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**REPORT ON THE STATUS OF ATLANTIC SALMON STOCKS
IN EASTERN CANADA IN 1993**

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1.0 INTRODUCTION

This report presents the results of Atlantic salmon stock assessments for Atlantic Canada for 1993. Stock assessment experts from the three Atlantic regions of the Department of Fisheries and Oceans (Newfoundland, Gulf and Scotia-Fundy) and DFO Headquarters, provincial government biologists, university scientists and representatives of various user groups, have provided input and reviewed the assessments. Detailed research documents on individual stocks or geographical areas will be published shortly and will be publically available from the Atlantic Stock Assessment Secretariat.

Section 2.0 is a global overview of Atlantic salmon stock status in 1993 for the Atlantic Zone, while sections 3.0-5.0 are regional overviews for the three DFO regions of Newfoundland, Gulf and Scotia-Fundy respectively. Section 6.0 on the Province of Quebec is included with concurrence of representatives of the Ministère de l'Environnement et de la Faune. Sections 7.0 and 8.0 contain the tables and figures referred to in the report. Section 9.0 contains summary sheets for the individual stocks assessed, provides basic information on catches, spawning escapements and achievement of spawning targets, and where possible, indications of expected returns in 1994. It is anticipated that the size of section 9.0 will continue to grow next year as additional information on about thirty stocks is provided through this reporting mechanism on Quebec stocks and, as new data collection projects by client groups are undertaken through funding mechanisms such as the Aboriginal Fisheries Strategy and through recreational fisheries development agreements.

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2.0 OVERVIEW OF ATLANTIC SALMON STOCKS

Several sources of information are used to assess the status of Atlantic salmon; the most important are derived from the fisheries, from counts available at fishways or by other means 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 and estimates derived from mark-recapture studies are more useful for the interpretation of stock status 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 non-maturing components, as well as some previous spawners and two-sea-winter (2SW) salmon.

There are approximately 550 Atlantic salmon rivers in eastern Canada, each of which could be considered to be a stock. In some individual rivers, several stocks are thought to exist. Stocks usually refer to groupings of individuals within a species which do not normally mate with other groups; they are "reproductively isolated" from other groups. For Atlantic salmon, this is usually because of their high degree of homing ability to individual rivers and the locations which the different stocks select for spawning within the tributaries. It is therefore impossible to assess **all stocks** of Atlantic salmon because it is only for a small proportion of rivers that we have sufficient information on numbers of fish spawning, their sizes, sexes and egg-laying potentials. However there is detailed catch information for most individual rivers. Accordingly, both information on stock status offered in this document as well as fishery management practices are based primarily on geographic areas, having within them several individual salmon rivers. These areas have been determined based on the premise that stocks within them should be behaving similarly. The 23 areas for which DFO manages the salmon fisheries directly are called Salmon Fishing Areas (SFAs); for Quebec, where management authority has been delegated by the Federal Government, the fishing areas are designated by Q1 through Q11. These geographic areas are shown in Figure 2.0.1.

2.1 Fisheries management changes

In 1993, there were again many changes to the Atlantic salmon fisheries, compared to previous years, particularly in Newfoundland and Labrador. The five-year moratorium which was placed on the commercial fishery in insular Newfoundland in 1992 continued while in Labrador commercial fishing quotas and numbers of fishers were decreased. The seasonal bag limit in the recreational fishery remained at eight fish in Newfoundland, Labrador, New Brunswick and Nova Scotia. Quotas continued in the recreational fishery of Newfoundland and Labrador and these were generally increased from 1992. These quotas were subdivided into early and late seasons and as the quota for each time period within each SFA was reached, the retention of salmon in the recreational fishery was not permitted for all rivers of that SFA; only hook-and-release fishing was allowed thereafter. At mid-season, the fishery was reopened for harvest of the second part of the quota. Daily bag limits decreased in the recreational fishery of Newfoundland and Labrador to 1 fish (previously 2 per day). As a result of these 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 1993 returns to rivers in Newfoundland, changes in the commercial fishery in Newfoundland and Labrador in 1992 and 1993 could have resulted in increased returns to some rivers of Quebec and the Maritime Provinces in both of those years. In Quebec, the commercial fishery in areas Q7 and most of Q8 was closed in 1993. As a result of low returns to many rivers in Atlantic Canada, some rivers were closed to exploitation for either the whole or part of the season.

2.2 Catches

The provisional catch of salmon in 1993 of all sea-ages combined by all users was 364 t which was the lowest on record, 70% of the 1992 harvest, 40% of the previous 5-year mean and 22% of the previous 20-year mean (Figure 2.2.1). The 214 t harvest of large salmon was the lowest on record, 67% of the 1992 harvest and 45% and 20% of the previous 5- and 20-year means, respectively. The 150 t harvest of small salmon was the lowest of record, 75% of the 1992 harvest and 34% of the previous 5 year mean and 23% of the 20 year mean. The catch in the recreational and commercial fisheries since 1974 is shown in Figure 2.2.2. While there have been substantial declines in the commercial catch of both small and large salmon, the total recreational catch has been relatively stable, although the catch of large salmon declined, starting in 1984 with the imposition of hook-and-release regulations in many areas for large salmon.

The 1993 harvest by weight for all sea-ages combined was taken by the following users (with % of the total):

Recreational	47%
Commercial	43%
First Nations' food fisheries	10%

The 1993 harvest by weight for all sea-ages combined was taken in the following provinces (with % of the total):

Newfoundland	42%
Quebec	38%
New Brunswick	16%
Nova Scotia	3%
P.E.I.	Unknown

No catch statistics were collected in PEI in 1993.

The catches noted above are those catches which are reported by fisheries officials. As well, it is known that there are "unreported" catches. These catches are more difficult to quantify but are important nevertheless in the consideration of stock status. In response to a request from the International Council for the Exploration of the Sea (ICES), information has been collated on the magnitude of unreported catches in the Canadian fisheries. ICES has specifically asked for a time series of unreported catches using the definition of unreported catches as follows:

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

To develop such estimates, regional fisheries officials were asked to provide their best estimates, based on enforcement knowledge, of the magnitude of the unreported harvest in their areas. These estimates have

summed to the following for the years 1986-1992:

YEAR	UNREPORTED CATCH (t)	REPORTED CATCH (t)	%
1986	315	1559	20
1987	234	1784	13
1988	161	1310	12
1989	174	1139	15
1990	111	911	12
1991	127	679	19
1992	136	470	29
1993	N/A*	364	N/A

*N/A- estimates of unreported harvests are not yet available for all areas of Atlantic Canada for 1993.

The unreported harvest represents a substantial proportion of the reported catch although their absolute magnitude appears to have decreased somewhat.

In comparison with the 5 year averages (1987-91), recreational catches of small salmon generally decreased or stayed the same in most areas (Figure 2.2.3). Exceptions to this were in Miramichi area (SFA 16), the Gaspé (Q1-Q3), the North Shore of Quebec (Q9) and Anticosti Island (Q10) where recreational catches increased. Recreational catches of large salmon were also generally lower in most fishing areas in comparison to the average. The only exceptions were in the Gaspé (Q2 and Q3) where they increased by less than 30%.

The commercial fishery in Labrador and Quebec decreased from 1992 to 1993 by about 40% and 1993 was the first year that total harvests by recreational anglers have exceeded those of the commercial fishery. Similar to previous years, quotas were not reached in the commercial fishery in Labrador, except in 14B (8 t). In Quebec, commercial catches overall were lower in 1993, compared to 1992, however this was mainly due to the closures in some areas. The remaining fishers in Q9 mostly reached their individual quotas and the catch here, about equal to 1992, was higher than most of the previous years.

2.3 Return trends

Counting facilities in northern Newfoundland recorded generally increased returns of both small and large salmon, both in comparison to 1992 and to the mean of the past 5 years; this was expected as a result of the commercial closure and quotas on recreational fisheries. On the south coast of Newfoundland however, returns were generally below average. Increased counts were generally noted in the southern part of the Gulf Region (New Brunswick), but not in the northern parts (SFA15) nor on the Gaspé peninsula. Gulf Region (Nova Scotia) returns in 1993 appeared similar to those in 1992, while on the Atlantic coast of Nova Scotia and in the Bay of Fundy rivers, returns were lower than in previous years.

Spawning targets were generally reached on monitored rivers with notable exceptions being very low percentages of targets reached on the south coast of Newfoundland, northern New Brunswick, the Atlantic coast of Cape Breton and the Bay of Fundy rivers. Many Atlantic coast Nova Scotia rivers are acid-impacted and do not have defined target. On the Gaspé, most rivers were within 20% of achieving their target spawning (see Figure 2.3.1). None of the rivers on the lower North Shore of Québec (Q9) and Labrador (SFAs 1,2 and 14B) are monitored and statements concerning their current status are therefore difficult to make. There are

strong indications however that spawning stocks and returns to Labrador rivers, particularly of large salmon, are very low and cause for urgent concern.

2.4 Survival trends

Monitoring of the sea survival rates is possible in a few rivers. Complete counts of smolt output and adult returns are necessary to do so. For large salmon, because of their harvest in other distant fisheries (Newfoundland and Greenland) in the past, it is difficult to separate the fishing mortality effects from the natural mortality effects. For small salmon however, at least on the mainland rivers, the total returns may better reflect natural survival over the past decade. On Newfoundland rivers, small salmon returns prior to 1992 would have been affected by the commercial fishery therefore survivals to return in 1992 and 1993 might have been expected to increase. Figure 2.4.1 shows return rates of 1SW salmon to the 12 rivers in Atlantic Canada where such information is available. The years shown are the year of smolt migration and return rates are plotted to a common scale, where a value of 0 represents the average survival rate. The rivers are grouped according to their geographic areas.

For south coast Newfoundland, there has been a declining trend in survival in the two rivers where there is more than three years of data; the increase in all three rivers in the most recent year may be related to the decreased fisheries mentioned previously.

In the northern Gulf rivers, similar to the south coast of Newfoundland, increases in survival were noted in two of the three rivers in the most recent year.

In the southern Gulf, while all three rivers are average or below for the most recent year, no trend is discernible other than perhaps for the hatchery stock in Morell River where survival has generally decreased over the seven years where data are available.

Scotia-Fundy hatchery smolts have also survived poorly in the last three years and survival rates have generally decreased since the high values noted for releases in 1985 and 1986.

Overall, for the 12 rivers where information on survival is available, only two had above average survival rates for 1992 smolts. Both of these were in Newfoundland where the closure of the commercial fisheries were expected to have this effect.

2.5 Forecasts for 1994

There was no commercial fishery for salmon at Greenland in 1993 as a combined result of negotiations through the North Atlantic Salmon Conservation Organization (NASCO) and funding for compensation of Greenland fishers by private interests. Both activities were strongly influenced by scientific advice from the International Council for the Exploration of the Seas (ICES) that the abundance of North American stocks which feed in Greenland waters and return to North America as large salmon have been decreasing. The forecast abundance for this group of fish in the Labrador Sea-Greenland area in 1993 was only 258,000, down from a peak of about 900,000 in 1975 and only about one-half of the 550,000 estimated to have been available in 1986. These few fish will form the greater part of the large salmon return to Canada in 1994.

The numerous changes in the fisheries in 1993 make it difficult to generalize forecast returns for 1994. In areas where large salmon are prevalent and small salmon returns were reasonable in 1993, the expectation would generally be for returns of large salmon that would satisfy egg deposition targets. This would include most SFAs in the Gulf of St. Lawrence area but not the Atlantic Coast of Nova Scotia or the Bay of Fundy areas. On the northeast and south coast of the island of Newfoundland, spawning stocks are primarily small salmon and return for many of these stocks are expected to be poor, as a result of low spawner estimates in the previous generation and an expected continuation of the below average sea survivals in these areas in recent years.

As a result of the difficulties in forecasting returns for 1994, cautious approaches to the management of fisheries should be implemented for most areas. Even for those areas where river specific forecasts are available, caution is warranted as, in many cases, pre-season forecasts last year were overly optimistic. Management approaches that include flexibility to modify harvest plans in-season would be desirable, as assessments at that time, in many cases, will be able to more precisely provide information on returns and expected year-end egg deposition estimates relative to targets.

2.6 Environmental conditions

Atlantic salmon returning to Canadian rivers in 1993 and 1994 have been exposed to a variety of environmental conditions over their 2-10 year lifespans, which is mostly spent in the freshwater with up to a few years in the marine environment.

While at sea, most Canadian salmon overwinter in the Labrador Sea area and northern Grand Banks area, prior to their return to their rivers of origin. Water temperatures and salinities in these areas have been below average in the past few years. In 1993, ICES provided advice on what may be considered to be an index of winter habitat in the North Atlantic for Atlantic salmon. This habitat area has varied considerably by both season and year (200,000 to 1.5 million km²) from 1946 to 1988. Winter habitat of North American stocks decreased during the mid-1950s and then increased to over 1 million km² during the late 1960s and early 1970s. Since that time, winter habitat has progressively declined for North American salmon. This may, in part, explain the low production of some Canadian Atlantic salmon stocks in recent years.

Ocean temperatures off the Atlantic coast of Newfoundland continued to be below normal by about 0.5-1.0° C throughout the water column in 1993. Sea ice extent off Newfoundland and on the southern Labrador Shelf was above average in 1993. Generally temperatures in the Gulf of St. Lawrence in 1993 were above normal, at least in the deep water area of the Laurentian Channel. Below normal sea temperatures were also noticed on the Scotian Shelf in 1993, particularly in early March, when temperatures were 2-4° C below normal.

Freshwater conditions affect both juvenile Atlantic salmon prior to their migration as smolts as well as affecting their return to rivers and their susceptibility to fishing gear as adults. Water flows in 1993 were generally average or above and this may have contributed to above average angling conditions, particularly on the Gaspé Peninsula, resulting in above average exploitation rates.

3.0 NEWFOUNDLAND REGION SUMMARY

-See summary sheets for the following rivers: Exploits, Campbellton, Gander, Middle Brook, Terra Nova, North Arm, Biscay Bay, Colinet, Rocky, Northeast (Placentia), Little, Conne, LaPoile, Highlands, Romaines, Pinchgut, Humber, Lomond, Torrent, Western Arm Brook.

3.1 Labrador (SFAs 1-2, 14(B))

SFAs 1 and 2

Commercial fishery

For the fourth year in a row, the quota was not caught in the commercial fishery. Therefore, catches presented in Fig. 3.1.1 for 1990-93 can be compared directly with pre-quota years. In both SFAs 1 and 2, total catch declined from 1992 and remained well below average.

The percentage of the quota taken in 1993 decreased from the high recorded in 1992 and was the second

lowest on record, in spite of 1993 being the second year of the salmon and cod moratoria. In both 1992 and 1993, it is possible that fish once taken in the commercial fishery in SFA 3 and to a lesser extent in SFAs 4-7, contributed to catches in Labrador. In the past, Labrador-origin Atlantic salmon have been intercepted in these SFAs. **Total commercial catch in 1993 was the second lowest on record. Some of the declines in 1992 and 1993 might have been due to the reductions in licensed effort.**

An index of fishing effort is available for the commercial Atlantic salmon fishery at Nain, north Labrador (SFA 1) and is shown in Fig. 3.1.2. This index has been directly associated with landings for the rest of Labrador. **In the general sense, catch rates have shown a rapid decline since 1989.** In all four subareas of the Nain region, effort was among the lowest recorded in 1992 and 1993. Catch rate trends in recent years however must be viewed with caution because little fishing effort was directed towards salmon.

Large salmon harvested in the commercial fishery in Labrador with river age greater than 3 years are principally from stocks in Labrador and the Quebec North Shore. There is a relationship between the catches of large salmon in Labrador and catches at West Greenland of North American-origin small salmon with river age greater than 3 years. The time series of landings, for small and large salmon in SFAs 1, 2, and 14(B) combined and North American-origin small salmon with a river age of greater than 3 years at West Greenland (which return the following year as large salmon) all show declining trends (Fig. 3.1.3). **The decline in catches of large salmon in Labrador and North American-origin small salmon of river age greater than 3 years at West Greenland, is indicative of a decrease in population size.**

Recreational fishery

The quotas for retained fish in the recreational fishery were not reached in both SFAs 1 and 2 in 1993 hence, direct comparison with years prior to 1992 is possible (Fig. 3.1.4). Retained catches up to the time quotas were caught in 1992 are also shown. **The catch of small salmon in 1993 was lower than the partial season catch of 1992, below the means, and continued a decline that started in 1988.** The catch of large salmon showed a similar trend, except the partial season retained catch in 1992 was well above average. It should be pointed out that low catches in 1991 were probably due in part to a delay in the entry of fish into rivers as a result of severe ice conditions throughout much of the summer.

Fig. 3.1.5 shows total retained catch (small and large combined), effort, and catch per unit of effort (CPUE) in 1993 compared to the means and years since 1974. **Effort expenditure in 1993 continued to be above average while CPUE declined.**

Recreational catches in Labrador have historically constituted only a small proportion of total catches (recreational plus commercial) and therefore a cautious approach must be taken in interpretation of trends as representative of abundance.

General comments and conclusions for SFAs 1-2

Overall trends in the recreational fishery, the catch rates for the Nain Region, and trends in the catches of small and large salmon in the commercial fishery in Labrador and small salmon at West Greenland with a river age greater than 3 years, all suggest continued low abundance of both small and large salmon. **The overall decline in abundance of large salmon is a matter of very serious concern. Immediate efforts should be undertaken to reduce mortality, particularly on the large salmon component, which contributes substantially to egg deposition in Labrador.**

Southern Labrador (SFA 14(B))

The commercial fishery quota of 8 t was reached on July 28, 1993.

Judging from recreational catch statistics (Fig. 3.1.6), commercial quotas and the reduction of commercial effort in SFA 14(B) along with the closure of the insular Newfoundland commercial fishery in 1992, **did not**

result in a significant improvement in the return of small salmon to SFA 14(B) rivers. An improvement over recent years was noted however for large salmon (Fig. 3.1.7). **The proportion of large salmon angled in 1992 and 1993 was the highest since the late 1970s (Fig. 3.1.8), suggesting the commercial exploitation on 14(B) large salmon has been reduced by the recent management measures; however the proportion of large salmon has not increased beyond historical levels when commercial fishing mortality was much higher than in 1992 and 1993. The SFA 14(B) recreational fishery quota was not reached in 1993.**

The numbers of large salmon retained and angling effort in SFA 14(B) did not decrease in 1993, compared to 1992, in spite of the season bag limit of 4 large salmon. **It is believed that increasing angling effort in southern Labrador since 1984, continues to be focused selectively on large salmon.** The practice of releasing small salmon in order to catch a large salmon to fill the daily bag limit, has been reported by river guardians on numerous occasions.

3.2 Northeast, east, and south Newfoundland (SFAs 3-11)

Recreational fishery

The recreational catch of small salmon (retained plus released fish), effort, and CPUE for SFAs 3-11 combined are shown in Fig. 3.2.1. Catches prior to 1992 are retained catches for the entire angling season. Catch, effort and CPUE were all above average. **The overall increase in recreational catch however was due mainly to the contribution of northeast coast rivers (SFAs 3-5); catches and CPUE in the remaining SFAs particularly along the south coast (SFAs 9-11) were generally below average.**

The total number of small salmon retained (for both quota periods combined) in SFAs 3-11 in 1993 is shown in (Fig. 3.2.2). Quotas in both 1992 and 1993 constrained catches at levels below the 1986-91 mean. The quota for retained fish was not reached in SFA 9.

Counts at counting facilities

Historic counts of small and large salmon at various counting facilities are shown in Table 3.2.1 and 3.2.2 respectively. Collectively over all rivers, there was a significant increase in small and large salmon returns during the two moratorium years compared to pre-moratorium years. **The overall increases however were due mainly to the influence of northeast coast (SFAs 4-5) rivers. For most counting facilities, counts of small salmon similar to or greater than those observed in 1992 and 1993 have occurred in years prior to the commercial salmon fishery moratorium. Returns of large salmon showed an overall improvement in 1993 but for several counting facilities there were years in the past when returns were higher. The proportion of large salmon returning in 1993 decreased from 1992 at eight out of fourteen counting facilities and in some cases reverted back to pre-salmon moratorium levels (Table 3.2.3).**

Individual stock assessments

Detailed stock assessments were carried out on the following rivers: Exploits River, Campbellton River, Gander River, Middle Brook, Terra Nova River, North Arm River, Biscay Bay River, Rocky River, Colinet River, Northeast River (Placentia), Little River, Conne River. Target egg deposition requirement was achieved in four of these rivers in 1993 (Table 3.2.4). Further details are provided in the attached Summary Sheets.

Trends in populations and anticipated returns in 1994

There has been a decline in total number of small salmon produced per spawner in Gander River, Middle Brook, Biscay Bay River, and Conne River (Fig. 3.2.3). Trends for Gander River, Middle Brook, and Conne River were quite similar while that of Biscay Bay River was much steeper. For Gander River and Middle Brook, the number of small salmon returning to freshwater in 1992 and 1993 was high compared to recent years; unfortunately this was not so for Conne and Biscay Bay rivers. However, returns to freshwater in 1992 and 1993 were lower and in some cases substantially lower than observed in previous years, including those years when there was a commercial fishery. Total populations on most rivers examined remain at or near historical lows. If the low number of recruits per spawner continue at current low levels then total returns may remain low. However, the commercial fishing moratorium has succeeded in increasing spawning escapements in all rivers except Conne River over those in previous years.

Returns in 1994 (Fig. 3.2.4) are expected to be substantially below target spawning levels for Biscay Bay River and Conne River even with no removals for recreational fishing. Returns to Gander River are anticipated to be at target spawning levels while those for Middle Brook will be about 30% over target if there are no removals by recreational fishing. Low spawning escapements in 1989-91 and low numbers of recruits per spawner for these rivers suggest that returns will continue to be low in 1994-97. **Exploitation should not be increased over levels in 1992-93.**

General comments and conclusions for SFAs 3-11

The recreational catch, returns to counting facilities, and trends in specific populations all suggest that overall, total population size of small salmon in 1992 and 1993 was lower than observed in years prior to the salmon fishing moratorium, especially compared to the early 1980s.

Smolt-to-adult survival back to the river in 1992 for Northeast Brook, Trepassey (SFA 10) and Conne River (SFA 11), was lower than for pre-salmon moratorium years. While there was an improvement for both rivers in 1993, survival was still as low as when there was a commercial fishery. **This is suggestive of high or above average mortality at sea affecting returns in both 1992 and 1993 at least for these stocks.** A recent study has shown a positive relationship between an index of condition and sea survival for smolts leaving both Conne River and Northeast Brook. **Low index of condition in 1991 and 1992 was associated with low sea survival. This suggests a possible freshwater influence on sea survival.**

Most of the fish classified as large salmon in rivers in SFAs 3- 11 of insular Newfoundland are repeat (consecutive) spawning grilse. An analysis of all available data spanning approximately 20 years and several rivers throughout SFAs 3-11 has shown that with a few exceptions, the proportion of consecutive spawning grilse in returns was around 10% or less, and most were of a size that precluded their entry into the large salmon size category (>63 cm). Thus it appears that expectations that a large proportion of small salmon entering a river in a given year will come back as large salmon in the following year, are unfounded. It is possible that more fish that eventually reach the large category will return in the future, as a result of the closure of the commercial fishery which selected for larger fish.

3.3 Southwest and west Newfoundland (SFAs 12-14(A))

Recreational fishery

Recreational catch statistics (retained plus released fish) for small and large salmon for SFAs 12-14(A) are shown in Figs. 3.1.6 and 3.1.7, respectively. With respect to small salmon, catches in 1993 increased over pre-salmon moratorium years in SFA 14(A) but the reverse was true for SFAs 12 and 13. Catches of large salmon showed a substantial increase in SFAs 13 and 14(A) but declined in SFA 12 from the high catch recorded in 1992. The proportion of large salmon in the recreational catch in SFA 12 decreased markedly from

1992 to below average in 1993; in SFAs 13 and 14(A), proportions decreased slightly from 1992 but remained the highest since the late 1970s and early 1980s (Fig. 3.1.8). Of the three SFAs the quota for SFA 13 was not caught in 1993.

The individual river quotas for Barachois River, Harry's River, Fox Island River, and Serpentine River, SFA 13, were reached in 1993. But the quotas for Fischell's Brook, Flat Bay Brook, and the Adies Lake portion of the Humber River, were not reached. Low catches in Fischell's Brook and adjacent Flat Bay Brook, suggest that these stocks in particular, are continuing to decline in spite of the commercial fishery closure in SFA 13. **These river quotas, which had been set in 1989 at the previous five year mean catch level, should be lowered to reflect the 1989-93 mean.** The individual river quotas for Lomond River, Watson's Brook, and Pincent's Brook in SFA 14 were not reached in 1993 before the SFA quota.

Counts at counting facilities

Counts of small and large salmon at the counting fence on Highlands River in 1993, were above those in 1980-1982 (Table 3.3.1). Counts of small and large salmon at the Pinchgut Brook fence were also above those in 1992. The estimated returns of salmon to the Humber River in 1993, indicate that the abundance of small salmon was at least equivalent to the 1992 level but the abundance of large salmon in 1993 was below the 1992 level. The Humber River may have benefitted more from the commercial moratorium than most other rivers in SFA 13 (i.e. St. George's Bay) because of higher commercial exploitation on Humber River salmon in the Bay of Islands. Salmon intercepted by the commercial fishery in St. George's Bay would have been destined for at least eight major rivers in that area compared to only one in the Bay of Islands.

Counts of small salmon at the Lomond River and Torrent River fishways, SFA 14(A), in 1993, were the highest recorded at these facilities (Table 3.3.1). The count of small salmon at the counting fence in Western Arm Brook in 1993, was the third highest since 1971 and twice the count in 1992. The count of large salmon at the Lomond River fishway in 1993 decreased from 1992 but remained above average. The count of large salmon at the Torrent River fishway increased over 1992 while at Western Arm Brook the count was the same as in 1992, which was the highest recorded since 1973.

Individual stock assessments

Detailed stock assessments were carried out on the following rivers in SFAs 12-14(A) in 1993: LaPoile River, Pinchgut Brook (tributary of Harry's River), Romaines River, Highlands River, Humber River, Lomond River (area above fishway), Torrent River, Western Arm Brook. Target egg deposition requirement was met (or nearly so) in four of these rivers (Table 3.2.4). For more details on these assessments, see the attached Summary Sheets.

Trends in populations and anticipated returns

The 1993 smolt count of at Western Arm Brook was 13% below the count in 1992; assuming the percentage returning to spawn in 1994 will be similar to the previous year (6.1%), the number of small salmon returning to the river in 1994 is anticipated to be about 13% below that of 1993. The analysis of trends in small salmon produced per spawner (Fig. 3.2.3) showed there was a decline for Humber River since 1974 but it was not as steep as for the rivers in SFAs 3-11. Anticipated returns of small salmon for Humber River are below target spawning requirement with no harvest (Fig. 3.2.4).

General comments and conclusions for SFAs 12-14(A)

Based on recreational catches and counts at counting facilities, it appears the commercial salmon fishery moratorium did not result in increased returns of small and large salmon to SFA 12 in 1993; overall returns of small salmon did not increase in SFA 13 but increased in SFA 14(A). Substantial increases in returns of large salmon were noted in SFAs 13 and 14(A). Atlantic salmon stocks in SFAs 12 and 13 were not expected to benefit as much from the commercial moratorium as other areas of insular Newfoundland; commercial exploitation on these stocks should have already been reduced prior to the moratorium due to previous management measures.

4.0 GULF REGION SUMMARY

- See summary sheets for Restigouche, Nepisiguit, Tabusintac, Miramichi, Richibucto, Buctouche, Morrell, River Philip, East (Pictou), West (Antigonish), and Margaree rivers.

4.1 Gulf New Brunswick (Salmon Fishing Areas 15 and 16)

- a) **General description** - Rivers in Salmon Fishing Areas 15 and 16 are included in Gulf New Brunswick. River assessments in this area are provided for **Restigouche, Nepisiguit, Miramichi, Tabusintac, Buctouche, and Richibucto** rivers. Of these rivers the Restigouche is an early run river with most salmon returning before the end of August and on average the returns are 50% small and 50% large salmon. The Nepisiguit and Miramichi rivers have both early and late run components and about 25% to 30% of the returns to these rivers are large salmon. The Tabusintac, Richibucto, and Buctouche rivers are primarily late run rivers with most of the returns entering the river after September 1. About 60% of the returns to these rivers are large salmon. The Miramichi River comprises about 60% of the rearing area in Gulf New Brunswick and the Restigouche about 30% of the area.
- b) **Industry input and environmental considerations** - Input from industry on these rivers was obtained in a series of stock status workshops held in each watershed. These meetings were attended by angling groups, First Nations, DFO Area staff, DFO Fisheries Officers, and Quebec and New Brunswick (Department of Natural Resources and Energy) biologists. Data collected by these groups were tabled at the meetings and concerns related to other species such as striped bass and trout were identified. Environmental concerns raised related to interpreting angling statistics and plans were made to investigate the relationship between discharge and angling catch in leased waters on the Tabusintac River as a means of developing an abundance index for this river.
- c) **Status of the stocks** - Indices of abundance were from trapnets used to mark fish entering the river and tag returns from upriver trapnets, angling fisheries, and counting fences. Trends in angling catches were also used and, on the Tabusintac River, the kelt fishery was used as an index of spawning escapement in the previous fall.

First Nations and angling catches were below 1992 and average catches throughout this area in 1993. Trends in returns and spawners differed between northern and southern areas of Gulf New Brunswick. Returns to northern rivers (Restigouche and Nepisiguit) were below 1992 and average values for both large and small salmon. Returns to southern rivers (Miramichi) were similar to 1992 for large salmon but below 1992 for small salmon. Spawning escapements in northern rivers were below spawning requirements but above requirements in the south (Fig. 4.1.1).

- d) **Forecasts** - Forecasts for the Nepisiguit River indicate that large salmon returns will be below requirements in 1994. On the Miramichi River, there is a 70% probability of exceeding spawning
-

requirements in 1994. There is no method other than using average returns for making pre-season forecasts for the other rivers. If returns to the Restigouche River are average for 1994, then large salmon returns are expected to be between 10,000-16,000 large salmon before harvests, while small salmon would be 9,000-14,000 before harvests.

- e) **Future research** - Major improvements in these assessments will be directed towards improving the mark-recapture techniques. These improvements will occur by operating additional trapnets on the Restigouche and Miramichi rivers and increasing the number of tags recovered and estimating reporting rate in the angling fisheries by conducting creel surveys. The Nepisiguit target spawning requirement needs to be re-evaluated in relation to stocking programs.
- f) **Effect of fishing** - Current fishing practices do not seem to be having an adverse effect on Miramichi and Tabusintac rivers as spawning requirements have been met in most years. While the Buctouche River is well below spawning requirements, angling harvest is small and the Buctouche First Nation has voluntarily stopped fishing. Restigouche and Nepisiguit rivers are generally below large salmon requirements but there are large surpluses of small salmon.

4.2 Gulf, Nova Scotia and Prince Edward Island (Salmon Fishing Areas 17 and 18)

- a) **General description** - Rivers in Salmon Fishing Areas 17 and 18 are included in Gulf Nova Scotia and Prince Edward Island. River assessments in this area are provided for **River Philip, East (Pictou), and West (Antigonish)** in the mainland portion of Nova Scotia, the **Margaree River** in Cape Breton, Nova Scotia, and the **Morrell River**, Prince Edward Island. The Nova Scotia rivers have salmon populations that consist of 75% large salmon. Mainland rivers are primarily late run with most of the salmon returning after September 1. The Margaree River has an early and late run, with about 40% of the salmon returning before September 1 in most years. The Morrell River is primarily an early run small salmon river.
- b) **Input from industry** - Input from industry on these rivers was obtained in a series of stock status workshops held in each watershed. These meetings were attended by angling groups, First Nations, DFO area staff, DFO Fishery Officers, and Nova Scotia provincial biologists. Data collected by these groups were tabled at the meeting and concerns related to other species such as striped bass and trout were identified.
- c) **Status of the stocks** - Abundance indices for mainland Nova Scotia rivers were angling catches and exploitation rates based on the Margaree River assessment. Mark-recapture techniques using trapnets to mark fish and tag recoveries from upriver trapnets, angling, and counting fences were used to estimate returns to the Margaree River. Returns to Leard's Pond fishway were used to assess Morrell River returns.

Angling catches for large salmon were below 1992 in Gulf Nova Scotia. In mainland Nova Scotia small salmon catches were below 1992 but were similar to 1992 in the Margaree River. First Nation harvests from mainland rivers were about 400 large and 4 small salmon. The largest proportion of these (35%) were taken from East (Pictou) River. Trends in total returns for 1993 were similar to those in angling catches.

Large salmon spawning escapements have been above targets in Gulf Nova Scotia every year since 1988. Small salmon targets have been exceeded in mainland Gulf Nova Scotia rivers every year since 1988 and three of the last five years on the Margaree River (Fig. 4.2.1).

- d) **Forecasts** - A stock recruitment curve is used to forecast pre-season returns to the Margaree River and predicts a surplus to large salmon spawning requirements in 1994. No forecast is available for any of the mainland Nova Scotia rivers. The Morrell River depends almost entirely on hatchery returns (92%). At average smolt return rates, approximately 700 small salmon returns can be expected in 1994, well above the 59 required for spawning.
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- e) **Future research** - Major improvements expected in 1994 are estimates of returns below the Leard's Pond fishway in the Morrell River. With the cooperation of user groups a mark-recapture and creel survey will occur on the River Philip. Principal improvements on the Margaree River will include an investigation of early and late run spawning requirements.
- f) **Effect of fishing** - Current fishing practices do not seem to be having an adverse effect on spawning escapement for Gulf Nova Scotia rivers as they are all well above large and small salmon requirements.

5. SCOTIA-FUNDY REGION SUMMARY

- See summary sheets for Middle, Grand, Liscomb, LaHave and Saint John rivers.

5.1 Atlantic coast, Nova Scotia (Salmon Fishing Areas 19-21)

General description: Rivers in Salmon Fishing Areas 19, 20 and 21 (Fig. 5.1.1) are included in Atlantic coast Nova Scotia. River assessments in this area are provided for the **Grand, Liscomb, LaHave, Middle and North** rivers. The salmon potential of most rivers in **SFA 21** is affected deleteriously by acid rain. Hatchery fish contribute to the returns of 19 rivers. The rivers hold mostly summer runs of salmon and grilse.

Status of the stocks: Indices of abundance were derived from catch and effort in recreational fisheries, from returns at counting facilities, and counts made by divers.

Retained catches of small salmon were 40 to 64% of the average for 1988-1992 and 38 to 64% of the average for 1983-1992. Released catches of large salmon were 35 to 69% of the average number released for 1988-1992. Fishing effort was about equal to the average value for 1988 to 1992 except in SFA 19 where it was only 61% of the average. Catch per unit of effort was 63 to 70% of the 1988-1992 average.

Counts of wild salmon (1SW and MSW) were even lower than the low values of 1992, representing 17 to 44% of the 1988-1992 average for 1SW and 10 to 35% of the 1988-1992 average for MSW. Hatchery returns were also lower than 1992 and recent averages. Hatchery MSW returns on the Liscomb River remained among the lowest of the series.

The status of salmon stocks in monitored rivers of **SFA 19** in 1993 is seriously low. Spawners in these rivers were well below target spawning escapement. Returns continued the decline begun in 1990. A four-year downward trend in the survival rate of hatchery-origin smolts in the **SFA 20**, Liscomb River, suggests that marine survival of wild smolts could also be decreasing.

Forecasts: Wild MSW at Liscomb Falls and Morgan Falls could be higher in 1994 than they were in 1993 but the forecasts are uncertain because of the possible effects of the moratoria in the Newfoundland commercial fisheries in 1992 and 1993 and in the Greenland fishery. Lower counts of 1SW fish at enumeration facilities in 1993 in **SFA 21** suggests returns of MSW fish in 1994 about half that of the last ten years. In addition, returns in 1994 may be negatively affected by the reduced marine habitat in the North Atlantic.

Effects of fishing: Continued exploitation at current levels in **SFA 19** could imperil stocks of the **Grand** and **Middle** rivers and possibly other rivers. Harvests in 1994 in all rivers should be restrained until in-season information can be evaluated. In **SFA 20 and 21**, the situation does not appear as precarious, but fishing should be carefully restrained until in-season indicators of abundance can be evaluated.

5.2 Bay of Fundy (Salmon Fishing Areas 22-23)

General description: Rivers in Salmon Fishing Areas 22 and 23 (Fig. 5.1.1) are included in the Bay of Fundy area. River assessments are provided for the **Stewiacke, Petitcodiac, Big Salmon, Saint John, Nashwaak, Magaguadavic and St. Croix** rivers. Hatchery fish potentially contribute to the returns of all of the above rivers (Magaguadavic is not stocked but has aquaculture escapees) as well as the Gaspereau, Annapolis and Bear rivers. The rivers hold a mix of summer and late run fish. Rivers in the inner Bay of Fundy have been cause for concern for many years and have been closed to exploitation since 1990.

Status of the stocks: Indices of abundance were derived from catch and effort in recreational fisheries, from returns at counting facilities, and from counts made by divers and observers onshore.

The retained catches of small salmon in the outer Bay of Fundy rivers were very low in 1993, less than 40% of the 1988-1992 averages. Fishing effort was also lower, partly due to the fishery closure on September 15 because of low escapement, but the catch per unit of effort was also low, 54% of the 1988-1992 average.

Salmon counts on the **Stewiacke, Peticodiac, and Big Salmon** rivers in 1993 indicate that spawning escapement has been less than 34-50% of the target. Counts of both 1SW and MSW on the **Saint John, Nashwaak, and Magaguadavic** rivers were all lower than 1992 and recent averages, with the declines generally more pronounced for 1SW than for MSW. Counts of wild 1SW and MSW salmon on the St. Croix River, an international salmon development project, were the lowest for the period during which records have been kept. Egg deposition was half the target on the Saint John above Mactaquac and 40% of the target on the Nashwaak.

Forecasts: The 3,100 or possibly 4,800 MSW salmon destined to return to Mactaquac on the Saint John River in 1994 are not expected to meet the spawning requirement above Mactaquac of 4,400 spawners; though the forecast of 8,000 1SW returns could be optimistic, the 1SW target of 3,200 spawners should be met. Based on low 1SW returns on the Nashwaak in 1993, it is expected that MSW returns will be low in 1994. In total, it is unlikely that the target escapement of MSW salmon for the outer Bay of Fundy rivers will be met in 1994.

The survival rate of hatchery smolts from the Saint John River returning in 1993 approximated the lowest values observed in the 18-year period.

Effects of fishing: Harvesting of salmon in most inner Bay of Fundy rivers east of the Saint John (SFA 23) has been closed to licensed exploitation since 1990 and recent trends in returns and escapement suggest a need to continue season closures in 1994. Reduced juvenile populations suggest that river returns will remain low in the next several years.

For the outer Bay of Fundy rivers, particularly those of the Saint John above Mactaquac, harvesting should be restrained until in-season observations at Mactaquac can be evaluated.

6.0 SUMMARY FOR QUEBEC

There are 112 salmon rivers in Quebec; recreational fisheries are permitted on 88 rivers, 9 of which are very small with no catches reported from them. The management of salmon is delegated to the Ministère de l' Environnement et de la Faune (previously the ministère des Loisirs, de la Chasse et de la Pêche).

The First Nations' food fisheries take place subject to agreements with the bands or through permits issued to them. There are nine bands with food fisheries in addition to the fishing activities of the Inuit in Ungava. Declared or estimated catches are presented in Table 6.0.1. For the commercial fishery, 94 participants remain on the North Shore of the Saint Lawrence, in addition to the Inuit of Ungava.

Public consultations with user groups took place in November and December of 1993 in each region having salmon fisheries. While little or no change is expected for most fishing areas in 1994, recommendations for new fishing rules for 1995 are under consideration.

In the next four sections, information for 1993 is compared to that of last year, 1992, and also with the average of the previous five years, 1988 to 1992.

6.1 Gaspé (Fishing Areas Q1-Q3)

There are 27 salmon rivers within areas Q1 to Q3, of which 19 are open for recreational fishing for Atlantic salmon. First Nations' food fisheries occur in two locations, near the mouths of the **Restigouche** and **Cascapédia** rivers. There is no commercial fishery in this area. Low estimates of salmon returns in 1993 to the end of July in six rivers in this area lead to the closure of the large salmon fishery on those rivers for the rest of the season.

Recreational catches of large salmon decreased by 17% from 1992 and were 8% below average (Table 6.1.1, Figure 6.1.1); an increase in the small salmon catch of 4% over 1992, and of 53% above the average was noted.

Counts of returning salmon are made at 11 counting sites and visual spawner estimates, by snorkling or canoe, are conducted in almost all other rivers. The total number of salmon returning to the Gaspé in 1993 was 16% less than in 1992 and 9% less than the average of the past five years.

The angling effort increased to 41,807 angler-days and fishing conditions were generally reported to have been very good; fishing success (catch per unit effort) remained high at 0.23 fish per day. The exploitation rate was 39%, the highest recorded during the last 10 years. Consequently, the number of spawners was severely reduced and the egg deposition compared to target was estimated at 70% compared to an average of 85% estimated for the previous five years.

