2012 Electrofishing Program Summary

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

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Introduction

The Miramichi Salmon Association (MSA) continued its electrofishing program in 2012 to assess juvenile Atlantic salmon populations in the headwater areas of the Miramichi River watershed. The MSA also worked co-operatively with the Department of Fisheries and Oceans (DFO) Science Branch on another survey using targeted 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 3rd or 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 of major focus to the MSA electrofishing as they are considered feeder streams to the major rivers and are typically under-seeded with juvenile salmon. 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, avoiding predation, and identifying suitable 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 are to:

1. Assess proper stocking distribution of spring first-feeding fry. Broodstock are collected from individual rivers and their progeny must return to their native river system. Determining wild densities allows us to avoid overstocking and target naturally under-stocked streams in each river system. In terms of stocking, any site containing more than 50 fry per 100m^2 is not considered for stocking as it appears to reflect a healthy natural population.

2. Identify areas absent of fry as this indicates adult salmon were not able to spawn in that area last fall. No fry present could mean that adults were unable to access the spawning grounds. That is, the river or stream may be barricaded in some way (e.g. beaver dams) as to limit upstream migration of adults. Not only will these areas be targeted to stock but efforts may be made to identify and remove any obstacles to natural spawning.

3. Evaluate the success of spring stocking activities by comparing juvenile densities at stocked sites to sites that were not stocked that year.

4. Estimate the number of juvenile salmon in the river. The juvenile Atlantic salmon survey conducted in partnership between DFO and MSA determines the number of juvenile salmon relative to other years, dating back to 1970, at the same sites each year. Fry to parr survival can be calculated to aid in determining where bottlenecks to juvenile salmon production may be.

Methods

Electrofishing is the use of electricity for the active capture of fish. Electricity is generated by a battery located on the back-pack of the electrofisher with an anode (positive) wand and the cathode (negative) tail placed in the water to pass the electric current through the water. The charged particles moving between the anode and cathode produce an electric field that is used to promote involuntary swimming action in fish, causing them to move toward the anode. When a site has been identified, a crew of three people wearing leak-proof waders and rubber gloves enter the site facing upstream. With one person carrying the backpack electrofisher, the two other crew members collect the fish with a dip-net and a small seine net as they 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.

There are two methods for measuring density in a given area: Catch per Unit Effort (CPUE) and closed-site depletion. The MSA survey for assessing headwater areas for stocking uses the CPUE method exclusively. CPUE sweeps are continued back and forth along the stream from bank to bank, until 500 seconds has elapsed on the electrofisher. The crew then samples the captured fish on shore for length and abundance counts for each species. The fish are then released back into the stream. The depletion method, only performed during the MSA/DFO juvenile assessment, is done by capturing all fish from a measured section of stream rather than the timed CPUE method. A 200 square meter section of stream is measured off and barricaded with fine nets at the upper and lower ends of the site. This ‘closed site’ is then swept three to four times removing all fish or until an acceptable reduction in fish occurs (often four sweeps). This method produces an actual density for a known area and is used to calibrate the formula for the timed CPUE method. All fish are identified to species and lengths and weights are recorded. Substrate type (rocky, gravel, etc.), stream type (riffle, run, etc.), water and air temperature, and site dimensions are all recorded along with a diagram of the site. The DFO uses both the closed site and CPUE techniques to get juvenile estimates for sites that are sampled annually.

Assessment of Stocking First-Feeding Fry

Starting in 2010, the MSA shifted the focus from stocking young of the year Atlantic salmon fingerlings in fall to stocking first-feeding young of the year salmon in late spring. First-feeding fry are at the life-stage when they would normally being feeding for the first time in the wild. Stocking sites are selected based on electrofishing results from the previous year as well as some additional headwater sites expected to have low levels of fry. Sites are stocked with approximately 5000 first-feeding fry and then electrofished later in the summer to determine if first-feeding fry successfully remained at the site. The stocked sites were all headwater tributary sites with moderate to high quality Atlantic salmon habitat. We compared the average first-feeding fry density of the sites stocked to those not stocked.

