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THE STATUS OF ATLANTIC SALMON STOCKS IN GULF OF ST. LAWRENCE,
WESTERN NEWFOUNDLAND AND SOUTHERN LABRADOR, 1993.

by

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ABSTRACT

On the basis of recreational catches and counts at counting facilities, it appears that the returns of small salmon to SFA 12 and 13 rivers in 1993 were below those in 1992, and compared to the six years prior to the commercial moratorium (1986-1991); however, small salmon in SFA 14(A) and to a lesser extent in SFA 14(B) were above those in 1992 and the 1986-1991 mean; substantial increases in returns of large salmon were also noted in SFAs 13, 14(A), and 14(B). Salmon stocks in SFAs 12 and 13 were not expected to benefit as much from the commercial moratorium as other areas of insular Newfoundland because commercial exploitation on these stocks should have already been reduced prior to the moratorium due to previous management measures.

RÉSUMÉ

D'après les prises des pêcheurs sportifs et les statistiques recueillies aux installations de dénombrement, il apparaît qu'en 1993 les montaisons de petits saumons dans les rivières des ZPH 12 et 13 ont été inférieures à celles de 1992 ainsi qu'à celles des six années qui ont précédé le moratoire sur la pêche commerciale (1986-1991); toutefois, les montaisons de petits saumons dans la ZPS 14 (A) et, dans une moindre mesure, dans la ZPS 14(B) ont été bien supérieures à celles de 1992 et à la moyenne de 1986-1991; on a aussi constaté une hausse notable des montaisons de grands saumons dans les ZPS 13, 14(A) et 14 (B). On ne s'attendait pas à ce que les stocks de saumon des ZPS 12 et 13 bénéficient du moratoire sur la pêche commerciale autant que ceux de l'île de Terre-Neuve, car leur exploitation commerciale aurait déjà dû diminuer avant le moratoire, du fait des mesures de gestion qui l'ont précédé.

INTRODUCTION

The western Newfoundland and southern Labrador, Gulf of St. Lawrence fisheries management area is comprised of three Salmon Fishing Areas (SFA's 12, 13, 14) (Figure 1). Salmon Fishing Area 14(A) (Northern Peninsula) and 14(B) (southern Labrador) are administrative sub-areas of Salmon Fishing Area 14. These sub-areas were established in 1991 in order to reflect the difference in run-timing of Atlantic salmon between the two geographic areas in the development of management plans (Mullins and Jones, 1992).

The status of Atlantic salmon stocks in western Newfoundland and southern Labrador in 1993 is assessed by: 1) comparing commercial and recreational harvests and fishing effort in 1993 with historical harvests and effort; 2) comparing counts of adult salmon and smolts returning to counting facilities with returns in previous years; and 3) examining the effect of management restrictions on fisheries harvests and counting facility returns.

Commercial Fishery

The five year moratorium, imposed in 1992, on the commercial salmon fishery in SFA's 13 and 14(A) and in other areas of insular Newfoundland, continued in 1993.

The only commercial fishery for salmon which remained open in the western Newfoundland and southern Labrador management area was in southern Labrador, SFA 14(B). The quota for this fishery was set at 8 t, a reduction of 5 t from the 1992 quota (Table 1). The monitoring of the southern Labrador quota in 1993 was similar to 1991 (Mullins and Jones, 1992). Only landings from the communities in Section 50(a) (Figure 2) were deducted from southern Labrador quota of 8 t. The landings in Section 50(b) were deducted from the quota for northern Labrador (SFA 2, north of Cape Charles; Figure 1), as in 1991.

The number of licensed salmon fishers in southern Labrador in 1993 was reduced to 30 from 79 in 1992. This was the result of a voluntary surrender of licenses for financial compensation.

Commercial gear restrictions in southern Labrador for 1993 were unchanged from those in 1992 or in previous years (Mullins and Jones 1991). Fishers were limited to a maximum fixed gillnet length of 200 fathoms and a mesh size of 127 mm. Gillnets are usually about 3 fathoms (60 meshes) in depth.

Recreational Fishery

The recreational quotas (zonal quotas) introduced in 1992 (Mullins and Jones, 1993), continued in 1993. However, the 1993 quotas were equivalent to the average catch in 1987-1991 instead of 1989-1991 as in 1992. This resulted in an increase in the SFA 12, 13 and 14(B) quotas (Table 1). The 1993 quotas were also split on a percentage basis between June 5-July 31 and August 1-Sept. 6 to reflect the proportion of the catch traditionally taken during these time periods in each SFA (Table 1).

Catch and release only fisheries were permitted when zonal quotas or individual river quotas were reached. The 1993 zonal and river quotas are given in Table 2. No new river quotas were introduced in 1993.

Recreational seasons were essentially unchanged since 1985. The season opening and closing dates in 1993 (Table 2) were changed from previous years only to accommodate a Saturday opening and Sunday closing. These dates, as in previous years, were subject to within-season closures due to low water levels and quotas being reached.

The zonal quotas in SFA 12, 13 and 14(A) were for small (< 63 cm) salmon but in SFA 14(B), the quota was for the total catch of small and large (≥ 63 cm) salmon.

The seasonal bag limit of **8 fish**, introduced in 1992 remained in effect in 1993. Anglers in southern Labrador (SFA 14(B)) could retain a maximum of **4 large salmon** as part of the seasonal bag limit in 1993. The daily bag limit in 1993 was **one fish per day**, reduced from **two** in 1992. The catch and release limit of **4 fish per day** was in effect for the entire season in 1993, as for 1992, however, anglers in 1993 were permitted to catch and release salmon after the daily bag limit was reached.

MATERIALS AND METHODS

Commercial and recreational Atlantic salmon catch statistics have been updated from those in Mullins and Jones (1993), therefore, summary tables in this document may differ slightly from those in previous reports. This difference is most relevant to 1989-1992 commercial harvests because of a delay in receiving purchase slips from some buyers.

Commercial catches in southern Labrador, as in previous years, were compiled from fish plant sales slips and from Supplementary 'B' slip records of local sales. Supplementary 'B' slips were compiled by Inspection and Conservation and Protection Branch personnel. In 1993, as in 1990-1992 because of weekly quota monitoring, local sales were first compiled weekly, then monthly totals were entered on Supplementary 'B' slips. Previous to 1990, local sales were reported monthly, by community, directly onto Supplementary 'B' slips (Jones and Mullins, 1992; Claytor et. al. 1991; Ash and O'Connell 1986).

Commercial catches in the communities of Carroll's Cove, Camp Islands and Cape Charles in Section 50(b) (Figure 2), were deducted from the quota for northern Labrador (SFA 2, north of Cape Charles) in 1992, as in 1991. These catches were compiled as part of the SFA 14(B) catch statistics, as in previous years.

Recreational catch statistics in 1993, were compiled from weekly salmon angling reports completed by river guardians throughout the angling season, as in previous years (Mullins and Claytor 1989). Catch statistics of both retained and released small salmon were compiled in 1992 and 1993. Catch statistics of released large salmon have been compiled since 1985, when the release of these fish was made mandatory. Catches in the summary tables are the sum of retained and released fish. The total recreational effort includes the effort during both the retention and the catch and release fisheries.

Commercial and recreational catches of Atlantic salmon in 1993 were compared with average historical catches for years in which salmon management plans were similar. Years with similar salmon management were 1974-1977, 1978-1983, 1984-1989. Management plans introduced in 1978-1983 resulted in a shortening of commercial and recreational seasons from those in 1974-1977 for conservation of large salmon stocks. Management plans in 1984-1989 included closure of the SFA 12 commercial fishery to reduce interception of non-Newfoundland origin salmon. In 1990, to achieve conservation targets in western Newfoundland and southern Labrador rivers, commercial quotas were introduced in SFA's 13 and 14. These quotas were reduced in 1991 (Mullins and Jones, 1992) and again in 1992 for southern Labrador. A five moratorium was imposed on the Newfoundland commercial fishery in 1992. This document compares recreational catches in 1992 and 1993 with the 1984-1989 mean which was prior to the beginning of quota regulations in the commercial fishery. The 1986-1991 mean is also used for comparison because it represents catch levels in the six years immediately prior to the commercial moratorium.

Atlantic salmon returns to counting facilities on selected rivers were determined by DFO personnel or DFO supervised personnel in 1993. All data were compiled by DFO personnel. The periods of operation of these facilities were similar to previous years:

SFA	Counting Facility	Date of Operation
12	LaPoile River counting fence	June 16 to July 31
13	Highlands River counting fence	May 18 to June 16
13	Romaines River counting fence	June 28 to October 12
13	Pinchgut Brook counting fence	June 17 to October 18
13	Hughes Brook counting fence	July 2 to September 21
13	Humber River Mark-Recapture	June 2 to August 31
13	North Brook counting fence	August 4 to September 14
14(A)	Lomond River fishway	June 26 to September 25
14(A)	Bound Brook counting fence	August 16 to September 24
14(A)	Torrent River fishway	June 28 to October 12
14(A)	Western Arm Brook counting fence	May 26 to October 19

RESULTS

CATCH SUMMARIES

There was no redistribution in the timing of recreational angling effort in 1993 relative to 1992, as a result of the mid-season split zonal quotas. The distribution of effort between the two quota allocation periods of June 5-July 31 and August 1-September 5 in 1993 was not substantially different from 1992 or the 1984-1991 mean in SFAs 12, 14(A) or 14(B) (Text Table 1). The greatest difference was in SFA 13 but the lower effort in 1993 relative to 1992 may have been more related to high water levels early in the season rather than a redistribution of effort because of zonal quotas. The SFA 13 quota was not reached in 1993. Management measures implemented in 1992 and 1993 do not appear to have changed the pattern of angling effort especially in SFAs 12, 14(A) and 14(B). Therefore, direct comparisons of total (retained + released) recreational catches and effort in 1992 and 1993 with those prior to implementation of zonal quotas may be made with some confidence.

Text Table 1. Recreational effort (rod-days) and proportion of effort occurring prior to July 31 in 1993, 1992 and 1984-1991 for Salmon Fishing Areas 12-14(B).

Year	12	13	14(A)	14(B)
1993	2,799 0.83	14,923 0.66	12,238 0.69	4,101 0.77
1992	2,439 0.86	18,819 0.87	10,554 0.62	3,555 0.77
1984-91 Mean	2,716 0.87	17,149 0.79	11,244 0.72	3,646 0.79

Salmon Fishing Area 12

The SFA 12 recreational quota of 665 small salmon for June 5 to July 31 was reached on July 25 and the quota of 35 small salmon for August 1 to September 6 was reached on August 9 (Table 2). The fishery remained open for catch and release angling after the quotas were reached. The length of the season for retention of salmon in SFA 12 was about five weeks longer in 1993 than in 1992.

