2013 Electrofishing Program Summary

Miramichi Salmon Association
In collaboration with the
Department of Fisheries and Oceans

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Funded in part by the New Brunswick Wildlife Trust Fund

Introduction

The Miramichi Salmon Association (MSA) continued its electrofishing program in 2013 to assess juvenile Atlantic salmon populations in tributaries throughout the Miramichi River watershed. The MSA also worked co-operatively with the Department of Fisheries and Oceans (DFO) Science Branch on another survey using historic baseline sites that are monitored on a yearly basis to assess Atlantic salmon juvenile abundances on the Miramichi River system. Both electro-fishing surveys target Atlantic salmon and brook trout juveniles but other fish species are often collected as by-catch. In this report, Atlantic salmon juveniles are listed as fry and parr, with the parr consisting of 1+ and 2+ age classes. Wild salmon fry (0+) are typically less than 60mm in length in late summer and wild parr (1+, 2+) vary in size by site; however, parr are grouped together in length by year class and generally do not exceed 120mm. There is typically a higher abundance of fry than parr as fewer salmon are present in successive age classes due to mortality and predation. If this trend is not observed, it could be viewed as an indication that fry survival is low and should be investigated.

Electro-fishing sites in both surveys are generally 2nd to 4th order streams and are tributaries to major rivers where salmon historically spawn; however, sites may also include some main river locations. The headwater tributary streams are the major focus of the MSA electrofishing program as they are considered feeder streams to the major rivers and maybe under-seeded with juvenile salmon in the event that adult salmon were unable to access these waters to spawn. Generally, swift moving water less than 60cm in depth with gravel, rocky substrate characterize juvenile salmon habitat. Adult salmon migrate as far upstream as possible to spawn but juveniles in their first, second or third year can move around quite extensively in search of food, predation avoidance, and seeking out over-wintering habitat. During the warm water periods in the summer months, juveniles (parr more often than fry) also move throughout the river seeking cold-water refuge.

The main objectives of the annual electrofishing program were to:

1. <u>Determine future stocking distribution of spring first-feeding fry:</u>
   The Miramichi Salmon Conservation Center (MSCC) annually collects and spawns adult salmon from major streams in the Miramichi watershed for the purpose of stocking early feeding fry back to their natal systems. In order to achieve effective stocking results in 2014, electrofishing surveys were carried out during the summer of 2013 to identify high quality juvenile habitat with low fry and parr densities. Determining wild densities allows for avoidance of overstocking areas with healthy juvenile densities and for the targeting of naturally tributaries which are naturally under-seeded or devoid of juvenile salmon. Any site containing more than 50 fry per 100m^2 is not considered for stocking as it appears to reflect a healthy natural population, where sites below this value are considered for stock compensation.

2. <u>Evaluating stocking success</u>
   To evaluate the effectiveness of the MSCC stocking program, electrofishing surveys were conducted on stretches of streams which were seeded in late June and early July 2013 with early feeding fry. These densities were contrasted against fry densities at unstocked locations to compare densities. Stocked location densities significantly above unstocked locations were considered to reflect successful survival of hatchery fry following stocking.

3. <u>Estimating juvenile abundance using baseline locations</u>
   Juvenile Atlantic salmon abundance surveys were conducted in partnership between DFO and MSA. These surveys monitored baseline sites which in some cases have been electrofished for over 40 years, and allow for the estimation of absolute juvenile abundances in these areas.

Methods

On small, low order streams or shallow portions of large rivers, back-pack electrofishing is a highly effective capture method for multiple fish species, including Atlantic salmon, *Salmo salar*. Electricity is generated by a battery located on the back-pack of the electrofisher. An anode wand (positive) and the cathode tail (negative) are placed in the water. The electric current moving between the wand and tail produces an electric field which can render fish immobile (galvanonarcosis) or cause them to move towards the electrofisher (galvanotaxis). A crew of three people wearing water tight chest waders and rubber gloves enter the site facing upstream. While the electrofisher stuns the fish, the other crew members collect the fish with dip-nets and a small seine net as the fish are drawn up to the water surface by the electrical current. The fish are placed in a bucket of water and held until the site is completed.

