Newfoundland & Labrador Atlantic Salmon 2003 Stock Status Update

Background

There are 15 Atlantic salmon (Salmo salar) management areas, known as Salmon Fishing Areas (SFAs) 1-14B, in Newfoundland and Labrador (Figs. 1-2). Within these areas there are more than 200 rivers with reported Atlantic salmon populations characterized by differences in life history traits including freshwater residence time, age at first spawning, and the extent of ocean migrations. Spawning populations consist of varying proportions of small (fork length < 63 cm) and large (fork length ≥ 63 cm) salmon. The majority of rivers in Newfoundland contain populations of small salmon or grilse which are predominantly maiden fish (never spawned before) that have spent one year at sea before returning to spawn (one-sea-winter salmon, 1SW). In Labrador (SFAs 1-2, & 14B), and western Newfoundland (SFAs 13 & 14A), there are important large salmon components that contain a mixture of maiden fish that have spent two (2SW) or more years (MSW) at sea before spawning and repeat spawners which are returning for a second or subsequent spawning. In other Newfoundland rivers, the large salmon component consists mainly of repeat spawners.

Conservation requirements for Atlantic salmon rivers are considered to be threshold reference points. The consequences of egg depositions below conservation to the long-term sustainability of the stock are unknown but the likelihood of deleterious effects are greater when egg depositions are below conservation. Conservation requirements are established for individual rivers in insular Newfoundland (SFAs 3-14A) and Labrador Straits (SFA 14B) based on 2.4 eggs per m^2 of river rearing habitat and 368 or 105 eggs per hectare of lake habitat, depending on the river system. Conservation requirements have been established for only a few SFA 1 & 2 rivers. 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. There should be no human induced mortality on stocks that are below 100% of conservation.

Summary

Newfoundland & Labrador

- Compared to 2002 (a below average year), returns of small and large salmon improved for most rivers. However, relative to the average for 1992-2002, many rivers still declined. In view of the closures and restrictions placed on fisheries since 1992, overall salmon abundance continues to be low.

Labrador (SFAs 1-2)

- Based on returns to four counting facilities, stocks appear low considering closure of commercial fisheries.
- Returns of small and large salmon in English River (SFA 1) decreased relative to 2002.
- For SFA 2, returns of small salmon declined in Southwest Brook, stayed the same in Sand Hill River but increased in Muddy Bay Brook compared to 2002. Large salmon declined in Southwest Brook but increased in Muddy Bay Brook and Sand Hill River compared to 2002.

Northeast and eastern Newfoundland (SFAs 3-8)

- In spite of greatly increased spawning in 1992-1996, returns of small salmon decreased overall

since 1997, while returns of large salmon increased in three out of six rivers.
- Conservation requirements were achieved in only two (Campbellton and Middle Brook) of six assessed rivers.
- Campbellton River and Middle Brook have met or exceeded conservation requirements in each year of assessment during the commercial salmon fishery moratorium.
- Gander River has met or exceeded conservation requirements in only five of the last twelve years.
- Exploits River, Terra Nova River and Northwest River (Port Blandford) have yet to achieve conservation requirements due to habitat expansion.
- Returns of small salmon to Exploits River were among the highest recorded.
- Northwest River (Port Blandford) had record returns of both small and large salmon in 2003.

Southern Newfoundland (SFAs 9-11)
- Stock abundance overall continues to be lower during the commercial salmon fishery moratorium than prior to the moratorium and there should be no increase in mortality.
- Conservation requirements were achieved in two out of four assessed rivers.
- Northeast Brook (Trepassey) and Rocky River improved compared to 2002 and the 1992-2002 mean while Little River and Conne River did not.

Southwest Newfoundland (SFA 12-13)
- Some improvements in SFA 13 were observed in most of the rivers assessed in 2003 relative to 2002 but population sizes still remain low.
- Conservation requirements were achieved in two out of seven rivers assessed.

Northwest Newfoundland (SFA 14A)
- In spite of greatly increased spawning escapements for Lomond and Torrent rivers in 1992-1996, there has been no corresponding increase in adult (small salmon) recruitment, which should have started in 1997. Western Arm Brook showed an increase over the period.
- Conservation requirements were exceeded in all three assessed rivers in 2003.

Smolt production
- Smolt production in insular Newfoundland declined in four out of five stocks, in comparison with 2002.
- Four of the five rivers experienced peak production in 1997, but since then substantive declines have occurred at Western Arm Brook, Campbellton and Rocky rivers.
- In rivers where smolt production declined in 2003, returns of small salmon in 2004 are expected to be lower unless there is a compensatory increase in marine survival.

Marine survival
- Marine survival remains highly variable but generally low.
- Higher survivals have occurred in the past, even in years when directed ocean fisheries for salmon were in existence.

