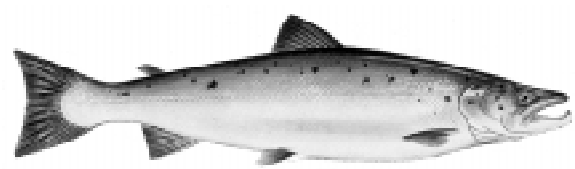
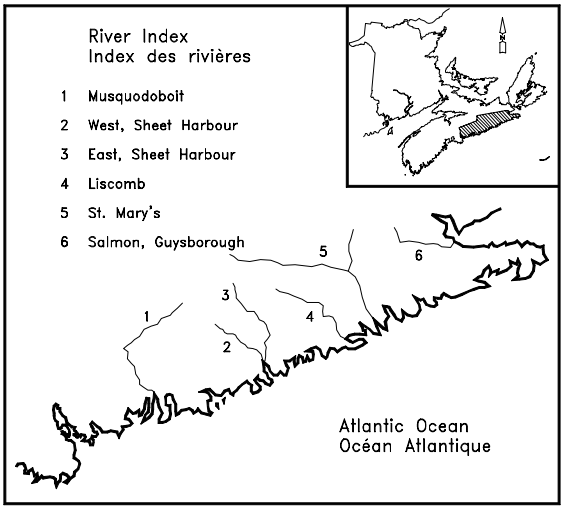
Fisheries and Oceans / Pêches et Océans
Maritimes Region

DFO Science
Stock Status Report D3-10(1998)



Atlantic Salmon
Eastern Shore Nova Scotia
SFA 20



Background

Salmon Fishing Area (SFA) 20 is located on the eastern shore of Nova Scotia between the eastern side of Halifax Harbour 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; St. Mary's; and Salmon, Guysborough), which are not seriously affected by acidity, yield the largest proportion of the fish angled in the area.

Stock status was determined for six stocks within SFA 20 in 1997. Conservation requirements were defined as the number of spawner eggs required to seed the habitat at a rate of 2.4 eggs per m^2. Assessments compared conservation requirements against spawning escapements determined either from mark-and-recapture experiments (Salmon River, Guysborough; St. Mary's River) or through the use of catch rates (proportion of fish which are hooked and released).

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 ($\geq$63 cm) and 60% small salmon, but 92% of the egg requirement is expected to come from large fish. On the Salmon River, Guysborough, large salmon spawners comprise 28% of the run and contribute 77% of the eggs. Small salmon spawners are 35% female and large fish are 83% female. The spawning requirement in eggs for the remaining eastern shore rivers is expected to come almost exclusively (~95%) from small salmon.

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. Seining data indicate that hatchery fish contribute 42% of small salmon spawners and 18% of large salmon spawners in the Musquodoboit River.

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 until the end of September.

Summary

- The number of large and small salmon returns to the non-acid-impacted rivers in the area did not meet conservation levels in 1997 and are not expected to meet those levels in 1998.
- Returns to the acid-stressed rivers were below requirements in 1997 and are expected to remain low for the foreseeable future. Some stocks in the area are in serious danger of extirpation.

Canada

The Fishery

First Nation and recreational salmon fisheries have occured in SFA 20 since the commercial fishery was closed after the 1984 season. Changes in regulations from 1983 until 1995 limited the recreational fishery to one where individual anglers must release all salmon $\geq$ 63 cm. in length; season and daily catch limits are 8 and 2 fish, respectively. In SFA 20, in 1996 and 1997, rivers were restricted to hook-and-release only, except on East River, Sheet Harbour, where two fish per day could be retained. The angling seasons were extended at the request of client groups on several rivers for the past two years. Angling seasons generally occurred from June until late September.

