Beaver Dam Management Project 2016

Prepared by:
Holly Labadie
Biologist
Miramichi Salmon Association
February 17th, 2017

Funded in part by:
Recreational Fisheries Conservation Partnership Program

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 50,000m^2 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

Miramichi Salmon Association staff flew a helicopter reconnaissance flight on the Southwest Miramichi watershed to locate and GPS beaver dams. Flight paths for 2016 were determined ahead of time based on previous year's results and known beaver activities in given areas. The flight was done on October 7th and surveyed ten tributaries on the Southwest system: Burntland Brook, Porter Brook, Salmon Brook, Muzzeroll Brook, Big Hole Brook, Betts Mills Brook, the south branch of the Main Southwest River, Big Teague Brook, Little Teague Brook, and Elliott Brook. Tributaries on the Northwest system were not flown, but areas were checked based on previous year's information and known beaver activity.

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 11th and finished on November 14th. Active dams were notched on multiple occasions following repairs by beavers.

Results

In the Northwest Miramichi basin, 22 dams were breached by field crews on two tributaries – Little River and the north branch of the Northwest River (Figure 1). In the Southwest Miramichi basin, 54 dams were breached by field crews on 11 tributaries (Bartholomew River, Big Hole Brook, Betts Mills Brook, Rocky Brook, Porter Brook, Sabbies River, Six Mile Brook, Gordon Brook, Little Teague Brook, Clearwater Brook, and Elliott Brook) (Figure 2 a&b). Dams on Gordon Brook, Porter Brook, Big Hole Brook, Rocky Brook, Little Teague Brook, Sabbies River, and the north branch of the Northwest River had to be breached on multiple occasions after beavers repaired them. A total of 76 dams were breached in 2016 (Appendix 1).