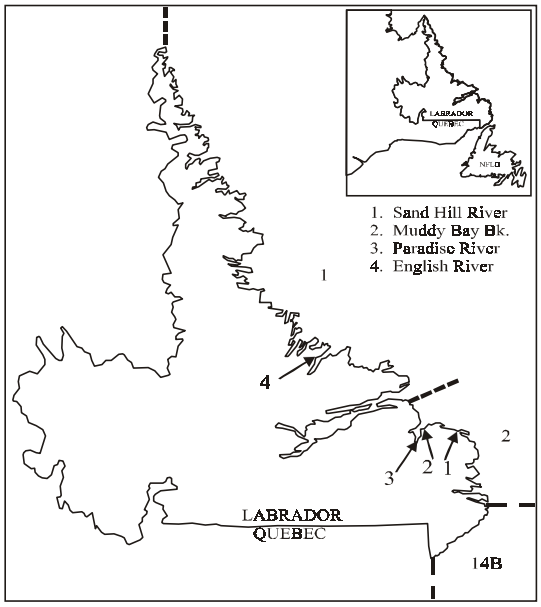

Figure 1. Map illustrating the location of Salmon Fishing Areas of Labrador, along with salmon rivers assessed in 2003. Labrador rivers were not assessed relative to conservation requirements.

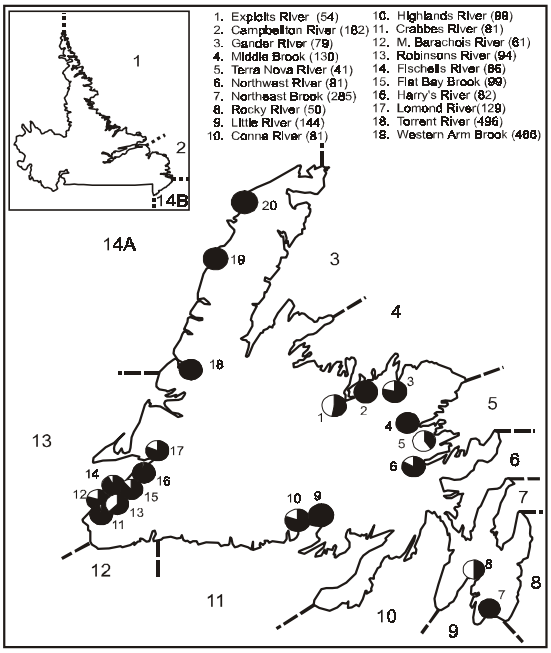

Figure 2. Map illustrating the location of the Salmon Fishing Areas of Newfoundland, along with various salmon rivers assessed relative to conservation requirements. The black portion of the circle and the numbers in parentheses indicate the percentage of conservation the conservation requirement achieved for each river in 2003.

Environmental conditions

Freshwater – For several years, freshwater environmental conditions have been inferred by examining the frequency and extent that scheduled salmon rivers were closed for environmental reasons. During the 2003 angling season, 93 out of 158 scheduled rivers in insular Newfoundland (58.9%) were closed for varying periods of time because of low water levels and warm water temperatures. As a result, 15.5% of the potential fishing days available were lost, the third highest amount in the past 15 years. This contrasts with 2002 when only 24 rivers were closed with 2.4% of the angling days affected.

Marine - Ocean temperatures at Station 27 off St. John's Newfoundland for the first nine months of 2003 indicated above normal conditions during January and February but colder-than-normal conditions during April with values reaching near 0.5°C below average in the upper water column. During May to September, conditions warmed to above normal values. Oceanographic data collected in the offshore areas during the spring on the Newfoundland Shelf generally showed below normal temperatures particularly in the upper part of the water column. Observations from the mid-summer oceanographic survey indicated that the area of the cold-intermediate-layer (CIL <0°C) continued below normal but increased slightly over 2002 values.

Winter and spring of 2003 air temperatures over Newfoundland and Labrador were among the coldest observed in almost a decade. During March, air temperatures had dropped to 3.5°C below normal over Labrador (Cartwright) and by 2.5°C below normal

over Newfoundland (St. John's). By April, conditions improved somewhat but air temperatures remained near 1.5°C below the long-term average. This resulted in heavy and extensive sea ice on the Newfoundland and Labrador Shelf during the winter and spring of 2003.

Preliminary analyses have shown associations between marine environmental conditions and both marine survival of salmon and adult salmon run timing (Colbourne et al., 2002). However, there is insufficient information to quantify the relationship.

The Fisheries

The recreational salmon fishery in SFAs 2-14B is managed based on the River Classification System. A five-year (2002-2006) integrated Atlantic salmon fisheries Management Plan was introduced for Newfoundland and Labrador in 2002 (Anon. 2002a). In the 2003 Management Plan, some rivers were reclassified as outlined in Angler's Guide for 2003 (Anon. 2002b).

The recreational salmon fishery for all Labrador rivers opened 15 June and closed 15 September. Retention of large salmon was not permitted in SFA 14B of Labrador. In SFA 1 and some SFA 2 rivers, anglers could retain four salmon for the season; other scheduled salmon rivers in SFA 2 were given a Class III designation, with a seasonal retention limit of two small salmon and no large salmon. The lower retention limit for some rivers in SFA 2 was implemented as a precautionary measure to prevent increased fishing mortality expected as a result of increased accessibility via the Trans-Labrador Highway. Rivers without direct access from the highway were left at four salmon, as was previously the case.

Aboriginal subsistence fisheries for salmon, charr and trout occurred in Labrador under communal licence similar to 2002. An All Resident Subsistence Fishery for trout and charr permitted retention of up to four salmon as a by-catch in 2003.

