Electrofishing Program Summary 2014

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 2014 to assess juvenile Atlantic salmon populations in the smaller tributaries 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 historic baseline sites that are monitored on an annual basis to assess Atlantic salmon juvenile abundance on the Miramichi River system. Both electrofishing 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. 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 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 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 2014 annual electrofishing program were to:

1. *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 2015, electrofishing surveys were carried out during the summer of 2014 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.

2. *Evaluate spring stocking success:*

   Electrofishing surveys were conducted on stream stretches stocked with first-feeding fry in late June and early July 2014. Stocked location densities that are higher than unstocked locations are considered to reflect successful survival of hatchery fry following stocking.

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

   The Miramichi beaver dam management program resulted in 112 dams breached in 2013 over the entire Miramichi watershed. Upstream locations from where some of these dams were removed were a large focus for electrofishing crews in 2014 to determine if adult salmon were able to access these areas for spawning.

4. *Estimate juvenile abundance using baseline locations:*

   Juvenile Atlantic salmon abundance surveys were conducted in partnership with DFO. These surveys monitor baseline sites, some of which have been electrofished for over 40 years, and allow for the estimation of absolute juvenile abundance in these areas.

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 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 in completed.

There are two methods for measuring density in a given area: catch-per-unit-effort (CPUE) and closed-site depletion (or removal). 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. 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 $200m^2$ section of stream is measured 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 (usually 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, site dimensions, and GPS locations are recorded.

Results

A total of 93 electrofishing sites were assessed by MSA and DFO field crews between August 5th and October 6th, 2014 on the Miramichi River system. MSA alone surveyed 37 sites, while MSA and DFO worked together on 56 sites.

Determining future stocking sites of first-feeding fry

Thirteen sites (of 37), concentrated on the Cains and Main Southwest Rivers, were surveyed to look for suitable habitat for future stocking. Over 75% of these thirteen sites contained no fry, but had good habitat. Five sites with zero fry had beaver dams in the vicinity. Three sites had parr densities higher than 20 parr/100m^2, while six sites had zero parr (Table 1). Sites with low juvenile densities could be potential stocking locations in the future.

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

Only three sites (of 37) were surveyed to assess spring stocking success because of the large focus put on surveying areas upstream of beaver dams removed in 2013. Moores Donnelly Brook, Doak Brook, and a site on the North Cains were all stocked in early summer 2014 and had densities of 147.7, 163.9, and 466.1 fry/100m^2, respectively when electrofished in August of 2014. 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 continue to stock first-feeding fry in the future.

Beaver dam removal success from previous year

In total, 57% (21/37) of the sites electrofished in 2014 focused on areas upstream of beaver dams removed in 2013 (12 on the Southwest and 9 on the Northwest). Ten of these sites had fry present, with fry densities ranging from 0 to 240.4 fry/100m^2 (Table 2). 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.

Table 1. Juvenile abundance assessments calculated using the CPUE method for 13 sites electrofished by the MSA to identify potential future stocking sites. Sites with <50 fry/100m^2 are candidate sites for future stocking locations. Sites with a * had beaver dams nearby.

