

## **Beaver Dam Management Project – 2015**

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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 50,000m<sup>2</sup> 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 helicopter and fixed wing aircraft reconnaissance flights on the Northwest and Southwest Miramichi watersheds to locate and GPS beaver dams. Flight paths for 2015 were determined ahead of time based on last year's results and known beaver activities in given areas. The first flight was done September 17<sup>th</sup> using a fixed wing aircraft that surveyed four tributaries on the Northwest system (Little River, the north branch of the North Sevogle River, the Little Sevogle River, and the Northwest Millstream) and four tributaries on the Southwest system (Bartholomew River, Sabbies River, Six Mille Brook, and Muzzeroll Brook). The second day of flying was done on October 14<sup>th</sup>, using a helicopter, and surveyed ten tributaries on the Southwest system: Burntland Brook, Porter Brook, Salmon Brook, Rocky Brook, Sisters Brook, Clearwater Brook, Burnthill Brook, the south branch of the Main Southwest River, Big Teague Brook, and Elliott Brook.

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 7<sup>th</sup> and finished on

October 28<sup>th</sup>. A small number of active dams were notched on multiple occasions following repairs by beavers.

## Results

In the Northwest Miramichi basin, eight dams were breached by field crews on two tributaries – Little River and the upper Northwest Millstream. On the Little Sevogle River and lower Northwest Millstream, a total of five dams were observed, but they were washed out and required no further breaching (Figure 1). In the Southwest Miramichi basin, 27 dams were breached by field crews on eight tributaries (Bartholomew River, Big Hole Brook, Betts Mills Brook, Salmon Brook, Porter Brook, Big Teague, Little Teague, and Elliott Brook). A further 15 dams were observed on the Bartholomew River, Big Hole Brook, Muzzeroll Brook, Betts Mills Brook, and the East Sabbies River, but these too were washed out and required no further work (Figure 2a&b). Two dams on Little River and one on Porter Brook were breached a second time after beavers had repaired them. A total of 55 dams were breached in 2015; 35 by MSA field staff and 20 by heavy rains that washed the dams away.

