

STATUS OF ATLANTIC SALMON STOCKS IN 1992

Introduction

Several sources of information are used to assess the status of Atlantic salmon; the most important are derived from the fisheries, from counting fences and from mark-recapture experiments. The year to year comparison of the information from the fisheries is difficult because fishing success is influenced by environmental conditions such as water levels and temperatures in rivers or at sea. Counts of returning salmon at fishways, counting fences and estimates derived from mark-recapture studies are more reliable but they are not available for all rivers.

In this document, salmon are generally referred to in two size categories, small and large. For salmon in freshwater, small salmon refers to salmon less than 63 cm in length. They are primarily mature virgin one-sea-winter (1SW) salmon (grilse) but may include some previous spawning grilse and virgin multi-sea-winter (MSW) salmon. Large salmon refers to salmon greater than or equal to 63 cm and are primarily virgin MSW salmon with some repeat spawning grilse and MSW salmon. Salmon caught in the commercial fishery are categorized by fish buyers as small or large by weight. Generally salmon less than 2.7 kg whole weight are graded as small and salmon greater than or equal to 2.7 kg are graded as large salmon. The large salmon would be primarily MSW salmon but could also include some maturing and non-maturing 1SW salmon as well as previous spawners. Small salmon are primarily 1SW salmon, consisting of maturing and nonmaturing components, as well as some previous spawners and two-sea-winter (2SW) salmon.

Atlantic Overview

In 1992, major changes were introduced to the Atlantic salmon fisheries, particularly those of the province of Newfoundland and Labrador. A five-year moratorium was placed on the commercial fishery in insular Newfoundland while, in Labrador, commercial fishing continued under quota or an allowance. The seasonal bag limit in the recreational fishery was reduced from ten to eight fish in Newfoundland, Labrador, New Brunswick and Nova Scotia and quotas were introduced in the recreational fishery of Newfoundland and Labrador for the first time. As the quota for each Salmon Fishing Area (SFA) (Figure 1) was reached, the retention of salmon in the recreational fishery was closed for all rivers of that SFA; only hook-and-release fishing was allowed thereafter. As well, in July, a moratorium was announced on the northern cod fishery, potentially reducing salmon by-catch in SFAs 1-9. As a result of these dramatic changes, salmon harvests and returns to some rivers varied greatly from past patterns making interpretation of the status of stocks more difficult. As well as affecting the 1992 returns to rivers in Newfoundland, changes to the commercial fishery in Newfoundland could have resulted in increased returns to some rivers of Quebec and the Maritime Provinces, although impacts on the return of large salmon would generally not be expected to start until 1993.

The provisional catch of salmon in 1992 of all sea-ages combined by all users was 470 t which was the lowest on record and 66% of the 1991 harvest and 40% and 27% of the previous 5- and 20-year means, respectively (Figure 2). The 291 t harvest of large salmon was the lowest on record, 79% of the 1991 harvest and 48% and 27% of the previous 5- and 20-year means, respectively. The 179 t harvest of small salmon was the lowest of record, 52% of the 1991 harvest and 32% of the previous 5 year mean and 27% of the 20 year mean.

The 1992 harvest by weight for all sea-ages combined was taken by the following users (with % of the total):

Commercial	(51.3%)
Recreational	(42.1 %)
Native food fisheries	(6.6%)

Table 1 provides an Atlantic overview of the status of Atlantic salmon stocks in 1992 using various indicators including recreational catches, commercial catches, and estimates of returns to rivers. Data for 1992 are compared to 1991 and the previous 5-year means. Differences are expressed in terms of

changes, whether increases or decreases of greater than 10%, or no change, that is an increase or decrease of less than 10%. It should be noted that there is no statistical significance associated with these percentage changes; they are used only to reflect, in a general manner, conditions of stocks in 1992 relative to previous time intervals.

In comparison with 1991, recreational catches of small salmon increased in most areas. Catches in 1991 were quite low, however, particularly in Newfoundland and a more appropriate comparison would be with the longer-term mean. In this case, only in Quebec, western Newfoundland and Gulf NB were recreational catches of small salmon higher than the average. Recreational catches of large salmon (including catch and-release estimates) were higher in most SFAs in comparison to both 1991 and the mean. Exceptions were in Nova Scotia (SFAs 19-21) and Quebec (Q9-Q11).

The commercial fishery in Labrador was better in 1992 than in 1991 but catches of both size categories continue to be below average. Similar to previous years, quotas were not reached. In Quebec, commercial catches were generally lower in 1992, compared to 1991 and the average. The exception however was the Lower North Shore (Q9) where catches increased to about 20% over average.

Counting facilities in Newfoundland recorded generally increased returns of both small and large salmon, both in comparison to 1991 and to the mean of the past 5 years; this was as expected with a commercial closure and quotas on recreational fisheries. Increased counts were generally noted throughout the Gulf Region while in the Scotia-Fundy Region, there were generally decreases or little change in the return of small and large salmon.

The fishery for salmon at Greenland was poor; the catch was approximately 185 t in 1992, the lowest on record since 1961. Indicators of abundance were the third lowest recorded at West Greenland since 1980.

The major changes in the fisheries in 1992, makes it difficult to forecast returns for 1993.

Newfoundland Region - Labrador and Insular Newfoundland SFA 1-11

In 1992, the most significant change to date in the management of Atlantic salmon in the Newfoundland Region went into effect. A five-year moratorium was placed on the commercial fishery in Insular Newfoundland while in Labrador, fishing continued under quota or allowance. In addition, a voluntary commercial license retirement program was implemented in both insular Newfoundland and Labrador. Otherwise, fishing regulations were the same as in 1991. It was illegal to retain Atlantic salmon caught as by-catch and the mandatory carcass tagging program remained in effect. The commercial fishery opening and closure dates for SF As 1 and 2 were June 5-October 15.

Quotas were introduced in the recreational fishery in each SFA for the first time in 1992. The quotas were assigned for the SF A as a whole and were not administered on an individual river basis. After the quota for retained fish was taken in each SFA, hook and release fishing only was permitted starting on July 8; the regulation allowing this to occur came into effect on that date. The season bag limit was reduced from ten to eight fish. Otherwise, angling regulations were the same as in 1991. There was a mandatory release of large salmon in insular Newfoundland but not in Labrador. The maximum number of fish that could be retained per day was two and the maximum number that could be hooked and released was four. Angling ceased for the day when one or the other limit was attained. On a river-specific basis, the recreational catch in Conne River was limited to a quota of 330 fish.

Catches were less than the quotas in SFAs 1, 2, and 5, and exceeded the quotas in SFAs 3,4,6,9,10, and 11. Cumulative catches to the closure of the fishery indicated increases in some SFAs and decreases in others; catches of large salmon in Labrador were above average.

Labrador

In Labrador, the commercial fishery lasted the entire season, closing on October 15. For the third year in a row, the quota was not caught in this fishery. There was a combined quota/allowance of 260 t, 20 t of

which was taken from the 80 t allowance in SFA 1 and 132 t from the 180 t quota in SFA 2. The total represents 58% of the quota/allowance taken in 1992 compared to 64% in 1990 and 31% in 1991. The salmon harvested in the Labrador commercial salmon fishery are believed to be primarily of Labrador origin. Sampling of the large salmon commercial catch in SFAs 1 and 2 indicate that the majority of them possess a river age greater than 3 years. Large salmon with river ages greater than 3 years are principally from stocks in Labrador and the Quebec North Shore.

In the recreational fishery, the numbers of retained small and large salmon in Labrador at the time quotas were reached, were higher than the 1991 angling season which had the lowest catches on record. The small salmon catches remained below the 1984-89 and 1986-91 means mainly because of the low catches in SFA 1. Large salmon catches improved over both means.

In July of 1992, a moratorium was implemented on the northern cod fishery affecting SFAs 1-9. This measure should have resulted in the elimination of any by-catch in cod fishing gear. It is possible that Atlantic salmon normally taken in the commercial fishery in SF A 3 contributed to catches in Labrador in 1992; in the past, Labrador-origin salmon have been intercepted in SFA 3.

The low catch of small salmon in the commercial fishery coupled with average and less than average catches in the recreational fishery suggest abundance was low in 1992. The commercial catch of large salmon remained low in 1992 although an improvement was noted in the recreational fishery. The magnitude of catch in the commercial fishery, however, suggests that the overall abundance of large salmon was low in 1992. An analysis of catch rates corroborates the conclusions of low abundance as does the analysis of trends in catches of large salmon in Labrador and small salmon at West Greenland with a river age greater than 3 years.

