Electrofishing Program Summary 2020

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September 9th, 2020

Funding provided in part by:
New Brunswick Wildlife Trust Fund

Introduction

The Miramichi Salmon Association (MSA) continued its electrofishing program in 2020 to assess juvenile Atlantic salmon populations in the smaller tributaries of the Miramichi River watershed. The MSA typically works co-operatively with the Department of Fisheries and Oceans (DFO) Science Branch on another survey using historic baseline sites, however because of the COVID-19 pandemic, DFO was not able to allow 3rd party organization assist them in their survey in 2020. The electrofishing survey targets 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. Wild parr vary in size by site, but 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.

Electrofishing sites 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 tributary streams are the major focus of the MSA electrofishing program as they are considered feeder streams to the major rivers and can be under-seeded with juvenile salmon in the event adults were unable to access these areas to spawn (i.e.: barriers, low water levels). Generally, swift moving water less than 60cm deep with gravel or rocky substrate is characterized as 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, to avoid predation, or to seek 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 for the 2020 annual electrofishing program were to:

1. *Evaluate previous year's beaver dam removal success:*

   The Miramichi beaver dam management program resulted in 24 dams breached in 2019 over the entire Miramichi watershed. Upstream locations from where some of these dams were removed were part of the focus for electrofishing crews in 2020 to determine if adult salmon were able to access these areas for spawning.

2. *Evaluate spring stocking success:*

   Electrofishing surveys were conducted on stream stretches stocked with first-feeding fry in late June and early July of 2019 and 2020 to assess fry survival rates. Stocked location densities that are higher than unstocked locations are considered to reflect successful survival of hatchery fry following stocking.

3. *Determine future stocking sites of spring first-feeding fry:*

   Broodstock are collected annually from major rivers/streams in the Miramichi watershed and spawned at the Miramichi Salmon Conservation Centre (MSCC). The fry produced are returned to their native river system. In order to achieve effective stocking results in 2021, electrofishing surveys were carried out during the summer of 2020 to identify high quality juvenile habitat (gravel, or rocky substrate) with low fry and parr densities. Determining wild densities allows for avoidance of overstocking areas with healthy juvenile densities and for the targeting of tributaries that are naturally under-seeded or devoid of juvenile salmon. Any site containing more than 50 fry/100m^2 is not considered for stocking as it appears to reflect a healthy natural population, where sites with densities below this value are considered for stocking.

Methods

Electrofishing is the use of electricity for the active capture of fish; electricity is generated by a battery located on the backpack of the electrofisher. An anode wand (positive) and cathode tail (negative) are placed in the water. The electric current moving between the wand and tail produce an electric field which can render fish immobile (galvanonarcosis) or cause them to move towards the electrofisher (galvanotaxis). A crew of three people wearing watertight 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 in completed.

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 a predetermined amount of time has elapsed on the electrofisher, approximately 200-500 seconds depending on the site. CPUE calculations are standardized so all densities reflect a 500 second sampling time and $100m^2$ area to allow for comparisons. 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.

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, site dimensions, and GPS locations are recorded.

Results

A total of 26 electrofishing sites were assessed by MSA field crews between August 5th and August 27th, 2020 on the Miramichi River system.

<u>Beaver dam removal success from previous year:</u>

In total, 38% (10/26) of the sites electrofished in 2020 focused on areas upstream of beaver dams removed in 2019 (9 on the Southwest and 1 on the Northwest). 8 of these sites had fry present, with fry densities ranging from 0 to 81.0 fry/$100m^2$ (Table 1). Sites with fry present were in lower to midstream reaches of the tributaries, suggesting adult salmon did make it past dams that were breached in the lower sections, but were not able to access the more upstream habitat. Beavers can repair active dams within a 24-hour time frame, so the timing of notching/removing dams is crucial in helping the fish access ideal spawning habitat. Field crews can only access and remove so many dams per day and the efficiency of the beavers in repairing them can still pose problems for adult salmon migrating upstream to spawn.

Evaluating spring stocking success:

12 of 26 sites (46%) were surveyed to assess the previous two year's stocking success. Of these 12 sites, 6 were stocked in 2019 (Northwest) and 12 in 2020 (10 on the Northwest and 2 on the Southwest). Fry were found in all sites stocked in 2020 and parr were found in all sites stocked in 2019. Fry densities ranged from 0.6 to 84.5/100m^2 and parr densities ranged from 7.5 to 27.7/100m^2 (Tables 2 & 3). The high survival of first-feeding fry at stocked sites can help to increase the overall juvenile salmon production in the river, therefore the MSA will hopefully continue to stock first-feeding fry in the future.

Determine future stocking sites of spring first-feeding fry:

This year, 4 out of 26 sites (15%) were surveyed to assess for suitable habitat for later stocking. Fry were found in all but one of the sites with densities ranging from 0 to 22.5/100m^2, making all 4 sites suitable for future stocking (Table 4). Many of the sites surveyed to assess beaver dam removal success from 2019 were poor quality habitat for juvenile Atlantic salmon. 8 of the 10 sites surveyed contained fry in 2020, however, all but 1 had a density below 50 fry/100m^2. This leaves 12 sites available for potential stocking locations in 2021 (Tables 1 – 4).

Acknowledgements

The Miramichi Salmon Association acknowledges the financial contributions of the New Brunswick Wildlife Trust Fund (NBWTF), Canada Summer Jobs (CSJ), the Student Employment Experience Development (SEED).

Table 1. Juvenile abundance assessments calculated using the CPUE method for 10 sites electrofished by the MSA upstream of beaver dams removed in 2019.

River Branch	Site	Fry/100m^2
Southwest	Betts Mills Brook 1	0.7
Southwest	Betts Mills Brook 2	0.2
Southwest	Big Hole Brook	81.0
Southwest	Salmon Brook	9.5
Southwest	Sabbies West	15.6
Southwest	Six Mile East	3.5
Southwest	Sabbies East	16.6
Southwest	No Name Brook	0.0
Southwest	Muzzeroll Brook	9.2
Northwest	Slack Lake Bridge	0.0

Table 2. Juvenile abundance assessments calculated using the CPUE method for 12 sites electrofished by the MSA to assess stocking success from 2020.

River Branch	Site	Fry/100m^2
Northwest	Black and White Pool	19.1
Northwest	Depot Camp	8.8
Northwest	White Horse Pool	32.4
Northwest	No Name pool	15.1
Northwest	Duncan Pool	21.1
Northwest	Split Rock Pool	15.1
Northwest	NW Millstream #2	3.4
Northwest	NW Millstream #3	9.2
Northwest	NW Millstream #4	3.1
Northwest	NW Millstream #1	0.6
Southwest	Juniper Brook	42.5
Southwest	Miramichi Headwaters	84.5

Table 3. Juvenile abundance assessments calculated using the CPUE method for 6 sites electrofished by the MSA to assess stocking success from 2019.

River Branch	Site	Parr/100m^2
Northwest	Black and White Pool	16.4
Northwest	Depot Pool	7.5
Northwest	White Horse Pool	27.7
Northwest	No Name pool	12.9
Northwest	Duncan Pool	18.1
Northwest	Split Rock Pool	13.0

Table 4. Juvenile abundance assessments calculated using the CPUE method for 4 sites electrofished by the MSA to assess suitable habitat for future stocking.

River Branch	**Site**	**Fry/100m^2**
Sevogle	Clearwater	0.4
Sevogle	Travis Brook	22.5
Sevogle	Barracks Brook	0.0
Sevogle	Johnston Brook	10.4