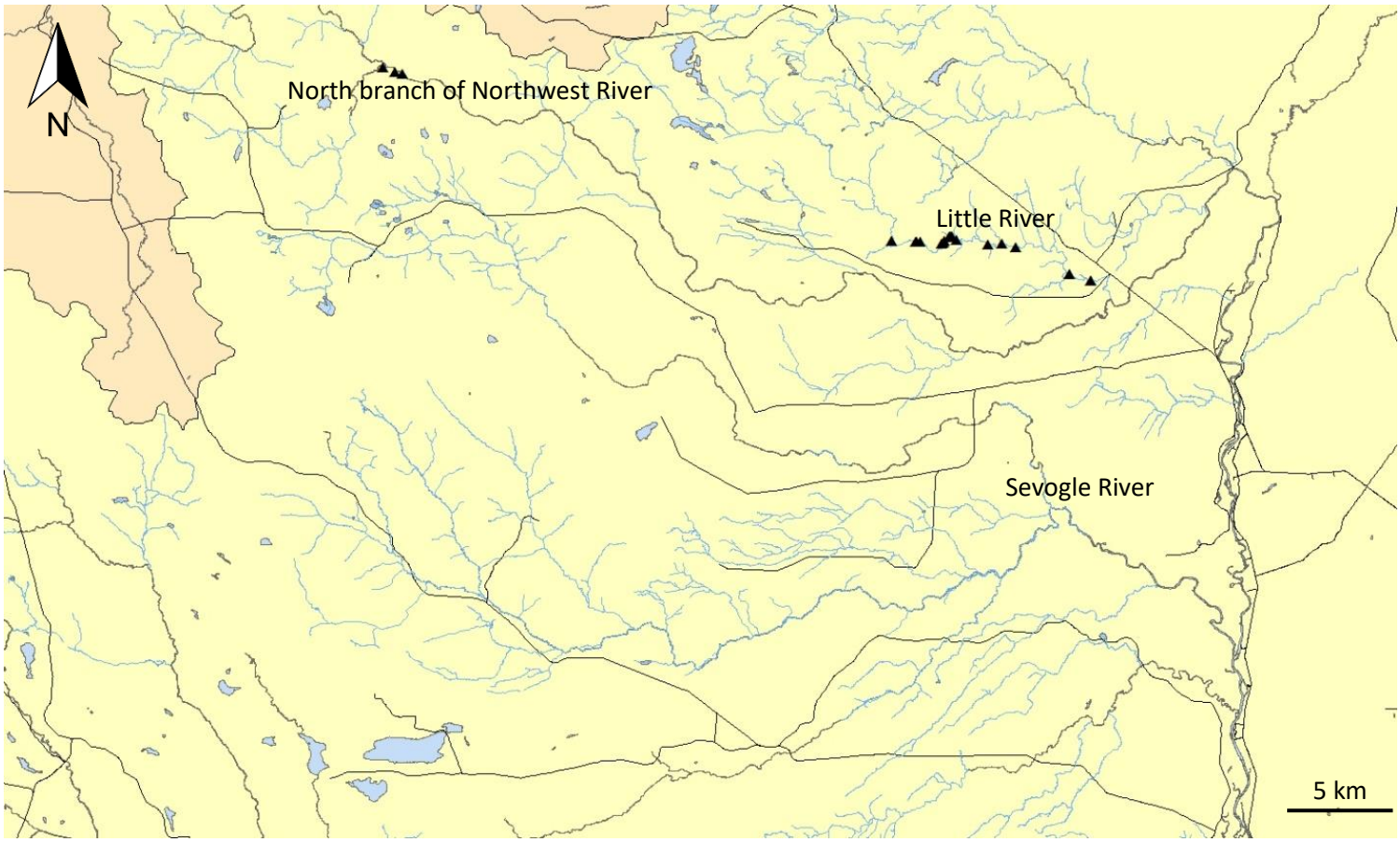

Figure 1: Tributaries of the Northwest Miramichi watershed. Beaver dams breached in 2016 are marked with a '▲'.

