Fisheries and Oceans | Pêches et Océans

Newfoundland Region

DFO Science
Stock Status Report D2-04

ATLANTIC SALMON

INSULAR NEWFOUNDLAND, SOUTH NEWFOUNDLAND, SALMON FISHING AREAS 9-11

Background

There are 49 scheduled rivers along this section of the south coast. Of these, river specific assessments are carried out on Biscay Bay River and Rocky River (SFA 9), Northeast River (Placentia) (SFA 10), and Conne River and Little River (SFA 11) (Fig. 1). Historically, rivers in this area have been characterized by runs comprised of in excess of 90% small salmon. During the five year interval prior to the moratorium (1987-91), the commercial salmon fishery took an estimated 330 t or about 136 thousand salmon, of which the large salmon component made up 43% of the catch by weight or 24% by number. Since the moratorium, the proportion of large salmon has increased in Northeast River (Placentia) relative to the 1984-91 period, but has either decreased (Rocky River) or shown no change in the other rivers assessed. Most large salmon are repeat spawning one-sea-winter (1SW) salmon.

Bay d'Espoir is the site of an aquaculture industry utilizing rainbow (steelhead) trout and Atlantic salmon. Numbers of both of these species have escaped sea cages and entered Conne River. Rainbow trout have also been documented to occur in three other inner Bay d'Espoir rivers. Additional escapements of both species occurred in 1996 including over 100,000 salmon parr (Saint John River, N.B. stock) that reportedly escaped during a winter storm in February 1996. Accurate information on actual escapees from aquaculture operations are difficult to obtain. Test fisheries for rainbow trout that had been conducted in Bay d'Espoir during May and September 1995, were not repeated during 1996. A rainbow trout fish-out pond also operated at St. Veronica's, Bay d'Espoir.

Little River was stocked with Atlantic salmon swim-up fry for several years, ending in 1993. However, stocking resumed in 1996. Atlantic salmon broodstock were removed from Little River again in 1996. Broodstock was taken from Conne River in 1995 but resulting progeny were not stocked. Survivors from an experiment using wild Conne River salmon smolts that were reared at an aquaculture cage in Roti Bay contributed 5% of the egg deposition in Conne River in 1996. The status of stocks is assessed on the basis of the proportion of the conservation egg deposition achieved in a given year and the trends in abundance of various life stages.

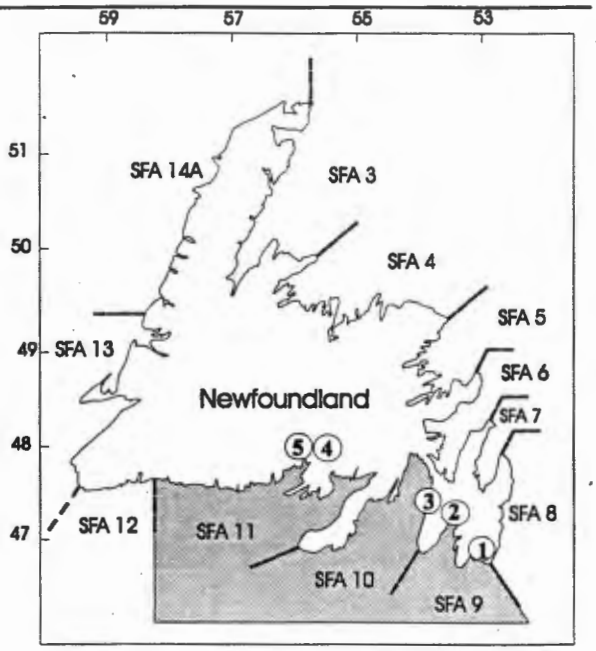

Figure 1. Map of Newfoundland showing the locations of Salmon Fishing Areas 9-11, and assessment facilities: (1) Biscay Bay, (2) Rocky, (3) Northeast, (4) Little, and (5) Conne rivers.

The Fishery

In 1996, Conne River was closed to recreational fishing and there was no First Peoples' food fishery. Little, Colinet and Rocky rivers were closed to recreational fishing in 1996. Rivers in SFAs 9 and 10 were opened to hook-and-release fishing two weeks earlier than usual in 1996 after which time retention of catch was permitted until the end of the season.