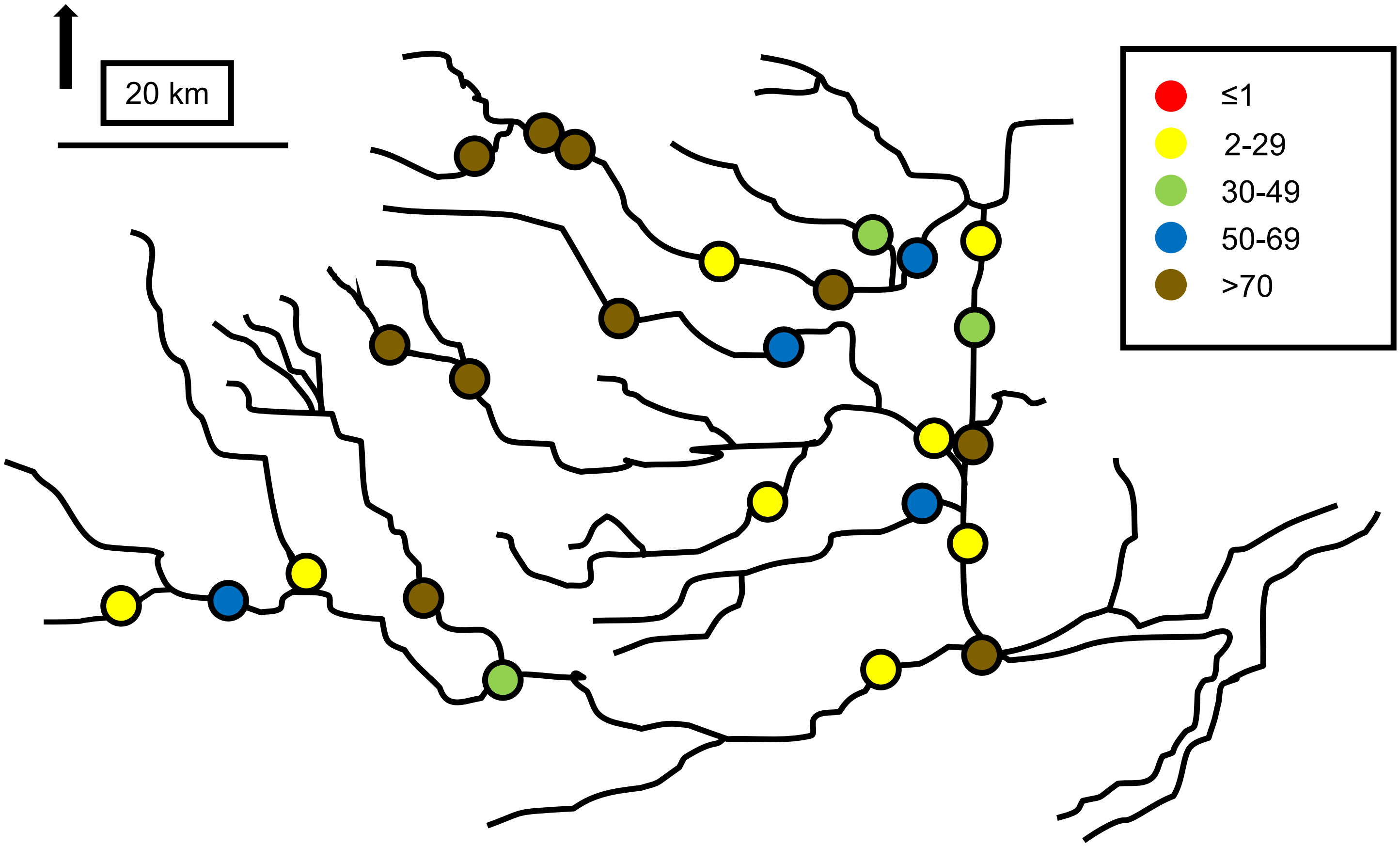
River	Site	Fry/100m^2	Parr/100m^2
Cains	North Cains*	0	24.4
Cains	10 Mile Brook	0	0
Main SW	Black Brook	0	132.4
Cains	Blue Rock Brook	0	13.0
Cains	East Muzzeroll*	0	78.7
Cains	Perogue Brook (Muzzeroll trib)*	0	0
Cains	East Sabbies (upper)	73.4	0
Cains	East Sabbies (upper)*	0	5.6
Cains	East Sabbies (upper)*	0	0
Cains	tributary to East Sabbies	104.3	0
Main SW	Grey Rapid Brook	48.5	34.4
Cains	Leighton Brook	0	0
Cains	Salmon Brook (upper)	0	3.3

Table 2. Salmon fry abundance assessments calculated using the CPUE method for 21 sites electrofished in 2014 by the MSA upstream of beaver dams removed in 2013.