The catch-per-unit-effort (CPUE) method, which samples a known length of stream for a predetermined time of approximately 500 seconds, was used during MSA/DFO electrofishing surveys to determine fish densities as part on the ongoing baseline survey of the Miramichi watershed. The density of salmon fry and parr from each site was then used to estimate the absolute number of juveniles per site by comparing the values against a trend line generated from multi-pass removal surveys from 2006 to 2012. Removal surveys were not conducted in 2013 due to water level, but a description of the method can be found in 2012 MSA Annual Field Report. Salmon and trout captured were measure to fork length, and a small number of juvenile salmon captured from each site were scale sampled for age and length analysis by DFO scientist. All fish species were counted and measured, with scale samples removed from salmon parr for age analysis.

The MSA electrofishing surveys used a shorter duration of typically 200 seconds per site and targeted optimal habitat types to assess the suitability of tributaries for future stocking, and to compare sites stocked in 2013 to unstocked sites to determine if fry densities were noticeably different. All fish were identified to species, with lengths and weights are recorded. Substrate type (rocky, gravel, etc.), stream type (riffle, run, etc.), water and air temperature, and site dimensions were also recorded.

Results

Electrofishing assessment of stocking first-feeding salmon fry in late spring

For the MSA assessment for stocking, a total of 36 electrofishing sites were assessed between July 31 and August 19, 2013 in the Miramichi River. Seven of the sites had been stocked with first-feeding fry from the Miramichi Salmon Conservation Centre between June 28 and July 11, 2013. The average fry density at the 29 unstocked sites was 51 fry per $100m^2$ while the 7 sites that were stocked earlier in the summer with first-feeding fry had a significantly higher average density of 132 fry per $100m^2$, which is considered above the minimum fry density required to sustain a healthy population (50 fry per $100m^2$). Of the 29 sites that were not stocked, fourteen sites had no fry and three site had less than 10 fry per $100m^2$. All of the sites that were stocked had fry present, ranging from 44 to 261 fry per $100m^2$. The MSA identified 23 of the electrofished sites as having fry densities lower than the target number and of these, all but two had not been stocked during the summer of 2013. The high survival of first-feeding fry at stocked sites following initial stocking was similar to results from previous years.

Juvenile population assessment survey (MSA/DFO)

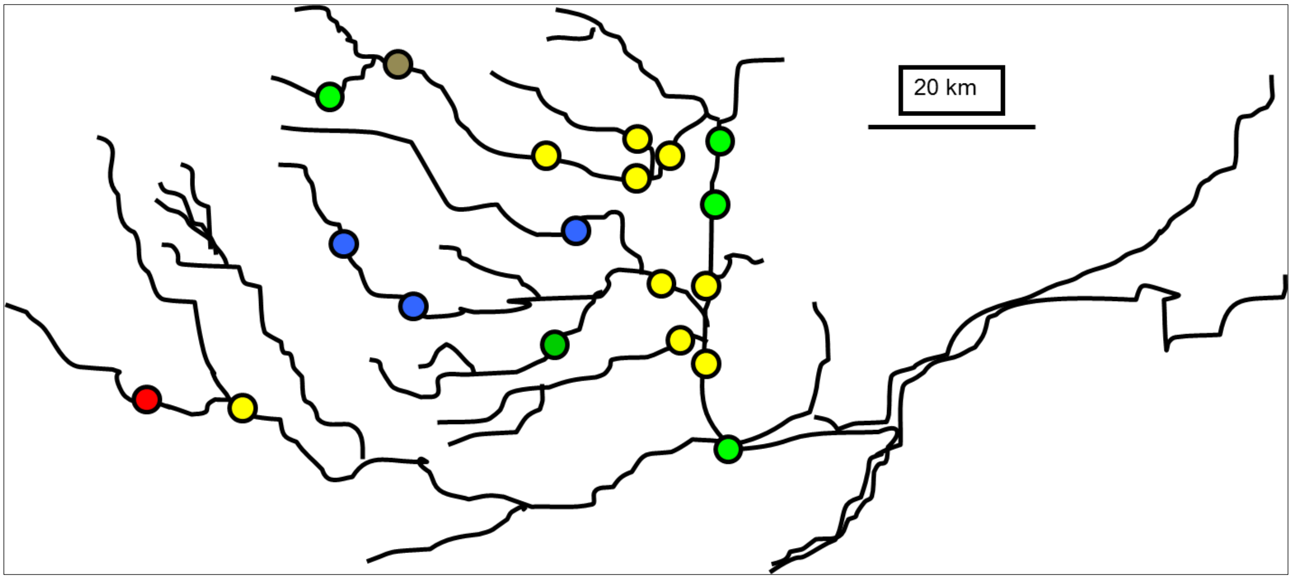
From August 26 to October 3, 2013 a total of 30 baseline sites were electrofished in several tributaries as part of the MSA/DFO cooperative program. Limited opportunities to electrofish due to high water events throughout the watershed resulted in most effort being focussed on the Renous and Northwest Rivers. High water levels throughout the summer interfered with sampling attempts, resulting in a lower number of baseline sites surveyed compared to past years, and no closed site, removal surveys being run. On days where electrofishing could be safely carried out, water levels were typically above average for most sites, which likely had confounding effects on the results. The ability to capture fish is reduced in higher water levels as fish can become more dispersed within a site, and become harder to see as water turbidity increases. Parr are also known to be highly mobile and avoid high discharges by moving to areas with reduced water velocity. These factors reduce our ability to make accurate inferences about juvenile production on the Miramichi in 2013.