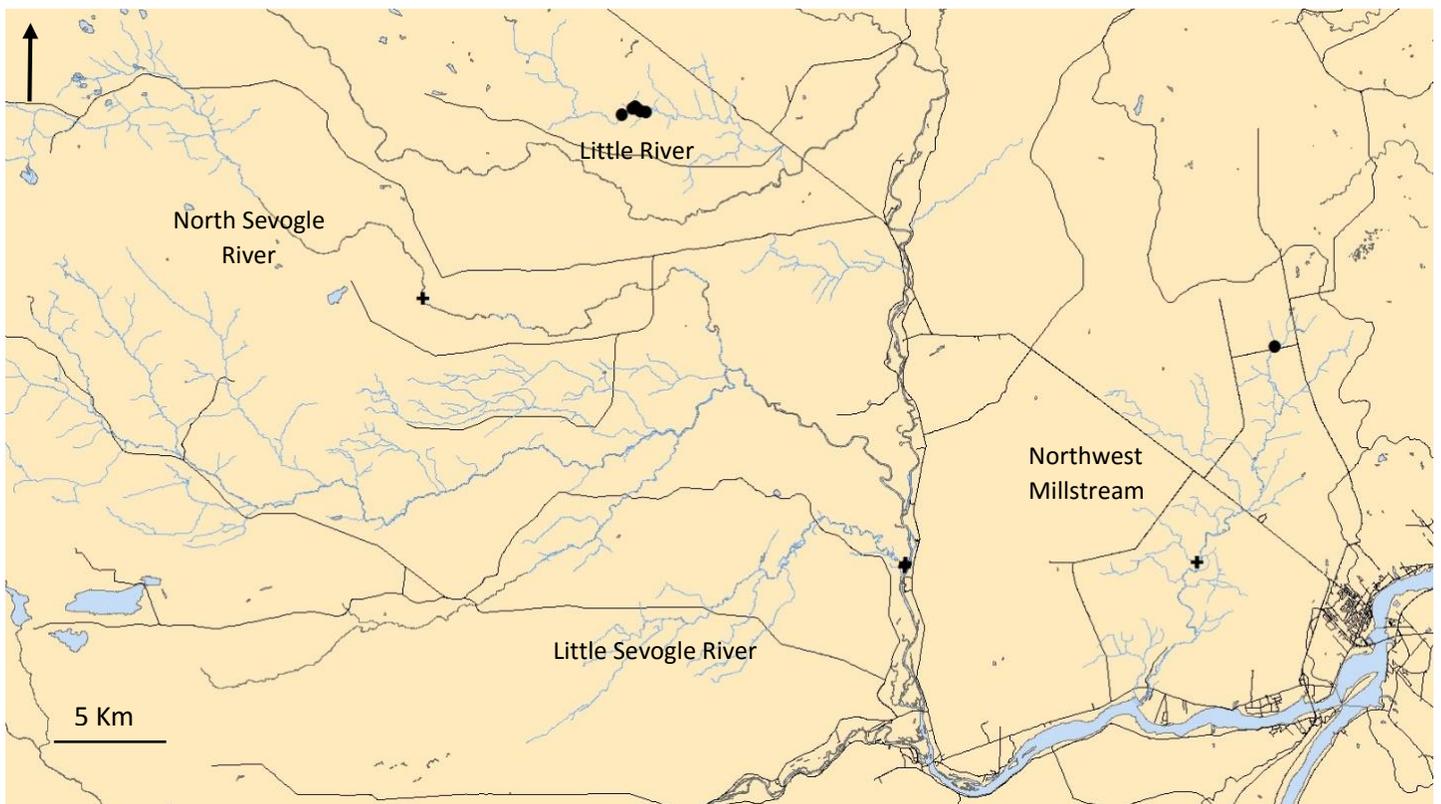


Figure 1: Tributary rivers and streams in the Northwest Miramichi watershed where beaver dam breaching/removal took place in 2015. Dams removed/breached by MSA staff are marked with a “•”. Dams washed out from heavy rains are marked with a “+”.