Returns in 1994 will mostly come from the spawners of 1988 and 1989, two years for which egg depositions were good. The commercial fishery closures in Greenland and Newfoundland should result in better returns to rivers. Consequently, no modifications are recommended to fishing plans for 1994.

6.2 North Shore of the St. Lawrence (Fishing Areas Q5-Q9)

There are fifty-seven salmon rivers in areas Q5 to Q9, 50 of which are open to recreational fishing. First Nations' food fisheries occur at sites, near the **Escoumins**, **Betsiamites**, **Moisie**, **Mingan**, **Natashquan** and **Saint-Augustin** rivers. No food fishery took place this year in **Olomane** River. The commercial fishery was closed in Area Q7 and quota was reduced to 150 salmon in Area Q8. In Area Q9, the quota and number of fishers was slightly reduced; 90 commercial fishers now share a quota of 15,175 salmon. The retention of large salmon was prohibited on five rivers from the beginning of August onwards due to the low adult return estimated.

The commercial catch of large salmon declined to 11,030, 29% less than 1992 and 34% less than the average (Table 6.2.1). The small salmon catch was 3,627, 6% below last year and 1% above average.

In spite of the reduction in the commercial fishery, recreational catches declined significantly. Landings of 3,648 large salmon were 27% less than last year, and 23% below the average. The reported catch of 3,043 small salmon was 14% below 1992, and 13% below the average.

Egg deposition evaluation is only carried out on ten rivers in the western portion of this area (areas Q5 to Q7), and 4 of these evaluations are for enhancement projects. In these rivers, egg deposition in 1993 varied from 11% to 74% of the requirement, a large reduction compared to last year and to the average.

Reduced total returns were noted from Area Q5 to Q8 (Figure 6.2.1) whereas salmon increased in both sport and commercial landings in Area Q9 (Figure 6.2.2).

For 1994, commercial fishing will be prohibited in areas Q7-Q8 and will remain only in Area Q9. These closed fisheries used to harvest, on average, 6,648 large salmon and 323 small salmon. Increased returns are expected to rivers in these areas as a result of the local commercial closures, as well as the closures of the Newfoundland and Greenland fisheries. Salmon stocks from the Q7 and Q8 are known to have contributed to these distant fisheries.

6.3 Anticosti Island (Fishing Area Q10)

There are twenty-four salmon rivers on Anticosti Island, Area Q10, but recreational fishing usually occurs on only sixteen of them. The unfished rivers are usually quite small, and often have only a late run of salmon in the fall that arrives after the angling season closes. There is no commercial or food fishery in this area.

The recreational catch was 216 large salmon in 1993, a decrease of 39% from 1992, and 55% below the average (Table 6.3.1, Figure 6.3.1). Catch of small salmon increased to 513, 46% more than last year and 35% more than the average.

6.4 Ungava Bay (Fishing Area Q11)

In Ungava, Area Q11, there are four salmon rivers. A recreational fishery is permitted on three of them, but the majority of the landings are taken by the food and the commercial fisheries, which are restricted to the local Inuit people.

The catch reports for the food and commercial fisheries are preliminary and indicate a low level of catch similar to last year. Recreational catch of 230 large salmon was an increase of 41% above 1992, but was 61% less than the average (Table 6.4.1). Recreational catch of 167 small salmon was a decrease of 22% from 1992, and 79% below the average.

Table 3.2.1. Counts of small salmon from fishways and counting fences in insular Newfoundland 1955-93 by Salmon Fishing Area (SFA); also shown are means (\bar{X}), 95% confidence intervals (CI), and coefficients of variation (CV). Partial counts are in parentheses and are not included in means.

Year	Fishways										Counting Fences				
	SFA 4		SFA 5			SFA 9	SFA 10	SFA 11	SFA 4	SFA 9		SFA 11			
	1A	1B	2	3	4	5	6	7	8	9	10	11	12	13	
1955						53									
1956				(323)	558	32									
1957			642	(28)	141	21									
1958			1072	(344)	677	10									
1959	(886)		591	(294)	394	62									
1960	1013	94	291		490	86									
1961	839	319	41		318	74									
1962		1037			496	284									
1963	1202	491			551	372									
1964		1752			418	246									
1965	1228	587			484	334									
1966	(829)	942			368	134									
1967	1372	822			606	367									
1968		1334			714	409		(57)							
1969	979	892			660	463									
1970		1023			755	561									
1971	961	902	731		579	316		159							
1972	794	(495)	540	838	609	331		236							
1973	205		971	(1079)	455	340		(399)							
1974	2538		857	(770)		162		223							
1975	9218	5531		(1119)		778		(186)							
1976	3991	2935				335		294							
1977	6148	4300				371									
1978	3790	2704	755	1403	810	436		390							
1979	6715	3925	(404)	(1350)	569	455		454							
1980		4597	997	1712	843	420		433							
1981	(8114)	4264	2459	2414	1115	619		(334)							
1982	(7605)	2796	1425	1281	963	625		(86)					133		
1983		(2952)	978	1195	1210	853		233		2330			272		
1984	17219	(6300)	1081	1379	1233	904		419		2430	89		359		
1985	16652	5985	1663	904	1557	960		384		(1377)	124		170		
1986	9697	3072	1064	1036	1051	726		725	211	2516	158	296	7515		
1987	9014	2327	(493)	914	974	570	80	(325)	(155)	(1302)	91	368	9687		
1988	8974	3433	1562	772	1737	795	313	543	149	1695	97	(205)	7118		
1989	7192	1694	596	496	1138	668	168	706	175	7743	(889)	62	441	4469	
1990	6629	1057	(328)	745	1149	(410)	401	551	208	7520	1657	71	(307)	4321	
1991	5245	1060	245	562	873	(311)	211	353	(46)	6445	394	99	218	2086	
1992	12538	3520	1168	1182	1443	886	237	921	101	(17306)	(1298)	49	251	1973	
1993	21319	5615	1560	1959	(2713)	962	292	847	(182)	25905	(1045)	79	276	2355	
1984-89															
\bar{X}	11458	3302.2	1193.2	916.8	1281.7	770.5	187.0	555.4	178.3	2213.7	103.5	326.8	7197.3		
95% CI	4541.5	2040.4	534.9	306.4	316.3	153.6	292.3	195.9	77.3	1121.0	34.9	126.2	3406.1		
CV	37.76	49.77	36.11	31.84	23.51	18.99	62.92	28.41	17.46	20.38	32.11	31.10	29.75		
N	6	5	5	6	6	6	3	5	3	3	6	5	4		
1986-91															
\bar{X}	7791.8	2107.2	866.8	754.2	1153.7	689.8	234.6	575.6	185.8	7236.0	1565.5	96.3	330.8	5866.0	
95% CI	1800.9	1060.8	910.3	214.6	319.1	151.5	155.5	186.8	46.8	1724.2	1393.4	35.3	152.2	2875.0	
CV	22.02	47.96	66.01	27.11	26.35	13.81	53.38	26.14	15.85	9.59	55.94	34.92	28.93	46.69	
N	6	6	4	6	6	4	5	5	4	3	4	6	4	6	

1. Exploits River
 - (a) Bishop's Falls
 - (b) Gt. Rattling Brook
2. Gander River (Salmon Brook)
3. Middle Brook

4. L. Terra Nova River
5. U. Terra Nova River
6. Rocky River
7. Northeast River (Placentia)
8. Grand Bank Brook

9. Gander River
10. Biscay Bay River
11. Northeast Brook (Trepassey)
12. Colinet River
13. Conne River

Table 3.2.2. Counts of large salmon from fishways and counting fences in insular Newfoundland 1955-93 by Salmon Fishing Area (SFA); also shown are means (\bar{X}), 95% confidence intervals (CI), and coefficients of variation (CV). Partial counts are in parentheses and are not included in means.

Year	Fishways									Counting Fences				
	SFA 4			SFA 5			SFA 9	SFA 10	SFA 11	SFA 4	SFA 9			SFA 11
	1A	1B	2	3	4	5	6	7	8	9	10	11	12	13
1955						24								
1956				(56)	37	44								
1957			323	(2)	41	1								
1958			491	(229)	195	0								
1959	(119)		290	(14)	67	0								
1960	157	9	183		216	0								
1961	118	53	15		100	1								
1962		31			277	4								
1963	65	37			320	34								
1964		116			298	18								
1965	203	190			255	51								
1966	(506)	470			220	2								
1967	710	382			359	43								
1968		687			376	28		(11)						
1969	498	290			391	136								
1970		199			469	172								
1971	300	261	494		279	121		21						
1972	113	(234)	54	10	348	200		34						
1973	89		135	(9)	303	223		(64)						
1974	411		9	(77)		121		9						
1975	1439	505		(9)		52		(36)						
1976	460	117				37		56						
1977	581	271				262								
1978	303	81	52	16	20	89		32						
1979	277	124	(6)	(54)	170	30		37						
1980		426	15	91	39	17		34						
1981	(1695)	514	33	39	90	28		(62)						
1982	(181)	122	18	20	19	8		(36)					116	
1983		(302)	12	75	57	76		22			88		43	
1984	529	(111)	38	57	107	98		44			83	33	97	
1985	183	38	26	27	112	60		0			(21)	41	42	
1986	355	174	12	15	140	58		39	4		101	30	31	397
1987	310	41	(9)	19	56	38	1	(16)	(2)		(106)	30	55	498
1988	147	10	24	14	206	45	6	11	2		61	19	(16)	418
1989	89	14	24	19	142	51	9	15	7	473	(104)	18	81	319
1990	122	15	(7)	13	144	(34)	17	25	15	508	71	9	(50)	361
1991	99	40	2	14	114	(26)	16	8	(7)	670	35	13	18	87
1992	314	242	101	43	270	224	46	46	35	(3850)	(49)	10	74	154
1993	627	312	87	87	(470)	173	72	65	(6)	1734	(116)	17	39	98
1984-89														
\bar{X}	268.8	55.4	24.8	25.2	127.2	58.3	5.3	21.8	4.3		81.7	28.5	61.2	408.0
95% CI	170.1	84.1	11.5	17.1	52.1	22.1	10.0	23.4	6.3		49.8	9.2	34.0	117.1
CV	60.29	122.26	37.22	64.58	39.00	36.13	75.78	86.64	58.08		24.53	30.65	44.69	18.03
N	6	5	5	6	6	6	3	5	3		3	6	5	4
1986-91														
\bar{X}	187.0	49.0	15.5	15.7	133.7	48.0	9.8	19.6	7.0	550.3	67.0	19.8	46.3	346.7
95% CI	121.1	65.8	16.9	2.8	51.1	13.6	8.4	15.6	9.1	261.1	43.4	9.1	44.2	147.6
CV	61.68	128.01	68.58	16.97	36.45	17.76	68.98	64.29	81.65	19.10	40.71	43.66	60.06	40.57
N	6	6	4	6	6	4	5	5	4	3	4	6	4	6

1. Exploits River

(a) Bishop's Falls

(b) Gt. Rattling Brook

2. Gander River (Salmon Brook)

3. Middle Brook

4. L. Terra Nova River

5. U. Terra Nova River

6. Rocky River

7. Northeast River (Placentia)

8. Grand Bank Brook

9. Gander River

10. Biscay Bay River

11. Northeast Brook (Trepassey)

12. Colinet River

13. Conne River

Table 3.2.3. Proportion of large salmon at counting facilities in 1992 and 1993 as well as the 1984-89 and 1986-91 means.

Counting facility	Proportion of large salmon			
	\bar{x} 84-89	\bar{x} 86-91	1992	1993
Exploits River (Bishops Falls)	0.023	0.023	0.024	0.029
Exploits River (Gt. Rattling Bk)	0.016	0.023	0.064	0.053
Gander River (counting fence)		0.071	0.182	0.063
Gander River (Salmon Brook)	0.020	0.018	0.080	0.053
Middle Brook	0.027	0.020	0.035	0.043
Terra Nova River (Lower)	0.090	0.104	0.158	0.148
Terra Nova River (Upper)	0.070	0.065	0.202	0.152
Rocky River	0.028	0.040	0.163	0.198
Northeast River (Placentia)	0.038	0.033	0.048	0.071
Grand Bank Brook	0.024	0.036	0.257	0.032
Biscay Bay River	0.036	0.041	0.036	0.100
Northeast Brook (Trepassey)	0.216	0.171	0.169	0.177
Colinet River	0.158	0.123	0.228	0.124
Conne River	0.054	0.056	0.072	0.040

Table 3.2.4 Newfoundland regional summary of percent target spawning requirements attained for various rivers during the 5-year period prior to the commercial salmon moratorium (1987-91) and for the two years during the moratorium.

SFA	River	1987	1988	1989	1990	1991	1992	1993
4	Exploits:							
	-Lower	65	61	48	47	35	79	109
	-Middle	9	12	14	12	16	20	23
	-Upper	97	125	119	88	0	2	6
	Gander			35	36	33	111	136
	Campbellton							274
5	Terra Nova	15	30	20	20	16	29	53
	Middle Brook	90	66	50	75	51	142	218
7	North Arm River							17
9	Biscay Bay	119	127	87	128	39	118	84
	Colinet	82	43	101	69	46	63	60
	Rocky	23	36	20	47	26	32	41
10	Northeast Placentia	152	209	277	251	161	440	418
11	Conne	214	159	103	112	51	51	61
	Little*	51	51	82	134	56	54	60
12	LaPoile	30	24	18	26	31	23	23
13	Pinchgut (Harry's)	69	91	126	350	99	45	136
	Romaines							12
	Highlands							55
	Humber	61	80	24	60	27	117	96
14	Lomond	56	70				121	118
	Torrent	201	266	225	221	176	314	538
	Western Arm Brook	103	72	144	114	68	151	288

* Colonization program at Little River. Eggs removed from most adult returns, incubated, and fry subsequently stocked into the system. Target achieved includes natural egg deposition and fry stocking egg equivalents.

Table 3.3.1. Counts of small (<63 cm) and large (>=63 cm) Atlantic salmon at fishways and counting fences in SFA 12, 13 and 14(A), 1971–1993. Numbers in parentheses refer to partial counts and are not used in calculation of statistics.

Year	SFA 12			SFA 13				SFA 14(A)										
	LaPoile		Romaines	Pinchgut	Humber *		North	Hughes		Lomond	Bound		Torrent		WAB			
	Small	Large	Small	Small	Small	Large	Small	Small	Large	Small	Large	Small	Large	Small	Large			
1971										6	0			54	4	427	-	
1972										30	15			64	3	309	9	
1973										108	110			96	12	555	30	
1974										41	33			38	3	399	4	
1975										1	0			191	25	631	1	
1976										132	11			341	47	520	0	
1977										192	11			789	33	341	3	
1978										117	12			971	21	285	1	
1979										195	1			1,984	39	1,578	0	
1980			82	55						301	19			792	63	430	3	
1981			127	29						110	50			2,101	97	447	1	
1982			100	56						275	16			2,112	523	387	3	
1983										220	7			2,007	442	1,141	4	
1984												90	3	440	47	1,805	288	
1985												13	0	190	14	1,553	30	
1986								66	3	63	2	354	32		9	2,815	92	
1987								74	1	37	6	355	11	62	12	2,505	68	
1988								166	9	65	0	437	21	47	3	2,075	44	
1989								46	2	54	1			17	0	1,369	60	
1990										12216	855	49	0	106	1	32	1	
1991										5724	401	52	1	175	0	18	0	
1992								222	5	17571	2945	131	12	146	7	435	80	
1993	(82)	(507)	137	88	(106)	(6)	576	43	18477	636	(39)	(1)	(87)	(0)	526	34	(12)	(2)
Mean (84–89)										88	4	54	2	355	25	34	4	
95% CL= +/-										85	6	28	2	126	18	40	8	
CV										60.59	95.84	49.07	114.02	28.56	58.86	73.91	125.06	
N										4	4	6	6	5	5	4	4	

* Returns to the Humber River are estimated from angling exploitation rate.

Tableau 6.0.1. Sommaire de l'exploitation de la pêche d'alimentation, 1984-93

Table 6.0.1. Harvest in the Native food fisheries, 1984-93

	Casapédia	Ristigouche	Escoumins	Betsiamites	Moisie	Mingan	Natashquan	Olomane	St-Augustin	Ungava
Zone	Q1	Q1	Q7	Q7	Q8	Q8	Q8	Q9	Q9	Q11
1984	93	1 247	30	ND	52	0	700	ND	ND	2 953
1985	121	1 011	57	ND	71	0	1 083	70	ND	1 829
1986	184	1 149	57	ND	241	0	ND	189	ND	3 408
1987	150	664	57	ND	71	0	1 232	39	ND	2 919
1988	150	924	29	ND	278	0	1 386	112	ND	2 602
1989	44	1 093	57	ND	201	6	1 072	0	ND	985
1990	190	1 151	57	278	425	50	620	0	ND	700
1991	221	868	50	203	320	11	732	0	ND	1 607
1992	164	1 001	57	203	432	0	ND	0	ND	1 119
1993	168	1 000	57	101	430	10	950	0	550	1 119
88-92	154	1 007	50	228	331	13	953	22	ND	1 403

ND : non déclaré / undeclared

Estimation minimale / minimum estimation

Tableau 6.1.1. Sommaire des prélèvements des zones Q1, Q2 et Q3, Gaspésie, 1984-93.

Table 6.1.1. Removals of salmon in zones Q1, Q2, and Q3, Gaspésie, 1984-93.

Année Year	Captures sportives Recreational			Jours- pêche Rod- days	Succès C.U.E.	Taux exploitation Exploitation Rate	Retrait Other removals	Prélèvement total Total removals	Montaison en rivière Returns to rivers	Reproducteurs / Spawners			
	Mad. Small	Réd. Large	Total Total							Nombre Number	Oeufs / déposés Eggs (M) deposited	requis requirement	%
1984	779	3 582	4 361	22 464	0,19	30%	280	4 641	14 633	9 992	41,06	77,14	53%
1985	976	3 847	4 823	24 919	0,19	34%	130	4 953	14 006	9 053	34,61	77,14	45%
1986	1 919	5 087	7 006	30 450	0,23	32%	420	7 426	22 075	14 649	47,96	77,14	62%
1987	1 994	4 266	6 260	30 435	0,21	26%	566	6 826	23 809	16 983	60,01	77,14	78%
1988	2 731	6 454	9 185	35 204	0,26	32%	296	9 481	28 616	19 135	71,48	77,14	93%
1989	1 666	6 025	7 691	35 208	0,22	28%	712	8 403	27 060	18 657	70,60	77,14	92%
1990	2 874	5 313	8 187	36 562	0,22	31%	545	8 732	26 809	18 077	61,67	77,14	80%
1991	2 354	5 458	7 812	35 154	0,22	31%	369	8 181	25 441	17 260	61,58	77,14	80%
1992	4 014	6 546	10 560	38 762	0,27	36%	319	10 879	29 539	18 660	62,54	77,14	81%
1993	4 186	5 464	9 650	41 807	0,23	39%	245	9 895	24 913	15 018	53,99	77,57	70%
88-92	2 728	5 959	8 687	36 178	0,24	32%	448	9 135	27 493	18 358	65,58	77,14	85%
Variations vs / % change													
92	4%	-17%	-9%	8%	-15%	8%	-23%	-9%	-16%	-20%	-14%	1%	-14%
88-92	53%	-8%	11%	16%	-4%	23%	-45%	8%	-9%	-18%	-18%	1%	-18%

Tableau 6.2.1. Sommaire des prélèvements des zones Q5, Q6, Q7, Q8 et Q9, Rive nord du Saint-Laurent, 1984-93.

Table 6.2.1. Removals of salmon in zones Q5, Q6, Q7, Q8 and Q9, North side of St-Lawrence, 1984-93.

Année Year	Captures sportives Recreational			Jours- pêche Rod- days	Succès C.U.E.	Captures commerciales Commercial harvest			Pêche alimentation Native fisheries Total	Captures Harvest Total	Oeufs requis Eggs requirement (M)
	Mad. Small	Réd. Large	Total Total			Mad. Small	Réd. Large	Total Total			
1984	1 874	2 630	4 504	14 572	0,31	794	11 220	12 014	782	16 518	221,06
1985	1 821	3 910	5 731	14 830	0,39	2 093	14 834	16 927	1 281	22 658	221,06
1986	2 993	4 377	7 370	17 213	0,43	3 707	18 095	21 802	487	29 172	221,06
1987	3 472	3 613	7 085	19 401	0,37	2 992	20 533	23 525	1 399	30 610	221,06
1988	3 795	4 716	8 511	21 206	0,40	4 760	18 103	22 863	1 805	31 374	221,06
1989	2 954	3 674	6 628	22 693	0,29	2 615	17 910	20 525	1 336	27 153	221,06
1990	4 219	5 579	9 798	26 592	0,37	3 425	15 867	19 292	1 430	29 090	221,06
1991	2 946	4 625	7 571	26 674	0,28	3 282	15 982	19 264	1 316	26 835	221,06
1992	3 537	5 006	8 543	26 519	0,32	3 849	15 514	19 363	692	27 906	223,93
1993	3 043	3 648	6 691	24 993	0,27	3 627	11 030	14 657	2 098	21 348	223,93
88-92	3 490	4 720	8 210	24 737	0,33	3 586	16 675	20 261	1 316	28 472	221,64
Variations vs / % change											
92	-14%	-27%	-22%	-6%	-17%	-6%	-29%	-24%	203%	-24%	0%
88-92	-13%	-23%	-19%	1%	-19%	1%	-34%	-28%	59%	-25%	1%

Tableau 6.3.1. Sommaire des prélèvements de la zone Q10, Anticosti, 1984-93.

Table 6.3.1. Removals of salmon in zone Q10, Anticosti, 1984-93.

Année Year	Captures sportives Recreational			Jours- pêche Rod- days	Succès C.U.E.	Retrait Other removals	Prélèvement total Total removals	Montaison* en rivière Returns* to rivers	Reproducteurs* Spawners*	Oeufs requis (million)
	Mad. Small	Réd. Large	Total Total							
1984	288	1 308	1 596	2 191	0,73	0	1 596	6 004	4 408	15,23
1985	745	1 156	1 901	3 147	0,60	0	1 901	7 101	5 200	15,23
1986	473	1 191	1 664	2 898	0,57	0	1 664	6 763	5 099	15,23
1987	499	555	1 054	2 025	0,52	0	1 054	3 521	2 467	15,23
1988	612	594	1 206	1 887	0,64	0	1 206	3 986	2 780	15,23
1989	227	502	729	1 921	0,38	0	729	3 917	3 188	15,23
1990	474	389	863	1 948	0,44	0	863	3 471	2 608	15,23
1991	243	559	802	1 783	0,45	23	825	3 356	2 531	15,23
1992	351	353	704	2 164	0,33	0	704	2 690	1 986	15,23
1993	513	216	729	1 583	0,46	17	746	2 569	1 823	15,23
88-92	381	479	861	1 941	0,44	5	865	3 484	2 619	15,23
Variations vs / % change										
92	46%	-39%	4%	-27%	42%		6%			0%
88-92	35%	-55%	-15%	-18%	4%	270%	-14%			0%

* Nombre variable de rivières / Variable number of rivers

Tableau 6.4.1. Sommaire des prélèvements de la zone Q11, Ungava. 1984-93.

Table 6.4.1. Removals of salmon in zone Q11, Ungava, 1984-93.

Année Year	Captures sportives Recreational			Jours- pêche Rod- days	Succès C.U.E.	Captures commerciales Commercial harvest	Pêche alimentation Native fisheries	Prises totales Total harvest
	Mad. Small	Réd. Large	Total Total					
1984	388	785	1 173	2 837	0,41	1 937	2 953	6 063
1985	366	708	1 074	2 582	0,42	1 785	1 829	4 688
1986	771	725	1 496	2 686	0,56	2 794	3 408	7 698
1987	1 323	1 042	2 365	2 825	0,84	2 212	2 956	7 533
1988	1 360	1 046	2 406	2 891	0,83	1 647	2 602	6 655
1989	1 081	678	1 759	3 249	0,54	245	985	2 989
1990	792	616	1 408	2 617	0,54	225	700	2 333
1991	572	413	985	2 836	0,35	389	1 607	2 981
1992	214	163	377	1 615	0,23	337	1 119	1 833
1993	167	230	397	941	0,42	337	1 119	1 853
88-92	804	583	1 387	2 642	0,53	569	1 403	3 358
Variations vs / % change								
92	-22%	41%	5%	-42%	81%	0%	0%	1%
88-92	-79%	-61%	-71%	-64%	-20%	-41%	-20%	-45%
Estimation								

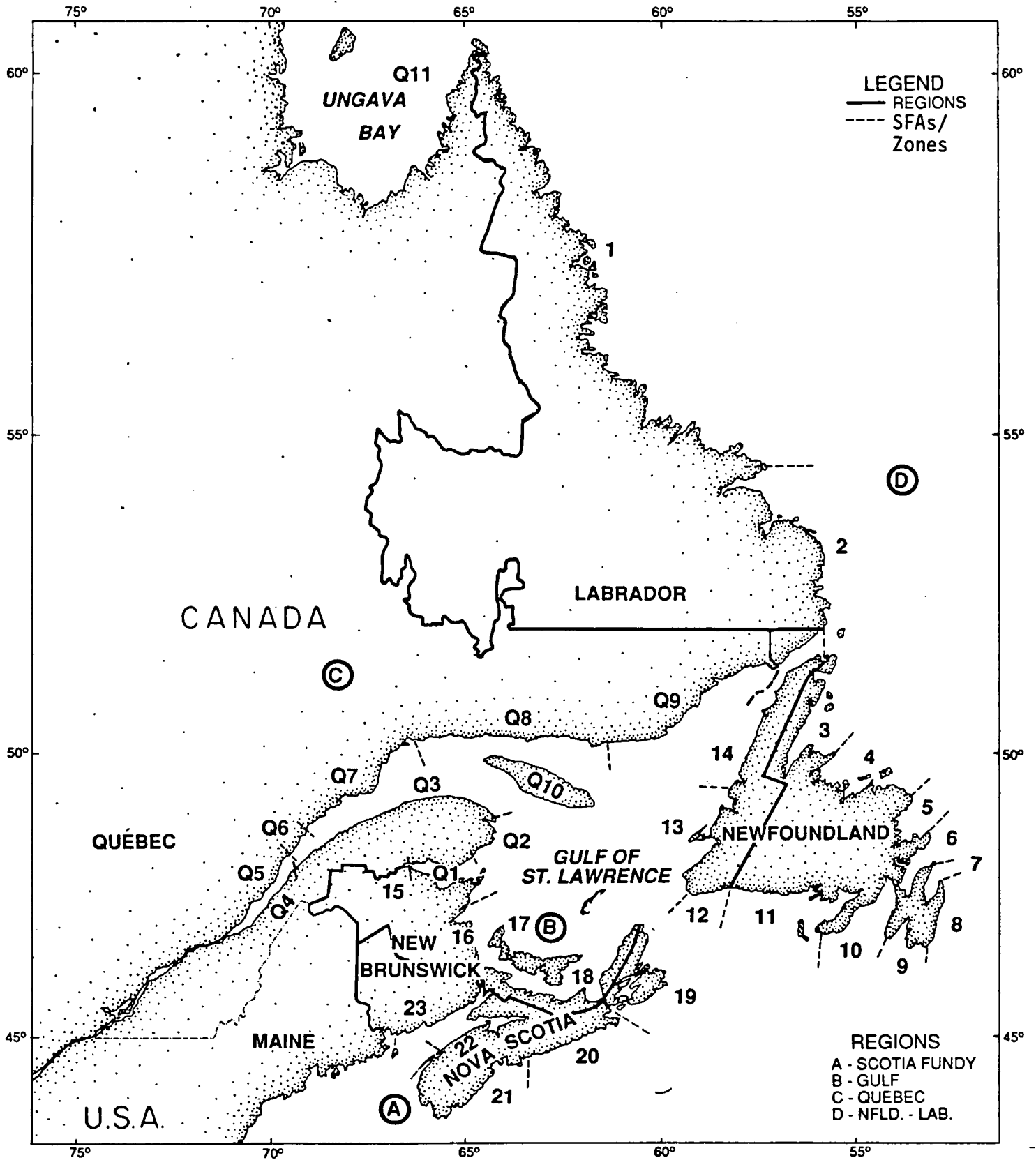
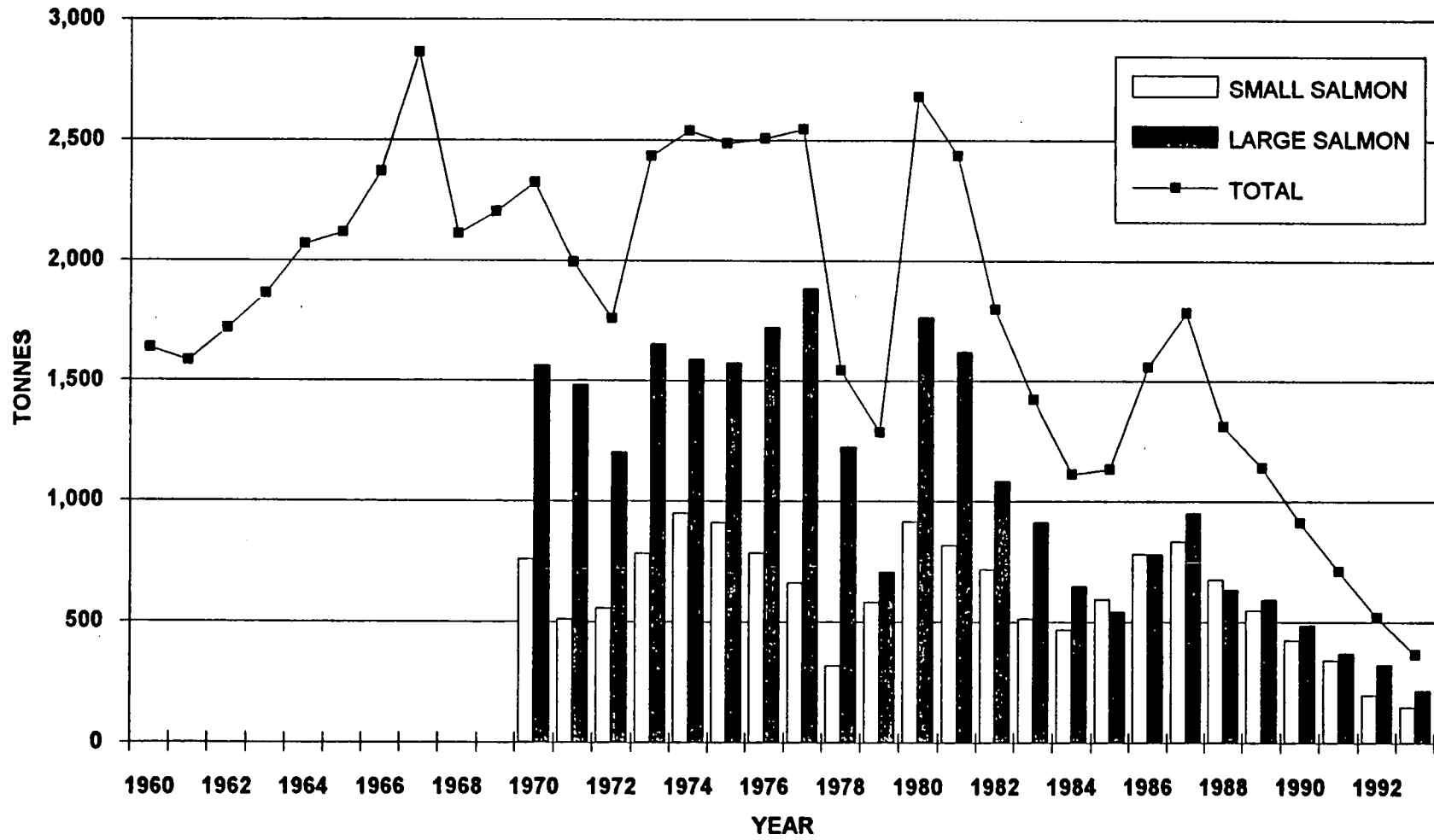


Fig. 2.0.1 Map of Atlantic Provinces showing Salmon Fishing Areas 1-23, Salmon Management Zones of Quebec (Qs) 1-11, provincial and DFO regional boundaries.

Figure 2.2.1. Total Canadian catch of small and large salmon since 1960



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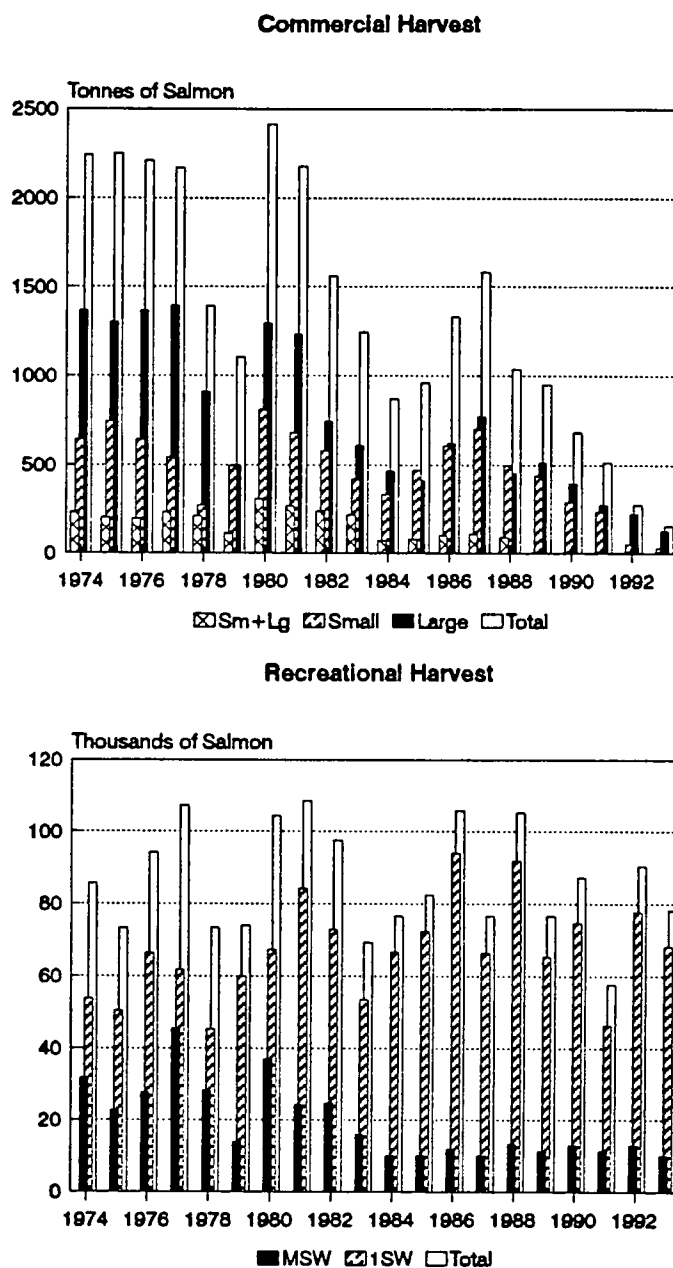


Fig. 2.2.2 Canadian landings of Atlantic salmon, 1974-93.

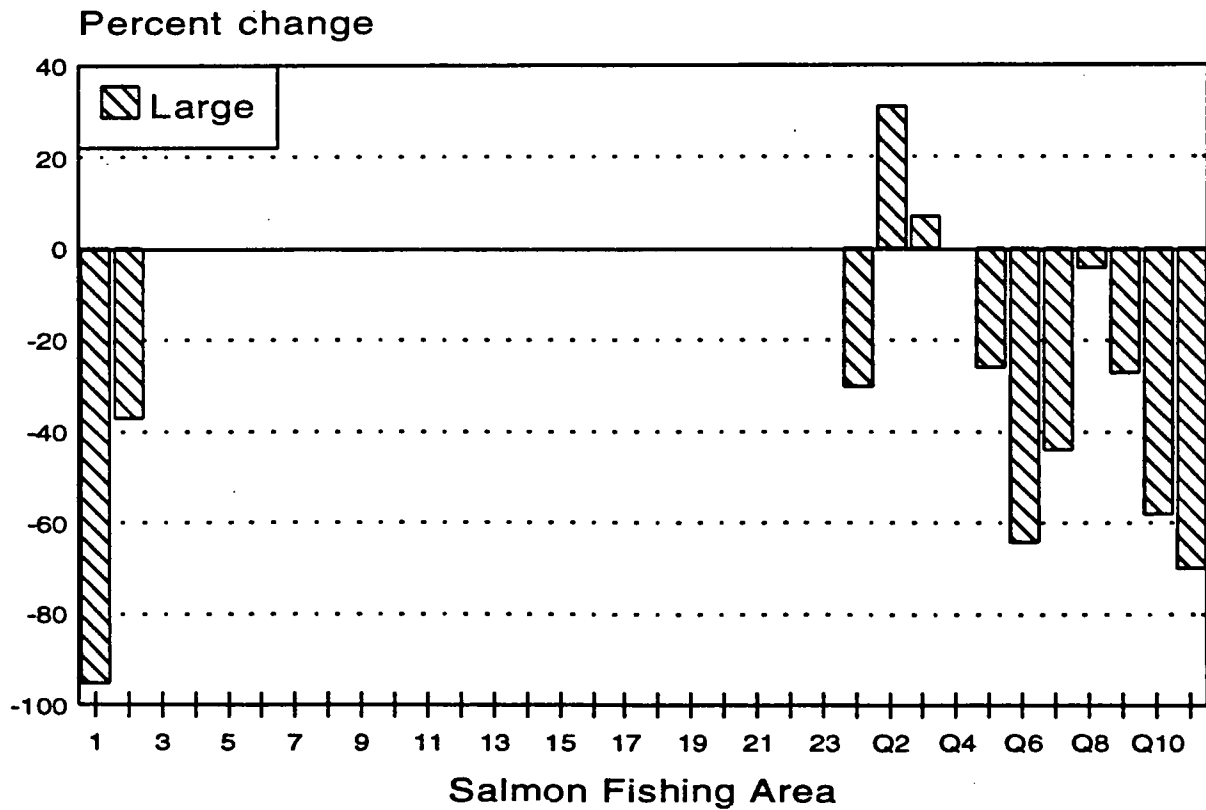
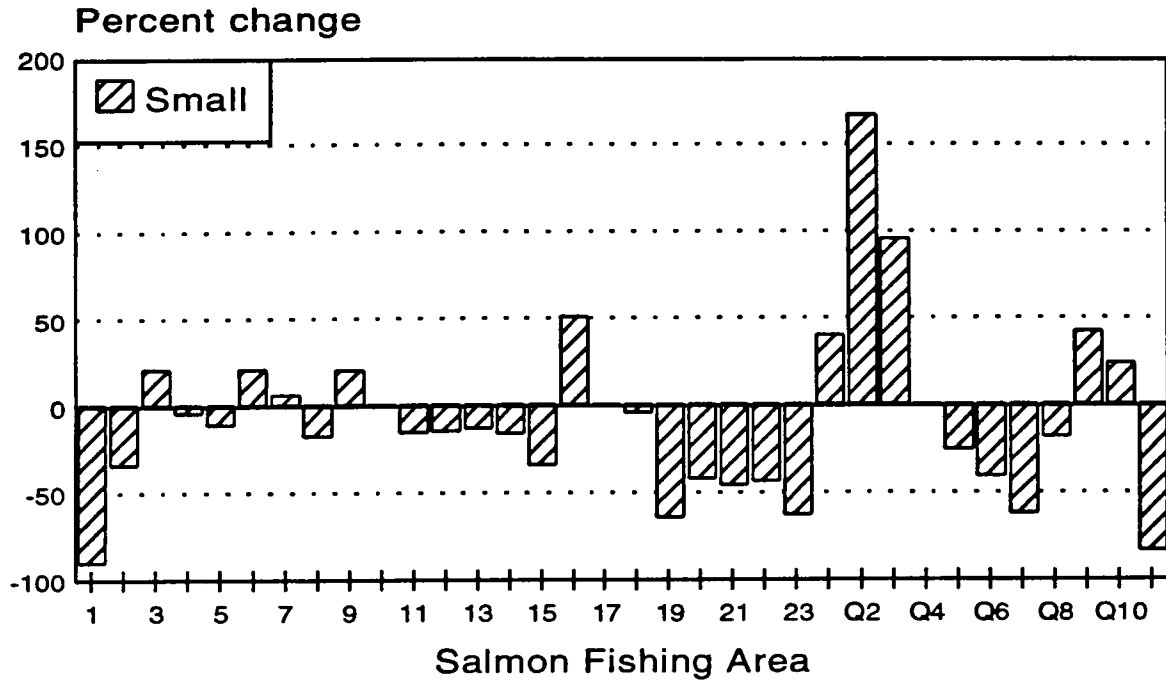


Fig. 2.2.3. A comparison of 1993 retained recreational catches of small and large salmon compared to the average catch (1987-91) in each zone.