Final results from the 2013 juvenile population assessments are currently in the final draft stage and will be published on the Department of Fisheries and Oceans website as a document titled “Assessment of Atlantic Salmon (*Salmo salar*) in Salmon Fishing Area 16 in the Southern Gulf of St. Lawrence”.

Table 1: Juvenile abundance assessments calculated using the CPUE method for the 37 sites electrofished by the MSA to identify potential future stocking sites. Sites with less than 50 fry per 100m^2 are candidate sites for future stocking efforts while sites that had been stocked in 2012 were also identified.

River	Site	Catch per 100m^2 Fry	Parr	Stocked in 2013
Main Southwest	Porter Brook South Branch	2.9	0.0	N
Main Southwest	Porter Brook North Branch	0.0	0.0	N
Main Southwest	Porter Brook Main Stem	189.1	30.3	N
Main Southwest	Porter Brook, below long brook	78.0	50.3	N
Main Southwest	Elliott Brook	81.4	52.4	N
Main Southwest	Main Elliott Brook	175.9	28.5	N
Main Southwest	Elliott Brook	0.0	8.2	N
Main Southwest	Little Teogue	0.0	20.2	N
Sevogle	Johnstone Brook	0.0	15.8	N
Little Southwest	Aesculapius	36.9	32.7	N
Cains	Sutherland	0.0	0.0	N
Cains	North Cains Bridge	0.0	8.8	N
Cains	Sling Dung Brook	0.0	4.4	N
Cains	Mckinley Brook	3.8	10.6	N
Cains	Bantalor Brook	0.0	0.0	N
Northwest	North Branch Tomogonops (2)	191.7	50.2	Y
Northwest	North Branch Tomogonops	79.5	58.5	Y
Northwest	Little River	0.0	4.1	N
Northwest	Mountain Brook	44.0	53.9	Y
Northwest	West Branch 6 Mile Brook	7.3	15.2	N
Cains	Sabies	16.5	19.0	N
Cains	Otter Brook at Bridge	0.0	0.0	N
Cains	Main Cains	0.0	0.0	N
Cains	Betts Mill Brook	195.4	7.1	Y
Cains	Upper Mozzeral Off Bettsburg	0.0	0.0	N
Main Southwest	West Branch Burtland	0.0	14.6	N
Little Southwest	Devils Brook	261.4	21.9	Y
Little Southwest	Crooked Brook	105.5	48.5	Y
Little Southwest	Squaw Barren	47.5	24.6	Y
Little Southwest	Below Barrier	278.6	60.3	N
Little Southwest	Above Goodwin Lake	321.3	81.7	N
Northwest	South Branch	11.5	7.9	N
Main Southwest	Big Hole	0.0	0.0	N
Main Southwest	Crooked Brook	13.5	0.0	N
Main Southwest	Donnely Brook on Joe Branch	206.3	0.0	N
Bartholomew	South Branch Bartholomew	59.9	0.0	N

A.



