

## Atlantic Salmon Eastern Shore Nova Scotia SFA 20

### Background

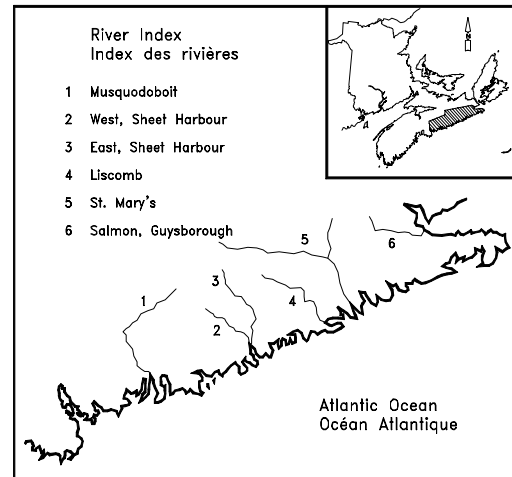
SFA 20 is located on the eastern shore of Nova Scotia between the city of Dartmouth and the Strait of Canso. Many of the rivers in the area are acid-stressed with some loss of salmon production potential. About 20 rivers in SFA 20 are fished regularly and three rivers (Musquodoboit; Salmon, Guysborough; and St. Mary's), which are not seriously affected by acidity, yield the largest proportion of the fish angled in the area.

Stock status was determined for five stocks within SFA 20 in 1996. Assessments compared conservation requirements against spawning escapements determined either from a mark-and-recapture experiment (Musquodoboit River) or through the use of capture rates in the angling fishery.

In the St. Mary's River stock, approximately one-half of the spawning requirement is expected to come from small salmon (<63 cm), which are 50% female. The Musquodoboit River salmon stock is comprised of 40% large (≥63 cm) and 60% small salmon, but 90% of the egg requirement is expected to come from large fish. The spawning requirement in eggs for the remaining eastern shore rivers is expected to come almost exclusively (~95%) from small salmon with the exception of Salmon River, Guysborough, where stock characteristics are not yet fully determined, but are believed to be similar to those of the Musquodoboit River.

Three rivers in the area, East, Sheet Harbour; Liscomb; and Musquodoboit have been stocked with hatchery fish (smolt and parr) over the past several years.

The Atlantic salmon stocks of the eastern shore area are summer-run stocks which typically begin to enter rivers between April and June and continue to enter through to the end of September.



### The Fishery

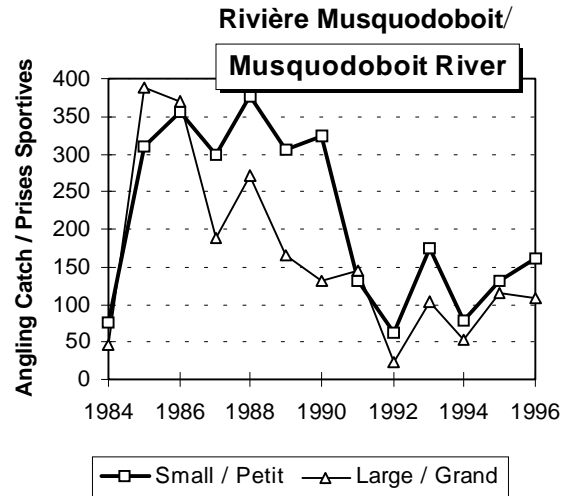
The 1996 angling fishery was limited to a hook-and-release fishery except on East River, Sheet Harbour, where a small salmon harvest was permitted. The angling seasons were extended at the request of client groups on East River Sheet Harbour by one month until September 30; on the Liscomb River by 17 days until September 15; and on the St. Mary's River, by 46 days from an earlier opening date of May 10 to a later closing date of September 30. The seasons on the remaining rivers in the area have not changed for several years and were open from June 1 to August 29 except those in the eastern portion of the area which were open from June 24 to September 22.

The Atlantic salmon sport catch on these rivers, as estimated from license stubs, was 21 small salmon retained (East River), 862 small salmon released and 335 large salmon released. The preliminary total small salmon

catch of 883 fish in 1996 was 78% of the 1995 catch and 73% of the 5-year (1991-1995) mean catch of 1,210 small salmon. Although angler effort in 1996 (2,692 rod-days) was lower than reported in previous years (1991-95 mean was 10,739 rod-days) by a substantial margin, angler catch per rod-day increased to the highest of the 1984-1996 time series of license stub data.