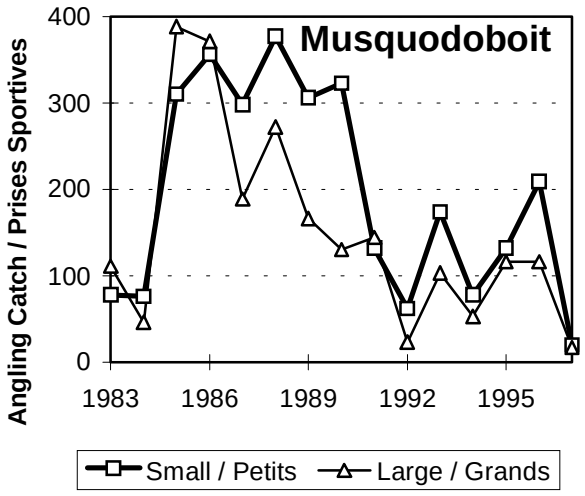
The Native Council of Nova Scotia is signatory to a fishing plan which permits the band to issue grilse harvest tags; Millbrook First Nation has a 50 grilse quota for East River, Sheet Harbour, and Indian Brook First Nation, a 100 grilse quota for the Musquodoboit River.

Sport catch in 1997 for SFA 20 was the lowest since detailed record keeping began in 1951. The 1997 catch of 262 grilse released, 2 grilse retained, and 107 large salmon released for a total of 371 fish was 25% of the 1996 catch of 1,479 salmon and grilse and also 25% of the 1992-96 mean catch for SFA 20 of 1,513 fish.

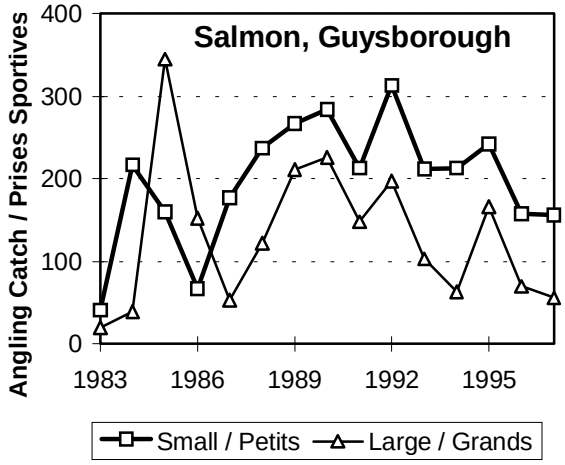
First Nations did not harvest any fish in SFA 20 in 1997 but participated in monitoring and assessment activities.

Angler effort in 1997, approximately 2,100 rod-days, was a small fraction of the time spent fishing by anglers during the previous five years; 1992-96 mean effort was 10,699 rod-days. In 1996, the effort estimate (2,684 rod-days) was low relative to any recent year but the effort value was considerably higher than that noted in 1997. Low angler effort was caused in part by the mandatory hook-and-release regulation in effect in 1997, but the general low abundance of fish was perhaps more responsible than any other single factor for the decrease in effort.

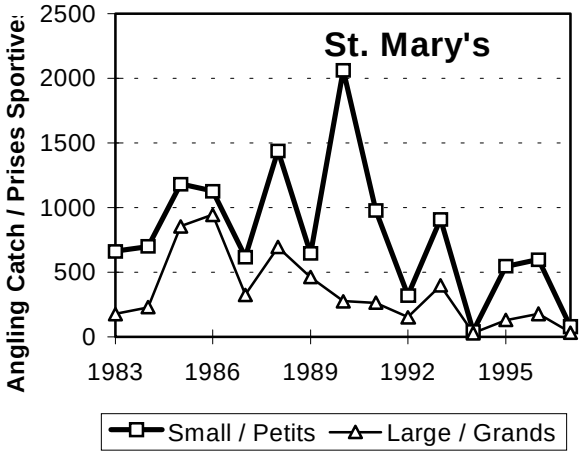
The sport catch of large salmon on the Musquodoboit River in 1997 of 17 fish was only 20% of the mean 1992-96 catch of 82 fish. The 1997 small salmon sport catch (hook-and-release) of 20 fish was also well below both the 1996 released catch of 209 fish and the five-year mean of 131 fish.



Anglers fish principally at the juncture between ocean and estuary on Salmon River, Guysborough, both for salmon and brown trout. In contrast to other area rivers, catches in 1997 (156 small and 56 large salmon) were similar to those reported in 1996. These data are also within the 1992-96 range of catches when anglers averaged 227 small and 120 large fish.



