

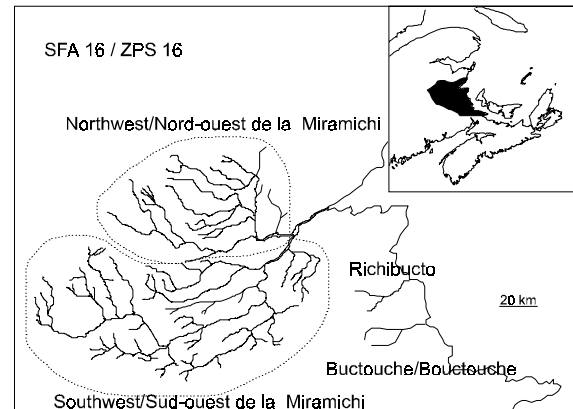
Atlantic Salmon Miramichi and SFA 16 Rivers

Background

The management area known as Salmon Fishing Area (SFA) 16 contains 41 rivers with Atlantic salmon runs. The Miramichi River is the largest river representing 90% of the salmon producing habitat in SFA 16.

Most juveniles spend two to three years in the river before migrating to the ocean in spring. Spawning populations consist of varying proportions of small salmon (fork length < 63 cm) and large salmon (fork length > 63 cm). The small salmon are predominantly maiden fish (never spawned before) which have spent one year at sea before returning to spawn (one-sea-winter salmon). These small salmon, are generally > 80% male. The large salmon component contains a mixture of maiden fish which have spent two and occasionally three years at sea before spawning and previous spawners which are returning for a second or more spawning. The majority (>80%) of the large salmon are female. The relative proportions of the size groups in the returns vary geographically. In the Miramichi, the ratio is two to five small salmon for every large salmon. In the smaller rivers, large salmon tend to be more abundant. The large salmon undertake extensive marine migrations to Labrador, Greenland and the Faroe Islands. The small salmon undertake less extensive migrations to Labrador, Newfoundland and the Grand Banks. The highly refined homing abilities of Atlantic salmon result in discrete stocks in individual rivers; the Miramichi River contains several stocks. Most salmon return to the smaller rivers in September and October but the Miramichi River has an important component which returns during May to August.

Conservation requirements are established for individual rivers based on $2.4 \text{ eggs} \cdot \text{m}^{-2}$ of river habitat. The objective is to obtain the egg depositions from the large salmon component.



Summary

- Returns of 22,500 small salmon to the Miramichi River in 1997 were the lowest observed (1971 to 1997).
- Returns of 18,500 large salmon were the lowest since 1984.
- 87% of conservation requirements were achieved in 1997.
- There is a 69% chance that returns of large salmon in 1998 will be insufficient to meet the conservation requirements of the Miramichi River.
- Juvenile abundances in the Miramichi River remain at historically high levels.

The Fishery

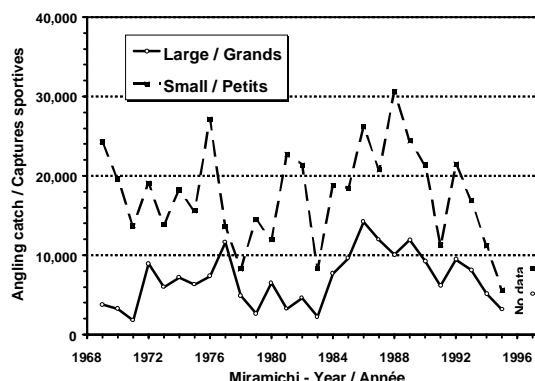
Atlantic salmon were harvested by two user groups: First Nations and recreational fishers. Fishing agreements were signed with four of six First Nations having access to salmon in SFA 16 rivers. Harvests were in most cases less than agreed upon allocations.