The largest catches, in 1993, of small and large salmon and the largest effort in the area were on LaPoile River as in 1992 (Table 3).

The total recreational effort in 1993 was 18.8% above the effort in 1992, 5% above the 1984-1989 mean and 13.8% above the 1986-1991 mean (Table 4). The total catch (retained + released) of small salmon, however, was 18.6% below the catch in 1992, 20.1% below the 1984-1989 mean and 3.1% above the 1986-1991 mean. The catch of large salmon was 71.8% below the catch in 1992 and 31.3% below the 1984-1989 mean but similar to the 1984-1991 mean. The total catch of small and large salmon was 22.1% below the total catch in 1992, 20.4% below the 1984-1989 mean and similar to the 1986-1991 mean. CPUE in 1993, based on the total catch was 35.7% above the 1992 value, 25.0% below the 1984-1989 mean and 10.0% below the 1986-1991 mean.

The number of small salmon released in 1993 was 17.2% of the total (retained + released) catch of small salmon, compared to 42.2% in 1992 (Table 5). This was probably the result of the lower recreational quota in 1992 which was reached about five weeks earlier than in 1993 and resulted in anglers releasing more small salmon during the catch and release fishery than in 1993.

The lower CPUE in 1993 compared to 1992 resulted from higher effort in 1993 and much lower numbers of large salmon angled (Table 5).

The trend of increasing angling effort in SFA 12 continued in 1993 (Figure 4). The recreational effort in 1993 was similar to the years of highest effort which occurred between 1984 and 1989. However, the total catch of small and large salmon did not show a corresponding increase following the closure of the SFA 12 commercial fishery in 1984.

The proportion of large salmon in the recreational catches, which in 1992 had been the highest since 1977, was among the lowest recorded, in 1993 (Figure 5).

Recreational catches of small and large salmon (retained + released) in SFA 12 indicate a lower abundance in 1993 compared to 1992, which was the first year of the commercial moratorium, and compared to the 1984-1989 mean. The commercial fishery in SFA 12 has been closed since 1984, therefore, the commercial moratorium introduced in 1992 was expected to have less of an impact in this area than in other areas of Newfoundland. The increase in numbers of large salmon angled in 1992, however, suggests that it did result in a reduction in commercial interception of SFA 12 large salmon or increased sea-survival of previously spawned small salmon. If the moratorium had not been in place in 1993, the returns of large salmon to SFA 12 rivers would have been even lower.

Salmon Fishing Area 13

The SFA 13 recreational quota of 5,200 small salmon was not reached in 1993. However, the individual river quotas on Barachois River, Harry's River, Fox Island River and Serpentine River, were reached (Table 2). The individual river quotas on Fischell's Brook, Flat Bay Brook and the Adies Lake portion of the Humber River, were not reached in 1993.

The largest catches and effort in the area, as usual, were from the Humber River and the Grand Codroy River (Table 5). The Humber River prosecuted the largest effort and the largest catch of small salmon, however, the Grand Codroy produced the largest catch of large salmon.

The SFA 13 total recreational effort in 1993 was similar to the effort in 1992 and the 1984-1989 and 1986-1991 means (Table 4). The catch of small salmon retained in 1993 was 6.3% below the catch in 1992, 19.1% below the 1984-1989 mean and 16.4% below the 1986-1991 mean. The total catch (retained + released) of small salmon was similar to the catch in 1992 and the 1984-1989 and 1986-1991 means. The catch of large salmon was 22.7% below the catch in 1992 but was more than 100% above the 1984-1989 and 1986-1991 means. The total catch of small and large salmon was only 3.7% below the catch in 1992, equivalent to the 1984-1989 mean and 3.3% above the 1986-1991 mean. CPUE, based on the total catches was 6.3% below the 1992 value and similar to the 1984-1989 and 1986-1991 means.

The catch of small salmon released in 1993 was 14.0% of the total (retained + released) catch of small salmon, compared to 8.9% in 1992 (Table 6). The number of small salmon released went up in 1993, in spite of the quota not being reached. In 1993, the only designated catch and release fishery in SFA 13 was on individual rivers (Table 2). The increase in released catches may be related to anglers being permitted to release up to four fish after the daily bag limit was reached. Had the daily bag limit not been reduced to one fish in 1993 but remained at the 1992 level of two fish per day, it is likely that the SFA 13 zonal quota would have been reached.

The total recreational catch of small salmon in 1992 and 1993 indicates that the abundance of small salmon in SFA 13 has not improved as a result of the commercial moratorium. The individual river quotas on Fischell's Brook and Flat Bay Brook were not caught in 1993, suggesting that salmon stocks on these rivers, in particular, are continuing to decline even with the commercial fishery closed. The quota on Flat Bay Brook was first set in 1986 at 400 small salmon. It was reduced to 300 in 1987-1988 and was further reduced to the present level of 250 small salmon in 1989 which has been reached in only two of the last five years (Text Table 2). The quota of 200 small salmon on Fischell's Brook which was set in 1989 equivalent to the previous five year mean catch, has never been reached. It is recommended that either the quotas on these rivers be reduced to reflect the 1989-1993 mean catch, or they be closed entirely and closely monitored.

Text Table 2. Individual river quotas in SFA 13, 1989-1993 and catches. '**' = quota reached.

River Name	Quota	1993	1992	1991	1990	1989
Barachois R.	175	230*	263*	68	138	79
Fischell's Bk.	200	157	133	157	116	17
Flat Bay R.	250	173	211	251*	277*	130
Harry's R.	350	319	311	370*	706*	324
Fox Island R.	50	52*	52*	56*	91*	38
Serpentine R.	150	150*	176*	132	131	107

In the past five years, the river quota on Barachois River was reached in two years; the quota on Harry's River was reached in three years; the quota on Fox Island River was reached in four years; and the quota on Serpentine River was reached in two years.

Recreational catch statistics indicate that the closure of the commercial fishery in 1992 resulted in a significant increase in returns of large salmon to SFA 13 rivers (Table 5). Catches of large salmon in 1992 and 1993 were above the upper 95% confidence limit of the 1984-1989 and 1986-1991 means. The proportion of large salmon angled in 1992 and 1993 was the highest recorded for SFA 13 rivers since the late 1970's (Figure 5), suggesting that the commercial fishery continued to intercept a large numbers of SFA 13 large salmon, in spite of the SFA 12 commercial fishery being closed since 1984.

Salmon Fishing Area 14(A)

The SFA 14(A) recreational quota of 2,925 small salmon for June 12 to July 31 was reached on July 19 and the quota of 975 small salmon for August 1 to September 6 was reached on August 7 (Table 2). The fishery remained open for catch and release angling after each quota was reached. The total length of the recreational season for retention of salmon in 1993, was about two weeks shorter than in 1992, as a result of the June 12 to July 31 quota being reached. Neither of the three individual river quotas in SFA 14(A) in 1993 was reached before the zonal quota was reached (Text Table 3).

Text Table 3. Individual river quotas in SFA 14(A), 1989-1993 and catches. '**' = quota reached.

River Name	Quota	1993	1992	1991	1990	1989
Lomond R.	350	281	357*	328	386*	270
Watson's Bk.	50	20	49*	6	36	6
Pincent's Bk.	10	2	0	3	10*	6

The largest individual river catches in 1993 were on River of Ponds and Portland Creek (Table 3). As in 1992, River of Ponds had the largest catch of small salmon and Portland Creek had the largest catch of large salmon. The catch of large salmon on Portland Creek was 24.9% above the 1992 catch, and 479.5% above the 1984-1989 mean (Table 3). The total catch of small salmon on River of Ponds, however, was 8.3% below the catch in 1992.

The SFA 14(A) recreational effort in 1993 was similar to effort in 1992 and 15.1% above the 1984-1989 and 1986-1991 means (Table 4). The total (retained + released) catch of small salmon in 1993, was 11.3% above the catch in 1992 and about 28% above the 1984-1989 and 1986-1991 means. The total catch of large salmon was almost identical to the catch in 1992 and was 375.9% and 268.6% above the 1984-1989 and 1986-1991 means, respectively. The total catch of small and large salmon was only 10.7% above the catch in 1992, 34.6% above the 1984-1989 mean and 33.1% above the 1986-1991 mean. CPUE, based on total catches, was 6.1% above the 1992 value and 20.7% above the 1984-1989 and 1986-1991 means (Table 4).

The catch of small salmon released in 1993 was 33.9% of the total (retained + released) catch of small salmon, compared to 10.0% in 1992 (Table 7).

Recreational catch statistics indicate that the closure of the commercial fishery in 1992 resulted in a significant increase in the return of small and large salmon to SFA 14(A) rivers. The catch of small salmon in 1993 and the catches of large salmon in 1992 and 1993 were above the upper 95% confidence limit of both the 1984-1989 and 1986-1991 means, suggesting a significant increase in abundance relative to the years immediately prior to the commercial moratorium (Table 7). The proportion of large salmon angled in 1992 and 1993 was the highest since 1977 in SFA 14(A) (Figure 6), suggesting that the former commercial fishery intercepted a large portion of SFA 14(A) large salmon.

Salmon Fishing Area 14(B)

The SFA 14(B) recreational quota of 1,400 small and large salmon was not reached in 1993 (Table 2). The 1992 quota of 1,100 fish had been reached (Mullins and Jones, 1993).

The largest catches of small and large salmon in the area, were on the Pinware River, as in previous years (Table 3).

Recreational effort in 1993 was about 14% above the effort in 1992 and the 1984-1989 mean and was 8.3% above the 1986-1991 mean (Table 4). The catch of small salmon retained was 22.3% above the catch in 1992 but about 20% below the 1984-1989 and 1986-1991 means. The total catch of small salmon was 58.8% above the catch in 1992, 12.4% above the 1984-1989 mean and 10.3% above the 1986-1991 mean. The catch of large salmon retained was almost identical to the catch in 1992 and 46.7% above the 1984-1989 mean and 70.4% above the 1986-1991 mean. The total catch of large salmon was 14.3% above the catch in 1992, 64.8% above the 1984-1989 mean and 91.5% above the 1986-1991 mean. CPUE, based on the total catches was 32.0% above the 1992 value, 6.5% above the 1984-1989 mean and 10.0% above 1986-1991 mean (Table 4).

The catch of small salmon released in 1993 was 28.3% of the total (retained + released) catch of small salmon, compared to only 7.5% in 1992 (Table 8). The catch of large salmon released was 11.0% of the total (retained + released) catch of large salmon. Because the zonal quota was not reached in SFA 14(B), these released catches in 1993 are directly attributable to the introduction of the one fish per day bag limit and the seasonal limit of four large salmon. Had these conservation measures not been in place, the total retained catch of small and large salmon would have been about 34.0% higher.