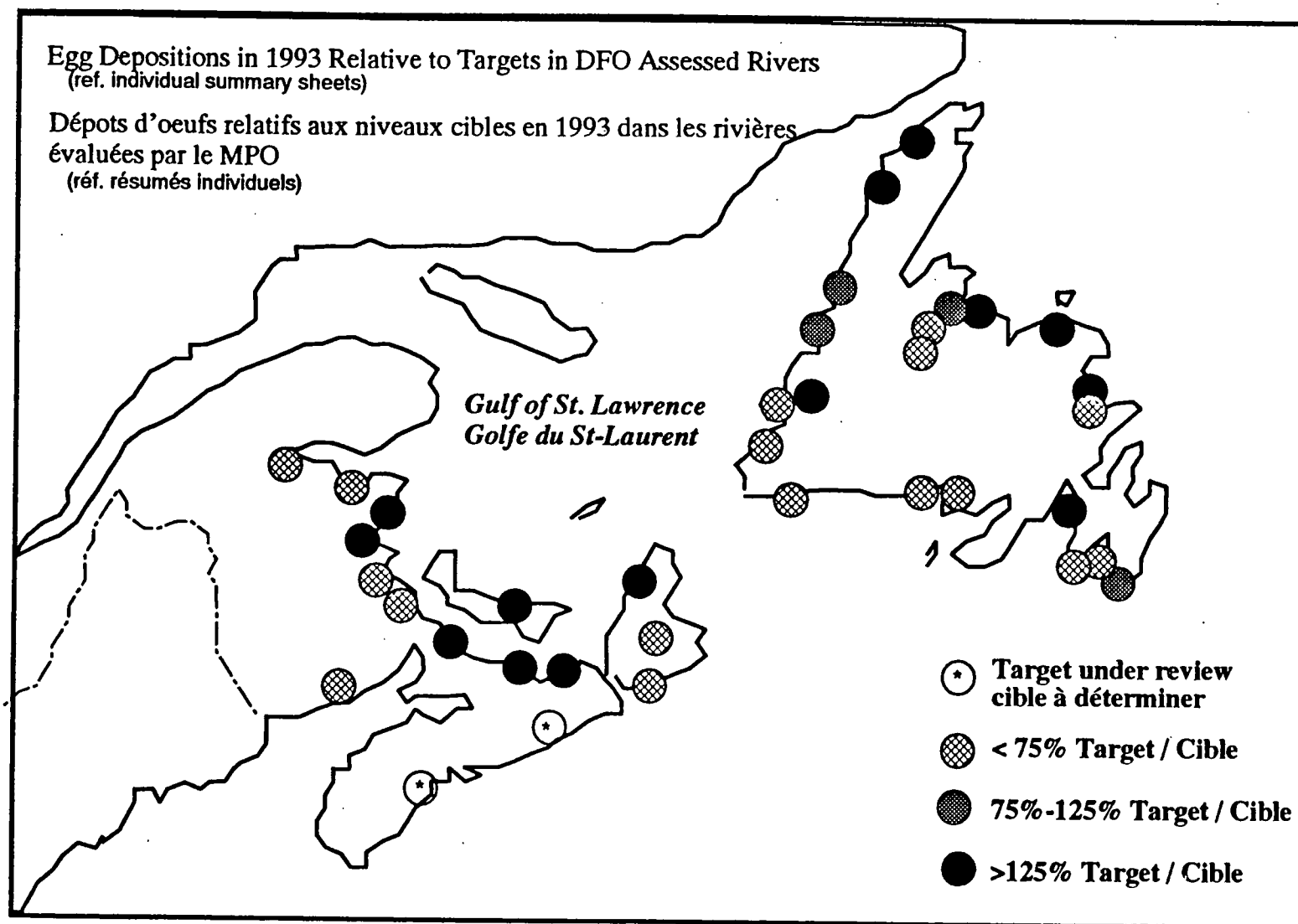


Fig. 2.3.1. Egg depositions in 1993 relative to targets in DFO assessed rivers (ref. individual summary sheets).

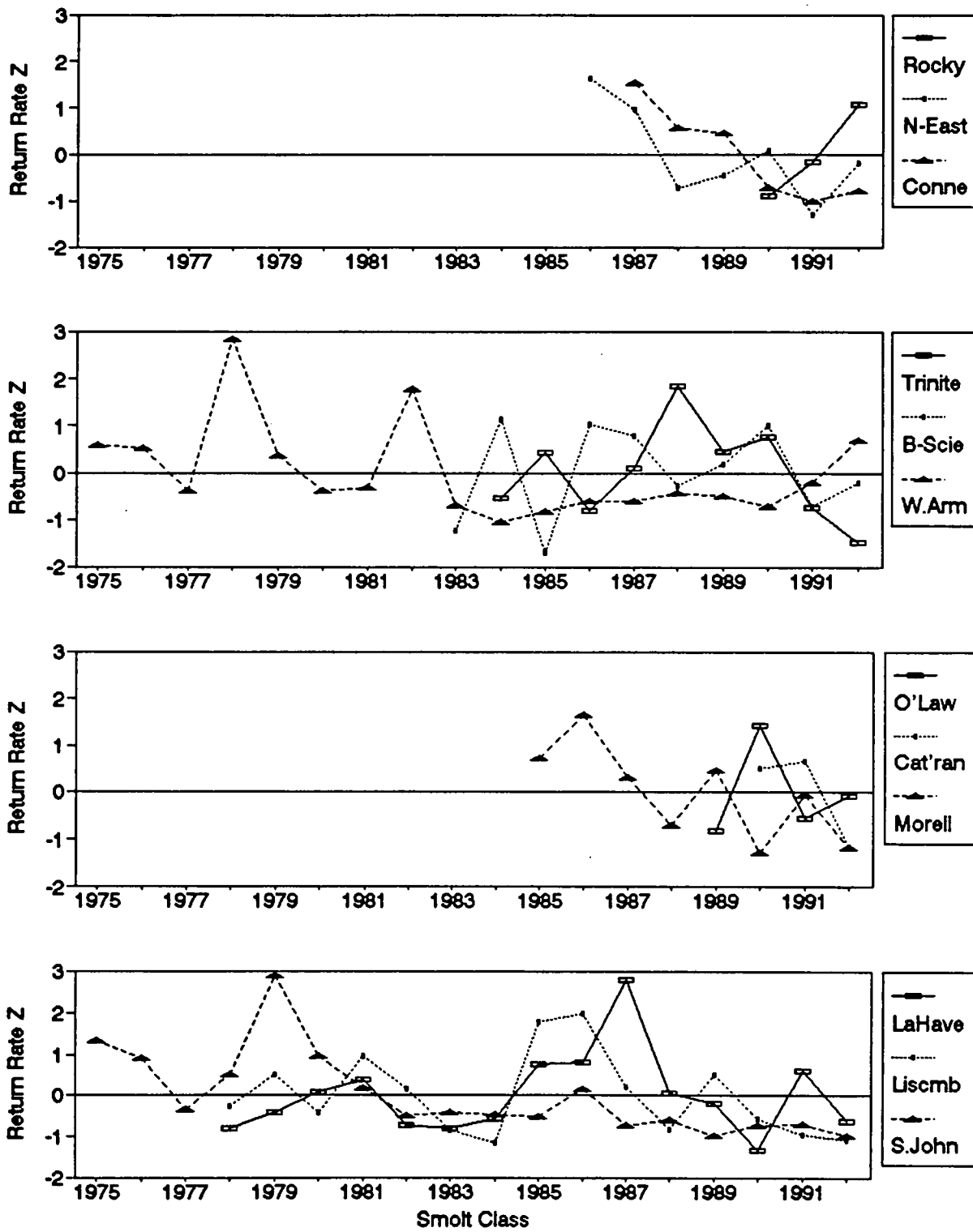


Fig. 2.4.1. Annual variation from the average (Z-score) for 1SW fish returning from smolts top to bottom: south coast Nfld; northern Gulf; southern Gulf; and Scotia-Fundy areas.

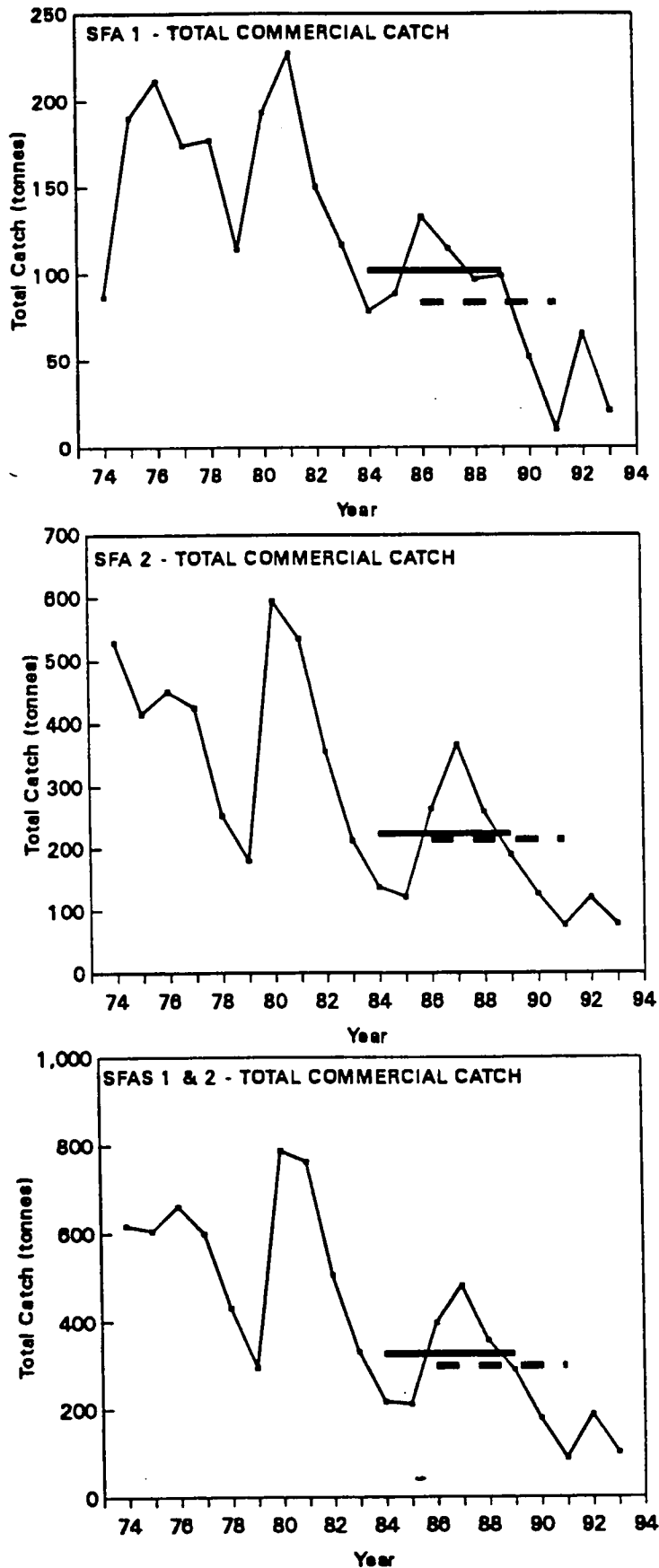


Fig. 3.1.1. Total commercial catch (tonnes) for SFAs 1 and 2 separately and combined, Labrador, 1974-93. The solid horizontal line represents the 1984-89 mean and the broken line the 1986-91 mean.

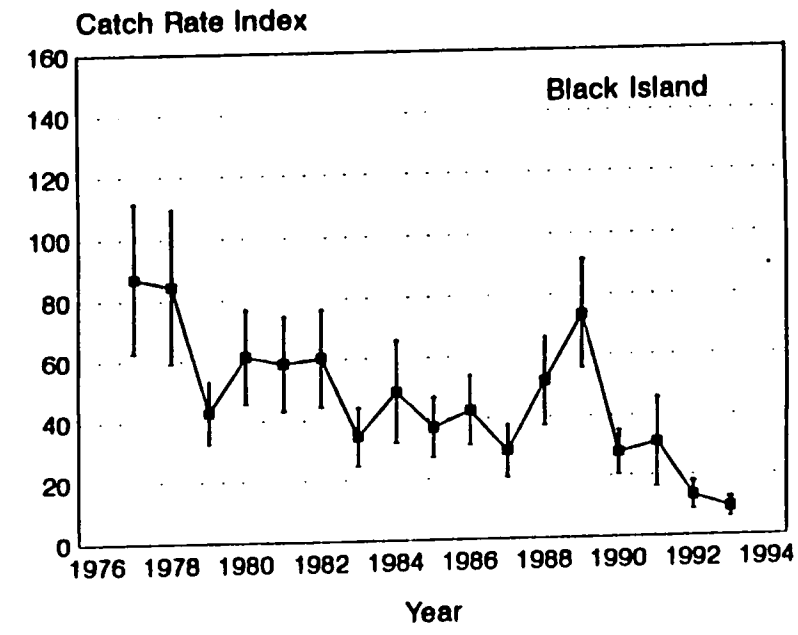
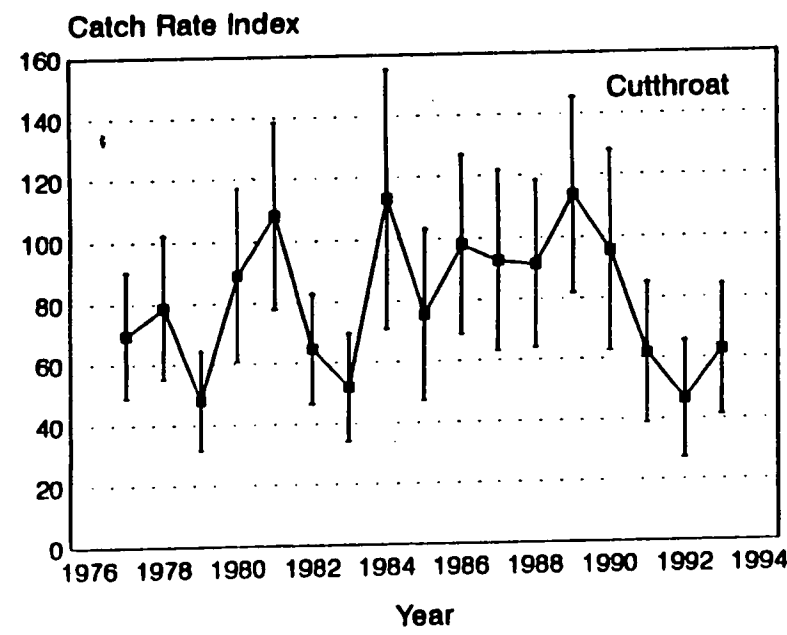
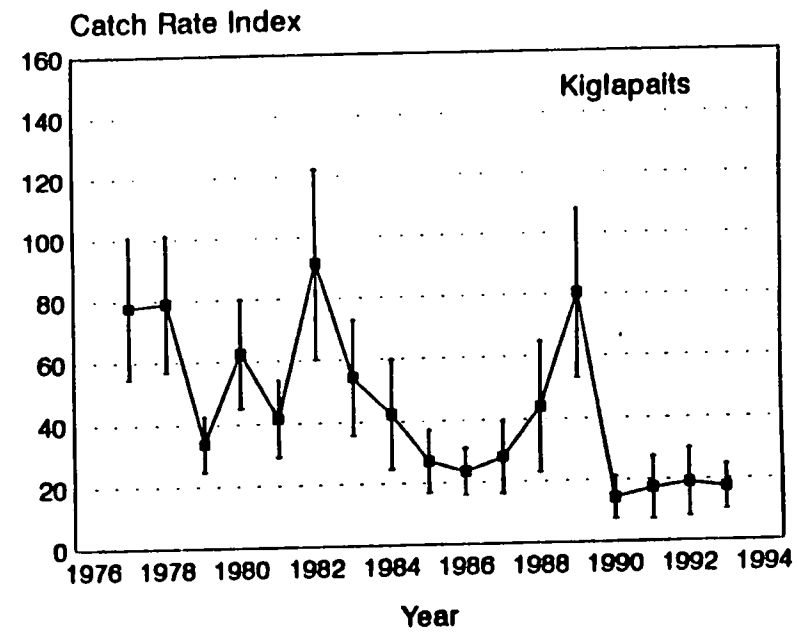
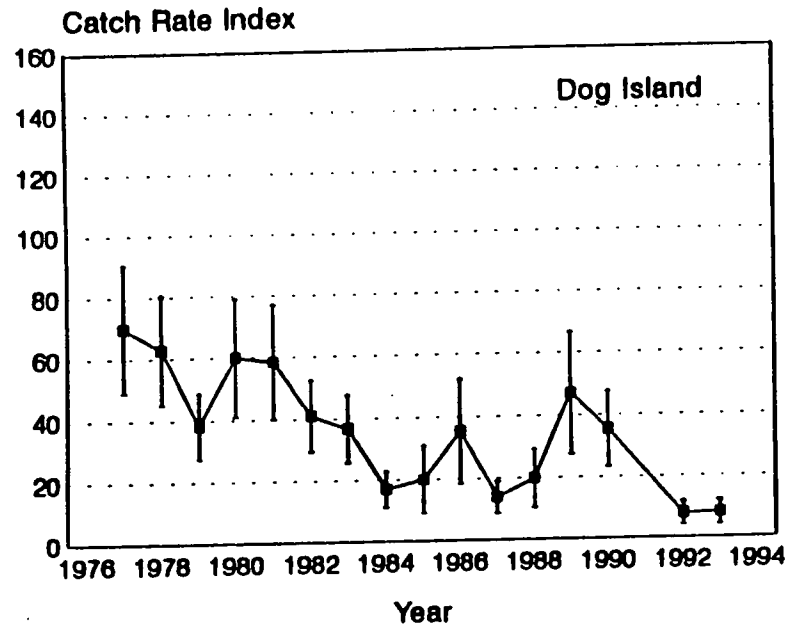


Fig. 3.1.2. Trends in the Atlantic salmon commercial catch rate index from four subareas within the Nain Fishing Region of the northern Labrador, 1977-93. Vertical lines indicate 90% confidence intervals.

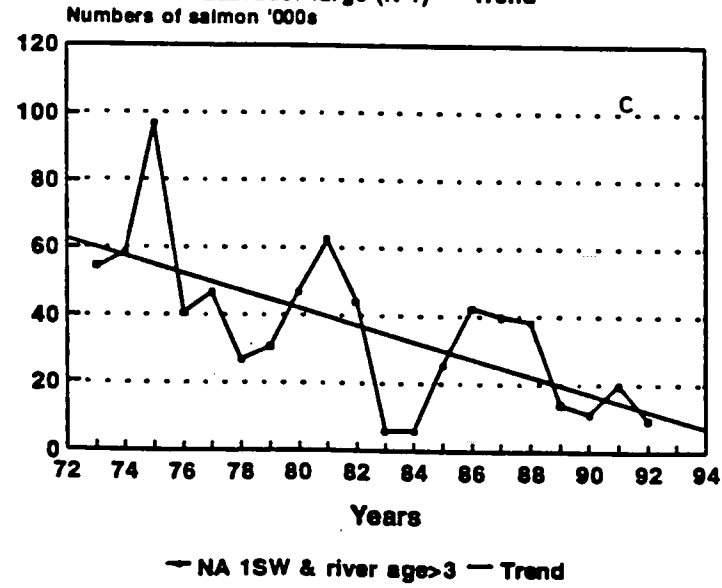
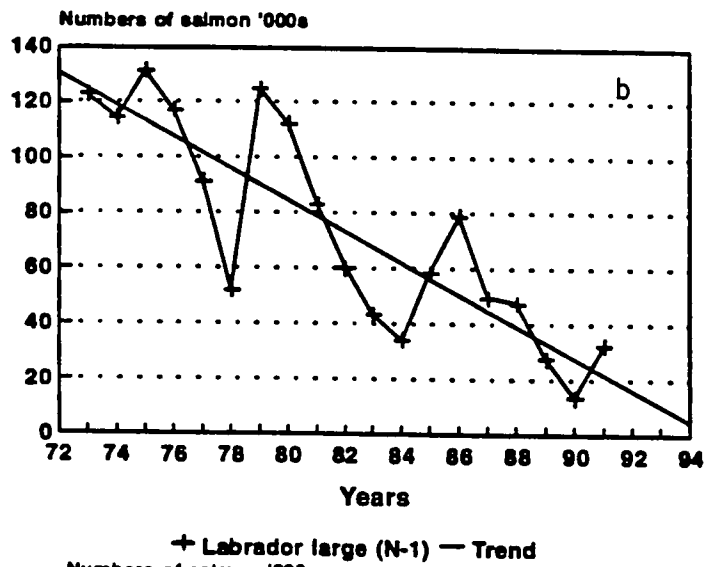
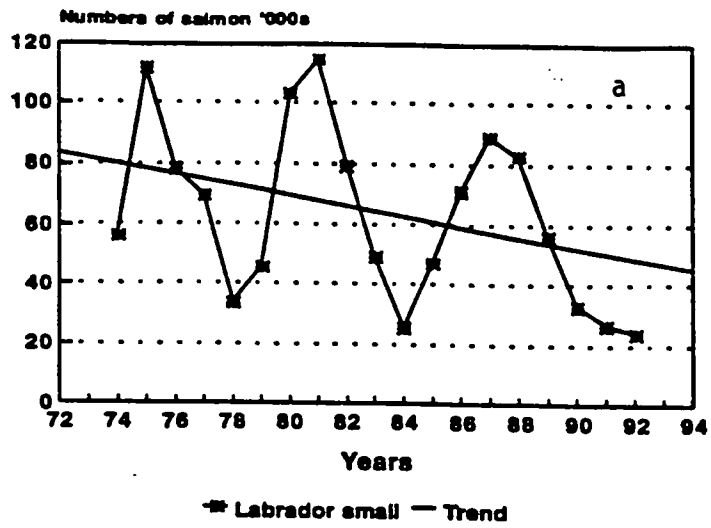


Fig. 3.1.3. Commercial catches and trend lines for: a) small salmon in SFAs 1 + 2; b) large salmon in SFAs 1 + 2; and c) North American-origin small salmon with river age > 3 years in West Greenland. Large salmon are lagged (t-1) so that catches of the same smolt class are shown in the same year.

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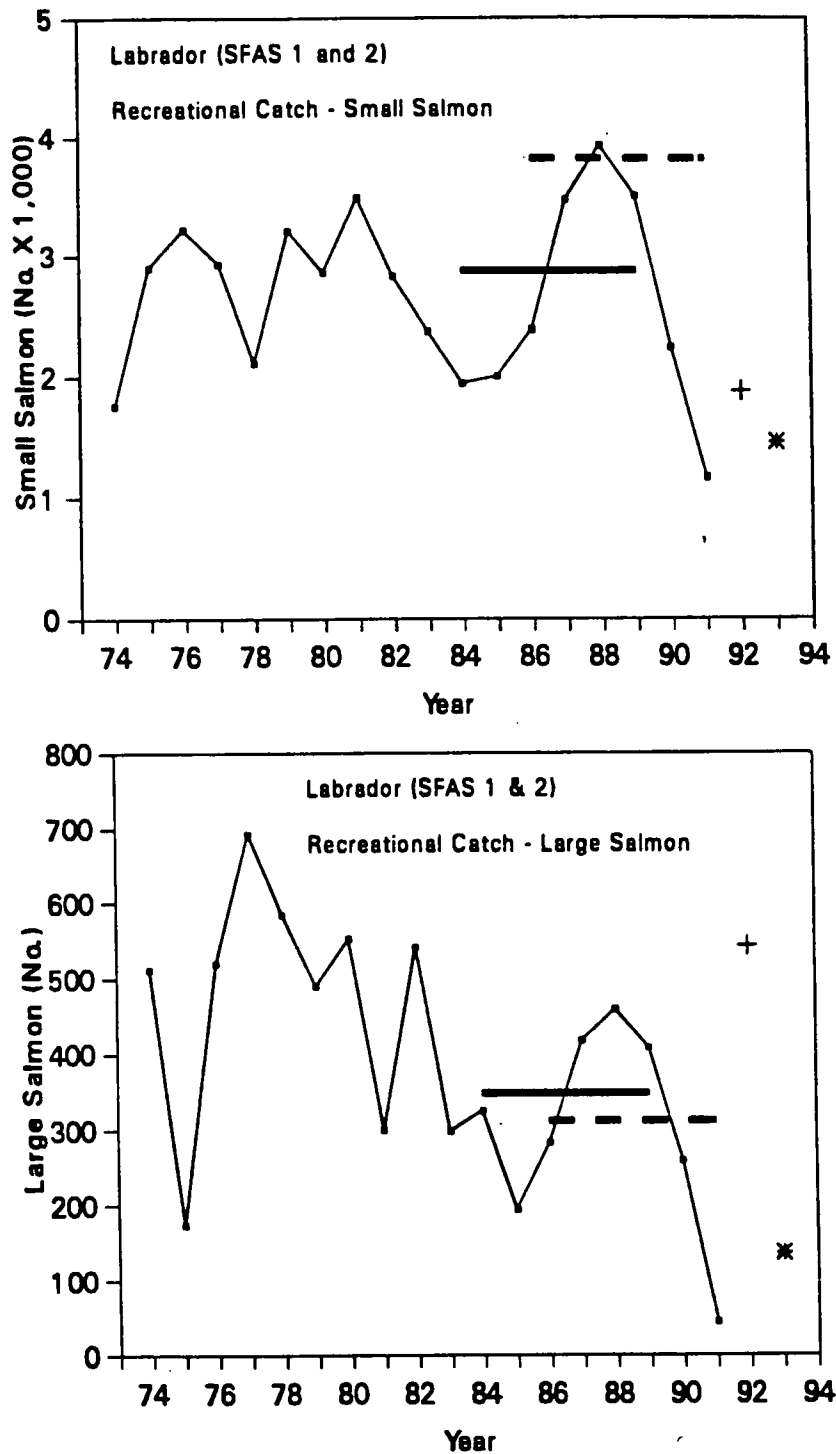


Fig. 3.1.4. Recreational catches (retained) of small and large salmon for SFAs 1 and 2 combined, Labrador, 1974-93. The solid horizontal line represents the 1984-89 mean and the broken line the 1986-91 mean. Catches for 1993 (*) are for the entire angling season; those of 1992 (+) are retained catches up to the time quotas were taken.

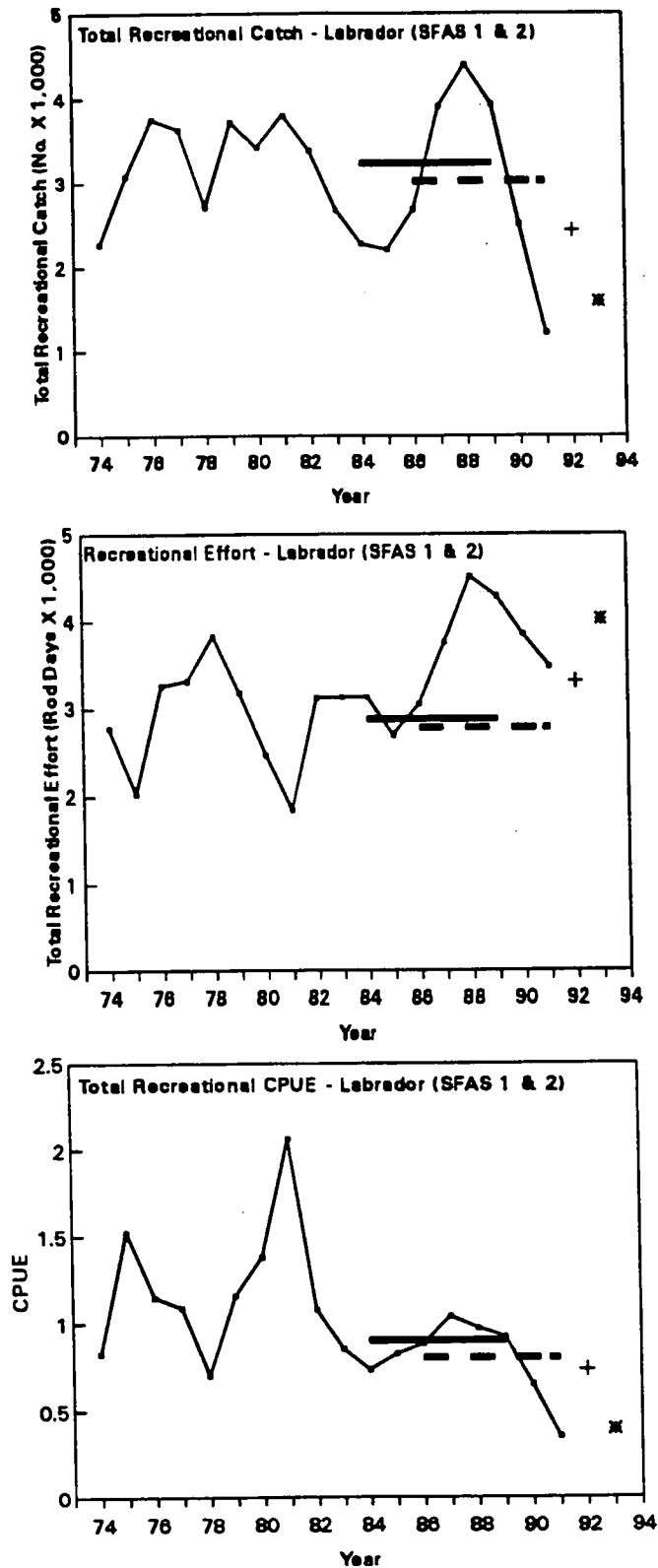


Fig. 3.1.5. Total recreational catch (retained), effort, and catch per unit of effort (CPUE) for SFAs 1 and 2 combined, Labrador 1974-93. The solid horizontal line represents the 1984-89 mean and the broken line the 1986-91 mean. Data for 1993 (*) are for the entire angling season; those of 1992 (+) correspond to retained catches up to the time quotas were taken.

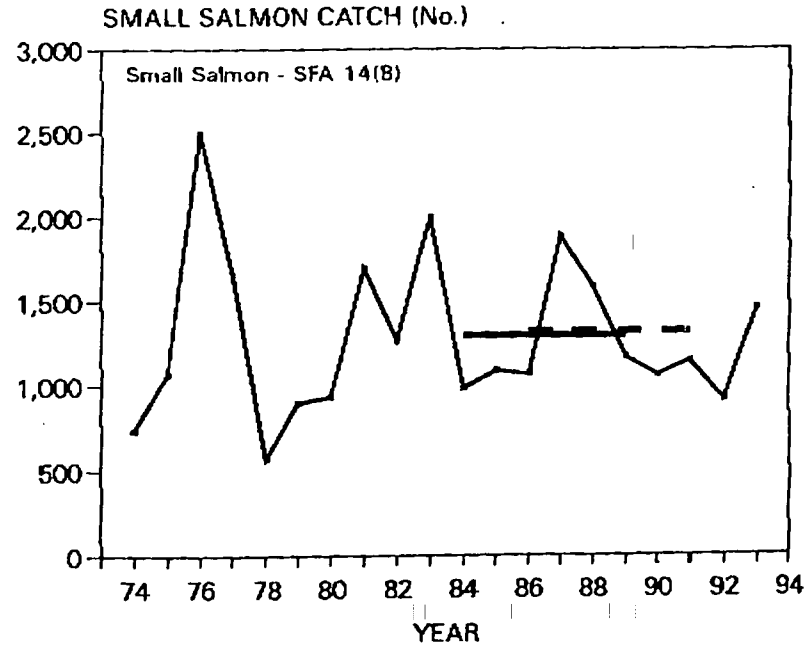
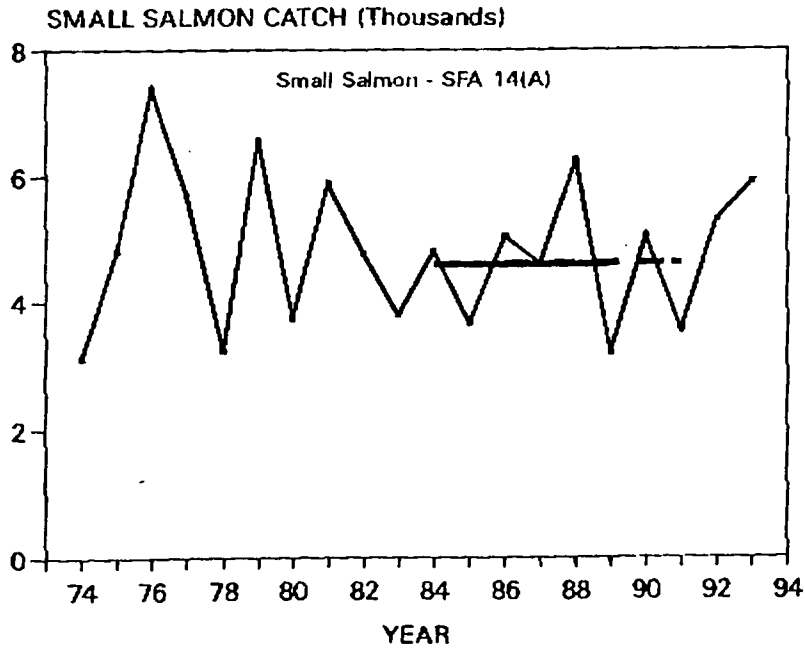
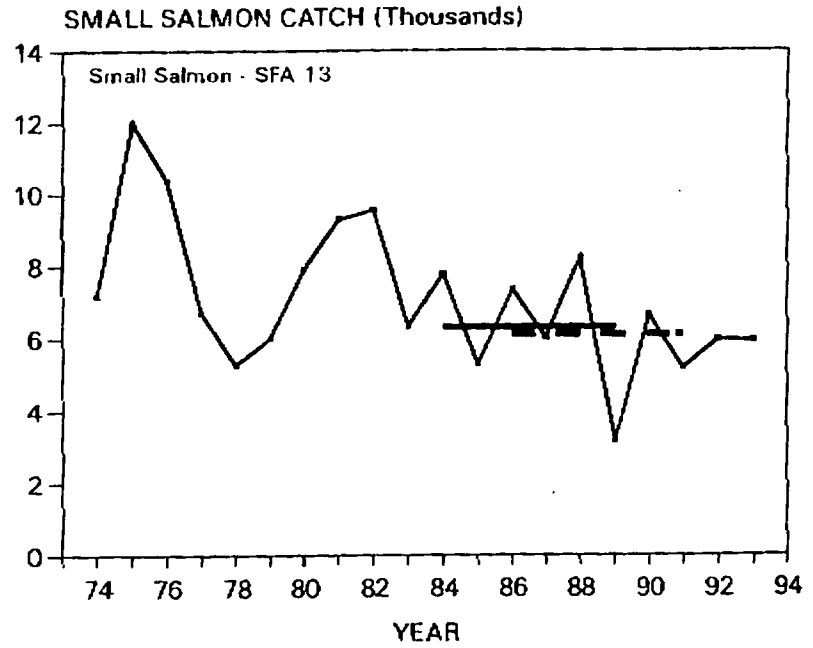
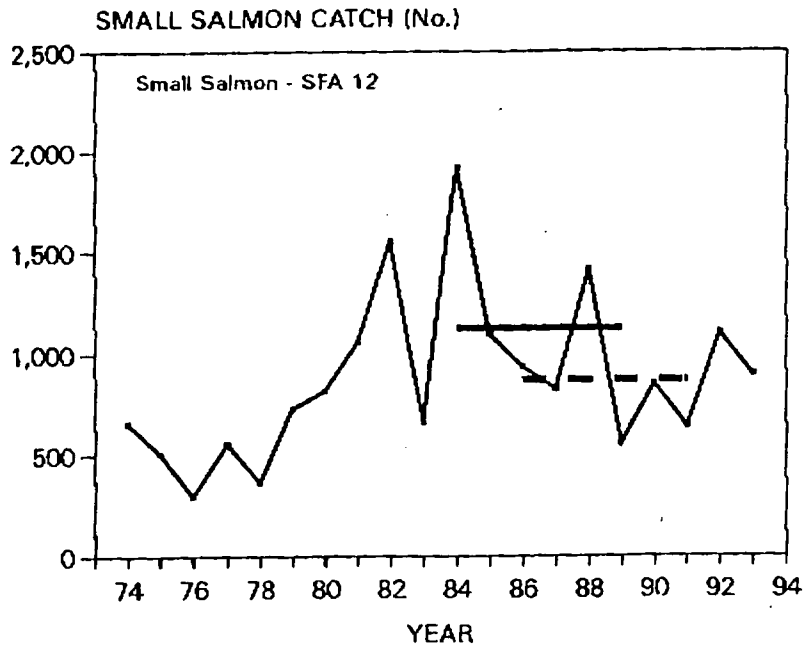


Fig. 3.1.6. Recreational catches of small salmon (retained plus released) in SFA's 12-14A, 1974-1993. Horizontal lines represent the 1984-89 (solid line) and 1986-91 (broken line) means.

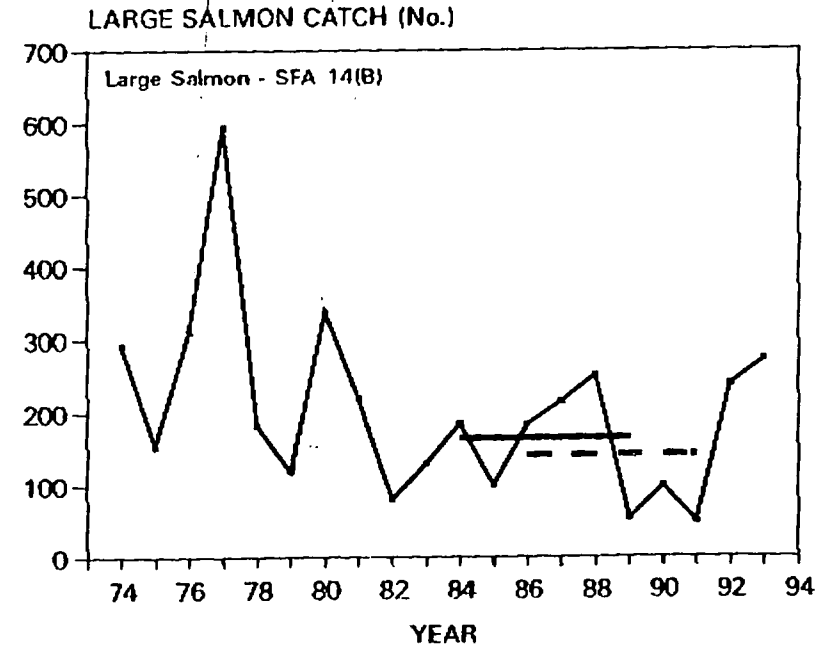
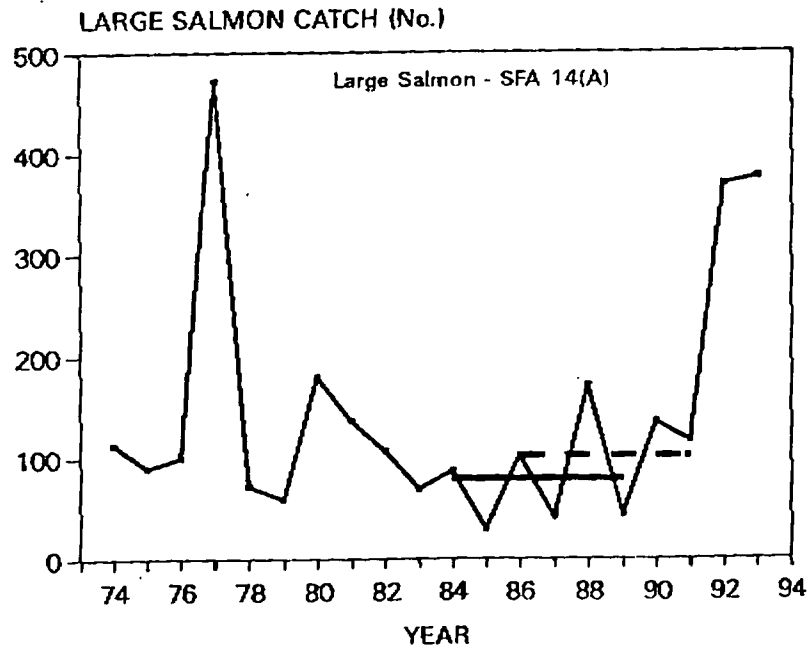
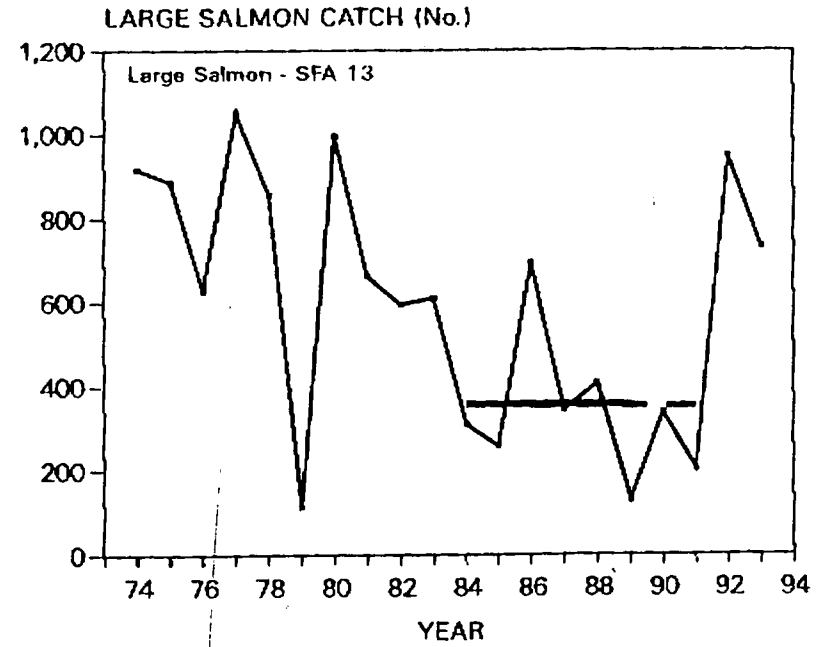
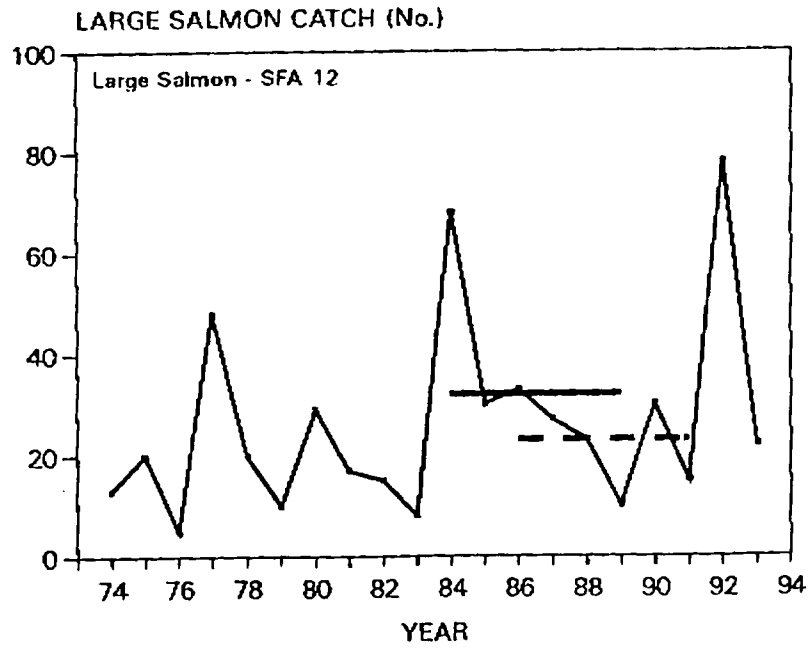


Fig. 3.1.7. Recreational catches of large salmon (retained plus released) in SFA's 12-14A, 1974-1993. Horizontal lines represent the 1984-89 (solid line) and 1986-91 (broken line) means.

