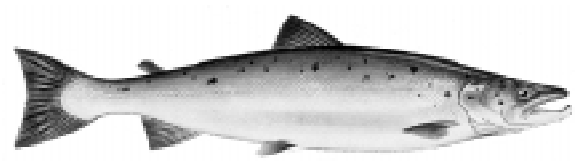


Atlantic Salmon
Cape Breton
SFA 18 [part] & SFA 19

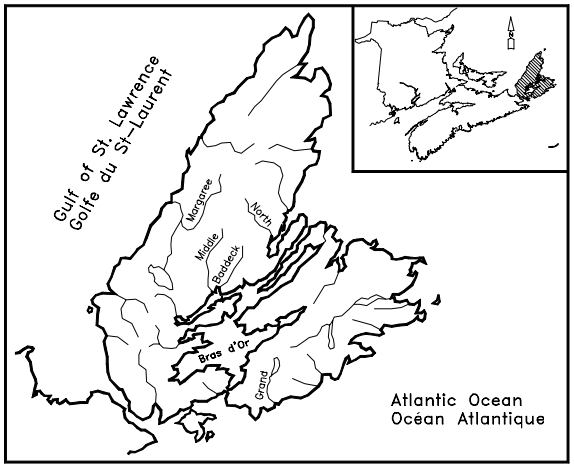
Background

Cape Breton Island has at least 33 rivers which support Atlantic salmon. Rivers of Inverness and Victoria counties with headwaters in the Cape Breton Highlands have steep gradients and on a per unit area basis are the more productive for salmon (e.g., Margaree, Middle, Baddeck and North rivers). Rivers of Cape Breton and Richmond counties are of lower gradient and production potential (e.g., Grand River).

The Margaree has the largest of the Islands' salmon resources and has an estimated 2.8 million m^2 of juvenile production habitat. The next larger are the Middle and Baddeck each with 0.8 million m^2 of habitat; the remainder of the rivers are smaller. Stock composition varies from that of the Margaree with summer- (20-40%) and fall- (60-80%) running components each comprised of 70-80% large salmon (multi-sea-winter), to that of the Grand River which has predominantly (90-95%) a summer run of small salmon (one-sea-winter). The North River stock is primarily comprised of summer-run large fish; most stocks of other rivers tend to be large fish but of fall run-timing (Baddeck River), or occasionally with a small summer-run component (Middle River).

Stocking from the Cobequid and Mersey hatcheries in 1996 consisted of about 18,000, 20,000 and 1,600 smolts to the Grand, Indian (Qamsipuk) and Salmon rivers, respectively. Age-0^+ parr (23,500) were released to the Grand River. Eggs of Margaree and Qamsipuk Brook stocks were collected in 1996. Hatchery-origin fish comprised about 15% of small and 6% of large salmon returns in the Margaree and in excess of 60% of small salmon returns to the North and Grand rivers.

Aquaculture of Atlantic salmon, rainbow trout/steelhead salmon occurs at several sites in Cape Breton (mostly within proximity to Bras d'Or). In 1996, total production was about 750t; salmon are thought to have comprised two-thirds of the total. Atlantic salmon are of Saint John River, River Philip and LaHave River origins. No major escapes were known to have occurred in 1996; compared to 1995, sightings of salmon and rainbow trout escapees were few in the Middle and Baddeck rivers. A few rainbow trout are observed and angled in the Margaree River.



The Fishery

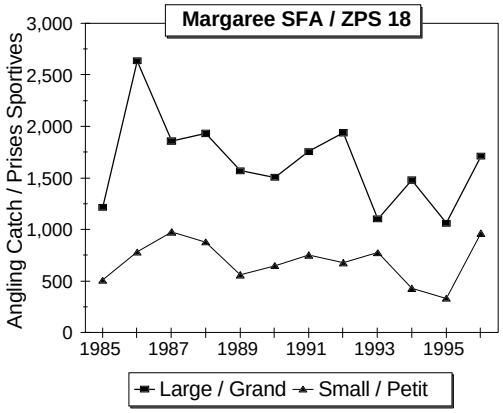
Allocations totaling 1,150 small and 675 large salmon were made to the five First Nations of Cape Breton Island. Of the total, 100 small and 600 large fish were targeted from the Margaree River; 100 small and 75 large were specified from the North River. The remainder were to be taken from within Bras d'Or Lake. Reported harvests numbered 214 fish, about the same as in 1995. Ninety-one fish (43%) were netted from the Margaree River in late fall; another 71 fish (33%) including aquaculture escapees were taken from Wycocomagh Bay/Skye River. Only one fish was reported from the North River. No catch data were available from the Native Council of Nova Scotia whose 22^+ individuals in Cape Breton could each tag 10 captured salmon.

