Nova Scotia Fishery Regulations under the Fisheries Act. The allocation will not exceed 100 fish.

ZONE 20 - EASTERN SHORE

Commercial Fishery

Waters	Season
All coastal waters of Guysborough County and that portion of Halifax County east of the City of Halifax.	Closed

1. Licensing

The Scotia-Fundy Region Licensing Policy will apply.

Recreational Fishery (Grilse only)

Season bag limit - 10 fish
Possession limit - 6 fish
Daily bag limit - 2 fish
Hook and release - 4 fish

Season

River	Opening/Closing Dates
All waters of Salmon Management zone 20 with the exception of the following:	June 1 - August 29
All rivers and tributaries thereof that flow into that portion of Chedabucto Bay bounded by Guysborough County	June 24 - September 22
Country Harbour River	June 24 - September 22
St Mary's River, downstream from a point 100 m upstream from Silver's Bridge and downstream from the highway bridge at Glenelg	May 18 - August 29
East River, St Mary's upstream from a point 100 m upstream of Silver's Bridge	May 18 - August 14
West River, St Mary's upstream from the highway bridge at Glenelg	June 1 - August 14

ZONE 21 - SOUTHWEST NOVA SCOTIA

Commercial Fishery

Waters	Season
All coastal waters of Lunenburg, Queens, Shelburne, Yarmouth and Digby Counties and that portion of Halifax County west of the city of Halifax.	Closed

1. Licensing

The Scotia-Fundy Region Licensing Policy will apply.

Recreational Fishery (Grilse only)

Season bag limit - 10 fish
Possession limit - 6 fish
Daily bag limit - 2 fish
Hook and release - 4 fish

Season

Rivers	Opening/Closing Dates
All the waters of the rivers and tributaries which flow into that portion of the Atlantic Ocean bounded by Lunenburg, Queens, Shelburne, Yarmouth and Digby Counties and that portion of Halifax County west of the city of Halifax with the following exceptions:	May 10 - August 15
Ingram River	June 1 - August 15
Lahave River, upstream from Morgan Falls	Under review
Medway River	May 10 - July 31
Petite Rivière	June 15 - August 15
Salmon River	June 1 - August 15
Tusket River	June 1 - August 15

ZONE 22 - UPPER BAY OF FUNDY

Commercial Fishery

Waters	Season
All coastal waters of Annapolis, Kings, Hants, Colchester and Cumberland Counties which border on the Bay of Fundy	Closed

1. Licensing

The Scotia-Fundy Region Licensing Policy will apply.

Recreational Fishery (Grilse only)

Season bay limit - 10 fish
Possession limit - 6 fish
Daily bag limit - 2 fish
Hook and release - 4 fish

Season

Rivers	Opening/Closing Dates
All the waters of any rivers and tributaries which flow into that portion of the Bay of Fundy bounded by Annapolis, Kings, Hants, Colchester, and Cumberland Counties with the following exceptions:	August 15 - October 31
Annapolis River	May 1 - July 31
Gaspereau River	May 1 - July 31
Stewiacke River	August 1 - October 31

ZONE 23 - SOUTH WESTERN NEW BRUNSWICK

Commercial Fishery

Fishery	Season
Saint John	Closed
Petitcodiac	Closed

1. Licensing

The Scotia-Fundy Region Licensing Policy will apply.

Recreational Fishery (Grilse only)

Season bag limit - 10 fish
Possession limit - 6 fish
Daily bag limit - 2 fish
Hook and release - 4 fish

Seasons

River	Opening/Closing Dates
Black Salmon	April 15 - May 15

Bright Salmon

Waters tributary to the Bay of Fundy with the following exceptions:	June 15 - October 15
Big Salmon River - upstream of and including Walton Dam Pool	June 15 - September 15
Big Salmon River - downstream from Walton Dam Pool	June 8 - October 22
Hammond River - downstream from French Village Bridge Pool	June 15 - October 31
Hammond River - upstream from and including French Village Bridge Pool	June 15 - October 15
Kennebecasis River	June 15 - October 31
Nashwaak River - upstream from the Bridge at Stanley	June 15 - September 30
Nashwaak River - downstream from the Bridge at Stanley to its confluence at the St John River	June 15 - October 15
St John River - upstream from the Grafton Bridge in Woodstock	June 15 - September 30
St John River - downstream from the Grafton Bridge in Woodstock to the Reversing Falls Bridge	June 1 - October 15
Peticodiac River System	August 15 - October 15
Point Wolfe River	No open season
St Croix River	June 15 - September 15
Tobique River	June 15 - September 15

Native Fishery

Kingsclear Reserve

Food fishery to be conducted as outlined in Section 6.2 of the New Brunswick Fishery Regulations under the Fisheries Act.

NEWFOUNDLAND COMMERCIAL SALMON FISHERY

ZONE 1 - Cape Chidley to Cape Rouge

(1) Season — June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 2 - Cape Rouge to Cape Charles

(1) Season — June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 3 - Cape Charles to Cape Bauld to Cape John, excluding Straits

(1) Season June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 4 - Cape John to Cape Freels

(1) Season June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 5 - Cape Freels to Cape Bonavista

(1) Season June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 6 - Cape Bonavista to Grates Cove

(1) Season June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 7 - Grates Cove to Cape St. Francis

(1) Season June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 8 - Cape St. Francis to Cape Race

(1) Season June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 9 - Cape Race to Cape St. Mary's

(1) Season June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 10 - Cape St. Mary's to Point Crewe

(1) Season — June 5 - October 15

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 11 - Point Crewe to Fox Point

(1) Season

Point Crewe to Pass Island	June 5 - October 15
Pass Island to Cape Fox	June 5 - July 10

(2) Licensing

The Newfoundland Region Licensing Policy applies.

ZONE 12 - Fox Point to Cape Ray

(1) Season — Closed

(2) Licensing

No commercial salmon licenses will be issued.

ZONE 13 - Cape Ray to Cape St Gregory

(1) Season — June 5 - July 10

(2) Licensing

The Gulf Region Licensing Policy will apply.

ZONE 14 - Cape St. Gregory to Cape Charles, including Straits

(1) Season — June 5 - October 15

(2) Licensing

The Gulf Region Licensing Policy will apply.

NEWFOUNDLAND RECREATIONAL SALMON FISHERY

With the exception of Labrador, anglers in the Province of Newfoundland and Labrador will only be permitted to retain grilse. The larger multi-sea winter salmon (63cm and greater in length) must be released immediately with the least possible harm to the fish.

A full scale recreational tagging program will be implemented in Newfoundland and Labrador in 1988.

Season bag limit - 15 fish
Possession limit - 4 fish (two day limit)
Daily bag limit - 2 fish
Hook and release - 4 fish

River	Season Opening/Closing Dates
Labrador	
All waters of rivers and tributaries in Labrador with the exception of the following:	June 18 - September 10
Pinware River	June 3 - September 10
Forteau River	June 3 - September 10
Lanse-au-Loup	June 3 - September 10
Newfoundland	
Three sets of opening/closing dates have been set for most rivers in three respective areas of the island portion of the province:	
(a) Cape Ray, north to and including Bonne Bay	June 3 - September 4
(b) Cape Bauld to Cape Ray (east and south coasts)	June 17 - September 4
(c) North of Bonne Bay to Cape Bauld	June 17 - September 4
The following rivers are exceptions within these areas:	
Northwest Brook, Grand Bay	June 3 - September 4
Bear Cove River	June 3 - September 4
La Poile River	June 10 - September 4
East River Bisok, La Poile	June 10 - September 4
Farmer's Arm River	June 10 - September 4
Garia River	June 10 - September 4
Burnt Islands River	June 10 - September 4
Isle aux Morts River	June 10 - September 4
Grand Bay River	June 10 - September 10
Garnish River (mouth up to, but not including the Gorge)	June 17 - August 27
Garnish River (from the Gorge to the headwaters)	Closed
Tides Brook and Tributaries	June 24 - July 16
Colinet River	June 17 - July 16