The sport catch of large salmon on the Musquodoboit River in 1996 of 112 fish was similar to the 1995 catch of 116 fish and higher than the 5-year mean (1991-1995) catch of 88 fish. Catches were similar in spite of a decrease in angler effort to 606 rod-days from over 1,800 rod-days in 1995. The 1996 small salmon sport catch of 230 fish exceeded both the 1995 and mean 1991-1995 catches.

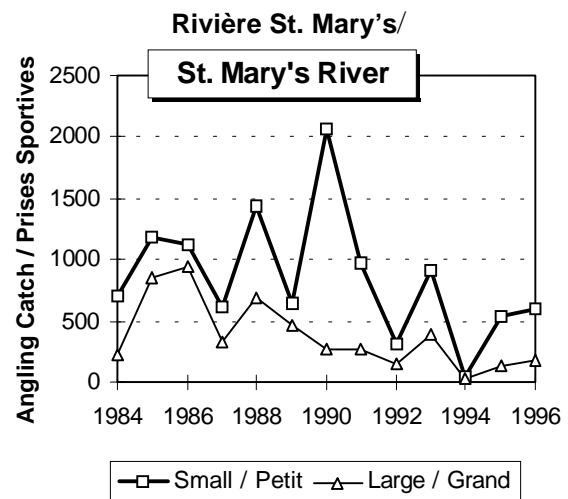
The catch of large salmon on the St. Mary's River in 1996 of 184 fish was higher than the 1995 catch of 131 fish and similar to the 1991-1995 mean catch of 195 salmon. The catch of 400 small salmon in 1996 was lower than the 1995 catch of 544 fish in 1995 and also below the 1991-1995 mean catch of small salmon of about 550 fish. The catch per rod-day on the river in 1996 (0.764) was considerably higher than both the 1995 (0.186) and 1991-1995 mean (0.179) catch per unit effort.

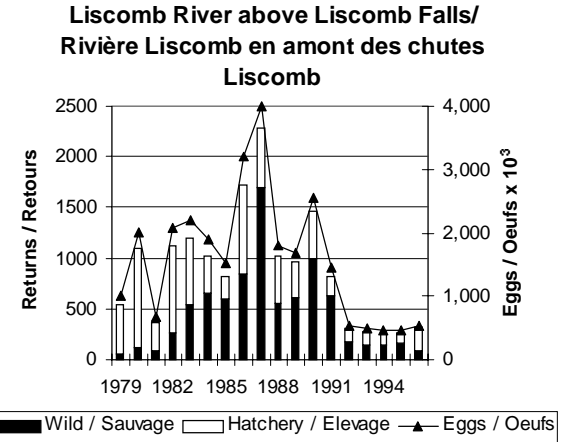
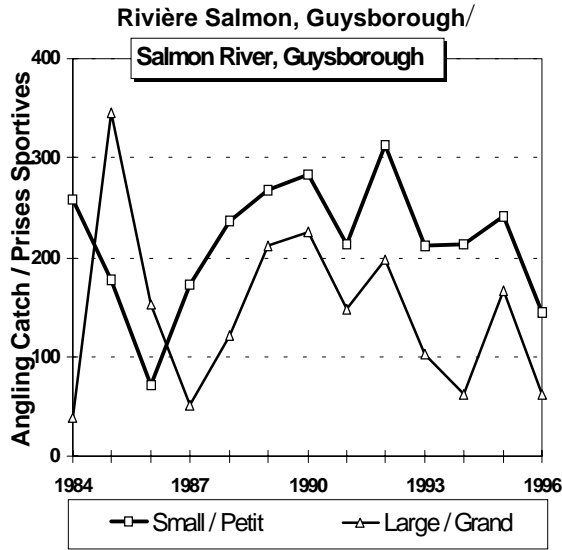


The catch of large and small salmon on Salmon River, Guysborough, in 1996, was down considerably from the catch in 1995 and close to the low for the period 1984-1996.

The absence of a retention fishery for small salmon (except on East River) discouraged angling and is probably the main factor responsible for the substantial reduction in angler effort throughout SFA 20 in 1996.

