

Beaver Dam Management Project 2018

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Introduction

Beaver dams are known barriers to adult Atlantic salmon migrating upstream to spawn, blocking access to habitat in the upper reaches of brooks and streams. Female salmon have been observed below beaver dams in large numbers and are forced to build multiple redds in confined areas of the stream, often with habitat of lower quality than would otherwise be available. The survival of eggs in these crowded, overlapping redds is severely reduced and can negatively impact juvenile salmon production within the stream. Upstream areas of brooks and streams are often excellent spawning and juvenile habitat with a high percentage of gravel and cobble substrates, cold ground fed water, and low numbers of predators. After several years of blocked access, these upstream reaches run the risk of becoming devoid of salmon fry and parr which can potentially lower the number of stream imprinted adult salmon returning to these areas. Improving access to upstream habitat on individual streams could be beneficial to egg survival and juvenile production. If upstream habitat on multiple streams within a watershed is improved, the total number of returning adult salmon in the following years could be increased.

To achieve the maximum benefit of dam breaching efforts, the timing of behaviour changes and movements of salmon must be considered. On the Miramichi River these fish typically begin moving out of large holding pools, and travel upstream to find spawning habitat, from late September to late October. Salmon are likely to encounter beaver dams in these upstream areas with high populations of beavers. Small dams may not pose much of an issue during high water flows, as the fish are able swim over them, but large dams will stop any further upstream movements. Beavers can repair active dams within a 24-hour time frame, which means the notching or removal of the dams must be correctly timed with the upstream migrations of the salmon so as to not waste time and resources.

Beaver dam removal initiatives by the Miramichi Salmon Association in the past have shown potential as a tool for salmon conservation. Several locations within the watershed have shown improved juvenile counts after the dams were notched during critical salmon migrations. Before 2006, very few salmon fry were found on Betts Mills Brook near Doaktown, NB despite the construction of a fish ladder, just upstream from the mouth of the brook, at a highway crossing. In 2006 a large beaver dam blocking the fish ladder was removed and an

additional 21 dams were notched or removed on the brook. This opened more than 50,000m² of spawning habitat for the salmon. Electrofishing results by DFO and MSA showed salmon fry present in Betts Mills Brook the following year. Big Hole Brook (also near Doaktown) and Porter Brook (near Boiestown) both have high quality salmon habitat and with the removal of dams on these watercourses adults were able to access to upstream sections. High densities of salmon fry were noted in both of these brooks the following year.

By providing access to crucial spawning habitat for adult Atlantic salmon in the Miramichi River, we will ensure that a strong juvenile production rate is maintained. High numbers of juvenile salmon migrating to the ocean could potentially increase the number of adult salmon returning, improving the conservation outlook for this iconic Miramichi River species.

Methods

The Miramichi Salmon Association did ground reconnaissance on the Southwest Miramichi watershed and the Northwest Miramichi Watershed, to locate and GPS beaver dams. The assessed locations were determined ahead of time based on the previous year's results and known beaver dam areas.

Any dams discovered were marked with hand-held Garmin GPS units and mapped using Google Earth and ArcGIS software to coordinate ground crew activities. Dams were accessed on foot and removed when possible, otherwise stream sections were canoed to remove the impoundments. Field crews began accessing and removing dams on October 2nd and finished on October 20th. Active dams were notched on multiple occasions following repairs by beavers.

Results

In the Northwest Miramichi basin, 4 dams were initially breached by the field crew on two tributaries – Little River and the Northwest Millstream (Figure 1). In the Southwest Miramichi basin, 11 dams were initially breached by field crews on 6 tributaries (Big Hole Brook, Betts Mills Brook, Porter Brook, Salmon Brook, the Bartholomew, Gordon Brook) (Figure 2).

Dams on Big Hole Brook, Betts Mills Brook, Salmon Brook, and Little River had to be breached on multiple occasions after beavers repaired them. A total of 16 dams were initially breached in 2018 (Appendix 1).