St Genevieve River	June 18 - September 5
Ten-Mile Lake and tributary streams	June 4 - September 5
Round Lake and tributary streams	June 3 - September 4
Aides lake (Humber River)	June 3 - July 31
Upper Humber River (Deer Lake to Big Falls)	June 3 - September 10
Portland Creek River and Tributary stream	June 17 - September 10
Deer Arm River	June 17 - August 31
Trout River	June 17 - September 4
Southeast River, Placentia	June 17 - August 27
Northeast River, Placentia	June 17 - August 27
Indian River	June 17 - August 27
Exploits River	June 17 - August 27
Terra Nova River	June 17 - August 27
Little Salmonier River	June 1 - August 2
Fox Island River	June 17 - Sept 4 (2)
Watson's Brook	June 17 - Sept 4 (2)
Little Codroy River	June 24 - Sept 4
Harry's River	June 24 - Sept 4
Little Barachois River	June 24 - Sept 4
Goose Arm River (excluding Cloudy Pool)	June 24 - Sept 4
Torrent River and Tributaries	Sept 4 (1)
Serpentine River and Tributaries	June 17 - Sept 4 (3)
Cook's Brook	July 1 - Sept 4
Lomond River (Main) (East Arm, Bonne Bay)	June 17 - Sept 4 (4)

Notes:

(1) Opening when 1000 salmon have passed upstream through the fishway.
(2) or when 50 fish are taken
(3) or when 100 fish are taken
(4) or when 350 fish are taken

Other Rivers with quotas

Barachois River	175 fish
Fischell's River	200 fish
Pincent's Brook, Pistolet Bay	10 fish
Flat Bay River	250 fish

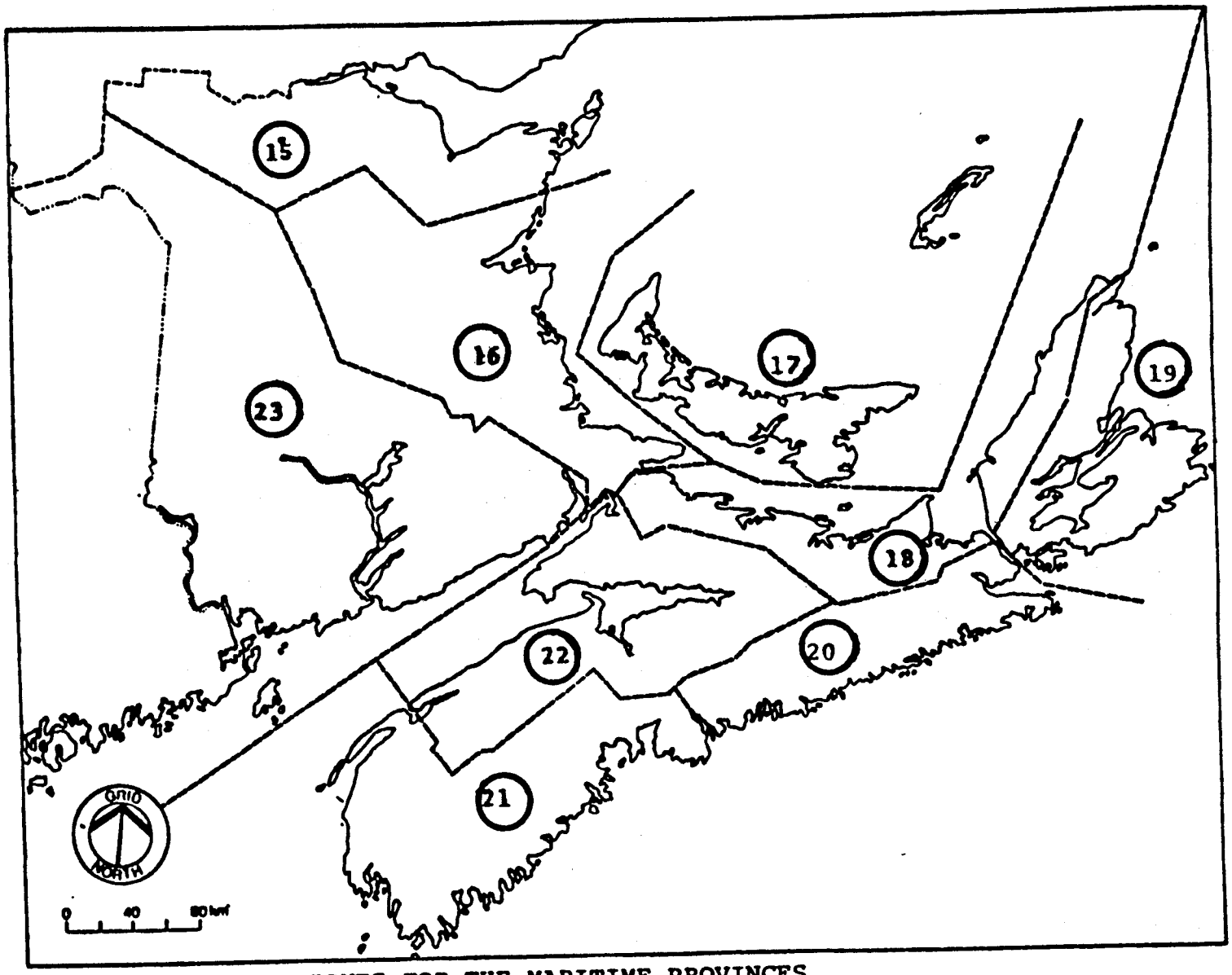
Closed Rivers

The following rivers will not be open to anglers in 1989:

Highlands River	Closed all year
Hughes Brook	Closed all year
Parker's River	Closed all year
Western Brook and tributaries	Closed all year
Ten Mile Feeder Brook	Closed all year
North Brook	Closed all year
Bounds Brook	Closed all year
Western Brook Pond	Closed all year
West River St Barbe	Closed all year
Rocky River	Closed all year

ANNEX 1
MANAGEMENT ZONES

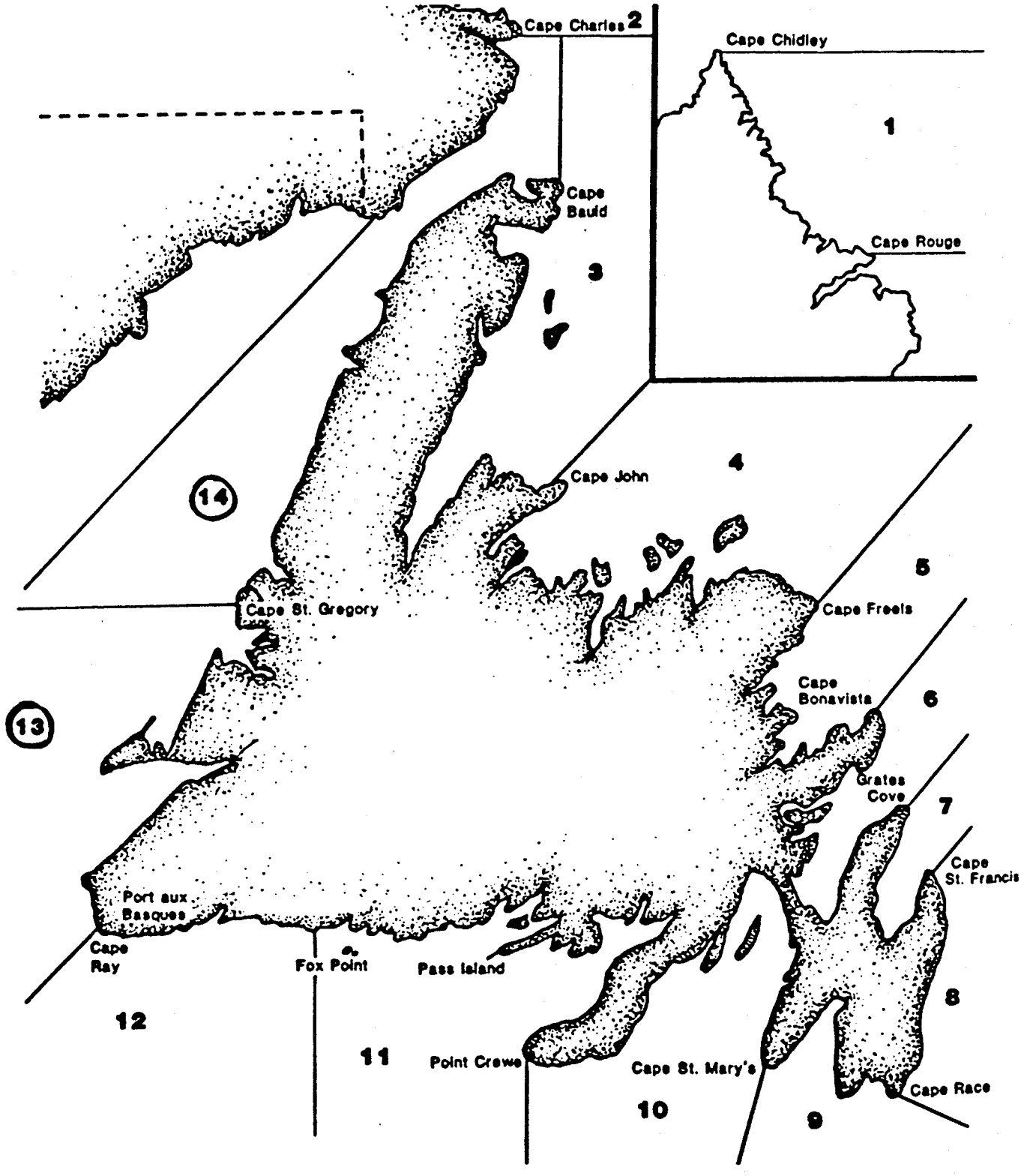
ZONE	PROVINCE	REGION
1 - Cape Chidley to Cape Rouge	Newfoundland	Newfoundland
2 - Cape Rouge to Cape Charles	Newfoundland	Newfoundland
3 - Cape Charles to Cape Bauld to Cape John, excluding Straits	Newfoundland	Newfoundland
4 - Cape John to Cape Freels	Newfoundland	Newfoundland
5 - Cape Freels to Cape Bonavista	Newfoundland	Newfoundland
6 - Cape Bonavista to Grates Cove	Newfoundland	Newfoundland
7 - Grates Cove to Cape St Francis	Newfoundland	Newfoundland
8 - Cape St Francis to Cape Race	Newfoundland	Newfoundland
9 - Cape Race to Cape St Mary's	Newfoundland	Newfoundland
10 - Cape St Mary's to Point Crewe	Newfoundland	Newfoundland
11 - Point Crewe to Fox Point	Newfoundland	Newfoundland
12 - Fox Point to Cape Ray	Newfoundland	Gulf
13 - Cape Ray to Cape St Gregory	Newfoundland	Gulf
14 - Cape St Gregory to Cape Charles, including Straits	Newfoundland	Gulf
15 - Restigouche	New Brunswick	Gulf
16 - Miramichi	New Brunswick	Gulf
17 - P.E.I.	P.E.I.	Gulf
18 - Northumberland	Nova Scotia	Gulf
19 - Cape Breton East	Nova Scotia	Scotia Fundy
20 - Eastern Shore	Nova Scotia	Scotia Fundy
21 - Southwest Nova Scotia	Nova Scotia	Scotia Fundy
22 - Upper Bay of Fundy	Nova Scotia	Scotia Fundy
23 - Saint-John	New Brunswick	Scotia Fundy