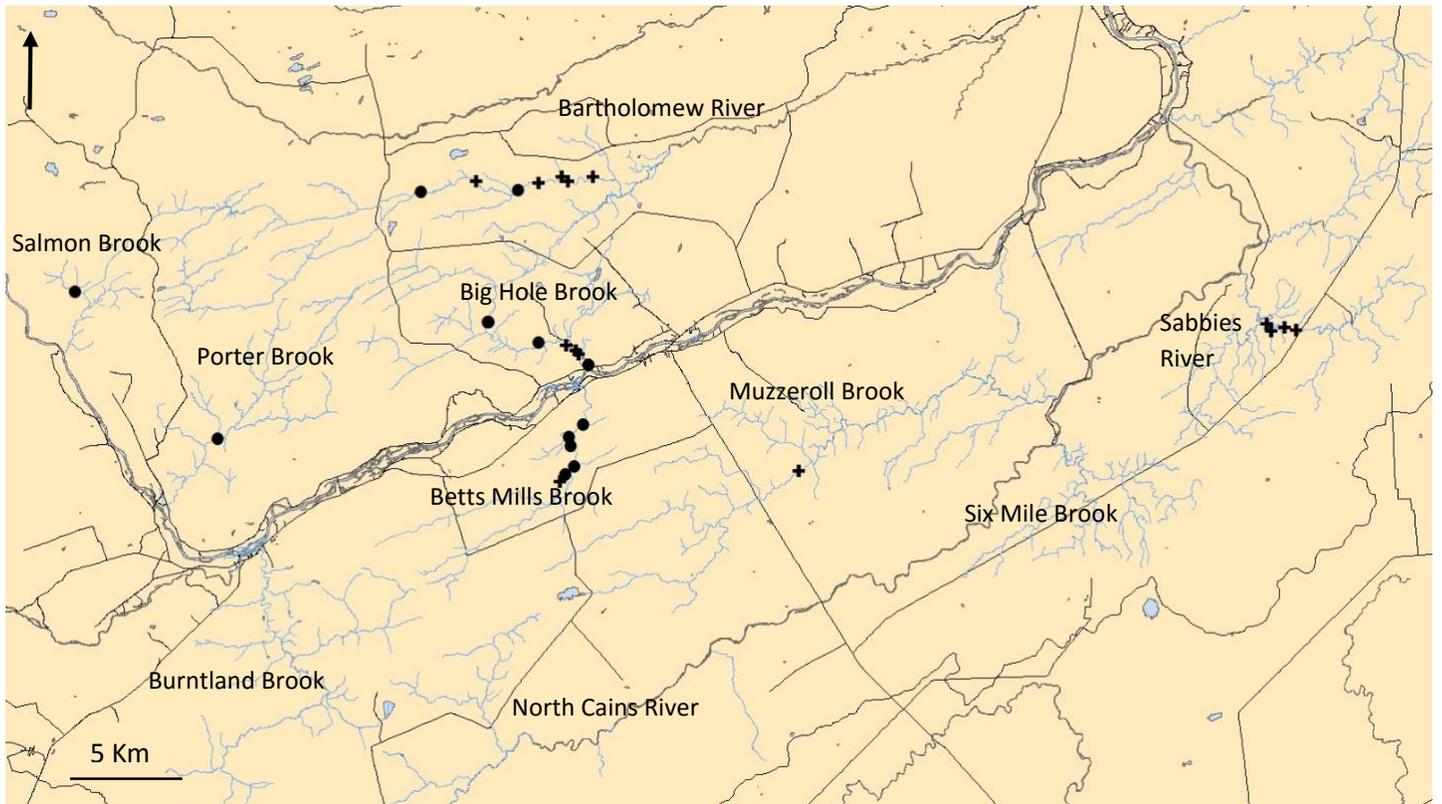


Figure 2a: Tributary rivers and streams in the Southwest Miramichi watershed where beaver dam breaching/removal took place in 2015. Dams removed/breached are marked with a “•”. Dams washed out from heavy rains are marked with a “+”.