Recreational catch statistics indicate that commercial quotas and the reduction of commercial effort in SFA 14(B) along with the closure of the Newfoundland commercial fishery in 1992, resulted in a substantial increase in the return of small and large salmon to SFA 14(B) rivers. The returns of large salmon, in particular, have increased relative to the long-term means. The proportion of large salmon angled in 1992 and 1993 was the highest since the late 1970's (Figure 7), suggesting that the commercial exploitation on SFA 14(B) large salmon has been reduced by the recent management measures.

The numbers of large salmon retained and the angling effort in SFA 14(B) did not decrease in 1993, compared to 1992, in spite of the introduction of the seasonal bag limit of four large salmon. It is speculated that the increasing angling effort in southern Labrador since 1984, continues to be focused primarily on large salmon.

It is possible, that the increase in the numbers of large salmon retained relative to small salmon retained, in 1992 and 1993, was due partly to 'high-grading'. This 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. Increased abundance of large relative to small salmon due to the commercial quotas in SFA 14(B) and the closure of commercial fishery in Newfoundland are also possible influences. Commercial catch statistics indicate an increase in the proportion of large salmon landed in 1992 and 1993 compared to before the moratorium (Table 9).

The commercial salmon quota of 8 t for Section 50a was reached on July 28, 1993. However, the total commercial catch for SFA 14(B) was about 19t, 12% above the catch in 1992 (Table 9).

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In spite of the lower SFA 13 recreational catches in 1993 compared to the 1984-1989 mean, counts of small and large salmon at the counting fence on Highlands River, were above counts at the fence in 1980-1982 when it was operated previously (Tables 10). 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 was below the 1992 level. The Humber River may have benefitted more from the commercial moratorium than most other rivers in SFA 13 (ie. Bay St. George) because of high commercial exploitation on Humber River salmon in the Bay of Islands. Salmon intercepted by the commercial fishery in Bay St. George would have been destined for at least eight major rivers in that area compared to only one in the Bay of Islands. Commercial fisheries affecting Bay St. George stock had already been closed (SFA 12) or had the season shorten back in 1978. Only partial counts were possible from the counting fences on Hughes Brook and North Brook, but the returns indicate lower returns of large salmon in 1993 relative to 1992.

In SFA 14(A), the counts of small salmon at the Lomond River and the Torrent River fishways in 1993, were the highest recorded at these facilities (Table 10). The count of small salmon at the counting fence on Western Arm Brook in 1993, was the third highest since 1971, twice the count in 1992 and above the upper 95% confidence limit of the 1984-1989 mean. The count of large salmon at the Lomond River fishway in 1993 was 58% below the 1992 count but was 36% above the 1984-1989 mean. The count of large salmon at the Torrent River fishway was 31% above the count in 1992 but the count of large salmon at the counting fence on Western Arm Brook was the same as in 1992 which was the highest recorded since 1973.

The number of small salmon returning to the Western Arm Brook counting fence in 1993 was anticipated to be 15% above the 1992 count based on a 15% increase in the smolt count from 1991 to 1992. The actual return was more than twice this value because of the reduction in commercial fishing mortality in 1992. The percentage of Western Arm Brook smolts in 1992 which returned to the river to spawn in 1993 was 6.1% (Table 11), which is above the 3.6% for the 1991 smolts. The 1993 smolt count of 13,435 at Western Arm Brook was 13% below the count in 1992. Assuming that the percentage returning to spawn in 1994 will be similar to the previous year (6.1%), returns of small salmon to the river in 1994 are anticipated to be about 13% below the 1993 return.

DISCUSSION

It should be noted that, although returns of Atlantic salmon to some rivers have increased since the commercial moratorium, no new salmon have yet been produced. Eggs laid down by salmon spawning in 1992 will not return as adults until at least 1997 and even later in more northern areas. It should be kept in mind that a single season of extreme low water levels could negatively influence survival of the juvenile fish. For example, the low water levels in 1989 in western Newfoundland may have a negative effect on 1994 adult salmon returns similar to low water conditions in 1987 in other parts of the island.

The analysis of recreational and commercial catch statistics in 1992 and 1993 has been complicated by a number of changes in the management of both fisheries in recent years. The impact of fisheries closures, zonal quotas and lower recreational bag limits on catches and effort is difficult, if not impossible, to quantify and as a result comparisons of catch data with previous years is confounded. However, certain basic trends are identifiable in the 1992 and 1993 recreational catch statistics: 1. recreational catches of small salmon retained and released, indicate that the abundance of small salmon in 1992 and 1993, has improved in all areas, relative to 1991, immediately prior to the moratorium, but only SFA 14(A), showed an improvement relative to historical levels (ie. the 1984-1989 mean) in both years; 2. the number of large salmon angled in 1992 and 1993, indicate that the abundance of large salmon has improved dramatically in all areas, relative to the 1991 level and to historical levels; 3. the increase in the proportion of large salmon angled and in the SFA 14(B) commercial fishery, indicates that the commercial fishery prior to the moratorium selectively exploited large salmon over small salmon.

Small salmon, in SFA 12 and 13 have not improved since the introduction of the commercial moratorium. However, stocks in these areas were not expected to benefit as much from the moratorium as other areas of Newfoundland, because commercial exploitation on these stocks had already been reduced by the introduction of shorter commercial seasons in 1978. Typically, salmon enter SFA 12 and 13 rivers in late May and early June, and the change in the season opening date from May 24 to June 5 in 1978, would have reduced the interception of SFA 12 and 13 salmon in other areas of Newfoundland. The closure of the SFA 12 commercial fishery in 1984 would have further reduced commercial exploitation on these stocks.

The returns of small and large salmon to counting facilities in SFA's 13 and 14(A) in 1992 and 1993, tend to support the trends indicated by recreational catches. Returns to counting facilities indicate that small salmon abundance has not improved in SFA 13, but that large salmon abundance has increased in areas since the commercial moratorium.

The reduction in the recreational daily bag limit to one fish per day in 1993 from two fish per day in 1992 was successful in limiting the number of salmon retained and increasing the number released. The zonal quotas for retained salmon in SFA 13 and 14(B) were not reached in 1993, but the number of small and large salmon released was higher than in 1992.

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Table 1. Commercial and recreational Atlantic salmon fisheries management plans introduced in 1992 and 1993.

1992	1993
Commercial:	Commercial:
– SFA 12, 13, 14(A) Closed	– SFA 14(B) Quota=8 t (June 5–Oct. 15)
– SFA 14(B) Quota=13 t	– Licenses reduced to 30 in SFA 14(B).
– Licenses reduced to 63 from 79	
Recreational:	Recreational:
– Zonal Quotas (3 yr. ave.)	– Zonal Quotas (increased to previous 5 yr. ave.)
SFA 12 600 small	SFA 12 700 small (95/5 split) 665 (June 5–July 31)
SFA 13 5000 small	35 (Aug. 1–Sept. 6)
SFA 14(A) 3900 small	SFA 13 5200 small (80/20 split) 4160 (June 5–July 31)
SFA 14(B) 1100 small and large	1040 (Aug. 1–Sept. 6)
	SFA 14(A) 3900 small (75/25 split) 2925 (June 5–July 31)
	975 (Aug. 1–Sept. 6)
	SFA 14(B) 1400 small and large
– Season limit reduced to 8 fish.	– Season bag limit of 8 fish (incl. only 4 large in SFA 14(B)).
– Catch and Release fishery permitted after the zonal and river quotas were reached.	– Daily bag limit reduced to 1 fish.
– Adies Lake quota of 100	– Catch and Release limit of 4 per day. (catch and release permitted after daily limit reached)
– Season extended 2 wks in 14(B).	

Table 2. Recreational Atlantic salmon fishery quotas and seasons for Salmon Fishing Area 12, 13, 14(A), and 14(B) rivers, 1993. Refer to Figure 3 for location of rivers.

Map Code River Name	Recreational Quotas (1) Zonal River	Recreational Seasons	
		Retention	Catch and Release
Salmon Fishing Area 12			
Quota June 5 to July 31:	665	June 5 – July 25	July 26 – July 31
Quota August 1 to Sept. 6:	35	Aug. 1 – Aug. 9	Aug. 10 – Sept. 6
Salmon Fishing Area 13			
Quota June 5 to July 31:	4160	June 5 – July 31	
Quota August 1 to Sept. 6:	1040	Aug. 1 – Sept. 6	
12 Little Codroy River		June 12 – Sept. 6	
14 Highlands River (2)		Closed	
16 Barachois River (5)	175	June 5 – Aug. 21	Aug. 22 – Sept. 6
18 Fischell's Brook	200	June 5 – Sept. 6	
19 Flat Bay Brook	250	June 5 – Sept. 6	
20 Little Barachois Brook		June 12 – Sept. 6	
22 Harry's River (5)	350	June 12 – Aug. 21	Aug. 22 – Sept. 6
23 Fox Island River (5)	50	June 5 – June 26	June 27 – Sept. 6
24 Serpentine River (5)	150	June 5 – July 29	July 30 – Sept. 6
25 Cook's Brook (2)		Closed	
26 Humber River (North Brook) (3)		Closed	
26 Humber River (Adies Lake)	100	June 5 – Aug. 1	
27 Hughes Brook (3)		Closed	
28 Goose Arm River		June 12 – Sept. 6	
Salmon Fishing Area 14(A)			
Quota June 12 to July 31:	2925	June 12 – July 19	July 20 – July 31
Quota August 1 to Sept. 6:	975	Aug. 1 – Aug. 7	Aug. 8 – Sept. 6
30 Lomond River	350	June 12 – July 19 Aug. 1 – Aug. 7	July 20 – July 31 Aug. 8 – Sept. 6
32 Western Brook (2)		Closed	
Bound Brook (3)		Closed	
37 Torrent River (4)		Aug. 1 – Aug. 7	Aug. 8 – Sept. 6
40 St. Genevieve River		June 5 – July 19 Aug. 1 – Aug. 7	July 20 – July 31 Aug. 8 – Sept. 6
40 St. Genevieve (Ten Mi. Feed.) (2)		Closed	
41 Western Arm Brook (2)		Closed	
45 Watson's Brook	50	June 12 – July 19 Aug. 1 – Aug. 7	July 20 – July 31 Aug. 8 – Sept. 6
46 Pincen't's Brook	10	June 12 – July 19 Aug. 1 – Aug. 7	July 20 – July 31 Aug. 8 – Sept. 6
47 Parker River		July 24 – July 19 Aug. 1 – Aug. 7	July 20 – July 31 Aug. 8 – Sept. 6
Salmon Fishing Area 14(B)			
Quota June 5 to Sept. 19:	1400	June 5 – Sept. 19	
53 Pinware River (Trout River) (6)		June 5 – Aug. 21	

Footnote

1. Quotas apply to the total catch of retained salmon.
2. Closed for conservation.
3. Closed for salmon stock restoration work.
4. River open to angling after 1000 salmon had passed through the fishway.
5. River quota was reached.
6. Closed due to low water levels.