MANAGEMENT ZONES FOR THE MARITIME PROVINCES
ZONES DE GESTION POUR LES PROVINCES MARITIMES

ZONES DE GESTION POUR TERRE-NEUVE ET LE LABRADOR

MANAGEMENT ZONES FOR NEWFOUNDLAND AND LABRADOR



EDINBURGH
JUNE 1989

ANNEX 11

CNL(89)38

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 each Commission area:

(a) describe events of the 1989 fisheries with respect to gear, effort, composition and origin of the catch.

(b) estimate exploitation rates in home water and interception fisheries on stocks occurring in the Commission area.

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

(d) evaluate the effectiveness of new or proposed management measures for home waters and interception fisheries on stocks occurring in the Commission areas;

(e) specify data deficiencies and research needs.

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

(a) with respect to the impact of aquaculture on wild salmon stocks, provide quantitative estimates of the effect of escapees on the number of salmon in the open ocean and home waters.

EDINBURGH
JUNE 1989

ANNEX 12

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

SIXTH ANNUAL MEETING OF THE NORTH AMERICAN COMMISSION
15-16 FEBRUARY 1989, HILTON HEAD, SOUTH CAROLINA, USA
AND 13-16 JUNE, EDINBURGH, UK

LIST OF NORTH AMERICAN COMMISSION PAPERS

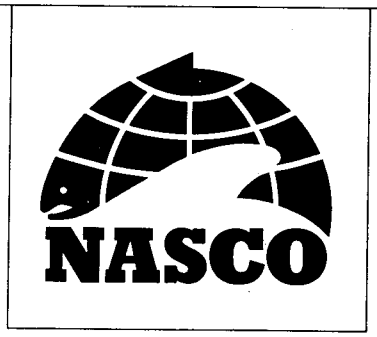
PAPER NO	TITLE
NAC(89)1	Provisional Agenda
NAC(89)2	Draft Agenda
NAC(89)3	Review of the 1988 USA Fishery
NAC(89)4	Agenda
NAC(89)5	Progress Report of Activities of NAC's Bilateral Scientific Working Group on Salmonid Introductions and Transfers
NAC(89)6	Evaluation of Atlantic Salmon Management Plan (CAFSAC 88/19)
NAC(89)7	The status of Atlantic salmon stocks in Atlantic Canada and advice for their management in 1989 (CAFSAC 88/26)
NAC(89)8	Canadian Atlantic Salmon Catches
NAC(89)9	1988 Atlantic Salmon Management Plan
NAC(89)10	Draft Report of the Sixth Annual Meeting of the North American Commission of NASCO
NAC(89)11	List of Participants
NAC(89)12	US Atlantic Salmon Stocks - A Ten Year Review
NAC(89)13	Introductions and Transfers of Salmonids: their impacts on North American Atlantic Salmon and recommendations to reduce such impacts
NAC(89)14	Draft Report on Fish Health Protocols for Protection of Wild Atlantic Salmon
NAC(89)15	Draft Report on Genetics Protocols for Maintenance of Genetic Variance in Atlantic Salmon

NAC(89)16	Draft Protocols dealing with ecological concerns respecting Atlantic Salmon due to introductions and transfers of fishes
NAC(89)17	Report of Activities of NAC Scientific Working Group on Salmonid Introductions and Transfers
NAC(89)18	1989 Atlantic Salmon Management Plan
NAC(89)19	Proposal by the United States
NAC(89)20	Draft Decision of the Council to request scientific advice from ICES
NAC(89)21	Report of the Sixth Annual meeting of the North American Commission of NASCO
CNL(89)10	Report of the ICES Advisory Committee on Fisheries Management
CNL(89)38	Draft decision of the Council to request scientific advice from ICES

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.

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

ORGANISATION POUR LA CONSERVATION DU SAUMON DE L'ATLANTIQUE NORD



REPORT OF THE

SIXTH ANNUAL MEETING

OF THE NORTH-EAST ATLANTIC COMMISSION

13-16 JUNE 1989

EDINBURGH, UK

CHAIRMAN:	MR STEFAN DE MARE (SWEDEN)
VICE-CHAIRMAN:	MR JOHN SPENCER (EEC)
RAPPORTEUR:	MS ANNE CARINE TANUM
SECRETARY:	DR MALCOLM WINDSOR

NEA(89)11

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NEA(89)11

REPORT OF THE SIXTH ANNUAL MEETING OF THE NORTH-EAST ATLANTIC COMMISSION OF THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION 13-16 JUNE 1989, SHERATON HOTEL, EDINBURGH

1. OPENING OF THE MEETING

1.1 The Sixth Annual Meeting of the North-East Atlantic Commission was opened by the Chairman, Mr Stefan de Mare (Sweden).

1.2 A list of participants is given in Annex 1.

2. ADOPTION OF THE AGENDA

2.1 The Commission adopted its agenda, NEA(89)7, (Annex 2).

3. NOMINATION OF A RAPPORTEUR

3.1 The Commission nominated Ms Anne Carine Tanum (Norway) as rapporteur for the meeting.

4. REVIEW OF THE 1988 FISHERY

4.1 The Commission reviewed the 1988 fishery in the Faroe Islands which had been described in detail in the ACFM report from ICES. The fishery in 1988 had amounted to 219 tonnes which was well within the quota.

4.2 The representative of the USSR pointed out the uncertainty related to the factors influencing the salmon stocks and commented that marine salmon fisheries should cease until sufficient information is available on the factors affecting salmon populations.

4.3 The representative of the EEC drew the attention of the Commission to papers NEA(89)3 and NEA(89)4 concerning a unilateral change to the regulatory measure agreed in 1987, and requested clarification of the background to the change. The representative of Denmark (in respect of the Faroe Islands and Greenland) explained that the measure was an effort limitation programme containing a number of elements. The change in season was seen as an insignificant change to this programme.