First Nations allocations (A) and actual harvests (H) from the rivers in SFA 16 assessed in 1997						
		1993	1994	1995	1996	1997
Miramichi River						
Large	A	135	120	441	823	900
	H	208	124	185	372	548
Small	A	8400	8400	11000	11000	11000
	H	601	2977	3004	2583	1197
Buctouche River						
Large	A		36	36	36	36
	H	0	12	0	4	5
Small	A		56	56	56	56
	H	0	11	15	25	25

There were no significant changes in recreational fishery management in 1997 relative to 1996. The salmon season for the Miramichi River opened April 15 and closed August 31 or September 15 for the upper portions of the river and October 15 for the lower sections. Angling seasons closed October 31 in the other rivers in SFA 16.

Based on preliminary 1997 data from the end of season mail-out survey (FISHSYS) conducted by the province of New Brunswick, catches of small salmon (11,500 fish) in the Miramichi River were down 36% from the 1991 to 1995 average. The large salmon catch from the Miramichi (5100 fish) was down 21% from the average. The 1996 survey was not conducted. Crown Reserve catches for the Northwest Miramichi in 1997 were 31% below the 1991 to 1995 average for small salmon but similar to the average for large salmon.

In the Miramichi, angling catches of small and large salmon peaked during 1986 to 1989 and have since declined. Reduced catches in 1995 were the result of low water conditions and extensive closures throughout the regular angling season.



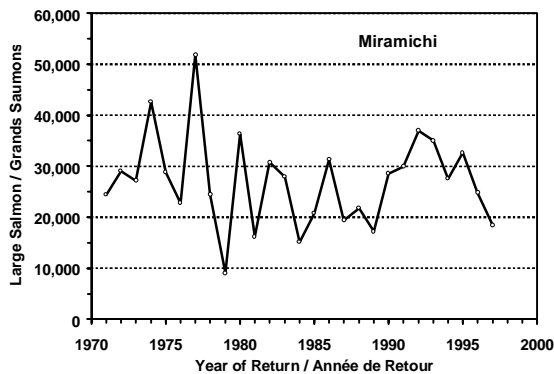
Catches in the other rivers of SFA 16 have generally represented less than 10% of the total SFA 16 catch.

Resource Status

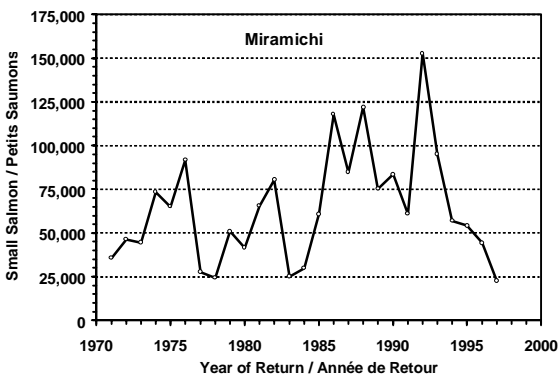
Returns to the Miramichi and Buctouche rivers were estimated using mark and recapture experiments. A fence count of salmon was obtained for a portion of the Richibucto River system. For the Miramichi River, returns have been estimated separately for the Northwest and Southwest branches since 1992. Escapements are the differences between returns and total removals (including First Nations harvests, angling harvest, hook and release mortality of 3% on large salmon catches, enforcement seizures and broodstock collections). Egg depositions are estimated from the average annual length of fish applied to a length-fecundity relationship and the annual sex ratio from sampling at trapnets.

Returns

The estimated returns of large salmon to the Miramichi River since 1992 have exceeded the average returns for 1984 to 1991 but have declined from the peak returns in 1992. Large salmon returns in 1997 were estimated at about 18,500 fish, the lowest level since 1984.



Estimated returns of small salmon to the Miramichi River peaked in 1992 and declined in 1997 to the lowest level of record at about 22,500 fish.



Returns to the Northwest and Southwest branches of the Miramichi River differ from the overall pattern for the Miramichi River. Returns of large salmon to the Northwest Miramichi peaked in 1995 whereas Southwest returns peaked in 1992. Returns

in 1997 of both small and large salmon in both branches were the lowest since 1992.