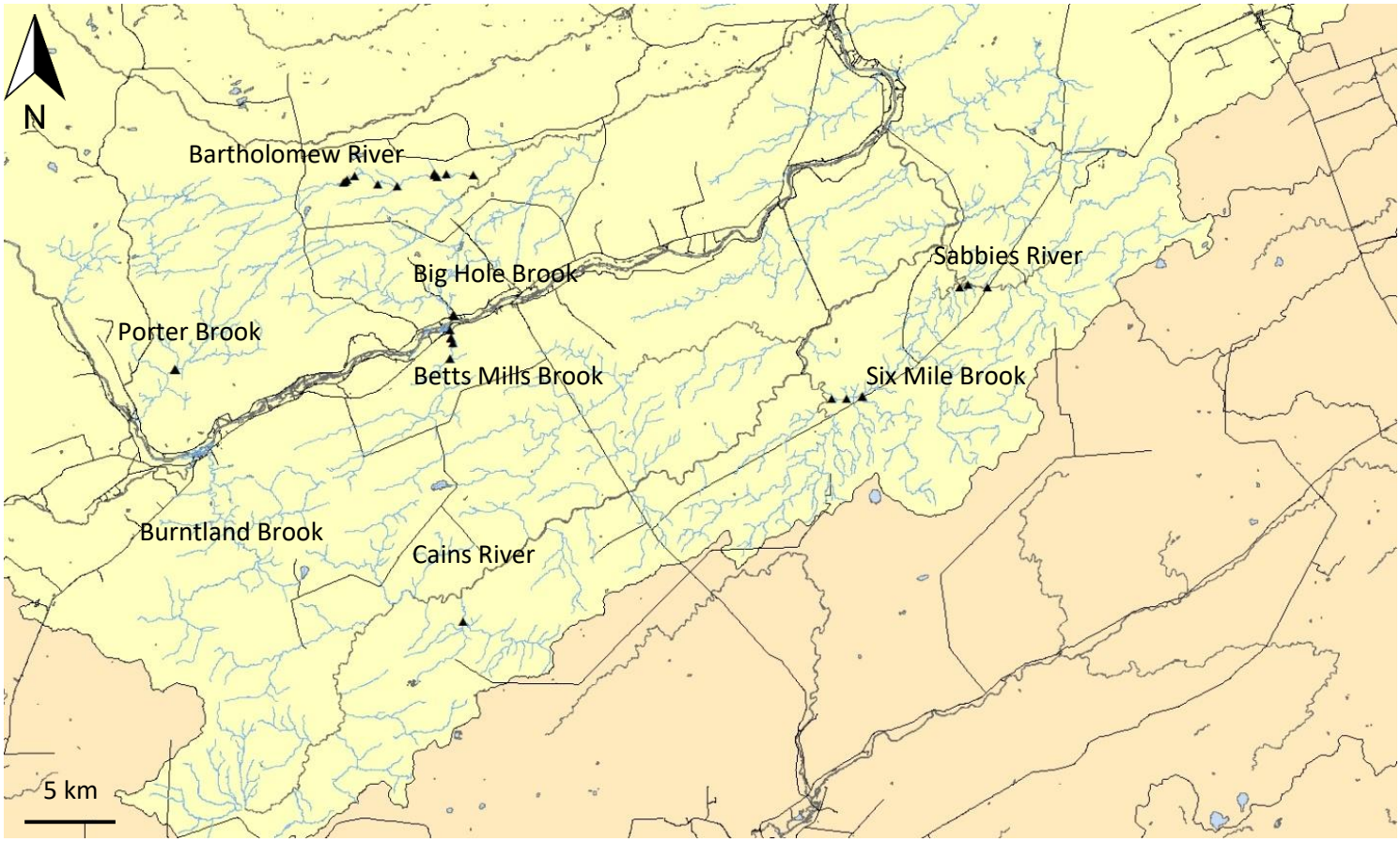

Figure 2a: Tributaries of the Southwest Miramichi watershed. Beaver dams breached in 2016 are marked with a '▲'.