4.4 The Commission agreed that the mechanisms laid down in the NASCO Convention and the Rules of Procedure should be used in the case of any proposed variation to any Regulatory Measure which had been agreed by the Commission.

4.5 The representative of the EEC drew the attention of the Commission to the report in the ACFM report of considerable catches of salmon being made outside the Faroese zone. He appreciated that the Faroese authorities had

taken measures to control such illegal fishing but requested information concerning the factors leading to such illegal fishing. The representative of the Faroe Islands explained the difficulty of patrolling the area but reported that fines had been imposed on fishermen fishing outside the 200 mile zone and it was thought that further fishing in this area would not occur. The representative of Iceland appreciated the steps taken by the Faroese authorities and raised the question of cooperation between countries in patrolling this area.

5. 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 North-East Atlantic Commission, CNL(89)10, (Annex 3) prepared in response to a request from the Commission at its Fourth Annual Meeting.

6. IMPACTS OF ACID RAIN ON ATLANTIC SALMON

6.1 The representative of Norway described the problem of acidification of salmon rivers in Norway and complimented the representative of ICES on the valuable quantitative information on losses contained in the ACFM report.

6.2 The representative of Sweden drew attention to the significant losses which have occurred in Sweden and Norway.

6.3 The representative of Denmark (in respect of the Faroe Islands and Greenland) pointed out that the estimated losses of salmon in the North-East Atlantic Commission of 106000-331000 salmon compared to catches of 125000 European salmon at West Greenland and 125000 fish in the Faroese zone.

6.4 The representative of Finland described the Finnish authorities concerns about acidification of salmon rivers in northern Finland. These rivers are very large and would not be suitable for liming. The situation in these rivers could only be improved by reduction of the air pollution at its source.

7. REGULATORY MEASURES

7.1 The Chairman reported that the regulatory measure for the Faroese fishery agreed in 1987 would expire at the end of the year and asked for an exchange of views on possible measures for a new period.

7.2 The representative of the Faroe Islands referred to paper NEA(87)4 which had presented a rationale for effort control as opposed to catch limitation. He asked the representative of ICES if it was possible to assess the effect of effort control compared to control of catches on the level of exploitation. The representative of ICES reported that this could not be evaluated in detail and that a new trial period was needed to evaluate the fisheries within

the zone.

7.3 The representative of the USSR considered that it would be more appropriate to discuss regulations on an annual basis taking into account the latest scientific advice from ICES as is the practice for other species. The representative of the EEC stressed the importance of adopting a measure which would cover a period of at least two years.

7.4 The representative of Sweden referred to the discussion in the Special Session of Council and the need to keep natural populations strong. On the West Coast of Sweden there are aboriginal populations of salmon in two major rivers but these populations are not very strong. The rate of exploitation of Swedish and Norwegian populations in the Faroese zone is higher than for other countries and further restrictions of this fishery would be necessary to protect these vulnerable stocks in Sweden.

7.5 The representative of Norway drew attention to the severe measures taken in the Norwegian fisheries in 1989. The measures included the closure of the drift net fishery which has affected 1200 fishermen in remote communities. In addition the bend net fishing season has been reduced and strong measures in the river fishing have been implemented. These measures have been taken to strengthen salmon populations. In relation to this the Norwegian authorities would therefore be seeking a realistic quota for future years.

7.6 The representative of the USSR reported on the severe measures taken to strengthen salmon populations in the USSR, which include a closure of the fisheries on the Pechora river, which is the largest salmon river in the world.

7.7 The representative of Iceland reported that in some years Icelandic stocks from the north coast occur in the Faroese zone. These populations are small and very vulnerable and any measure for the Faroese fishery should take these populations into account. The representative of the Faroe Islands considered that it would be difficult to adopt a regulatory measure which would take all of the factors discussed into account.

7.8 The Commission considered a proposal from the Chair for a regulatory measure, NEA(89)6 (Annex 4). The representative of Norway drew the attention of the Commission to paper, NEA(89)8 (Annex 5). On a vote the EEC, Finland, Sweden and the USSR voted in favour of the proposal. Denmark (in respect of the Faroe Islands and Greenland), Iceland and Norway abstained from the vote and the proposal was therefore adopted as a regulatory measure.

7.9 The representative of Norway explained that the Norwegian authorities found it reasonable and necessary that other nations exploiting salmon of Norwegian origin share the burden for conservation of stocks and restrict their fisheries. The representative of Norway expressed dissatisfaction with the result of the negotiations on a measure for the Faroese fishery but in the spirit of the Convention the Norwegian authorities would abstain from the vote.

7.10 The representative of Denmark (in respect of the Faroe Islands and Greenland) made an explanatory statement on the vote, explaining the difficulties for his delegation in accepting the basis for changing the regulatory measure. The representative of Denmark (in respect of the Faroe Islands and Greenland) pointed out to the Commission the possibility that an objection to the measure could be lodged in accordance with Article 13, paragraph 3 of the Convention.

7.11 The representative of the EEC expressed his satisfaction at the success of the Commission in reaching further agreement on a regulatory measure for the Faroese fishery.

8. RECOMMENDATIONS TO THE COUNCIL ON SCIENTIFIC RESEARCH

8.1 The Commission reviewed and accepted the relevant sections (sections 1 and 2) of paper CNL(89)38 (Annex 6) and agreed to recommend it to the Council as part of the annual request for scientific advice to ICES.

8.2 The Commission also supported the list of research needs and recommendations in the 1989 Working Group Report.

9. OTHER BUSINESS

10. DATE AND PLACE OF NEXT MEETING

10.1 The Commission agreed to hold its next meeting during the Seventh Annual Meeting of the Council, 12-15 June 1990 in Helsinki.

11. CONSIDERATION OF THE DRAFT REPORT OF THE MEETING

11.1 The Commission agreed the draft report of the meeting.

JUNE 1989
EDINBURGH

ANNEX 1

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
SIXTH ANNUAL MEETING OF THE NORTH-EAST ATLANTIC COMMISSION
13-16 JUNE 1989, SHERATON HOTEL, EDINBURGH, UK

LIST OF PARTICIPANTS

* Denotes Head of Delegation

MEMBERS OF THE COMMISSION:

DENMARK (IN RESPECT OF THE FAROE ISLANDS AND GREENLAND)

*MR KJARTAN HOYDAL	Representative Faroese Home Government, Torshavn, Faroe Islands
MR SVEN ADSERSEN	Representative Ministry of Foreign Affairs, Copenhagen
MR HJALTI I JAKUPSSTOVU	Fishing Laboratories, Faroe Islands
MR SOFUS POULSEN	Faroese Commercial Attache, Aberdeen
MR JENS MOELLER-JENSEN	Greenland Fisheries Research Institute, Copenhagen
MR ANFINN KALLSBERG	Ministry of Fisheries, Torshavn, Faroe Islands
MR MANNE NAESS	Ministry of Fisheries, Torshavn, Faroe Islands

EEC

*MR HENRIK SCHMIEGELOW	Representative Fisheries Directorate-General, EEC Commission, Brussels
MR ANDREW THOMSON	Representative Directorate-General for External Relations, EEC Commission, Brussels
MR JOAN CALVERA VEHI	Embassy of Spain, London
MR PAULINO PEREIRA	Council of the European Communities, Brussels
MR NICK BROWN	Ministry of Agriculture, Fisheries and Food, London

MR BOB WILLIAMSON	Department of Agriculture and Fisheries for Scotland, Edinburgh
MR TED POTTER	Ministry of Agriculture, Fisheries and Food, Lowestoft
MS EILEEN TWOMEY	Department of the Marine, Dublin, Ireland
MR RAPHAEL KELLY	Department of the Marine, Dublin, Ireland
DR DICK SHELTON	Department of Agriculture and Fisheries for Scotland, Pitlochry
MR CHARLES R MCCALL	Ministry of Agriculture, Fisheries and Food, London
MR DAVID DUNKLEY	Department of Agriculture and Fisheries for Scotland, Montrose
MR WILLIAM MALCOLM	Department of Agriculture and Fisheries for Scotland, Edinburgh
FINLAND	
*MR PEKKA NISKANEN	Representative Ministry of Agriculture and Forestry, Helsinki
MR EERO NIEMELA	Representative Finnish Game and Fisheries Institute, Helsinki
ICELAND	
*MR ARNI ISAKSSON	Representative Institute of Freshwater Fisheries, Reykjavik
NORWAY	
*MR SVEIN MEHLI	Representative Directorate for Nature Management, Trondheim
MRS ANNE CARINE TANUM	Representative Ministry of the Environment, Oslo
MR LARS HANSEN	Directorate for Nature Management, Trondheim
SWEDEN	
*MR STEFAN DE MARE	Representative Ministry of Agriculture, Stockholm

DR INGEMAR OLSSON	Representative National Board of Fisheries, Goteborg
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USSR

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DR GABY WARD	Representative Champlain College, Quebec
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SECRETARIAT

Secretary	DR MALCOLM WINDSOR
Assistant Secretary	DR PETER HUTCHINSON

(++) Under Article 11, paragraph 2 of the Convention for the Conservation of Salmon in the North Atlantic Ocean, Canada and the United States of America each have the right to submit and vote on proposals for regulatory measures concerning salmon stocks originating in the rivers of Canada or the United States of America, respectively, and occurring off East Greenland.

