# Miramichi Salmon Restoration
# Stocking 2023

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**Introduction**

Stocking Atlantic salmon (*Salmo salar*) first-feeding fry can improve the juvenile production capacity of the Miramichi River by targeting areas that are under-seeded or inaccessible to wild spawning adults. An electrofishing survey is carried out each year by the Miramichi Salmon Association (MSA) to assess areas of the river that are lacking adequate numbers of fry or parr. Low fry or parr numbers could be the result of multiple factors including poor adult returns, barriers to adult movement into upper stream reaches (i.e.: beaver dams), environmental events such as ice scouring that could destroy a redd, or suboptimal water conditions. Areas with zero/minimal fry present were targeted to stock and efforts were made to identify and remove any impediments to natural spawning. Most of these areas were in small tributaries in the headwaters of the Miramichi River. Small brooks and streams often have good quality habitat and lower numbers of predators than larger downstream locations. These narrow waterways may be inaccessible however, because of barriers or decreased water levels in low flow years.

Juvenile abundance electrofishing surveys and smolt estimates are used to aid in determining specific tributaries that may need additional stocking. To increase efficiency and successful establishment, salmon fry that have incubated at the Miramichi Salmon Conservation Centre (MSCC) are placed strategically in streams that will benefit most from their introduction. Stocking salmon fry into a tributary with high salmon fry abundance could negatively impact those fish by increasing the level of competition for food resources. To avoid this, sites with less than 50 fry/100m$^2$ are considered candidates for stocking. The absence of fry at a previously stocked site may indicate that the site does not contain the appropriate habitat, or it may have too many predators.

Prior to 2010, fall fingerlings were stocked and identified by an adipose clip (removal of the adipose fin). In 2010 the MSA shifted focus from stocking Atlantic salmon fall fingerlings to stocking first-feeding salmon fry in the early summer. These fry were incubated as eggs on brook water to ensure the rate of egg development is similar in timing to that of wild eggs. The stocking of fry over fingerlings has several benefits, including the reduced risk of fish contracting a pathogen while in artificially high densities at the MSCC, and the improved capacity to develop wild behaviour tendencies at a younger age. First-feeding fry are stocked in June at an average size of 0.3-0.5g. The objective of this stocking program is to improve Atlantic salmon production in the headwaters of the Miramichi watershed using first-feeding fry.

**Methods**

Wild adult salmon were collected from September to October 2022 for broodstock from two locations on the Southwest Miramichi River – the Cains River and the Southwest Miramichi

River in Juniper. These fish were held at the MSCC and kept separated based on their river of origin. Once ripe, female salmon were stripped of their eggs, which were then fertilized by a male salmon from the same river. Immediately following spawning, the wild adults were released back into the wild via Stewart Brook, which runs beside the MSCC. Eggs from both groups were incubated on brook water in trays until the eyed stage, when dead eggs were then removed daily. Eyed eggs were transferred to upwelling incubation boxes in preparation for hatching. After hatching, fry were fed a formulated salmonid diet (Skretting Nutra Sprint 0.5mm/0.7mm) for approximately 2-3 weeks until stocking. All salmon fry were stocked into their native river of origin.

Stocking sites were selected based on low juvenile densities found at the exact or nearby locations from the previous year's electrofishing results and in tributaries that typically have low juvenile production.

***Permits***

Scientific Permits from the Department of Fisheries and Oceans (SG-RHQ-22-117 and NB-2023-036) were obtained prior to starting this project.

**Results and Discussion**

Approximately 90,310 first-feeding Atlantic salmon fry were stocked into 29 sites of the Southwest Miramichi River system (Figure 1a,b). The Cains River received 35,075 fry, and the Juniper area of the Main Southwest received 55,235 fry (Table 1). The water levels were very high in spring 2023, so some sites had additional buckets of fry added due to a lack of available and accessible habitat elsewhere.

This program allows a higher proportion of salmon eggs and fry to be produced and released back into the wild. This program also connects anglers to the Miramichi Salmon Conservation Centre and provides wild fry back to the Miramichi River system, with the goal to sustain and enhance Atlantic salmon populations.

**Acknowledgements**

The Miramichi Salmon Association acknowledges the financial contributions of Canada Summer Jobs (CSJ) and the Student Employment Experience Development (SEED). We also thank the many volunteer outfitters, anglers, and students involved in wild broodstock collection in the fall of 2022 and stocking volunteers in the spring of 2023.