There has been no commercial salmon fishing in insular Newfoundland since 1992; the Straits area of Labrador (SFA 14B) since 1997; and the rest of Labrador (SFAs 1-2) since 1998.

Commercial salmon fishing in Greenland territorial waters was suspended in 2002. Greenlanders continued a subsistence harvest in 2002 and 2003. There was a small commercial and recreational net fishery in St. Pierre et Miquelon territorial waters.

Newfoundland - Angling catch statistics from Licence Stub Returns in 2003 are not yet available.

Labrador - Angling catch data for SFA 1 was derived, as in previous years, from records kept by Department of Fisheries and Oceans (DFO) Conservation and Protection staff and logbooks from outfitting camps. For SFA 2, DFO data were used for 1974-1993 and a combination of DFO data and License Stub Return Data was used for 1994-2003. In 2003, preliminary estimates suggest the total angling catch in SFAs 1-2 was 6,986, the second highest on record. The total angling effort was 4,668 rod-days, the lowest since 1995. The catch of small salmon was 5,725 (1,534 retained and 4,191 released) and large salmon was 1,261 (236 retained and 1,024 released) (Fig. 3). In SFA 1,

the total catch (small and large salmon combined) of 1,620 increased 108% over 2002. In SFA 2, the total catch of 5,366 was 5% higher than in 2002.

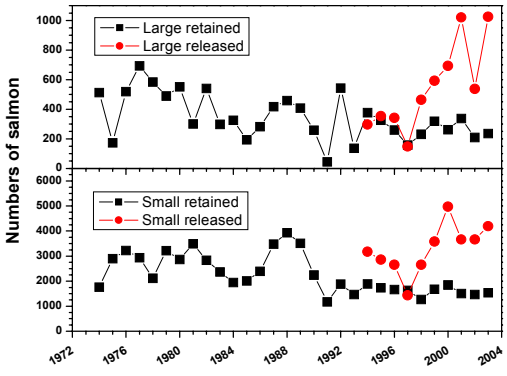

Figure 3. Angling catch statistics for small and large salmon in Labrador SFAs 1&2, 1974-2003 (data for 2003 are preliminary).

Total catches in SFAs 1-2 were the highest in three years. The proportion of salmon released by anglers in Labrador, which has been increasing over time, was 75% of the total catch, and was the highest reported to date. In total, there were 5,215 small and large salmon estimated to be hooked and released in 2003.

Information available on subsistence fishery catches indicates that about 18 tonnes (7,200 salmon) were harvested in 2002 of which large salmon represented 34% of the catch by weight and 20% by number. Subsistence fishery landings from 2003 log returns are not yet complete but preliminary information indicates landings will likely be similar to those of 2002.

Subsistence salmon fisheries landings in Labrador as of 2 October 2003.

Year	Small salmon		Large salmon		Total	
	Number	Weight (kg)	Number	Weight (kg)	Number	Weight (kg)
2000	5,323	10,353	1,352	5,262	6,675	15,613
2001	4,789	9,789	1,673	6,499	6,478	16,288
2002	5,806	11,581	1,437	5,990	7,236	17,551

Resource Status - Adult salmon

During the commercial salmon fishery moratorium (in place beginning in 1992 in insular Newfoundland and 1998 in Labrador), the numbers of small and large salmon returning to rivers in insular Newfoundland are considered to be the total numbers of salmon that survive the marine environment. Spawning escapements are determined by accounting for known removals of salmon, including recreational harvests, brood-stock collections, in-river mortality, or scientific samples. Recreational harvests for 2003 were, for most rivers, estimated based on average catches derived from licence stub returns in 1997-2001. Hence, returns of small and large salmon and values for percentage conservation requirements achieved are preliminary.

Adult salmon stocks in 2003 were assessed in 20 rivers in insular Newfoundland and four in Labrador (Table 1). These were distributed among nine of the 14 SFAs (Figs. 1-2).

Three of the 20 stocks assessed in insular Newfoundland (Exploits River, Terra Nova River and Rocky River) have undergone enhancement (colonization) activities within the past 10-20 years that made vast amounts of habitat accessible to anadromous salmon. These stocks are still in the

development stage thus are not expected to achieve conservation requirements in the near future.

Labrador (SFAs 1-2, 14B)

There are now 28 scheduled salmon rivers in SFAs 1-2 and 14B, although many other rivers contain populations of Atlantic salmon. Prior to the closure of the Labrador commercial salmon fishery in 1998, landings (small and large salmon combined) averaged 369 tonnes annually during the period from 1984 to 1989, and 111 tonnes per year from 1990 to 1997, the period in which quotas and allowances were in effect. Commercial salmon landings during the last year of the fishery (1997) were about 47 tonnes. By comparison, approximately 18 tonnes of salmon were harvested in subsistence fisheries in 2002.

The status of English River (SFA 1), Southwest Brook (Paradise River), Muddy Bay Brook, and Sand Hill River (SFA 2) (Fig. 1) was assessed using fish counting facilities. There are no additional facilities from which to determine the status of other Labrador salmon stocks.

