The Southwest Miramichi Smolt Study 2006

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Introduction

Over the past three decades, there has been a continuing and recognizable need for conservation efforts to sustain Atlantic salmon stocks in the Miramichi River. Over that time, despite major management actions such as the closing of commercial fisheries in both the Maritimes and Newfoundland, the annual returns have fallen below expectations. In very recent years, minimum spawning requirements for Atlantic salmon have not been realized in the Miramichi River system. There clearly is a need for further management action to find the cause of declining stocks and to provide a solution, which will bring a recovery to them. One of the large questions is to determine whether the problem is merely in the ocean, or in the river, or perhaps both.

Although electrofishing studies have consistently indicated an abundance of juvenile salmon (fry and parr) in the river, the adult returns have been much lower than should logically be expected. It has been assumed that smolt (young salmon ready to migrate to the ocean) production would be consistent with the high levels of juveniles, but recent DFO surveys on the Northwest Miramichi indicate that this assumption may be incorrect. Hence, an accurate estimation of the total smolt population migrating from the Miramichi River is an essential component to understanding and managing the regeneration process of the Atlantic salmon in this watershed.

Methods

The method used to obtain the smolt inventory estimates was a mark and recapture concept. On the Cains and Dungarvon Rivers, rotary screw traps (RST) or smolt wheels were used to capture smolts for tagging. The Cains smolt wheel operated from May 2 to June 1, and the Dungarvon smolt wheel operated from May 2-31, 2006. The smolt wheel was strung across the river by an overhead cable and floats on the top of the water by two large pontoons. The current forced the partially submerged wheel to rotate. Any fish that entered the trap were guided into the trap's holding box which is located at the back of the smolt wheel. The rotating wheel prevented the fish from swimming out of the trap. All the fish in the live-box were collected and sorted. Each species caught was identified, counted and released, except for salmon smolts, which were measured for fork length and then tagged with streamer research tags. Scale samples were also taken from up to five smolts per day for age analysis. After the smolts were tagged they were moved upstream of the smolt wheel. The percentage of tagged smolts that are recaptured at the smolt wheel allow us to estimate the number of smolts moving out of that particular tributary.

A single large trapnet was installed in the estuary of the Southwest Miramichi at Millerton to capture smolts moving from freshwater into the estuary from May 8 to June 5, 2006. Tagged smolts captured at the Millerton trap net allow us to get an estimate of the smolts moving out of the Southwest Miramichi. The Millerton trapnet efficiency is calculated by the percentage of these tagged smolts that are recaptured, and this trap efficiency is then extrapolated to estimate the total smolt run from the number of untagged smolts also captured there. This latter facility was fished daily, generally at low tide, and the smolts were sorted from the rest of the species captured. Each day, sub-

samples of up to 100 smolts were measured and 20 were sampled in detail for length, weight, sex and age. All smolts captured were counted and checked for missing adipose fin clips and tags.

In addition to the spring smolt estimates we conducted a fall smolt program to determine if presmolts were moving out of the Cains River. The smolt wheel was placed in the same location as in the spring from October 19 to November 2, 2006. All fish were counted and identified to species. Atlantic salmon parr were classified according to fry (less than 9 cm), 1+ parr (9-10 cm) or 2+ parr or presmolts (greater than 10 cm) based on length.

Results

Salmon smolts tend to move in two peak times during the spring smolt run. The peaks of the smolt run on the Dungarvon River occurred on May 8 and 19th and on May 6 and 19, 2006 for the Cains River. This year we tagged 1381 smolts on the Cains and 1711 smolts on the Dungarvon River. We estimated that 98,000 smolts moved from the Cains River and 48,000 smolts moved from the Dungarvon River downstream to the ocean in the spring of 2006. The Cains river smolt production was higher in 2006 than 2002-2004, but the Dungarvon River was slightly lower than 2005 (Table 1). Of the tagged fish 14 smolts from the Cains and 73 from the Dungarvon River were later recaptured at the trap net near the estuary at Millerton. We estimated a total smolt production of 1.3 million smolts in the Southwest Miramichi, up from the past four years. In addition, 0.5% of the Cains, 5% of the Dungarvon and 2% of the Southwest Miramichi smolt run was comprised of salmon smolts with clipped adipose fins which were stocked by MSA a few years earlier.

The fall smolt wheel was running for 11 of the 15 days. During this time 69 juvenile Atlantic salmon were captured (Figure 1). Of these 14% were fry, 39% were 1+ parr and 46% were 2+ parr. In comparison, the spring Cains smolt wheel gets on average 43 smolts per day and 7 parr per day, whereas the fall smolt wheel captured on average 3 presmolts per day and 3 parr/fry per day. The presence of low numbers of parr in the smolt wheel during the fall appears to be due to localized small scale movements. Therefore there appears to be little to no movement of presmolts from the Cains river.

Table 1. Estimate for salmon smolt movements (using 0% mortality factor) for SW Miramichi 2001 – 2006, Cains River 2002 – 2006 and Dungarvon River for 2002 - 2006. The desired target for smolt production on the Miramichi River is 3.0 smolts/100m^2 of habitat. *Note: This is only a minimum smolt estimate as wheel was not operational for three days during typical smolt peak time.

River	Year	Smolt estimate	Smolts/100m^2
SW Miramichi	2001	500,000	1.4
	2002	637,000	1.8
	2003	534,400	1.5
	2004	1,152,000	3.3
	2005	N/A	N/A
	2006	1,336,000	3.8
Cains	2002	38,500	0.8
	2003	47,000	1.0
	2004	78,000	1.7
	2005	N/A	N/A
	2006	98,000	2.1
Dungarvon	2002	43,300	1.8
	2003	34,700	1.6
	2004	38,000	1.7
	2005	58,000*	2.6
	2006	48,000	2.1

Figure 1. Abundance of juvenile Atlantic salmon captured in the smolt wheel located on the Cains river in fall.