An increase was noted in the ratio of large salmon to small salmon in the angling fishery in Labrador over previous years. A possible explanation for this is a change in fishing pattern with anglers opting to retain more large salmon as part of the total season bag limit for retained fish than in previous years. This might be a reflection of the imposition of quotas on this fishery for the first time. Alternatively, it may not have been a matter of choice; the change might reflect overall greater availability of large salmon.

Insular Newfoundland

The catch of 12,271 small salmon retained in the recreational fishery in 1992 was compared to the catch to the same date for the period 1984-91. The catch increased 186% over 1991, decreased 6% from the 1984-89 mean, and increased by 17% over the 1986-91 mean. The catch in 1991 was one of the lowest on record. With respect to the means, on an individual SFA basis, with the exception of SFAs 3, 4, and 5, catches of small salmon were below average. Effort and CPUE overall increased over 1991 with only marginal changes relative to the means.

Except for Northeast Brook, Trepassey, counts of large salmon increased over 1991. In relation to the 1984-89 and 1986-91 means, increases occurred for all rivers except Biscay Bay River (SFA 9), Northeast Brook, Trepassey, and Conne River where the low escapements of large salmon in 1992, in these rivers, could be related to low escapements of virgin grilse in 1991 as most of the fish classified as large salmon in rivers in the insular Newfoundland portion of the Newfoundland Region are repeat spawning grilse. The angling catches up to the time the quota was caught in each SFA used in terms of indices of abundance should be viewed with caution. There were differences among SFAs in the times quotas were caught (e.g., July 41n SFA 10, July 24 in SFAs 3 and 4, August 28 in SFA 1). Of particular concern are differences in annual timing of runs into rivers which could confound historical comparisons; for example, notable delays in adult migration occurred in 1985 and 1991.

STOCK: Exploits River, SFA 4

TARGET: 95.9×10^6 eggs (equivalent to 56,670 1SW salmon)
 Lower Exploits 16.4×10^6 eggs
 Middle Exploits 64.2×10^6 eggs
 Upper Exploits 15.4×10^6 eggs

Year	1987	1988	1989	1990	1991	1992 ¹	MIN	MAX	MEAN ⁸
Angling harvest²:									
1SW	1935	1731	577	917	1045	1408	79	2998	1241
Brood removals³:									
	4303	5111	4459	3869	1408	1078	74	5111	3812
Total returns⁴:									
1SW	9791	9643	7666	7117	5758	13818	5083	19557	7995
Large Salmon	9481	9496	7577	6995	5659	13504	4740	19205	7482
	310	147	89	122	99	314	343	352	153
% Target egg met:									
Lower Exploits ⁵	65	61	48	47	35	63	9	127	51
Middle Exploits ⁶	9	12	14	12	14	18	1	20	12
Upper Exploits ⁷	96	125	119	88	0	2	0	125	66
¹ Preliminary data. ² MIN, MAX period from 1960-1991. ³ MIN, MAX period from 1974-1991. ⁴ MIN, MAX period from 1974-1991. ⁵ MIN, MAX period from 1972-1991. ⁶ MIN, MAX period from 1967-1991. ⁷ MIN, MAX period from 1975-1991. ⁸ MEAN period from 1987-1991.									

Methodologies: Fluvial habitat includes 3.5×10^5 units and lacustrine includes 3.4×10^4 ha. of standing water habitat. Target eggs are to come from 1SW salmon. Biological characteristics used are those of the Exploits stock. Current fry releases are back-calculated to eggs for % of target egg achieved in areas stocked. Total returns to the river are based on the count at Bishop Falls fishway plus angling below fishway.

Broodstock requirements: 1400 1SW fish.

State of the stock: From 1987 to 1991, the lower, middle and upper Exploits have averaged 51%, 12% and 66% of target egg, respectively, based on fry releases and natural spawning.

STOCK: Gander River, SFA 4

TARGET: 46.211 million eggs (~21,828 small salmon)

Year	1987	1988	1989	1990	1991	1992	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)	1444	2686	1173	1155	1180	1268	1155	4578	2459
Counts									
Small			7743	7520	6445	18316	6445	18316	10006
Large			473	508	670	4154	473	4154	1451
% of target met			35	36	33	111	33	111	54
¹ Recreational fishery data are for the period 1974 to 1991. The catch for 1992 is retained catch to the time the SFA quota was caught and does not include hook-and-release fish. Data prior to 1992 are for retained fish for the entire angling season. Data for 1987 are omitted from the calculation of min, max, and mean due to river closure as a result of drought conditions.									

Recreational catches: Catches have ranged from 1,155 to 4,578 small salmon during the past 17 years (1974-91) and have declined during the 1980s (1981-90). Effort has remained relatively steady. The catch of small salmon in 1992 up to July 24 when the quota for retained fish was taken in SFA 4 was higher than for the entire angling season in 1989-91.

Data and assessment: Complete counts of salmon are obtained at a fish counting fence, 1989-92, and have historically been counted at a fishway located on a tributary, Salmon Brook.

State of the stock: The percentage of target egg deposition achieved in 1989-91 ranged from 33% to 36%. In 1992, a small surplus to target requirement was achieved. The relative contribution to the total target spawning requirement by large salmon in 1992 increased to 40% from an average of 17% for 1989-91. Using Salmon Brook as an indicator of returns to the entire river, it is likely that the small salmon returns in 1992 were similar to those experienced in some years prior to the salmon moratorium. The return of large salmon to Salmon Brook in 1992 was the highest on record.

STOCK: Middle Brook, SFA 5

TARGET: 2.3 million eggs (~1012 small salmon)

Year	1987	1988	1989	1990	1991	1992	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)									
	187	708	165	349	278	423	165	789	461
Fishway counts									
Small	914	772	496	745	562	1168	496	2415	1121
Large	19	14	19	13	14	43	13	91	34
% of target met									
	90	66	50	75	51	142	51	142	87
¹ Recreational catch is for the period 1974 to 1991. The catch for 1992 is retained catch to the time the SFA quota was caught and does not include hook-and-release fish. Data prior to 1992 are for retained fish for the entire angling season. The years 1979 and 1987 are omitted from calculations of min, max, and mean due to river closures resulting from drought conditions. Means for fishway counts are from 1980 to 1992. Summary for target egg deposition applies from 1984 and represents contribution from both small and large salmon.									

Recreational catches: For the period 1974-91, catches have ranged from 165 to 789 small salmon. Rod days of effort peaked during the mid-1980s but have declined substantially in recent years. In 1992, the number of retained fish up to July 19 when the quota for SF A 5 was caught, was higher than the entire catch observed for 1991.

Data and assessment: Complete counts of fish are available from a fishway.

State of the stock: Target egg deposition requirements were met in 1984 and 1992. Even though the commercial salmon and cod fisheries were closed in 1992, counts of both small and large salmon in the past have equalled or surpassed those of 1992.

STOCK: Terra Nova River, SFA 5

TARGET: 14.30 million eggs (7094 small fish)

Year	1987	1988	1989	1990	1991	1992	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)									
	546	682	357	624	448	409	243	850	559
Fishway counts									
Small	974	1737	1138	1149	873	1443	569	1737	1111
Large	56	206	142	144	114	270	19	270	112
% of target met									
	15	30	20	20	16	29	15	30	21
¹ Recreational catches are for the period 1974 to 1991. The catch for 1992 is retained catch to the time the SFA quota was caught and does not include hook-and-release fish. Data prior to 1992 are for retained fish for the entire angling season. Means for fishway counts are from 1979 to 1992. Summary for targets here applies from 1984.									

Recreational catches: For the period 1974-91, catches have ranged from 243 to 850 small salmon. Catches in recent years have declined relative to those during the late 1970s and early 1980s. Effort, in terms of rod days, has generally increased over time. The number of small salmon retained in 1992 up to July 19, when the quota for SFA 5 was caught, was slightly below that for the entire angling season in 1991.

Data and assessment: Complete counts of fish are available from a fishway on the lower section of the river.

STOCK: Rocky River, SFA 9

TARGET: 3.4×10^6 eggs (equivalent to 881 1SW fish)

Year	1987	1988	1989	1990	1991	1992	MIN ¹	MAX ¹	MEAN ¹
Total returns:	205*	319	177	418	227	283	177	418	269
% Target egg met:	23	36	20	47	26	32	20	47	30
¹ MIN, MAX and MEAN for the period 1987-1991. * includes 124 grilse transferred into Rocky River.									