JUNE 1989
EDINBURGH

ANNEX 2

NEA(89)7

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
SIXTH ANNUAL MEETING OF THE NORTH-EAST ATLANTIC COMMISSION
13-16 JUNE 1989
SHERATON HOTEL, EDINBURGH, UK

AGENDA

1. Opening of the meeting
2. Adoption of the agenda
3. Nomination of a rapporteur
4. Review of the 1988 fishery
5. ACFM report from ICES on salmon stocks
6. Impacts of acid rain on Atlantic salmon
7. Regulatory measures
8. Recommendations to the Council on scientific research
9. Other business
10. Date and place of next meeting
11. Consideration of the draft report of the meeting.

JUNE 1989
EDINBURGH

ANNEX 3

COUNCIL

PAPER CNL(89)10

REPORT OF THE ICES ADVISORY COMMITTEE ON FISHERIES MANAGEMENT (ACFM)

(SECTION 6-6.4)

(This paper makes reference to the report of the meeting of the ICES Working Group on North Atlantic Salmon (Copenhagen, 15-22 March 1989). That report is not annexed here but is available on request to the Secretariat).

6. QUESTIONS OF INTEREST TO THE NORTH-EAST ATLANTIC COMMISSION OF NASCO

6.1 The Fisheries in the 1987/1988 Season and in 1988

The Faroese salmon fishery is described below and descriptions of fisheries in homewaters are given in Section 8.

6.1.1 Description of the fishery at Faroes

The fishery in the 1987/1988 season was poor yielding 204t (Table 20). Catch rates were fairly good at the beginning of the season but were poor from February onwards. The Landings were low because few boats fished in November and December, the weather was unfavourable in January, and most vessels stopped fishing from February onwards because the low catch rates (Table 21) made the fishery unprofitable.

The nominal landings by seasons broken down into numbers and weights by sea age group are given in Table 3. Catch in numbers by statistical rectangle for the season 1987/1988 is presented in Figure 8.

The normal programme of discard retention did not operate but an observer participated in two trips with commercial vessels. A total of 1,264 salmon were caught and the discard rate was 18.6%, which is high compared with previous years. The sample numbers, however, were low (23 hauls) and the figure was greatly influenced by one haul where discards were particularly high.

6.1.2 Fishing effort

A total of 464 sets was fished in the 1987/1988 season; this is 54% of the total for the 1986/1987 season. The catch in numbers per unit effort (1,000 hooks) by statistical rectangle is given in Figure 9. The CPUE by month and season is given in Table 21.

6.1.3 Origin of salmon in the Faroese fishery

The only new data presented on external tags were from the USSR. A recovery rate at the Faroes of 0-1.33 per 1,000 parr tagged is shown in Table 22.

The numbers of microtags estimated to have been taken in the Faroese fishery in the 1987/1988 season are presented in Table 23. The CWT return rates per 1,000 fish tagged for Ireland, England, and Wales remain low compared to estimates from external tags previously obtained for Norway (3.19) and Sweden (5.02). The figures suggest that the rates of contribution of fish to the Faroese fishery from England and Wales, Ireland, and Scotland are lower than the rates from Norway and Sweden.

6.1.4 Biological characteristics

All vessels but one now freeze their catches onboard. Accordingly, only two scale samples were obtained during market sampling in the 1987/1988 season. A further two samples were obtained by an observer during two commercial fishing trips.

The scale samples were used to establish age/length keys and the composition of the landings was 18% 1SW fish, 77% 2SW fish, and 5% 3SW fish. The proportion of 1SW fish was higher than in the two previous seasons when 1SW fish comprised about 1% of the catch. Data on smolt age composition from samples show that 3-year-old smolts formed the largest age group with either 2- or 4-year-olds the next most common smolt age.

An assessment of the use of fork length data to determine sea age, although based on only two seasons and not all months within a season, indicated that the length frequency distribution could be used to estimate the numbers in each sea-age class.

6.1.5 Abundance and exploitation

There are no measures of abundance of salmon in the Faroese EEZ other than CPUE figures (Table 21). These data suggest that stock abundance was not significantly lower than in previous seasons.

Data from the River Imsa tagging experiments (Tables 24, 25) indicate that the exploitation of this stock at Faroes during the 1987/1988 season decreased compared to previous years.

6.2 Stocked and Farmed Salmon in the Fisheries

The development in farming of Atlantic salmon has led to an increase of escaped fish in the wild. If not caught in the fisheries, adult escapees enter rivers to spawn (Hansen et al, 1987). Experimental releases in Norway of tagged farmed salmon during their first year at sea showed a much higher adult recapture rate of fish escaping at the smolt stage in spring than those escaping during summer and autumn (Hansen and Jonsson, 1989). When reared fish escape from a marine location at the smolt stage, the adults tend to return to the area from which they escaped and enter rivers in that area to spawn (Hansen et al 1989).

6.2.1 Identification of reared fish

The reliability of morphometric methods and scale analysis to distinguish reared (farmed, ranched, or stocked for enhancement) and wild salmon has been evaluated by Lund et al, (in press). The best morphometric and scale characters to use in identification were listed. It was concluded that recently-escaped farmed fish could be identified with a high degree of accuracy both on morphological and scale characters. Regeneration of fins, however, reduced the accuracy of identification of fish that were released as smolts or escaped at an early sea age. The combined use of morphological characteristics and scale analysis improved the accuracy of identification.

It was recommended that further development of methods of analysis of salmon scales using circuli spacing and surface texture patterns to separate between wild, ranched, and farmed fish should take place.

6.2.2 Reared fish in the fisheries

It was noted that about 20% of the salmon caught in some commercial fisheries in Norwegian homewaters in 1988 were of reared origin (ranched and farmed escapees). In the Faroese fishery during the 1987/1988 season, 8.2% of a sample was classified as reared. Reared fish or cage escapees were reported in rivers in Iceland, Ireland, and Scotland.

6.3 Acoustic Survey at Faroes

Staff from the Marine Laboratory, Aberdeen, Scotland and the Fishery Laboratory at Faroes took part in an acoustic survey at Faroes from 18 January to 6 February 1989. The R/V "Magnus Heinason" was equipped with a towed 38 kHz sounder and a 330 kHz scanning sonar.

The horizontally scanning sonar was buoy mounted and operated at a depth of 20-40m on a 1,000m cable paid out from the boat. The system drifted at about 1-1.5 knot and the range (radius) of the sonar was 50-70m with a vertical beam angle of 30". The sonar was used 5 times for a total of 50 hours. Forty hours were at a position where the vessels had recently reported good catches. Single targets could be seen on the sonar, but in no case could these be confirmed as fish (salmon). It was not possible to track an echo from one scan to the next, and it was difficult to tell whether it was a target or noise. It was possible to identify a preset target (trawl float).

Some of the problems encountered apart from the very severe weather were listed; the range of the sonar was too short (maximum radius was 50-70m); the scanning rate was too slow (one revolution per 33 s at a range of 79m); handling of the sonar, shooting, and hauling, was difficult in bad weather.

It was agreed that if more suitable equipment were available, further tests should be conducted using a laterally scanning towed sonar operating between 35 and 120 kHz.

6.4 Effectiveness of Management Measures in the Faroese Fishery

In the 1987/1988 season, some fishing took place outside the Faroese fishing zone. The catch outside the zone comprised about 30% of the total for the season. After warnings, several vessels were apprehended by the Coast Guard in February, fines were imposed, and the catch and gear confiscated. No further landings were reported from outside the zone.

A total of 19 licenses was issued for the season. The fishery opened on 1 November 1988 as agreed. The closure during Christmas, however, was reduced from 1 month (15 December - 15 January) to 2 weeks (20 December - 4 January). The Faroese authorities decided to end the season 15 days early to compensate for this.