Table 3. Percentage change in Atlantic salmon catch and effort (Retained + Released) in 1993 compared to 1992 and the 1984-1989 mean in Salmon Fishing Area 12, 13, 14(A) and 14(B) rivers. '+' indicates an increase and '-' indicates decrease in 1993 catches.

RIVER	Effort (rod-days)			Small (<63 cm)				Large (≥63 cm)			
	% Change			1993		% Change		1993		% Change	
	1993	1992	'84-89	Retained	Released	1992	'84-89	Retained	Released	1992	'84-89
SFA 12											
La Poile River	961	35.0	75.7	206	55	-42.3	25.5	0	14	-65.0	600.0
Farmers Arm River	206	3.0	-24.5	38	5	-30.6	-63.9	0	0	0.0	0.0
Garia River	242	-2.4	-4.0	74	33	-46.2	-5.3	0	2	-86.7	0.0
Northwest River	56	-24.3	-70.1	0	0	-100.0	-100.0	0	0	0.0	0.0
Burnt Island River	1025	21.9	20.0	201	17	0.0	-31.2	0	3	-70.0	-57.1
Isle aux Morts River	609	26.6	-5.1	160	19	64.2	-1.1	0	3	-72.7	-25.0
Grand Bay River	263	-4.4	-41.6	66	26	53.3	-37.0	0	0	-100.0	-100.0
SFA 13											
Bear Cove River	242	-17.1	-28.2	65	8	180.8	128.1	0	3	-40.0	200.0
Little Codroy River	476	14.4	44.2	85	0	26.9	-3.4	0	29	107.1	2800.0
Grand Codroy River	4345	-6.3	-15.9	720	20	-25.3	-43.6	0	251	-27.0	304.8
Crabbes River	737	-10.3	10.2	150	0	-48.1	-28.2	0	24	-72.7	300.0
Barachois River	916	71.2	112.0	230	23	14.0	93.1	0	11	-50.0	450.0
Robinsons River	1284	-17.3	-22.2	225	0	-45.1	-27.2	0	18	-76.0	157.1
Fischells Brook	819	113.3	164.2	157	0	11.3	27.6	0	34	209.1	3300.0
Flat Bay Brook	678	1.8	-12.4	173	0	-22.4	-25.8	0	17	-15.0	750.0
Little Barachois Bk.	601	82.7	191.7	173	1	89.1	155.9	0	24	200.0	2300.0
Southwest & Bottom	1201	-15.7	-18.9	174	31	-41.9	-44.0	0	63	10.5	530.0
Harrys River	1870	-10.7	-10.5	319	23	-1.2	-14.9	0	50	78.6	1150.0
Fox Island River	278	-56.6	-10.0	52	7	-15.7	31.1	0	13	62.5	333.3
Serpentine River	806	6.9	319.8	150	113	-1.1	286.8	0	69	-22.5	1050.0
Cooks Brook	0	-100.0	-100.0	0	0	-100.0	-100.0	0	0	0.0	0.0
Humber River	7023	15.7	-6.5	2206	601	15.6	-1.5	0	125	-29.4	290.6
Goose Arm River	1245	31.7	269.4	220	2	404.5	1068.4	0	1	0.0	0.0
SFA 14(A)											
Trout River	504	50.0	118.2	6	2	-52.9	166.7	0	0	0.0	0.0
Lomond River	2190	35.9	60.4	281	85	-3.9	4.9	0	40	-28.6	300.0
Deer Arm River	244			18	11			0	1		
Parsons Pond River	273	-38.8	-8.7	18	7	-43.2	-3.8	0	0	0.0	0.0
Portland Creek	3445	3.1	0.4	577	529	41.8	50.9	0	226	24.9	479.5
River of Ponds	3149	-13.3	-16.8	934	510	-8.3	9.6	0	40	-51.8	3900.0
Little Brook Ponds	680	7.9	-5.6	88	155	34.3	42.1	0	8	-20.0	0.0
Torrent River	619	-25.7	25.6	179	266	-19.4	158.7	0	15	150.0	0.0
Big East River	1078	14.6	48.5	376	124	15.2	237.8	0	30	0.0	0.0
Castor River	1333	23.0	4.5	444	51	10.0	-18.5	0	2	0.0	100.0
Ste. Genevieve River	2106	12.4	16.7	769	78	33.0	14.9	0	11	266.7	1000.0
Eastern Arm Brook	86	-54.7	17.8	13	0	-75.5	-40.9	0	0	0.0	0.0
Big Brook	573	0.9	58.7	56	10	53.5	-30.5	0	2	0.0	0.0
Watsons Brook	220	-13.0	-10.2	20	9	-40.8	-27.5	0	0	0.0	0.0
Pincents Brook	183	15.8	195.2	2	8	233.3	100.0	0	0	0.0	0.0
Parker River	411	-18.9	168.6	17	108	95.3	1983.3	0	0	0.0	0.0
Bartletts Brook	318	11.2	165.0	50	37	171.9	295.5	0	1	0.0	0.0
Upper Brook	241	-18.9	61.7	14	2	300.0	-23.8	0	0	0.0	0.0
East River, Pistolet	205	60.2	-14.2	43	10	381.8	23.3	0	0	0.0	0.0
SFA 14(B)											
Forteau River	1707	34.3	20.2	385	78	91.3	10.8	43	4	422.2	176.5
L'Anse-Au-Loup R.	431	-12.2	-35.9	8	0	-33.3	-93.3	0	0	0.0	-100.0
Pinware River	3158	10.1	23.5	654	336	48.6	29.8	199	26	-1.7	54.1
TOTALS	49037	6.1	8.4	10,796	3,400	6.7	7.5	242	1,160	-14.1	276.9

Table 4. Percent change in recreational Atlantic salmon fishery catches and effort in 1993 from those in 1992 and the 1984–1989 mean in and 1986–1991 means in SFA 12, 13, 14(A) and 14(B). Percent change from the 1974–1977 and 1978–1983 means are given only for SFA 14(B).

% Change in 1993 from:	Effort (Rod-days)	Small (<63 cm)			Large (>=63 cm)			Total (Small + Large)			CPUE *
		Retained	Released	Total	Retained	Released	Total	Retained	Released	Total	
SFA 12											
1992	+18.8	+16.6	-66.7	-18.6	.	-71.8	-71.8	+16.6	-67.5	-22.1	+35.7
1984-89	+5.0	-33.9	.	-20.1	.	-31.3	-31.3	-33.9	+453.1	-20.4	-25.0
1986-91	+13.8	-14.7	.	+3.1	.	-4.3	-4.3	-14.8	+669.6	+2.8	-10.0
SFA 13											
1992	+4.1	-6.3	+56.1	-0.7	.	-22.7	-22.7	-6.3	+5.6	-3.7	-6.3
1984-89	+2.5	-19.1	.	-6.0	.	+108.5	+108.5	-19.1	+344.7	+0.1	0.0
1986-91	+2.1	-16.4	.	-2.8	.	+111.0	+111.0	-16.4	+349.9	+3.3	+3.4
SFA 14(A)											
1992	+4.3	-18.3	+277.0	+11.3	.	+1.9	+1.9	-18.3	+164.2	+10.7	+6.1
1984-89	+12.1	-15.1	.	+28.4	.	+375.9	+375.9	-14.9	+2910.1	+34.6	+20.7
1986-91	+11.6	-15.5	.	+27.8	.	+268.6	+268.6	-15.5	+2231.4	+33.1	+20.7
SFA 14(B)											
1992	+14.4	+22.3	+546.9	+58.8	+1.7	.	+14.3	+17.8	+593.8	+49.7	+32.0
1984-89	+13.9	-19.5	.	+12.4	+46.7	.	+64.8	-12.0	.	+18.3	+6.5
1986-91	+8.3	-20.9	.	+10.3	+70.4	.	+91.5	-12.0	.	+18.3	+10.0
1978-83	+84.7	-29.8	.	+18.8	+36.0	.	+52.7	-8.5	.	+23.0	-31.3
1974-77	+66.7	-14.9	.	-2.1	-28.2	.	-19.3	-29.5	.	-52.0	-41.1

* CPUE (Catch-per-unit-effort) is based on the Total (retained + released) catch of small and large salmon.

Table 5. Recreational fishing effort and catch (estimated + observed) of Atlantic salmon in Salmon Fishing Area 12, 1974–1993.

Year	Effort (Rod-Days)	Small (<63 cm)			Large* (>=63 cm)			Total (Small + Large)			CPUE**
		Retained	Released	Total	Retained	Released	Total	Retained	Released	Total	
1974	1,423	658	.	658	13	.	13	671	.	671	0.47
1975	1,204	510	.	510	20	.	20	530	.	530	0.44
1976	926	297	.	297	5	.	5	302	.	302	0.33
1977	1,238	558	.	558	48	.	48	606	.	606	0.49
1978	1,305	366	.	366	20	.	20	386	.	386	0.30
1979	1,711	733	.	733	10	.	10	743	.	743	0.43
1980	2,175	820	.	820	29	.	29	849	.	849	0.39
1981	2,038	1,060	.	1,060	17	.	17	1,077	.	1,077	0.53
1982	2,810	1,555	.	1,555	15	.	15	1,570	.	1,570	0.56
1983	2,648	667	.	667	8	.	8	675	.	675	0.25
1984	3,590	1,922	.	1,922	.	68	68	1,922	68	1,990	0.55
1985	3,722	1,097	.	1,097	.	30	30	1,097	30	1,127	0.30
1986	3,430	938	.	938	.	34	34	938	34	972	0.28
1987	2,212	831	.	831	.	27	27	831	27	858	0.39
1988	3,607	1,413	.	1,413	.	23	23	1,413	23	1,436	0.40
1989	2,657	560	.	560	.	10	10	560	10	570	0.21
1990	3,060	856	.	856	.	30	30	856	30	886	0.29
1991	2,761	644	.	644	.	15	15	644	15	659	0.24
1992	2,831	639	466	1,105	.	78	78	639	544	1,183	0.42
1993	3,362	745	155	900	.	22	22	745	177	922	0.27
Means calculated for years with similar management plans (1984–1989) and six years prior to the commercial moratorium (1986–1991).											
Mean (84–89)	3,203	1,127	.	1,127	.	32	32	1,127	32	1,159	0.36
95% CL= +/-	649	505	.	505	.	20	20	505	20	523	0.13
N	6	6	.	6	.	6	6	6	6	6	6
Mean (86–91)	2,955	874	.	874	.	23	23	874	23	897	0.30
95% CL= +/-	543	314	.	314	.	10	10	314	10	319	0.08
N	6	6	.	6	.	6	6	6	6	6	6

* Since 1984, large salmon could be retained only in southern Labrador, however, this regulation was not enforced until 1985.