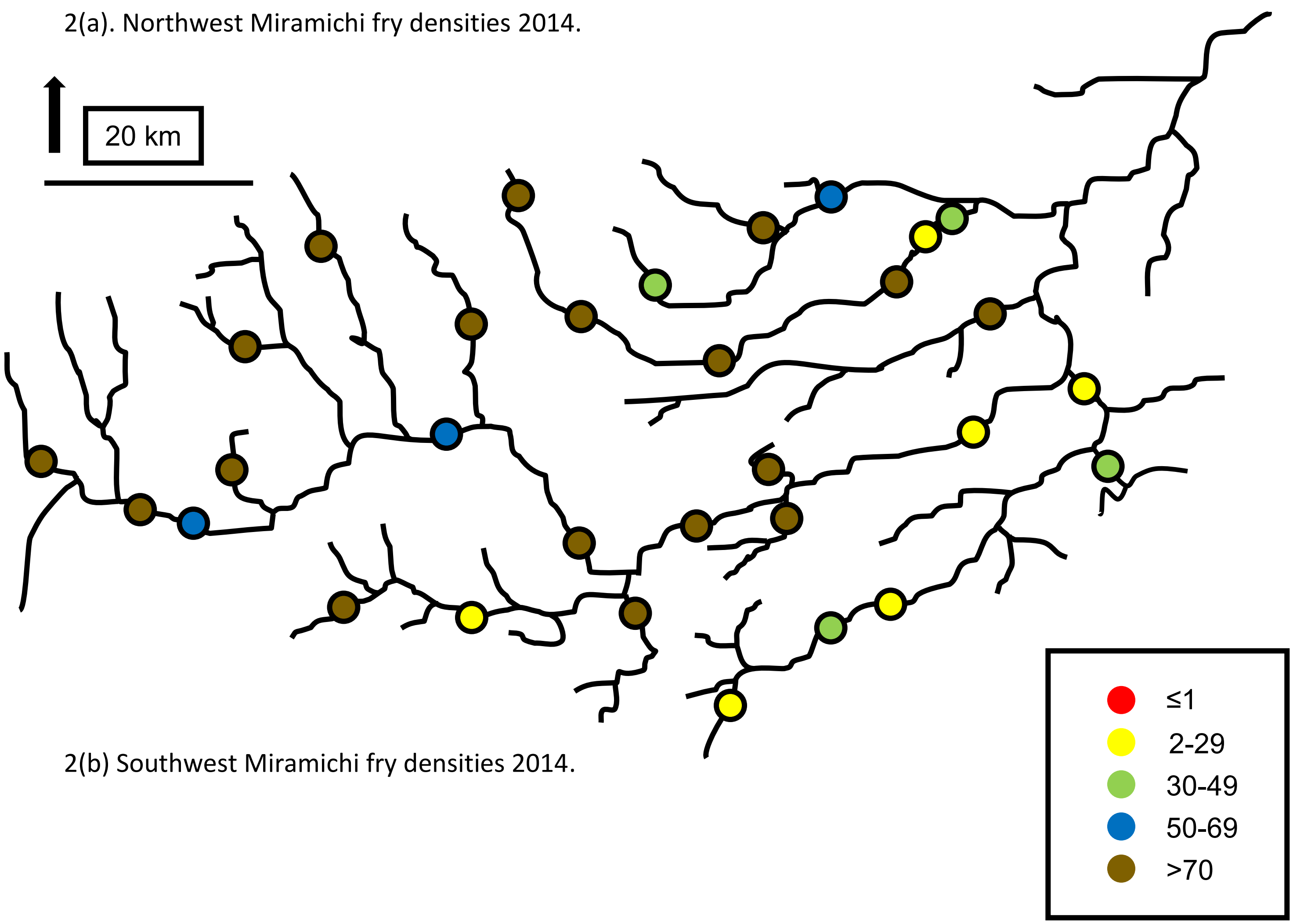
River	Site	Fry/100m^2
Main SW	Big Hole Brook (above Crooked Bridge Brook)	0
Main SW	Big Hole Brook	27.6
Main SW	Big Hole Brook (lower stretch)	157
Main SW	Betts Mills Brook	0
Cains	6 Mile Brook (upper stretch, west)	0
Cains	6 Mile Brook (west Acadia Road)	31.7
Cains	Salmon Brook (upper bridge)	0
Cains	Salmon Brook (middle)	0
Cains	Salmon Brook (lower)	18.9
Cains	Otter Brook (upper)	0
Main SW	Porter Brook (upper)	0
Main SW	Porter Brook (@ junction of Long Brook)	122.1
NW	Little River (upper)	0
NW	Littler River (middle)	2.5
NW	Little River (below middle)	0
NW	Little River (lower)	185.5
NW	Little Sevogle (bridge)	0
NW	Little Sevogle (lower bridge)	219.1
Sevogle	Sheephouse (upper put in)	0
Sevogle	Sheephouse (middle)	86.4
Sevogle	Sheephouse (@ bridge, lower)	240.4