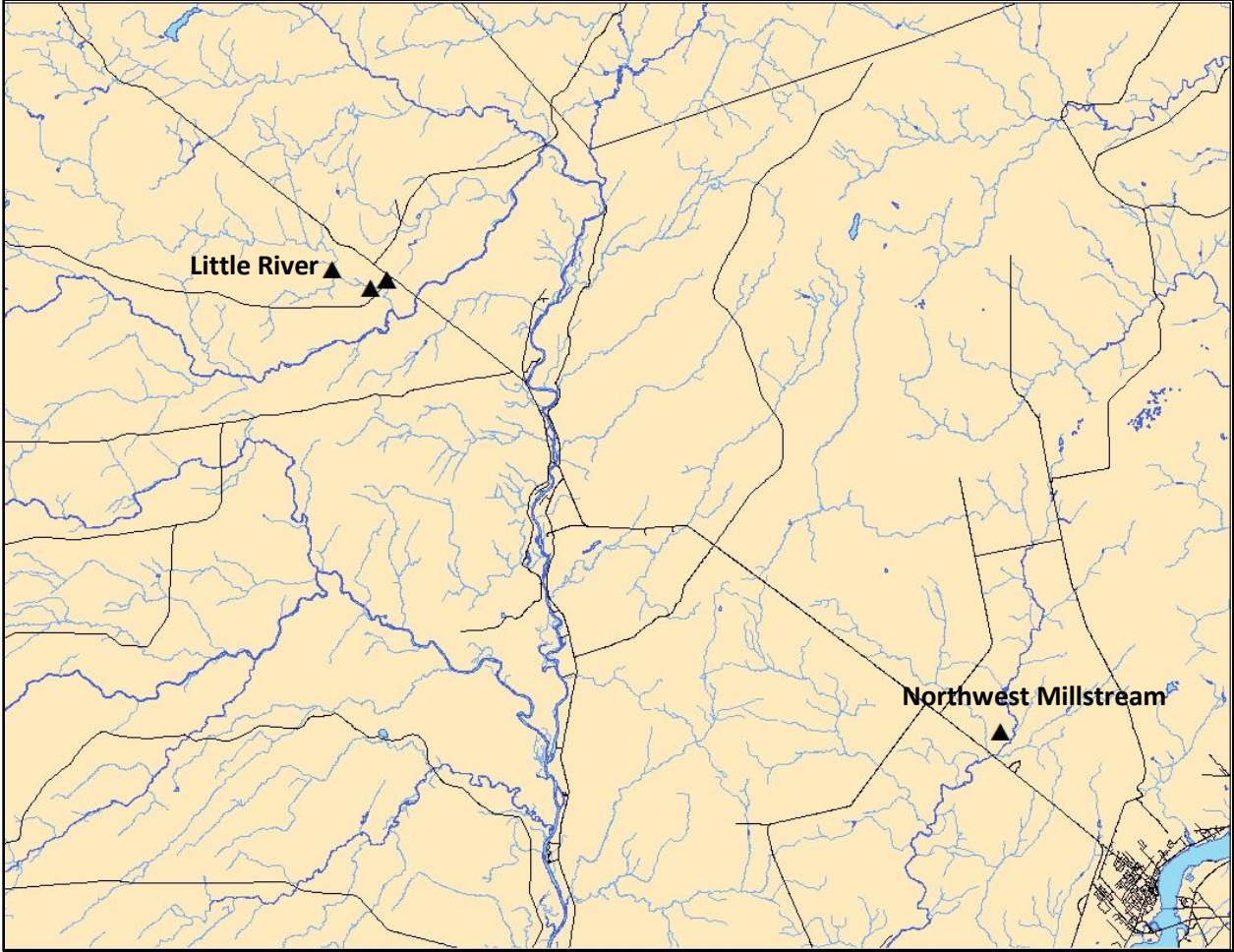


Figure 1: Tributaries of the Northwest Miramichi watershed. Beaver dams breached in 2018 are marked with a '▲'.