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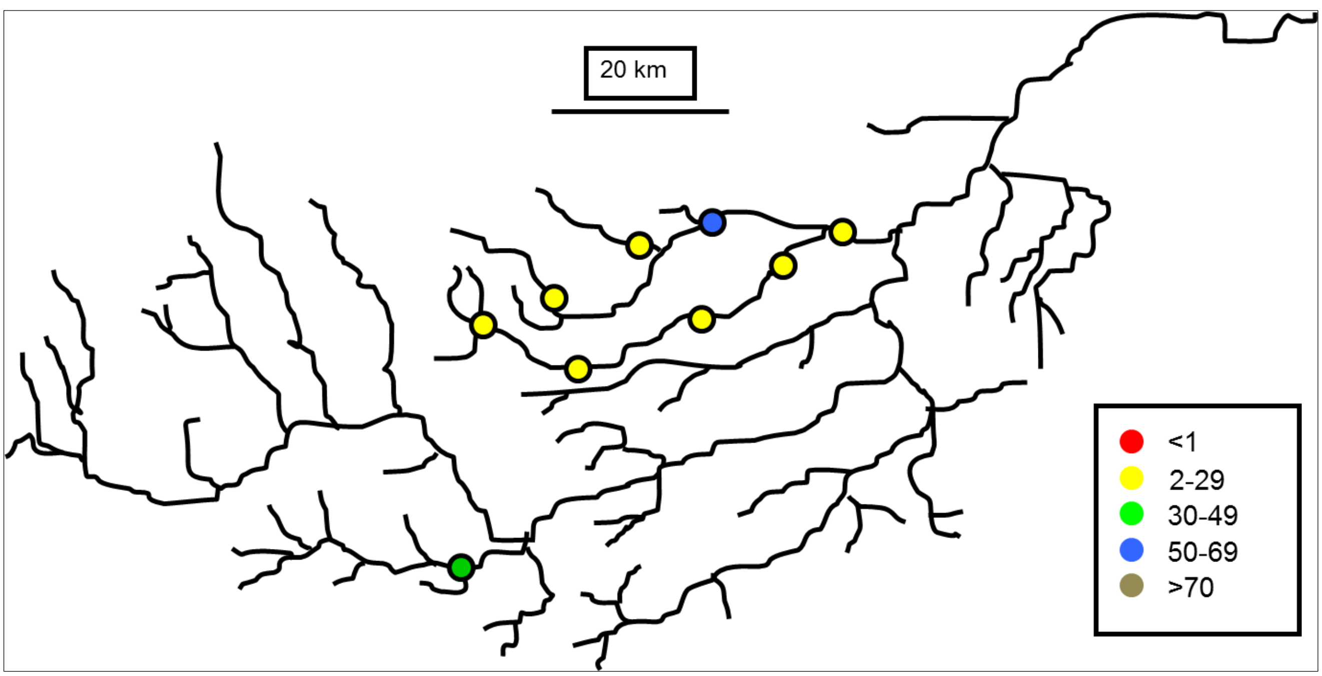