JUNE 1989
EDINBURGH

ANNEX 4

NEA(89)6

PROPOSAL BY THE CHAIR FOR A REGULATORY MEASURE FOR FISHING OF SALMON IN THE FAROE ISLANDS FOR THE CALENDAR YEARS 1990 AND 1991.

The North-East Atlantic Commission of the North Atlantic Salmon Conservation Organization

having regard to Article 8, subparagraph (b), recognising the need for regulatory measures in the Faroese fishery for the years 1990 and 1991 decides that:

The Faroese catch shall be controlled in accordance with an effort limitation programme, set out in Appendix 1, for a trial period of two years.

During the trial period the fishery shall be monitored by the Commission at its Annual Meetings, at which the Commission could decide on changes in the effort limitation programme and/or of the catch target. For this purpose, account shall be taken of the advice received from ICES.

The fishing effort shall be targeted at an average annual catch so that the total nominal catch for the duration of the trial period shall not exceed 1100 tonnes. However, in any given year the annual catch shall not exceed 15% more than the annual average.

Appendix 1

The following regulatory measures for the fishing of salmon in the fisheries zone of the Faroe Islands for the years 1990 and 1991 shall apply.

(1) Areas with salmon below the length of 60cm will be closed for salmon fishery at short notice, following the general rules for closing areas with undersized fish already in force in the Faroese fisheries zone.

(2) The number of boats licensed for salmon shall not exceed 26.

(3) The salmon fishing season will be limited to 150 days between 1 January and 30 April and 1 November and 31 December. The Faroese Authorities shall inform NASCO before 15 December of the fishing season for the coming calendar year.

(4) Subject to the maximum annual catch the total allowable number of fishing days for the salmon fishery in the Faroese Islands zone shall be set at 1600 each year.

Appendix 2

The reduction in the Faroes quota is in recognition of newly introduced restrictions in the fisheries of an important state of origin. The justification for this reduction will be reviewed in the light of a scientific assessment of the effects of these new restrictions. In this connection ICES is specifically requested to make the necessary evaluation.

JUNE 1989
EDINBURGH

ANNEX 5

NORTH-EAST ATLANTIC COMMISSION

PAPER NEA(89)8

NORWEGIAN STATEMENT FOR THE NORTH-EAST ATLANTIC COMMISSION

A BRIEF SURVEY OF THE NORWEGIAN REGULATIONS OF SALMON FISHERY FROM 1989

PAPER NEA(89)8
NORWEGIAN STATEMENT FOR THE NORTH-EAST ATLANTIC COMMISSION

A BRIEF SURVEY OF THE NORWEGIAN REGULATIONS OF SALMON FISHERY FROM 1989

Norwegian salmon stocks have for several years been under heavy pressure. The main problems are extermination of salmon stocks due to acidification, loss of salmon due to the parasitic fluke Gyrodactylus salaris and a heavy exploitation, mainly on mixed stocks. This has reduced the spawning stock in many rivers and reduced the stock enhancement activity. Furthermore, the increased salmon farming is a potential threat to salmon stocks.

Due to these severe problems the Norwegian authorities decided to regulate the Norwegian homewater fishery considerably from the 1989 season.

THE MAIN MEASURES OF REGULATION UNTIL 1989 WERE AS FOLLOWS:

In the sea: Legal fishing season from 1 June until 5 August.

A weekly closed time from 6pm on Friday to 6pm on Monday except for rod fishing. This gave four fishing days each week.

The legal operating gears and fishing methods were drift nets, bag nets, bend nets, lift nets, stake nets and rod fishing.

Drift netting was allowed between the base line and 12 nautical miles and required a licence.

In freshwater: Fishing season from 1 June until 1 September with several local exceptions.

With a few exceptions, rod fishing was the only legal method.

THE MAIN NEW REGULATIONS EFFECTUATED FROM THE 1989 FISHING SEASON ARE AS FOLLOWS:

In the sea: A total ban of the drift net fishery, which landed about 50% of the total nominal salmon catch in Norway in recent years.

Bend nets are banned in June, and can only operate two days a week, from 6pm on Monday until 6pm on Wednesday. The legal fishing season is from 1 July until 4 August. From the 1990 season it is prohibited to use mono-filament in this type of gear.

Nets with a mesh size of 35mm or more intended for harvesting marine fish, have to be set three meters below the surface during the salmon season. This applies to the recreational fishery only.

In freshwater: The salmon fishing season is reduced by 14 days at the end of the season.

In 74 water courses all salmon fishing is prohibited for a period of up to five years.

Furthermore, there are also some restrictions on the use of fishing tackle.

It is expected that these regulations will improve Atlantic salmon spawning escapement in Norway and strengthen the natural stocks. We look upon these regulations as an important measure to the conservation of the stock of Atlantic salmon in the future.

JUNE 1989
EDINBURGH

ANNEX 6

CNL(89)38

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 each Commission area:

(a) describe events of the 1989 fisheries with respect to gear, effort, composition and origin of the catch.

(b) estimate exploitation rates in home water and interception fisheries on stocks occurring in the Commission area.

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

(d) evaluate the effectiveness of new or proposed management measures for home waters and interception fisheries on stocks occurring in the Commission areas;

(e) specify data deficiencies and research needs.

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

(a) with respect to the impact of aquaculture on wild salmon stocks, provide quantitative estimates of the effect of escapees on the number of salmon in the open ocean and home waters.

JUNE 1989
EDINBURGH

ANNEX 7

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

SIXTH ANNUAL MEETING OF THE NORTH-EAST ATLANTIC COMMISSION
13-16 JUNE 1989, EDINBURGH, UK

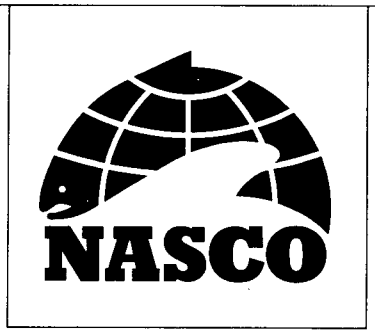
LIST OF NORTH-EAST ATLANTIC COMMISSION PAPERS

PAPER NO	TITLE
NEA(89)1	Provisional Agenda
NEA(89)2	Draft Agenda
NEA(89)3	Communication from the Faroe Islands regarding the NEAC Regulatory Measure
NEA(89)4	Communication from the EEC regarding the NEAC Regulatory Measure
NEA(89)5	Clarification of a Communication from the Faroe Islands
NEA(89)6	Proposal by the Chair for a Regulatory Measure for fishing of salmon in the Faroe Islands for the calendar years 1990 and 1991
NEA(89)7	Agenda
NEA(89)8	Norwegian Statement for the North-East Atlantic Commission
NEA(89)9	Not issued
NEA(89)10	Draft Report of the Sixth Annual Meeting of the North-East Atlantic Commission
NEA(89)11	Report of the Sixth Annual Meeting of the North-East Atlantic Commission
CNL(89)10	Report of the ICES Advisory Committee on Fisheries Management
CNL(89)38	Draft decision of the Council to request scientific advice from ICES

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.

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

ORGANISATION POUR LA CONSERVATION DU SAUMON DE L'ATLANTIQUE NORD



REPORT OF THE

SIXTH ANNUAL MEETING

OF THE WEST GREENLAND COMMISSION

13-16 JUNE 1989

EDINBURGH, UK

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

WGC(89)4

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CONTENTS

WGC(89)4

REPORT OF THE SIXTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION OF THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION 13-16 JUNE 1989, SHERATON HOTEL, EDINBURGH

1. OPENING OF THE MEETING

1.1 The Sixth Annual Meeting of the West Greenland Commission was opened by the Chairman, Dr Wilfred Carter (Canada).

1.2 A list of participants is given in Annex 1.

2. ADOPTION OF THE AGENDA

2.1 The Commission adopted its agenda, WGC(89)3 (Annex 2).

3. NOMINATION OF A RAPPORTEUR

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

4. REVIEW OF THE 1988 FISHERY AND ACFM REPORT FROM ICES OF SALMON STOCKS

4.1 The Chairman of the ACFM, Mr Bernard Vaske, presented the scientific advice from ICES relevant to the West Greenland Commission, CNL(89)10, (Annex 3) prepared in response to a request from the Commission at its Fifth Annual Meeting. The representative of ICES drew the attention of the Commission to two typographical errors in the ACFM report:

- (1) Paragraph 2 on page 5 should read:
"This could be a result of the early opening date in Division IF."