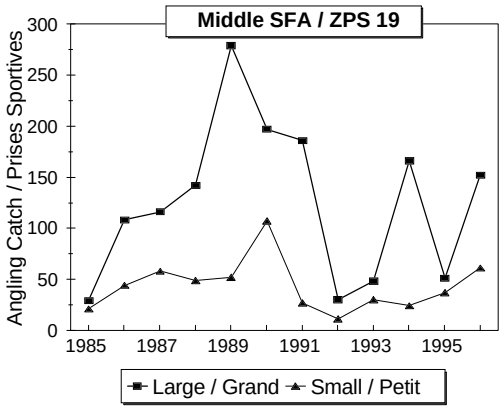
As in previous years, commercial fisheries were closed (only two fishers remain eligible for re-entry) and by-catch in non-salmon commercial gears was prohibited. The recreational fishery for salmon on Cape Breton in 1996 was, with the exception of the Margaree, Mabou and Judique rivers, restricted to hook-and-release. The excepted rivers were open Sep 1-Oct 31 to

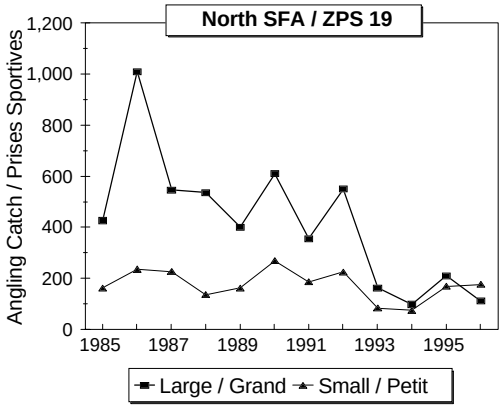
Canada

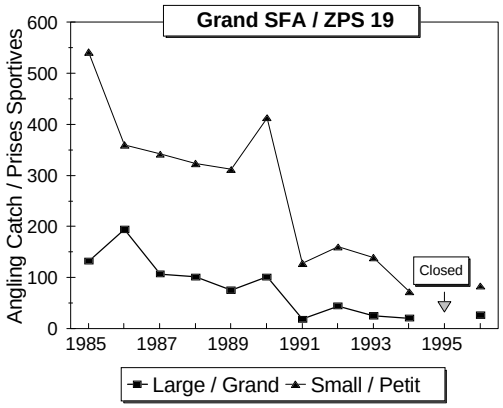
the retention of small salmon (<63cm); the Margaree was open Jun 1-Aug 31 to hook-and-release for small salmon. The Grand River was reopened in 1996 after having been closed in 1995. Most rivers, excepting those of Cape Breton Highlands National Park (CBHNP), were open Jun 1-Oct 31.

The estimated angling catch for Cape Breton (from NS Salmon License stub-returns; License not required in CBHNP) was 1,458 small and 2,445 large salmon; only 275 small fish were estimated to have been retained. Catches of small salmon were more than twice the number caught in 1995; catches of large salmon were 163% of the low value in 1995. The Margaree River attracted 77% of the Island's recreational fishing effort for salmon--down from 88% in 1995. The Middle, Baddeck, North and Grand rivers drew an additional 15% of the Island's effort. Total effort was down 23% from 1995 and 43% from the mean effort, 1991-1995. The decline in effort reflects the continuance of hook-and-release regulations for small salmon that was instituted in 1994. Catch and catch-per-effort were in most cases significantly higher than in 1995. Catches of small and large salmon were in most cases up over those of 1995.