** CPUE (Catch-per-unit-effort) is based on the Total (retained + released) catch.

Table 6. Recreational fishing effort and catch (estimated + observed) of Atlantic salmon in Salmon Fishing Area 13, 1974–1993.

Year	Effort (Rod-Days)	Small (<63 cm)			Large * (>=63 cm)			Total (Small + Large)			CPUE**
		Retained	Released	Total	Retained	Released	Total	Retained	Released	Total	
1974	29,313	7,189	.	7,189	916	.	916	8,105	.	8,105	0.28
1975	32,253	12,003	.	12,003	886	.	886	12,889	.	12,889	0.40
1976	32,922	10,383	.	10,383	626	.	626	11,009	.	11,009	0.33
1977	24,474	6,712	.	6,712	1,049	.	1,049	7,761	.	7,761	0.32
1978	19,686	5,289	.	5,289	855	.	855	6,144	.	6,144	0.31
1979	16,383	6,009	.	6,009	113	.	113	6,122	.	6,122	0.37
1980	21,313	7,913	.	7,913	993	.	993	8,906	.	8,906	0.42
1981	23,839	9,300	.	9,300	663	.	663	9,963	.	9,963	0.42
1982	25,246	9,566	.	9,566	595	.	595	10,161	.	10,161	0.40
1983	25,473	6,337	.	6,337	610	.	610	6,947	.	6,947	0.27
1984	22,152	7,771	.	7,771	.	309	309	7,771	309	8,080	0.36
1985	20,137	5,302	.	5,302	.	257	257	5,302	257	5,559	0.28
1986	25,707	7,346	.	7,346	.	662	662	7,346	662	8,008	0.31
1987	20,887	6,018	.	6,018	.	342	342	6,018	342	6,360	0.30
1988	24,356	8,217	.	8,217	.	406	406	8,217	406	8,623	0.35
1989	18,544	3,174	.	3,174	.	129	129	3,174	129	3,303	0.18
1990	21,769	6,652	.	6,652	.	337	337	6,652	337	6,989	0.32
1991	21,028	5,188	.	5,188	.	204	204	5,188	204	5,392	0.26
1992	21,629	5,439	531	5,970	.	947	947	5,439	1,478	6,917	0.32
1993	22,521	5,099	829	5,928	.	732	732	5,099	1,561	6,660	0.30
Means calculated for years with similar management plans (1984–1989) and six years prior to the commercial moratorium (1986–1991).											
Mean (84–89)	21,964	6,305	.	6,305	.	351	351	6,305	351	6,656	0.30
95% CL= +/-	2,815	1,979	.	1,979	.	188	188	1,979	188	2,113	0.07
N	6	6	.	6	.	6	6	6	6	6	6
Mean (86–91)	22,049	6,099	.	6,099	.	347	347	6,099	347	6,446	0.29
95% CL= +/-	2,715	1,862	.	1,862	.	194	194	1,862	194	2,017	0.06
N	6	6	.	6	.	6	6	6	6	6	6

* Since 1984, large salmon could be retained only in southern Labrador, however, this regulation was not enforced until 1985.

** CPUE (Catch-per-unit-effort) is based on the Total (retained + released) catch.

Table 7. Recreational fishing effort and catch (estimated + observed) of Atlantic salmon in Salmon Fishing Area 14(A), 1974–1993.

Year	Effort (Rod-Days)	Small (<63 cm)			Large * (>=63 cm)			Total (Small + Large)			CPUE**
		Retained	Released	Total	Retained	Released	Total	Retained	Released	Total	
1974	9,569	3,120	.	3,120	113	.	113	3,233	.	3,233	0.34
1975	9,259	4,818	.	4,818	90	.	90	4,908	.	4,908	0.53
1976	17,146	7,381	.	7,381	100	.	100	7,481	.	7,481	0.44
1977	17,067	5,707	.	5,707	472	.	472	6,179	.	6,179	0.36
1978	12,069	3,241	.	3,241	72	.	72	3,313	.	3,313	0.27
1979	14,285	6,578	.	6,578	59	.	59	6,637	.	6,637	0.46
1980	14,219	3,743	.	3,743	180	.	180	3,923	.	3,923	0.28
1981	18,718	5,882	.	5,882	137	.	137	6,019	.	6,019	0.32
1982	16,113	4,763	.	4,763	107	.	107	4,870	.	4,870	0.30
1983	16,020	3,800	.	3,800	69	.	69	3,869	.	3,869	0.24
1984	16,497	4,807	.	4,807	.	87	87	4,807	87	4,894	0.30
1985	13,388	3,626	.	3,626	.	28	28	3,626	28	3,654	0.27
1986	15,382	5,030	.	5,030	.	102	102	5,030	102	5,132	0.33
1987	15,061	4,620	.	4,620	.	41	41	4,620	41	4,661	0.31
1988	18,968	6,251	.	6,251	.	171	171	6,251	171	6,422	0.34
1989	16,223	3,203	.	3,203	.	44	44	3,203	44	3,247	0.20
1990	16,413	5,050	.	5,050	.	136	136	5,050	136	5,186	0.32
1991	13,850	3,565	.	3,565	.	117	117	3,565	117	3,682	0.27
1992	17,117	4,778	531	5,309	.	369	369	4,778	900	5,678	0.33
1993	17,858	3,905	2,002	5,907	.	376	376	3,905	2,378	6,283	0.35
Means calculated for years with similar management plans (1984–1989) and six years prior to the commercial moratorium (1986–1991).											
Mean (84–89)	15,920	4,590	.	4,590	.	79	79	4,590	79	4,668	0.29
95% CL= +/-	1,944	1,136	.	1,136	.	56	56	1,136	56	1,187	0.05
N	6	6	.	6	.	6	6	6	6	6	6
Mean (86–91)	15,983	4,620	.	4,620	.	102	102	4,620	102	4,722	0.29
95% CL= +/-	1,813	1,163	.	1,163	.	54	54	1,163	54	1,200	0.06
N	6	6	.	6	.	6	6	6	6	6	6

* Since 1984, large salmon could be retained only in southern Labrador, however, this regulation was not enforced until 1985.

** CPUE (Catch-per-unit-effort) is based on the Total (retained + released) catch.

Table 8. Recreational fishing effort and catch (estimated + observed) of Atlantic salmon in Salmon Fishing Area 14(B), 1974–1993.

Year	Effort (Rod-Days)	Small (<63 cm)			Large * (>=63 cm)			Total (Small + Large)			CPUE**
		Retained	Released	Total	Retained	Released	Total	Retained	Released	Total	
1974	2,713	740	.	740	291	.	291	1,031	.	1,031	0.38
1975	2,180	1,069	.	1,069	154	.	154	1,223	.	1,223	0.56
1976	3,896	2,498	.	2,498	310	.	310	2,808	.	2,808	0.72
1977	3,918	1,662	.	1,662	593	.	593	2,255	.	2,255	0.58
1978	2,413	573	.	573	183	.	183	756	.	756	0.31
1979	2,149	901	.	901	119	.	119	1,020	.	1,020	0.47
1980	2,476	938	.	938	337	.	337	1,275	.	1,275	0.51
1981	3,353	1,698	.	1,698	220	.	220	1,918	.	1,918	0.57
1982	3,279	1,271	.	1,271	80	.	80	1,351	.	1,351	0.41
1983	3,529	2,000	.	2,000	130	.	130	2,130	.	2,130	0.60
1984	3,997	987	.	987	185	.	185	1,172	.	1,172	0.29
1985	3,664	1,092	.	1,092	100	.	100	1,192	.	1,192	0.33
1986	4,643	1,071	.	1,071	184	.	184	1,255	.	1,255	0.27
1987	4,993	1,887	.	1,887	215	.	215	2,102	.	2,102	0.42
1988	5,707	1,592	.	1,592	251	.	251	1,843	.	1,843	0.32
1989	4,895	1,173	.	1,173	53	.	53	1,226	.	1,226	0.25
1990	5,075	1,066	.	1,066	98	.	98	1,164	.	1,164	0.23
1991	4,017	1,152	.	1,152	49	.	49	1,201	.	1,201	0.30
1992	4,630	856	64	920	238	.	238	1,094	64	1,158	0.25
1993	5,296	1,047	414	1,461	242	30	272	1,289	444	1,733	0.33
Means calculated for years with similar management plans (1984–1989) and six years prior to the commercial moratorium (1986–1991).											
Mean (84–89)	4,650	1,300	.	1,300	165	.	165	1,465	.	1,465	0.31
95% CL= +/-	770	375	.	375	78	.	78	423	.	423	0.06
N	6	6	.	6	6	.	6	6	.	6	6
Mean (86–91)	4,888	1,324	.	1,324	142	.	142	1,465	.	1,465	0.30
95% CL= +/-	582	355	.	355	91	.	91	423	.	423	0.07
N	6	6	.	6	6	.	6	6	.	6	6

* Since 1984, large salmon could be retained only in southern Labrador, however, this regulation was not enforced until 1985.

** CPUE (Catch-per-unit-effort) is based on the Total (retained + released) catch.

Table 9. Commercial catches of small and large Atlantic salmon in Salmon Fishing Area 14(B) (Statistical Area O(50)), 1974–1993. Weight is in kilograms.