Recreational effort for SFAs 9-11 during 1996 was the highest on record and was 18% greater than the previous year.

April 1997

Canada

Angled catch of small salmon (retained plus released fish) in 1996 totaled 9923 small salmon, and increased 27% over 1995 and was also greater than the 1986-91, and 1992-95 means (Fig. 2). CPUE increased over 1995 but was lower than the 1986-91 means. Compared to the recreational fishery quota years 1992 and 1993, the number of small salmon retained in 1996 (7498) was well above that of both years, and was the highest recorded since 1988.

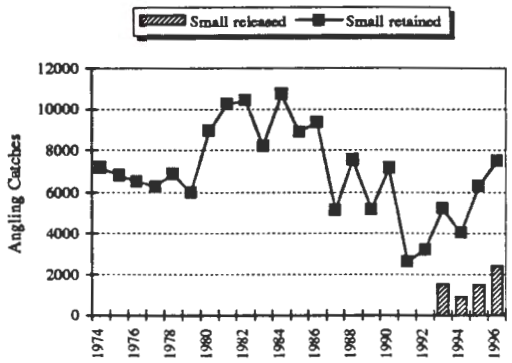

Figure 2. Recreational catches of small salmon in Salmon Fishing Areas 9-11, 1974-96.

Resource Status

Returns

Indices of abundance were from counts of small and large salmon for Conne River, Little River, Northeast River (Placentia), Rocky River, and Biscay Bay River. Counts of small salmon during the moratorium years (1992-1996) decreased from pre-moratorium counts in Biscay Bay and Conne River but increased in Northeast River (Placentia) and Rocky River. Counts of large salmon decreased at Conne River. For most rivers, there have been counts in some pre-moratorium years that were higher than those experienced during the moratorium. Sea survival of smolts to adult small salmon increased to the highest values recorded at Northeast Brook (Trepassey) and Rocky River in 1996, while at Conne River sea survival was the highest since 1989. Conne River, however, has experienced higher survivals in the past when the commercial fishery was still in operation. Overall, sea survivals remain low given the complete closure of commercial fisheries. This is still indicative of high or above average natural mortality at sea.

During commercial fishery moratorium years, total numbers of small salmon returning to rivers are assumed to be equivalent to the total numbers produced. Prior to the moratorium, total production included returns to rivers plus estimated commercial catches. Thus while returns to some rivers have shown some overall improvement, total production sizes are low compared to pre-moratorium levels.

In 1996, of the salmon sampled entering Conne River during June and July, 6% possessed net marks implying some fish are still encountering gear, legal or illegal, while migrating to their home river.

Egg depositions relative to conservation

Of the rivers assessed, the conservation egg deposition requirements in 1996 were achieved in Northeast River (Placentia) (736%), Biscay Bay River (117%) and Little River (298%) (Fig. 3). Conne River is assessed against a Management Target, which is greater than the corresponding conservation requirement. In 1996, the Management Target was attained (112%) for the first time since 1990. Rocky River achieved 34% of its conservation requirement. Additional information on individual river assessments for Conne River, Little River, Northeast River (Placentia),

Rocky River, and Biscay Bay River are provided in the accompanying summary sheets. Egg-to-smolt survival has been increasing at Conne River. This is coincident with better freshwater environmental conditions, but also coincident with declining egg deposition rates per unit of fluvial rearing habitat.

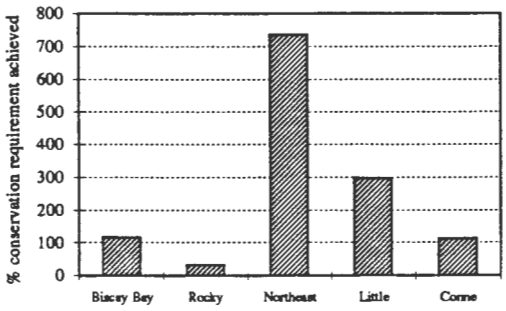

Figure 3. Egg depositions, expressed as a percentage of conservation requirements, in Biscay, Rocky, Northeast, Little, and Conne rivers in 1996. For Conne River, egg deposition is compared to the Management Target.