Background: The Rocky River was stocked with salmon fry from 1983-1987 with the first returns to the newly constructed fishway noted in 1987.

Methodologies: Fluvial habitat includes 10.8×10^3 units and lacustrine includes 2.2×10^3 ha. of standing water habitat. Target egg requirements are to come from 1SW salmon. Biological characteristics used are those of the Rocky River stock and other salmon stocks in SFA 9. Previous fry releases are back-calculated to eggs for the percentage of target egg number achieved in areas stocked.

Recreational fisheries: The recreational fishery is closed on this river.

Data and assessment: Complete adult counts are available from a trap installed in the fishway. Smolt counts in 1990, 1991 and 1992 have totalled 8,287, 7,732 and 7,813, respectively. Adult returns in 1991 and 1992 have been 1.8% and 3.2% of the respective smolt runs.

State of the stock: On average, the watershed is achieving 30% of its required target egg deposition.

STOCK: Biscay Bay River, SFA 9

TARGET: 2.9 million eggs (~1134 small salmon)

Year	1987	1988	1989	1990	1991	1992	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)	101	349	102	232	10	75	10	424	234
Counts									
Small	1302	1695	889	1657	394	1298	394	2516	1837
Large	106	58	104	73	35	49	35	101	73
% of target met	119	127	87	128	39	118	39	208	140
¹ Recreational catch is for the period 1974 to 1991. The catch for 1992 is retained catch to the time the SFA quota was caught and does not include hook-and-release fish. Data prior to 1992 are for retained fish for the entire angling season. Data for 1987 are omitted from the calculation of the mean due to river closure resulting from drought conditions. Fence counts for 1985, 87, 89, and 92 are minimum values due to incomplete counts and are not included in calculation of min, max, or means. Percentage of target met since 1984 reflects contribution of both small and large salmon.									

Recreational catches: For the period 1974-1991, catches of small salmon have ranged from 10 to 424. Rod-days of effort have been relatively stable during the past decade.

Data and assessment: Complete counts of fish are obtained from a fish counting fence in operation since 1983.

State of the stock: Since 1983, from 39% to 208% of the target egg deposition was achieved. Including those years when incomplete counts were obtained, the target egg requirement has been met or exceeded in all years but 1991. Even though the commercial salmon and cod fisheries were closed in 1992, returns of both small and large salmon have been higher in the past.

STOCK: Northeast River, SFA 10

TARGET: 0.72 million eggs (~224 small salmon)

Year	1987	1988	1989	1990	1991	1992	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)									
	36	186	210	173	19	37	19	349	168
Fishway counts									
Small	325	543	706	551	353	921	224	921	473
Large	16	11	15	25	8	46	0	56	27
% of target met									
	152	209	277	251	161	440	152	440	254
¹ Recreational catch is for the period 1974 to 1991. The catch for 1992 is retained catch to the time the SFA quota was caught and does not include hook-and-release fish. Data prior to 1992 are for retained fish for the entire angling season. Data for 1987 are omitted from the calculation of the mean due to river closure resulting from drought conditions. Fishway counts (since 1974) for 1975, 81, 82, and 87 are minimum values due to incomplete counts. These years are omitted from calculation of min, max, and means. Percentage of target met (since 1984) reflects the contribution from both small and large salmon.									

Recreational catches: For the period 1974-91, catches of small salmon have ranged from 19 to 349. Roddays of effort peaked during the early 1980s (1984-88) but have declined substantially in recent years.

Data and assessment: Complete counts of fish are available from a fish counting fence.

State of the stock: Target egg deposition requirements have been exceeded in all years including 1992.

STOCK: Conne River, Newfoundland, SFA 11

TARGET: 7.8 million eggs (~ 4000 small salmon) calculated as fluvial area x 2.4 eggs/m² and egg/recruit applied to total population as derived from assumed commercial exploitation rates.

Year	1987	1988	1989	1990	1991	1992 ²	MIN ¹	MAX ¹	MEAN ¹
HARVEST:									
Native									
Large	0	2	1	11	3	5	0	11	3
Small	18	607	381	959	281	484	18	959	461
Recreational									
Small	1598	1544	1036	767	108	329	108	3302	1824
Returns:									
Large	516	420	320	372	89	159	89	516	355
Small	10155	7627	4968	5377	2411	2523	2411	10155	6473
Escapement:									
Large	488	418	319	361	87	153	87	488	345
Small	7823	5567	3609	3765	2062	1783	2062	7823	4709
% Target met:									
	214	159	103	112	51	51	51	214	131
¹ Recreational catch is for the period 1974-91; other data are for 1986-91. ² Preliminary data. Angling catches are DFO statistics. Native catch in salt water includes some salmon from other rivers. A food fishery quota of 1200 fish has been in effect since 1986.									

Data and methodology: The smolts used in adult forecasts are surveyed by mark-recapture. Returning adult salmon are enumerated at a fish counting fence.

State of the stock: The target requirements were met from 1986-90. Only 51% of the target was achieved in 1991 and 1992. Low sea survival impacted on salmon returns during the past two years.

Forecast: The estimated smolt output in 1992 of 68200 (61300-75050) indicates a pre-season forecast for 1993 of 4500 fish (4000-4900). Low sea survival could again impact on reducing expected numbers of returning salmon. In-season monitoring could be used to provide updates on changing conditions as the 1993 run progresses.

Gulf Region -SFAs 12-18

Commercial fisheries for Atlantic salmon stocks in SFAs 12, 13, and 14(A) were closed in 1992 and the quota in SFA 14(8) was reduced to 13 t from 15 t in 1991. The SFA 14(8) harvests from north of Henley Harbour to Cape Charles were deducted from the SFA 2 quota in 1992, as in 1991, because these catches were made by SFA 2 licensed fishermen who fished and landed their catch in SFA 14(8). The total number of licenses available to be fished in southern Labrador in 1992 was 63 compared to 76 in 1991.

Recreational fishery management changes in 1992 included the introduction of zonal SFA quotas which were set approximately equivalent to the average catch for the previous three years in each SFA. In SFAs 12, 13 and 14(8) the quota was for small salmon only, as all large salmon were required to be released; in SFA 14(8) the quota was for small and large salmon.

Ten rivers were managed by Individual river quotas in 1992 compared to 9 in 1991. A catch and release fishery for small and large salmon was permitted until the end of the season in all SFAs after either the zonal quota or the river quota was reached. The season bag limit was reduced to 8 fish from 10 in 1991. Duration of seasons remained the same as those since 1984 in SFAs 12, 13, and 14(A); however, the SFA 14(8) season was extended by two weeks.

Recreational quotas were reached in all SFAs before the end of the season and catch-and-release angling was permitted. The catch and release fishery began officially on July 8 in SFA 12 which resulted in the loss of one day fishing after the closure of the retention fishery. Catches of small salmon during the catch-and release fishery represented 42% of the total catch of small salmon in SFA 12 and only 10% of catches in other areas. Angling catches of small salmon dropped off quickly in all SFAs once zonal quotas were reached, indicating that the catch-and-release fishery was not prosecuted to the same extent as for retained fish and resulted in fewer anglers on the rivers. Catches of large salmon had dropped off before quotas were reached, indicating an earlier run-timing for large salmon in all areas. In SFA 14(8), southern Labrador, where large salmon could be retained and where declining large salmon abundance has been noted in previous assessments, the large salmon component of the stock did not benefit from the early closure of the recreational fishery. The early closure resulted in a disproportionate harvesting of small and large salmon. The earlier entry of large salmon into southern Labrador rivers resulted in the exploitation of these fish over their entire run, whereas only a portion of the small salmon run was exploited.

Total (retained + released) recreational catches of small salmon were above those in 1991 for SFAs 12, 13 and 14(A) but did not increase relative to the 1984-1989 mean. In southern Labrador catches of small salmon were 20% below those in 1991 and below the 1984-1989 mean and 95% confidence limits.

The greatest change in recreational catches in 1992 was in the catches of large salmon which was two to four times higher than in the previous year and suggests a positive impact on river escapements in 1992 from the reduction in commercial fishing mortality. Relative to the 1984-89 mean catches, only large salmon increased significantly in 1992. This increase was not necessarily indicative of an increase in total abundance but was probably the result of the removal of commercial gill nets which selectively harvested larger salmon.