- (2) Paragraph 2 on page 6 should read:
"The 43% and 57% proportions in 1988 correspond to catches of 359t or 125,456 North American salmon and 534t or 168,762 salmon of European origin.

4.2 The Representative of Canada drew the attention of the Commission to two typographical errors in the Report of the ICES North Atlantic Salmon Working Group CNL(89)9: The first occurs on page 15, third paragraph, second sentence. It should read,

- (1) Paragraph 3 on page 15 should read:
"Although some salmon (primarily European) are not distinguishable directly by this method, the new analysis indicated that acceptable (<6%) misclassification rates would

occur using a relative likelihood model to assign specific genotype combinations to one continent or another."

The second occurs on page 27 of the same document, second paragraph, sentence 3. It should read,

- (2) Paragraph 2 of page 27 should read:
"The landings of 1SW salmon (658t) in 1988 were 21% below the 1987 landings (833t), and only 3% above the previous 5 year mean (637t)."

4.3 The fishery in 1988 opened on 1 August (Division 1F) and on 25 August (Divisions 1A-1E) and ended on 4 December. The total catch was 893t which corresponds to 820t with an opening date of 1 August. The representative of Denmark (in respect of the Faroe Islands and Greenland) described the new quota arrangements at West Greenland. During 1988 there was no free quota but individual boat quotas were allocated by the municipalities according to previous average catches. The fishery organizations were not satisfied with this arrangement and it is not anticipated that this will continue in future seasons. The Commission expressed its gratitude to the representative of the ACFM for the answers provided.

5. REGULATORY MEASURES

5.1 The representative of the EEC referred to the possible increase in discards with individual boat quotas and the problem of overfishing with a free quota and asked the representative of Denmark (in respect of the Faroe Islands and Greenland) what measures would be taken to reduce overfishing of the quota if there was a return to a free quota.

5.2 The representative of Denmark (in respect of the Faroe Islands and Greenland) acknowledged that a combination of a boat quota and price differences for different qualities of salmon could result in higher levels of discards. However, if the Greenland authorities reinstated the free quota it will be managed by allocating a buffer to be held in reserve for later in the season to ensure that overfishing of the quota does not occur.

6. RECOMMENDATIONS TO THE COUNCIL ON SCIENTIFIC RESEARCH

6.1 The Commission reviewed and accepted the relevant section (Section 1) of paper CNL(89)38 (Annex 4) and agreed to recommend it to the Council as part of the annual request for scientific advice to ICES.

6.2 The Representative of the USA offered the following statement concurred to by the other Parties:

- NASCO agrees strongly with the research needs and recommendations listed in the 1989 Working Group Report (89/ass:12) and suggests that these receive high priority by the 1990 Atlantic Salmon Working Group. In particular NASCO emphasizes the need to produce the information needed

to refine the salmon run reconstruction models such as the tagging studies, estimate of spawning stock numbers and the exploitation rates.

7. OTHER BUSINESS

8. DATE AND PLACE OF NEXT MEETING

8.1 The Commission agreed to hold its next meeting during the Seventh Annual Meeting of the Council, 12-15 June 1990 in Helsinki.

9. CONSIDERATION OF THE DRAFT REPORT OF THE MEETING

9.1 The Commission agreed the draft report of the meeting.

EDINBURGH
13 JUNE 1989

ANNEX 1

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
SIXTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION
13-16 JUNE 1989, EDINBURGH, UK

LIST OF PARTICIPANTS

* Denotes Head of Delegation

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MR GLENN BLACKWOOD	Department of Fisheries, St John's Newfoundland

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MR TED POTTER	Ministry of Agriculture, Fisheries and Food, Lowestoft
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MR STETSON TINKHAM	Dept of State, Office of Fisheries Affairs, Washington DC
DR JAMES WEAVER	US Fish and Wildlife Service, Newton Corner, MA
MR GILBERT RADONSKI	Sport Fishing Institute, Washington DC
MR HENRY LYMAN	Atlantic Salmon Federation, Boston, MA
MR JOHN PHILLIPS	Atlantic Salmon Federation, Ipswich, MA
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SECRETARIAT

DR M L WINDSOR	Secretary
DR P HUTCHINSON	Assistant Secretary

JUNE 1989
EDINBURGH

ANNEX 2

WGC(89)3

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION
SIXTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION
13-16 JUNE 1989
SHERATON HOTEL, EDINBURGH, UK

AGENDA

1. Opening of the meeting
2. Adoption of the agenda, WGC(89)2
3. Nomination of a rapporteur
4. Review of the 1988 fishery and ACFM report from ICES of salmon stocks
5. Regulatory measures
6. Recommendations to the Council on scientific research
7. Other business
8. Date and place of next meeting
9. Consideration of the draft report of the meeting.

JUNE 1989
EDINBURGH

ANNEX 3

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

COUNCIL

CNL(89)10

REPORT OF THE ICES ADVISORY COMMITTEE ON FISHERIES MANAGEMENT (ACFM)

(SECTION 5-5.2)

(This paper makes reference to the report of the meeting of the ICES Working Group on North Atlantic Salmon (Copenhagen, 15-22 March 1989). That report is not annexed here but is available on request to the Secretariat).

REPORT TO THE NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

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

5.1 The Fisheries in 1988

The fishery at West Greenland is described below and descriptions of fisheries in homewaters are given in Section 8.

5.1.1 Description of the fishery at West Greenland

In 1988, the fishery opened on 1 August in NAFO Division IF and on 25 August in NAFO Divisions 1A to 1E and ended on 4 December. The nominal catch was 893t (Table 7). This corresponds to a catch of 820t if the entire fishery had opened on 1 August.

To prolong the season and allow for better organisations within the fish plants the TAC was divided into individual "boat quotas" instead of the normal "free quota" and "small boat quota". This arrangement which allows each fisherman to fill his quota at his own pace may have resulted in a higher discard rate if they selected for high quality (higher priced) fish.

A comparison between the landings of second class salmon in different years in Divisions 1A-1C and Divisions 1E-1F shows that 2.91% of the landings in 1988 were second class whereas for the years 1975 to 1988 it was 5.19% (SD 1.35%).

The geographical distribution of the fishery in 1988 (Table 8) differs at little from 1987, the landings being lower in Divisions 1A and 1B, but higher in Division 1F. This could be a result of the early opening date in Divisions 1C to 1E. It should be noted that Division 1D, from which there are no samples, had a high catch.

Boats smaller than 30 feet took 723t or 81% of the catch compared to 77% in 1987. The number of fixed gillnets being used is decreasing each year. Most of the salmon were taken with driftnets with a target mesh size of 140mm stretched. On average, the small boats used 44 (SD 29) driftnets per fishing day while the bigger boats used 92 (SD 28) compared to 40 and 99 nets respectively in 1987.

The high catches taken by small boats indicates that the salmon fishery took place in the inshore area or very close to the coast.

Effort and catch information in 1988 was available from 47 logbooks out of a total of 350 distributed. These have not yet been fully analyzed but the CPUE appears to have been the same as in 1987.

5.1.2 Composition and origin of the catch for 1988

Using an improved discrimination function scale samples from commercial catches in 1988 indicated that the North American proportion was 48% (95% C.L = 38,59) and the European proportion was 52% (95% C.L = 41,62)(Table 9).

An alternative estimate of the proportion of North American and European origin samples for the years 1982-1988 was derived by weighting NAFO Division samples by catch in numbers. Pooled samples were applied to divisions with no samples. Results are presented below:

	Weighted by catch in numbers				Percentage of all samples combined	
	NA		EU		NA	EU
Year	%	Wt	%	Wt	%	%
1982	57		43		62	38
1983	40		60		40	60
1984	54		46		50	50
1985	47		53		50	50
1986	59	537	41	423	57	43
1987	59	556	41	411	59	41
1988	43	359	57	534	48	52

The Working Group recommends that the method of allocating continental proportions by weight and NAFO Divisions should be used in future.

The 43% and 57% proportions in 1988 correspond to catches of 359t or 12,456 North American salmon and 534t or 168,762 salmon of European salmon.

While the reporting of Carlin tags for 1988 is not yet complete, the USA reported 104 Maine origin tags recovered compared to 165 in 1987. Salmon landings were again scanned in 1988 for adipose fin clips and coded-wire tags (CWTs) using procedures similar to those in previous years and including the addition of a further sampling site at Godhaven (Division 1A).