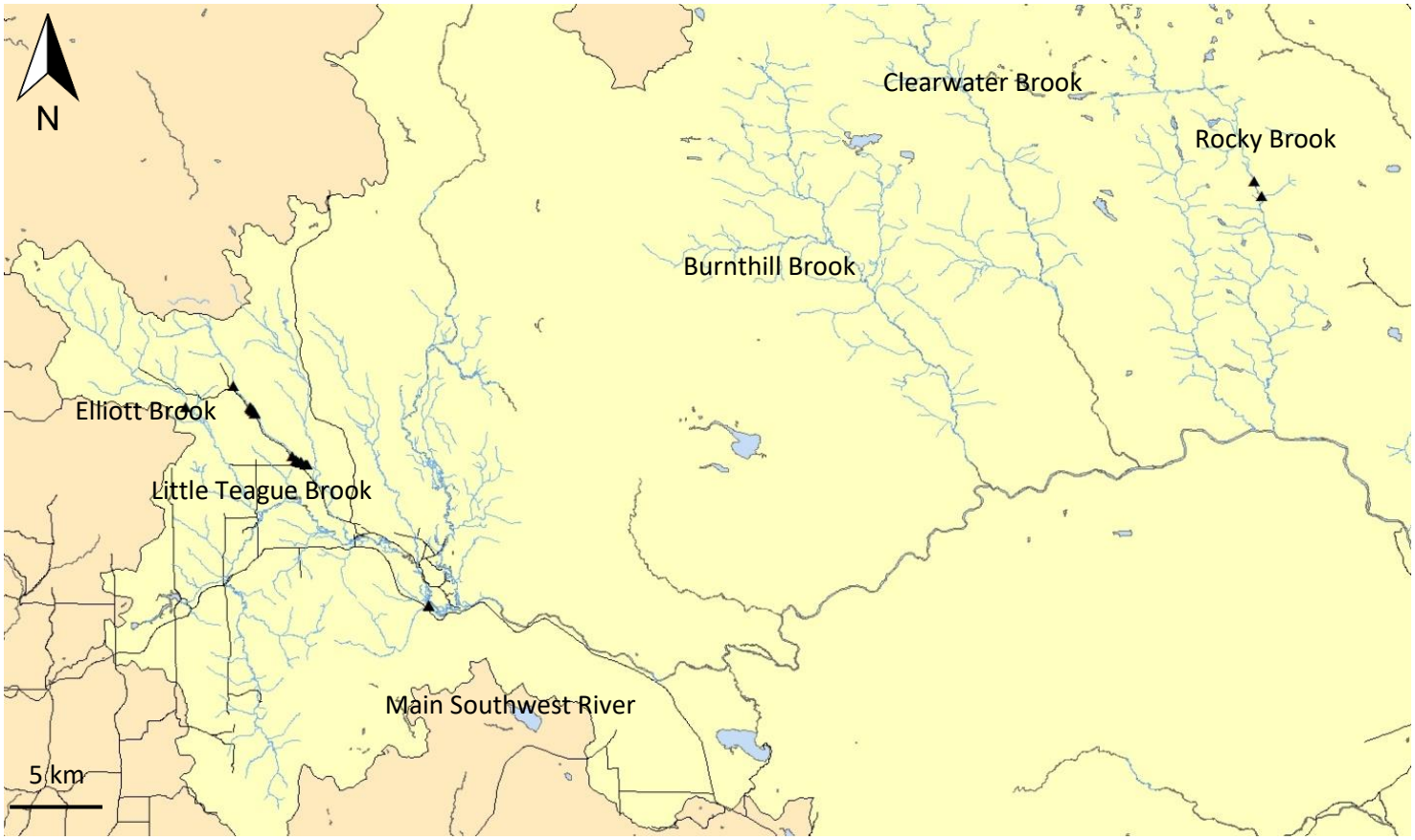

Figure 2a: Tributaries of the Southwest Miramichi watershed. Beaver dams breached in 2016 are marked with a '▲'.

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. Flights paths for 2016 were chosen based on beaver activity locations noted in previous years, and focused on larger and wider tributaries of the Miramichi River which offered more clear line-of-site observations from the air of the dams, and on areas where river access was easy to moderately acceptable for field crews.

A total of 15 dams/obstructions were observed from the air on the Southwest River; the majority of them in the Juniper area on Little Teague Brook. Field crews located 53 dams on the Southwest branch in 2016, with a large number of them on the Bartholomew River, Six Mile Brook, and the Sabbies River, which were not flown because of the difficulty seeing the tributary from the air. Water levels in 2016 were extremely low compared to previous years, and made it difficult to view obstructions from the air, and also limited where crews could canoe sections of rivers. Most dams were accessed on foot, except for those on the Bartholomew River on the Southwest branch and Little River on the Northwest branch.

The number of dams breached in 2016 (76) was more than that of 2015 (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 2016, and is most likely related to the low water levels in 2016 and limited access for field crews.

Although beaver activity was present throughout the watershed, levels of activity varied between river systems. In the Southwest system, Rocky Brook, Salmon Brook, Porter Brook, Burntland Brook, and Muzzeroll Brook all had zero to relatively low levels of beaver activity whereas Elliott Brook, Little Teague Brook, Bartholomew River, Big Hole Brook, Betts Mills Brook, Six Mile Brook, and Sabbies River had higher activity levels. In the Northwest system, the north branch of the Northwest River had low levels of beaver activity, whereas Little River had more dam activity.

Just over a third (38%) of the electrofishing surveys completed in the summer of 2016 by MSA focused on areas upstream of beaver dams removed in 2015; 13 on the Southwest and

1 on the Northwest. This percentage is lower than previous years because of the rain storm in the fall of 2015 that washed out many of the dams. Twelve of these sites had fry present, which were located on the Bartholomew River, Betts Mills Brook, Big Hole Brook, Sabbies River, Otter Brook, and Porter Brook. 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 2017 electrofishing surveys will be conducted upstream of dams breached/removed in 2016 to assess the impact of the program on Atlantic salmon fry production.