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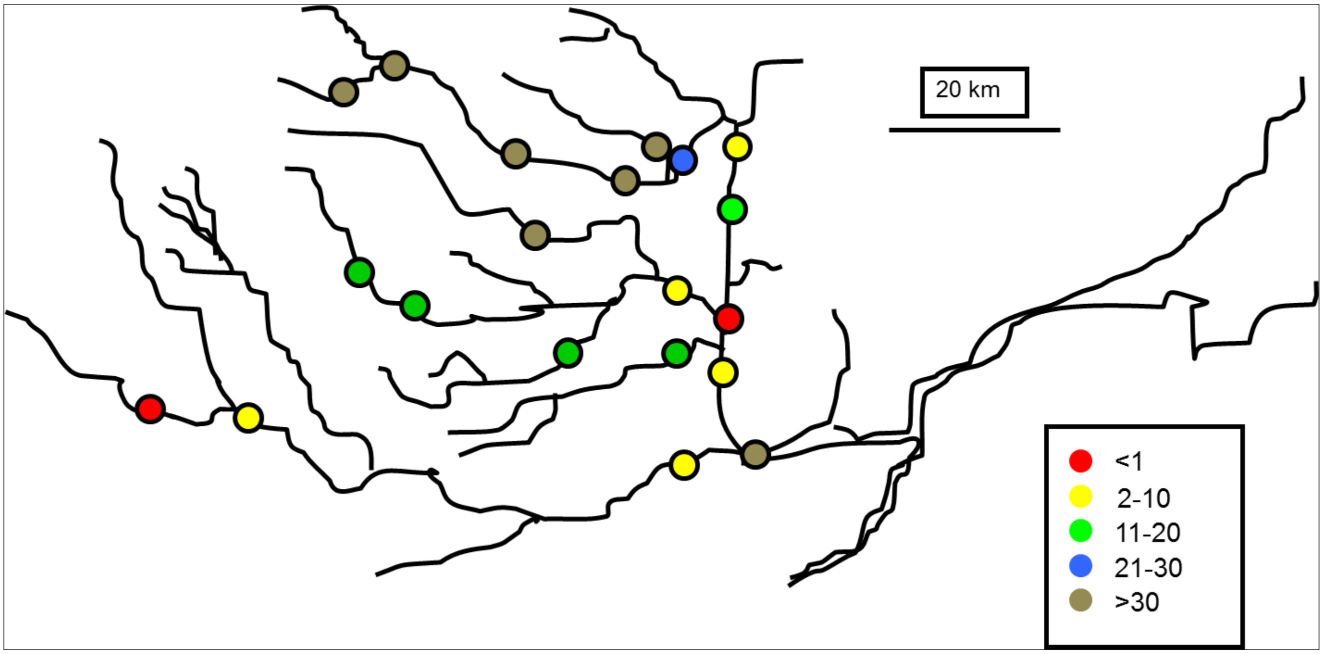

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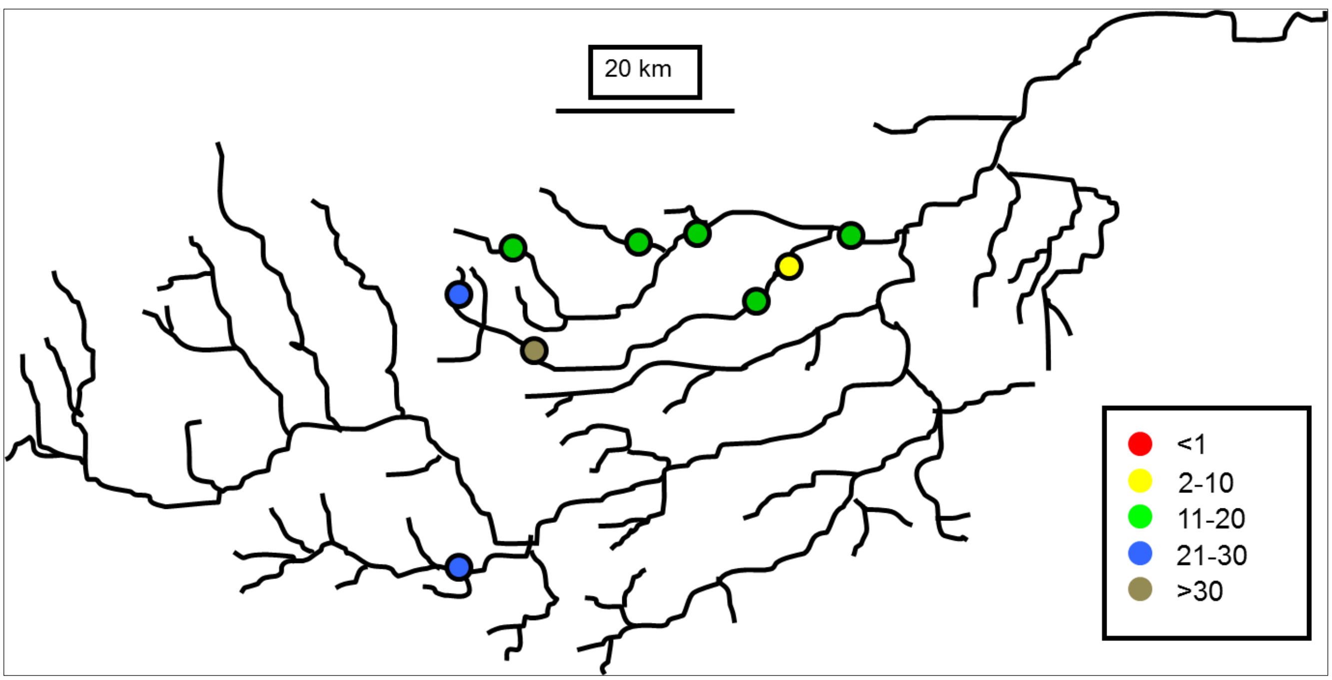