Results

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

A total of thirty electrofishing sites were assessed between July 30 and August 29, 2012 in the Miramichi River (Table 1). Of the sites electrofished, 18 sites had been stocked with first-feeding fry from the Miramichi Salmon Conservation Centre between June 18 and July 5, 2012 (Table 1). The average fry density at the sites that were not stocked with first-feeding fry in 2012 was 57 fry per $100m^2$ while the sites that were stocked had a significantly higher average density of 121 fry per $100m^2$, which is considered well above the minimum sustainable fry density (50 fry per $100m^2$) for the river (Fig. 1). Variable results were found in the non-stocked sites as five sites had no fry and one site had less than five fry per $100m^2$ whereas one site (Bill Gray Mountain) had an extremely high density of 454 fry per $100m^2$ and this site likely over-inflated the non-stocked sites average. All of the sites that were stocked had fry present, ranging from 3-422 fry per $100m^2$. The MSA identified 14 sites as having fry densities lower than the target number and of these, nine of the sites had not been stocked this spring compared to only five that had been stocked (Table 1). The high survival of first-feeding fry at stocked sites can help to increase the overall juvenile salmon production in the river. Therefore, the MSCC will continue its stocking of first-feeding fry in the future.

Juvenile population assessment survey (MSA/DFO)

The DFO/MSA collaboration resulted in 55 of the annual sites being electrofished in 2012. Preliminary results from the assessment revealed high fry densities at many sites in both the Northwest and Southwest Miramichi Rivers as 60% (33/50) of all sites contained greater than 50 fry per $100m^2$ (Fig. 2). No site contained zero fry and only 11% (6/55) had fewer than 30 fry per $100m^2$. Parr results revealed high densities, greater than 20 parr per $100m^2$, at 33% (18/55) of the sites but also found that five sites contained zero parr. However, some sites were electrofished in

relatively warm water conditions and parr, which do not tolerate warm water as well as fry, may have moved away from the sites seeking out cold-water refuge. However, the DFO continues to verify age classes using the scale samples they had collected to confirm these results.

Table 1: Juvenile abundance assessments calculated using the CPUE method for the 30 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.

		Catch per $100m^2$		
River	Site	Fry	Parr	Stocked 2012
Main Southwest	Betts Mills Brook	0.0	6.1	N
Main Southwest	Doak Brook	30.5	29.5	N
Main Southwest	Big Hole brook	3.8	14.5	N
Main Southwest	Crooked Bridge Brook	0.0	23.3	N
Northwest	South Branch- road crossing	207.3	11.6	Y
Northwest	Bill Gray Mountain	454.3	13.0	N
Northwest	South Branch - Goodwin Lake	419.9	47.0	Y
Northwest	North Branch Tomogonops	287.3	68.3	Y
Sevogle	Johnstone Brook	132.8	5.2	Y
Sevogle	South Branch - above old e-fish	51.3	38.8	Y
Sevogle	Sheephouse Brook	77.7	28.2	N
Sevogle	Bear Brook	18.5	15.6	N
Sevogle	North Branch-bridge crossing	162.7	9.1	Y
Sevogle	North Branch- above bridge	129.7	51.6	Y
Sevogle	Little Sheephouse Brook	0.0	0.0	N
Sevogle	Travis Brook	46.8	30.7	Y
Little Southwest	Upper West Branch	60.5	40.5	Y
Little Southwest	West Branch- lower e-fish site	34.6	12.5	N
Little Southwest	Upper Libby's Brook	107.6	19.4	Y
Little Southwest	Devils Brook	31.3	19.1	Y
Little Southwest	Upper Saddlers Brook	189.7	17.0	Y
Little Southwest	Squaw Barron Brook	54.8	34.7	Y
Little Southwest	Crooked Brook Tuadook	209.5	42.2	Y
Little Southwest	County Line Brook	2.3	3.2	Y
Cains	McKenzie Brook	19.5	3.4	Y
Cains	Salmon Brook	0.0	1.4	N
Cains	Mahoney Brook	8.8	0.0	Y
Cains	West Branch Sabbies	74.7	36.4	N
Cains	East Branch 6 Mile Brook	0.0	27.7	N
Cains	West Branch 6 Mile Brook	70.3	9.7	Y