Acknowledgements

The Miramichi Salmon Association would like to thank the following people for their help with this program:

- IP/Rocky Brook Camp field crews for their help removing dams on the Southwest Miramichi
- the Miramichi Headwater Salmon Federation (MHSF) for helping coordinate and remove dams in the Juniper area
- J.D. Irving Ltd. for their helicopter donation to conduct aerial surveys on a section of the Southwest Miramichi River from 2013 - 2016
- DFO (RFCPP) for their funding contribution to the project from 2013 - 2016
- Ken Cogswell for his help notching a dam on Gordon Brook

Appendix 1: GPS coordinates of breached beaver dams in 2016.

Date	Tributary	Latitude	Longitude	Active (Y/N)	Initial/Return Visit (I/R)	Breached on Return (Y/N)
11-Oct-16	Big Hole Brook	46.54847	-66.18045	Y	I	N/A
11-Oct-16	Big Hole Brook	46.54813	-66.17915	Y	I	N/A
12-Oct-16	Betts Mills Brook	46.52056	-66.18303	Y	I	N/A
12-Oct-16	Betts Mills Brook	46.53088	-66.18048	Y	I	N/A
12-Oct-16	Betts Mills Brook	46.53364	-66.18233	Y	I	N/A
12-Oct-16	Betts Mills Brook	46.53406	-66.18205	Y	I	N/A
12-Oct-16	Porter Brook	46.51414	-66.43958	Y	I	N/A
12-Oct-16	Porter Brook	46.51405	-66.43916	Y	I	N/A
12-Oct-16	Porter Brook	46.51396	-66.43864	Y	I	N/A
12-Oct-16	Porter Brook	46.51424	-66.43971	Y	I	N/A
12-Oct-16	Rocky Brook	46.71260	-66.64498	Y	I	N/A
12-Oct-16	Rocky Brook	46.70587	-66.64025	Y	I	N/A
13-Oct-16	Betts Mills Brook	46.52047	-66.18303	Y	I	N/A
13-Oct-16	Betts Mills Brook	46.53876	-66.18350	Y	I	N/A
14-Oct-16	Porter Brook	46.51414	-66.43958	Y	R	Y
14-Oct-16	Porter Brook	46.51405	-66.43916	Y	R	Y
14-Oct-16	Porter Brook	46.51396	-66.43864	Y	R	Y
14-Oct-16	Porter Brook	46.51424	-66.43971	Y	R	Y
15-Oct-16	Little Teague	46.58297	-67.25698	Y	I	N/A
15-Oct-16	Little Teague	46.58278	-67.25601	Y	I	N/A
15-Oct-16	Little Teague	46.58350	-67.25948	Y	I	N/A
15-Oct-16	Little Teague	46.58418	-67.26197	Y	I	N/A
15-Oct-16	Little Teague	46.58499	-67.26335	Y	I	N/A
15-Oct-16	Little Teague	46.58660	-67.26568	Y	I	N/A
16-Oct-16	Little Teague	46.58297	-67.25698	Y	R	Y
16-Oct-16	Little Teague	46.58278	-67.25601	Y	R	Y
16-Oct-16	Little Teague	46.58350	-67.25948	Y	R	Y
16-Oct-16	Little Teague	46.58418	-67.26197	Y	R	Y
16-Oct-16	Little Teague	46.58499	-67.26335	Y	R	Y
16-Oct-16	Little Teague	46.58660	-67.26568	Y	R	Y
16-Oct-16	Little Teague	46.60828	-67.29292	Y	I	N/A
16-Oct-16	Little Teague	46.60773	-67.29247	Y	I	N/A
16-Oct-16	Little Teague	46.60705	-67.29154	Y	I	N/A
16-Oct-16	Little Teague	46.60674	-67.29133	Y	I	N/A
16-Oct-16	Little Teague	46.58382	-67.26017	Y	I	N/A
17-Oct-16	Northwest River	47.27195	-66.30905	Y	I	N/A
17-Oct-16	Northwest River	47.27117	-66.30514	Y	I	N/A
17-Oct-16	Northwest River	47.27369	-66.31600	Y	I	N/A
17-Oct-16	Porter Brook	46.51414	-66.43958	Y	R	Y
17-Oct-16	Porter Brook	46.51405	-66.43916	Y	R	Y