It was noted that total recreational catches recorded in 1992 exceeded the total recreational quota by 13%. The discrepancy between the quota and the actual catch ranged from zero to 23%, depending on the SFA, drawing attention to the accuracy of traditional angling catch estimates for quota monitoring. Attention was also drawn to the discrepancy between angling catch estimates by traditional methods and catches estimated by the "bus route" creel survey method on the Humber River in 1992. Catch estimates based on the creel survey suggest that catches were actually twice as high as reported. These results question the utility of traditional catch and effort statistics collection methods in quota monitoring and in evaluating the effect of the closure of the commercial fishery on recreational fisheries harvests.

Cumulative commercial landings of small salmon in southern Labrador in 1992, up to week 29, when the quota in the southern portion of the area was reached, were the lowest recorded since 1984 and landings

of large salmon were the third lowest. The proportion of large salmon in commercial catches increased in 1992 but this was probably due to an earlier run-timing of large relative to small salmon, in this area rather than an increase in large salmon abundance.

Returns of small and large salmon to index facilities in SFA 13 and SFA 14(A) in 1992 were consistent with the increase in river escapements in 1992 suggested by recreational catches. Returns of large salmon to all facilities, except for Bound Brook in SFA 14(A), were the highest recorded. Returns of small salmon, although above returns in 1991, were within the 95% confidence limits of the 1984-89 mean.

The smolt survival to Western Arm Brook in 1992 was 3.6%, the highest since 1985. With a 15% increase in smolt counts in 1992, and assuming a similar sea survival to the previous year, returns of adult salmon to the river in 1993 should be about 15% greater than in 1992.

New assessment projects were initiated on the Richibucto, Tabusintac and Buctouche rivers as native co-management programs with the Big Cove, Burnt Church and Buctouche bands, respectively. In 1992, native personnel gained experience in constructing and operating assessment trapnets and collected biological data during the fall salmon run in all three rivers. Sufficient data for assessment of salmon abundance are expected to be collected in 1993.

In addition to stocking the Morell River in SFA 17 of Prince Edward Island, enhancement projects have been initiated on the Trout, Dunk, Valleyfield, and West rivers. Estimates of the catches of the recreational and native fisheries are not available for either 1991 or 1992. The Morell River has the largest salmon returns in SFA 17. Returns to the Leard's Pond fishway on the Morell River were 907 small and 46 large salmon, of which the majority are of hatchery origin. These counts represent increases of 177% and 18% compared to 1991 and translate into a return rate to date of 3.4% for the 26,643 smolts stocked above Leard's Pond in 1991.

Details on specific rivers in the Gulf Region follow: Humber River (SFA 13); Restigouche River (SFA 15); Miramichi River (SFA 16); and the Margaree River (SFA 18).

STOCK: Humber River, Bay of Islands, SFA 13, Newfoundland

TARGET: 27.673×10^6 eggs calculated as rearing area \times 2.4 eggs/m²

Year	1987	1988	1989	1990	1991	1992	MIN ¹	MAX ¹	MEAN ¹
Angling harvest - Humber River									
Small	3074	4042	1217	3054	1431	4479	1217 ²	5102 ²	2564
Commercial harvest - Bay of Islands (number)									
Small ³	8060	9989	4211	4983	2007	-	2007	9989	5850
Large ³	728	824	815	579	244	-	244	824	638
Total returns									
Small	12296	16168	4868	12216	5724	22364	4868	16168	10254
Large	861	1132	341	855	401	3748	341	1132	718
Spawning escapement									
Small	9222	12126	3651	9162	4293	17885	3651	12126	7691
Large	861	1132	341	855	401	3748	341	1132	718
% of egg target met (small + large)									
	58	77	23	58	27	159	23	77	49
¹ For the period 1987-1991 unless otherwise indicated. ² For the period 1976-1991. ³ Small- commercial refers to salmon less than 2.7 kg round weight. recreational refers to salmon less than 63 cm fork length. Large- commercial refers to salmon greater than or equal to 2.7 kg round weight. recreational refers to salmon greater than or equal to 63 cm fork length.									

Methodologies: The drainage area equals 8000 km² and the accessible rearing area equals 115.3×10^6 m². Target eggs come from 1SW and MSW salmon. Biological characteristics are based on samples from the Humber River - Bay of Islands stock. The current assessment of the state of the stock are based on estimates of 1SW angling catches as estimated by mark-recapture method. MSW salmon catches are assumed to equal 16.76% of 1SW catches. The angling exploitation rates were estimated in 1990 and 1991 and a value of 0.25 was used for 1987 to 1991. For 1992, returns were estimated based on an angling exploitation rate derived from tag recoveries at the Big Falls section of the river from small salmon recaptures observed by DFO creel survey personnel.

State of the stock: Egg depositions by all salmon have, on average, been less than 50% of the target in the last 5 years. With the Bay of Islands commercial fishery closed in 1992, egg depositions were 159% of the target.

STOCK: Restigouche River, SFA 15
LIFE STAGE: Juveniles (0+,1 +,2+), small and large salmon
TARGET: 71.4 million eggs (12,200 large salmon, 2,600 small salmon)

	1987	1988	1989	1990	1991	1992 ^B	MIN	MAX	MEAN ^P
River harvest (angling harvest, catch-release mortalities, broodstock removals) ¹									
Large	1073	1207	1336	1146	1181	1327	688	6707	1189
Small	5005	6776	3301	4324	2522	4755	896	6776	4386
Estuary harvest (Native harvest) ¹									
Large	1902	1430	1649	1606	1111	1412	23	18180	1540
Small	100	73	163	136	19	55	0	7339	98
Spawning escapement ^{1,2}									
Large (x1000)	7-13	10-17	8-13	6-11	5-9	7-13	1-2	11-19	7-13
Small (x1000)	5-12	7-16	3-8	4-10	3-6	5-11	1-2	7-16	4-10
Total returns ^{1,2}									
Large (x1000)	12-18	15-23	12-19	10-16	9-14	12-19	6-9	23-26	12-18
Small (x1000)	12-19	16-26	8-13	10-17	6-10	11-18	3-4	16-26	10-17
% egg target met ^{1,2}	59-105	83-146	63-113	53-95	43-78	62-111	9-20	89-159	60-107
Canoe counts of spawners ³									
Large	8535	9520	12362	—	7513	4909	2397	12362	9483
Small	3930	3861	3970	—	3836	3002	986	5190	3899
Barrier counts of spawners									
Upsalquitch ⁴ : Large	1000	993	894 ⁶	946 ⁶	930 ⁶	963	301	1166	953
Upsalquitch ⁴ : Small	1557	1121	1051	1324	1267	1351	430	1738	1264
Causapsca ⁵ : Large	—	505	605	456 ⁶	451	350 ⁶	460	605	504
Causapsca ⁵ : Small	—	49	7	37	9	8	7	49	26
Juvenile Densities ⁷									
0+	42.0	53.2	72.1	53.2	106.5	49.6	5.2	106.5	65.4
1+	9.4	6.1	12.1	12.9	12.3	14.6	2.4	12.9	10.6
2+	4.7	2.1	1.9	3.1	2.9	2.8	0.4	4.7	2.9

¹ MIN MAX for years 1970-1991.
² Range given reflects uncertainty of angling exploitation rate (assumed to be between 0.3 and 0.5), from which spawning escapement (and therefore eggs), and total returns are derived.
³ MIN MAX for years 1982-1991.
⁴ MIN MAX for years 1980-1991.
⁵ MIN MAX for years 1988-1991.
⁶ Incomplete counts.
⁷ MIN MAX for years 1972-1991.
⁸ 1992 data are preliminary.
⁹ MEAN for years 1987-1991.

Recreational catches: The angling catch of both large and small salmon in 1992 was within 10% of the 5-year mean.

Data and assessment: Spawning escapement, losses to poaching and disease, and total returns are all calculated from angling catch and exploitation rate. Exploitation rate has not been measured since 1977, but is assumed to be between 0.3 and 0.5. Spawning escapement has been estimated by canoe surveys since 1982. Since 1980 salmon are counted at headwater protection barriers on the Upsalquitch River and since 1988 on the Causapsca River (Matapedia). Juvenile salmon densities (number/100 m²) were estimated from electrofishing at 15 standard sites (since 1972) except in 1991 (8 sites) and 1992 (10 sites).

State of the stock: Because angling exploitation rates have not been measured in recent years, true spawning escapements are unknown. Potential indices of spawning escapement (canoe counts, barrier counts, and juvenile densities) suggest that the stock is larger now than it was in the early 1980s.