Environmental considerations

Several rivers in SFA 9 were closed to angling in mid-August due to low water levels and high water temperatures. Similarly, rivers in SFA 10 were closed anywhere from 9 to 25 days in August. A number of SFA 11 rivers were also closed, generally from mid-August until September 2.

Spring environmental conditions at Conne River improved relative to past years, and an air temperature index for the period April 1-May 15 was the warmest recorded since 1988. Previously, this index was directly associated with the timing of the smolt migration, with later runs occurring in colder years. In addition, run timing was also related to subsequent sea survival. The warmer spring temperatures resulted in the earliest smolt run at Conne River during the 10 years that monitoring has been carried out. Marine conditions in 1996, as measured by sea surface temperatures, appear to be improving relative to past years.

Outlook

Short-term

Improved freshwater conditions in recent years, as determined from studies in this region (e.g. Conne River) and other parts of Newfoundland, suggest increased smolt production and the possibility for improved adult returns. At Conne River and Rocky River, the highest smolt migrations on record occurred in 1996 while the smolt run at Northeast River (Trepassey) was among the highest recorded. The trend to increased sea survival at Conne River, if continued there and in other rivers, should also contribute to better overall escapements to south coast areas in 1997. A sea survival approximating that of 1996 would result in small salmon returns that would easily exceed those of 1996. The early smolt run timing at Conne River is also suggestive of improved adult returns in 1997.

At Biscay Bay River, returns in 1997 are anticipated to be well above the conservation requirement. In contrast, Rocky River is not anticipated to reach its conservation requirement.

Management considerations

Conne River is currently managed against a Management Target rather than a conservation requirement. The management target was based upon the estimated number of spawners required to produce the highest recorded returns to the river, which occurred in 1987. The returns were adjusted to account for the total population prior to any sea fisheries by using a assumed commercial

exploitation rate. Considerations for harvests should be done pending inseason reviews carried out during the latter part of June, 1997. In general, south coast rivers have not shown consistent increases in salmon returns resulting from the moratorium. Thus, there are still concerns about the health of these stocks.

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This report is available:

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STOCK: Biscay Bay River (SFA 9) **Drainage area:** 239 km^2

CONSERVATION REQUIREMENT: 2.9 million eggs (~1,134 small salmon) calculated as fluvial area x 2.4 eggs/m^2 and lacustrine area x 368 eggs/ha.

Year	1991	1992	1993	1994	1995	1996	MIN	MAX	MEAN
Recreational harvest (small salmon)[1]									
Retained	10	75	299	214	386	238	10	424	234
Released			38	43	112	50	38	112	64
Recreational harvest (large salmon)[1]									
Retained	0	0	0	0	0	0	0	0	-
Released			0	0	0	0	0	0	-
Counts[2]									
Small	394	1442	1107	1592	1071	1182	394	2516	1656
Large	35	51	120	68	56	149	35	101	75
Conservation requirement[2] % eggs met	38%	141%	97%	143%	77%	117%	38%	230%	124%

[1]Recreational fishery data for retained fish are for the period 1974 to 1991 (prior to the commercial fishery moratorium). Harvests for 1992 and 1993 are retained catches to the time the SFA quota was caught. Data prior to 1992 and for 1994-96 are retained fish for the entire angling season. Data for 1987 are omitted from the calculation of the mean due to the closure of the river as a result of drought conditions. Data for released fish are for the years 1993-96.

[2] Summary (min., max., and mean) for counts is for 1983 -91 and for percent of conservation requirement for 1984-91. Percentage conservation requirement met since 1984 reflects the contribution of both small and large salmon. Counts for 1985, 1989, 1992, and 1993 were adjusted to total counts.

Note: any changes from previous years are due to the updating of count and catch data and biological characteristics information.

Recreational catches: For the period 1974-91, harvests have ranged from 10 to 424 small salmon. Rod days of effort in 1995 and 1996 were the highest recorded since 1978. In 1996, a total of 238 small salmon was retained and 50 were released.

Data and assessment: Complete counts are available from a fish counting fence which has been in operation since 1983. A hook-and-release mortality of 10% was used in the calculation of spawning escapements for the years 1993-96.