Date	Tributary	Latitude	Longitude	Active (Y/N)	Initial/Return Visit (I/R)	Breached on Return (Y/N)
17-Oct-16	Porter Brook	46.51396	-66.43864	Y	R	Y
17-Oct-16	Porter Brook	46.51424	-66.43971	Y	R	Y
18-Oct-16	Betts Mills Brook	46.53876	-66.18350	Y	R	N
18-Oct-16	Big Hole Brook	46.54847	-66.18045	Y	R	Y
18-Oct-16	Big Hole Brook	46.54813	-66.17915	Y	R	Y
19-Oct-16	Little Teague	46.60674	-67.29133	Y	R	Y
19-Oct-16	Little Teague	46.60773	-67.29247	Y	R	Y
19-Oct-16	Little Teague	46.60806	-67.29264	Y	I	N/A
19-Oct-16	Little Teague	46.60563	-67.28988	Y	I	N/A
19-Oct-16	Sabbies River	46.56386	-65.68305	N	I	N/A
19-Oct-16	Sabbies River	46.56578	-65.70041	Y	I	N/A
19-Oct-16	Sabbies River	46.56418	-65.70889	Y	I	N/A
20-Oct-16	Six Mile Brook	46.49436	-65.80048	Y	I	N/A
20-Oct-16	Six Mile Brook	46.49494	-65.80036	Y	I	N/A
20-Oct-16	Six Mile Brook	46.49359	-65.81449	Y	I	N/A
20-Oct-16	Six Mile Brook	46.49337	-65.82835	Y	I	N/A
20-Oct-16	Rocky Brook	46.71260	-66.64498	Y	R	Y
20-Oct-16	Rocky Brook	46.70587	-66.64025	Y	R	Y
21-Oct-16	Gordon Brook	46.35239	-66.17204	Y	I	N/A
21-Oct-16	Elliott Brook	46.60821	-67.33497	Y	I	N/A
21-Oct-16	Little Teague	46.58390	-67.26050	Y	I	N/A
21-Oct-16	Little Teague	46.60586	-67.29026	Y	I	N/A
21-Oct-16	Little Teague	46.60828	-67.29292	Y	R	Y
21-Oct-16	Porter Brook	46.51414	-66.43958	Y	R	Y
21-Oct-16	Porter Brook	46.51405	-66.43916	Y	R	Y
21-Oct-16	Porter Brook	46.51396	-66.43864	Y	R	Y
21-Oct-16	Porter Brook	46.51424	-66.43971	Y	R	Y
21-Oct-16	Big Hole Brook	46.54813	-66.17915	Y	R	Y
21-Oct-16	Betts Mills Brook	46.53876	-66.18350	Y	R	N
22-Oct-16	Clearwater Brook	46.51971	-67.17694	Y	I	N/A
22-Oct-16	Clearwater Brook	46.52000	-67.17684	Y	I	N/A
22-Oct-16	Little Teague	46.60586	-67.29026	Y	R	Y
22-Oct-16	Little Teague	46.61794	-67.30417	Y	I	N/A
22-Oct-16	Little Teague	46.58390	-67.26050	Y	R	Y
22-Oct-16	Elliott Brook	46.60821	-67.33497	Y	R	Y
23-Oct-16	Gordon Brook	46.35239	-66.17204	Y	R	Y
23-Oct-16	Little Teague	46.60586	-67.29026	Y	R	Y
23-Oct-16	Little River	47.20608	-66.02867	Y	I	N/A
23-Oct-16	Little River	47.20587	-66.01493	Y	I	N/A
23-Oct-16	Little River	47.20582	-66.01435	Y	I	N/A
23-Oct-16	Little River	47.20558	-66.01248	Y	I	N/A
23-Oct-16	Little River	47.20493	-66.00022	Y	I	N/A