Forecast for 1993: Based on the mean returns from 1988 - 1992, between 12,000 - 18,000 large and between 10,000 - 17,000 small salmon are expected to return in 1993. There is no evidence to suggest that returns will be significantly different from the average. The ranges given reflect the upper and lower exploitation rates used in calculating returns, not confidence limits.

STOCK: Miramichi River, SFA 16
LIFE STAGE: Juveniles (0+, 1+, 2+), small and large salmon
TARGET: 132 million eggs (23,600 large, 22,600 small salmon)

	1987	1988	1989	1990	1991	1992	MIN ¹	MAX ¹	MEAN ⁷
Angling harvest²									
Large	358	303	358	278	184	323	54	358	296
Small	20765	30620	24426	21372	11300	25593	8265	30620	21697
Native harvest³									
Large	898	348	540	609	544	608	200 ⁶	898 ⁶	588
Small	1274	944	1085	2110	1111	1652	100 ⁶	2110 ⁶	1305
Other harvest⁴									
Large	109	114	153	99	131	142	99 ⁷	153 ⁷	121
Small	114	77	155	142	189	198	77 ⁷	189 ⁷	135
Spawning escapement									
Large (x 1000)	18	21	16	28	29	31	4	34	22
Small (x 1000)	63	90	48	60	48	125	13	90	62
Total returns									
Large (x 1000)	19	22	17	29	30	32	9	52	23
Small (x 1000)	85	122	75	83	61	153	24	122	85
% Egg target met	142	150	97	151	158	201	23	192	140
Juvenile densities⁵									
0+	74.5	95.1	72.2	94.6	44.6	74.0	9.4	95.1	76.2
1+	13.1	13.9	18.4	12.4	14.3	21.6	3.0	18.4	14.4
2+	2.5	1.8	2.6	2.9	10.4	4.1	0.8	10.4	4.0
¹ MIN MAX over the period 1971-1991 unless stated otherwise. ² Angling harvest of large salmon is mortality due to catch and release, estimated to be 3% of catch. ³ Native harvest includes catch reported by Burnt Church, Red Bank, and Eelground Indian Bands. ⁴ Other harvest includes broodstock removals, mortalities at all index traps, and all samples. ⁵ Number per square meter, from electrofishing surveys at 15 standard sites (3 in 1991, 14 in 1992). ⁶ For 1975 to 1991. ⁷ For 1987 to 1991.									

Recreational catches: Have ranged from 2,240 to 14,266 large and 8,390 to 30,620 small salmon during the past 10 years. Effort in rod-days has increased in recent years. Angling catches in 1992 were estimated from DFO figures as Department of Natural Resources and Energy figures were unavailable. Grilse catches were 18% above the average; large salmon catches were 9% above average.

Data and assessment: An index trap has been operated on the Miramichi River since 1954. The trap efficiency, estimated in 1972-73, changed in the early 1980s when the river channel was altered and the trap was recalibrated in 1985-87. Estimated returns from the trap efficiency and mark-recapture have been similar in recent years, but were very different in 1992 suggesting a dramatically lower trap efficiency in 1992. Three Index traps were operated in the Northwest Miramichi estuary and 1 trap in the Southwest estuary in 1992. Tag recapture estimates of grilse from tags put on at Millbank and recovered at Enclosure traps were similar to estimates from tags put on at Enclosure traps and recovered at estuarine traps and barrier fences. The latter is reported here because the confidence interval is narrower because more tags were placed and recovered. Returns of large salmon were estimated as the product of returns of small salmon and the large salmon to small salmon ratio observed at Millbank trap. Spawners were estimated as returns minus known removals.

State of the stock: Target egg deposition rates have been almost met or exceeded in each of the last eight years.

Forecast for 1993: The probability distribution model prediction for large salmon returns in 1993 is 18314 with a probability of meeting the spawning target (23,600) of 21% (i.e., a 79% chance of returns being less than 23,600). However, the model is based on a data set that does not include small salmon returns as large as those estimated for 1992 and therefore is considered unreliable (i.e., the relationship between very numerous grilse returns and returns of large salmon in the next year is not well defined). In addition, closure of the Newfoundland commercial fishery may have resulted in more small salmon returns in 1992 than in previous years, and may result in more large salmon returns in 1993 than predicted.

STOCK: Northwest Miramichi River, SFA 16
LIFE STAGE: Juveniles (0+,1 +,2+), small and large salmon
TARGET: 41 million eggs (7316 large, 7006 small salmon)

1992	
Angling harvest¹	
Large	78
Small	7985
Native harvest²	
Large	580
Small	1616
Other harvest³	
Large	56
Small	61
Spawning escapement	
Large (x 1000)	6
Small (x 1000)	22
Total returns	
Large (x 1000)	7
Small (x 1000)	31
% Egg target met	119
¹ Angling harvest of large salmon is mortalities due to catch and release, estimated at 3% of catch. ² Native catch is catch reported by the Redbank and Eelground Indian Bands. ³ Other harvest includes broodstock, mortalities at the Eelground index trap, and samples.	

Recreational catches: New Brunswick Department of Natural Resources and Energy FISHSYS estimates indicate that over the period 1987-1991, 27-34% (mean: 31%) of total angling in the Miramichi River has occurred in the Northwest Miramichi.

Data and assessment: Returns of small salmon to the Northwest Miramichi River were estimated in 1992 from a mark-recapture program, applying tags at Eelground Enclosure trap and recovering tags from traps at Redbank (NW), and from fences in the headwaters of the NW and in Catamaran Brook. Returns of large salmon were estimated as the product of returns of small salmon and the large salmon to small salmon ratio observed at Millbank trap. Spawners were estimated as returns minus known and estimated removals.

State of the stock: The spawning target for large salmon was not achieved in 1992. Egg deposition was achieved because of a large surplus of small salmon. Juvenile salmon densities in the Northwest Miramichi are lower than those in the Southwest Miramichi.

Forecast for 1993: Because 1992 is the first year of data on returns, no forecast can be made of returns in 1993.

STOCK: Southwest Miramichi River, SFA 16

LIFE STAGE: Juveniles (0+,1 +,2+), small and large salmon

TARGET: 88 million eggs (15,730 large, 15,063 small salmon)

1992	
Angling harvest¹	
Large	245
Small	17608
Native harvest	
Large	0
Small	0
Other harvest²	
Large	75
Small	26
Spawning escapement	
Large (x 1000)	25
Small (x 1000)	104
Total returns	
Large (x 1000)	25
Small (x 1000)	121
% Egg target met	243
¹ Angling harvest of large salmon is mortalities due to catch and release, estimated at 3% of catch. ² Other harvest includes broodstock, mortalities at the SW Enclosure trap, and samples.	

Recreational catches: Department of Natural Resources and Energy FISHSYS estimates indicate that over the period 1987-1991, 66-73% (mean: 69%) of total angling in the Miramichi River has occurred in the Southwest Miramichi.

Data and assessment: Returns to the Southwest Miramichi are estimated as the difference between returns to the river as a whole and returns to the Northwest Miramichi.

State of the stock: Spawning targets for large salmon, small salmon, and eggs were exceeded in 1992.

Forecast for 1993: Because 1992 is the first year of data on returns, no forecast can be provided for 1993.

STOCK: Margaree River (SFA 18)

TARGET: 6.7×10^6 eggs (1,036 large, 582 small salmon) calculated as area x 2.4 eggs/m²

Year	1987	1988	1989	1990	1991	1992	MIN ²	MAX ²	MEAN ²
Angling harvest									
MSW ¹	40	18	23	85	30	30	16	704	183
1SW	403	589	208	256	391	747	21	899	161
Native harvest									
MSW	-	-	-	-	1	-	-	-	-
1SW	-	-	-	-	2	-	-	-	-
Total returns									
MSW	4015	1688	2289	11144	3484	3941	167	11144	1196
1SW	1478	2209	768	997	1909	1018	72	3061	565
Spawning escapement									
MSW	3975	1670	2266	11067	3453	3931	118	11067	1013
1SW	1075	1620	560	730	1507	271	51	2162	404
% of Egg target met (MSW + 1SW)									
	387	165	217	1067	334	379	10	1067	96
¹ MSW angling catch for 1985 to 1991 is hook-and-release mortality at 5%. ² Min, Max and Mean are for 1947 to 1990.									