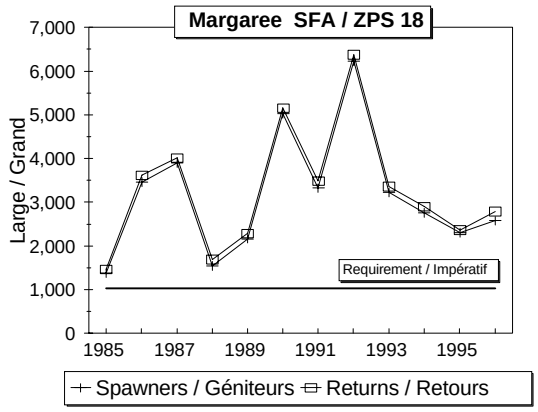


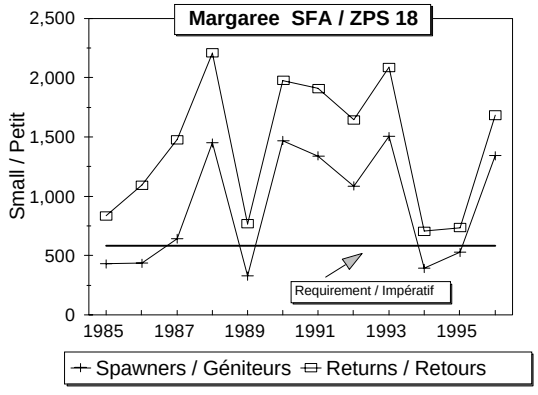
Resource Status

Estimated returns/escapements to the Margaree, Middle, Baddeck and North rivers were based on mark-and-recapture techniques. On the Margaree, fish were marked at an estuarial trapnet and later recovered by seining/netting in-river, by trapping on the Lake O'Law tributary and by sampling within the recreational fishery. On the Middle,

Baddeck and North rivers, marks were applied 1, 2 or 3 days previous to late-October swim-thrus to count tagged and un-tagged salmon. Returns to the Grand River were based on partial counts of salmon trapped in the fishway at Grand Falls and a falls bi-pass rate.

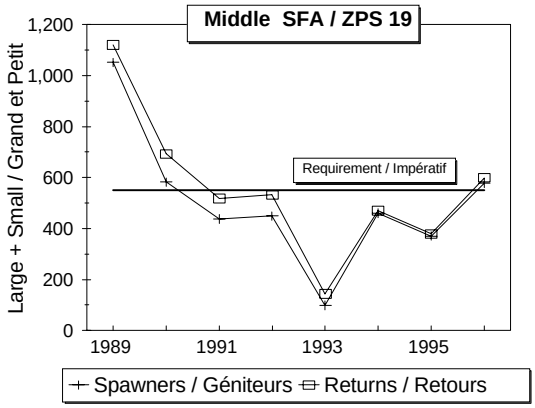
Margaree River: Estimated returns to the Margaree River were 2,792 large (90% CI 2,214-4,050) and 1,685 (90% CI 1,277-2,960) small salmon. Large and small salmon spawning escapements exceeded the conservation requirements (1,036 large and 582 small) by 149% and 131%, respectively. The requirement for large fish has been exceeded each year since 1985, small salmon last exceeded requirement in 1993. Egg deposition exceeded requirement by 133%; large hatchery fish contributed only 5% of eggs from large salmon.





Juvenile densities at three tributary sites on the Margaree averaged 114 age 0^+ and 81 age 1^+, 2^+ parr per 100 m^2--similar to those of a large mainstem site. High densities are consistent with past egg depositions in excess of conservation requirements.

Middle River: The estimated spawning escapement to the Middle River was 579 (90% CI 392-1,202) fish comprised of 458 large and 121 small salmon. Escapement of large salmon was 97% of conservation requirement; total small and large escapement was 105% of requirement. Egg requirements have not knowingly been exceeded since 1990.

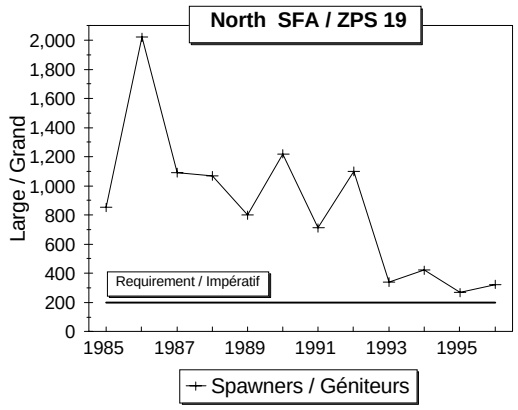


Densities of 31 age 0^+ and 45 age 1^+, 2^+ parr per 100 m^2 at two mainstem electrofishing sites on the Middle River exceeded an Elson index of normal abundance and are the equal of densities determined on the Middle River in various years since 1957.