State of the stock: Since 1984, from 38 to 230% of conservation requirements was achieved. During the commercial salmon fishery moratorium years, the requirement was exceeded in 1992, 1994, and 1996, but not in 1993 and 1995. Generally, counts of small salmon were higher in pre-salmon moratorium years than in 1992-96; the 1993 and 1995 counts of large salmon were higher than any observed previously. Total population size of small salmon during the moratorium years was substantially lower than in the early 1980s.

Forecast: Based on an analysis of the numbers of small salmon produced per spawner, returns in 1997 are anticipated to be in excess of conservation requirement.

STOCK: Rocky River (SFA 9) **Drainage area:** 296 km^2

CONSERVATION REQUIREMENT: 3.4 million eggs (equivalent to 881 small salmon)

Year	1990	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Total returns	418	227	283	364	177	424	401	81	418	244
Small	401	211	237	292	158	385	356	80	401	235
Large	17	16	46	72	19	39	45	1	17	10
Recreational harvest										
Small	-	-	-	-	-	-	-	-	-	-
Large	-	-	-	-	-	-	-	-	-	-
Broodstock	0	0	0	0	62	76	0	0	0	0
Conservation requirement % eggs met:	40	22	28	34	25	56	34	17	40	26
Smolt Count	8287	7732	7813	5115	9781	7786	14261	7732	8287	8010
Sea Survival	2.3	2.9	3.5	2.3	3.4	3.8		2.3	2.9	2.6

[1]Min, Max and Mean period from 1987-91.

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

Methodologies: Fluvial habitat consists of 1.08 million m^2 and lacustrine habitat includes 2200 ha. Conservation egg requirement to come from small salmon. Biological characteristics used are those of the Rocky River 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. Smolts have been enumerated annually since 1990.

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

Forecast: Based on the 1991-95 smolt-to-adult survival, between 300 and 496 maiden 1SW salmon are expected in 1997.

STOCK: Northeast River (SFA 10) **Drainage area:** 94 km^2

CONSERVATION REQUIREMENT: 0.72 million eggs (~224 small salmon) calculated as fluvial area x 2.4 eggs/m^2 and lacustrine area x 368 eggs/ha.

Year	1991	1992	1993	1994	1995	1996	MIN	MAX	MEAN
Recreational harvest (small salmon)[1]									
Retained	19	37	132	39	127	268	19	349	168
Released			61	5	8	7	5	61	25
Recreational harvest (large salmon)									
Retained	0	0	0	0	0	0	0	0	-
Released			0	0	0	0	0	0	-
Other mortalities									
Small					25	49			
Large					5				
Counts[2]									
Small	353	921	847	677	663	1225	223	725	415
Large	8	46	65	70	74	123	0	62	29
Conservation requirement[3]									
% eggs met	175%	555%	527%	434%	422%	736%	152%	352%	233%

[1] Recreational fishery data for retained fish for the period 1974 to 1991 (prior to the commercial fishery moratorium). Harvests for 1992 and 1993 are retained catches to the time the SFA quota was caught. Data prior to 1992 and for 1994-96 are retained fish for the entire angling season. Data for 1987 are omitted from the calculation of the mean due to the closure of the river as a result of drought conditions. Data for released fish are for the years 1993-96.

[2]Summary (min., max., and mean) for counts is for the period 1976 -91.

[3]Summary (min., max., and mean) for the conservation requirement is for 1984-91. Percent of conservation requirement met represents the contribution from both small and large salmon.

Note: any changes from previous years are due to the updating of count and catch data and biological characteristics information.

Recreational catches: For the period 1974-91, harvests have ranged from 19 to 349 small salmon. Rod-days of effort in 1996 were the highest recorded. In 1996, a total of 268 small salmon was retained and 7 were released.

Data and assessment: Counts are available from a fishway on the lower river. A hook-and-release mortality of 10% was used in the calculation of spawning escapements for the years 1993-96.

State of the stock: Conservation requirement has been exceeded every year since 1984. The counts of small and large salmon in 1996 were the highest on record.