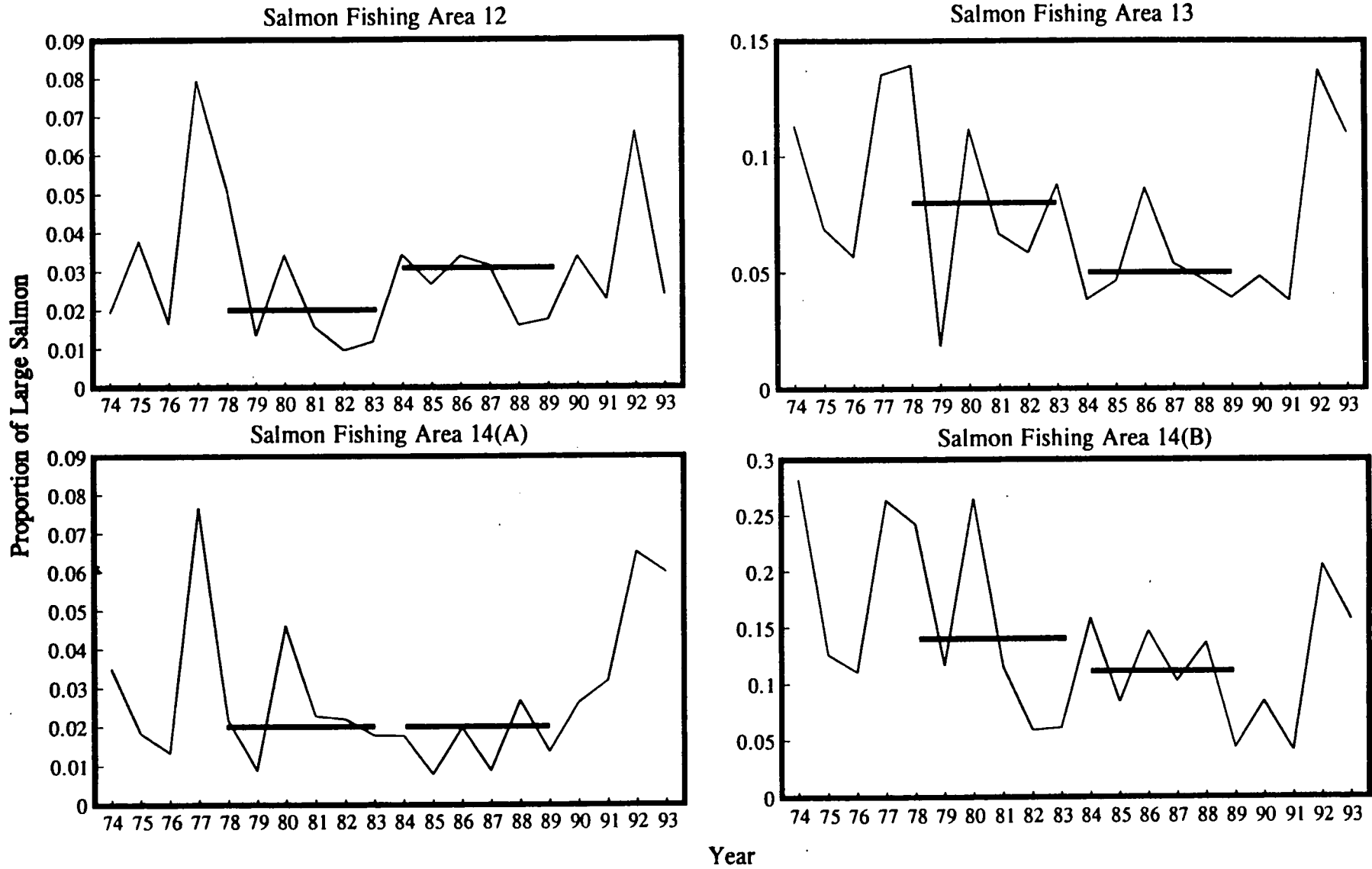


Fig. 3.1.8. Proportion of large salmon in Salmon Fishing Area 12, 13, 14(A) and 14(B) recreational catches, 1974-1993. Horizontal lines represent the 1978-83 and 1984-89 means.

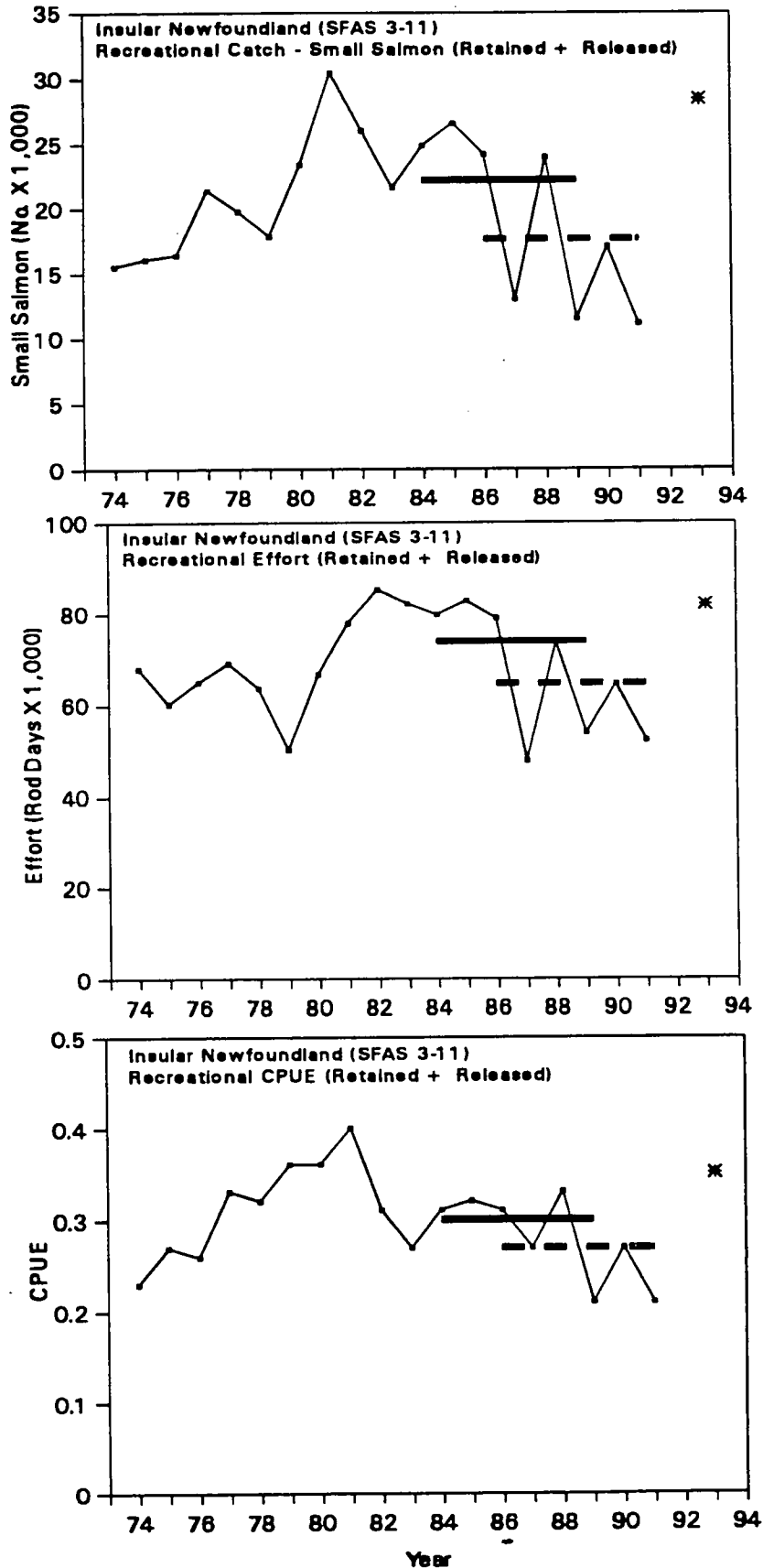


Fig. 3.2.1. Recreational catch (retained plus released fish) of small salmon, effort, and catch per unit of effort (CPUE) in 1993 (all denoted by the symbol*) for SFAs 3-11, insular Newfoundland, compared to years prior to 1992 and the 1984-89 (solid horizontal line) and 1986-91 (broken horizontal line) means.

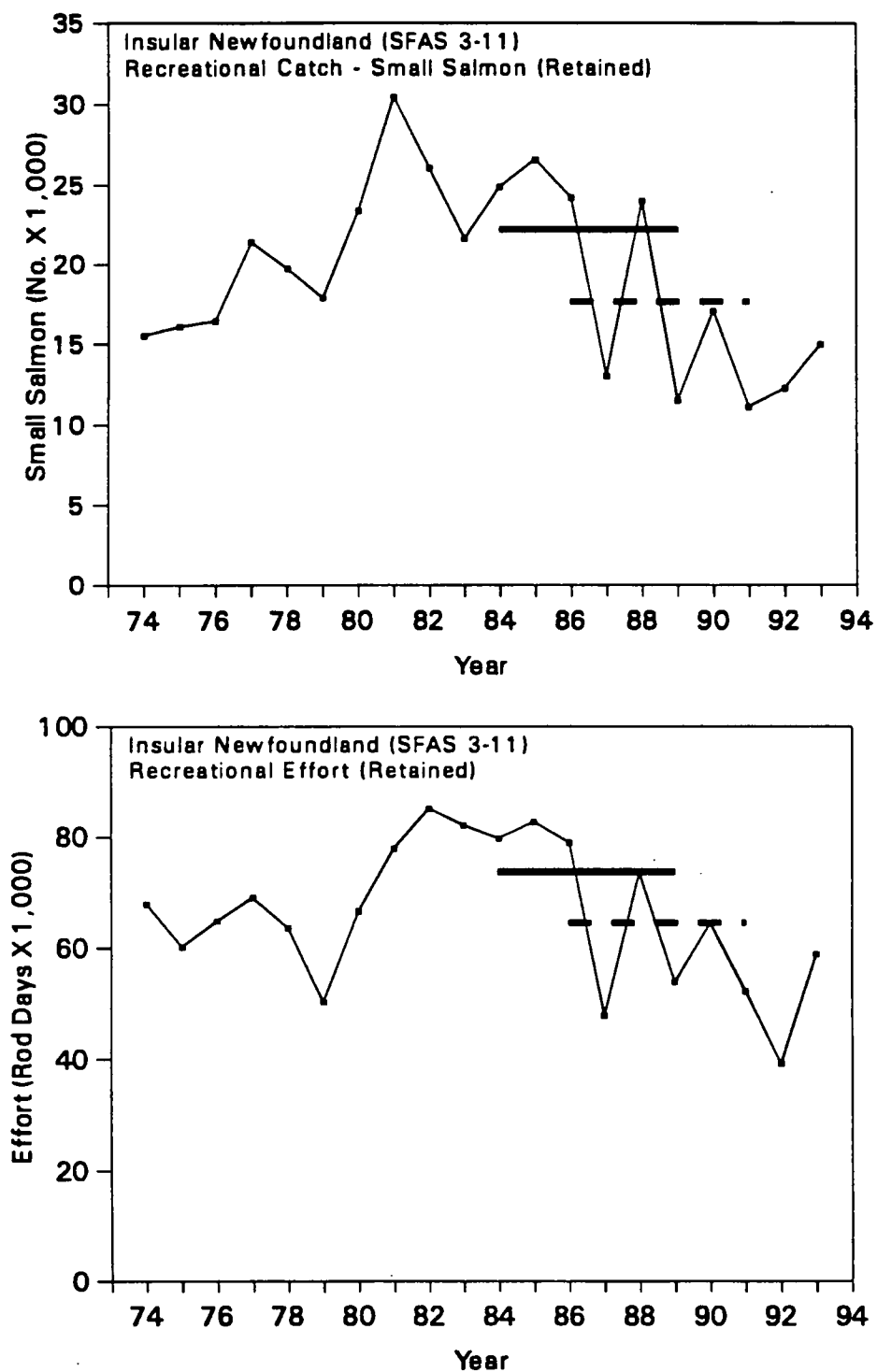


Fig. 3.2.2. Numbers of small salmon retained and associated effort in 1993 compared to the 1984-89 (solid horizontal line) and 1986-91 (broken line) means. Data prior to 1992 are for retained catch for the entire season. Retained catch and effort for 1992 are also shown.

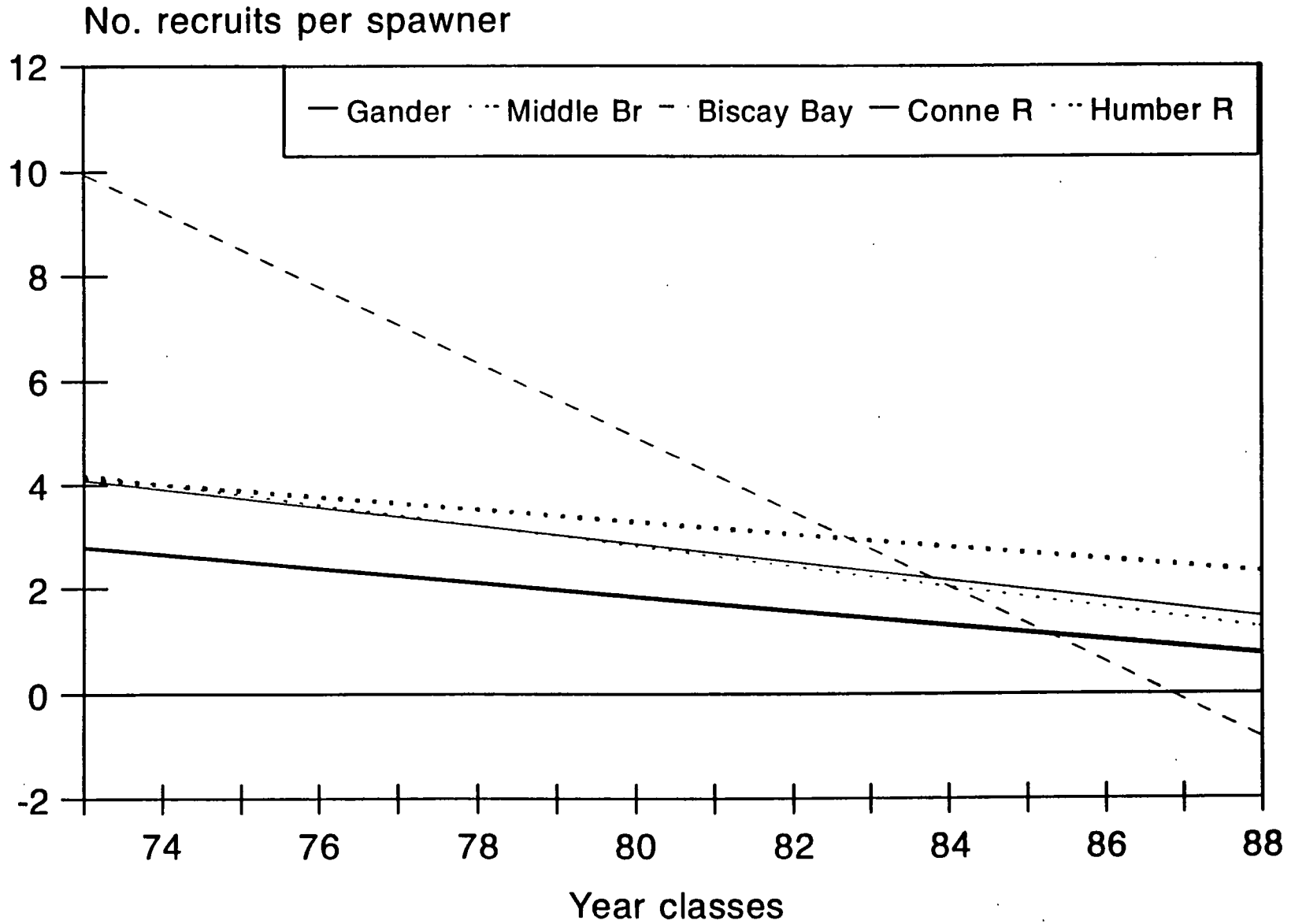


Fig. 3.2.3. Trends in number of recruits per spawner (small salmon) for Gander, Biscay Bay Connet and Humber rivers, and Middle Brook.

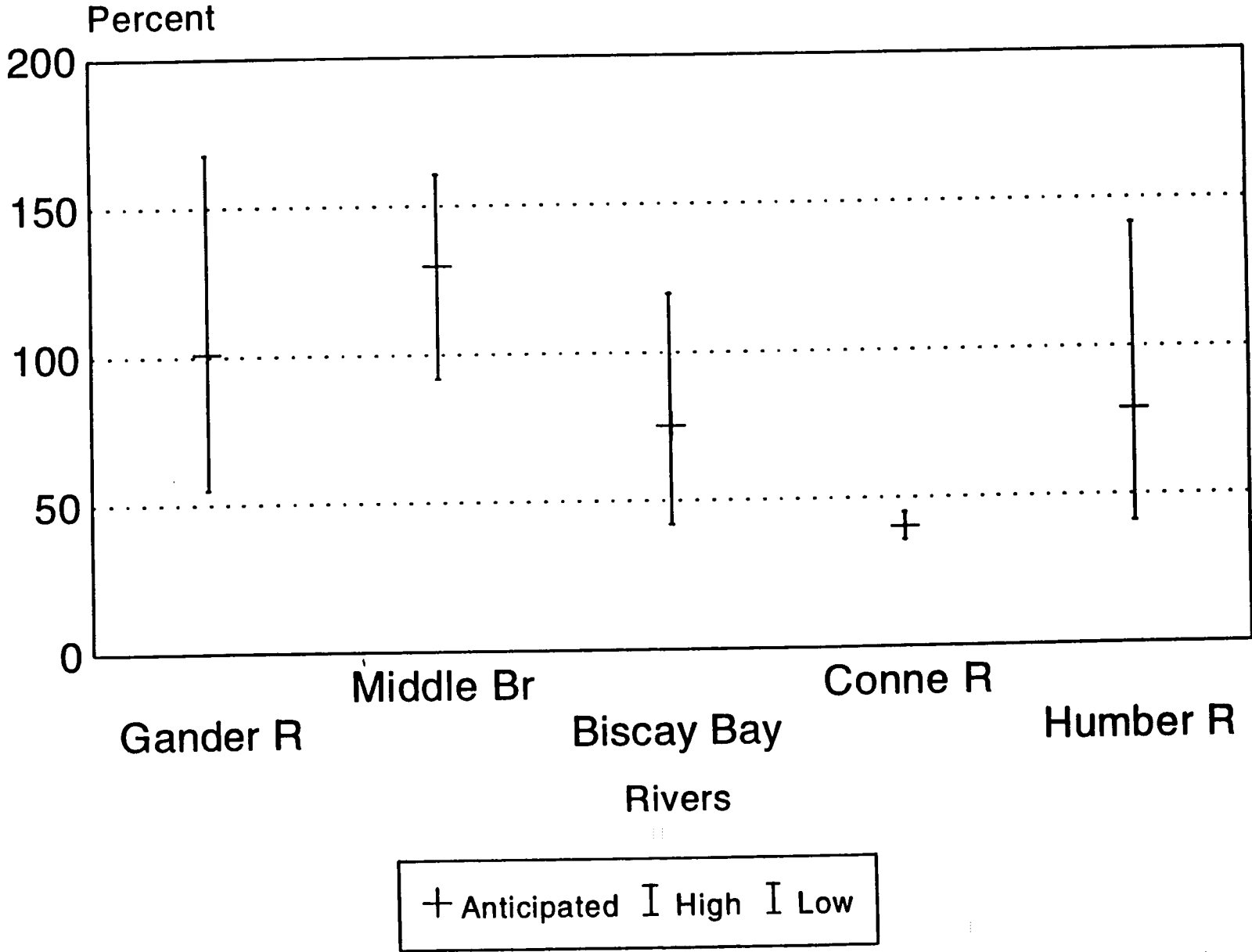


Fig. 3.2.4. Anticipated returns in 1994 of small salmon for Gander, Biscay Bay, Conne and Humber rivers, and Middle Brook.

**Report on the status of Atlantic salmon
stocks in eastern Canada in 1993**

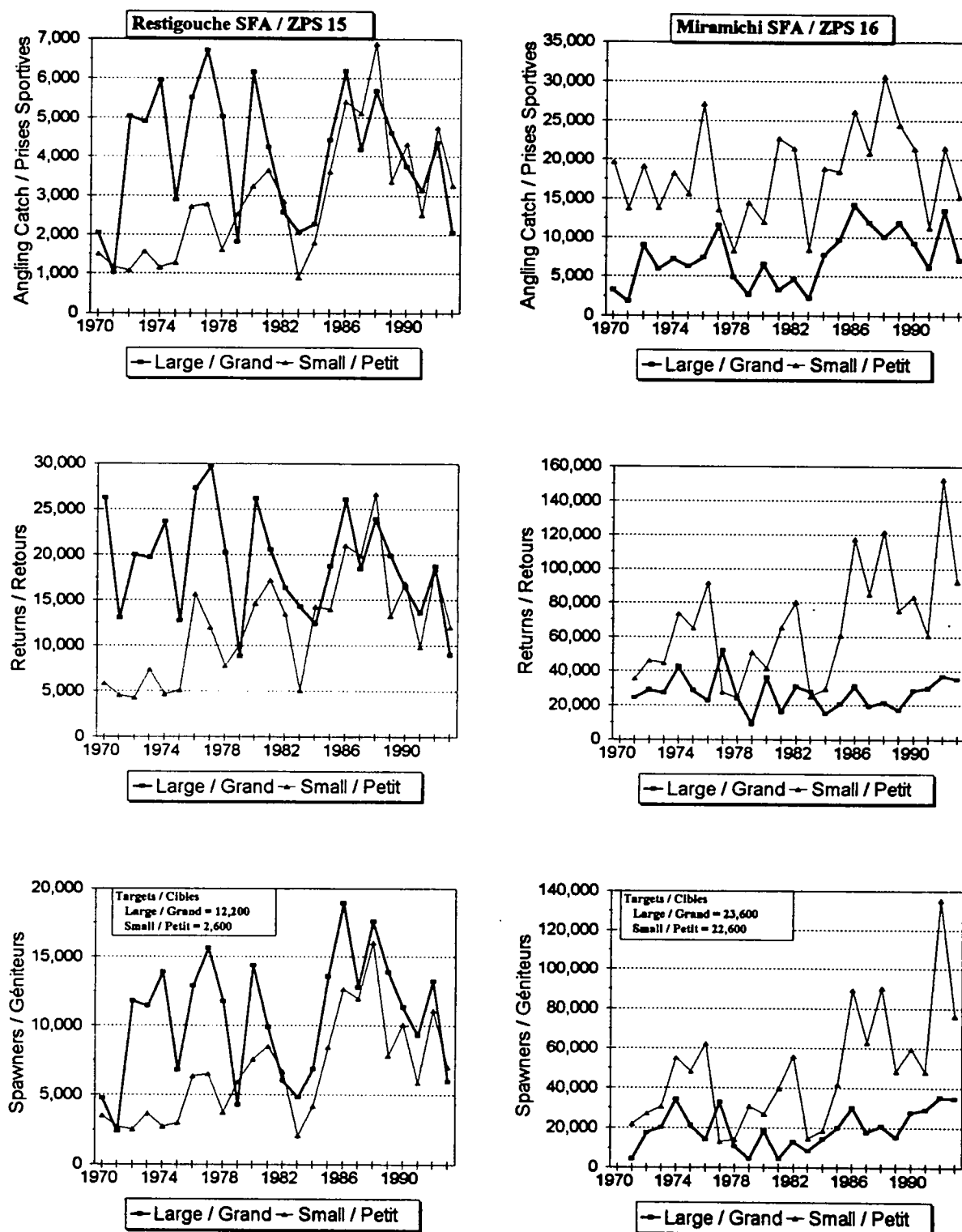


Figure 4.1.1. Catches, returns and escapements of large and small salmon from the Restigouche River (left) and the Miramichi River (right).

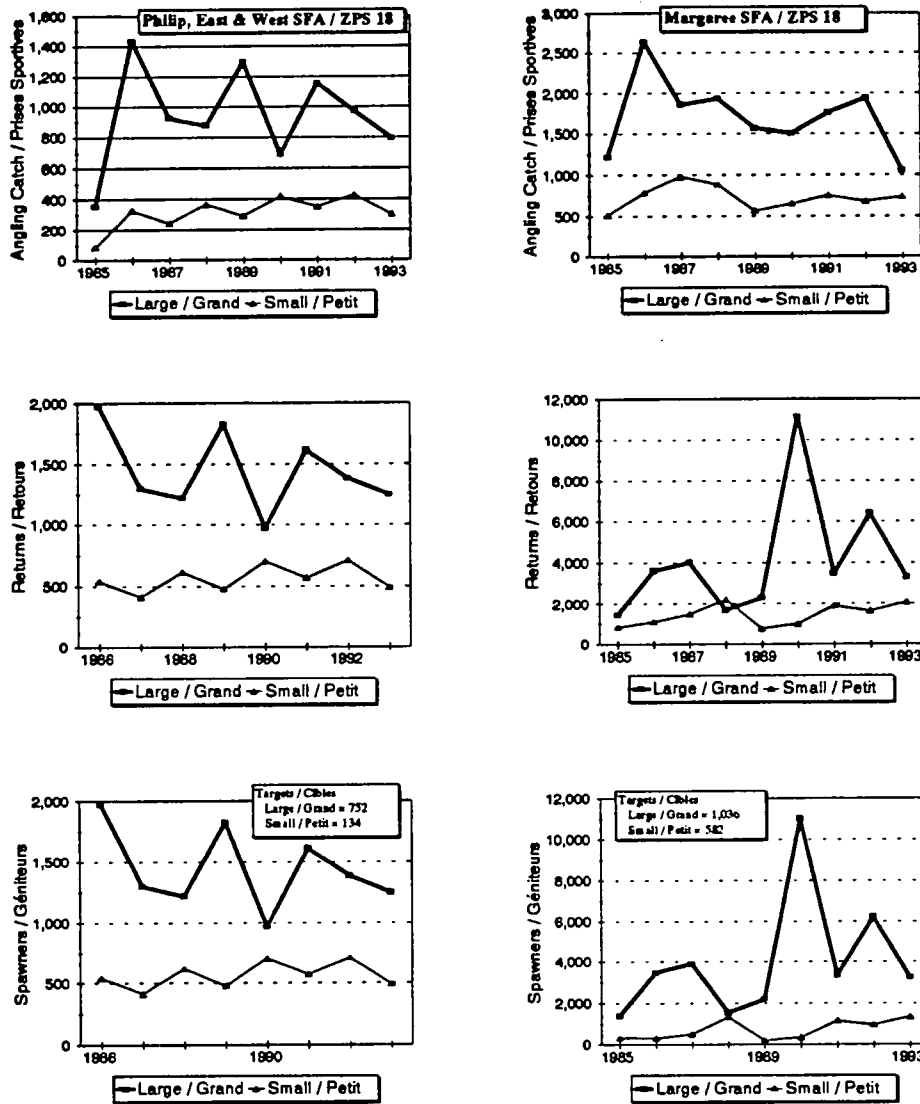


Figure 4.2.1. Catches, returns, and escapement of large and small salmon from the three rivers in Gulf mainland Nova Scotia (left) and the Margaree River (right) from SFA 18.

Report on the status of Atlantic salmon
stocks in eastern Canada in 1993

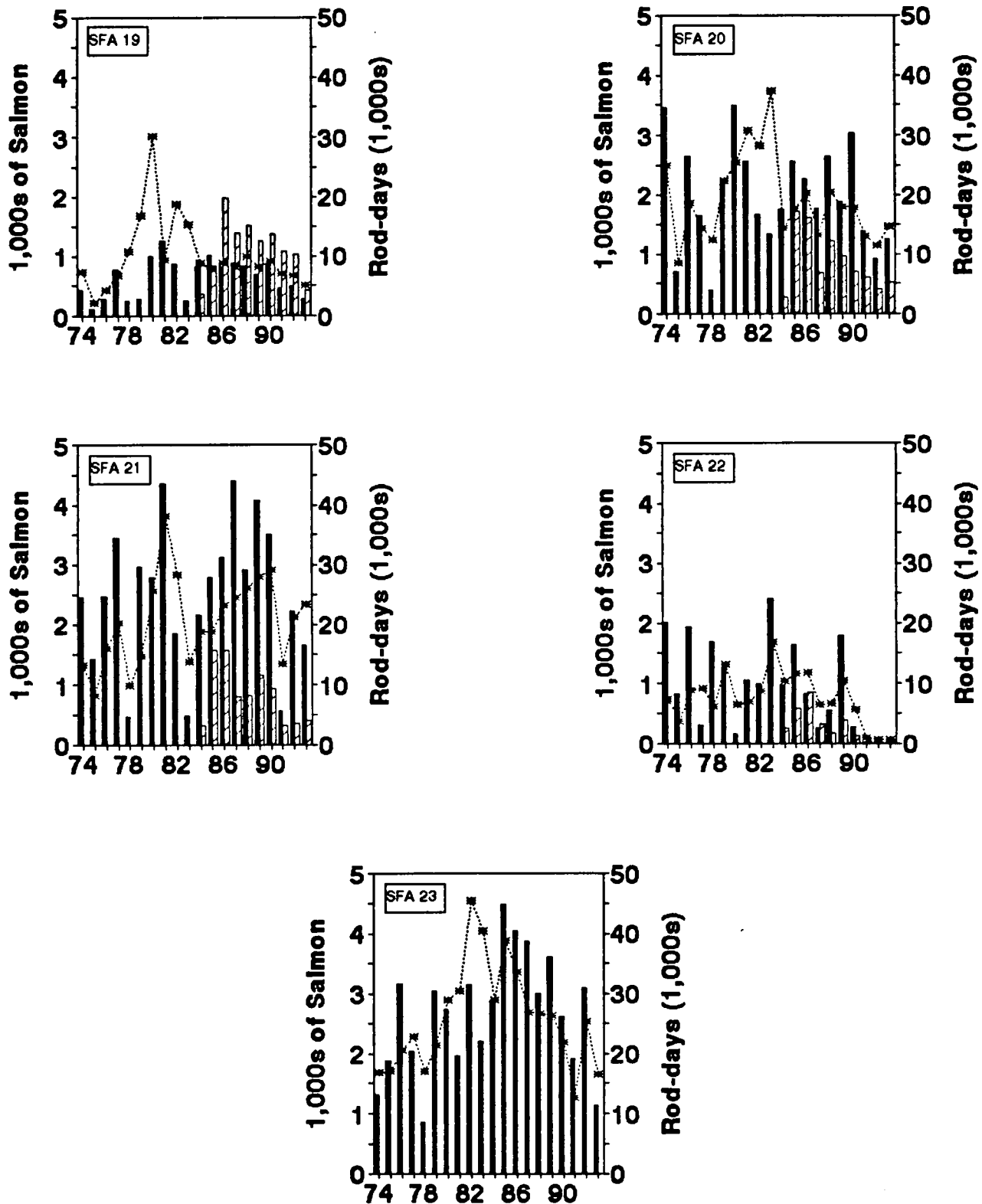


Fig. 5.1.1. Recreational harvest of 1SW salmon (filled bars), catch of released MSW fish (since 1984; slashed bars) and effort (*) in the 5 SFAs of Scotia-Fundy Region, 1974-93.

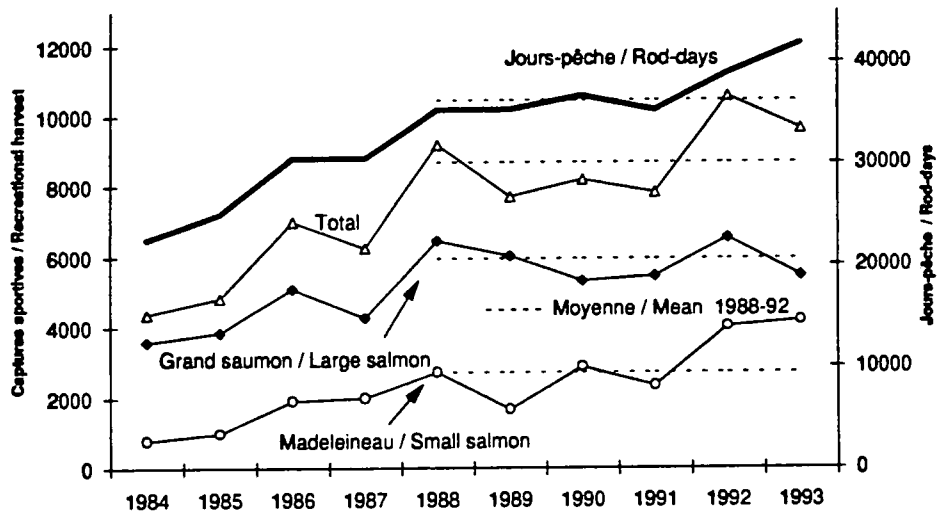


Fig. 6.1.1 Récolte sportive, zones Q1-Q3, 1984-93 / Recreational harvest in zones Q1-Q3, 1984-93.

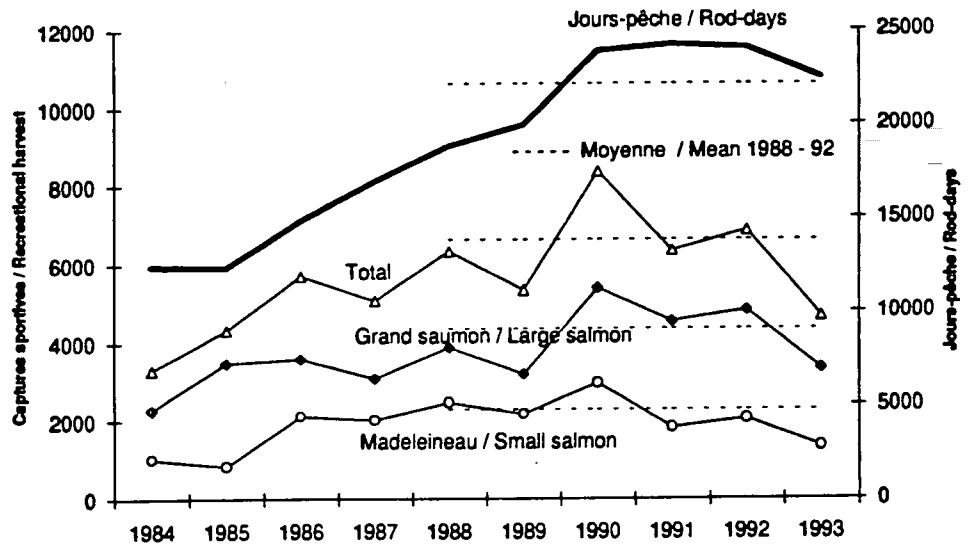


Fig. 6.2.1 Récolte sportive, zone Q5-Q8, 1984-93 / Recreational harvest of salmon in zones Q5-Q8, 1984-93.

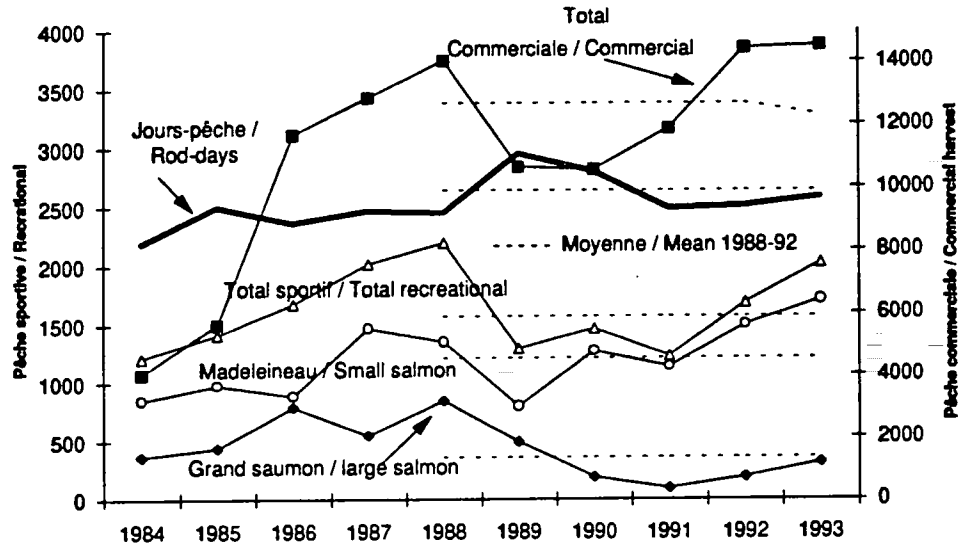


Fig. 6.2.2 Récolte sportive et commerciale, zone Q9, 1984-93 / Recreational and commercial harvest in zone Q9, 1984-93.

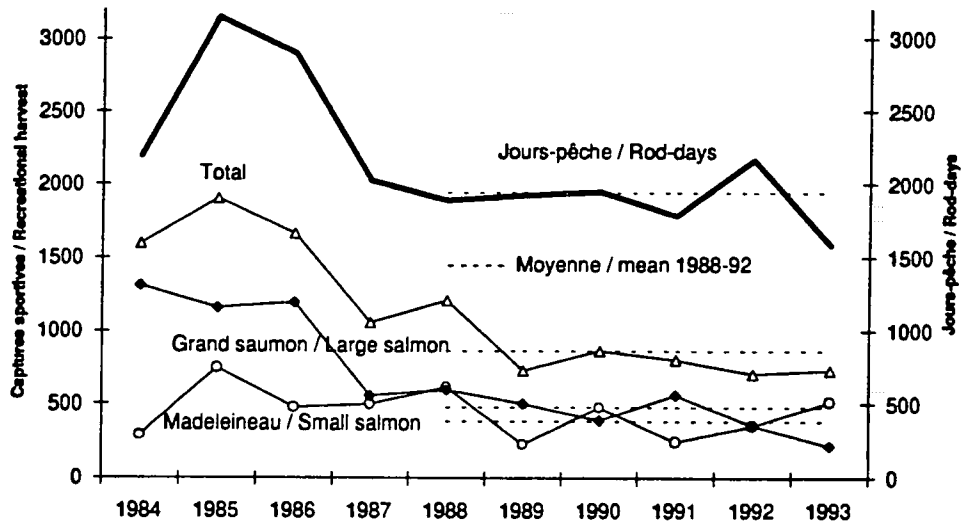


Fig. 6.3.1 Récolte sportive, zone Q10, 1984-93 / Recreational harvest in zone Q10, 1984-93.

STOCK: Exploits River, SFA 4

TARGET: 95.9x10⁶ eggs (equivalent to 56,670 small salmon)
 Lower Exploits 16.4x10⁶ eggs
 Middle Exploits 64.2x10⁶ eggs
 Upper Exploits 15.4x10⁶ eggs

Year	1988	1989	1990	1991	1992	1993	MIN	MAX	MEAN ⁵
Recreational¹ catch									
Small Salmon	1731	577	917	1045	1408	1655	259	2998	1269
Brood removals⁴:	5111	4459	3869	1408	1078	0	31	5111	3371
Total returns²:									
Small Salmon	9643	7666	7117	5758	13818	22777	3845	19557	8966
Large Salmon	9496	7577	6995	5659	13504	22150	4740	19205	8785
Large Salmon	147	89	122	99	314	627	343	352	180
% Target eggs met³:									
Lower Exploits	61	48	47	35	79	109	35	127	51
Middle Exploits	12	14	12	14	20	23	8	21	12
Upper Exploits	125	119	88	0	2	6	0	125	66
¹ MIN, MAX period from 1960-1991. ² MIN, MAX period from 1974-1991. ³ MIN, MAX period from 1987-1991. ⁴ MIN, MAX period from 1974-1993. ⁵ MEAN period from 1987-1991. Angling harvest is retained catch i.e. does not include hook-and-release fish.									