Date	Tributary	Latitude	Longitude	Active (Y/N)	Initial/Return Visit (I/R)	Breached on Return (Y/N)
23-Oct-16	Little River	47.20545	-65.99905	Y	I	N/A
23-Oct-16	Little River	47.20583	-65.99867	Y	I	N/A
23-Oct-16	Little River	47.20757	-65.99615	Y	I	N/A
23-Oct-16	Little River	47.20768	-65.99582	Y	I	N/A
23-Oct-16	Little River	47.20787	-65.99463	Y	I	N/A
23-Oct-16	Little River	47.20753	-65.99435	Y	I	N/A
23-Oct-16	Little River	47.20643	-65.99175	Y	I	N/A
23-Oct-16	Little River	47.20448	-65.97388	Y	I	N/A
23-Oct-16	Little River	47.20464	-65.96613	Y	I	N/A
23-Oct-16	Little River	47.20343	-65.95858	Y	I	N/A
23-Oct-16	Little River	47.19270	-65.92815	Y	I	N/A
23-Oct-16	Little River	47.19013	-65.91607	Y	I	N/A
24-Oct-16	Little River	47.19270	-65.92815	Y	I	N/A
24-Oct-16	Little River	47.19013	-65.91606	Y	I	N/A
24-Oct-16	Northwest	47.27369	-66.31600	Y	R	Y
25-Oct-16	Gordon Brook	46.35239	-66.17204	Y	R	Y
25-Oct-16	Big Hole Brook	46.54813	-66.17915	Y	R	Y
25-Oct-16	Betts Mills Brook	46.53876	-66.18350	Y	R	N
26-Oct-16	Bartholomew	46.63357	-66.28238	Y	I	N/A
26-Oct-16	Bartholomew	46.63465	-66.28013	Y	I	N/A
26-Oct-16	Bartholomew	46.63535	-66.27827	Y	I	N/A
26-Oct-16	Bartholomew	46.63802	-66.27142	Y	I	N/A
26-Oct-16	Bartholomew	46.63292	-66.25005	Y	I	N/A
26-Oct-16	Bartholomew	46.63132	-66.23227	Y	I	N/A
26-Oct-16	Bartholomew	46.63938	-66.19783	Y	I	N/A
26-Oct-16	Bartholomew	46.63838	-66.19695	Y	I	N/A
26-Oct-16	Bartholomew	46.63740	-66.19482	Y	I	N/A
26-Oct-16	Bartholomew	46.63888	-66.18618	Y	I	N/A
26-Oct-16	Bartholomew	46.63828	-66.16070	Y	I	N/A
26-Oct-16	Porter Brook	46.51414	-66.43958	Y	R	Y
26-Oct-16	Porter Brook	46.51405	-66.43916	Y	R	Y
26-Oct-16	Porter Brook	46.51396	-66.43864	Y	R	Y
26-Oct-16	Porter Brook	46.51424	-66.43971	Y	R	Y
27-Oct-16	Sabbies River	46.56578	-65.70041	Y	R	Y
27-Oct-16	Sabbies River	46.56418	-65.70889	Y	R	Y
02-Nov-16	Rocky Brook	46.75325	-66.69690	Y	I	N/A
10-Nov-16	Gordon Brook	46.35239	-66.17204	Y	R	Y
12-Nov-16	Gordon Brook	46.35239	-66.17204	Y	R	Y
14-Nov-16	Gordon Brook	46.35239	-66.17204	Y	R	Y