Baddeck River: Spawning escapement to the Baddeck River was estimated at 329 fish (90% CI 229-657) comprised of 263 large and 66 small salmon. Escapement was only 62% of the 530 fish conservation requirement; large salmon were about 58% of the 450 fish requirement--down slightly from that of 1995 when fall estimates may have been incomplete. The first swim-thru assessment in 1994 also suggested that

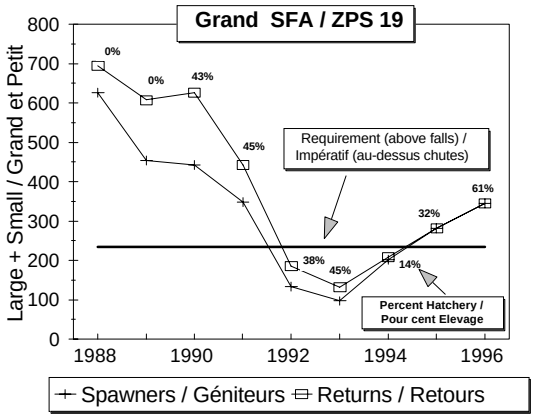
escapement had not met requirements. Densities of 63 age 0^+ and 36 age 1^+, 2^+ parr per 100 m^2, resultant of escapements in 1994 and 1995 are, however, above the index of normal abundance.

North River: Estimates of late-October returns to the North River in 1996 were 566 (90% CI 367-1,350) fish comprised of 323 large and 243 small salmon. At least 150 (62%) of small fish were returns from hatchery-stocked smolts. Estimated escapements exceeded conservation requirements of 200 large fish and 220 total fish by 61% and 157%, respectively. Based on run re-construction (angling catch raised by a 50% catch rate, 1985-1993) and swim-thru estimates 1994-1996, large fish requirements are estimated to have been exceeded in each of the last 13 years.



Juvenile densities at only two lower river mainstem sites were less than those of the Middle and Baddeck rivers and are inconsistent with estimates of escapement to the North River.

Grand River: A count of 200 small (61% of hatchery origin) and 5 large salmon in the fishway at Grand River Falls suggested an escapement of 147% of the 234 fish conservation requirement above the Falls. Wild fish were the third fewest in 9 years of assessment.



Juvenile densities both above and below the Falls were low compared to densities of other rivers assessed in Cape Breton.

Environmental Considerations

Rivers of Cape Breton are resistant to the effects of acid precipitation; river discharges measured at Margaree were above the long-term average in July, low in August and moderate in September and October. Water temperatures were cooler than in 1995. July entrants to the Margaree were numerous and summer fish represented 62% and 49% of respective total small and large fish captured at Levi's trapnet. Unlike 1995, conditions appeared to be ideal for river entry of most salmon prior to late-October assessments.

The winter index of habitat for Atlantic salmon in the North Atlantic (and by inference, over-winter survival) increased from that of 1995 (third lowest value of a 27-year record; the 1993 value was the second lowest of the series). Values since 1993 trend upwards. This index of habitat has been successfully used by the Working Group on North Atlantic Salmon (International Council for the Exploration of the Sea) to forecast the current low estimates of pre-fishery abundance in Greenland. The index has also been used to infer the abundance of large salmon (such as those of

Cape Breton) returning to homewaters the year following their foraging at West Greenland.

Outlook

Short term

Margaree River: Quantitative forecasts of large salmon returning to the Margaree in 1997 are 1,656-4,160 fish, i.e., 1.6 to 4.0 times the conservation requirements. A return equal to or greater than the 2,800 large salmon in 1996 (2.7 times requirement) would be consistent with high juvenile densities in 1994 and 1995 and a possible increase in marine survival (evidenced by small salmon returns in 1996 and an increasing index of over-winter habitat in the North Atlantic). Data are in-sufficient to forecast small salmon returns to the Margaree. No hatchery smolts were stocked in 1996; the previous 5-year mean estimate of small wild returns, including the low values of 1994-1995, is about 1,100 fish--approximately twice the conservation requirement.