Methodologies: Fluvial habitat includes 3.5x10⁵ units and lacustrine habitat includes 3.4x10⁴ ha. of standing water. Target egg requirements are to come from small salmon. Biological characteristics used are those of the Exploits stock. Current fry releases are backcalculated to eggs for % of target egg deposition achieved in areas stocked. Total returns to the river are based on the count at Bishop Falls fishway plus angling below the fishway. Spawning escapements are for the tributaries of the Lower Exploits except for Great Rattling Brook which are derived from spawning surveys and in 1993 only account for 45% of the adults that were available to spawn in these tributaries.

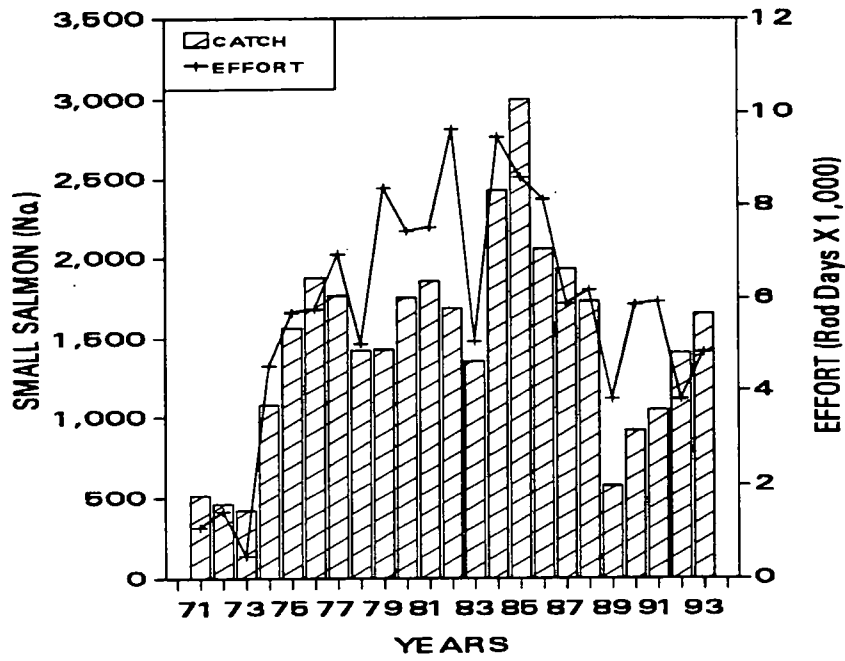
Broodstock requirements: None at present.

Recreational catches: There are concerns that no angling statistics were reported for the area above Grand Falls.

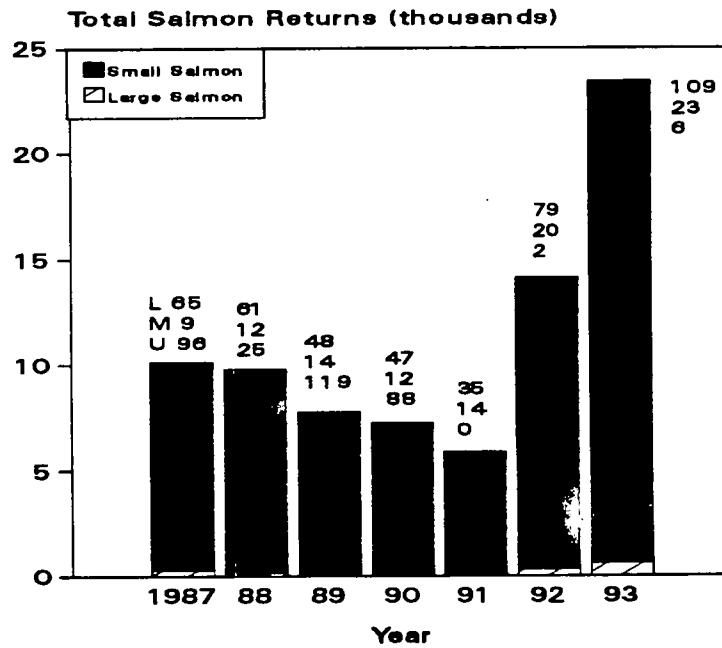
State of the stock: From 1987 to 1991, the Lower, Middle and Upper Exploits have averaged 51%, 12% and 66% of target egg requirements, respectively, based on fry releases and natural spawning. The egg requirement for the Middle Exploits includes the main stem of the river which at present is not producing adults. If this habitat is removed, then the Middle Exploits in 1993 achieved 77% of its target. The low returns to the Upper Exploits is cause for concern and every effort should be made to reduce mortality on these returning adults.

Forecast: No quantitative forecast of returns is possible for 1994.

RECREATIONAL CATCH EXPLOITS RIVER



Total Returns & Percent Target Achieved



Numbers above bars represent the % target egg requirement for the Lower, Middle and Upper Exploits.

STOCK: Campbellton River, SFA 4
TARGET: 2.916 million eggs (1480 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)	636	148	106	126	311	316	23	1547	626
Smolt counts						31577			
Adult counts									
Small						4001			
Large						135			
% Target eggs met (small + large)						274			
¹ Recreational catch is for the period 1974 to 1991. Catches for 1992 and 1993 are retained catches to the time the SFA quota was caught and do not include hook-and-release fish. Catches prior to 1992 are for retained fish for the entire angling season. Catches for 1979 and 1987 were not included in the mean since in that year the river was closed for most of the angling season due to drought conditions.									

Recreational catches: Catches have ranged from 23 to 1,547 during the period 1974-93. Catches declined during 1981-91 before the salmon moratorium. Effort has remained relatively steady until 1992. The number of small salmon retained in 1993 was 316 and 103 were released.

Data and assessment: Complete counts of smolt and adult salmon migrations were obtained from portable fish counting fences in 1993.

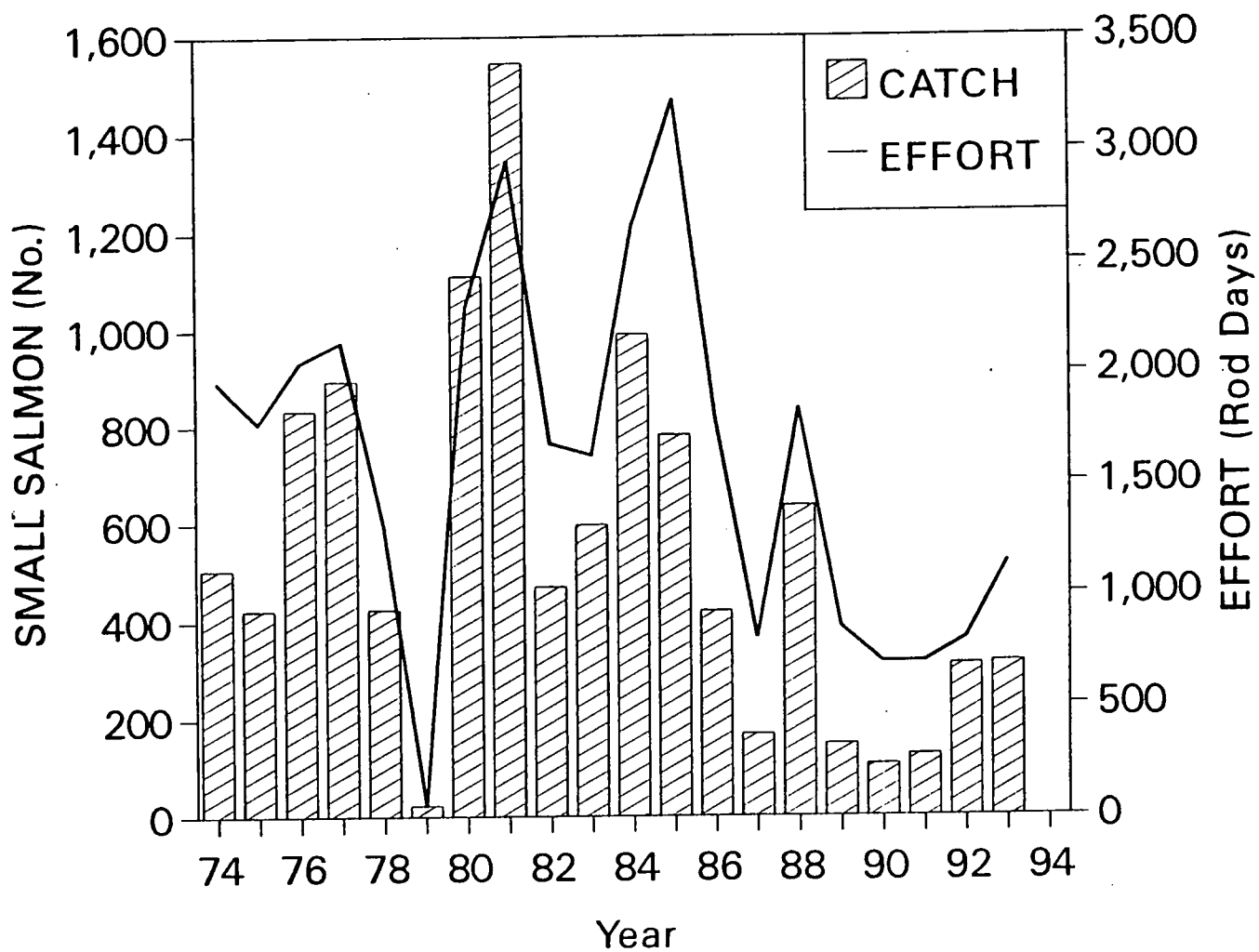
State of the stock: Egg deposition in 1993 was 7.98×10^6 eggs which was in excess of target requirement.

Accessible habitat:

Fluvial = 5,960 units / Lacustrine = 4037.3 ha

Forecast: No quantitative forecast of returns is possible for 1994.

Recreational Catch - Campbellton River



STOCK: Gander River, SFA 4

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

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)									
	2686	1173	1155	1180	1268	1271	1155	4575	2459
Counts									
Small		7743	7520	6445	18411	25905	6445	7743	7236
Large		473	508	670	4180	1734	473	670	550
% of target eggs met									
		35	36	33	111	136	33	36	35
¹ Recreational fishery data are for the period 1974 to 1991. Catches for 1992 and 1993 are retained catches to the time the SFA quota was caught and do 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 closure of parts of the river as a result of drought conditions. Summaries for counts and target egg deposition are for 1989-91. Target egg deposition represents the contribution of both small and large salmon.									

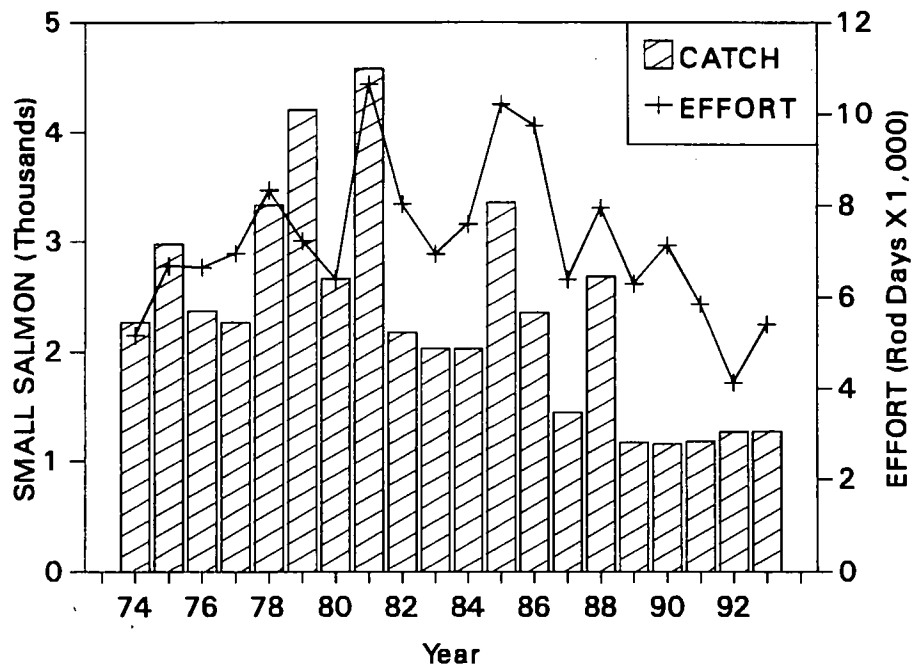
Recreational catches: Catches have ranged from 1,155 to 4,578 small salmon during the period 1974-91. Catches declined during 1981-91 before the salmon moratorium. Effort has remained relatively steady. The number of small salmon retained in 1993 was 1271 (similar to 1992) and the number released was 1950.

Data and assessment: Complete counts of salmon were obtained at a fish counting fence during 1989-93, and have historically been counted at a fishway located on a tributary, Salmon Brook.

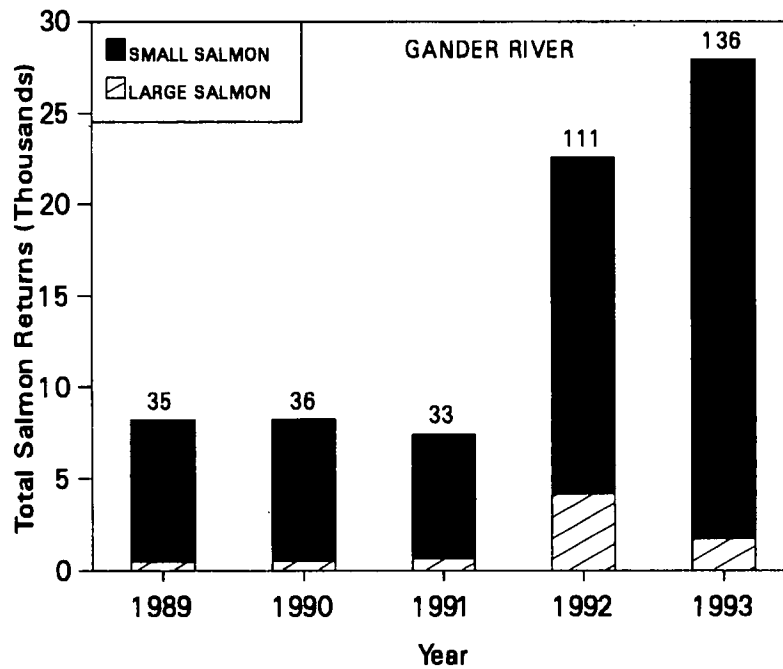
State of the stock: The percentage of target egg deposition achieved in 1989-91 ranged from 33% to 36%. In 1992, a small surplus to target requirement was achieved (111%) and this increased to 136% in 1993. The contribution of large salmon to total egg deposition in 1993 was 14%, a substantial decline from 40% observed in 1992 and also below the average for 1989-91 (17%). In contrast to 1992, target spawning requirement in terms of small salmon was exceeded in 1993. Using Salmon Brook as an indicator of returns to the entire river, it is likely that returns of small salmon of a magnitude similar to or greater than those in 1992 and 1993 occurred in pre-salmon moratorium years. In this context, the relatively low spawning escapements in 1989-91 suggest future returns of small salmon could be low, which should be viewed with concern. Counts of large salmon at Salmon Brook in 1992 and 1993 were the highest on record.

Forecast: No quantitative forecast of returns is possible for 1994.

Recreational Catch - Gander River



Total Returns & Percent Target Achieved



Numbers above bars represent percentage of target spawning requirement met

STOCK: Middle Brook, SFA 5
TARGET: 2.3 million eggs (~1012 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)									
	708	165	349	278	423	299	165	708	461
Fishway counts									
Small	772	496	745	562	1168	1959	496	2414	1118
Large	14	19	13	14	43	87	13	91	34
% of target eggs met									
	66	50	75	51	142	218	50	134	80
¹ Recreational catch is for the period 1974 to 1991. Catches for 1992 and 1993 are retained catches to the time the SFA quota was caught and do 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 1991. Summary for target egg deposition applies from 1984 to 1991 and represents contribution from both small and large salmon.									

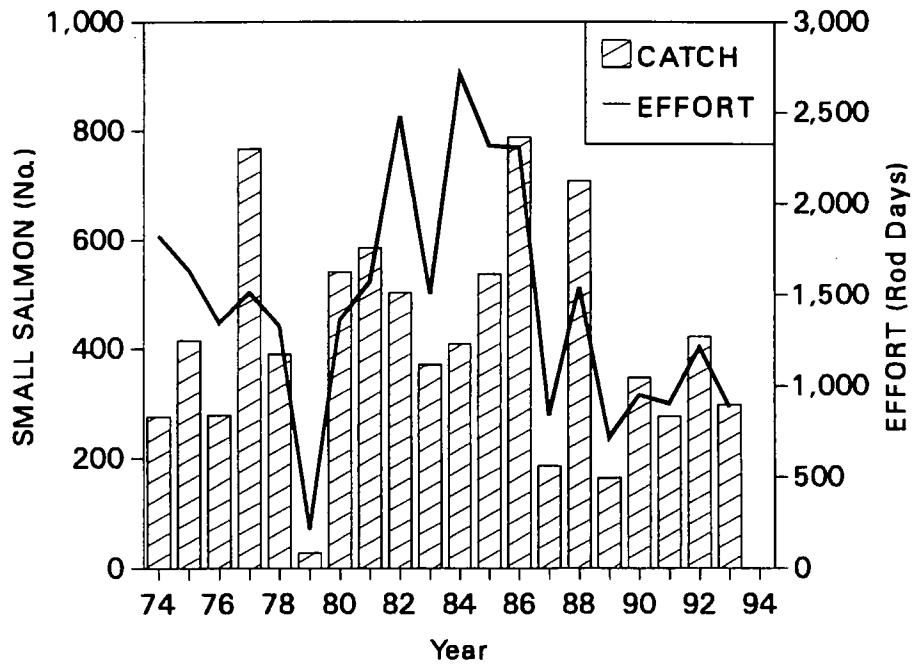
Recreational catches: For the period 1974-91, catches have ranged from 165 to 789 small salmon. Rod-days of effort peaked during the mid-1980s but have declined substantially in recent years. A total of 299 small salmon was retained in 1993 and 387 were released.

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

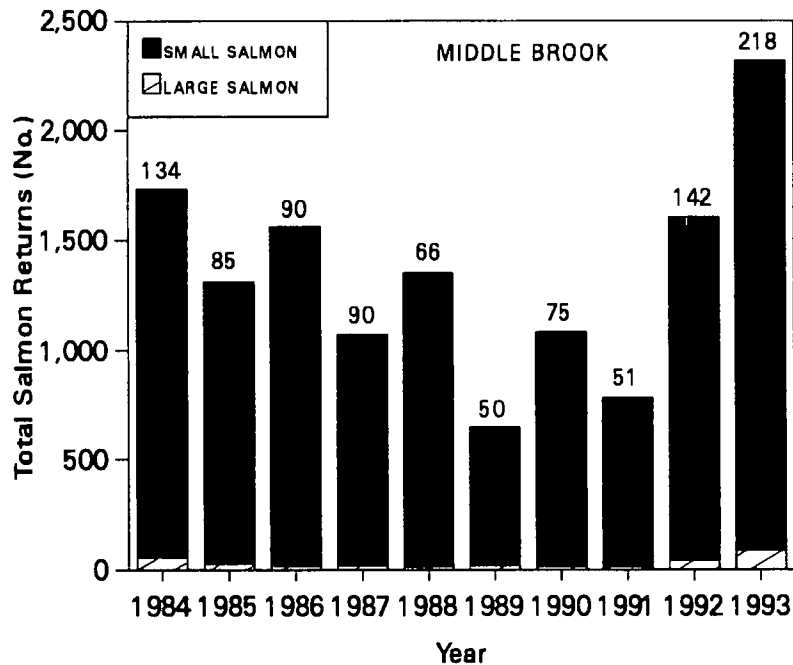
State of the stock: Target egg deposition requirement was exceeded in 1992 and 1993; the target was met in 1984. Higher counts of both small and large salmon occurred in pre-salmon moratorium years than were observed in 1992 and 1993.

Forecast: No quantitative forecast of returns is possible for 1994.

Recreational Catch - Middle Brook



Total Returns & Percent Target Achieved



Numbers above bars represent percentage of target spawning requirement met

STOCK: Terra Nova River, SFA 5
TARGET: 14.30 million eggs (~7094 small fish)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)									
	682	357	624	448	409	484	243	850	559
Fishway counts									
Small	1737	1138	1149	873	1443	2713	569	1737	1087
Large	206	142	144	114	270	470	19	206	101
% of target eggs met									
	30	20	20	16	29	53	15	30	20
¹ Recreational catches are for the period 1974 to 1991. Catches for 1992 and 1993 are retained catches to the time the SFA quota was caught and do 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 1991. Summary for targets here applies from 1984 to 1991. Percentage of target egg deposition met includes contribution from small and large salmon.									

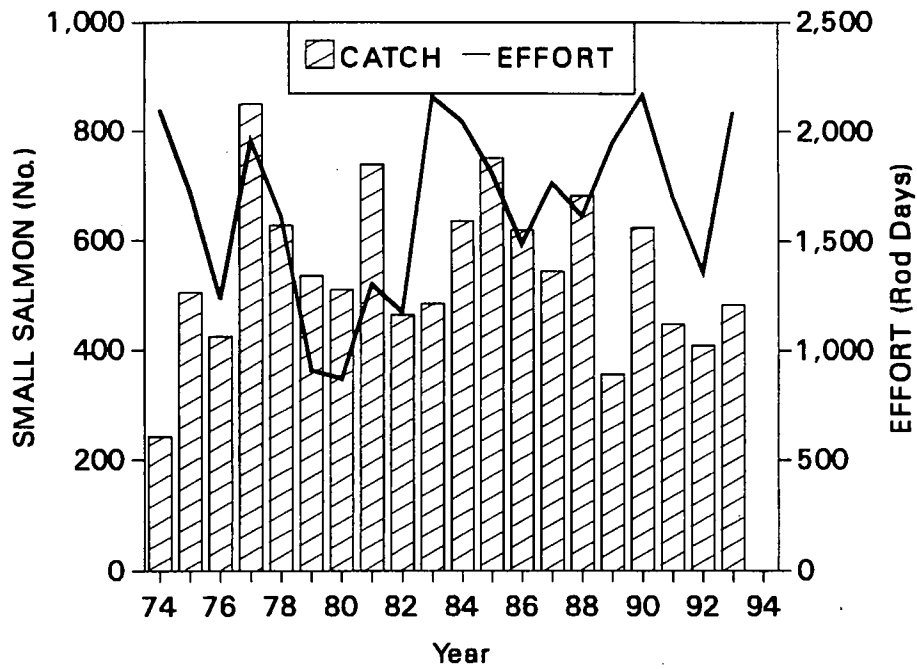
Recreational catches: For the period 1974-91, catches have ranged from 243 to 850 small salmon. Catches in recent years have declined relative to those during the late 1970s and early 1980s. Rod days of effort have generally increased over time. A total of 484 small salmon was retained in 1993 and 569 were released.

Data and assessment: Counts are available from a fishway located on the lower river. Counts of small and large salmon for 1993 are incomplete.

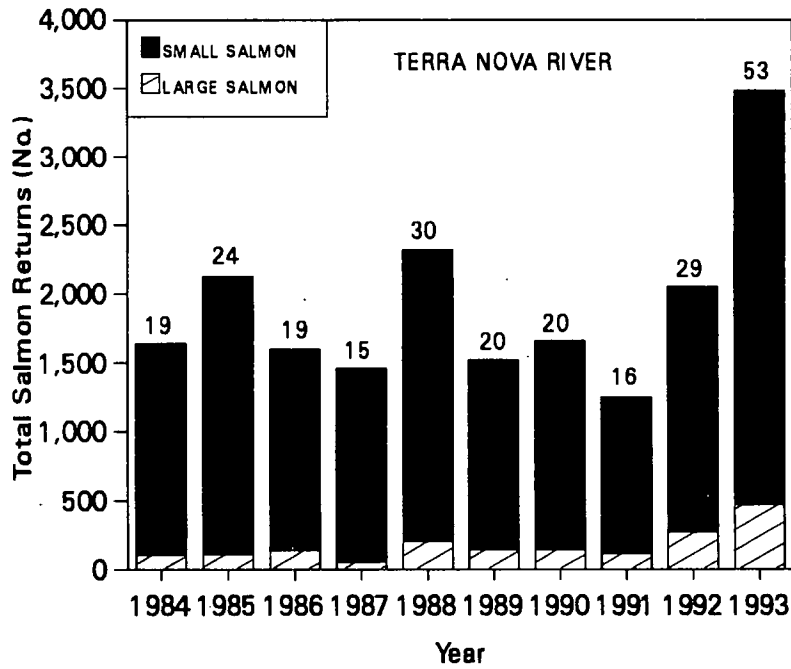
State of the stock: Counts of small and large salmon in 1993 surpassed those of 1992 and were the highest on record; the highest proportion of target egg deposition achieved to date occurred in 1993.

Forecast: No quantitative forecast of returns is possible for 1994.

Recreational Catch - Terra Nova River



Total Returns & Percent Target Achieved



Numbers above bars represent percentage of target spawning requirement met

STOCK: North Arm River, SFA 7
TARGET: 528,000 eggs (~180 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)	41	24	11	14	9	9	7	47	28
Counts									
Small						30			
Large						0			
% of target egg met						17			
¹ Recreational catch is for the period 1974 to 1991. Catches for 1992 and 1993 are retained catches to the time the SFA quota was caught and do 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.									

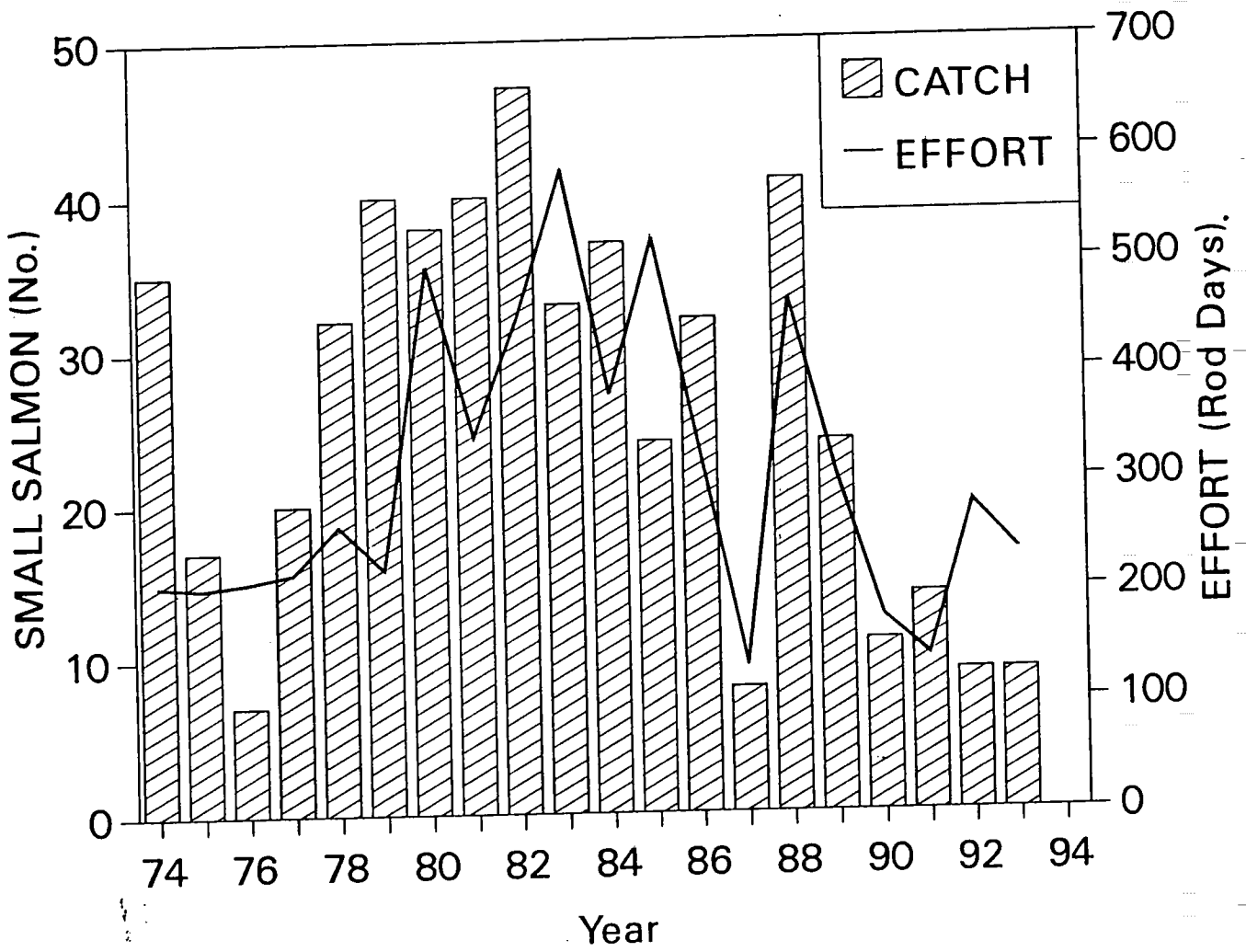
Recreational catches: For the period 1974-91, catches have ranged from 7 to 47 small salmon. Rod-days of effort peaked in the early to mid-1980s and have declined since then. In 1993, a total of nine small salmon was retained and two were released.

Data and assessment: The number of adult salmon entering the river was determined from a counting fence operated for the first time in 1993 and from a diving survey conducted below the counting fence location.

State of the stock: In 1993, the river achieved 17% of target spawning requirement.

Forecast: No quantitative forecast of returns is possible for 1994.

Recreational Catch - North Arm River



STOCK: Biscay Bay River, SFA 9
 TARGET: 2.9 million eggs (~1134 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)									
	349	102	232	10	75	299	10	424	234
Counts									
Small	1695	889	1657	394	1298	1045	394	2516	1837
Large	58	104	73	35	49	116	35	101	73
% of target eggs met									
	127	87	128	39	118	84	39	208	140
¹ Recreational catch is for the period 1974 to 1991. Catches for 1992 and 1993 are retained catches to the time the SFA quota was caught and do 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. Summaries for fence counts are from 1983 to 1991 and for percent of target from 1984 to 1991. Percentage of target met since 1984 reflects contribution of both small and large salmon.									

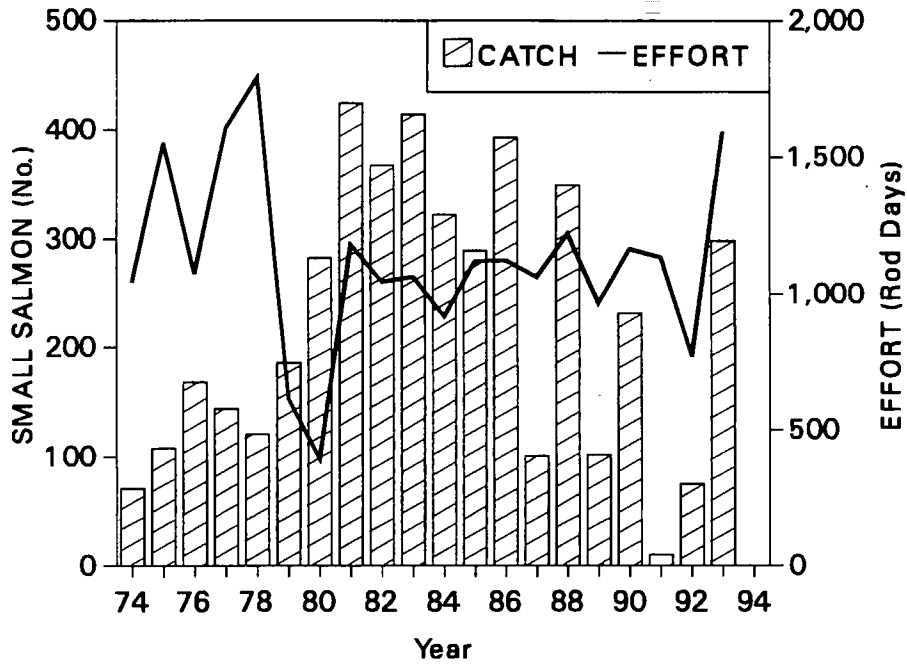
Recreational catches: For the period 1974-91, catches have ranged from 10 to 424 small salmon. Rod-days of effort have been relatively stable during the past decade. In 1993, a total of 299 small salmon was retained and 38 were released.

Data and assessment: Complete counts are available from a fish counting fence in operation since 1983. Fence counts for 1985, 1987, and 1989 are incomplete and are not included in the minimum and mean. Incomplete counts were also obtained in 1992 and 1993.

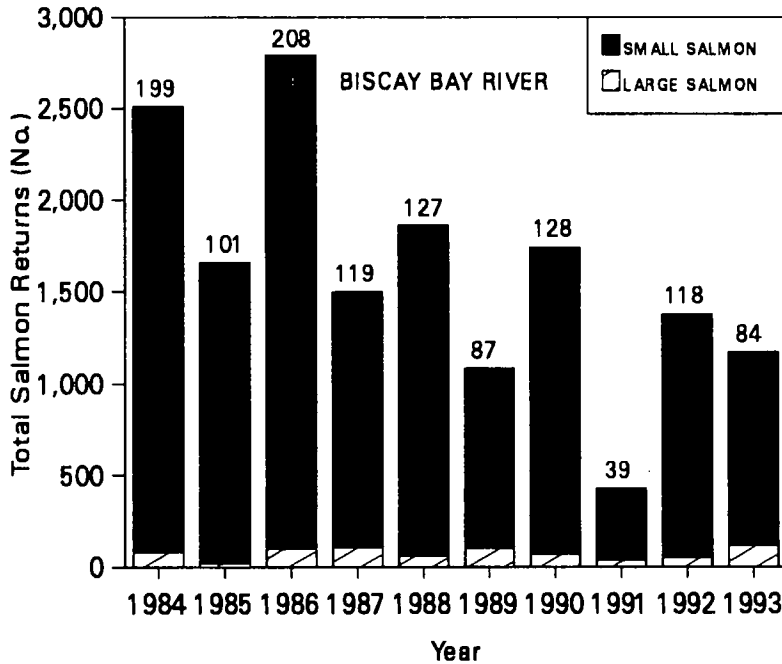
State of the stock: Since 1983, from 39 to 208% of target egg deposition was achieved. Even for some years with incomplete counts, target egg deposition requirement was met or exceeded. The target was not met in 1993 even taking into account an estimated 100-200 fish which bypassed the counting facility. Counts of small salmon have been higher in pre-salmon moratorium years than in 1992 and 1993; the 1993 count of large salmon was the highest recorded.

Forecast: No quantitative forecast of returns is possible for 1994.

Recreational Catch - Biscay Bay River



Total Returns & Percent Target Achieved



Numbers above bars represent percentage of target spawning requirement met

STOCK: Colinet River, SFA 9
TARGET: 1.414×10^6 eggs (equivalent to 514 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN	MAX	MEAN ⁴
Angling Harvest¹:									
Small	42	13	*	*	*	*	13	159	25
Total returns²:									
Small	221	522	357	236	325	315	84	522	352
Large	205	441	307	218	251		74	251	308
Large	16	81	50	18	74		10	116	44
Target eggs met³:									
	43	101	69	46	63	60	9	101	68
¹ MIN,MAX period from 1974-1991. ² MIN, MAX period from 1981-1991. ³ MIN, MAX period from 1981-1991. Represents contribution from both small and large salmon. ⁴ MEAN period from 1987-1991. * No Angling.									

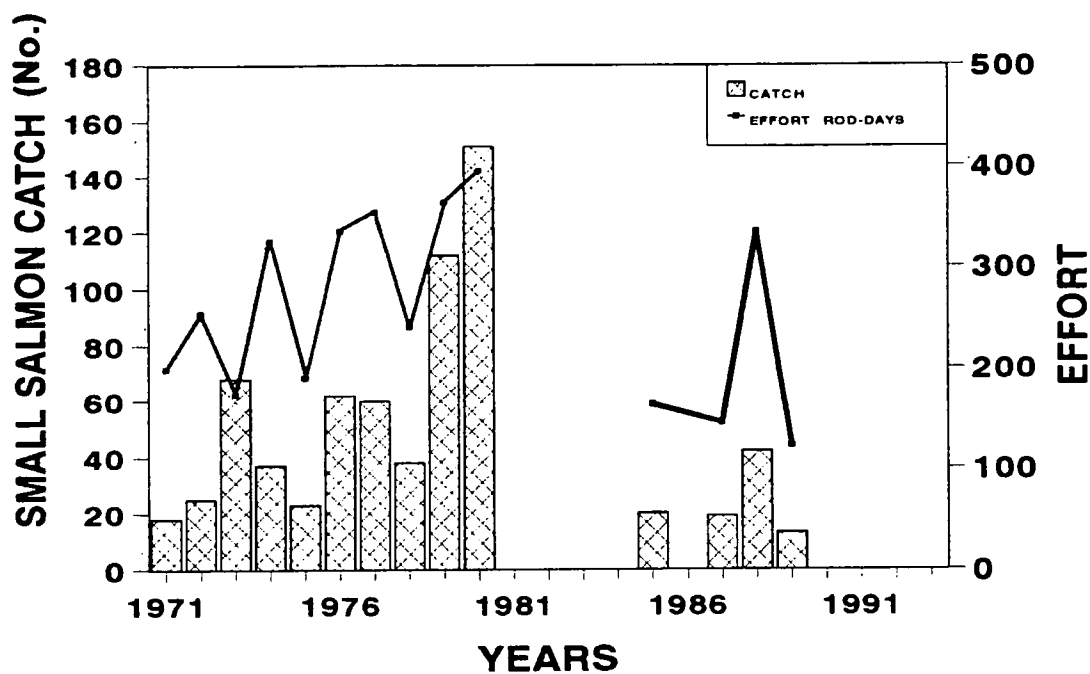
Methodologies: Fluvial habitat includes 4,228 units and lacustrine habitat includes 1,083 ha. of standing water. Target eggs are to come from small salmon. Biological characteristics used are the default figures for SFA 9. Past fry releases were backcalculated to eggs for calculation of % target egg achieved. Total returns to the river are based on data from a counting fence.

Recreational fisheries: The recreational fishery has been closed on this river from 1981-1984, for 1986 and from 1990 to present. For 1985 and 1987-1989 the fishery was open downstream of the fence only.

State of the stock: From 1987 to 1991, the Colinet River has averaged 68% of target egg based on fry releases and natural spawning. The 1992 and 1993 average target egg deposition is below the previous 5- year mean.

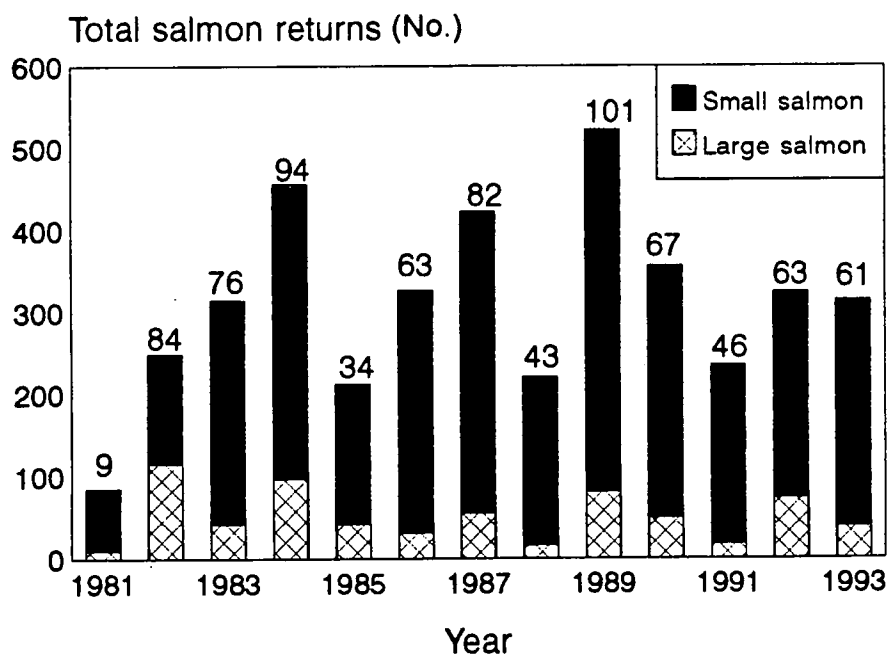
Forecast: No quantitative forecast of returns is possible for 1994.

Recreational Catch - Colinet River



Recreational fishery closed, 1981-84, 1986 & 1990-93
For 1985 & 1987-89, angling below fence only

Total Returns & Percent Target Achieved



Numbers above bars represent the percentage target spawning requirement met

STOCK: Rocky River, SFA 9
TARGET: 3.4×10^6 eggs (equivalent to 881 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Counts = total returns:									
Smolt			8287	7732	7813	5115			
Small salmon	313	168	401	211	237	282	80	401	235
Large salmon	8	9	17	16	46	72	1	17	10
% Target eggs met ² :	36	20	47	26	32	41	20	64	30
¹ Min, Max and Mean period from 1987-1991.									
² Represents contribution from both small and large salmon.									