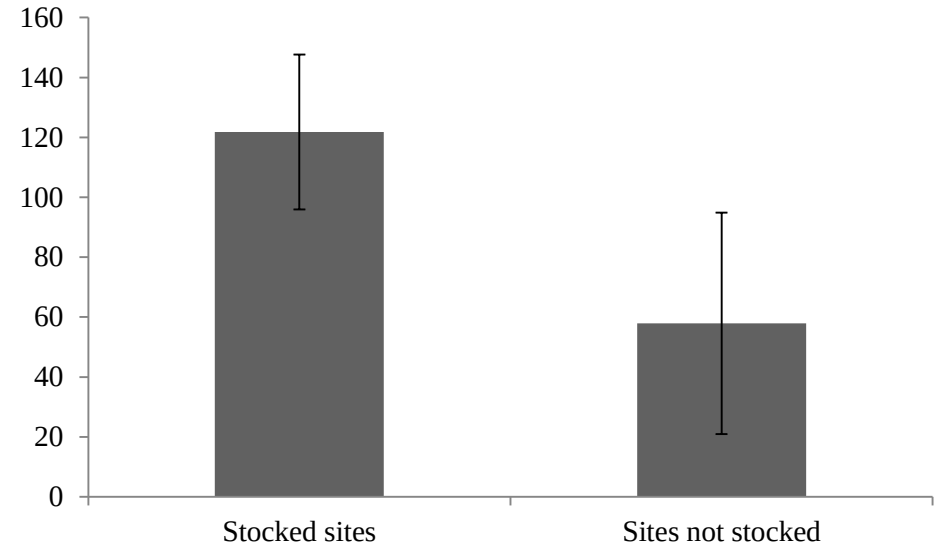
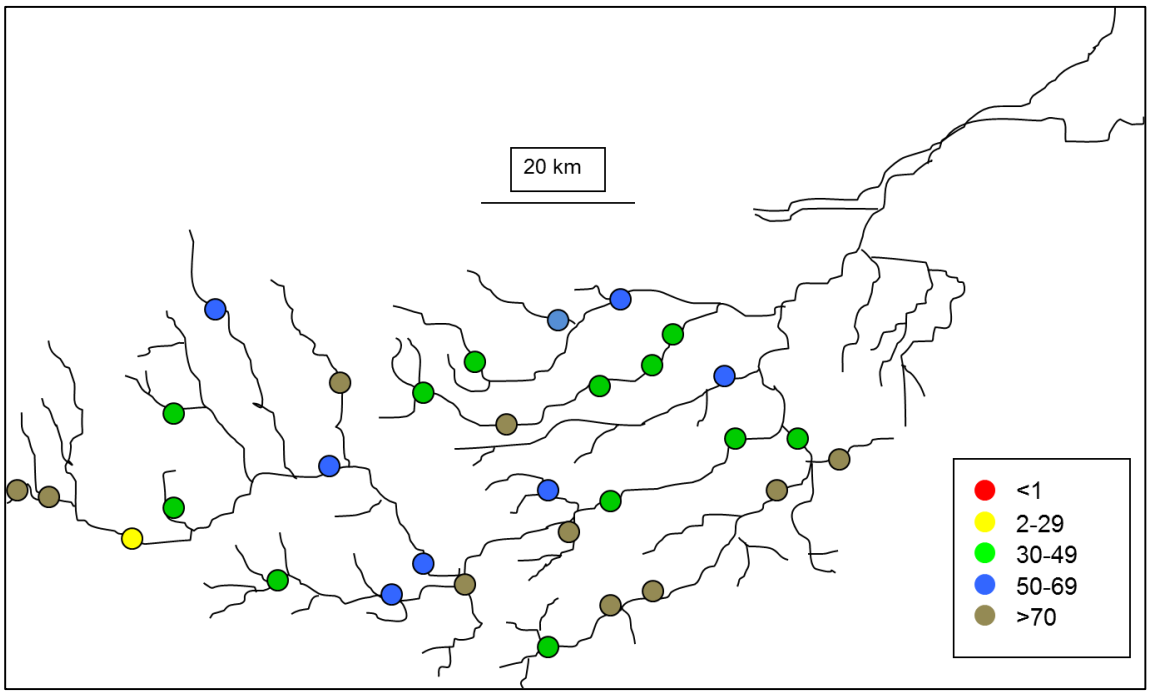


Fig 1: Comparing the number of fry collected at sites that had been stocked by the Miramichi Salmon Conservation Center in 2012 to the number of fry collected at sites that had not been stocked with first-feeding fry.