Status

Returns of small salmon to English River and Southwest Brook, a tributary of Paradise River in 2003 decreased over 2002 by 30% and 33% respectively (Table 1). Returns of small salmon to English River were the second lowest since assessments commenced in the late 1990s. Returns of large salmon also decreased at both English River (39%) and Southwest Brook (53%). Muddy Bay Brook with two years of data showed considerable increases of 269% for small salmon and 173% for large salmon over 2002. Sand Hill River although broken into 3 time periods (1970-73, 1994-96 & 2002-2003) has the longest series of count information in Labrador. Returns to the river in 2003 were similar to those of 2002 for small salmon but increased by 9% for large salmon. Returns of small salmon in 2003 were the 5th highest on record while large salmon were the 2nd highest. Removals by marine fisheries are not included in total returns to the rivers.

Conservation spawning requirements for Labrador rivers have not been defined and the use of 2.4 eggs per m² of fluvial habitat and 105 eggs per hectare of pond habitat may not be appropriate (CSAS 2002). Efforts are needed to derive acceptable reference or conservation levels for Labrador rivers, as there is uncertainty in reconciling and comparing different reference criteria from these approaches.

Northeast and Eastern Newfoundland (SFAs 3-8)

Six rivers were assessed: Exploits, Campbellton, and Gander rivers in SFA 4, and Middle Brook, Terra Nova River and Northwest River (Port Blandford), in SFA 5 (Fig. 2). With the exception of Gander River, all stocks were assessed directly from salmon returning to fish counting facilities. The status of Gander River in 2003 was inferred from salmon returning to a fishway in Salmon Brook, a tributary.

Status

Total returns of small salmon in 2003 increased over 2002 (ranging from 12% for Campbellton River to 128% for Northwest River) for all rivers except

Gander River, which remained similar. Compared to the 1992-2002 means, increases occurred in Exploits (46%), Terra Nova (15%), and Northwest (151%) rivers while decreases were noted for Campbellton (19%) and Gander (25%) rivers and Middle Brook (26%). Returns of large salmon in 2003 increased relative to 2002 in all rivers, except Gander River and Middle Brook, which were similar to 2002. Only Exploits (14%) and Northwest (121%) rivers increased relative to the 1992-2002 means while the remaining rivers experienced decreases ranging from 13% (Terra Nova) to 45% (Campbellton). Conservation spawning requirements were met only at Campbellton River and Middle Brook (Fig. 2, Table 1). Campbellton River and Middle Brook have exceeded their conservation spawning requirements in each of the years they have been assessed during the moratorium (Table 1). Gander River has met or exceeded conservation requirements in only five of 12 years, and has declined relative to conservation requirements in each of the past four years. Terra Nova River, Exploits River and Northwest River (Port Blandford) have yet to achieve conservation spawning requirements.

In spite of greatly increased spawning escapements for most assessed rivers in this area in 1992-1996, immediate benefits of the moratorium, there has been no corresponding increase in adult recruitment (i.e. small salmon) which should have started in 1997.

South Newfoundland (SFAs 9-11)

Four rivers were assessed: Northeast Brook (Trepassey) and Rocky River in SFA 9; Conne River and Little River in SFA 11 (Fig. 2). Northeast River (Placentia) in SFA 10 was not assessed in 2003. Spawning escapements were assessed using fish counting facilities while mark-recapture methods were used to survey smolt production at Conne River.

Status

Total returns of small salmon in 2003 increased by 77% at Northeast Brook (Trepassey) and 46% at Rocky River by comparison with 2002, while returns at Conne River declined by 24%, and were also 34% below the 1992-2002 mean. Returns to Northeast Brook (Trepassey) were the third highest recorded since 1984, the highest since the commercial salmon fishery moratorium began in 1992. Returns of large salmon were similar to the mean moratorium values at Northeast Brook (Trepassey) and Rocky River, but were the lowest recorded at Conne, approximately 70% less than the average during the moratorium. Large salmon at Conne River are predominately alternate spawning grilse. Hence, these fish were largely derived from the record low returns that occurred in 2001.

Conservation spawning requirements in 2003 were achieved only at Northeast Brook (Trepassey), with approximately 50% and 81% attained at Rocky and Conne rivers, respectively. Rocky River has yet to achieve conservation while Conne River has met its requirement in 8 of the past 12 years.

Southwest Newfoundland (SFAs 12-13)

Seven rivers were assessed in SFA 13 (Fig. 2). Crabbes, Middle Barachois, Robinsons, Fischells, and Flat Bay rivers were assessed by snorkelling

surveys, while the status of Highlands and Harry's rivers were assessed using fish counting facilities.

Status

Returns of both small and large salmon increased substantially in Highlands, Crabbes, Fischells and Harry's rivers, both in comparison to 2002 and to the 1997-2002 mean (Table 1). Returns of small salmon to Middle Barachois and Robinsons rivers also increased relative to 2002, but were lower than the 1996-2002 mean. Returns of small salmon to Flat Bay Brook, were similar to the returns in 2002, but the returns of large salmon were less (-15%) than the 1996-2002 mean. The returns of large salmon in Middle Barachois Brook declined both in relation to 2002 and the 1996-2002 mean by 39% and 20%, respectively. Returns of small salmon to Harry's River were the second highest and the returns of large salmon were the highest since 1992.