Year	Small		Large		Total *		Percent Small	
	Weight	Number	Weight	Number	Weight	Number	Weight	Number
74	18,655	9,328	77,743	15,863	96,398	25,191	19.4	37.0
75	36,670	19,294	63,414	14,752	100,084	34,046	36.6	56.7
76	27,635	13,152	68,416	15,189	96,051	28,341	28.8	46.4
77	22,521	11,267	91,433	18,664	113,954	29,931	19.8	37.6
78	7,649	4,026	55,071	11,715	62,720	15,741	12.2	25.6
79	15,096	7,194	17,032	3,874	32,128	11,068	47.0	65.0
80	18,877	8,493	46,168	9,138	65,045	17,631	29.0	48.2
81	13,681	6,658	38,485	7,606	52,166	14,264	26.2	46.7
82	14,535	7,379	27,195	5,966	41,730	13,345	34.8	55.3
83	6,580	3,292	33,265	7,489	39,845	10,781	16.5	30.5
84	4,841	2,421	29,844	6,218	34,685	8,639	14.0	28.0
85	11,099	7,460	15,916	3,954	27,015	11,414	41.1	65.4
86	14,602	8,296	26,203	5,342	40,805	13,638	35.8	60.8
87	22,987	11,389	58,170	11,114	81,157	22,503	28.3	50.6
88	15,155	7,087	22,615	4,591	37,770	11,678	40.1	60.7
89	19,291	9,053	22,036	4,646	41,327	13,699	46.7	66.1
90	7,735	3,592	15,335	2,858	23,070	6,450	33.5	55.7
91	11,391	5,303	22,616	4,417	34,007	9,720	33.5	54.6
92	2,819	1,325	14,401	2,752	17,221	4,077	16.4	32.6
93	2,207	1,144	17,013	3,620	19,309	4,764	11.4	24.0

Means calculated for years with similar management plans.

Mean (84–89)	14,663	7,618	29,131	5,978	43,793	13,595	34.3	55.3
95% CL= +/-	6,640	3,116	15,708	2,762	19,980	4,976	12.3	15.2
N	6	6	6	6	6	6	6	6
Mean (78–83)	12,736	6,174	36,203	7,631	48,939	13,805	27.6	45.2
95% CL= +/-	4,950	2,152	14,221	2,811	13,901	2,795	13.2	15.6
N	6	6	6	6	6	6	6	6
Mean (74–77)	26,370	13,260	75,252	16,117	101,622	29,377	26.2	44.4
95% CL= +/-	12,393	6,865	19,591	2,798	13,399	5,860	13.1	14.7
N	4	4	4	4	4	4	4	4

* Total weight and number for 1993 are preliminary values.

Table 10. 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 R.	Highlands R.	Romaines R.	Pinchgut Bk.	Humber R.*	North Bk.	Hughes Bk.	Lomond R.	Bound Bk.	Torrent R.	WAB	Small	Large									
	Small	Large	Small	Large	Small	Large	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	120	0					
1985										13	0	190	14	1,553	30	416	2					
1986						66	3	63	2	354	32	9	2	2,815	92	525	0					
1987						74	1	37	6	355	11	62	12	2,505	68	378	1					
1988						166	9	65	0	437	21	47	3	2,075	44	251	1					
1989						46	2	54	1			17	0	1,369	60	455	0					
1990								12216	855	49	0	106	1	32	1	2,296	82	322	0			
1991								5724	401	52	1	175	0	18	0	1,415	73	233	1			
1992						222	5	17571	2945	131	12	146	7	435	80	2,347	169	480	8			
1993	(82)	(507)	137	88	(106)	(6)	576	43	18477	636	(39)	(1)	(87)	(0)	526	34	(12)	(2)	4009	222	947	8
Mean (84–89)								88	4	54	2	355	25	34	4	2020	97	358	1			
95% CL= +/-								85	6	28	2	126	18	40	8	586	101	155	1			
CV								60.6	95.8	49.1	114.0	28.6	58.9	73.9	125.1	27.6	98.9	41.3	122.5			
N								4	4	6	6	5	5	4	4	6	6	6	6			

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

Footnotes:

LaPoile River – Counting Fence
 Highlands River – Counting Fence
 Romaines River – Counting Fence
 Pinchgut Brook – Counting Fence

Humber River – Mark-Recapture
 North Brook – Counting Fence
 Hughes Brook – Counting Fence
 Lomond River – Fishway

Bound Brook – Counting Fence
 Torrent River – Fishway
 WAB (Western Arm Brook) – Counting Fence

Table 11. Sea—survival of Atlantic salmon smolts from Western Arm Brook, 1971–1993.

Year i	Smolts Year i	Grilse		% Sea— Survival
		Returns Year i+1		
1971	5,735	406	7.1	
1972	11,905	798	6.7	
1973	8,484	523	6.2	
1974	11,854	639	5.4	
1975	9,600	552	5.8	
1976	6,232	352	5.6	
1977	9,899	307	3.1	
1978	13,071	1,578	12.1	
1979	8,349	460	5.5	
1980	15,665	488	3.1	
1981	13,981	460	3.3	
1982	12,477	1,141	9.1	
1983	10,552	235	2.2	
1984	20,653	514	2.5	
1985	13,417	525	3.9	
1986	17,719	437	2.5	
1987	17,029	422	2.5	
1988	15,321	455	3.0	
1989	11,407	322	2.8	
1990	10,563	233	2.2	
1991	13,453	480	3.6	
1992	15,405	947	6.1	
1993	13,435			
Mean (84–89)	11,407	322	2.8	
Max	20,653	525	3.9	
Min	11,407	322	2.5	
C.V.	29	23	19.79	
N	5	5	5	

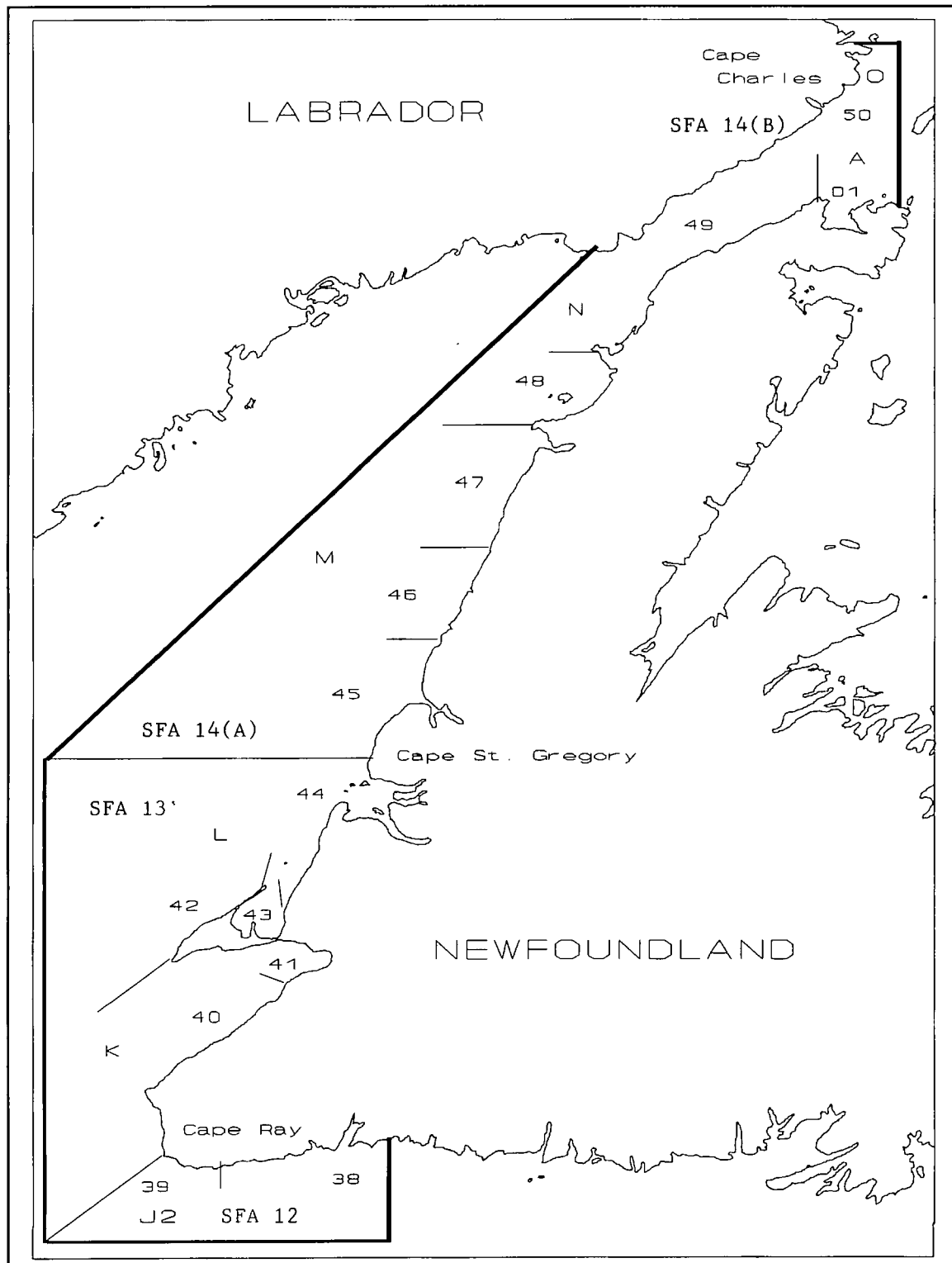


Figure 1. Boundaries of Salmon Fishing Areas (SFA), Statistical Areas (Capital Letters), and Statistical Sections (Numbers) for Western Newfoundland and Southern Labrador.