Three Aboriginal groups indicated an interest in harvesting salmon in SFA 20. Millbrook First Nation reported harvesting 13 grilse from East River in 1996.





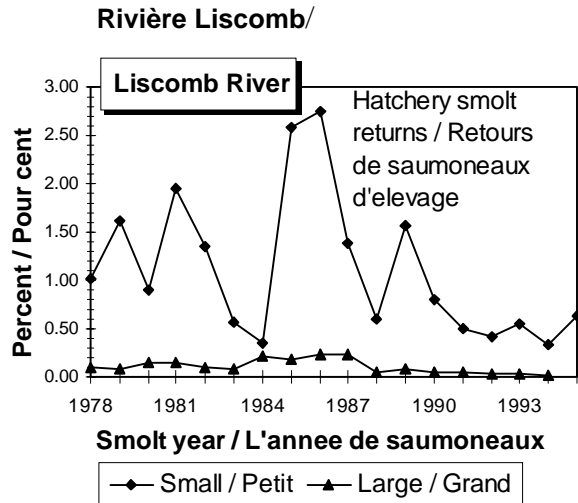
**Resource Status**

**Acid-impacted rivers**

The status of the salmon resource in those rivers in SFA 20 negatively impacted by acid precipitation are assumed to parallel that of the Liscomb River salmon stock. Monitoring of these stocks is thereby done through a counting trap on the Liscomb River which has been operated since 1979. The 1996 return of wild grilse to the Liscomb River was lower than the number of hatchery fish which returned. Returns have been low for the last five years (1992-1996) relative to the number of fish which returned during the 1980s. Wild fish accounted for less than 5% of the conservation requirement for the Liscomb River in 1996. The return of wild plus hatchery fish to the trap at Liscomb Falls on the Liscomb River in 1996 (313 fish) accounted for only 15% of the non-acid-impacted conservation requirement for the river.

The return rates for hatchery smolts, as small salmon to East and Liscomb rivers in 1996 were higher than in recent years. On East River, the return rate was the highest of the 3-year period that total counts have been conducted. Similarly, on the Liscomb River, the return rate was the highest observed since 1990.

User groups in SFA 20 have begun to view the application of limestone to the acid-impacted rivers as the only means of maintaining the unique stocks of salmon in these stressed rivers. The return of salmon to West River, Sheet Harbour, is critically low due to the combined effects of acidification, over fishing and above normal mortality at sea. The local angler's association added limestone rock to areas of the river in 1995 and 1996, and juvenile salmon numbers (0+ parr) increased in 1996 from the low numbers noted in 1995.



use of the 1996 catch rate of 55% for the Musquodoboit River, indicates that only 38% of the conservation requirement was achieved in 1996. Third, the application of a 30% catch rate, as used in the 1994 and 1995 assessments of the St. Mary's River stock, estimated the return at 2,617 fish or 84% of the conservation requirement. The figure below summarizes the performance of the St. Mary's River stock relative to its conservation requirement over the past thirteen years. The lower catch rate (30%) is used in this illustration.

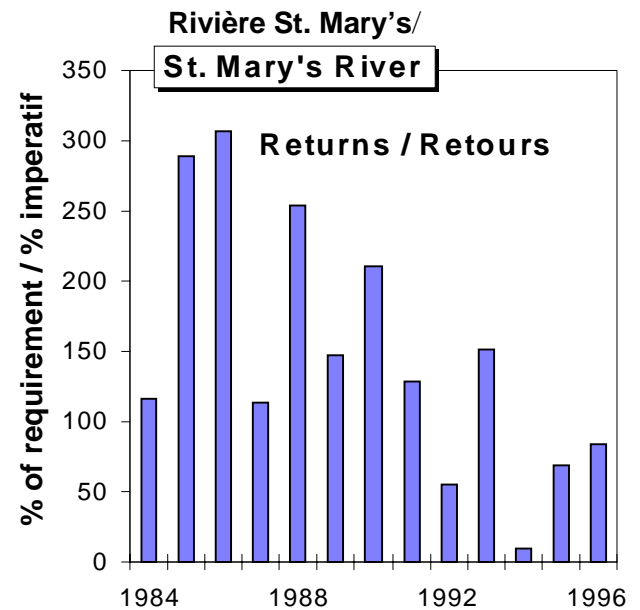
**Non-acid-impacted rivers**

A mark-and-recapture experiment on the Musquodoboit River estimated the adult returns at 580 fish (390 small and 190 large salmon). This return in 1996 provided for about two-thirds of the river's conservation requirement.