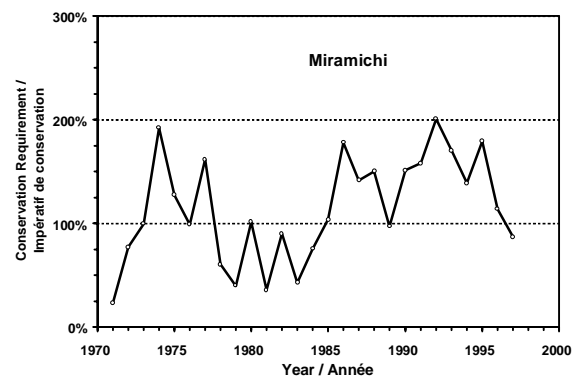
Returns (number of fish) of small and large salmon					
	1993	1994	1995	1996	1997
Northwest Miramichi					
Small	46200	20600	22379	18943	9788
Large	10541	12600	15227	7957	7104
Southwest Miramichi					
Small	42600	33775	31675	30241	13486
Large	21900	14000	17097	15734	10991
Buctouche River					
Small	78	77	98	127	97
Large	95	225	154	134	200

In the Buctouche River, the returns of large salmon in 1997 were improved from the previous two years. Small salmon returns were similar to the 1993 to 1995 values.

Only 21 large salmon and 24 small salmon were enumerated at the counting fence in the Richibucto River.

Egg depositions relative to conservation

The egg depositions in 1997 were below the conservation requirements for the Miramichi overall and for the Southwest Miramichi. Egg depositions were equivalent to conservation in the Northwest Miramichi. The conservation requirements in the Miramichi have been exceeded in 11 of 14 years since 1984.



Egg depositions in each branch were exceeded every year since 1992.

Egg depositions relative to conservation requirements (%) N/A means the river was not assessed in that year.			
Year	Northwest Miramichi	Southwest Miramichi	Buctouche River
1992	119%	238%	N/A
1993	177%	149%	35%
1994	200%	108%	72%
1995	269%	139%	58%
1996	134%	114%	46%
1997	104%	78%	72%

Conservation requirements for the Buctouche River have not been met in the five years that the river has been assessed but egg depositions in 1997 were the second highest since 1993. Egg depositions in the portion of the Richibucto River sampled by the counting fence were equivalent to 15% of the conservation requirement for the habitat area above the fence.

Environmental Considerations

Discharge levels were low through the fall of 1997. Water temperatures in 1997 were generally cooler than in 1994 and 1995. Spawning distributions in the Miramichi River in recent years have been good throughout the river system as demonstrated by the distribution and abundance of age 0 parr.

Outlook

Short term

There is a 69% chance that the returns of large salmon to the Miramichi River in 1998 will be insufficient to meet the conservation requirements. The forecast, based on the model relating large salmon returns to small salmon returns the previous year, should be used with caution for the following reasons:

1) predicted returns of 14,000 to 26,000 salmon have relatively similar probabilities of occurrence, 2) the model has overpredicted the returns by 27% in 1996 and 62% in 1997, and 3) the small salmon returns in 1997 are the lowest in the time series and the model therefore predicts outside the range of previously observed values.

Qualitatively, the decline in large salmon returns since 1992, the low return of small salmon in 1997 and the observed low sea survivals of the 1996 smolts in the monitored rivers of eastern Canada suggest that returns in 1998 will be low and likely lower than in 1997. Since large salmon returns in 1997 were below the conservation requirements, the returns in 1998 are expected to be below conservation as well. Previous spawners have comprised up to 40% of the large salmon returns since 1992 and are expected to continue making an important contribution to the large salmon returns in 1998.

There is no short-term forecast of small salmon returns. Juvenile densities in the Miramichi River remain high and an improved count of smolts from a tributary of the Northwest Miramichi (Catamaran Brook) suggests that even if those factors which produced the low returns of small salmon in 1997 are present, the returns in 1998 should be better than in 1997.

Returns from hatchery progeny are expected to be negligible (probably less than 1% of the total returns), similar to previous years.