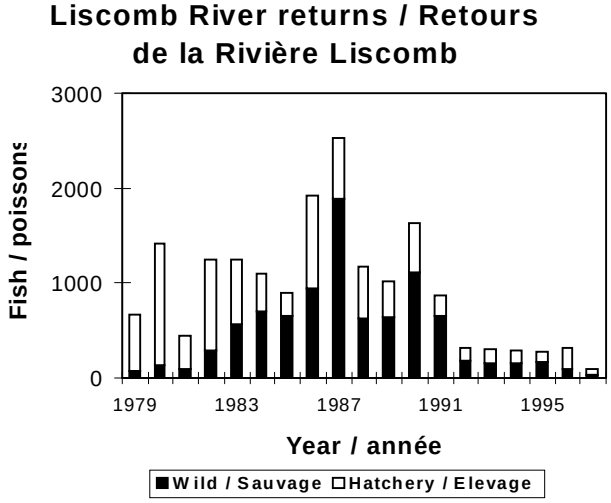
The 33 large salmon caught on the St. Mary's River in 1997 was the lowest on record. Similarly, the 78 small salmon angled was among the lowest of reported catches on the system. Recent five-year average catches have been 177 large and 482 small fish. Angler effort on the system (550 rod-days) was low relative to angler effort on the LaHave River in SFA 21 (4,000 rod-days; returns of salmon to the two systems have previously been shown to be related). The difference may be partly due to a permitted retention fishery on the LaHave River.



Resource Status

Acid-impacted rivers

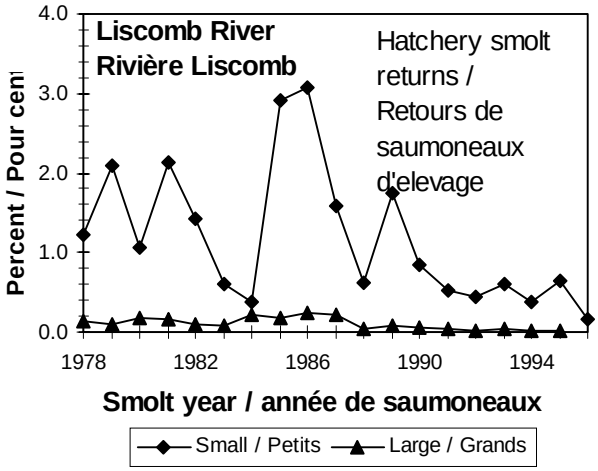
The Liscomb River is used as an index for rivers in the area negatively impacted by acid precipitation. Monitoring of these stocks is accomplished through a counting trap which has been operated since 1979. For the second consecutive year, the return of wild grilse was lower than the number of hatchery fish. Returns have been low for the last six years (1992-1997) relative to the number of fish which returned during the 1980s. Total returns in 1997 accounted for less than 5% of the conservation requirement for a non-acid-impacted Liscomb River. Revised conservation requirements, which take the acidic water quality into account, have not been defined for the Liscomb River or the other impacted systems on the Eastern Shore.



The return rates for hatchery smolts as small salmon, to East and Liscomb rivers, in 1997, were the lowest on record and similar to the recent low return rates for large salmon.

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 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 and above normal mortality at sea. The local anglers' association has added limestone rock to areas of the river in each of the last 3 years and juvenile salmon numbers (0+ parr) have increased at treated sites relative to the unlimed areas and pre-liming levels.



Non-acid-impacted rivers

The returns to the Musquodoboit River in 1997 were estimated to be 340 fish, using angling catch data and a catch rate estimated for the St. Mary's River. This return estimate represents 38% of the 1.9 million-egg conservation requirement for the river.

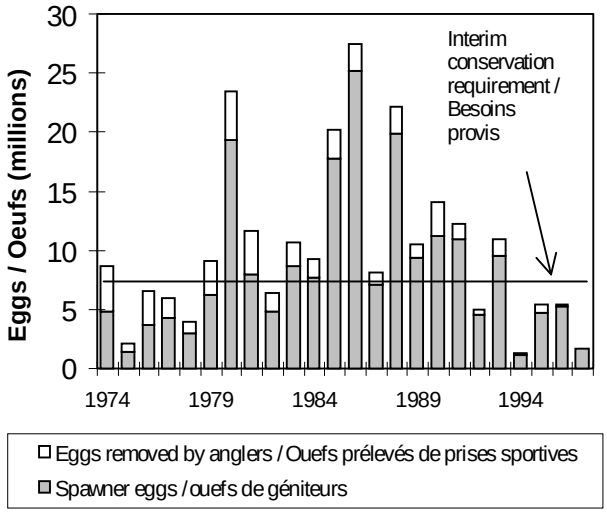
A mark-and-recapture experiment conducted on Salmon River, Guysborough, provided two estimates of returns. Spawners met either about one-quarter or one-half of the conservation requirement of 2.8 million eggs, depending on the estimation procedure.