Fig 2: Preliminary juvenile density results from the 2013 MSA/DFO annual electrofishing program with: (A) showing the fry densities at sites in the Northwest Miramichi River tributaries, (B) showing fry densities at sites in the Southwest Miramichi River tributaries, (C) showing fry densities at sites in the Northwest Miramichi River tributaries, and (D) parr densities at sites in the Southwest Miramichi River tributaries. Fry density classifications range from <1, 2-29, 30-49, 50-69, and >70 fry per 100m^2. Parr density classifications range from <1, 2-10, 11-20, 21-30, and >30 parr per 100m^2.

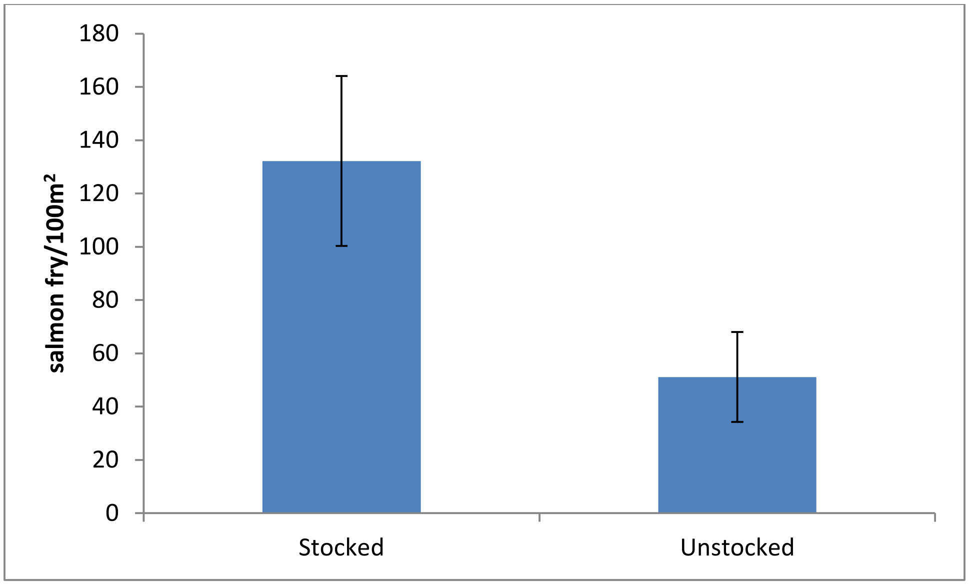

Fig 1: Comparison of the calculated densities of fry at sites stocked with first feeding fry in 2013 to unstocked sites. Average fry density at stocked (132.15 fry/100m2, SE+/- 31.88) was unstocked (51.03 fry/100m2, SE+/-16.92) sites was significantly different (p=0.0486)