Angling catch derived from the license stub-return system estimated the 1996 catch for the Musquodoboit River at 317 fish. Comparing this to the estimate of total returns yields a catch rate of 55% for this river in 1996.

Densities of 1+ parr on the Musquodoboit River have exhibited a decreasing trend over the period 1988 to 1996. This downward trend is of concern and demands investigation as to the cause and significance.

Returns to the St. Mary's River were estimated for 1996 using three different angler catch rates. First, using the LaHave catch rate of 44.3%, derived for salmon returning to Morgan Falls, LaHave River, yielded a return estimate of 1,500 fish. A return of this magnitude equals 48% of the conservation requirement for the St. Mary's River defined as 7.4 million eggs or 3,155 fish (718 large and 2,437 small). Second,



Juvenile densities on the St. Mary's River have not exhibited a trend over the period 1985-1996 and have ranged from a low of 4.1 to a high of 10.1 parr per 100 m<sup>2</sup> of rearing area. These densities are low relative to the "Elson norm" of approximately 24 1+ parr per 100 m<sup>2</sup>.

The low angling catches of both large and small salmon in Salmon River, Guysborough, suggest that returns were low in 1996.

### *Environmental Considerations*

The discharge of water at Stillwater on the St. Mary's River in 1996 was higher, on average, than in 1994 or 1995. Water temperatures were also more moderate in 1996 than those measured during the previous 2 years. These conditions provided for good angling and may, in part, be responsible for the high catch per unit effort recorded for the 1996 angling fishery.

The marine habitat index, which has been correlated with Atlantic salmon returns the following year to many Maritime rivers, increased slightly in 1996. This increase may result in an increased survival of salmon in the Northwest Atlantic Ocean and have a positive impact on returns to SFA 20 rivers in 1997.

### *Outlook*

#### **Acid-impacted rivers**

Returns in 1997 to the Liscomb and other acid-stressed rivers in SFA 20 are expected to continue the same pattern of low return as observed in recent years on the Liscomb River. Accordingly, returns to the various acid-impacted rivers in 1997 are likely to achieve only a fraction of the conservation requirements for those rivers.

The salmon stock in West River, Sheet Harbour, remains critically low. Juveniles were absent from the majority of electrofishing sites in both 1995 and 1996.

#### **Non-acid-impacted rivers**

Returns to the Musquodoboit River are expected to be less than required for conservation in 1997. For instance, if the 1997 sportcatch of salmon on the Musquodoboit River equaled the 5-year average (1992-96) of 216 fish, the catch rate

would have to be 25% for the conservation requirement to be met. The catch rate estimated for the river in 1996 was 55%. Even with the release of 21,800 hatchery smolts into the river in 1996 (27,300 smolts were released in 1995), returns in 1997 are not likely to meet the conservation requirement unless there is a major improvement in sea survival.

No improvement in returns to the St. Mary's River should be expected in 1997. The forecast return of large salmon (based on wild small salmon returns to the LaHave River in 1996) is 473 fish, or 66% of the conservation requirement for large salmon. The probability that the escapement of large salmon will achieve the requirement in 1997 is 22%. Similarly, returns of small salmon would only meet two-thirds of their requirement if they returned in numbers similar to the five-year average.

Returns to Salmon River, Guysborough, as in the case of the St. Mary's River, are not expected to meet the river's conservation requirement in 1997.

### *Management Considerations*

The acid-stressed stocks are impacted by both acidity effects and depressed marine survival. As well, spawning requirements for acid-stressed rivers are under review. Until requirements are defined and returns improve, harvest levels should be minimized.

Because returns are not expected to meet conservation requirements for the Musquodoboit, St. Mary's and Salmon rivers in 1997, fishing mortality should be minimized in 1997. Returns to these rivers are expected to remain below conservation requirements until marine survival improves.

***For more Information***

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***References***

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This report is available from the:

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