Methodologies: The drainage area equals 500 km². Rearing area surveys were conducted during the 1950s through 1970s. All the target eggs are to come from MSW salmon. Biological characteristics are based on data from the Margaree River stock. Summer and fall (after Aug. 31) run components occur in the river with the fall run comprising over 70% large and 45% of small salmon returns in recent years. The current assessment of the state of the stock are based on angling catches, including kept and released small salmon and hook and released large salmon, as estimated by Conservation and Protection field personnel prior to 1987 and by on-site creel surveys since 1987. Angling exploitation rates are those derived for the fall angled small and large salmon from the Margaree River for the years 1988 to 1990 (avg. of 0.18 for large and 0.26 for small), assumed exploitation rate of 0.29 for summer angled large and small salmon. Integrated exploitation rates of 0.17 in 1991 and 0.11 in 1992 were used for large salmon whereas exploitation rates of 0.19 for 1991 and 0.25 for 1992 were estimated for small salmon for the entire angling catch.

State of the stock: Egg depositions by large salmon have exceeded target requirements by between one third and nearly ten fold since 1985. The summer run component has increased since the 1970s but the actual number of fish available to anglers in the summer depends on river conditions in the summer.

Forecast: On the basis of a stock-recruit relationship for the large salmon component, and using the estimated escapement of 1678 large salmon in 1988, the predicted recruitment in 1993 should be about 5000 large salmon, 10% higher than the recent five-year mean returns.

Scotia-Fundy Region (SFA 19-23)

Retained catches of small salmon in the recreational fisheries of SFAs 19, 20, and 21 in Nova Scotia in 1992 were below both the previous 5 years and 10 years average. Released catches of large salmon in SFAs 19, 20 and 21 were also lower than the mean number released during 1987-1991. Angling effort in SFAs 19, 20 and 21 was also lower than average perhaps because of poor angling conditions, particularly low river discharges and warm water temperatures much of the angling season. Catch per unit effort for retained small salmon was also lower than average. All rivers of inner Bay of Fundy (portions of SFAs 22 and 23) were closed to any legal exploitation.

The retained catch of small salmon in the outer Fundy portion of SFA 23 was 180% of that of 1991, 115% of the previous 5-year mean and 109% of the 10-year mean. Fishing effort was 200% of that in 1991 and 112% of the 1987-91 mean, in all probability because of generally good angling conditions in SFA 23. The catch per unit effort was 103% of the previous 5-year mean.

Counts of wild adult salmon at counting facilities in SFAs 19 and 20 were down from the low values of 1991; counts of 1SW fish in SFA 21 increased four-fold over 1991 while MSW salmon counts in SFA 23 were similar to those of 1991. Wild 1SW counts in the Liscomb (SFA 20), LaHave (SFA 21) and Saint John (SFA 23) rivers were 17%, 101% and 86%, respectively, of the 1987-1991 means. Wild MSW counts were 42%, 48%, and 112% of the 1987-1991 means. Counts of 1 SW and MSW salmon on the Magaguadavic in SFA 23 (about one-third of aquaculture origin) were down 6% and 59%, respectively, from the mean of four annual counts in the 1980s. Less than a dozen salmon were counted at the Causeway on the Petitcodiac (SFA 23); others were known to have bypassed the fishway. In-river counts of salmon in the Middle (SFA 19), and Big Salmon (SFA 23) rivers were down from those of 1991.

Estimated returns of wild MSW salmon to Mactaquac on the Saint John River, 1992, was 116% of the forecast; counts of MSW salmon on the Liscomb and LaHave rivers were 51% and 141% of their respective pre-season forecasts.

The percentage return of 1SW fish from hatchery smolts to the Liscomb River counting facilities was the second lowest of record; the return of 1SW fish to the LaHave was 148% of that of 1991 but the fourth lowest of that 14-year record. Survival of Saint John River smolts increased slightly over the previous year but was the fourth lowest of the 17-year record. Hatchery MSW return rates on the Saint John and Liscomb rivers remained among the lowest of the series; the return rate for the LaHave River doubled over that of 1991 and approximated the mean value, 1987-1991.

The Middle (SFA 19) and the Saint John River above Mactaquac (SFA 23) did not achieve target spawning requirements. Escapements to Big Salmon and Stewiacke rivers, two index rivers for inner Bay of Fundy were similar at about 21% of requirement.

The estimated egg deposition above Liscomb Falls on the Liscomb River (SFA 20) was 0.4 eggs m⁻²; the potential egg deposition above Morgan Falls on the LaHave River (SFA 21) was 4.9 eggs m⁻², up considerably from the 15+ year low in 1991. Target spawning requirements for the Liscomb and LaHave rivers remain to be established because these rivers are acid-impacted.

Hatchery fish contributed 25% and 16% of the 1SW and MSW potential spawning escapement above Mactaquac on the Saint John River, 46% and 31% of 1SW and MSW fish above Liscomb Falls on the Liscomb River, 23% and 21% of 1SW and MSW salmon above Morgan Falls on the LaHave River and 37% of all salmon above Grand River Falls on Grand River.

Forecasts indicate that wild MSW salmon returns in 1993 will be about the same as the 1992 count at Liscomb Falls and for Morgan Falls on the LaHave River, the forecast returns are 97% above the 1992 count. Both forecasts are less certain than those of previous years because the forecasts do not take into account possible impacts of the moratorium in 1992 on the insular Newfoundland commercial salmon fisheries. The estimated return of wild MSW salmon destined for Mactaquac on the Saint John River (adjusted for the Newfoundland closure) is expected to be 92% or 106% (depending on method) of the 1992 return. Wild 1SW returns to Mactaquac in 1992 are projected to be 91% or 112% (depending on

method) of the 1992 return. Zero to 15% of the forecast MSW returns to Mactaquac could be composed of 2SW salmon that were affected by the moratorium on the Newfoundland commercial fishery.

It was noted that recent reports of salmon by-catch within SFA 21 in 1991 helped explain some of the dramatic reduction in the count at Morgan Falls in 1991, and that counts at the Petitcodiac fishway were an unreliable Indicator of river returns, particularly in years of high river discharge.

STOCK: Grand River, SFA 19

TARGET: 1.1 million eggs

Year	1987	1988	1989 ¹	1990	1991 ¹	1992	MIN ²	MAX ²	MEAN ²
Native fisheries				24	39	UK			
Recreational catch									
Grilse	342	338	307	416	115	139	115	416	313
Salmon	107	105	74	98	15	46	15	194	99
Broodstock		33	25	18	19	10			
Count at fishway									
Grilse		554	512	527	234	114			
Salmon		31	25	27	18	18			
% Hatchery		NA	NA	43	45	38			
Correction for by-pass									
Grilse		55	51	52	176 ⁵	40			
Salmon		54	19	20	14	14			
Total above fishway		694	607	626	442	186			
Population below fishway (estimate)		143	UK	UK	UK	UK			
% Angled above		UK ⁶	42 ³	31 ³	31 ³	31 ³			
Required spawning escapement		539	545	545	545	545			
Estimated escapement⁴		736	453	442	348	143			
% of Adults required		136	83	83	64	26			
¹ In-season variation closures. ² For the period 1986-1991; not shown where only 1988-1991 data are available. ³ Determined from post-season phone survey. ⁴ Above fishway in relation to entire river. ⁵ 1991 by-pass rate for fish < 63cm. ⁶ 20% Assumed angled above fishway.									

Recreational catches: Have ranged from 422 fish in 1984 to 115 fish in 1991, the period since the Nova Scotia license-stub return system. This river is the highest or second highest producer of fish smaller than 63 cm on Cape Breton Island.

Data and assessment: Counts and scale samples are taken at the fishway 10.2 km above the head of tide on the main river. By-pass of fish ascending the falls was estimated in 1989 at 9% for fish less than 63 cm and 43% for fish equal to or greater than 63 cm but may have been different in 1991 when flood conditions followed a prolonged drought. The 1991 by-pass rate for grilse of 43% was estimated from broodstock collected above the fishway (8 of 14 grilse were marked). Numbers below the fishway were estimated from redd counts in 1988 only.

State of the stock: The target spawning escapement for the Grand River has not been met during the past three years, based on the number of salmon estimated to be spawning above the fishway.

STOCK: Liscomb River above Liscomb Falls Fishway, SFA 20

TARGET: Under development for this acid-stressed river.