At Highlands River, conservation spawning requirements were virtually achieved (99%) for the first time in six years. Increases in small and large salmon in Crabbes River and Fischells Brook resulted in 81% and 86%, respectively, of conservation requirements achieved. This halts the downward trend experienced over the previous three (3) years. The percentage of the conservation requirement achieved in Crabbes River was the highest since 1997 and the third highest in Fischells Brook since 1997. Egg deposition in Fischells Brook has been highly variable since 1997. Egg deposition in Middle Barachois Brook was only 61% of its conservation requirement and was 14% below the 1996-2002 mean. Egg depositions in both Robinsons River (94%) and Flat Bay Brook (99%) in 2003 were 10% below their means in 1996-2002. Egg deposition in Harry's River in 2003 was 82% of its conservation requirement, the highest recorded. Crabbes and Middle Barachois rivers have not achieved their conservation requirements since the closure of commercial salmon fisheries in 1992.

Northwest Newfoundland (SFA 14A)

Three rivers were assessed (Fig. 2). Lomond River, Torrent River, and Western Arm Brook were all assessed using fish counting facilities.

Status

Returns of both small and large salmon in 2003 were variable throughout the area. At Lomond River, returns of small salmon showed little change compared to 2002 and were 13% below the 1992-2002 mean. Returns of large salmon increased by 24% compared to 2002 but showed little change compared to the 1992-2002 mean. At Torrent River, returns of small salmon decreased compared to 2002 (-18%) and the 1992-2002 mean (-16%). Returns of large salmon in Torrent River also decreased compared to both 2002 (-21%) and the 1992-2002 mean (-27%). At Western Arm Brook, returns of small salmon were the fourth highest observed since the moratorium began but returns of large salmon decreased by 52% compared to both 2002 and the 1992-2002 mean.

Conservation spawning requirements were exceeded in all three assessed stocks in 2003 and have done so in all years (except Lomond River in 2001) since the closure of the commercial

salmon fishery (Fig. 2, Table 1). Torrent River is an enhanced (colonized) stock and Lomond River is a stock that has benefited from construction of a fishway to improve fish passage.

In spite of greatly increased spawning escapements for Lomond River and Torrent River in 1992-1996, immediate benefits of the moratorium, there has been no corresponding increase in adult (ie. small salmon) recruitment, which should have started in 1997. Western Arm Brook showed an increase over the period.

Smolt production and marine survival

In insular Newfoundland, information on both smolt and adult salmon counts is available from five rivers: Campbellton River (SFA 4); Northeast Brook (Trepassey) (SFA 9); Rocky River (SFA 9); Conne River (SFA 11); and Western Arm Brook (SFA 14A).

Smolt production

Smolt production in 2003 declined in four out of five stocks, by comparison with 2002. Decreases ranged from 13% at Conne River and Western Arm Brook to more than 40% at both Northeast Brook (Trepassey) and Rocky River, the latter achieving its lowest smolt production on record (Fig. 4). At Campbellton River, smolt production increased by 8% relative to the previous year. With the exception of Conne River, the other four stocks have smolt production values in 2003 that were 21 to 59% less than corresponding average values for the period 1997 to 2002. Four of the five rivers experienced peak