<u>Juvenile population assessment survey (MSA/DFO)</u>

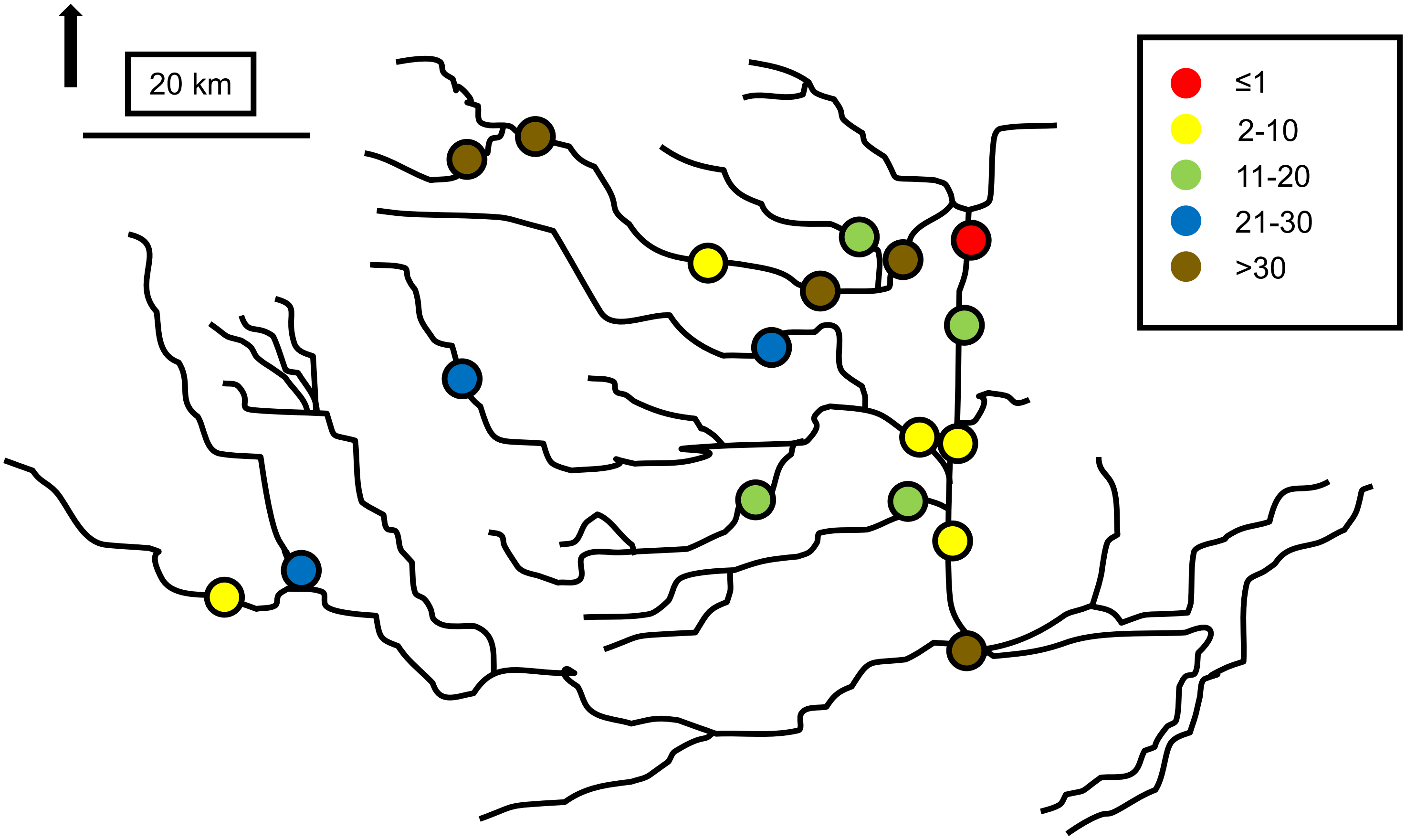
From August 25th to September 16th 2014, a total of 56 baseline sites were electrofished in several tributaries as part of the MSA/DFO cooperative program. Preliminary results from the assessment revealed high fry densities at many sites in both the Northwest and Southwest Miramichi Rivers, as 75% (42/56) of all sites contained greater than 30 fry/100m^2 (Fig 2a&b). No site contained zero fry and only 9% (5/56) of sites had fewer than 30 fry/100m^2. Parr densities were high (>20 parr/100m^2) at 52% (29/56) of sites, and only 3.5% (2/56) of sites contained zero parr (Fig 2c&d).