A.



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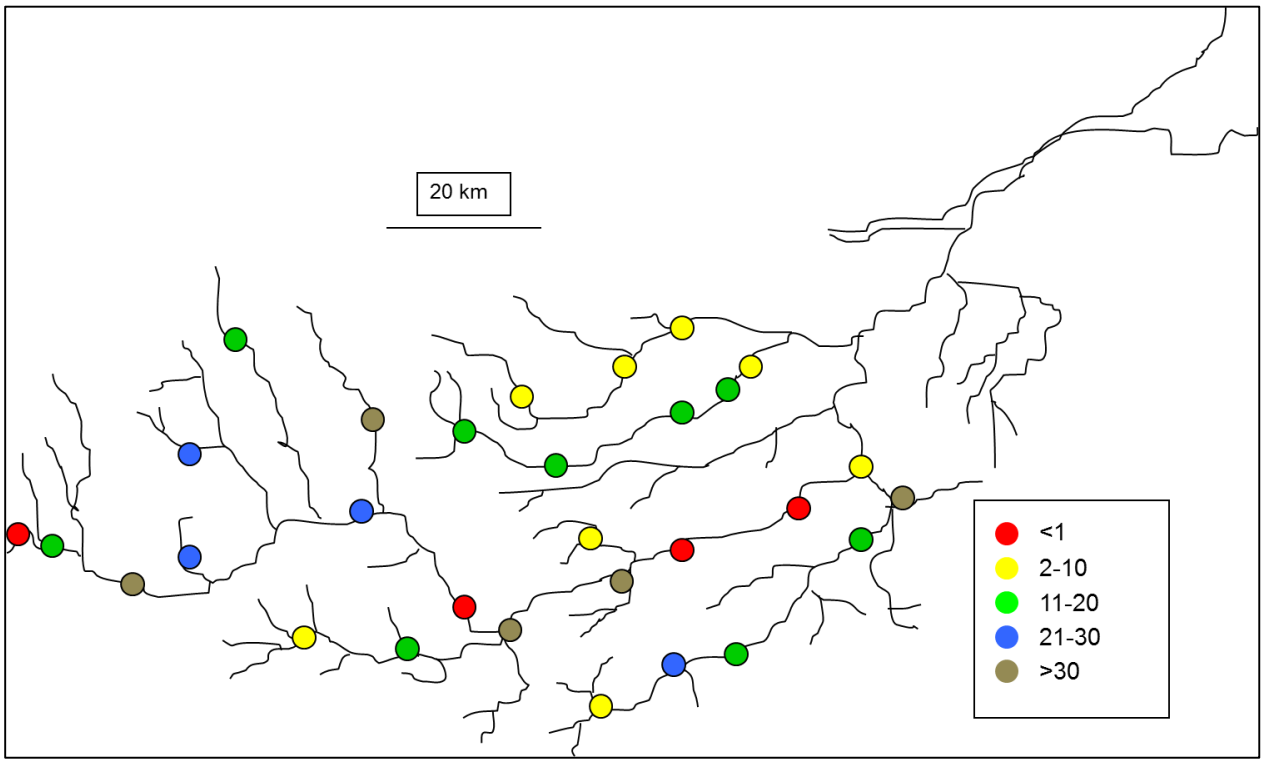