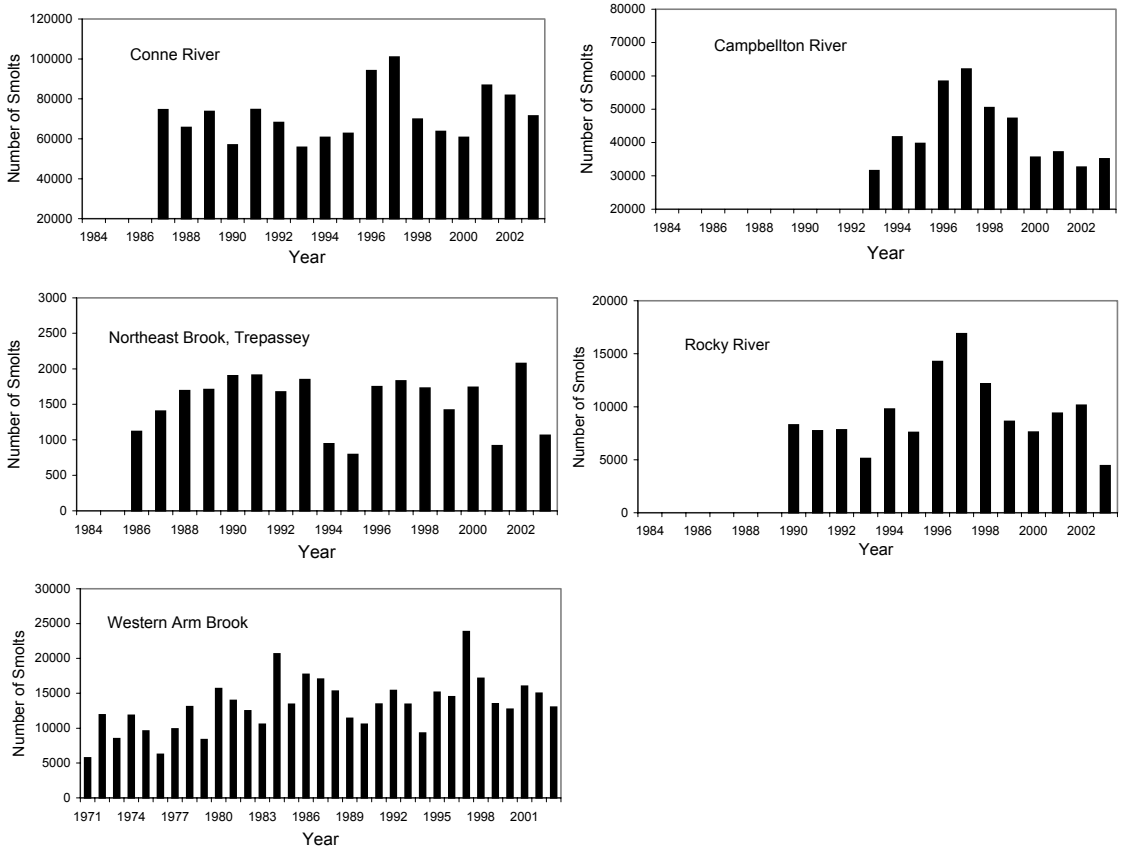

Figure 4. Trends in smolt production from various Newfoundland rivers.

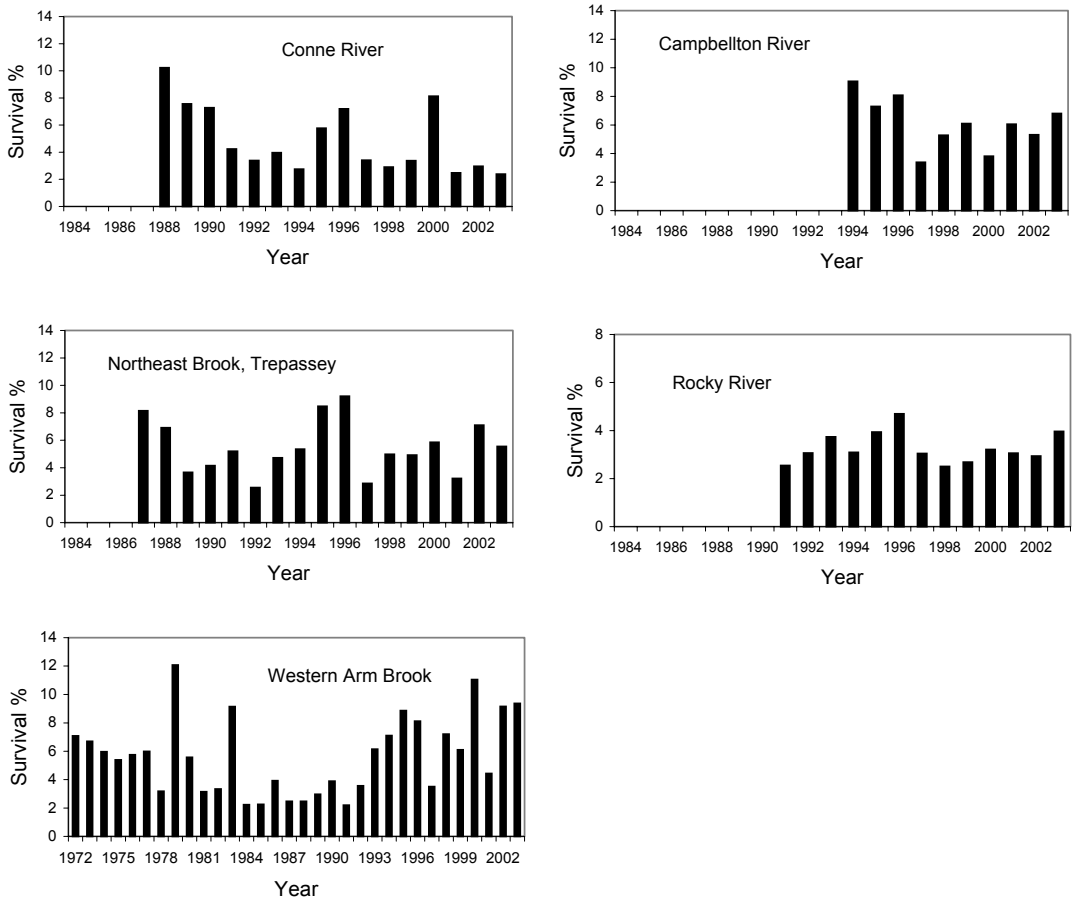

Figure 5. Marine survival rates for adult small salmon at various Newfoundland rivers. Survival rates have not been adjusted for marine exploitation in years prior to 1992 when commercial fisheries for salmon occurred. Thus, values represent actual survival of salmon back to the river or local home waters.

production in 1997, but since then precipitous declines have occurred at Western Arm Brook, Campbellton and Rocky rivers. In rivers where smolt production declined, returns of small salmon in 2004 are expected to be lower unless there is a compensatory increase in marine survival.