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

Methodologies: Fluvial habitat includes 10.8×10^3 units and lacustrine habitat includes 2.2×10^3 ha. of standing water. Target eggs to come from small salmon. Biological characteristics used are those of the Rocky stock. Previous fry releases are backcalculated to eggs for % of target egg achieved in areas stocked.

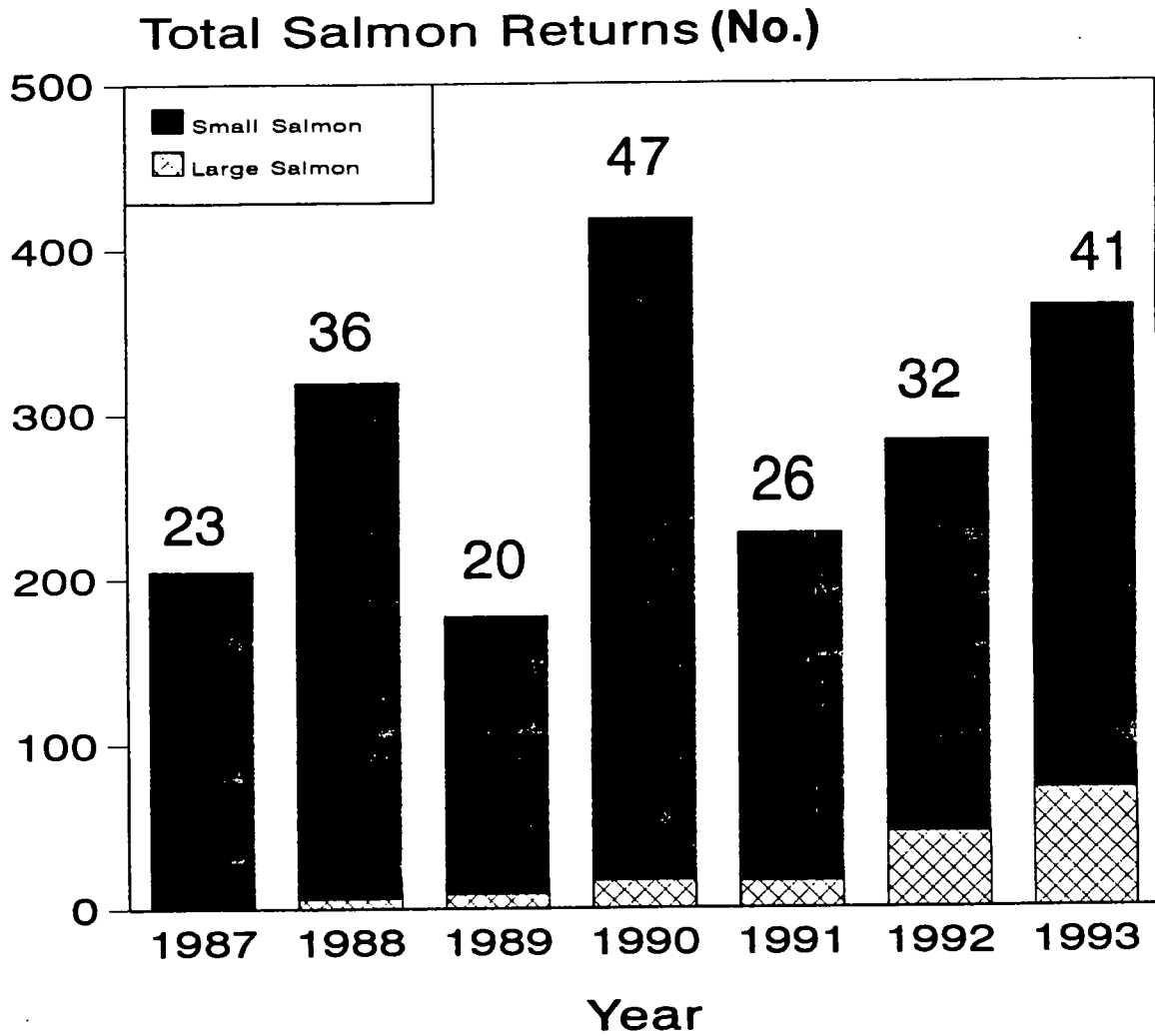
Recreational fisheries: The recreational fishery is closed on this river.

Data and assessment: Complete adult counts are available from a trap installed in the fishway. Smolt-to-adult survival for 1991, 1992 and 1993 was 2.5%, 3.1% and 4.1% respectively. The low smolt count in 1993 was in part due to the 1989 seeding rate.

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

Forecast: Based on the 1993 smolt count and using the mean of the 1990-1992 smolt-to-adult survival, less than 200 adults are expected in 1994.

Total Returns & Percent Target Achieved Rocky River



Numbers above bars represent % of target egg achieved

STOCK: Northeast River, SFA 10
TARGET: 0.72 million eggs (~224 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (small salmon)	186	210	173	19	37	133	19	349	168
Counts									
Small	543	706	551	353	921	847	223	725	439
Large	11	15	25	8	46	65	0	56	26
% of target eggs met	209	277	251	161	440	418	152	346	218
¹ Recreational catch is for the period 1974 to 1991. Catches for 1992 and 1993 are retained catches to the time the SFA quota was caught and do 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. Summaries for fishway counts are for the period 1976 to 1991 and for percent of target from 1984-91. Percentage of target met reflects the contribution from both small and large salmon.									

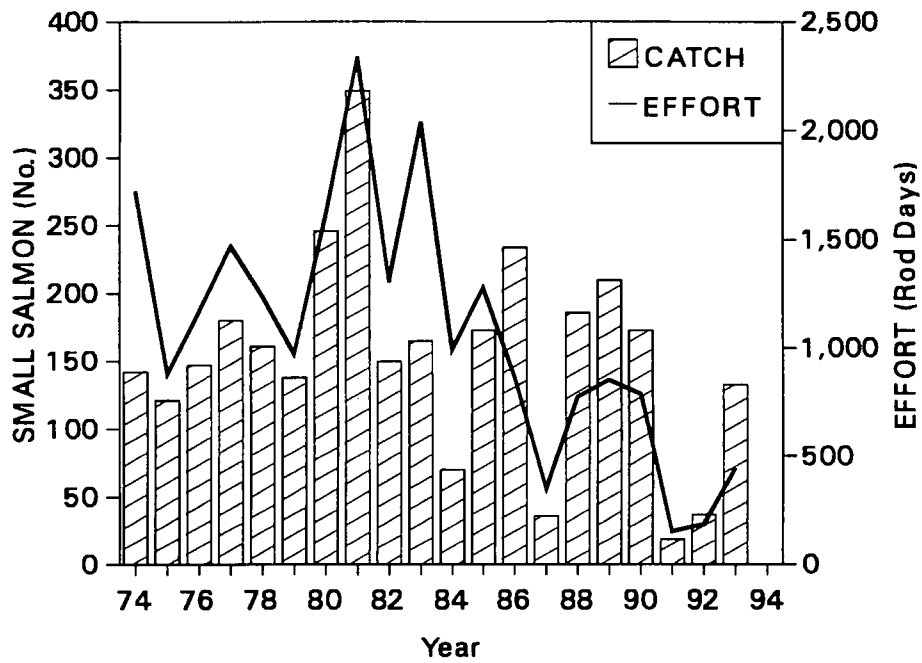
Recreational catches: For the period 1974-91, catches have ranged from 19 to 349 small salmon. Rod-days of effort peaked during the early 1980s but declined substantially in recent years. In 1993, a total of 133 small salmon was retained and 61 were released.

Data and assessment: Counts are available from a fishway. Counts for 1975, 1981, 1982, and 1987 are incomplete and are not included in min, max, and mean.

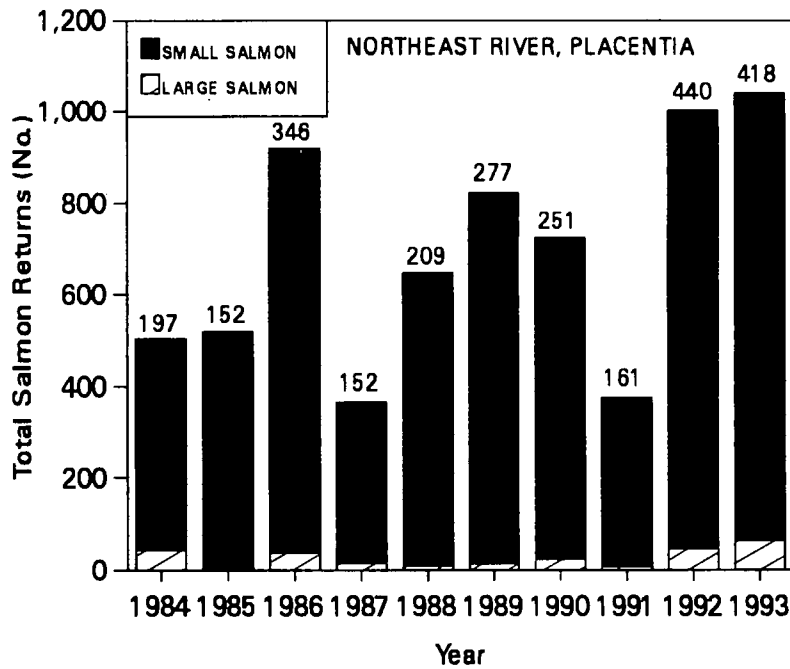
State of the stock: Target egg deposition requirement has been exceeded in all years including salmon moratorium years 1992 and 1993. Counts of small salmon in 1992 and 1993 were the highest recorded; the count of large salmon in 1993 was the highest on record.

Forecast: No quantitative forecast of returns is possible for 1994.

Recreational Catch - Northeast River, Placentia



Total Returns & Percent Target Achieved



Numbers above bars represent percentage of target spawning requirement met

STOCK: Little River, SFA 11
TARGET: 3.06×10^5 eggs (equivalent to 230 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Angling Harvest	+	*	*	*	*	*	NA	NA	NA
Total returns:	68	107	173	61	125	180	61	173	95
Small	65	102	158	55	104	169	55	158	89
Large	3	5	15	6	21	11	3	15	6
% Target eggs met ² :	51	82	134	6	54	60	51	134	75
¹ MIN, MAX, and MAX period 1987 -1991. ² Represents contribution from both small and large salmon. + no angling data reported. * recreational fishery closed.									

Background: The Little River is the site of an enhancement project where limited fry stocking commenced in 1990.

Methodologies: Target egg deposition for accessible habitat (3.1×10^5 riverine units). Target eggs to come from small salmon. Biological characteristics are those of Little River and the Conne River. Current fry releases are backcalculated to eggs for % of target egg achieved in areas stocked. Total returns to the river are based on fence counts.

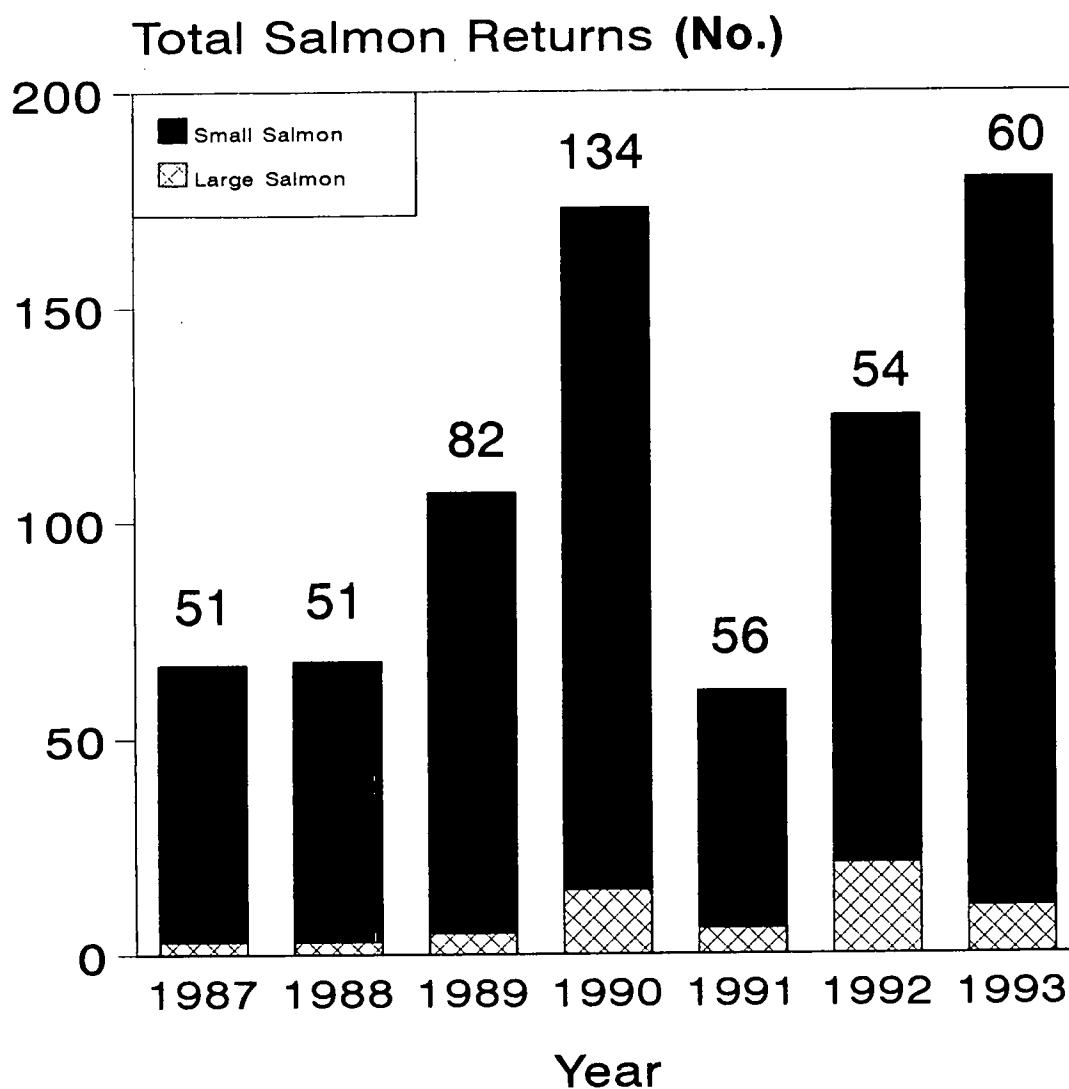
Recreational fishery: The recreational fishery closed in 1989 and the only angling statistics for the river predate 1975.

Data and assessment: Complete counts of fish are available from a counting fence. Smolt counts are available for 1992 and 1993.

State of the stock: For 1992 and 1993 the stock is averaging 57% of target egg requirements based on natural spawning and fry releases. The 1993 egg depositions are preliminary. Smolt counts for 1992 and 1993 are 382 and 324 respectively.

Forecast: No quantitative forecast is possible for 1994.

Total Returns & Percent Target Achieved Little River



Numbers above bars represent % of target egg achieved

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.

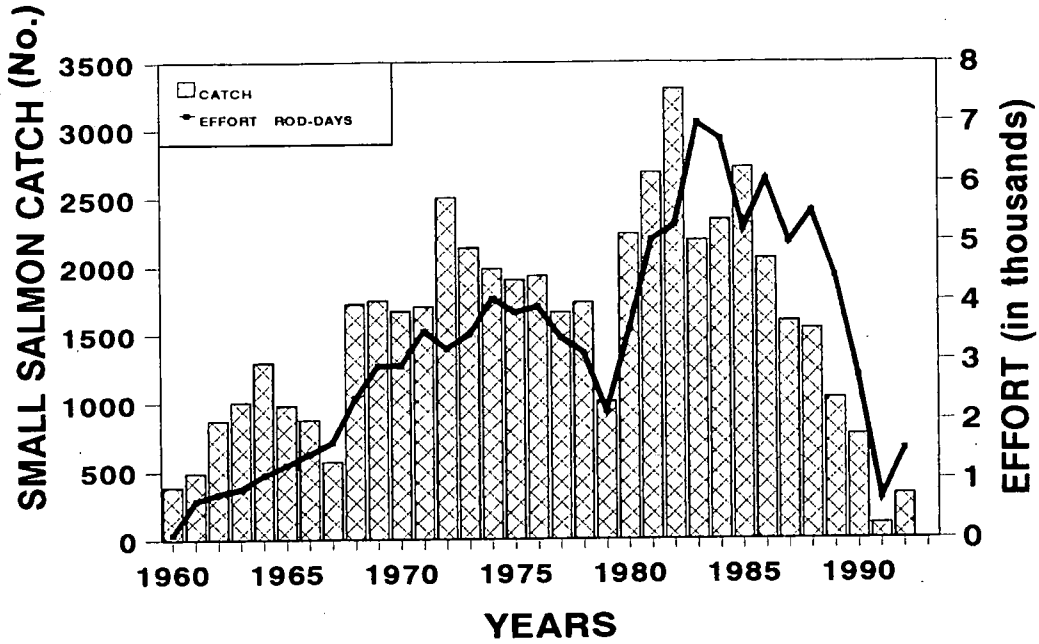
Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
HARVEST:									
First Nations									
Large	2	1	11	3	5	3	0	11	3
Small	607	381	959	281	484	417	18	959	461
Recreational									
Small	1544	1036	767	108	329	0	0	3302	1824
Returns:									
Large	420	320	372	89	159	100	89	516	355
Small	7627	4968	5377	2411	2523	2703	2411	10155	6473
Escapement:									
Large	418	319	361	87	153	97	87	488	345
Small	5567	3609	3765	2062	1783	2353	1783	7823	4709
% Target eggs met:									
	159	103	112	51	51	61	51	214	131
¹ Recreational catch for period 1974-91; other data for 1986-91. Angling catches are DFO statistics. First Nations' catch in salt water includes some salmon from other rivers. First Nations' fishery quota of 1200 fish has been in effect since 1986, but was reduced to a preliminary value of 500 fish for 1993.									

Data and methodology: Smolts used in adult forecasts are surveyed by mark-recapture. Returning adult salmon are enumerated at a fish counting fence. A video camera system introduced in 1993.

State of the stock: Target requirements were met from 1986-90. Only 51% of the target was achieved in 1991 and 1992, but 61% was achieved in 1993. Low sea survival impacted on salmon returns during the past three years.

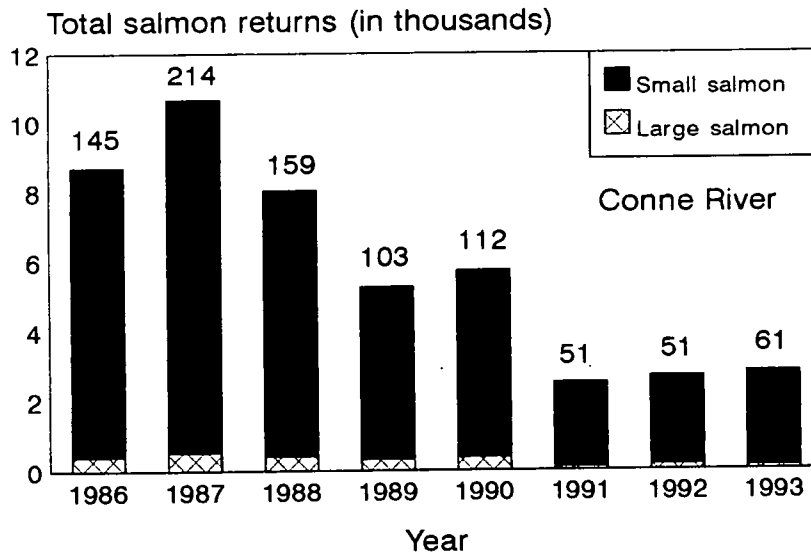
Forecast: Estimated smolt output in 1993 was 55,765 (51,666-59,864); 18% below 1992. At 4% survival, the approximate average recorded during the past three years, no more than 2,400 fish would be expected to return in 1994. A sea survival of about 7% will be needed in order for total returns to meet or exceed the 4,000 salmon necessary to reach the target egg deposition. Sea survival of 7-10% has been recorded at Conne River in past years. Survival of salmon appears to be associated with smolt condition. Assuming this association holds, this could result in returns greater than that indicated above. In-season monitoring could be used to update managers on changing conditions as the 1994 run progresses.

Recreational Catch - Conne River



Fishery closed for 1 month in 1990
 Quota of 100 fish in 1991
 Quota of 330 fish in 1992

Total Returns & Percent Target Achieved



Numbers above bars represent the percentage target spawning requirement met

STOCK: LaPoile River, SFA 12
TARGET: 5.3 million eggs

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Angling catch²:									
Small	204	153	219	262	194	206	32	325	158
Large	7	6	19	8	40	14	0	24	7
Angling catch retained below counting fence:									
Small						121			
Adjusted counts at fence:									
Small						542			
Large						88			
Total returns²:									
Small	648	486	695	832	616	663	102	1032	502
Large	105	79	113	135	100	88	16	167	81
Spawning escapement:									
Small	444	333	476	570	422	457	70	707	344
Large	105	79	113	135	100	88	16	167	81
% Target eggs met (small + large):									
	24	18	26	31	23	23	4	39	19
¹ MIN, MAX, MEAN are for 1974-1991. Small salmon are retained catches only. Note that the 1992 catches of small salmon were affected by the zonal quotas. Large salmon catches in 1985-1993 are released catches. ² Returns of small salmon are based on an angling exploitation rate on small salmon of 0.3149 derived in 1993. Returns of large salmon were calculated as 16.17% of small salmon returns based on the ratio of large to small at the fence in 1993.									

Methodology: Fluvial habitat includes 21,457 (100 sq. m) rearing units and the lacustrine habitat includes 519 ha of standing water. Target egg depositions were based on 240 eggs per fluvial rearing unit and 368 eggs per ha of lacustrine area. Target eggs are to come from small and large salmon. Total returns are based on counts at the fence and angling catches below the fence. In 1993, the counting fence was operated from June 16 to July 30. The number of small salmon entering the river after July 30, 1993 was estimated from angling catches after the fence was removed based on an angling exploitation rate of 0.3149 derived for 1993. Returns in 1974-1992 were estimated from angling catches based on the 1993 angling exploitation rate.

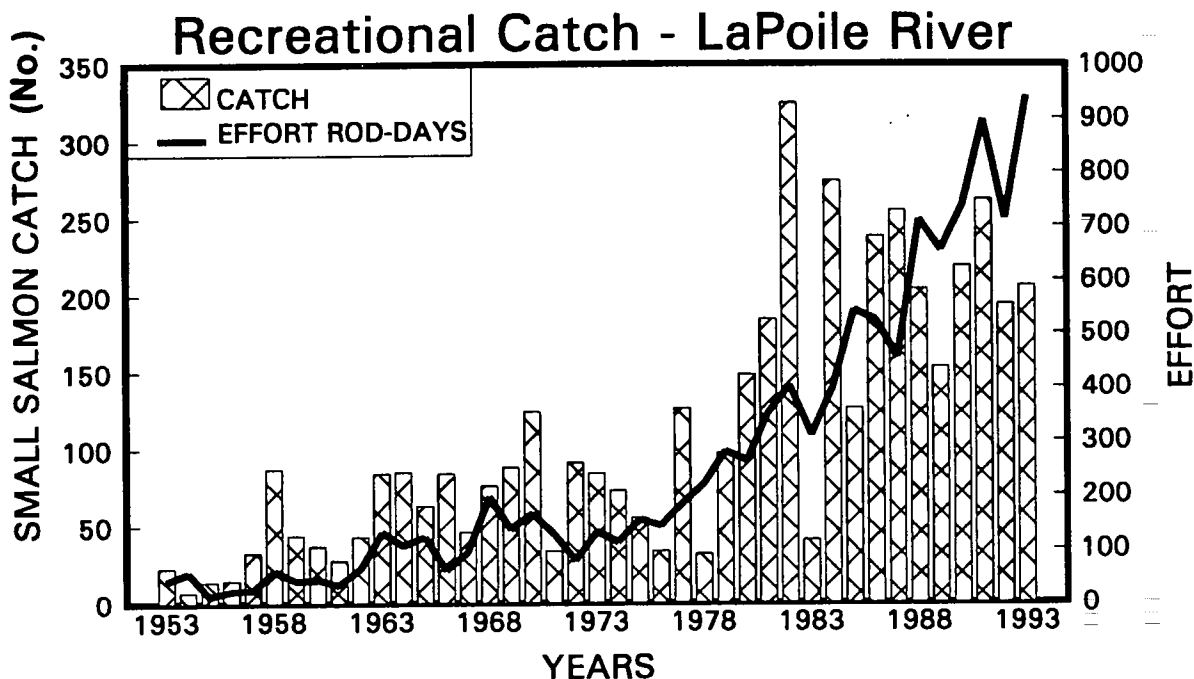
Commercial fishery: The commercial fishery in SFA 12 has been closed since 1984 which would have benefitted the LaPoile River stock prior to the commercial moratorium in 1992.

Recreational fishery: Recreational catches in 1992 and 1993 were affected by the SFA 12 zonal quota. If released catches in 1992 and 1993 represent retained fish in previous years, the recreational catch of small salmon in 1992 was the highest recorded since 1953 and the catch in 1993 was the fourth highest. Recreational effort has been increasing on the river since 1984, possibly due to an anticipated increase in salmon abundance following the closure of the commercial fishery in 1984.

Data and assessment: The LaPoile River is characterized by relatively high drainage basin relief, surrounded by high plateau areas and low vegetation. The accessible portion of the system is comprised of only 519 ha of standing water and as a result the system is subject to extreme fluctuations in water discharge after heavy rainfall. These conditions may affect the quality of the accessible salmon habitat.

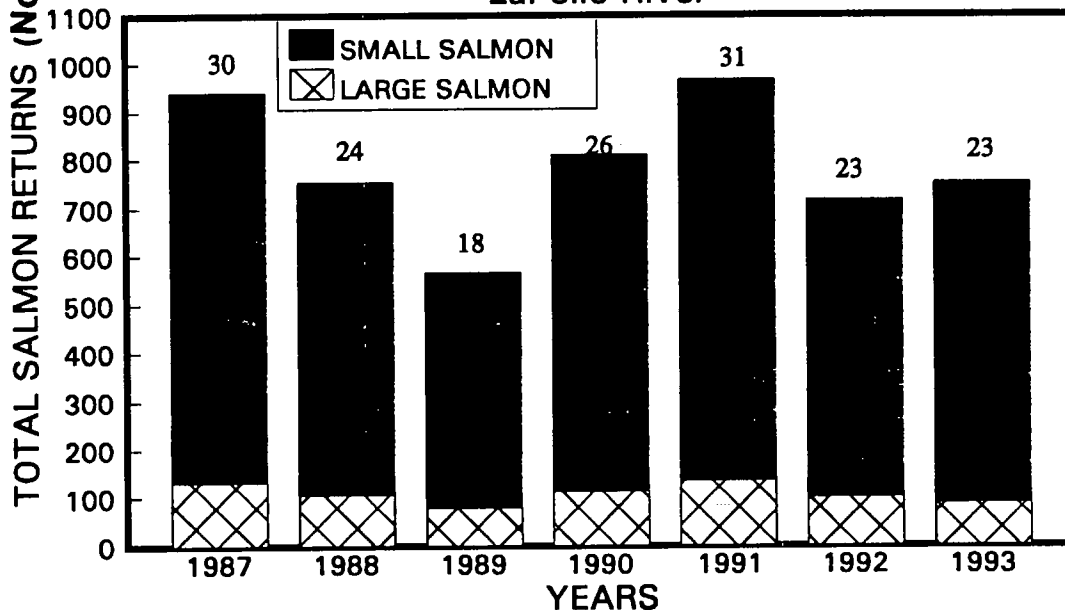
State of the stock: The stock achieved about 23% of its target egg deposition in 1993, which is similar to the percentage of the target achieved estimated for 1987-1991.

Forecast: No quantitative forecast is possible for 1994.



Catches are retained fish only.
The zonal quota was reached in 1992 and 1993.

Total Returns & Percent Target Achieved LaPoile River



Numbers above bars represent the percentage target spawning requirements achieved.

STOCK: Highlands River, SFA 13
TARGET: 1.55 million eggs

Year	1980	1981	1982...	1991	1992	1993	MIN	MAX	MEAN
Recreational Catch ¹									
Closed since 1978							19	114	67
Counts									
Smolt	15130	15839	12373			9984			
Small	82	127	100			137			
Large	55	29	56			88			
%Target eggs met:									
(small + large)						55			
¹ Recreational fishery data are available for 1953-1977 only since the river was closed to angling from 1978 to present.									

Data and assessment: Complete counts of salmon were obtained with a fish counting fence in 1980-82 and in 1993.

State of the stock: Egg deposition is based on 1993 adult salmon returns (contribution of small and large) and was 55% of the target spawning requirement (1,542,608 eggs). This compares to a range of 27% (in 1981) to 36% (in 1982) observed during counting fence operations in the early 1980s.

Comments: Despite closure to angling since 1978, egg deposition has remained below the reference 2.4 eggs m⁻². It is possible that this target is too high for the Highlands River system. The study of juvenile densities ten years ago indicated a wide range in relative production. It also indicated that the main stem (River Brook) above Loch Leven Pond had a wide range of discharge, sparse spawning habitat above the Trans Canada Highway and relatively low production of juvenile salmon (about 15% of the total smolt yield), and yet this reach comprised 28% of the fluvial habitat. Relatively greater production occurred below Loch Leven and in the tributaries. A major tributary is blocked by a collapsed bridge, and others by beaver dams.

A proportion of the run is in the fall, so that fence counts should be conducted at least until the end of September.

Continuation of this investigation will provide a better estimate of the potential of the river system, and juvenile studies at the higher egg deposition following the moratorium will give a better estimate of the potential production of different reaches within the system, and more accurate estimation of the target egg deposition. Stream mapping is planned to better estimate predicted yields of smolts, and to enable removal of obstructions.

Forecast: No quantitative forecast is possible for 1994.

STOCK: Romaines Brook, SFA 13, Newfoundland
TARGET: 1.6×10^6 eggs (met by 912 small salmon)

Year	1993	MIN	MAX	MEAN
Angling harvest ¹ :				
Small	5			
Total returns ² :				
Small	111 ³			
Large	6			
% Target eggs met :				
	12			
¹ No other angling data available for watershed. ² Includes 24 small salmon observed by DFO fishery officer prior to the fence installation. ³ Partial count.				

Methodologies: Fluvial habitat includes 6,607 units (estimated). Target eggs are to come from small salmon. Total returns to the river are based on the count at the fence, angling and reported fish entering the river prior to the fence installation.

Recreational fisheries: No historic angling data are available for this river. The angling catch for 1993 is from observations of trap attendants.

Data and assessment: The count was obtained at the fence.

State of the stock: An egg deposition rate of 12% is cause for concern regarding the future of this stock. Every effort should be made to reduce mortality on this stock as well as rebuild numbers.

Forecast: No quantitative forecast is possible for 1994.

STOCK: Pinchgut Brook, (tributary of Harry's River), SFA 13
TARGET: 0.8 million eggs (~ 509 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Returns to fence:									
Small					222	576	0	222	12
Large					5	43	0	5	0
Angling catch above fence (retained catch of small):									
Small	24	33	92	26	10	28	0	92	14
Large		0	0	0	1	0	0	1	0
Estimated total returns²:									
Small	490	673	1878	531	222	576	0	1878	281
Large		0	0	0	5	43	0	5	0
Estimated spawning escapement:									
Small	466	640	1786	505	212	548	0	1786	268
Large		0	0	0	5	43	0	5	0
% Target eggs met (small + large):									
	91	126	350	99	45	136	0	350	53
¹ MIN, MAX, MEAN are for 1974-1992. ² Returns were estimated 1987-1991 based on an angling exploitation rate of 0.049 on small salmon derived in 1993.									

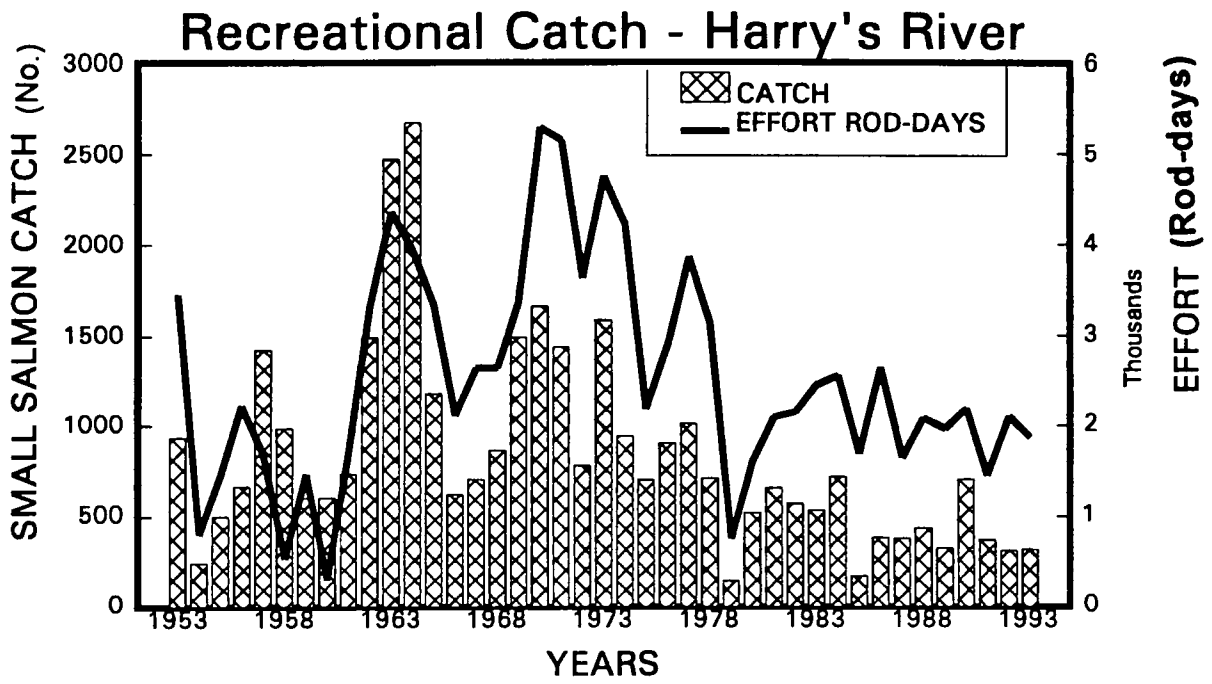
Methodology: Fluvial habitat includes 1,655 units and lacustrine habitat includes 1,036 ha of standing water. Target egg deposition was based on 240 eggs per fluvial unit and 368 eggs per ha of lacustrine area. Target eggs are to come from small salmon. Total returns are based on counts at the fence. Potential egg depositions were calculated from the total spawning escapement based on 1,528 eggs per small salmon spawner and 5,128 eggs per large salmon spawner.

Recreational fishery: The recreational fishery on Harry's River has been controlled by a quota of 350 small salmon since 1987. The river quota was reached in 1987-1988 and 1990-1991 and the SFA 13 zonal quota was reached in 1992. The catch of small salmon in 1993 was only the fourth highest since 1987.

Data and assessment: The counting fence was operated from July 4 to Sept. 23, 1992 and June 17 to Oct. 18, 1993. Counts in 1992 may not represent the complete run.

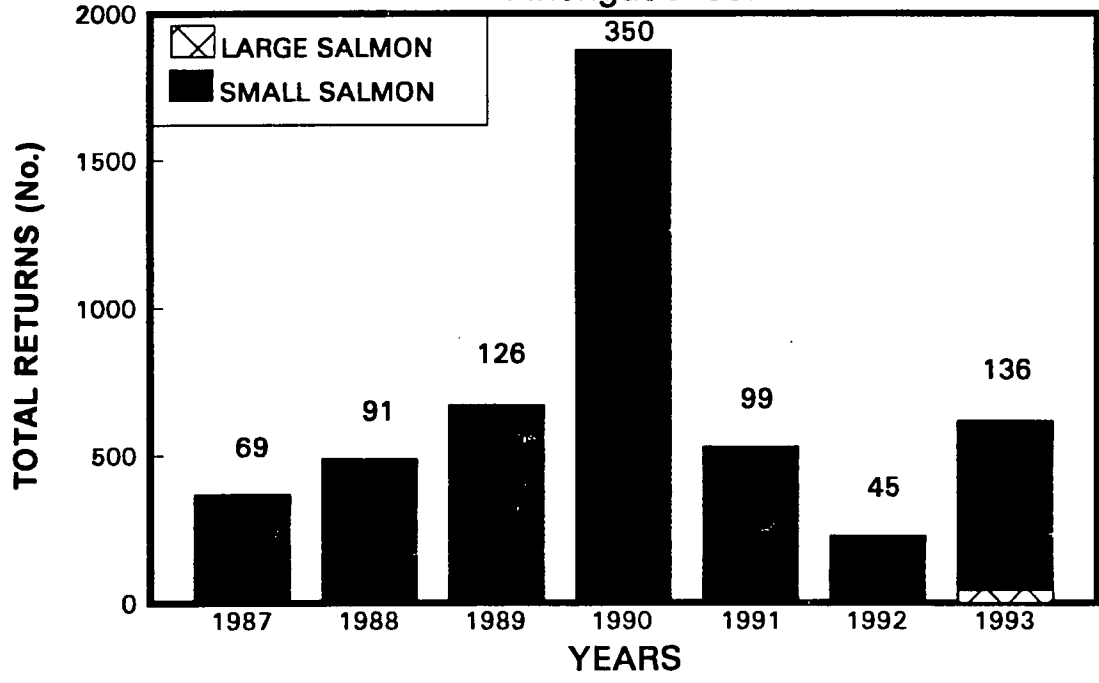
State of the stock: The state of the stock should be assessed in terms of the whole river. The Pinchgut Brook tributary achieved 136% of its target in 1993.

Forecast: No quantitative forecast is possible for 1994.



Catches in 1992 and 1993 are for retained fish only.
 The fishery on Harry's River has been managed by a river quota of 350 small salmon since 1987.

Total Returns & Percent Target Achieved Pinchgut Brook



Numbers above bars represent the percentage target spawning requirement achieved

STOCK: Humber River, SFA 13
TARGET: 28.3 million eggs (~13651 small and 1326 large salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Total angling catch ² :									
Small	4042	1217	3054	1431	4349	4161	1217	6147	3268
Large	144	10	75	11	177	112	10	303	100
Estimated total returns ³ :									
Small	16168	4868	12216	5724	17571	18477	4868	24588	13074
Large	1132	341	855	401	2945	636	341	2945	915
Estimated spawning escapement:									
Small	12126	3651	9162	4293	13222	14316	3651	18441	9805
Large	1132	341	855	401	2945	636	341	2945	850
% Target eggs met (small + large) ^{4,5}									
	80	24	60	27	117	96	24	119	63
¹ MIN, MAX, MEAN are for 1974-1991. ² Angling catch in 1992 and 1993 is estimated based on a creel survey conducted at Big Falls. ³ Total returns for 1988-1991 were estimated based on an angling exploitation rate of 25% adjusted for tag loss and reporting rate. ⁴ Percent of target met, in 1988-1990 is based on biological characteristics. ⁵ The target egg deposition requirement has been adjusted from previous reports to reflect total fluvial and lacustrine habitat.									

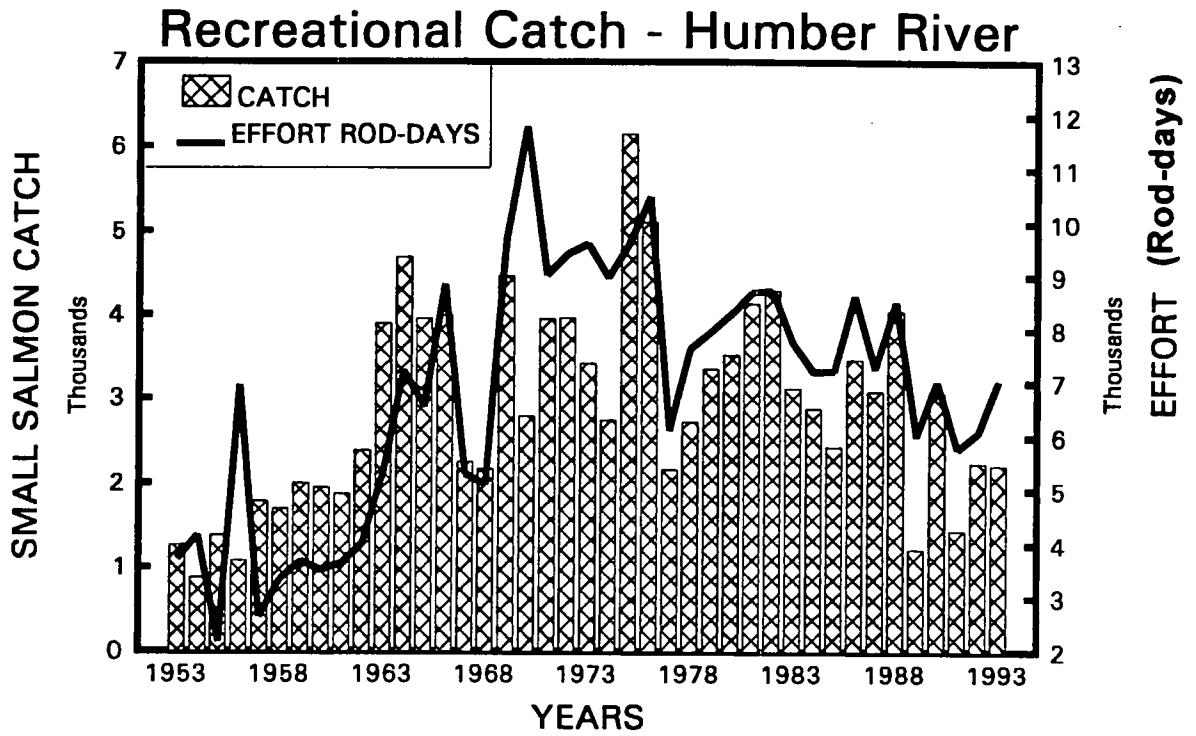
Methodology: Fluvial habitat includes 115,307 units and lacustrine habitat includes 1,751 ha of standing water (excluding Deer Lake - 5930 ha). Target egg deposition is based on 240 eggs per fluvial unit and 368 eggs per ha. of lacustrine area. Target eggs are to come from small and large salmon. Biological characteristics are based on samples from the recreational fishery and from the tagging trap located in the estuary of the Humber River. Returns of small salmon to the river are currently estimated by mark-recapture method. Returns of large salmon in 1993 were assumed to equal 3.5% of small salmon returns as determined from the ratio of large to small salmon in the the tagging trap in 1993. Returns of small salmon in 1992 were based on an angling exploitation rate derived from tags recovered at the Big Falls section of the river by DFO creel survey personnel. The estimate of exploitation rate reported in 1992 had not been adjusted for tag loss but the current value for 1992 includes this adjustment based on a tag loss rate of 23%.