A total of 22,327 salmon (7.5% of the catch) was examined for adipose fin clips and CWTs. The CWTs recovered in 1988 were apportioned as follows: 58 (53%) from USA, 23 (21%) from Canada, 17 (15%) from Ireland, 8 (7%) from England and Wales, 1 (1%) from Scotland, and, new in 1988, from Iceland 3 (3%) (Table 11).

Proportionate contributions by various countries to the 1988 West Greenland harvest cannot be determined due to differential survivals of stocks tagged, as well as the different proportions of coded-wire tagged fish relative to total smolt production in each country.

The Working Group considered estimates of the number of USA fish at West Greenland based on the number of 1SW North American salmon of river age 1 in the fishery as apportioned by the relative proportion of 1-year-old smolts produced by USA (637,536) and Canadian (449,300) hatcheries in 1987 (the proportional harvest method). The estimate of USA salmon harvested at Greenland in 1988 was 4,811 (Figure 7).

An extension of this method based on the identification of North American 1SW salmon, which migrated as 1-year-old fish was used. Identification was by a discriminant function based on circuli spacing data of 1-year-old smolts produced by the various North American hatcheries in 1987. The results are considered preliminary but gave estimates of USA (Maine) and Canadian 1-year-old hatchery origin salmon as 5,087 and 4,516, respectively.

Three further stock identification techniques were considered:

- levels of mitochondrial DNA polymorphism within various salmon stocks and the use of mtDNA as a genetic marker for distinguishing North American from European stocks;

- the use of genetic protein variation of 8 loci to classify salmon to continent of origin;

- use of otolith shapes to identify continent of origin;

Further studies on all three methods are required and further development is encouraged by the Working Group.

5.1.3 Biological characteristics of the 1988 harvest

Biological characteristics (length, weight, and age) were recorded from samples of commercial catches from NAFO Divisions 1A, 1B and 1D-1F. A summary of the data divided into North American and European components based on the results of discriminant analysis is presented in Table 12.

As previously observed, the North American 1SW salmon were significantly shorter and lighter than their European counterparts, both overall and on a divisional basis. This was confirmed by samples from coded wire-tagged salmon. The sea and river age composition of samples is summarized in tables 13a, 13b and 14.

The mean smolt age of North American origin salmon at 3.04 was higher than in 1986 and 1987 (2.86 and 2.8 respectively). The mean for European salmon at 2.02 was about the same.

The sea age composition in 1988 (Tables 13a and 13b) of 97.4% 1SW, 1.7% 2SW, and 0.9% previous spawners was similar to that found in 1987.

Based on the estimate that 43% of salmon by number in 1988 West Greenland catches were of North American origin, the catch by age by continent of origin was as follows:

Sea age	NA	EU	Total
1	121,442	165,724	287,166
2	2,509	2,194	4,703
PS	1,505	844	2,349
Total	125,456	168,762	294,218

There was concern that sampling in 1988 was not as representative of the catch as in recent years and caution was advised in the extrapolation of sampling data on continent of origin, and biological characteristics of the catch outside the sampling period. It was recommended that the sampling programme be redesigned, if similar management measures (boat quota) are expected in 1989 and beyond.

5.1.4 Composition and origin of the catch for 1987 at West Greenland

Three methods were used to estimate contributions by USA to the West Greenland fishery:

- The harvest estimate for 1SW Maine-origin salmon using the Carlin tag method was 2,152 in 1987, a 2% increase from 1986 (Tables 15, 16 and 17). Tag returns suggest that the harvest occurred primarily in Divisions 1C and 1D, whereas in 1986 the largest tag returns (and harvest estimates) were from 1F, followed by 1D and 1C.

- The harvest estimate for Maine-origin stocks using the CWT method was 5,593, higher than the Carlin tag estimate of 2,152. The most likely explanation for the differences lie with the assumed reporting rate (80%) and non-detection of Carlin tags.

- The proportional method estimated the harvest of 1SW USA-origin salmon at West Greenland in 1987 to be 6,006. These estimates of harvest are compared in Figure 7 along with similar estimates for other years. For all years presented in Figure 7, the estimates of harvest of Maine-origin fish at West Greenland are much greater than those made from the Carlin tag data.

5.1.5 Stock abundance and exploitation at West Greenland

In 1987 and 1988, the Working Group considered a model to estimate exploitation in the West Greenland fishery based on virtual reconstruction of Maine stocks in both the Canadian and West Greenland fisheries. These calculations assumed constant proportions of the stock migrating to one fishery versus the other between years.

An analysis of the Carlin tag batch releases (12 per year) indicated that at least in some years batches behave similarly between the Canadian and Greenland fisheries.

Exploitation rates on 1SW Maine-origin salmon at both Canada and West Greenland were estimated from Carlin tag harvest data, assuming that populations are available to one or the other fishery, but not to both (Table 18). Estimated exploitation rates in West Greenland and Canada are inversely related within a given year by virtue of the uncertainty in the fraction of salmon returning from their respective fisheries (Figure 6). Until this parameter can be estimated, it is not possible to ascertain the absolute magnitude of exploitation in either fishery.

Two alternative hypotheses regarding the migration of Maine-origin salmon were considered.

The first hypothesis assumed that exploitation rates in Canada were constant over the period 1971-1986. This implies that the fraction of the stock migrating from West Greenland varies each year and, therefore, the exploitation rate derived for West Greenland is contingent upon the assumed level of exploitation in Canada and an annually varying migration pattern. Results from these analyses suggested that exploitation had increased in West Greenland since 1984. However, the model implied that the lowest possible exploitation rates in Canada would have to be 57% which was not consistent with experimental data.

The second hypothesis considered that the population in the Newfoundland-Labrador early summer fishery (standard weeks 21-30) could migrate to the West Greenland summer fishery (standard weeks 31-40) from which the survivors were again vulnerable to the Newfoundland fall fishery (standard weeks 41-52). Analysis on this basis suggested that exploitation at West Greenland in the past two years was between 50 and 70% but that Canadian exploitation rates were less than 10%. This result also is not consistent with experimental data.

Regardless of the assumptions, results suggest that since 1983 exploitation rates have increased in West Greenland. Two of the assumptions imply that exploitation rates have decreased in Canada over the period. There are, however, other explanations for the trends, such as decreased reporting rates in Canada or increased reporting rates in West Greenland.

5.2 Effectiveness of Management Measures in the Fishery at West Greenland

Prior to 1984, the quota for the West Greenland salmon fishery was 1,190t (or its equivalent adjusted for season opening date). Since 1984, the quota has been lower.

In order to assess the impact of the change in quota, data collected from the fishery since 1978 were analyzed to estimate the catch of North American and European salmon. In investigating the periods prior to and subsequent to 1984 it was decided not to use the years 1983 and 1984 when the catch did not reach the quota (Table 7). Significant reductions have taken place in the total weight, lower by 22%, and in numbers, lower by 17% (Table 19). Total harvest in West Greenland averaged 304,000 fish during recent years, which is about 61,000 fish less than when the quota was 1,190t.

The introduction of an individual boat quota in the West Greenland fishery had the effect of extending the period of time over which the fishery took place. It was not possible to conclude, however, if this changed the proportion of the continent of origin or the exploitation rates in the fishery.

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ANNEX 4

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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 each Commission area:

(a) describe events of the 1989 fisheries with respect to gear, effort, composition and origin of the catch.

(b) estimate exploitation rates in home water and interception fisheries on stocks occurring in the Commission area.

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

(d) evaluate the effectiveness of new or proposed management measures for home waters and interception fisheries on stocks occurring in the Commission areas;

(e) specify data deficiencies and research needs.

ANNEX 5

NORTH ATLANTIC SALMON CONSERVATION ORGANIZATION

SIXTH ANNUAL MEETING OF THE WEST GREENLAND COMMISSION
13-16 JUNE 1989, EDINBURGH, UK

LIST OF WEST GREENLAND COMMISSION PAPERS

PAPER NO	TITLE
WGC(89)1	Provisional Agenda
WGC(89)2	Draft Agenda
WGC(89)3	Agenda
WGC(89)4	Report of the West Greenland Commission
WGC(89)5	Not issued
WGC(89)6	Not issued
WGC(89)7	Draft Report of the West Greenland Commission
CNL(89)10	Scientific advice from ICES - Report of the ACFM
CNL(89)38	Draft Decision of the Council to request scientific advice from ICES

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.