Marine survival

Marine survival, corresponding to adult small salmon returns in 2003, averaged 5.6% across all five rivers, ranging from a high of 9.4% at Western Arm Brook, to a low of 2.4% at Conne River, the lowest ever recorded (Fig. 5). At two south coast rivers, Conne River and Northeast Brook (Trepassey), survival was about 20% lower than that recorded for adult salmon returns in 2002. In contrast, survival increased by 28% at Campbellton River and 35% at Rocky River. With the exception of Conne River, survival in 2003 was 15 to 37% higher than the average recorded from 1997 to 2002. Marine survival, however, remains highly variable and generally low. Higher survivals have occurred in the past, even in years when directed ocean fisheries for salmon were in existence.

Management Concerns

Marine survival of Atlantic salmon stocks remains low throughout Newfoundland and Labrador even with the reductions in directed marine fisheries since 1992. Recently there was some concern about salmon by-catch in baitnets. Studies (Reddin et al. 2002, Anon. 2002c) recommend that salmon by-catch would be minimized by setting bait nets parallel to shore, with head ropes one fathom below the surface. Also bait nets should be kept away from salmon rivers and areas where salmon are concentrated.

In **Labrador** (SFAs 1-2) overall, salmon abundance as evidenced by returns to four counting facilities, appears to be low considering closure of commercial fisheries.

Increased access provided by the Trans-Labrador Highway has the potential to increase angling exploitation rates on fishery resources. Careful monitoring of stock status and the compilation of accurate catch statistics are essential to ensure the long-term sustainability of the resource. In the absence of resource monitoring coupled with harvest adjustments, sustainability could be jeopardized.

In **Northeast and Eastern** (SFAs 3-8), the improvement in the status of salmon in Northwest River (Port Blandford) in 2003, is attributed in part to increased stewardship of the resource in 2002 and 2003.

Compared to 2002, salmon spawning populations assessed in SFAs 4-5 improved in 2003 but many were still below average. Consideration should be given to reducing mortality to ensure conservation requirements are not compromised.

Gander River has met or exceeded conservation requirements in only five of 12 years, and has declined relative to conservation requirements in each of the past four years. There is some uncertainty around estimates of returns from year 2000 onwards (O'Connell 2003); nevertheless, spawning escapements should be increased. Observations by some anglers suggest returns were better than estimates extrapolated from Salmon Brook.

In **Southern Newfoundland** (SFAs 9-11), some rivers (e.g. Northeast Brook (Trepassey), and Conne River) had average returns of small salmon in 1992-2002 that were lower than returns prior to the commercial salmon moratorium.

In **Southwest Newfoundland** (SFAs 12-13), particular consideration should be given to the conservation of salmon populations in SFA 13, especially in Bay St. George. Concern for these stocks has been registered for more than two decades, particularly the low returns of large salmon, many of which are virgin 2-sea-winter salmon. Information from Middle Barachois Brook indicates that 27% of large salmon are only 60-63 cm upon entering freshwater. This may also apply to other rivers in the area and needs to be investigated.

Rivers in Bay St. George experience dramatic fluctuations in salmon abundance. Some, but not all, of these fluctuations may be attributed to the frequent extremes in river discharge. Poaching in some Bay St. George rivers is also believed to be a long-standing problem hampering stock recovery.

The increased management efforts with respect to stewardship and enforcement appear to be successful in some rivers. DFO should continue to support the stewardship initiatives and implement management options that will maximise the spawning population.

A concerted effort should be made to reduce the overall removals of salmon in Bay St. George rivers in 2004 with particular emphasis on Middle Barachois Brook, Fischells Brook, and Crabbes River. It is recommended that there be no increase in fishing mortality in any river, until there are salmon surplus to conservation requirements.

In **Northwest Newfoundland** (SFA 14A), assessed rivers had returns that exceed their conservation requirements, thus there is potential for increased harvest. However, there is concern as to whether or not this can be extrapolated to other rivers. Given the high annual variability in marine survival and declining stocks, caution should be exercised when considering any change in fisheries management measures.

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Table 1. Summary of Atlantic salmon stock status in the Newfoundland Region. Conservation met refers to the actual percentage of the conservation spawning requirement achieved, but is intended as a reference level only for Labrador stocks, when reported. Refer to footnotes for definition of characters and abbreviations.