Recreational fishery: The Humber River produces about 40% of the small salmon catch in SFA 13. Recreational catches estimated in 1992 and 1993 were among the highest on the river.

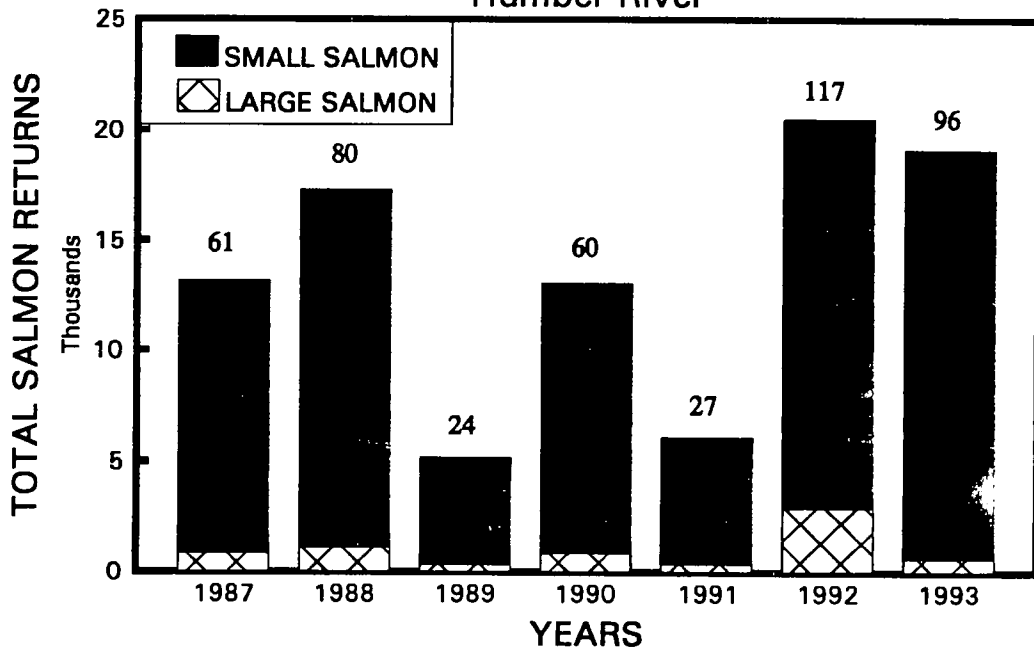
Data and assessment: The 1993 assessment was the fourth assessment of Humber River salmon using the mark-recapture method.

State of the stock: The potential egg deposition in 1974-1991, on average, represented about 63% of the target and egg deposition in 1992 and 1993 were the highest since 1975.

Forecast: No quantitative forecast is possible for 1994.



Total Returns & Percent Target Achieved Humber River



Numbers above bars represent the percentage target spawning requirements achieved.

STOCK: Lomond River (above the fishway), SFA 14(A)
TARGET: 1.1 million eggs (~ 653 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Returns to fishway:									
Small	437	No Counts		435	526	1	440	224
Large	21		Available (89-91)		80	34	0	50	19
Angling catch below fishway:									
Small	404	270	386	328	357	275	203	650	366
Large	25	5	17	10	56	36	2	46	18
Approximate total returns²:									
Small	841	270	386	328	792	801	259	986	590
Large	21	5	17	10	80	34	3	75	31
Known removals above fishway:									
Small					16	22	0	0	0
Large					0	1	0	0	0
Spawning escapement above fishway:									
Small	437				419	504	1	440	224
Large	21				80	33	0	50	19
% of Target eggs met (small + large)³:									
	70				121	118	0	74	37
¹ MIN, MAX, MEAN are for 1974-1988. ² Approximate because of the occurrence of spawning below the fishway. Large salmon were not retained after 1984. ³ Egg depositions in 1992 and 1993 are based on biological characteristics for 1993. Egg depositions for 1974-1988 are based on average biological characteristics for female salmon in 1983-1993.									

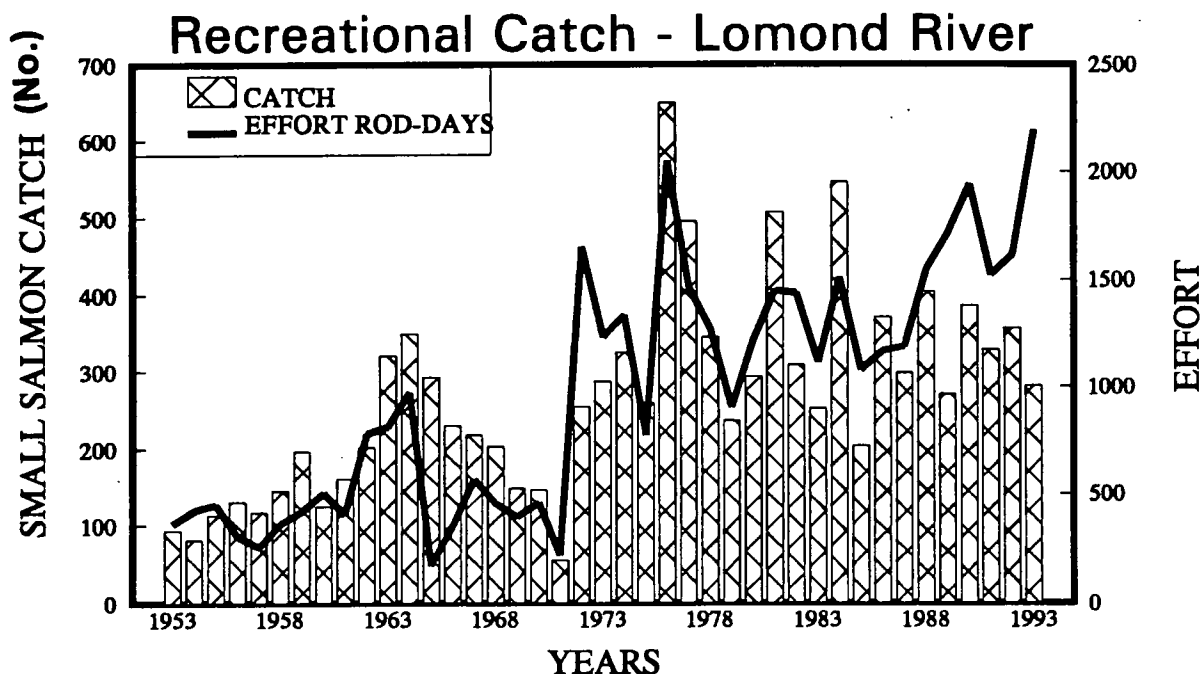
Methodology: Fluvial habitat includes 2,156 (100 sq. m) parr rearing units and 1,570 ha of standing water. Target egg deposition was based on 240 eggs per fluvial unit and 368 eggs per ha of lacustrine area. Target eggs are to come from small salmon. Potential egg deposition was determined from counts of small and large salmon at the fishway and biological characteristics obtained from samples at the fishway and in the recreational fishery.

Recreational fishery: The recreational fishery above the fishway has been closed since 1978. The recreational fishery on the Lomond River has been managed by a river quota of 350 small salmon since 1986.

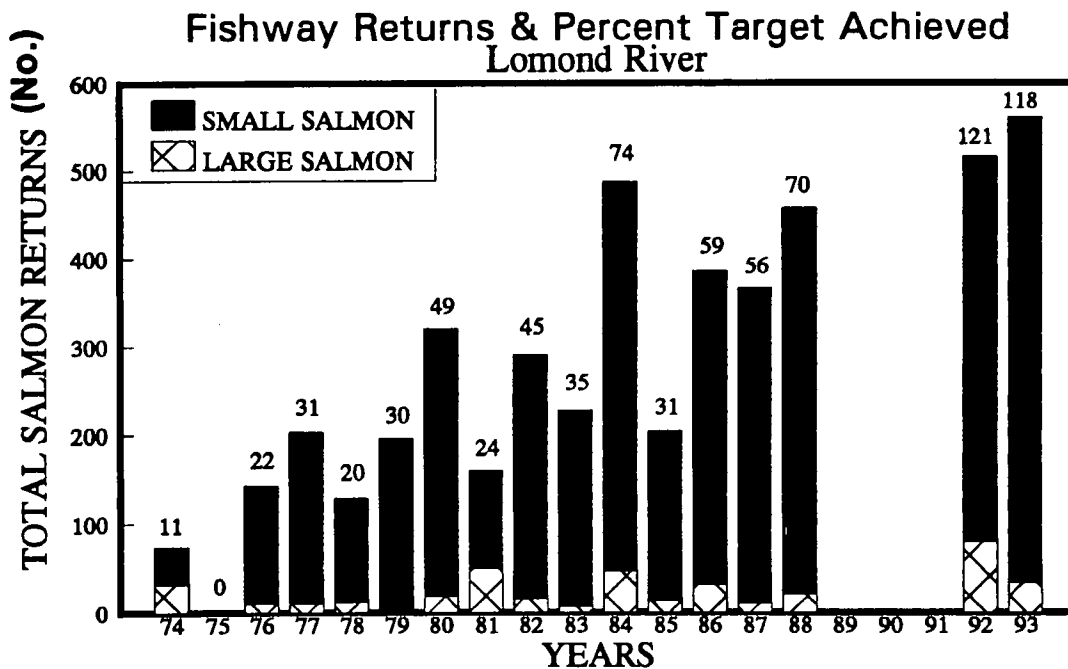
Data and assessment: Counts of salmon using the fishway on Lomond River are available from 1962-1993 with the exception of 1968-1970 and 1989-1991 when the fishway was not monitored.

State of the stock: The state of the stock should be assessed in terms of the whole river. The area above the fishway represents about 40% of the total river area. Potential egg depositions for 1974-1988 averaged 37% of the target. The target was achieved for the first time in 1992 and again in 1993.

Forecast: No quantitative forecast is possible for 1994.



Catches are for retained fish only.
 A recreational quota of 350 small salmon has been in effect since 1986.



Numbers above bars represent the percent target spawning requirement achieved. The fishway was not operated in 1989-1991 but salmon were observed passing through the fishway.

STOCK: Torrent River, SFA 14(A)
TARGET: 1.5 million eggs (~ 867 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Returns to fishway:									
Small	2075	1369	2296	1415	2347	4009	38	2815	1509
Large	44	60	82	73	169	222	3	523	113
Angling catch below fishway:									
Small	313	143	222	150	477	179	0	340	118
Large	0	0	4	1	6	15	0	18	3
Approximate total returns to river²:									
Small	2388	1512	2518	1565	2824	4188	96	3155	1626
Large	44	60	82	73	169	222	7	525	115
Total spawners above fishway:									
Small	2075	1369	2296	1415	2347	4009	138	2815	1533
Large	44	60	82	73	169	222	3	523	113
% of Target eggs met (small + large)³:									
	266	225	221	176	314	538	17	360	195
¹ MIN, MAX, MEAN are for 1974-1991. ² Approximate because of occurrence of spawning below the fishway. ³ Potential egg deposition in 1990-1993 were calculated based on the 1985-1989 mean wt. of 1.6 kg for small and 4.13 kg for large salmon.									

Methodology: Fluvial habitat includes 5,168 (100 sq. m) parr rearing units and the lacustrine habitat includes 2,323 ha of standing water. Target egg deposition is based on 240 eggs per fluvial unit and 105 eggs per ha of lacustrine area. Target eggs are to come from small salmon. Potential egg depositions were determined from the spawning escapement of small and large salmon based on a fecundity of 1783 eggs per kg estimated for Western Arm Brook. Biological characteristics used to calculate the potential egg depositions in 1974-1984 were the mean weight and percent female of small and large salmon in 1985-1989. Potential egg depositions in 1990-1993 were based on the 1985-1989 mean weight of 1.6 kg for small and 4.13 kg for large salmon. Samples were collected at the fishway.

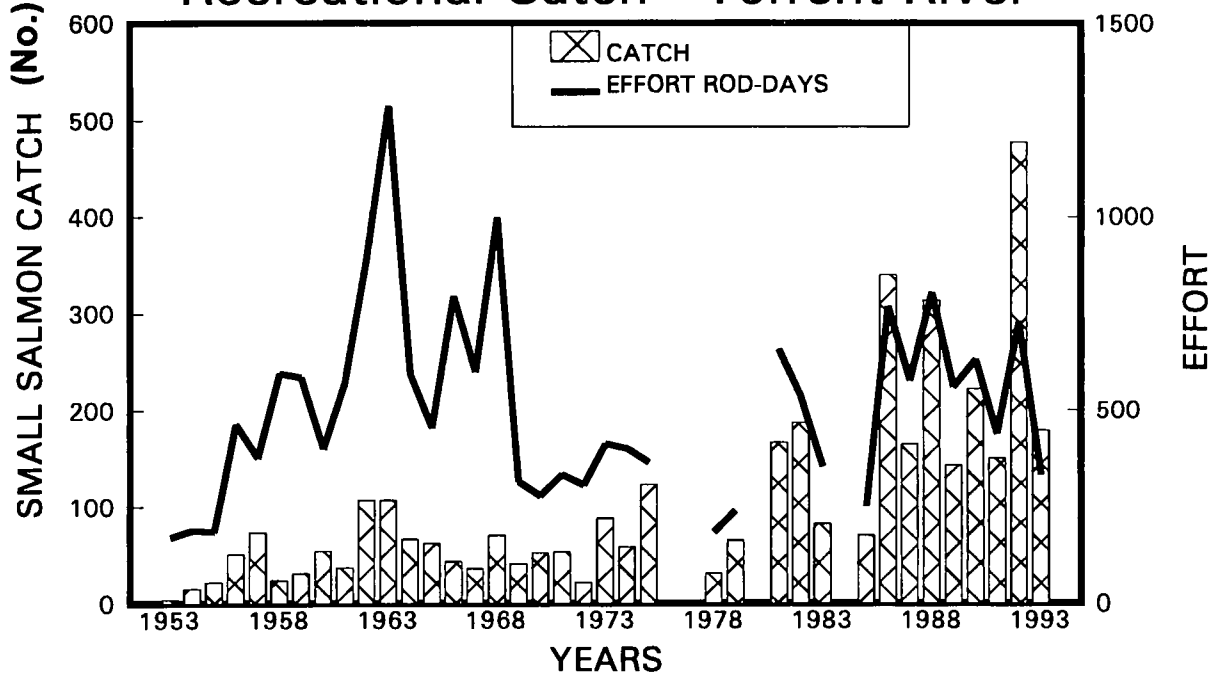
Recreational fishery: The river is not open to angling until 1000 salmon have passed through the fishway. Angling is currently not permitted above the fishway.

Data and assessment: The salmon stock on Torrent River above the fishway was enhanced in 1972-1976 with the transfer of over 700 adult salmon from Western Arm Brook.

State of the stock: It is estimated that the Torrent River stock has averaged about 200% of its target egg deposition since 1974. The potential egg deposition in 1992 was the fourth highest recorded and the egg deposition in 1993 was the highest recorded.

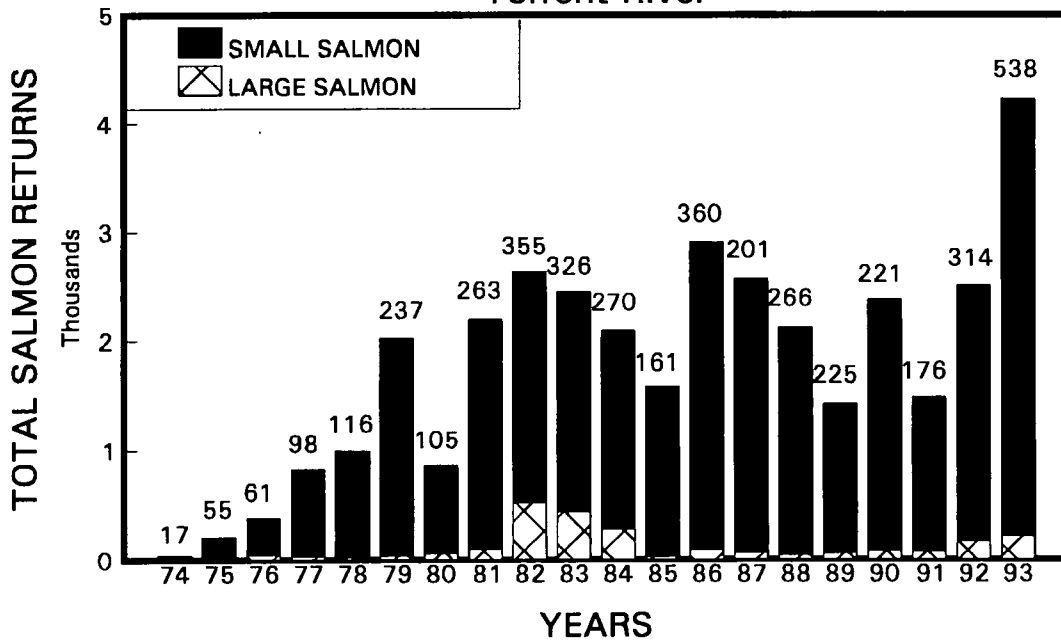
Forecast: No quantitative forecast is possible for 1994.

Recreational Catch - Torrent River



River closed to angling in 1976-1977, 1980 and 1984.
 The SFa 14(A) zonal quota was reached in 1992 and 1993.

Fishway Returns & Percent Target Achieved Torrent River



Numbers above bars represent percent target spawning requirement achieved

STOCK: Western Arm Brook, SFA 14(A)
TARGET: 0.91 million eggs (~ 344 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Returns to counting fence:									
Small	251	455	322	233	480	947	120	1578	492
Large	1	0	0	1	8	8	0	4	1
Angling catch below fence:									
Small	171						0	171	41
Large	0						0	2	0
Total returns to river:									
Small	422	455	322	233	480	947	233	1578	533
Large	1	0	0	1	8	8	0	5	2
Broodstock removals²:									
Small							0	238	23
Large							0	0	0
Spawning escapement above fence:									
Small	251	455	322	233	480	947	120	1578	468
Large	1	0	0	1	8	8	0	4	1
% Target eggs met (small + large):									
	72	144	114	68	151	288	31	287	111
¹ MIN, MAX, MEAN are for 1974-1991. ² Broodstock removals for Torrent River, 1974-1976.									

Methodology: Fluvial habitat includes 2,900 units and lacustrine habitat includes 2,017 ha. of standing water. Target egg deposition was based on 240 eggs per fluvial unit and 105 eggs per ha. of lacustrine area. Target egg requirements are to come from small salmon. Total returns to the river are based on counts at the fence and angling catch below the fence. Potential egg depositions were calculated from the total spawning escapement of small and large salmon based on 1783 eggs per kg of females.

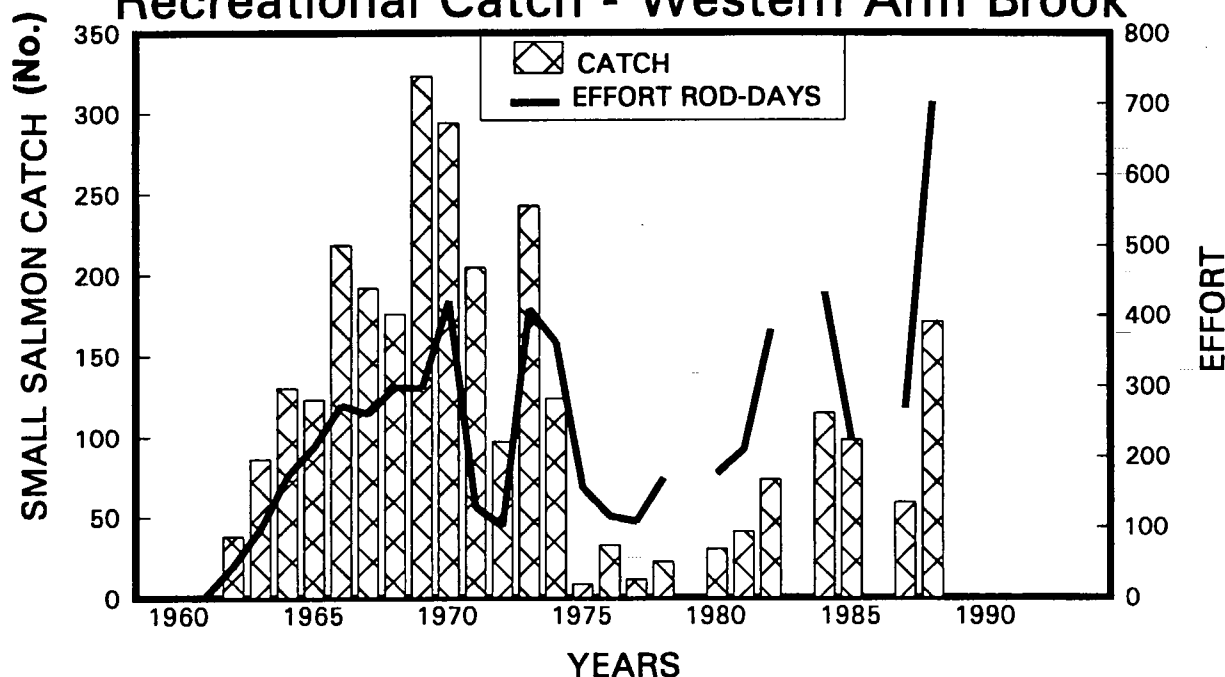
Recreational fishery: The recreational fishery on this river has been closed since 1987 because of high angling exploitation below the counting fence.

Data and assessment: Complete adult and smolt counts at the counting fence are available since 1971. Adult returns in 1990, 1991, 1992, 1993 were 2.8%, 2.2%, 3.6%, and 6.1% of the respective smolt runs.

State of the stock: The percentage of the target egg deposition requirement met in 1993 was the third highest since 1974. The egg deposition in 1974-1991 averaged 111% of the target.

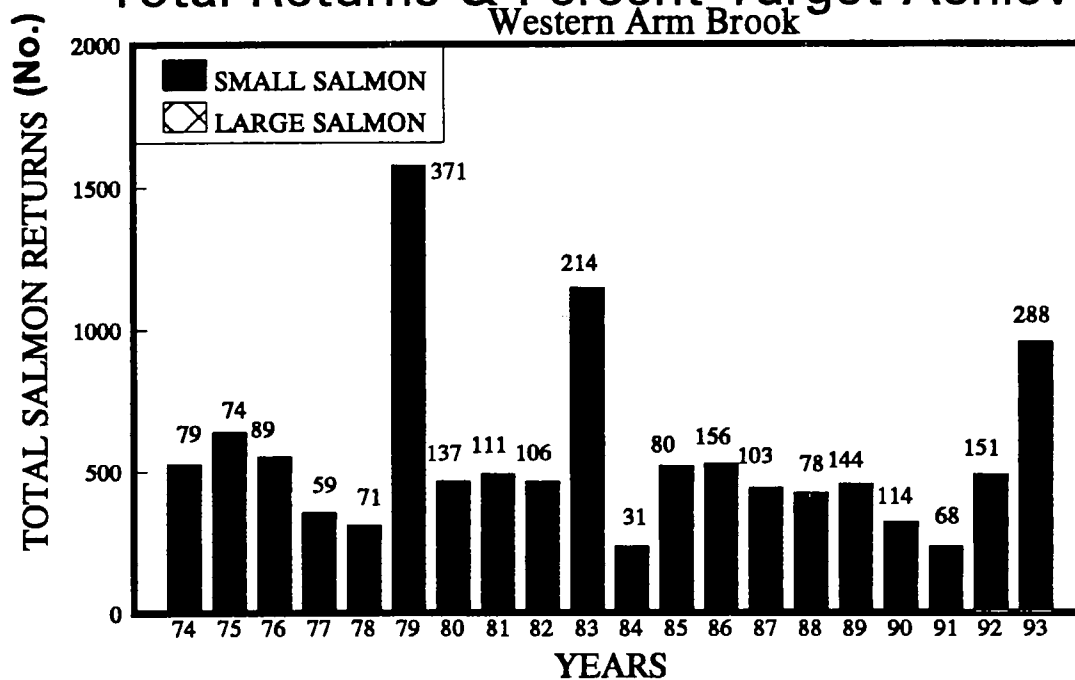
Forecast: The number of smolt counted on Western Arm Brook in 1993 was 13% below the count in 1992. Assuming a sea-survival of 1993 smolts similar to 1992 smolts, the returns of adults to the river in 1994 is expected to be about 13% below the returns in 1993 (or 830 salmon).

Recreational Catch - Western Arm Brook



River closed due to low water levels in 1979 and 1983.
Hook and release only in 1986.

Total Returns & Percent Target Achieved Western Arm Brook



Numbers above bars represent the percentage target spawning requirement achieved

STOCK: Restigouche River, SFA 15
TARGET: 71.4 million eggs (12,200 large salmon, 2,600 small salmon)
REARING AREA: 29,768,000 m², 76% of SFA 15, 30% of Gulf New Brunswick

	1988 ¹	1989 ¹	1990	1991	1992	1993	MIN	MAX	MEAN ²
Angling catch³									
Large	5675	4603	3735	3137	4355	2055	1016 ⁴	6707	4301
Small	6873	3360	4324	2522	4751	3268	896	6873	4366
First Nations' harvest									
Large	1430	1649	1606	1111	1412	1194	129 ⁵	2950	1442
Small	73	163	136	19	55	0	0	178	89
Spawning escapement⁶									
Large	10-18	8-14	6-11	5-9	7-13	3-6	1-2	11-19	7-13
Small	7-16	3-8	4-10	3-6	5-11	3-7	1-2	7-16	4-10
Total returns⁶									
Large (x1000)	15-24	13-20	10-16	9-14	12-19	6-9	6-9	23-30	12-19
Small (x1000)	16-27	8-13	10-17	6-10	11-18	8-12	3-4	16-27	10-17
% egg target met⁶									
	84-148	65-116	53-95	43-78	62-111	28-52	9-20	89-159	61-110

¹ The values for 1988 and 1989 reflect changes resulting from the updating of Quebec angling catches.

² MEAN for years 1988 to 1992.

³ Angling harvests are estimates of hook and release of catches rather than hook and release mortality which was previously reported.

⁴ MIN MAX for years 1970 to present.

⁵ MIN MAX for years 1975 to present.

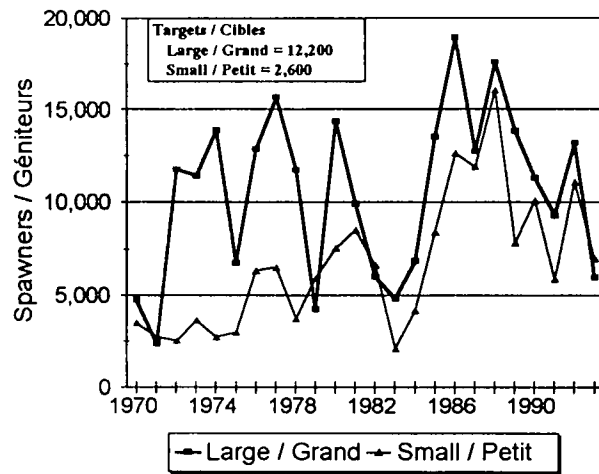
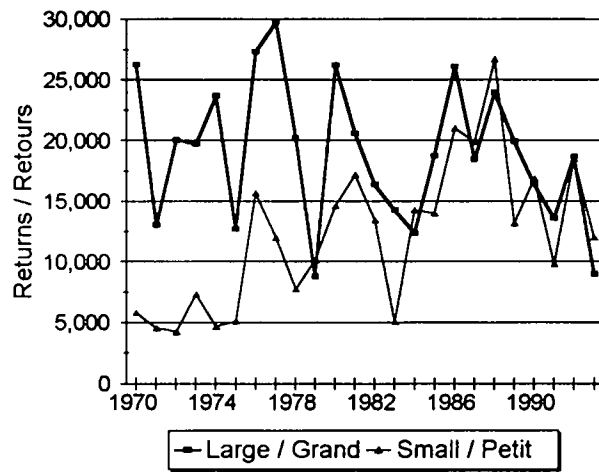
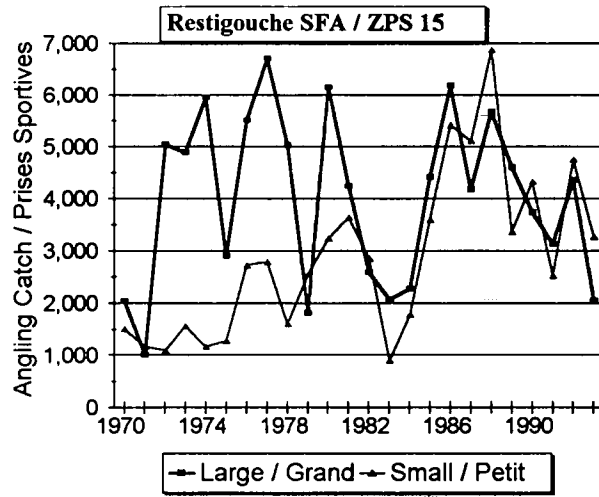
⁶ Range given reflects uncertainty of angling exploitation rate (assumed to be between 0.3 and 0.5 for 1970 to 1992 and mark-recapture and 0.5 for 1993), from which spawning escapement, eggs and total returns are derived.

Landings: First Nations' harvest of large salmon was 17% below the previous five-year average and no small salmon were harvested. Angling catches of large (including catch and release in N.B.) and small salmon in 1993 were 52% and 25% below the five-year means, respectively.

Data and assessment: A mark-recapture experiment formed the basis for river population and spawning escapement estimation for the first time in the Restigouche River in 1993. Angling exploitation rates estimated using these river population estimates and angling catches were 31% and 30% for small and large salmon, respectively compared to the (assumed) rates of 30% to 50% used in previous assessments. Canoe surveys of spawners and salmon counted at headwater protection barriers on the Upsalquitch River and Causapsal River (Matapedia) provide additional indices of spawning escapement. Juvenile salmon densities were estimated from electrofishing at up to 15 standard sites and provide an index of spawning one and two years in the past.

State of the stock: Spawning escapement estimated by mark-recapture was 6,145 large salmon compared to a requirement of 12,200. All indications are that 1993 large salmon total returns were 50% of the 1992 (0.3 angling exploitation rate) value. 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 1994: Based on the mean returns from 1989-1993, between 10,000-16,000 large salmon and between 9,000-14,000 small salmon are expected to return in 1994. There is no evidence to suggest that returns will be significantly different from average. The ranges given reflect upper and lower exploitation rates used in calculating returns, not confidence limits.



STOCK: Nepisiguit River, SFA 15
TARGET: 9.6 million eggs (1363 large salmon, 690 small salmon)
REARING AREA: 3,973,000 m², 30% of SFA 15, 4% of Gulf New Brunswick

	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ²
Angling									
Large (Released)	600	490	300	300	270	258	0	600	392
Small (Retained)	1000	600	500	700	800	470	0	1000	720
First Nations' Harvest									
Large	n/a	n/a	n/a	n/a	n/a	50			
Small	n/a	n/a	n/a	n/a	n/a	200			
Spawning escapement									
Large	2381	1239	1117	1026	336	925	109	2381	1220
Small	2900	309	1593	2164	1092	836	309	2900	1612
Total returns									
Large	2700	1568	1390	1290	642	7084	545	2700	1518
Small	4057	968	2152	2930	1974	1511	562	2930	2416
% egg target met									
	187	92	89	85	29	72	9	187	96

¹ Min, Max for the period from 1982 to 1993.

² Mean for the period from 1988 to 1992.

Landings: Small and large salmon recreational catches were the lowest since 1986.

Data and assessment: Salmon population and spawning escapement of the Nepisiguit has been estimated from returns to a counting fence in conjunction with harvest statistics. For the years 1990, 1991, and 1993 counting fence returns were estimated using the relationship between fence counts and angling catch above the fence. Spawning escapement above the fence was estimated using the distribution of spawning redds. Total returns below the fence were then calculated as the sum of spawning escapement plus removals.

State of the stock: The estimated spawning escapement of large salmon was 336 in 1992 and 925 in 1993, well below requirements for the system. In contrast, escapements of small salmon have exceeded requirements in the last four years.

Forecast: Ricker curve and probability distribution models indicate that returns in 1994 will most likely be between 800 to 1000 large salmon.

STOCK: Tabusintac River, SFA 16

TARGET: 1.9 million eggs (372 large salmon, 200 small salmon)

REARING AREA: 778,000 m², 1% of SFA 15, <1% of Gulf New Brunswick

	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ²
Angling									
Large (Released)	359	165	80	84	488	n/a	25	488	235
Small (Rel + Kept)	180	184	95	154	330	n/a	19	261	189
First Nations' Harvest									
Large					270	101			
Small					126	79			
Spawning escapement									
Large						667			
Small						348			
Total returns									
Large						799			
Small						599			
% egg target met									
						184			

¹MIN and MAX for period from 1969 to 1993.

²Mean is for the period from 1988 to 1992.

Landings: First Nations' catches were 35% to 65% lower in 1993 than 1992. Final estimates of angling catch for 1993 were not available at the time of analysis.

Data and assessment: A mark-recapture experiment was the basis for estimating population size and spawning escapement on the Tabusintac River. Tag recoveries from angling fisheries were used as the recapture sites. Angling catches in the kelt fishery as reported and the bright fishery after adjusting for exploitation rate were used as indices of spawning escapement in past years.

State of the stock: Spawning targets for small and large salmon were met in 1993 and in most years since 1984.

Forecast: No quantitative forecast is possible for 1994.

Stock: Miramichi River, SFA 16
Life Stage: Small and large salmon
Target: 132 million eggs (23,600 large, 22,600 small salmon)

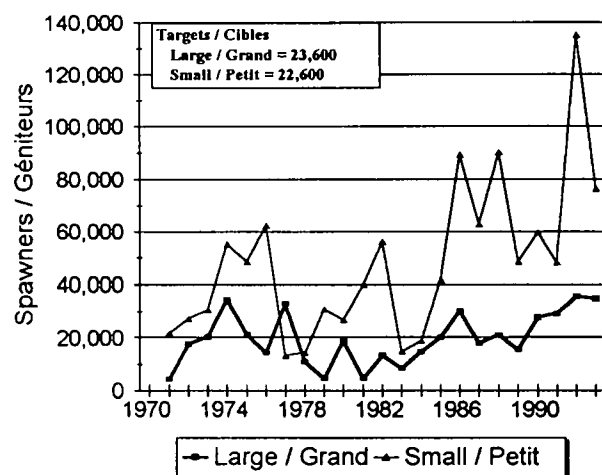
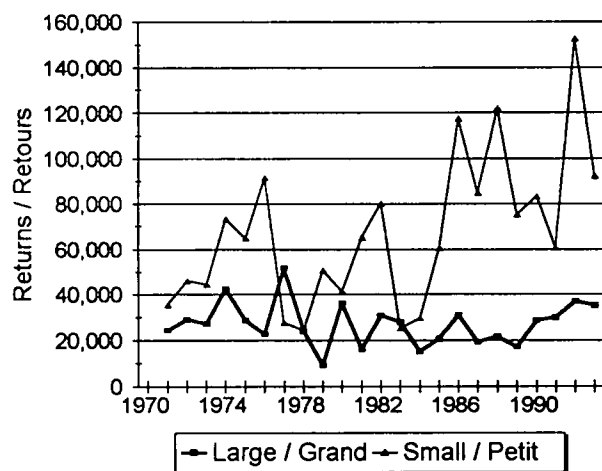
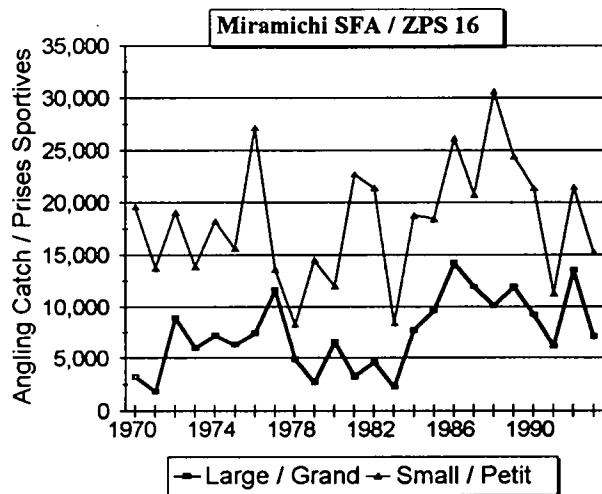
	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ⁷
Angling harvest²									
Large	10090	11928	9258	6147	13525	7082	1792	14223	10189
Small	30620	24426	21372	11300	21509	15271	8265	30620	21845
First Nations' harvest³									
Large	348	540	609	544	608	208	200 ⁵	898 ⁵	530
Small	944	1085	2110	1111	1652	601	100 ⁵	2110 ⁵	1380
Other harvest⁴									
Large	114	153	99	131	142	166	99 ⁶	166 ⁶	128
Small	77	155	142	189	198	236	77 ⁶	236 ⁶	152
Spawning escapement									
Large (x 1000)	21	16	28	29	36	35	4	36	26
Small (x 1000)	90	48	60	48	135	76	13	135	76
Total returns									
Large (x 1000)	22	17	29	30	37	35	9	52	27
Small (x 1000)	122	75	83	61	153	92	24	153	99
% Egg target met	151	98	152	159	242	170	23	242	160
¹ MIN MAX over the period 1971-1991 unless stated otherwise. ² Angling harvests are estimates of hook and release of catch rather than hook and release mortality which was previously reported. ³ First Nations' 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 For 1975 to 1991. ⁶ For 1988 to 1992.									

Recreational catches: Have ranged from 7,685 to 14,266 large and 11,300 to 30,620 small salmon during the past 10 years. Effort in rod-days has increased in recent years. Angling catches for 1993 are preliminary. Large and small salmon catches in 1993 were 25 and 30% below average.

Data and assessment: For 1988-1991, returns were estimated from trap efficiency at a DFO trap operated in the estuary of the Miramichi River at Millbank. The efficiency of this trap was calibrated from tag recapture experiments in 1985 through 1993. Index traps were operated in the estuaries of the Northwest and Southwest Miramichi rivers in 1992 and 1993. Returns of small and large salmon were estimated separately from marks applied at these traps and recaptures upstream. Escapements 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: The probability distribution model prediction for large salmon returns in 1994 is 28,200 with a probability of meeting the spawning target (23,600) of 69% (i.e., a 31% chance of returns being less than 23,600).



STOCK: Northwest Miramichi River, SFA 16
TARGET: 41 million eggs (7316 large, 7006 small salmon)

	1988	1989	1990	1991	1992 ⁵	1993	MIN ¹	MAX ¹	MEAN ⁶
Angling harvest²									
Large	3082	2805	2142	1519	1794	2038	419	3836	2268
Small	9825	7567	6827	3056	6960	5569	2232	9825	6847
First Nations' harvest³									
Large	270	462	502	462	580	54	200	898	455
Small	892	1054	2095	1109	1616	477	100	2110	1353
Other harvest⁴									
Large	25	26	39	44	56	100			38
Small	0	0	0	29	61	106			18
Spawning escapement									
Large (x 1000)	n/a	n/a	n/a	n/a	9	10			
Small (x 1000)	n/a	n/a	n/a	n/a	22	40			
Total returns									
Large (x 1000)	n/a	n/a	n/a	n/a	10	11			
Small (x 1000)	n/a	n/a	n/a	n/a	31	46			
% Egg target met	n/a	n/a	n/a	n/a	198	175			

¹ MIN MAX over the period 1972 to present unless stated otherwise.
² Angling harvests are estimates of hook and release of catch rather than hook and release mortality which was previously reported. 1993 angling values are preliminary.
³ First Nations' harvest includes catch reported by Red Bank, and Eelground Indian Bands.
⁴ Other harvest includes broodstock removals, mortalities at all index traps, and all samples.
⁵ The 1992 values reported last year were preliminary.
⁶ For 1988 to 1992.