Salmon returns to the St. Mary's River were also estimated using a mark-and-recapture experiment in 1997. Estimated spawners were about 1,000 fish (770 small and 230 large). This return provided only one-third of the river's conservation requirement.

Four separate spawning requirement estimates for the St. Mary's River are available. The variations in these estimates emphasize: 1) the uncertainties associated with estimating conservation requirements given the variability in productivity of the habitat; 2). the inconsistency between estimated spawning escapements and age 0+ juvenile numbers on the river.

The catch rate for the sport fishery on the St. Mary's River was estimated at 0.110 by using the license stub derived catch, the post-fishery population estimate and a 10% hook-and-release mortality rate. This catch rate was low relative to assumed rates of 0.30 used in the past or compared to the LaHave River 1997 catch rate of 0.347. Although the 1997 St. Mary's rate is low, the catch rate for the LaHave River in 1994 was lower.

St. Mary's River / Rivière St. Mary's



Estimates of returns to the St. Mary's River over the period 1974-97, relative to the spawning requirement used in the past, indicated that returns have fallen short of requirements more than one-half of the time.

Average juvenile densities on the St. Mary's River have not exhibited a trend over the period 1985-1997, and have ranged from a low of 4 to a high of 10 parr per 100 m^2 of rearing area. These densities are low relative to the "Elson norm" of approximately 38 parr (age 1+ and 2+) per 100 m^2.

Environmental Considerations

The discharge of water at Stillwater on the St. Mary's River during the summer and early autumn was low relative to discharges in 1996 but not thought to be an impediment to fish migration. Angler success may have been negatively impacted by low flows and warm temperatures for a portion of the season.

The marine habitat index, which has been correlated with Atlantic salmon returns the following year to many Maritime rivers, increased in 1997 for the second consecutive year. Because returns in 1997 were inconsistent with the marine habitat index, the implications of the improved conditions in 1997 on SFA 20 stocks is unclear.

Outlook

Acid-impacted rivers

Returns in 1998 to the Liscomb and other acid-stressed rivers in SFA 20 are expected to continue the recent pattern of low returns observed at the counting facility on the Liscomb River. Accordingly, returns will only meet a small fraction of the conservation requirements.

The salmon stock in West River, Sheet Harbour, remains critically low. Juveniles were absent from the majority of electrofishing sites from 1995 through 1997.

Non-acid-impacted rivers

Returns to the Musquodoboit River are expected to be less than required for conservation in l998. The low returns estimated for 1997 occurred in spite of the release of 22,000 hatchery smolts in the river in 1996. Forecast for 1998 is in the order of two-thirds of requirements assuming marine survival rates approximate the recent (5-year) average.

No improvement in returns to the St. Mary's River is expected in 1998. The forecast return of large salmon is less than one-quarter of their conservation requirement. There is only a 30% probability of small salmon returns meeting their requirement if numbers are similar to the five-year average.

The 1998 returns to Salmon River, Guysborough, are not expected to meet the river's conservation requirement.

Management Considerations

The acid-stressed stocks are also impacted by depressed marine survival. Spawning requirements for acid-stressed rivers are under review. Until returns improve, exploitation should be minimized.

In non-acid-stressed rivers, exploitation should be minimized because returns are not expected to meet conservation requirements. Returns to these rivers are anticipated to remain below conservation requirements until marine survival improves.

For more Information

Contact: Shane O'Neil
Dept. of Fisheries and Oceans
Maritimes Region
Science Branch
P.O. Box 550
Halifax, N.S.
B3J 2S7

Tel: 902-426-1579
Fax: 902-426-6814
E:Mail: Shane.ONeil@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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