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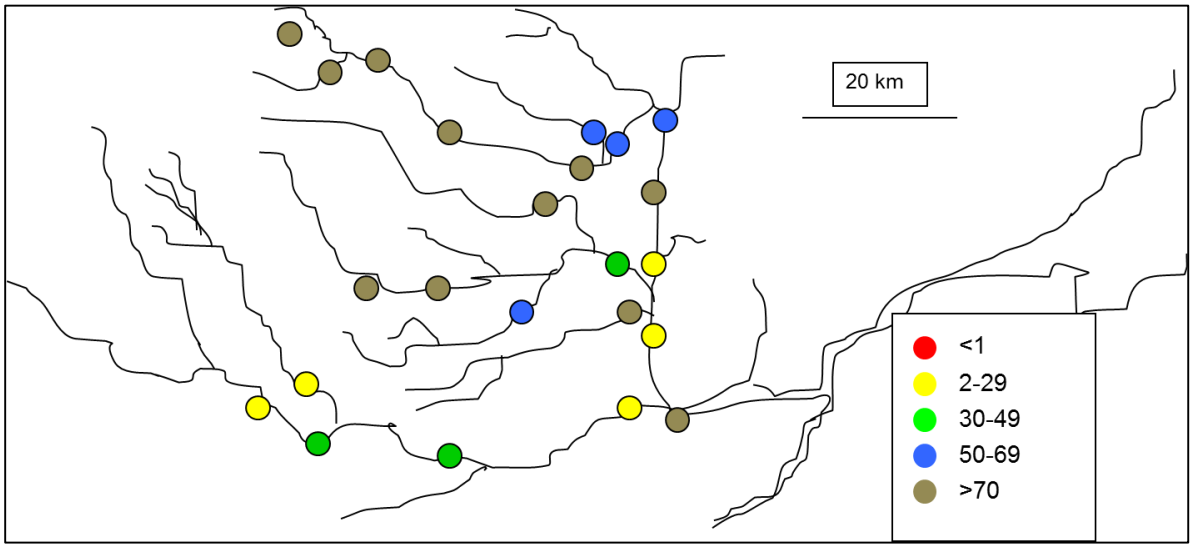

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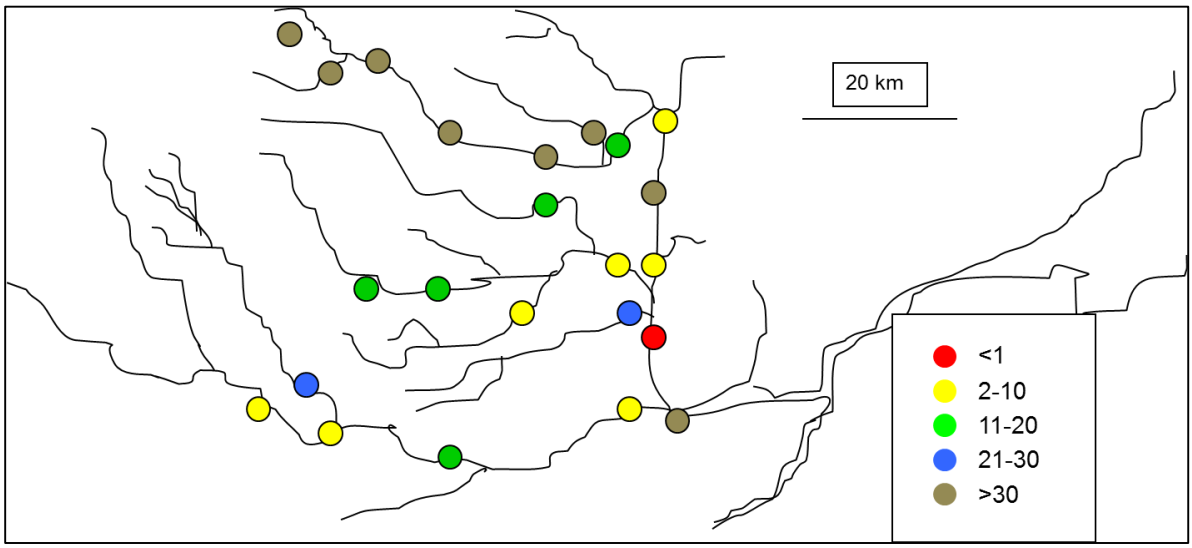

Fig 2: Preliminary juvenile density results from the 2012 MSA/DFO annual electrofishing program with: (A) showing the fry densities at sites in the Southwest Miramichi River tributaries, (B) showing parr densities at sites in the Southwest Miramichi River tributaries, (C) showing fry densities at sites in the Northwest Miramichi River tributaries, and (D) parr densities at sites in the Northwest 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 $100m^2$.