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 and large salmon to the Northwest Miramichi River were estimated in 1992 and 1993 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 Northwest Miramichi and in Catamaran Brook. Spawners were estimated as returns minus known and estimated removals.

State of the stock: The spawning target for large salmon was exceeded in 1992 and 1993.

Forecast: Because 1993 is only the second year of data on returns, no quantitative forecast can be made of returns in 1994.

STOCK: Southwest Miramichi River, SFA 16
TARGET: 88 million eggs (15730 large, 15063 small salmon)

	1988	1989	1990	1991	1992 ⁵	1993	MIN ¹	MAX ¹	MEAN ⁶
Angling harvest²									
Large	7008	9123	7116	4628	7682	5044	1373	10387	7111
Small	20790	16858	14545	8244	14549	9702	4570	22137	14997
First Nations' harvest³									
Large	0	0	0	0	0	0			
Small	0	0	0	0	0	0			
Other harvest⁴									
Large	71	78	49	39	75	66			62
Small	0	0	0	39	26	130			13
Spawning escapement									
Large (x 1000)	n/a	n/a	n/a	n/a	27	22			
Small (x 1000)	n/a	n/a	n/a	n/a	106	33			
Total returns									
Large (x 1000)	n/a	n/a	n/a	n/a	27	22			
Small (x 1000)	n/a	n/a	n/a	n/a	121	43			
% Egg target met	n/a	n/a	n/a	n/a	259	150			
¹ MIN MAX over the period 1972 to present unless stated otherwise. ² Angling harvests are estimates of hook and release of catch rather than hook and release mortality which was previously reported. 1993 angling values are preliminary. ³ No First Nations' harvests have occurred in the Southwest Branch. ⁴ Other harvest includes broodstock removals, mortalities at all index traps, and all samples. ⁵ The 1992 values reported last year were preliminary. ⁶ For 1988 to 1992.									

Recreational catches: New Brunswick 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 of small salmon and large salmon to the Southwest Miramichi River were estimated in 1992 and 1993 from a mark-recapture program, applying tags at Enclosure trap and recovering tags from creel surveys, and from fences and barriers in the Southwest Miramichi. Spawners were estimated as returns minus known and estimated removals.

State of the stock: The spawning target for large salmon was exceeded in 1992 and 1993.

Forecast: Because 1993 is only the second year of data on returns, no quantitative forecast can be made of returns in 1994.

STOCK: Richibucto River, SFA 16

TARGET: 2.9 million eggs (575 large salmon, 309 small salmon)

REARING AREA: 1,226,000 m², 2% of SFA 16, 1% of Gulf New Brunswick

	1988	1989	1990	1991	1992	1993	MIN	MAX	MEAN
First Nations' Harvest									
Large					452	253			
Small					61	50			
Spawning escapement									
Large					467				
Small					80				
Total returns									
Large					1119				
Small					142				
% egg target met									
					83	Below target			

Landings: First Nations' harvest was about one half of 1992 values for large salmon in 1993 and about 20% lower than 1992 in 1993 for small salmon. Angling effort is very low on this river and catch is not estimated.

Data and assessment: A mark-recapture experiment formed the basis for population and spawning escapement estimates on the Richibucto River. The First Nations' food fishery was used as the recapture site in 1992. In 1993, insufficient tags were placed to permit a population estimate. Returns and escapement in 1993 were qualitatively assessed assuming the same efficiencies of trapnets in 1993 as 1992 and similar exploitation rates in the First Nations' fishery in 1992 and 1993.

State of the stock: Spawning escapement was met for large salmon in 1992 but not for small salmon. Large and small salmon were below requirements in 1993. This conclusion was based on the decline in trapnet catches (only about 25% as many large salmon were caught in the trapnet in 1993 compared to 1992) and declines in First Nations' harvests of large salmon. Not enough fish were captured to make a mark-recapture population estimate in 1993 so a qualitative assessment was made based on changes in trapnet and First Nations' harvests.

Forecast: No quantitative forecast is possible for 1994.

STOCK: Buctouche River, SFA 16
TARGET: 1.1 million eggs (215 large salmon, 126 small salmon)
REARING AREA: 446,000 m², 1% of SFA 16, <1% of Gulf New Brunswick

	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Angling									
Large		52	47			22	22	52	
Small			16			55	13	55	
First Nations' Harvest									
Large					12	0			
Small					0	0			
Spawning escapement									
Large						28			
Small						18			
Total returns									
Large						79			
Small						62			
% egg target met									
						13			

¹Min and Max for the period from 1984 to 1993. The mean was not calculated because angling catches are not estimated for this river on a consistent basis.

Landings: First Nations did not harvest in 1993 because of suspected low spawning escapement. Angling effort on this river is very small and catch cannot usually be estimated. Estimates of angling catch were possible for 4 out of the last 10 years.

Data and assessment: Population estimates are made using mark-recapture techniques. In 1993, for the first time two trapnets were installed, one as a marking trap and one as a recapture trap. The recapture trap was installed late in the season and did not recapture enough tags for a population estimate. Angling and a gillnet seized by Conservation and Protection Branch during an enforcement patrol served as the recapture sites.

State of the stock: Numbers of spawners were estimated to be only about 14% of the spawning target for this river.

Forecast: No quantitative forecast is possible for 1994.

STOCK: Morrell River, SFA 17
TARGET: 0.5 million eggs (141 large salmon, 66 small salmon) (entire river)
 0.2 million eggs (59 large salmon, 28 small salmon) (above Leard's)
REARING AREA: 200,000 m², 7% of SFA 17,
 Above Leard's Pond 84,300 m² 42% of Morrell River

	1988	1989	1990	1991	1992	1993	MIN	MAX	MEAN
Angling									
Large	n/a								
Small	643	167	768	657	781	n/a	0 ¹	781 ¹	603 ¹
First Nations' Harvest									
Large	n/a								
Small									
Spawning escapement									
Large									
Small									
Total returns									
Large	89	125	63	39	46	11	1 ²	12 ²	72 ²
Small	1394	335	409	327	907	628	2 ²	1394 ²	674 ²
% egg target met									

¹ Min, Max Mean for the period from 1970 to 1993.

² Min, Max, Mean for the period from 1988 to 1992.

Landings: No First Nations' fisheries data or catch from angling were available for 1993.

Data and assessment: Catch and effort data were not available for the angling fishery for 1993. Counts of returning salmon are made at the Leard's Pond fishway.

Broodstock requirements: 130 large salmon and 39 small salmon (400,000) eggs are required for enhancement on the Morell and other P.E.I. rivers.

State of the stock: A surplus of hatchery return small salmon has been realized since 1986. The combined egg deposition of female small and large salmon released above Leard's Pond fishway has met or exceeded spawning requirements since 1986. Returns of wild large and small salmon to the Leard's Pond fishway are low indicating poor wild production on this portion of the river.

Forecast: The salmon run on the Morell River is the result of extensive habitat restoration and salmon enhancement activities on the system and continues to be composed predominantly of hatchery return salmon (1989-1993 average of 92%). In 1993 over 19,000 smolts were stocked into the Morell and, given a return rate of 3.5%, approximately 700 adipose clipped grilse could return to the Morell in 1994.

STOCK: River Philip (SFA 18)
TARGET: 2.3 million eggs (358 large, 75 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ²	MAX ²	MEAN ²
Angling harvest¹									
Large ¹	328	407	191	421	322	356	69	421	331
Small	169	114	155	164	179	171	12	179	156
First Nations' harvest									
Large	-	-	-	-	-	50			-
Small	-	-	-	-	-	0			-
Total returns									
Large	458	566	279	578	461	493	279	578	468
small	384	254	362	360	398	383	169	398	352
Spawning escapement									
Large	452	561	276	573	457	438	276	573	464
Small	286	187	268	262	292	280	124	292	259
% of Egg target met (large)									
	126	157	77	160	128	136	77	160	130
¹ All angling catches are NS license stub estimates. MSW angling catch for 1986 to present is hook-and-release estimates. ² Min, Max are for 1986 to 1993. Mean for 1988 to 1992.									

Recreational catches : Angling catches of large salmon in 1993 were above 1992 and the previous 5-year means. Small salmon catches were below 1992 but above the 5-year mean.

Methodologies: All the target eggs are to come from large salmon. Biological characteristics are based on data from East River (Pictou Co.) stock. Most of the angling catch occurs in October. Assessment of returns is based on license stub angling catches adjusted to correspond to historical kill estimates which are then weighted by exploitation rates derived from fall angling fisheries in the Margaree River. Returns, escapements and percent of target based on median values are from simulation which is why returns minus removals do not necessarily equal escapement.

State of the stock: Escapements and egg depositions by large salmon have exceeded target requirements in five of the last six years. Small salmon target escapement exceeded in all years.

Forecast: No quantitative forecast is possible for 1994.

STOCK: East River (Pictou Co.) (SFA 18)
TARGET: 1.8 million eggs (281 large, 59 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ²	MAX ²	MEAN ²
Angling harvest¹									
Large	422	670	299	440	371	203	203	670	397
Small	129	87	109	121	111	57	57	129	97
First Nations' harvest									
Large	-	-	-	-	-	139			-
Small	-	-	-	-	-	-			-
Total returns									
Large	585	942	407	619	523	429	407	942	615
small	303	196	247	270	251	137	137	303	253
Spawning escapement									
Large	579	933	403	614	519	287	287	933	610
Small	223	143	182	200	184	95	95	223	186
% of Egg target met (large)									
	206	332	143	219	185	102	102	332	217
¹ All angling catches are NS license stub estimates. MSW angling catch for 1986 to present is hook-and-release estimates. ² Min, Max are for 1986 to 1993. Mean for 1988 to 1992.									

Recreational catches : Angling catches of large salmon were down 50% from 1992 and the previous 5-year mean. Small salmon catches were also down 50%.

Methodologies: All the target eggs are to come from large salmon. Biological characteristics are based on data from East River (Pictou Co.) stock. Most of the angling catch occurs in October. Assessment of returns is based on license stub angling catches adjusted to correspond to historical kill estimates which are then weighted by exploitation rates derived from fall angling fisheries in the Margaree River. Returns, escapements and percent of target are based on median values from simulation which is why returns minus removals do not necessarily equal escapement.

State of the stock: Escapements and egg depositions by large salmon have exceeded target requirements in five of the last six years. Small salmon target escapement was exceeded in all years except 1993.

Forecast: No quantitative forecast is possible for 1994.

STOCK: West River (Antigonish Co.) (SFA 18)
TARGET: 0.4 million eggs (113 large, 0 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ²	MAX ²	MEAN ²
Angling harvest¹									
Large	126	218	200	294	277	235	126	476	245
Small	67	90	152	65	136	72	65	152	103
First Nations' harvest									
Large	-	-	-	-	-	-	-	-	-
Small	-	-	-	-	-	-	-	-	-
Total returns									
Large	175	316	284	414	398	325	175	649	317
small	147	200	342	146	312	159	147	342	229
Spawning escapement									
Large	173	314	281	410	395	323	173	645	315
Small	108	147	253	108	233	116	108	253	170
% of Egg target met (large)									
	153	278	249	363	350	286	155	574	278
¹ All angling catches are NS license stub estimates. MSW angling catch for 1986 to present is hook-and-release estimates.									
² Min, Max are for 1986 to 1993. Mean for 1988 to 1992.									

Recreational catches : Angling catches of large salmon in 1993 were down 13% from 1992 but up 5% from previous 5-year mean. Small salmon catches were 30% below the 5-year mean.

Methodologies: All the target eggs are to come from large salmon. Biological characteristics are based on data from South River (Antigonish Co.) stock. Most of the angling catch occurs in October. Assessment of returns is based on license stub angling catches adjusted to correspond to historical kill estimates which are then weighted by exploitation rates derived from fall angling fisheries in the Margaree River. Returns, escapements and percent of target are based on median values from simulation which is why returns minus removals do not necessarily equal escapement.

State of the stock: Escapements and egg depositions by large salmon have exceeded target requirements in all years since 1986.

Forecast: No quantitative forecast is possible for 1994.

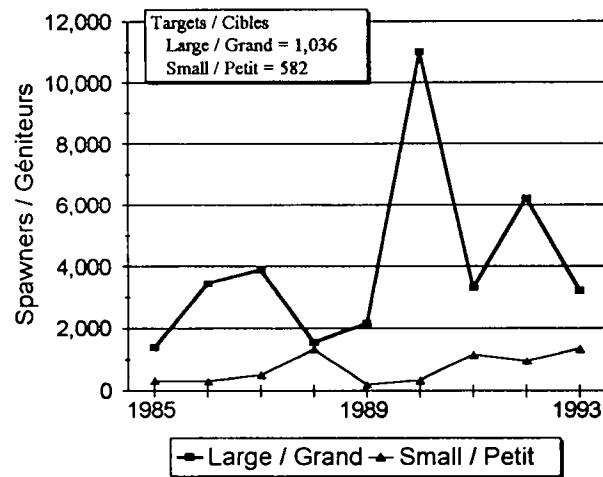
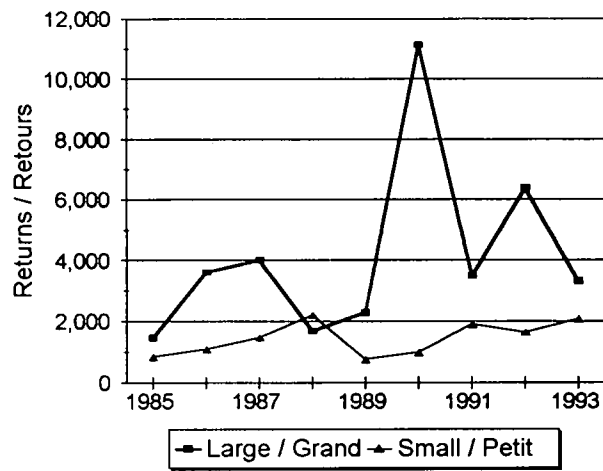
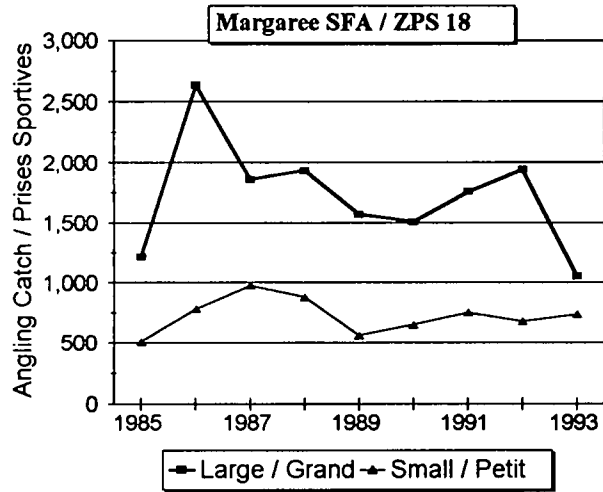
STOCK: Margaree River (SFA 18)
TARGET: 6.7 million eggs (1,036 large, 582 small salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ²	MAX ²	MEAN ²
Angling harvest¹									
Large	1932	1570	1507	1757	1938	1051	305	2636	1741
Small	879	561	649	752	678	735	242	977	704
First Nations' harvest									
Large	-	-	-	1	-	58			-
Small	-	-	-	2	-	8			-
Total returns									
Large	1688	2289	11144	3484	6375	3358	1462	11144	4996
small	2209	768	997	1909	1645	2087	768	2209	1506
Spawning escapement									
Large	1545	2164	11010	3323	6222	3224	1378	11010	4853
Small	1330	207	348	1157	954	1339	207	1339	799
% of Egg target met (MSW + 1SW)									
	149	209	1063	321	601	311	133	1063	469
¹ All angling catches are NS license stub estimates. Angling catches for large salmon are hooked and released. For small salmon previous estimates were based on creel surveys. Because these numbers have changed the spawning escapement and percent of egg target met numbers have been updated.									
² Min, Max are for 1985 to 1993. Mean for 1988 to 1992.									

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 large 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 assessment of returns is based on mark-recapture techniques. Prior to 1992, returns were estimated from angling catches and annually calculated exploitation rates in the angling fishery.

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 2266 large salmon in 1989, the predicted recruitment in 1994 should be about 4300 large salmon.



STOCK: Middle River, SFA 19
TARGET: 2.07 million eggs (80 small salmon, 470 large salmon)

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
First Nations	UK	UK	UK	UK	UK	UK			
Recreational catch:									
Small	52	51	107	27	11	29	0	158	37
Large	148	276	197	186	30	46	9	27	84
Counts by divers:									
Wild									
Small		7	53	18	56	2	2	56	276
Large		323	208	244	211	31	31	323	203
Hatchery									
Small		5	16	0	0	0	0	16	4
Large		25	26	10	1	1	1	26	13
Proportion covered:		0.55	0.83	1	0.96	0.55	0.55	1	0.78
Estimated post angling population:		655	365	272	279	62	62	655	327
% Adults required:		119	66	49	51	11	11	119	59

¹1974-93 for the recreational catches and for the period shown for all other means.

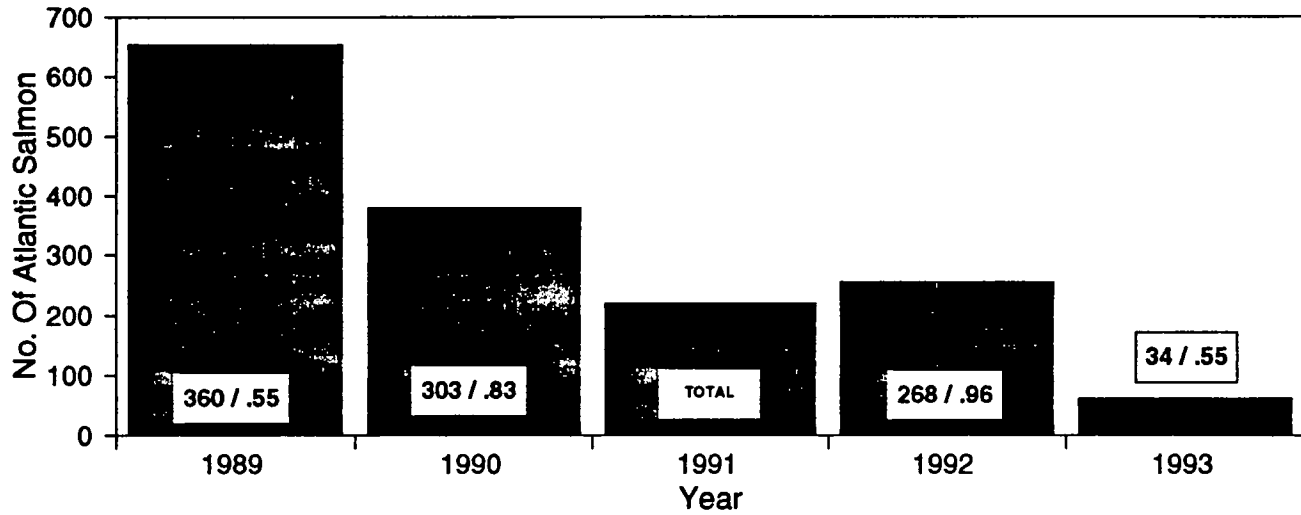
Harvests: First Nations fisheries occur outside the estuary and river. About 130 large salmon have been allocated to the Wagmatcook Band since 1983. These salmon are traditionally harvested in gillnet fisheries in the Bras D'or Lake adjacent to Wagmatcook. Other Bands have harvested within the river. Few salmon were harvested in 1993.

Data and assessment: Annual counts of adult salmon are conducted by teams of divers following the closure of the recreational fishery. Counts cover from 100% to 55% of the holding area in the main river and have recorded up to 65% of the target requirement before population estimates were made.

State of the stock: Estimates of escapements have declined steadily since 1989 and were critically low in 1993.

Forecast: No quantitative forecast is possible for 1994.

Fall population estimates of Atlantic salmon Middle River, Victoria County (boxed information is numbers counted/proportion of river swum by divers).



S TOCK: Grand River, SFA 19.
TARGET: 1.1 million eggs

Year	1988	1989 ¹	1990	1991 ¹	1992	1993	MIN ²	MAX ²	MEAN ²
First Nations' fisheries			24	39	UK	UK			
Recreational catch									
Small	338	307	416	115	139	113	115	416	263
Large	105	74	98	15	46	22	15	105	68
Broodstock	33	25	18	19	10				
Count at fishway									
Small	554	512	527	234	114	91	114	554	388
Large	31	25	27	18	18	5	18	31	24
% Hatchery	NA	NA	43	45	38	45	38	45	42
Correction for by-pass									
Small	55	51	52	176 ⁵	40	32	40	176	75
Large	54	19	20	14	14	4	14	54	24
Total above fishway	694	607	626	442	186	132	186	694	511
Population below fishway (estimate)	143	UK	UK	UK	UK	UK			
% Angled above	UK ⁶	42 ³	31 ³	31 ³	31 ³	31	31	42	34
Required spawning escapement	539	545	545	545	545	545			
Estimated escapement ⁴	736	453	442	348	143	102	143	736	424
% of Adults required	136	83	83	64	26	19	26	136	78

¹ In-season variation closures.

² For the period 1988-1992; not shown where only 1988-1992 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 the 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 small salmon of 43% was estimated from broodstock collected above the fishway (8 of 14 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.

Forecast: No quantitative forecast is possible for 1994.

STOCK: Liscomb River above Liscomb Falls Fishway, SFA 20
TARGET: Under development for this acid-stressed river.

Year	1988	1989	1990	1991	1992	1993	MIN ¹	MAX ¹	MEAN ¹
Recreational catch (1SW) ^a	138	65	177	68	19	11	19	289	61
Counts:									
Wild 1SW	477	532	955	586	145	132	145	1614	694
Wild MSW	76	75	44	38	27	11	27	117	69
Hatchery 1SW	431	288	438	178	125	128	125	766	366
Hatchery MSW	44	71	22	22	12	12	12	108	48
Total	1028	966	1459	824	309	283	309	2279	1176
Egg deposition/m ^{2b}	1.2	1.2	1.6	0.9	0.4	0.34	0.4	2.5	1.5
Return rate of hatchery smolts									
1SW(%)	1.38	0.6	1.56	0.79	0.5	0.42	0.35	2.75	1.31
MSW(%)	0.23	0.23	0.05	0.08	0.05	0.05	0.05	0.23	0.14
¹ For the period 1985-1992.									
^a below fishway; harvest and release									
^b above fishway									

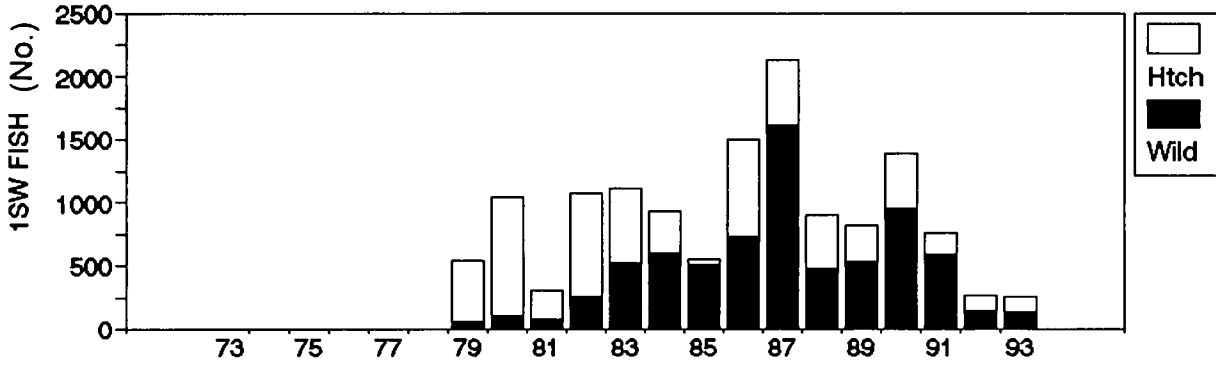
Recreational catches: No retention of MSW fish since 1984; 1SW catches (1985-1993) have ranged from 11 in 1993 to 289 in 1987. Prior to 1993 the recreational fishery was limited to the 5 km of river below the fishway.

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

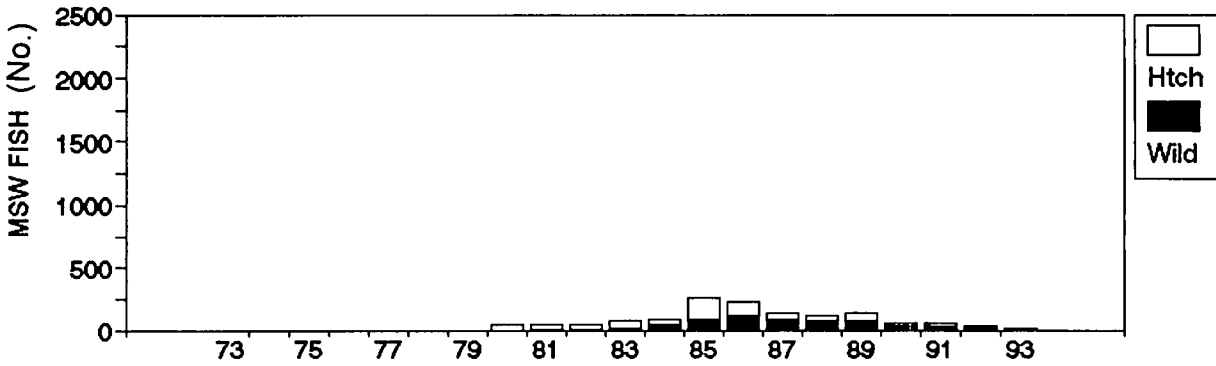
State of the stock: Since 1979, target egg requirements according to the 2.4 eggs/m² have been met only in 1987; a significant contribution to egg deposition comes from hatchery-origin fish of the Liscomb River stock. The 1993 escapement resulted in an egg deposition of approximately one-seventh (14%) of nominal target.

Forecast: Forecasts of 1SW returns are not possible. An annually-updated relation between 1SW returns in year t and MSW returns in year t + 1 predicts a return of 27 MSW salmon (p<0.05; 90% CI 0-86) in 1994.

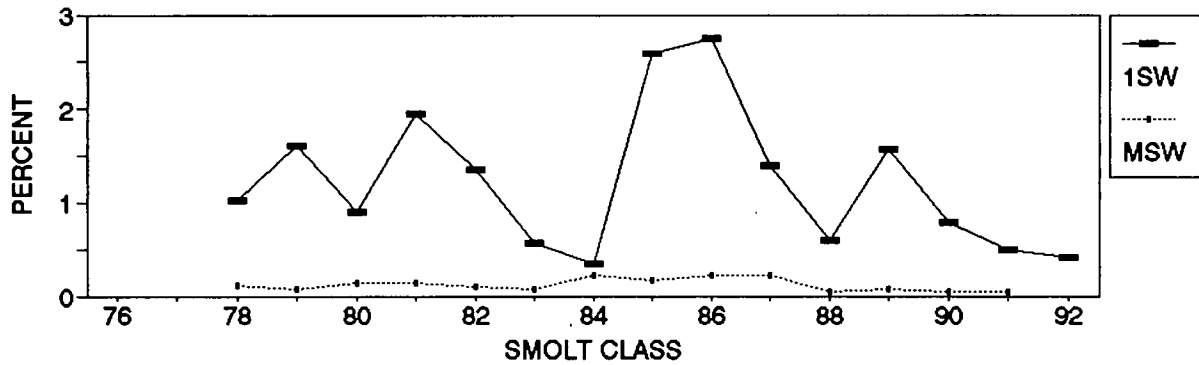
TOTAL 1SW COUNT LISCOMB FALLS



MSW COUNT LISCOMB FALLS



HATCHERY SMOLT RETURNS TO LISCOMB FALLS



STOCK: LaHave River above Morgan Falls Fishway, SFA 21
TARGET: Under development for this acid-stressed river

Year	1988	1989	1990	1991	1992	1993 ¹	MIN ²	MAX ²	MEAN ²
Harvest:									
Recreational									
-small ³	1585	2411	2008	233	1058	1655	233	2411	1459
Counts:⁵									
- Wild 1SW	2464	2087	1880	495	1915	777	495	2464	1768
- Wild MSW	390	511	396	236	215	121	215	511	350
- Hatchery 1SW ⁴	1056	443	596	109	558	381	109	1056	552
- Hatchery MSW ⁴	59	183	112	90	59	84	59	183	101
	3969	3224	2984	930	2747	1363	878	4214	2771
Return rate of hatchery smolts:									
- 1SW (%)	3.92	1.89	1.72	0.87	2.33	1.37	0.87	3.92	2.15
- MSW (%)	0.23	0.61	0.39	0.22	0.44	0.36	0.22	0.61	0.38
¹ Preliminary data.									
² For the period 1988-1992.									
³ Retained catch taken mostly below the enumeration site.									
⁴ Mostly as a result of smolt releases.									
⁵ Errors corrected from prior publications.									

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.

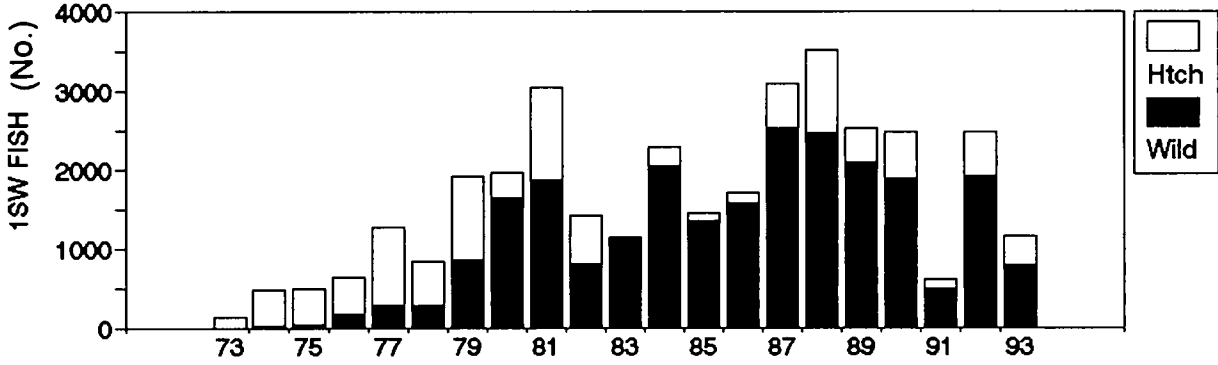
Data and assessment: Spawner counts are made at a fishway at a natural falls, 25.3 km above tidehead.

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. The estimated egg deposition in 1993 is 2.4 eggs m⁻², without any downward adjustment for instream losses above Morgan Falls.

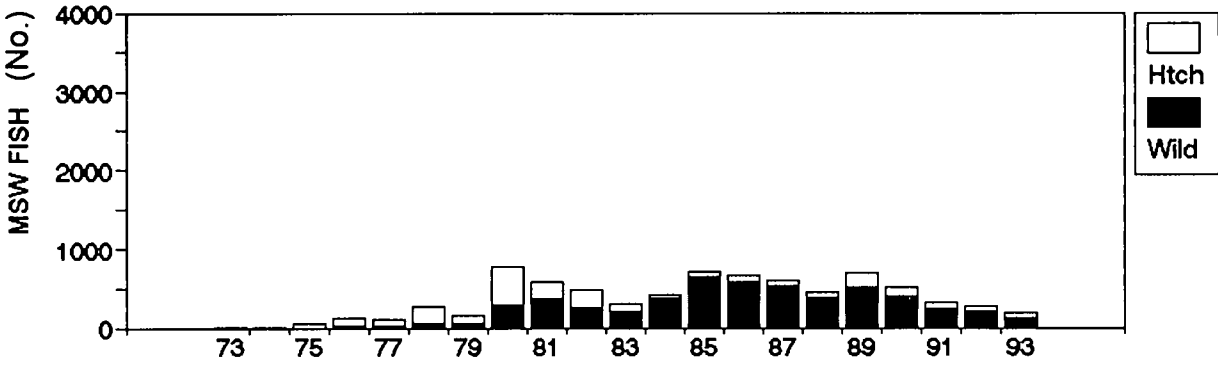
Conditions in 1993: River discharge during the angling season declined, but was adequate until mid-August when low flows persisted until mid-October.

Forecast: A significant regression (n=19) of wild MSW counts at Morgan Falls on wild 1SW counts at Morgan Falls in the previous year forecasts a count of 202 MSW salmon in 1994. A significant regression (n=20) of hatchery-return MSW counts at Morgan Falls on hatchery-return 1SW counts there in the previous year forecasts a count of 98 MSW salmon in 1994.

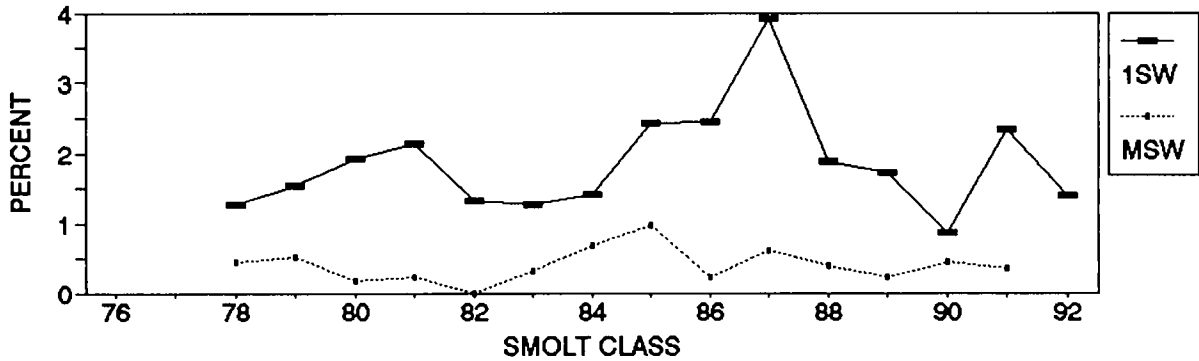
TOTAL 1SW COUNT MORGAN FALLS



TOTAL MSW COUNT MORGAN FALLS



HATCHERY SMOLT RETURNS TO MORGAN FALLS



STOCK: Saint John River, N.B. (above Mactaquac) SFA 23
TARGET: 29.4 million eggs (4,400 MSW and 3,200 1SW fish)

Year	1988	1989	1990	1991	1992	1993 ³	MIN	MAX	Mean
Harvest:									
First Nations									
- small	300	560	273	657	560	241	241 ²	657 ²	470 ²
- large	1200	240	247	957	748	462	240 ²	1200 ²	678 ²
Recreational:									
- small	1755	2304	2110	1690	2104	852	852 ¹	3580 ¹	2248 ¹
Counts:									
- 1SW	9191	9587	7907	7575	7664	3907	3907 ¹	17314 ¹	8793 ¹
- MSW	2600	4291	3919	4226	4203	2980	2010 ¹	10451 ¹	5164 ¹
Returns:									
- 1SW	10180	10861	8804	8751	8940	4369	4369 ¹	19275 ¹	10235 ¹
- MSW	3537	4541	4125	5215	4898	3389	3389 ¹	13916 ¹	7356 ¹
Spawning:									
- 1SW	7810	7533	6057	5721	5128	2819	2819 ²	7810 ²	6450 ²
- MSW	1704	3491	3202	3481	3269	2149	1704 ²	3491 ²	3029 ²
% of Target met:									
- 1SW	244	235	189	179	160	88	88 ²	244 ²	201 ²
- MSW	39	79	73	79	74	49	39 ²	79 ²	69 ²
- Eggs	50	95	85	87	81	51	50 ²	95 ²	80 ²
¹ For the period 1975-1992.									
² For the period 1988-1992.									
³ Preliminary data.									

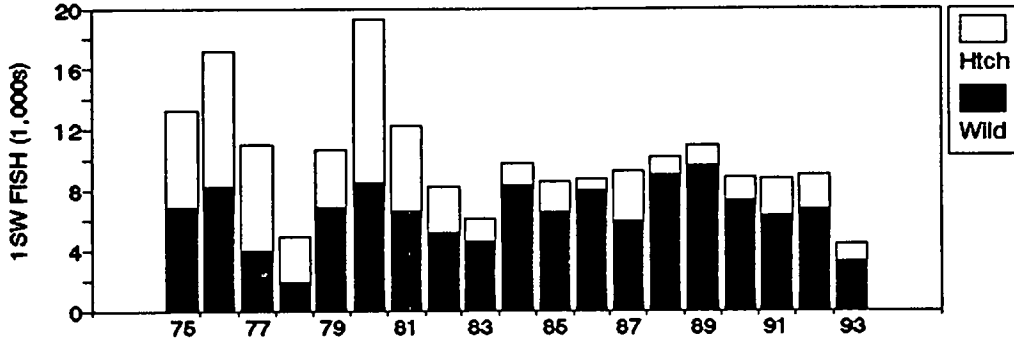
Harvests: The harvest by First Nations reflects poor river returns, voluntary lifting of some nets and a late closure for conservation purposes. MSW salmon have not been retained since 1984; 1SW harvests were the lowest in 20 years because of low returns and a reduced angling season.

Data and methodology: Counts of fish were obtained from the collection facility at Mactaquac the Dam; returns to the Dam equal counts plus estimates of down river removals. Spawners equal releases above Mactaquac minus estimates of upriver removals, not including poaching and disease.

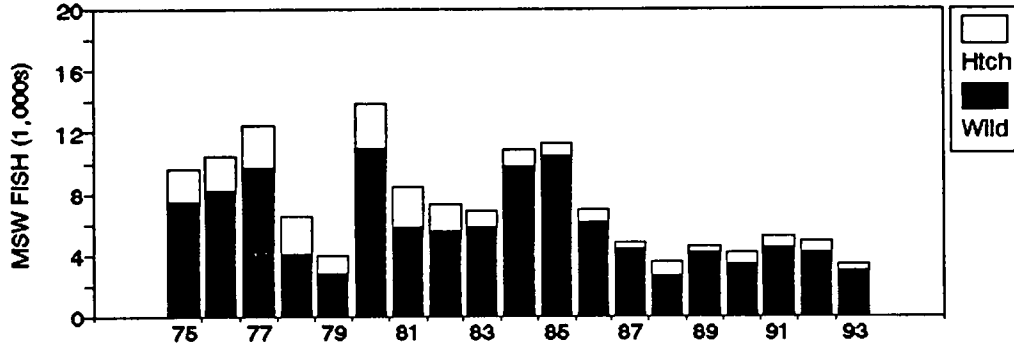
State of the stock: 1SW and MSW returns were the fewest in 19 years. Egg deposition (nearly all from MSW fish) was 51% of the requirement; the target has not been met since 1985. Hatchery fish comprised 26% of 1SW and 13% of MSW returns; return rates for hatchery smolts were virtually the lowest on record.

Forecast: 1SW returns destined for Mactaquac in 1994 could number 8,000 fish (6,400 wild and 1,600 of hatchery origin). However, because of the very low marine survival in 1993 and, quite possibly in 1994, returns like those of 1993, could be only one-half of the forecast value. In any event, the return should exceed the target spawning requirements of 3,200 1SW fish above Mactaquac. Forecast MSW returns destined for Mactaquac in 1994 could number 3,100 (2,300 wild and 800 of hatchery origin) or 4,800 fish (3,600 wild and 1,200 of hatchery origin) depending on models supposing either none or total benefits, respectively from the moratoria in distant fisheries. The model that ascribed no benefits from the moratorium in Newfoundland best forecasted the 1993 MSW return but the reason may have been the low marine survival. Neither MSW forecast fully accounts for potentially low marine survival in the winter of 1994 or the fact that the 1SW and fork length data used to predict MSW returns were, together, outside the range of data in the models. Therefore, it is likely that MSW returns will be inadequate, with incidental losses below Mactaquac and the removal of 400 MSW broodstock at Mactaquac, to meet the 4,400 target spawning requirements for MSW fish above Mactaquac or requirements for salmon development initiatives in the Aroostock River and above Grand Falls. Early in-season forecasts are the best basis for determining a toleratable level of harvesting in 1994.

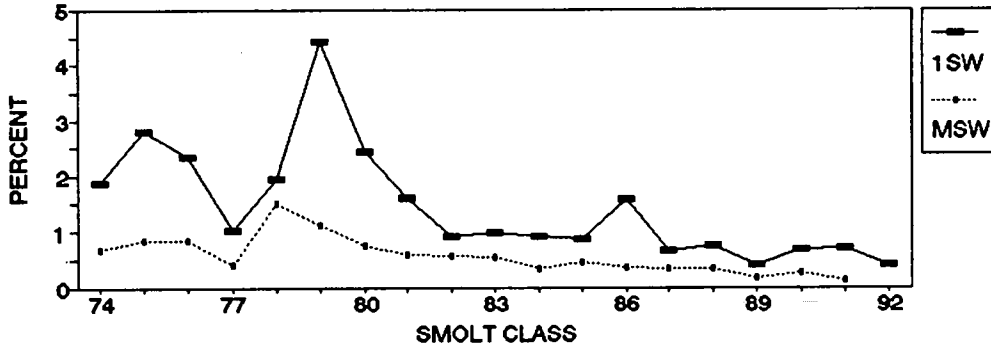
EST 1SW RETURNS DESTINED FOR MACTAQUAC



EST MSW RETURNS DESTINED FOR MACTAQUAC



HATCHERY SMOLT RETURNS TO MACTAQUAC



EGG DEPOSITION ABOVE MACTAQUAC