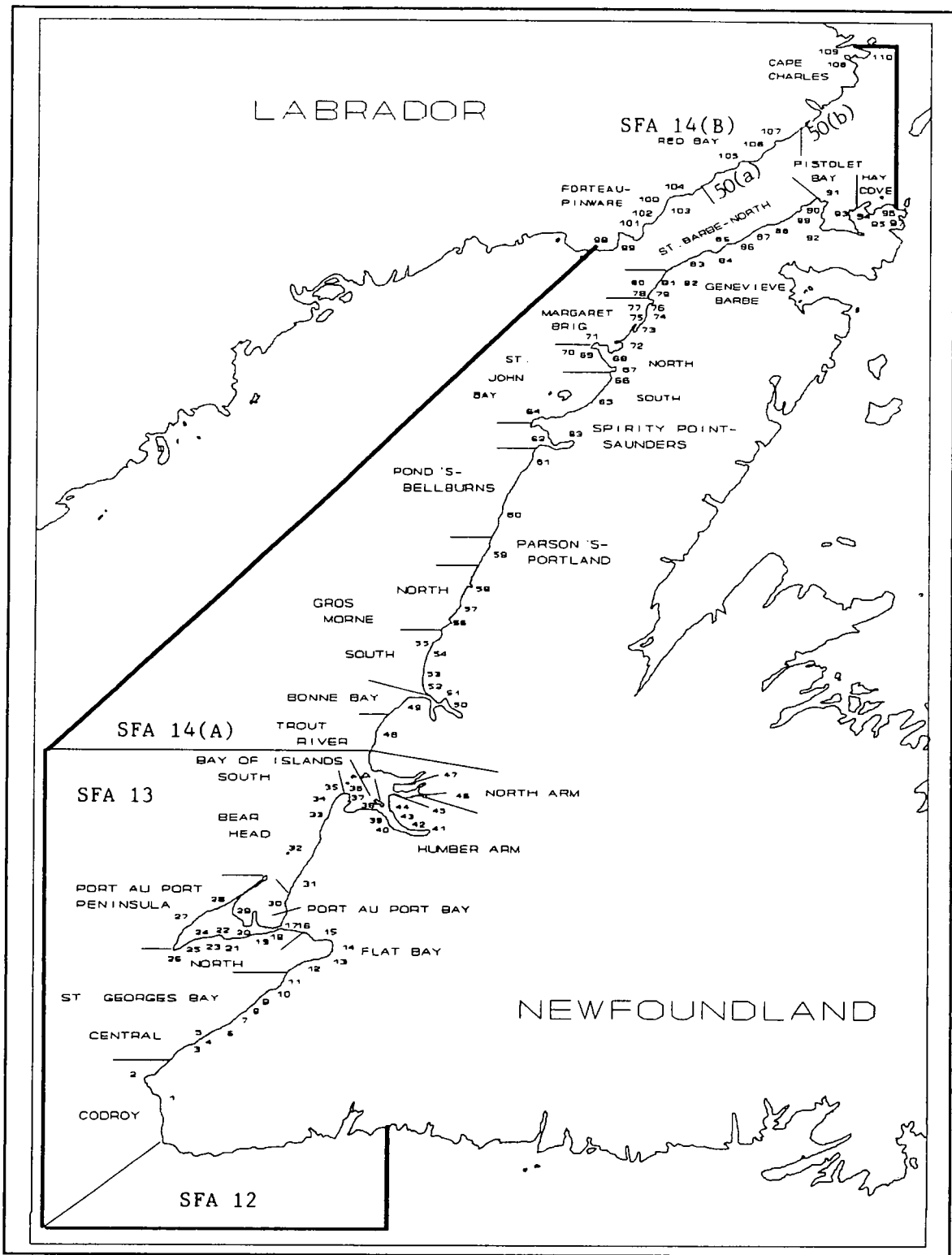


Figure 2. Location of communities within Salmon Fishing Areas (SFA) 12, 13, 14(A), and 14(B).

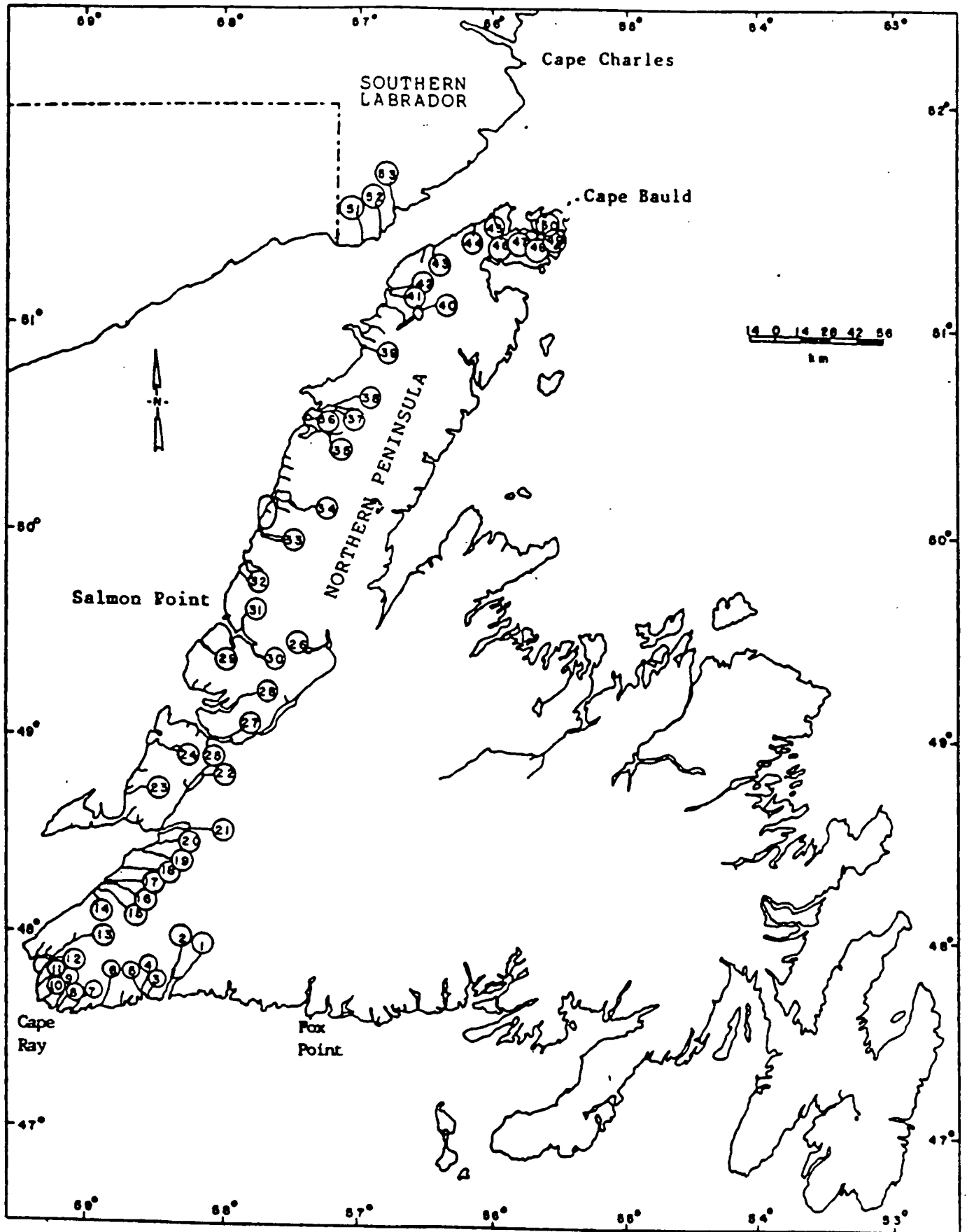
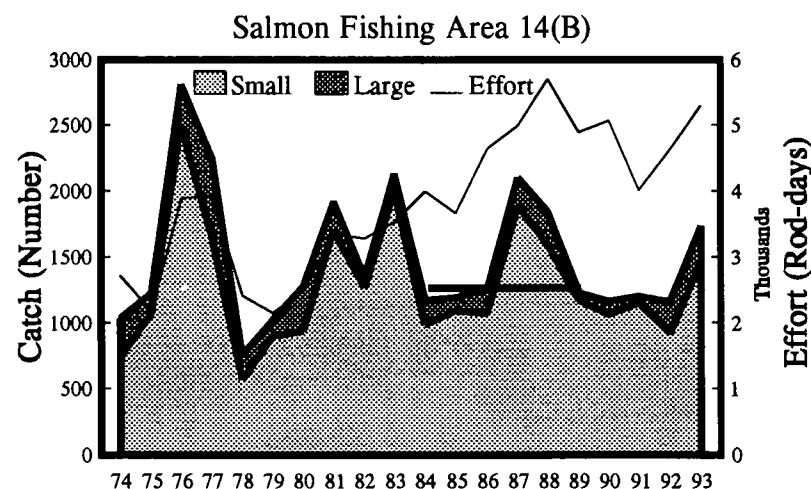
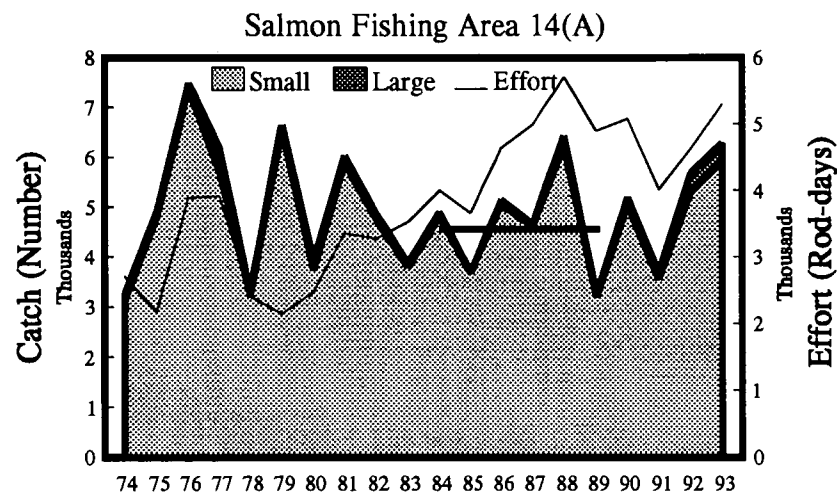
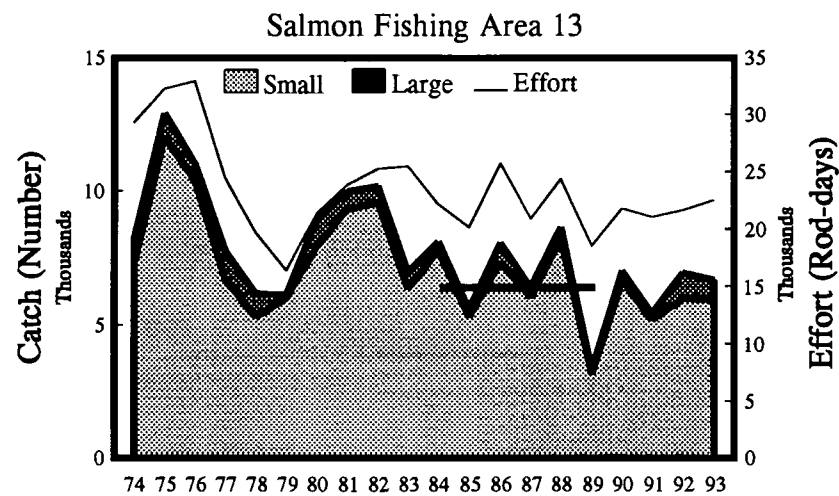
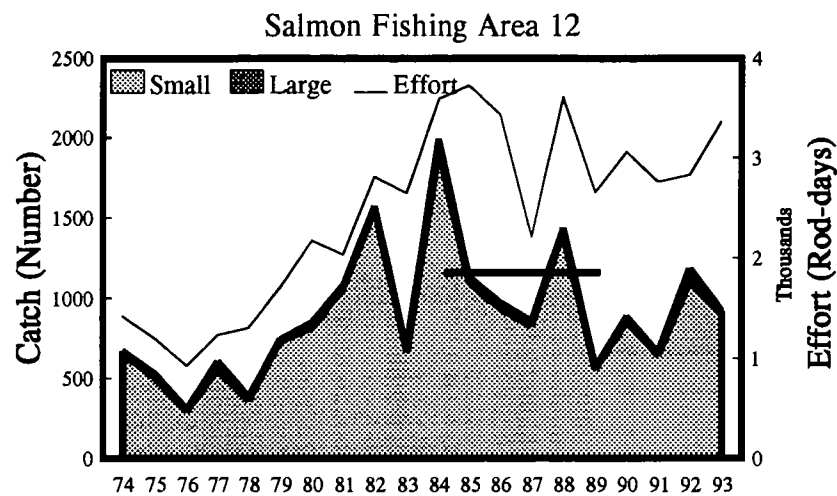
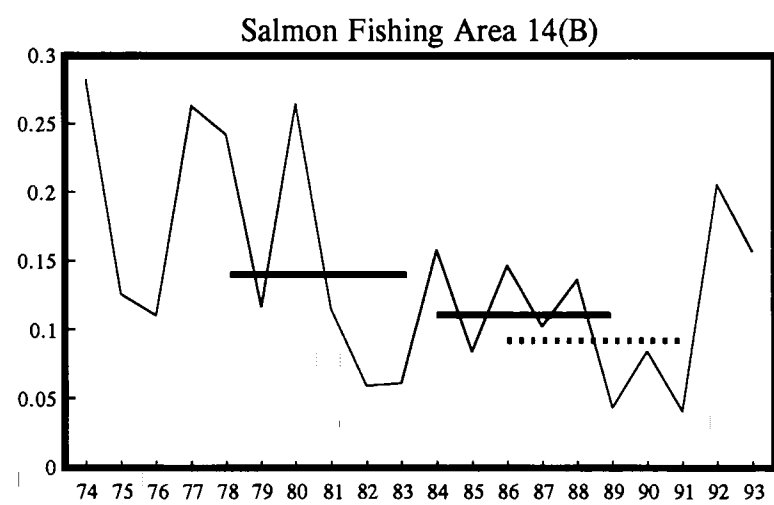
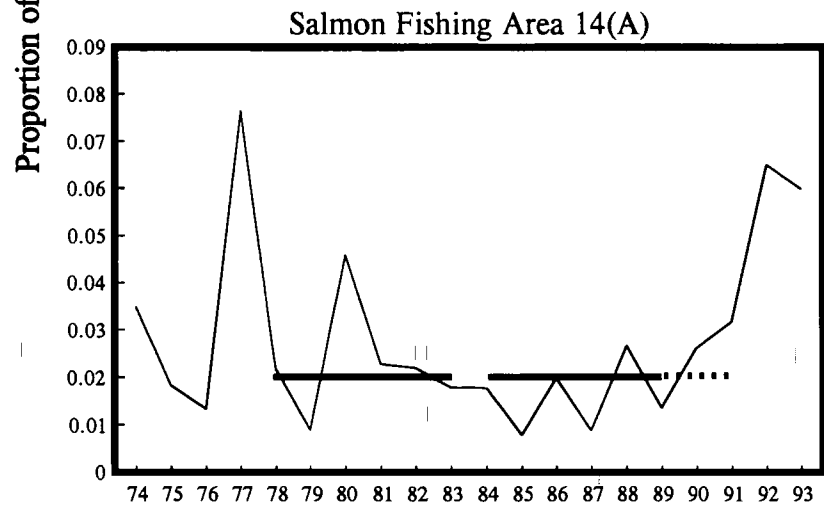
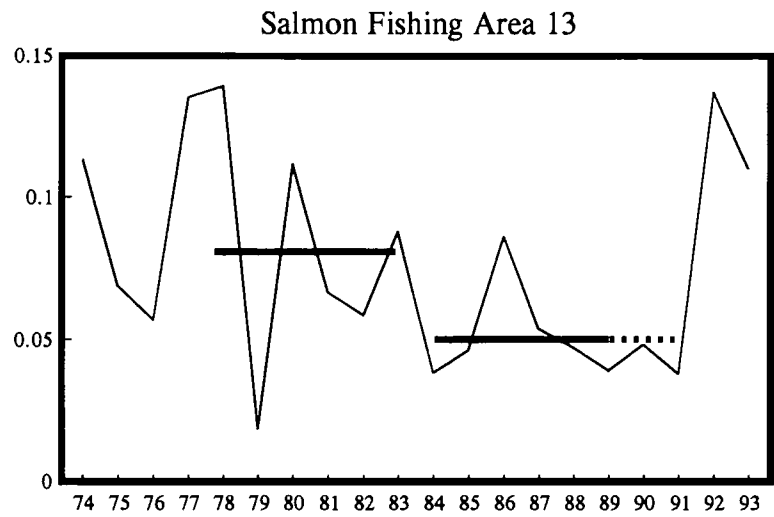
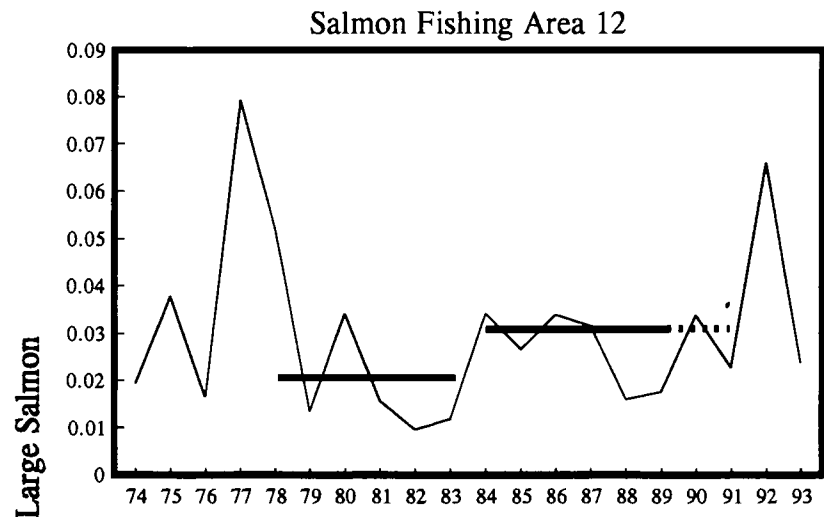