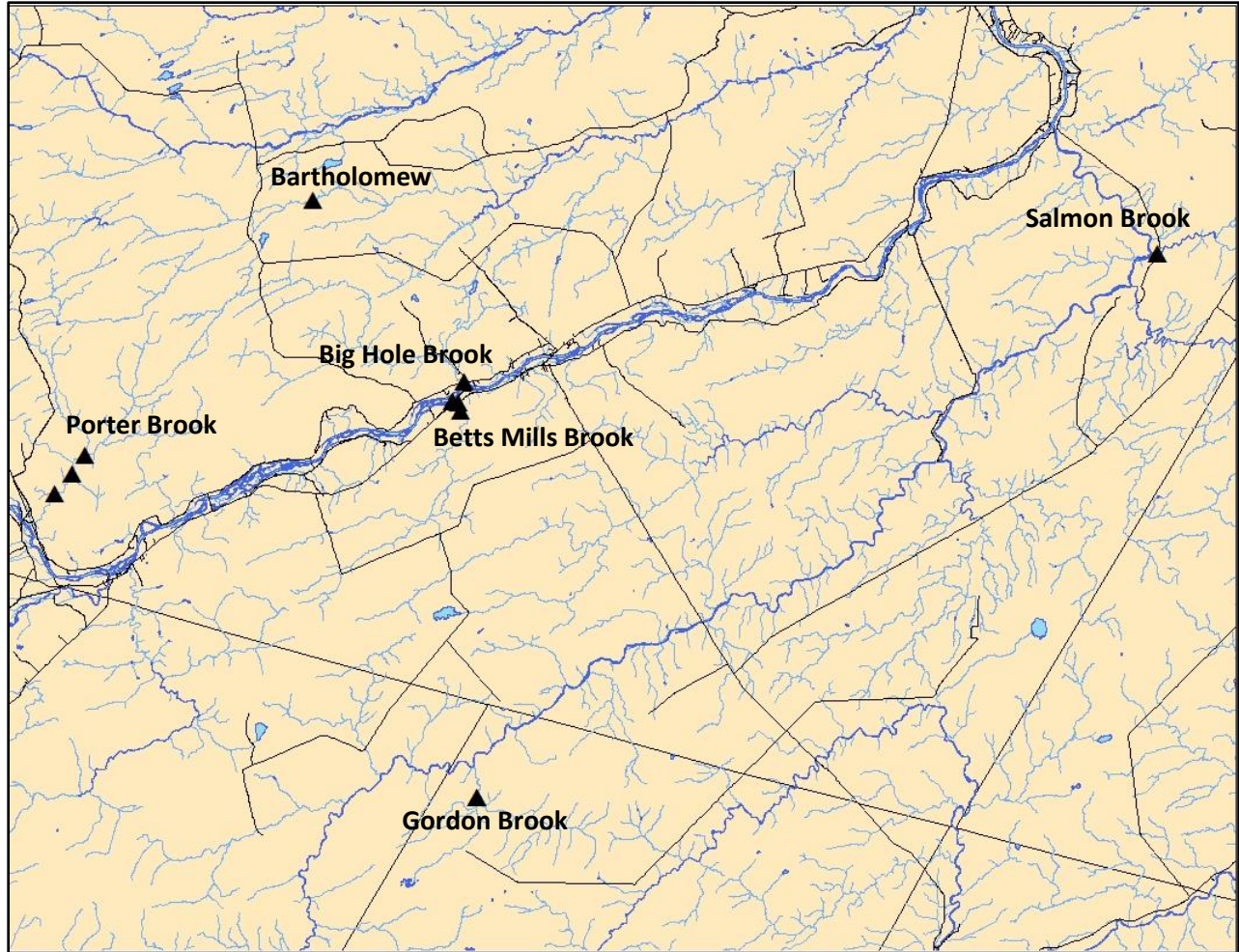


Figure 2: Tributaries of the Southwest Miramichi watershed. Beaver dams breached in 2018 are marked with a ▲.

Discussion

The Miramichi watershed has a large number of tributaries with beaver dam activities, more than would be possible for field crews to remove in the scope of this project. In a typical year, a helicopter survey would be conducted, and flight paths chosen based on beaver activity locations noted in previous years (focusing on larger and wider tributaries of the Miramichi River which offer clear line-of-site observations from the air of the dams, and on areas where river access is easy to moderately acceptable for field crews). In 2018, the helicopter was not available for the MSA to use until very late in the season, so all of the reconnaissance was done

on foot by the field crews. Because water levels were very low, the focus of the beaver dam management in 2018 was on salmon habitat that historically had high beaver activity.