Year	1987	1988	1989	1990	1991	1992	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (1SW)^a	289	138	65	177	68	19	65	289	150
Counts:									
Wild 1SW	1614	477	532	955	586	145	477	1614	772
Wild MSW	88	76	75	44	38	27	38	117	75
Hatchery 1SW	523	431	288	438	178	125	175	766	400
Hatchery MSW	54	44	71	22	22	12	22	108	53
Total	2279	1028	966	1459	824	309	818	2279	1300
Egg deposition/m^{2b}	2.5	1.2	1.2	1.6	0.9	0.4	0.9	2.5	1.5
Return rate of hatchery smolts									
1SW(%)	2.75	1.38	0.60	1.56	0.79	0.50	0.35	2.75	1.43
MSW(%)	0.18	0.23	0.23	0.05	0.08	0.05	0.05	0.23	0.15
¹ For the period 1985-1991. ^a below fishway ^b above fishway									

Recreational catches: No retention of MSW fish since 1984; 1SW catches (1985-1992) have ranged from 19 in 1992 to 289 in 1987.

Data and assessment: Counts of adult fish are obtained at Liscomb Falls fishway.

State of the stock: Target egg requirements according to the 2.4 eggs/m² have been met only once since 1979 (1987); a significant contribution to egg deposition comes from hatchery-origin fish of Liscomb River stock. The 1992 escapement resulted in egg deposition of approximately one-tenth of nominal target.

Forecast for 1993: Forecasts of 1SW returns are unavailable. An annually-updated relation between 1SW returns in year t and MSW returns in year t + 1 has become progressively less reliable over the past few years (p=0.06), and predicts a return of 30 MSW salmon (90% CI 0-94) in 1993.

STOCK: LaHave River above Morgan Falls Fishway, SFA 21

TARGET: Under development for this acid-stressed river

Year	1987	1988	1989	1990	1991	1992 ¹	MIN ²	MAX ²	MEAN ²
Harvest:									
Recreational									
-small ³	2562	1585	2411	2008	233	1058	233	2562	1760
Counts:									
- Wild 1SW	2529	2464	2087	1861	495	1915	495	2529	1887
- Wild MSW	532	380	511	596	236	215	236	596	451
- Hatchery 1SW ⁴	573	1026	443	402	109	574	109	1026	511
- Hatchery MSW ⁴	79	59	183	118	90	58	59	183	106
	3713	3929	3224	2977	930	2762	930	3929	2955
Return rate of hatchery smolts:									
- 1SW (%)	2.45	3.92	1.89	1.72	0.87	1.29	0.87	3.92	2.17
- MSW (%)	0.97	0.23	0.61	0.39	0.22	0.46	0.22	0.97	0.48
¹ Preliminary data. ² For the period 1986-1991. ³ Retained catch taken mostly below the enumeration site. ⁴ Mostly as a result of smolt releases.									

Recreational catches: Catches are for the entire river rather than only those from the stock above Morgan Falls. Retention of MSW catch since 1983 has been prohibited, but large numbers have been released after hooking.

Data and assessment: Spawner counts are made at a fishway at a natural falls, 25.3 km above tidehead.

State of the stock: Target egg requirements according to the 2.4 eggs m⁻² (approx. 2,800 1SW and 500 MSW salmon for the entire river; 60% of the drainage is below Morgan Falls) have been exceeded except for 1991, but the adequacy of that rate under conditions of some acid stress is uncertain at this time.

Forecast for 1993: A significant regression of wild MSW counts at Morgan Falls on wild 1SW counts at Morgan Falls in the previous year (18 years) forecasts a count of 423 MSW salmon in 1993.

Conditions in 1992: River discharge during the angling season declined, but was adequate until mid-July when low flows persisted until mid-October.

STOCK: Saint John River, N.B. (above Mactaquac) SFA 23

TARGET: 29.4 million eggs (4,400 MSW and 3,200 1SW fish)

Year	1987	1988	1989	1990	1991	1992 ³	MIN	MAX	Mean
Harvest:									
Native									
- small	280	300	560	273	657	560	273 ²	657 ²	414 ²
- large	1120	1200	240	247	957	748	240 ²	1200 ²	753 ²
Recreational:									
- small	1650	1755	2304	2110	1690	2104	1151 ¹	3580 ¹	2256 ¹
Counts:									
- 1SW	7972	9191	9587	7907	7575	7664	4140 ¹	17314 ¹	8859 ¹
- MSW	3430	2600	4291	3919	4226	4203	2010 ¹	10451 ¹	5221 ¹
Returns:									
- 1SW	9237	10180	10861	8804	8751	8940	4946 ¹	19275 ¹	10311 ¹
- MSW	4832	3537	4541	4125	5215	4898	3537 ¹	13916 ¹	7501 ¹
Spawning:									
- 1SW	7020	7810	7533	6057	5721	5128	5721 ²	7810 ²	6828 ²
- MSW	2758	1704	3491	3202	3481	3269	1704 ²	3491 ²	2927 ²
% of Target met:									
- 1SW	219	244	235	189	179	160	179 ²	244 ²	213 ²
- MSW	63	39	79	73	79	74	39 ²	79 ²	67 ²
¹ For the period 1975-1991.									
² For the period 1987-1991.									
³ Preliminary data.									

Harvests: MSW salmon have not been retained since 1984; up to 1990, 1SW landings have ranged from 311 in 1972 to 3,580 in 1976. The native fishery, lower than that of 1991, approximated the mean of the previous five years.

Data and methodology: Counts of fish obtained from the collection facility at Mactaquac Dam; returns to Dam equal counts plus estimates of down river removals. Spawners equal releases above Mactaquac minus estimates of upriver removals.

State of the stock: Target egg requirements have been met only three times in the last 15 years (1980, 1984, 1985); 1SW escapement contributed to about 6% of the target egg deposition; hatchery fish comprised 25% of 1SW and 16% of MSW returns in 1992.

Forecast: A relationship between egg depositions and wild 1 SW returns indicates a return of 6,100 or 7,500 wild 1SW fish in 1993, depending on the forecast model. Another relationship between wild 1SW returns, their fork length and MSW returns including those predicted to have benefited by the moratorium on the Newfoundland commercial fishery, forecasts 3,800 or 4,400 wild MSW returns in 1993, depending on forecast model. The product of the numbers of hatchery releases and recent return rates suggest hatchery returns in 1993 of 1,900 1SW and 1,000 MSW salmon. Total 1SW returns could be 8,000 or 9,400 1SW fish; total MSW returns could be 4,800 or 5,400 MSW salmon. Zero to 15% of the forecast MSW returns could be the result of the 1992 moratorium on the Newfoundland commercial fishery. Target spawning requirements do not include approximately 400 MSW brood stock required to seed Mactaquac Hatchery or spawners required for salmon development in the Aroostook River or above Grand Falls.

Table 1. Overview of the status of Atlantic salmon in Atlantic Canada during 1992. Indices include recreational catches with estimates of catch-and-release, where available, for large salmon, commercial catches, and estimated returns. The data for 1992 are compared with 1991 and previous 5-year means. A '-' symbol implies a decrease by more than 10%, '+' an increase by more than 10% while '0' refers to a change of less than 10% in either direction. No statistical significance is assigned to these changes.

ZONES	RECREATIONAL CATCH				ESTIMATED RETURNS				COMMERCIAL CATCH			
	SMALL		LARGE		SMALL		LARGE		SMALL		LARGE	
	1991	5-YR MEAN	1991	5-YR MEAN	1991	5-YR MEAN	1991	5-YR MEAN	1991	5-YR MEAN	1991	5-YR MEAN
NFLD 1	+	-	+	+								
2	+	-	+	+								
3	+	+										
4	0	-			+	+	+	+				
5	0	-			+	+	+	+				
6	+	-										
7	+	-										
8	-	-										
9	+	-			+	-	0	-				
10	0	-			+	+	+	+				
11	+	-			+	-	+	+				
GULF 12	+	+	+	+								
13	+	0	+	+	+	+	+	+				
14	+	+	+	+	+	+	+	+	-	-	-	-
15	+	+	+	0	0	0	+	0				
16	+	+	+	0	+	+	0	+				
17					+		+					
18	0	0	0	0	-	-	+	-				
S-F 19	0	-	0	-	-	-	-	-				
20	-	-	-	-	-	-	-	-				
21	+	-	+	-	+	0	0	-				
22												
23	+	+			0	-	0	+				
QUEBEC Q1	+	+	+	0								
Q2	+	+	+	+								
Q3	+	+	0	+								
Q 5+6	+	+	+	+								
Q7	-	-	+	0					+	-	-	-
Q8	+	+	0	+					-	-	-	-
Q9	+	+	+	-					+	+	+	+
Q10	+	-	-	-								
Q11	-	-	-	-					-	-	-	-