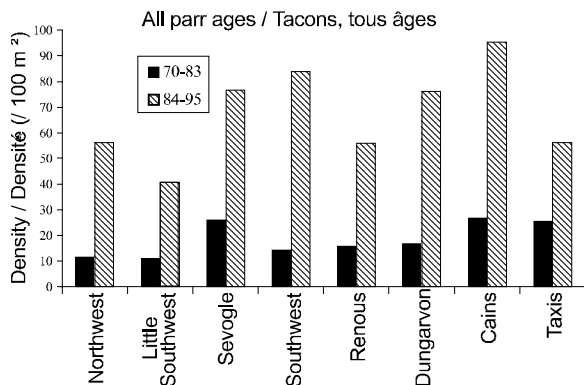
The trend in returns to the Buctouche River between 1993 and 1997, indicates that the returns in 1998 are not expected to meet the conservation requirements. Juvenile densities in the Buctouche River are low compared to those of the Miramichi River and are

consistent with estimates of low escapements to the river in recent years and also provides little optimism for increased returns of salmon to the river over the next five years.

Juvenile densities in the Richibucto River are low compared to the Miramichi River and Buctouche River. Previous assessments indicated that returns to this system were below conservation requirements. Returns are not anticipated to meet conservation requirements in the near future.

Long term

There has been a four-fold increase in the densities of age 0 and older parr throughout the Miramichi River since the major changes in management introduced in 1984. The long-term prospect for adult returns to the Miramichi remain uncertain until the depressed sea survivals observed in monitored stocks of eastern Canada improve.



Management Considerations

Under a management plan similar to 1997 (First Nations allocations of small and large salmon; catch-and-release angling of large salmon, retention of small salmon), the risk of not meeting the conservation requirements by large salmon in 1998 is 87%. The total removals of large salmon in 1997 (First

Nations harvests plus losses from catch and release) were 4% of the total returns. Removals were higher in the Northwest Miramichi (8%) where the First Nations harvests of large salmon occur. In the absence of any fisheries-related mortality in 1998, there is a 69% chance that the egg depositions from the returns of large salmon to the Miramichi River will be below the conservation requirements. Considering the uncertainties in the expected returns of large salmon to the Miramichi River in 1998, a precautionary approach to fisheries management is recommended.

The index trapnet on the Southwest Miramichi could provide an inseason assessment of returns in 1998. The count to Sept. 15, 1998 could be used to assess the likelihood of meeting the conservation requirements for the Southwest Miramichi and the Miramichi rivers.

On average, one large salmon is equivalent to the eggs produced by eleven small salmon. Egg losses from the angling fishery on small salmon between 1993 and 1997 have represented from 3% to 6% of the conservation requirement of 132 million eggs. Under catch-and-release management for small salmon in 1993 to 1997, less than half a million eggs from small salmon would have been lost (less than 0.5% of the conservation egg requirement).

Small salmon returns in 1997 were the lowest of record. They remain an important component of both the First Nations and angling fisheries. Small salmon returns in 1998 are uncertain and an inseason assessment would be beneficial. An inseason assessment could be provided by July 12.

In the Buctouche River, the Buctouche First Nation has limited its harvest of small and large salmon to well below fishing agreement

values. Returns to the Buctouche in 1998 are expected to be below conservation requirements. The total losses of eggs from the First Nations and angling fisheries in the last five years has amounted to less than 2% of the potential egg deposition.

For the Richibucto River, the total removals remain unknown. If these removals are large and remain unchanged, then the Richibucto River will remain at its current low production level.

For more Information:

Contact: Gérald Chaput
Science Branch
Dept. of Fisheries and Oceans
P.O. Box 5030
Moncton, N.B.
E1C 9B6

Tel: 506 851 2022
Fax: 506 851 2147
E-Mail: ChaputG@MAR.DFO-
MPO.GC.CA

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Maritimes Regional Advisory Process
Department of Fisheries and Oceans
P.O. Box 1006, Stn. B105
Dartmouth, Nova Scotia
Canada B2Y 4A2
Phone number: 902-426-7070
e-mail address: myrav@mar.dfo-mpo.gc.ca

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