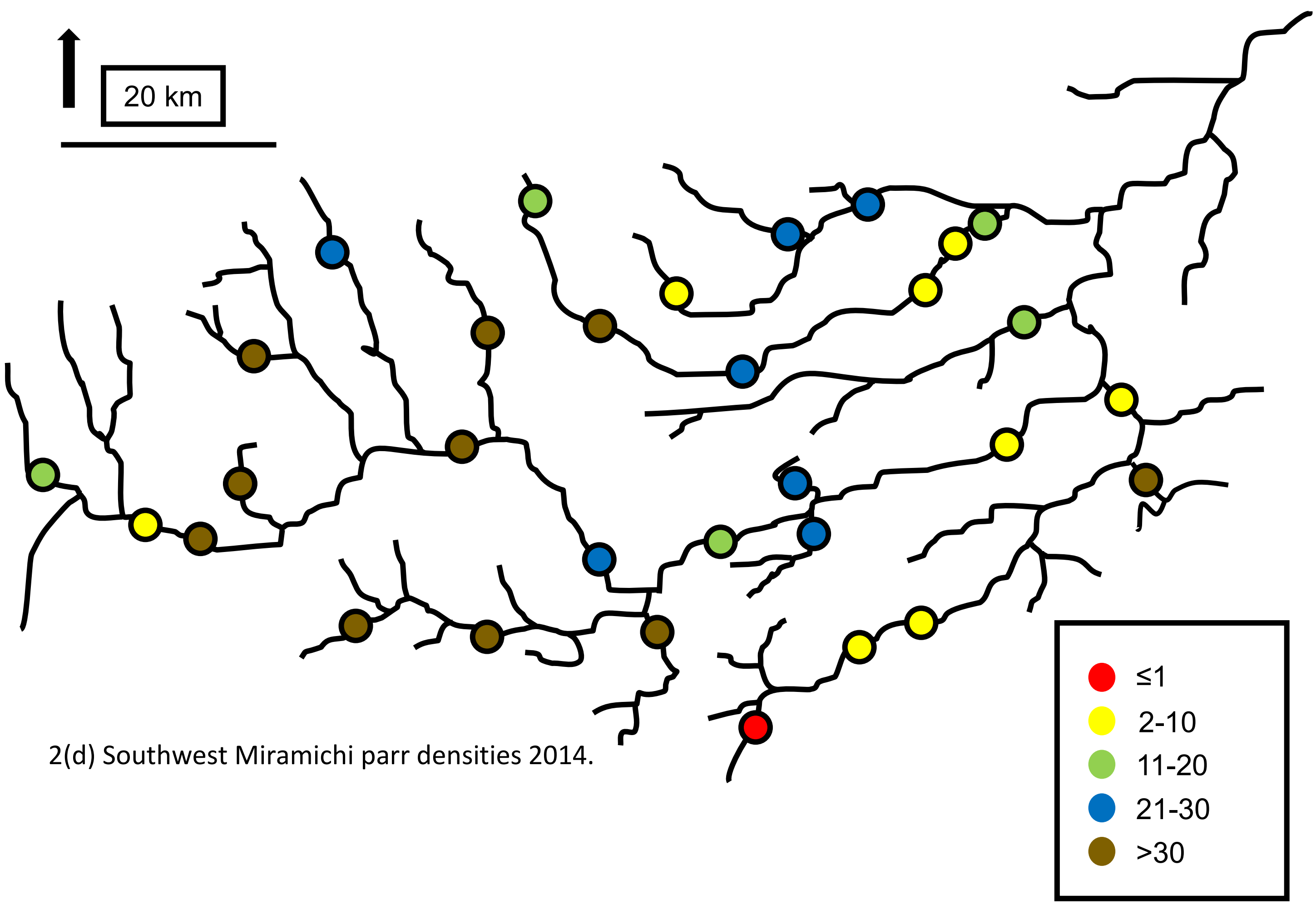
2(a). Northwest Miramichi fry densities 2014.



2(b) Southwest Miramichi fry densities 2014.



2(c) Northwest Miramichi parr densities 2014.



2(d) Southwest Miramichi parr densities 2014.

Figure 2: Preliminary juvenile density results from the 2014 DFO/MSA annual electrofishing program – (a) fry densities at sites on the Northwest Miramichi River system, (b) fry densities at sites on the Southwest Miramichi River system, (c) parr densities on the Northwest Miramichi River system, (d) parr densities on the Southwest Miramichi River system. Fry densities range from ≤1, 2-29, 30-49, 50-69, and >70 per $100m^2$. Parr densities range from ≤1, 2-10, 11-20, 21-30, and >30 per $100m^2$.