Middle and Baddeck rivers: Data are insufficient to forecast returns to the Middle and Baddeck rivers in 1997. However, returns of both small and large salmon in 1997 should at least equal those of 1996 because of: i) the abundance of contributory juveniles in 1994 and 1995, and ii) the possibility of improved marine survival (upward trend in marine conditions). On the Middle River in 1996, there was a 70% probability that conservation requirements were attained and a 50% probability of a 110 fish surplus. On the Baddeck River, there was only a 15% probability that conservation requirements were attained.

North River: The forecast of large wild salmon returns to the North River indicate a 99% probability that the 200 large fish conservation requirement will be met. However, the same forecast model in 1994 and 1995 poorly predicted actual surpluses of 50-75 fish. Large salmon returns in 1997 will be supplemented by hatchery returns for smolts released in 1995; total surplus of large salmon may equal the number allocated in 1996 (75 fish). Small salmon cannot be forecast but, without hatchery stocking in 1996, could be as few as 3 or 4 times the 20 fish conservation requirement.

Grand River: There is no model from which to forecast returns to the Grand River, or Grand River Falls in 1997. Juvenile densities and presumed recruitment to smolts have been low and wild returns have been decreasing. Returns from smolts stocked in 1996 should, however, contribute to the attainment of requirement and possibly a small surplus above the Falls.

Long term

Juvenile densities and possible improvement in marine survival should contribute to the continued attainment of conservation requirements and surpluses (various degrees) on the Margaree, Middle and North rivers through 1998-1999. Salmon of the Baddeck River should increase in number and approach the current conservation requirement. Grand River is likely to meet conservation requirements in 1998 but only because of hatchery stocking in 1997. Because i) no stocking is planned beyond 1997 and ii) juvenile salmon in freshwater are at low levels of abundance, it is unlikely that Grand River will meet conservation requirements in 1999.

Management Considerations

Conservation egg depositions are being attained with apparent ease on the Margaree River. Small salmon returns to the Margaree could exceed requirement; the numbers of

summer-run fish will be dependent on river discharges and temperatures. Returns to the Middle River in 1997 should equal those of 1996, i.e., potentially a small surplus to conservation requirements.

Returns to the Baddeck River are unlikely to meet conservation requirements. Returns to the North River should exceed requirements, if perhaps only by the contribution of hatchery smolts stocked in 1995. Conservation requirement was met on the Grand River above Grand Falls in 1996, but only as a result of hatchery stocking above the Falls and the absence of an in-river harvest. Juvenile densities on the Grand River above and below the Falls are very low.

In general, salmon of *most* Highland-source rivers (Inverness and Victoria counties), Baddeck excepted, may be equaling or exceeding conservation requirements. Data are few for lowland rivers of Richmond and Cape Breton counties. However, without hatchery supplementation, stocks of these rivers should not be expected to differ from the wild stocks in the Grand River and possibly, those of the eastern shore, mainland Nova Scotia.

Summer-run components to the Margaree, Middle and North rivers deserve continued protection in sanctuary areas. Allocations of surplus small or large salmon from any river should be in proportion to the abundance of the summer and fall run-timing components. In-season estimates of the summer-run components on the Margaree and North rivers offer opportunities to adjust fishing plans in accordance with abundance and conservation requirements.

For more Information

Contact: Dr. Larry Marshall, Science Br.
Department of Fisheries and Oceans, Maritimes Region
P.O. Box 550
Halifax, N.S. B3J 2S7
Tel: 902-426-3605
Fax: 902-426-6814
E-mail:larry.marshall@sfnet.dfo.ca

References

Anon. MS 1996. Report of the Working Group on North Atlantic salmon. ICES C.M. 1996/Assess: 11 Ref.:M 228p.

Elson, P.F. 1967. Effects on wild young salmon of spraying DDT over New Brunswick Forests, J. Fish. Res Bd. Canada 24(4) 731-677.

Marshall, T.L., L. Forsyth, R. Jones, P. LeBlanc and K. Rutherford. MS 1997. Status of Atlantic salmon stocks in selected rivers of Cape Breton Island, 1996. DFO CSAS Res. Doc. 97/23.

This report is available from the:

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: v_myra@bionet.bio.dfo.ca

Internet address: http://csas.meds.dfo.ca

La version française est disponible à l'adresse ci-dessus.