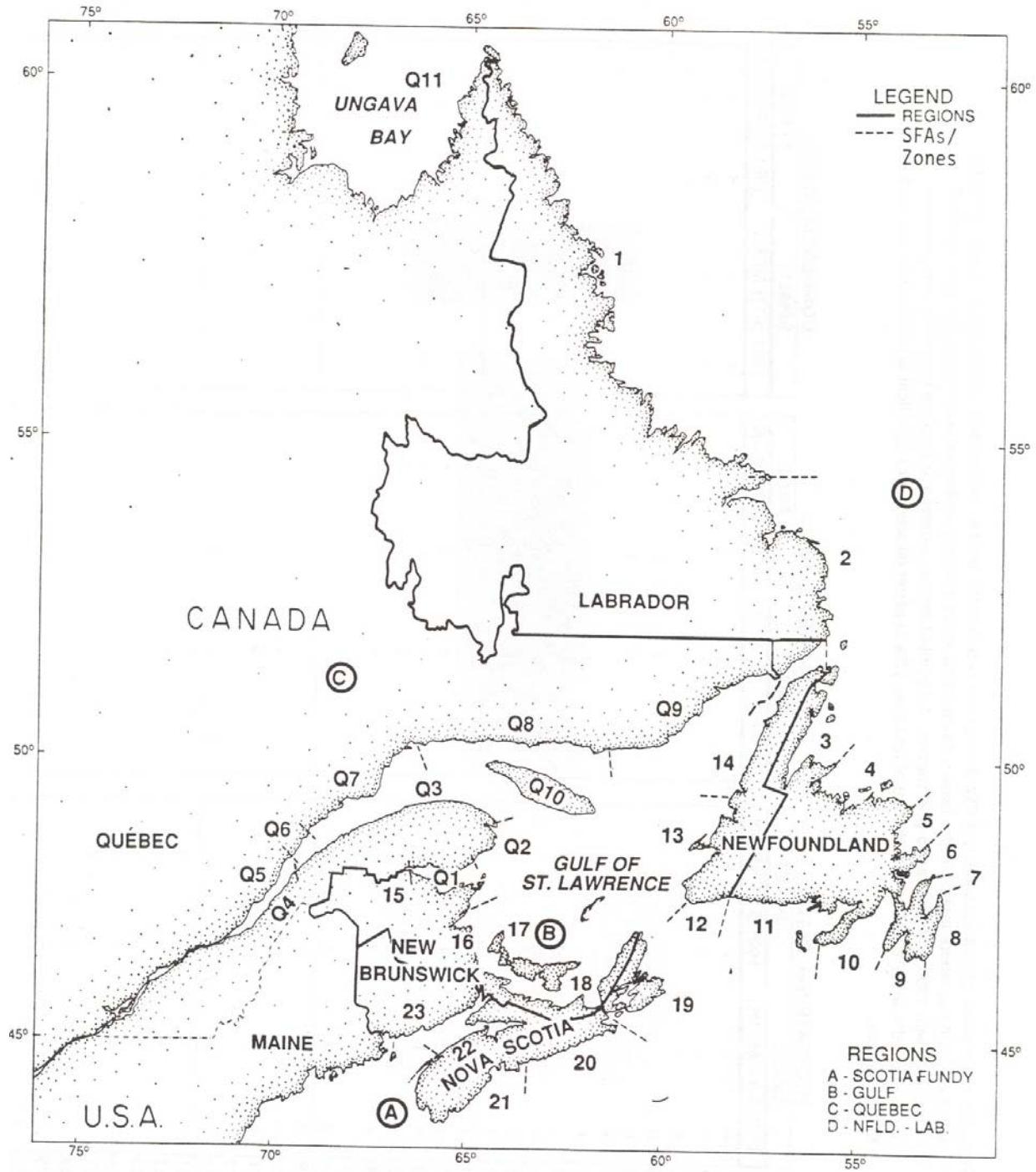
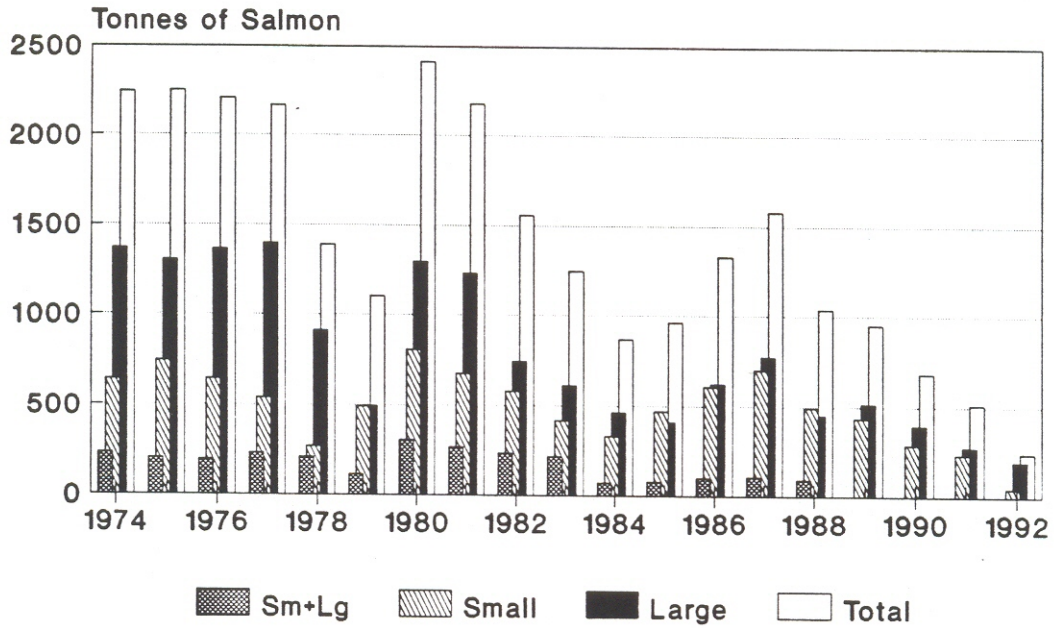


Figure 1. Map of eastern Canada showing Salmon Fishing Areas (SFAs).

Commercial Harvest



Recreational Harvest

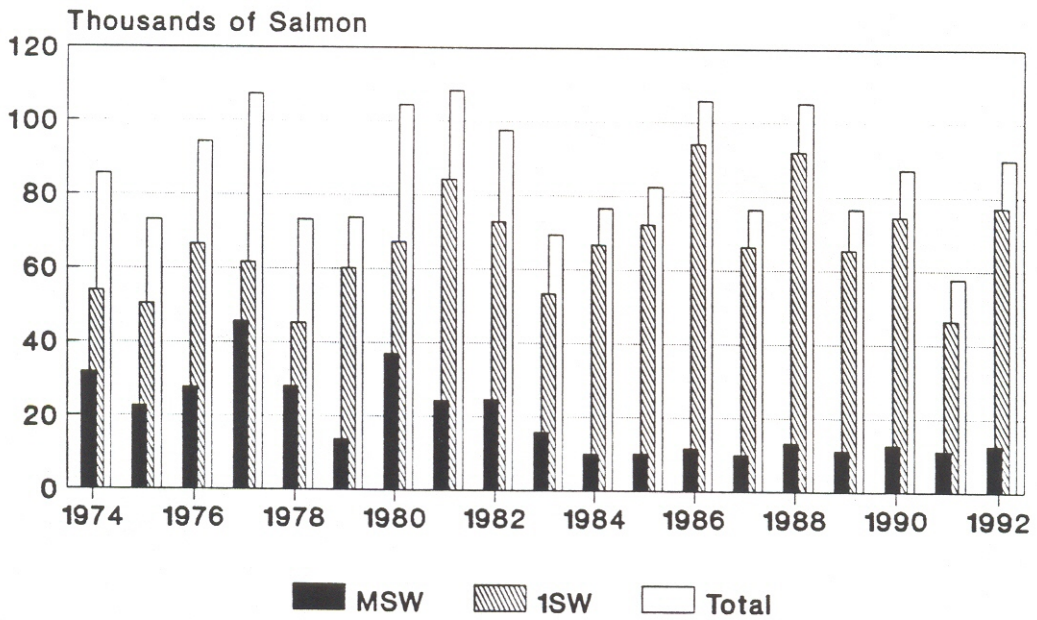


Figure 2. Canadian landings of Atlantic salmon, 1974-92.