## Appendix

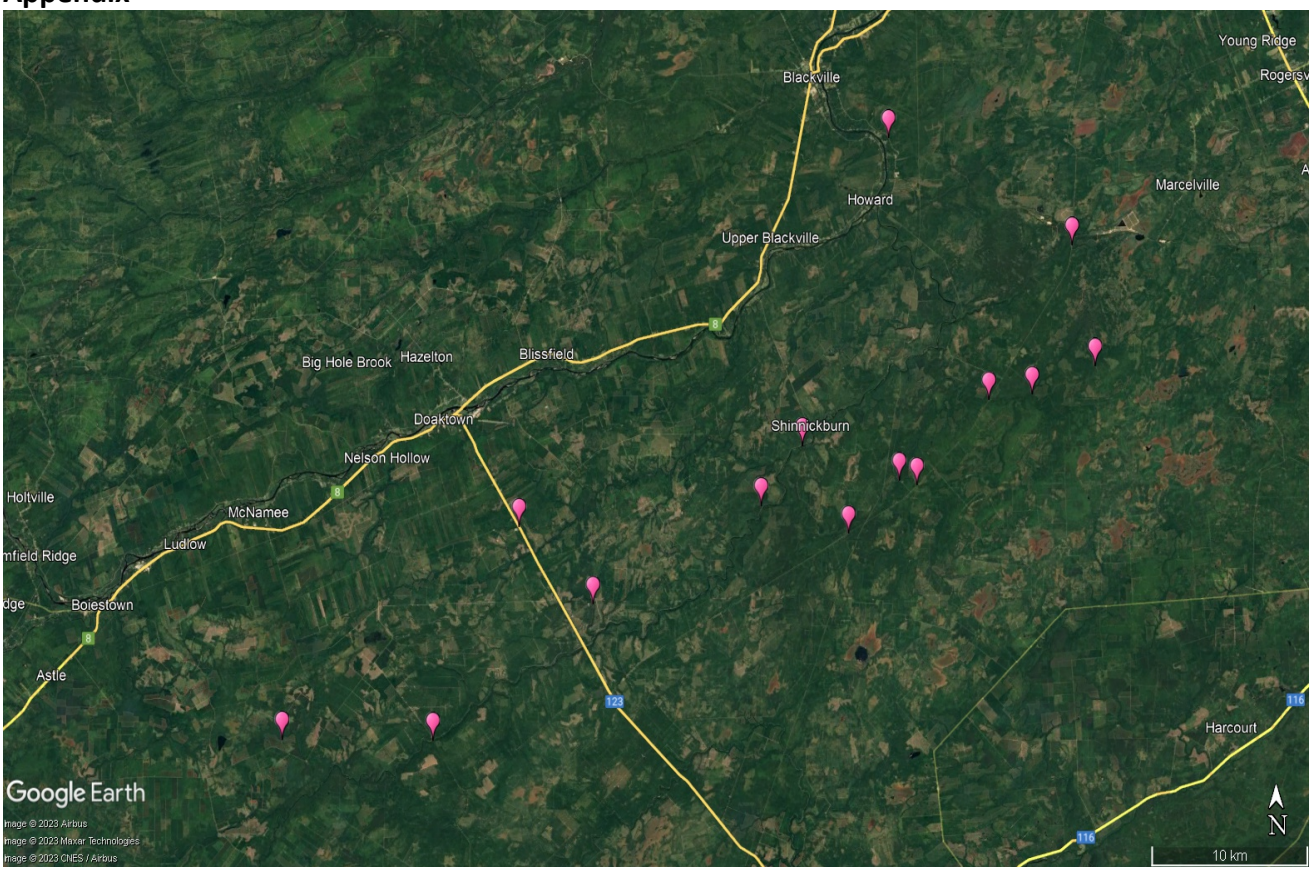


*Figure 1a.* Stocking sites of wild Atlantic salmon fry distributed to the Cains River in 2023.


*Figure 1b.* Stocking sites of wild Atlantic salmon fry distributed to the Southwest Miramichi River in Juniper in 2023.

*Table 1.* Distribution of wild Atlantic salmon fry from the Miramichi Salmon Conservation Centre to the Southwest Miramichi River system in 2023.

| Stock Origin | Site | # of fish | Latitude | Longitude |
|---|---|---|---|---|
| Cains | Fosse Acadian Bridge Pool | 2,525 | 46.38600 | -66.14452 |
| Cains | Main Cains River 1 | 2,525 | 46.54015 | -65.83801 |
| Cains | Main Cains River 2 (Mahoney Camp) | 2,500 | 46.50881 | -65.87241 |
| Cains | McKenzie Brook | 2,500 | 46.45720 | -66.01199 |
| Cains | McKenzie Brook | 2,300 | 46.70116 | -65.76582 |
| Cains | Muzzeroll Brook Connector | 2,600 | 46.49793 | -66.07334 |
| Cains | Otter Brook 2 | 2,650 | 46.38624 | -66.26956 |
| Cains | Sabbies Brook 2 | 2,425 | 46.56372 | -65.68307 |
| Cains | Sabbies Brook 3 | 2,425 | 46.51912 | -65.74315 |
| Cains | Sabbies Brook 4 | 2,525 | 46.52176 | -65.75774 |
| Cains | Sabbies Brook 5 | 2,525 | 46.56647 | -65.64708 |
| Cains | Sabbies Brook 6 | 2,750 | 46.58115 | -65.59451 |
| Cains | Salmon Brook 2 | 2,425 | 46.64460 | -65.61314 |
| Cains | Six Mile Brook 1 | 2,400 | 46.49401 | -65.79994 |
| Juniper | Big Teague Brook 3 | 3,000 | 46.57310 | -67.24873 |
| Juniper | Clearwater Brook 1 | 6,100 | 46.51842 | -67.17828 |
| Juniper | Clearwater Brook 2 | 3,050 | 46.51812 | -67.18161 |
| Juniper | Elliott Brook 2 | 4,450 | 46.61548 | -67.34229 |
| Juniper | Elliott Brook 1 | 3,075 | 46.62107 | -67.36778 |
| Juniper | Juniper Brook 1 | 3,300 | 46.53867 | -67.18463 |
| Juniper | Juniper Brook 2 | 3,025 | 46.54930 | -67.18627 |
| Juniper | Lake Brook 2 | 3,000 | 46.55489 | -67.28783 |
| Juniper | Lake Brook 3 | 3,075 | 46.51897 | -67.33208 |
| Juniper | Lake Brook 4 | 3,000 | 46.52055 | -67.33279 |
| Juniper | Little Teague Brook 1a | 3,000 | 46.59258 | -67.27400 |
| Juniper | Little Teague Brook 2a | 4,300 | 46.61376 | -67.30021 |
| Juniper | Little Teague Brook 3 | 3,025 | 46.63515 | -67.31494 |
| Juniper | MSW South Branch 1 | 3,075 | 46.55436 | -67.24509 |
| Juniper | MSW South Branch 3 | 6,850 | 46.49834 | -67.29631 |