Region / River	SFA	Map Index	Method	Total Returns 2003 Small	2003 Large	2002 Small	2002 Large	1992-02 Small	1992-02 Large	Conservation met (%) 2003	2002	1992-02	1992-03	Status in 2003: Smolts Relative to: 2002	Smolts Relative to: 1992-02	Marine Survival Relative to: 2002	Marine Survival Relative to: 1992-02	Egg Deposition Relative to: 2002	Egg Deposition Relative to: 1992-02
Labrador																			
Sandhill River	2	1	Fe	3148	621	3155	567	2863	568										
Muddy Bay Brook	2	2	Fe	391	30	104	11												
Southwest Brook (Paradise River)	2	3	Fe	157	16	235	34	249	28										
English River	1	4	Fe	133	19	190	31	210	34										
Newfoundland																			
Northeast Coast																			
Exploits River	4	1	Fw	28943	1331	15486	890	19827	1169	54	27	37	0 of 12 yrs					⇧	⇧
Lower	4		Fw							156	64	111	8 of 12 yrs					⇧	⇧
Middle	4		Fw							39	23	25	0 of 12 yrs					⇧	⇧
Upper	4		Fw							7	3	8	0 of 12 yrs					⇧	⇩
Campbellton River	4	2	Fe	2219	152	1974	123	2735	278	182	133	241	11 of 11 yrs	⇔	⇩	⇧	⇧	⇧	⇩
Gander River *	4	3	EFw	13482	1912	13183	1835	17974	2332	79	75	97	5 of 12 yrs					⇔	⇩
Middle Brook	5	4	Fw	1289	74	890	69	1735	133	130	102	191	12 of 12 yrs					⇧	⇩
Terra Nova	5	5	Fw	2322	331	1437	272	2027	381	41	28	34	0 of 12 yrs					⇧	⇧
Northwest River (Port Blandford)	5	6	Fe	1012	273	443	114	404	123	81	37	35	0 of 9 yrs					⇧	⇧

Assessment Methods: Fe = counting fence; Fw = fishway count; Sc = snorkel count; MR = mark-recapture; EFw = estimated from tributary fishway count

Trend symbols: ⇩ > 10% decrease; ⇧ > 10% increase; ⇔ no change = ± 10%

Footnotes:
Map index numbers refer to text figure and legend.
Marine survival is from smolts in year i to small salmon in year i + 1.
Use of 240 eggs/100 m2 as a conservation requirement for Labrador rivers may not be appropriate, and is used here only as a reference level.
In some cases fewer years are included in the 1992-2002 mean for some rivers.
* Gander River was assessed using a fish counting fence from 1989 to 1999.

Table 1. Continued. Summary of Atlantic salmon stock status in the Newfoundland Region. Conservation met refers to the actual percentage of the conservation spawning requirement achieved, but is intended as a reference level only for Labrador stocks, when reported. Refer to footnotes for definition of characters and abbreviations.

Region		Map		Total Returns 2003		Total Returns 2002		Total Returns 1992-02		Conservation met (%)				Status in 2003: Smolts Relative to:		Status in 2003: Marine Survival Relative to:		Status in 2003: Egg Deposition Relative to:	
River	SFA	Index	Method	Small	Large	Small	Large	Small	Large	2003	2002	1992-02	1992-03	2002	1992-02	2002	1992-02	2002	1992-02
South Coast																			
Northeast Brook (Trepassey)	9	7	Fe	115	11	65	2	75	12	285	156	192	12 of 12 yrs	↓	↓	↓	⇔	↑	↑
Rocky River	9	8	Fe	402	73	276	78	309	69	50	40	39	0 of 12 yrs	↓	↓	↑	↑	↑	↑
Little River*	11	9	Fe	322	13	487	41	299	45	144	224	123	5 of 12 yrs					↓	↑
Conne River	11	10	Fe	1953	51	2573	167	2949	172	81	113	128	8 of 12 yrs	⇔	⇔	↓	↓	↓	↓
Southwest Coast																			
Highlands River	13	11	Fe	294	166	169	87	160	106	99	53	60	2 of 11 yrs (incl. 2003)					↑	↑
Crabbes River	13	12	Sc	1107	264	630	136	799	227	81	43	53	0 of 8 yrs					↑	↑
Middle Barachois	13	13	Sc	735	101	548	165	844	126	61	61	67	0 of 7 yrs					⇔	⇔
Robinsons River	13	14	Sc	1260	182	998	206	1308	216	94	82	87	3 of 7 yrs					↑	⇔
Fischells Brook	13	15	Sc	1071	180	414	42	799	128	86	28	53	2 of 7 yrs					↑	↑
Flat Bay Brook	13	16	Sc	1641	200	1560	202	1656	236	99	97	75	3 of 7 yrs (incl. 2003)					⇔	↑
Harry's River**	13	17	Fe	2334	422	1640	285	1565	134	82	60	42	0 of 12 yrs					↑	↑
Northwest Coast																			
Lomond River	14A	18	Fw	921	82	895	66	1062	86	129	111	140	11 of 12 yrs					↑	⇔
Torrent River	14A	19	Fw	3875	341	4750	433	4595	472	496	597	704	12 of 12 yrs					↓	↓
Western Arm Bk.	14A	20	Fe	1406	23	1465	48	1021	48	466	510	354	12 of 12 yrs	↓	↓	⇔	↑	⇔	↑

Assessment Methods: Fe = counting fence; Fw = fishway count; Sc = snorkel count; MR = mark-recapture; EFw = estimated from tributary fishway count

Trend symbols: ↓ > 10% decrease; ↑ > 10% increase; ⇔ no change = ± 10%

Footnotes:
Map index numbers refer to text figure and legend.
Marine survival is from smolts in year i to small salmon in year i + 1.
Use of 240 eggs/100 m2 as a conservation requirement for Labrador rivers may not be appropriate, and is used here only as a reference level.
In some cases fewer years are included in the 1992-2002 mean.
*Percent conservation met in Little River 2003 is a minimum value.
** Percent conservation met in Harry's River 2002 is considered to be 60-77%.