The number of dams breached in 2018 (16) was less than that of 2017 (42) due to water levels being extremely low during the fall of 2018, no access to the aerial observation, and there being limited access to for the field crews. 2015 dam breaching was low (35) because of a large rain storm that occurred during the fall of 2015, that washed out many of the dams. The number of dams removed in 2014 (167) and 2013 (112) exceeded those removed in 2018, 2017 and 2016 (92) and is most likely related to the water level being ideal during those field seasons as opposed to the poorer water conditions of 2018, 2017 and 2016.

In the Southwest system, Porter Brook, and the Bartholomew, had zero to relatively low levels of beaver activity whereas Salmon Brook, Big Hole Brook, Gordon Brook, and Betts Mills Brook had higher activity levels. In the Northwest system, Little River had high levels of beaver dam activity, while the Northwest Millstream had low levels.

Over half (68%) of the electrofishing surveys completed in the summer of 2018 by MSA focused on areas upstream of beaver dams removed in 2017; 11 on the Southwest and 2 on the Northwest. Out of the 13 sites surveyed, 8 of these sites had fry present, which were located on Big Hole Brook, Salmon Brook, Porter Brook, Betts Mills Brook, Six Mile Brook, Muzzeroll Brook, the Sabbies, and the Sevogle river. These sites 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.

In the summer of 2019 electrofishing surveys will be conducted upstream of dams breached/removed in 2018 to assess the impact of the program on Atlantic salmon fry production.

Acknowledgements

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- UNB/ CRI field crews for their help removing dams on the Northwest Millstream
- Ken Cogswell for his help notching a dam on Gordon Brook
- MREAC/NBCC for their help assessing and removing a dam on the Bartholomew.

Appendix 1: GPS coordinates of breached beaver dams in 2018.

Date	Tributary	Latitude	Longitude	Active (Y/N)	Initial/Return Visit (I/R)	Breached on Return (Y/N)
2-Oct-18	Big Hole Brook	46.54821	-66.17975	Y	Initial	N/A
2-Oct-18	Betts Mills Brook	46.53871	-66.18777	Y	Initial	N/A
6-Oct-18	Gordon Brook	46.35239	-66.17204	Y	Initial	N/A
9-Oct-18	Salmon Brook	46.60628	-65.70615	Y	Initial	N/A
9-Oct-18	Big Hole Brook	46.54820	-66.17976	Y	Return	Y
9-Oct-18	Betts Mills Brook	46.53856	-66.18342	N	Initial	N/A
9-Oct-18	Betts Mills Brook	46.53871	-66.18777	Y	Return	Y
10-Oct-18	Little River	47.19202	-65.90708	Y	Initial	N/A
11-Oct-18	Northwest Millstream	47.051667	-65.633056	Y	Initial	N/A
12-Oct-18	Little River	47.19202	-65.90708	Y	Return	Y
12-Oct-18	Little River	47.18953	-65.91453	Y	Initial	N/A
12-Oct-18	Little River	47.18789	-6590802	N	Initial	N/A
13-Oct-18	Gordon Brook	46.35239	-66.17204	Y	Return	Y
15-Oct-18	Salmon Brook	46.60628	-65.70615	Y	Return	Y
15-Oct-18	Betts Mills Brook	46.53871	-66.18777	Y	Return	Y
16-Oct-18	Little River	47.19202	-65.90708	Y	Return	Y
16-Oct-18	Little River	47.19550	-65.93164	Y	Initial	N/A
17-Oct-18	Bartholemew	46.63357	-66.28238	Y	Initial	N/A
18-Oct-18	Porter Brook	46.51402	-66.43871	N	Initial	N/A
18-Oct-18	Porter Brook	46.50530	-66.44756	Y	Initial	N/A
18-Oct-18	Porter Brook	46.49619	-66.45888	Y	Initial	N/A
18-Oct-18	Porter Brook	46.48782	-6646687	Y	Initial	N/A
19-Oct-18	Betts Mills Brook	46.53457	-66.18251	Y	Initial	N/A
20-Oct-18	Gordon Brook	46.35239	-66.17204	Y	Return	Y