STOCK: Little River, SFA 11
CONSERVATION REQUIREMENT: 306 thousand eggs (equivalent to 230 small salmon)

Year	1990	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Total returns:	173	61	125	180	88	135	801	61	173	95
Small	158	55	104	169	75	118	674	55	158	89
Large	15	6	21	11	13	17	127	3	15	6
Recreational Harvest	-	-	-	-	-	-	-	-	-	-
Broodstock	82	30	97	100	0	85	119			
Conservation requirement % eggs met[2]:	105	47	45	82	38	21	298	29	105	54
Smolt	-	-	382	324	501	2712	4449			

[1] MIN, MAX, and Mean period 1987-91.
[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 was conducted from 1990 to 1996, except for 1995.

Methodologies: Conservation egg deposition is derived for accessible habitat (1,308 riverine units) with eggs required for conservation to come from small salmon. Biological characteristics are those of Little River and Conne River. Current fry releases are backcalculated to eggs for % of conservation egg achieved in areas stocked. Total returns to the river are based on fence counts.

Recreational fishery: The recreational fishery was 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 1992-96.

State of the stock: The stock appears to be increasing.

Forecast: No quantitative forecast is possible for 1997.

STOCK: Conne River (SFA 11) **Drainage area:** 602 km^2

MANAGEMENT TARGET: 7.8 million eggs (~4000 small salmon) calculated as fluvial area x 2.4 eggs/m^2 and egg/recruit applied to total population as derived from assumed commercial exploitation rates.

Year	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Total Returns:									
Small	2411	2523	2703	1533	3502	4440	2411	10155	6472
Large	89	159	100	100	110	179	89	516	355
First Peoples' harvest									
Small	281	483	417	0	0	0	18	948	459
Large	3	5	3	0	0	0	0	11	3
Recreational harvest									
Small (retained)	108	329	0	0	0	0	0	3302	1824
Large (retained)	0	0	0	0	0	0	0	-	-
Small (released)	-	-	-	-	-	-	-	-	-
Large (released)	-	-	-	-	-	-	-	-	-
Other Mortalities including broodstock removal									
Small	7	8	3	98	126	38	-	-	-
Large	0	2	2	1	2	0	-	-	-
Spawners:									
Small	2062	1783	2353	1435	3376	4402	2062	7823	4709
Large	87	153	97	99	108	179	87	488	345
Management target % eggs met:	51%	51%	61%	40%	81%	112%	51%	214%	131%
Smolt count[2]	74645	68208	55765	60762	62749	94088	55765	94088	68743
Sea Survival[3]	3.4%	4.0%	2.7%	5.8%	7.2%	-	2.7%	10.2%	5.8%

[1] Min, max and mean recreational harvest calculated for period 1974-91; other mean data for 1986-91 to coincide with the pre-moratorium period. Angling harvests are DFO statistics. First Peoples harvest in salt water includes some salmon from other rivers. First Peoples fishery quota of 1200 fish has been in effect since 1986, but reduced to 500 fish for 1993. First Peoples fishery closed in 1994-96.

[2] Min., max. and mean for the period 1987 to 1996.

[3] Sea survival of smolt to small salmon returns. Min., max. and mean are for 1987 to 1995 smolt migrations.

Data and methodology: Smolts estimates are derived from mark-recapture surveys. Returning adult salmon are enumerated at a fish counting fence. A video camera system was introduced in 1993.

State of the stock: The Management Target, which differs and is higher than the conservation egg requirement, was met from 1986-90 and again in 1996. Only 40-61% of the target was achieved from 1991-1994 but rose to 81% in 1995. Sea survival increased to the highest value in six years (7.2%). An enhancement project was initiated in 1994 with approximately 128 thousand fry released in 1995. Note that these fry have not been included in terms of the percentage target achieved in the above table.

Forecast: Estimated smolt output in 1996 was the highest on record: 94,088 (79,867-108,309). Given the high smolt run, a survival of only 4.25% should result in 4000 adult salmon returns in 1997. With survival in 1997 similar to that for 1SW salmon in the previous year, then returns should easily exceed 4000 fish and could approach 5400 1SW salmon. In addition, other relationships between (a) median timing of the smolt run and sea survival, and (B) an index of marine thermal habitat and sea survival, both suggest high returns in 1997. In-season monitoring should be used to update managers on changing conditions as the 1997 run progresses. Over 130 thousand Saint John River origin salmon reportedly escaped in February, 1996, from an aquaculture sea cage in Bay d'Espoir. Some of these fish could begin to return to local rivers, including Conne River, as 1SW salmon in 1997.