Fig. 3. Location of salmon rivers in Western Newfoundland and Labrador.



Year

Figure 4. Total recreational catch (retained + released) of Atlantic salmon and effort in Salmon Fishing Areas 12, 13, 14(A) and 14(B), 1974-1993. Horizontal lines represent the mean of total catches in 1984-1989.



Year

Figure 5. Proportion of large salmon in recreational catches in Salmon Fishing Areas 12, 13, 14(A), and 14(B), 1974-93. Horizontal lines represent 1978-83 (solid), 1984-89 (solid) and 1986-91 (broken) means.

Commercial Salmon, 1974-1993

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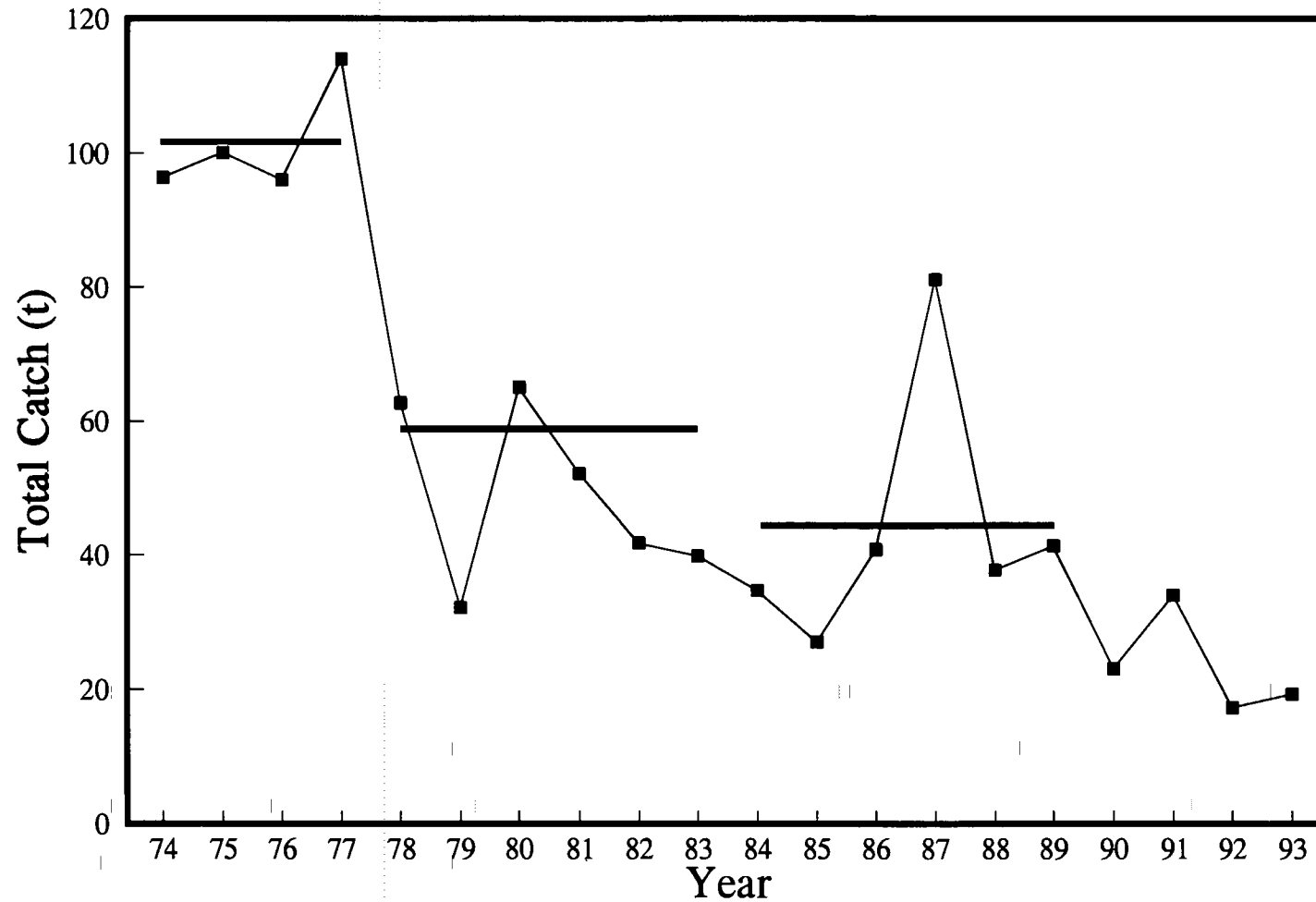


Figure 6. Total commercial catch of Atlantic salmon in Salmon Fishing Area 14(B) in 1974-1993. Horizontal lines represent 1974-77, 1978-83, and 1984-89 means.