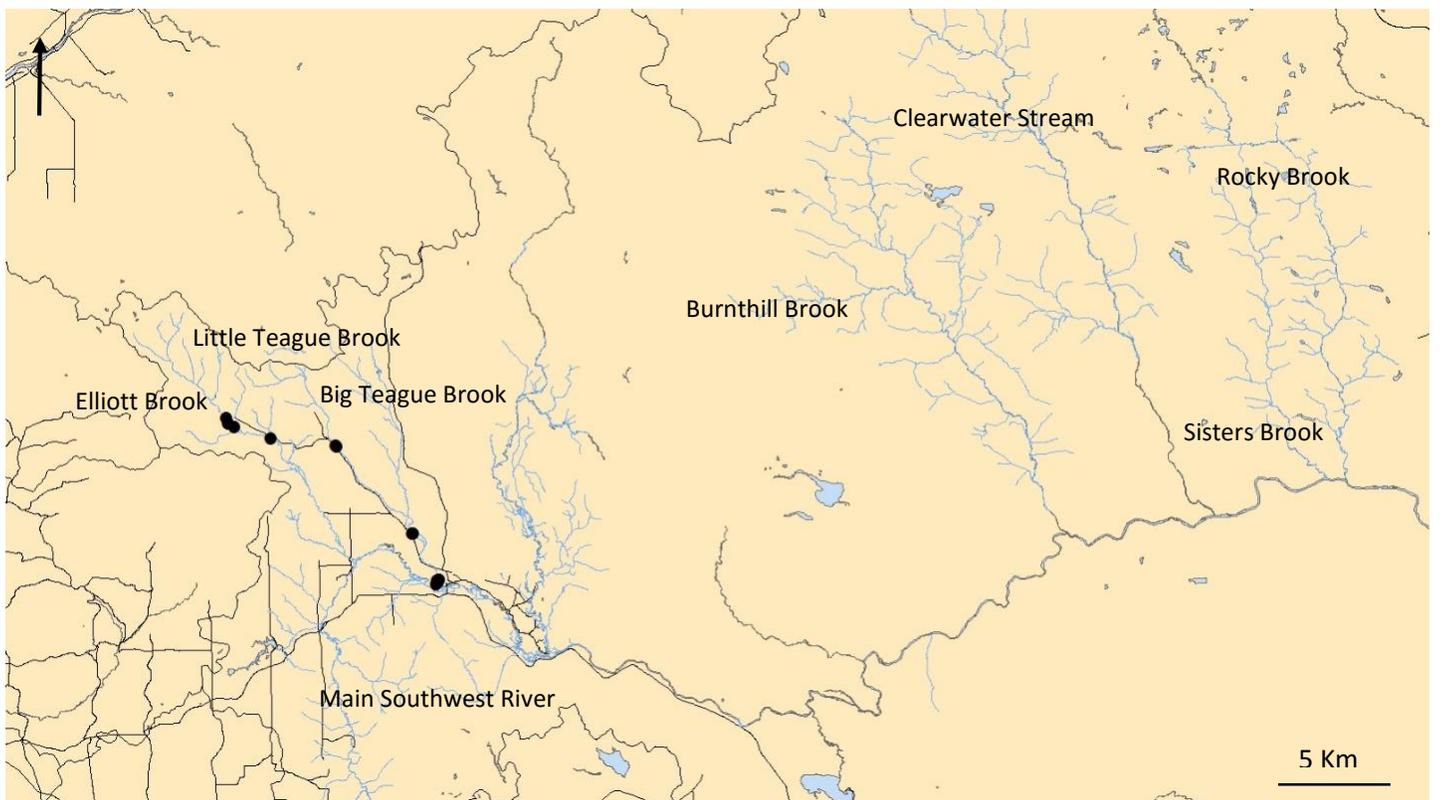


Figure 2b: Tributary rivers and streams in the Southwest Miramichi watershed where beaver dam breaching/removal took place in 2015. Dams removed/breached are marked with a “•”. Dams washed out from heavy rains are marked with a “+”.

## 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. Flight paths for 2015 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. Streams and brooks that are known spawning locations for salmon and have had high beaver activity in past years were not flown and were added to the dam removal list automatically (i.e.: Big Hole Brook, Betts Mills Brook). This method of conducting aerial surveys follows changes made in the 2014 program to try and maximize efficiency from the air by not flying areas that have commonly exhibited beaver activity.

A total of 43 dams/obstructions were observed from the air, however 55 dams were noted by field crews on the ground in 2015. Of the 55, 35 were removed by hand and 20 were washed out. The number of dams breached in 2015 was less than that of 2013 (112) and 2014 (167) because of a large rain storm that occurred on September 30<sup>th</sup> and October 1<sup>st</sup> in which over 140mm of rain fell in less than two days. Several roads and bridges were washed out with this volume of water, and many beaver dams were destroyed, thus reducing the number of dams MSA field staff could locate and therefore breach. The high water levels in 2015 made canoe runs very easy to facilitate down many tributaries. Larger dams that held up to the high water levels were easily visible and breached, whereas dams that were washed out were completely submerged and/or broken apart, which should allow easy access for fish migrating upstream. Salmon were observed on the Bartholomew River, Six Mile Brook, and the Little Sevogle River at the time of breaching.

Although beaver activity was present throughout the watershed, levels of activity varied between river systems. In the Southwest system, Burnthill Brook, Clearwater Stream, Sisters Brook, Rocky Brook, Salmon Brook, Porter Brook, and Burntland Brook all had relatively low levels of beaver activity whereas Elliott Brook, Big Teague Brook, Little Teague Brook, Bartholomew River, Big Hole Brook, and Sabbies Brook had much higher activity levels. In the

Northwest system, the north branch of the North Sevogle River and the Little Sevogle River had low levels of beaver activity and Little River and the Northwest Millstream had higher dam activity.

Over three quarters of the electrofishing surveys completed in the summer of 2015 by MSA focused on areas upstream of beaver dams removed in 2014; 18 on the Southwest and four on the Northwest. Nine of these sites had fry present and were located on Betts Mills Brook, Big Hole Brook, Porter Brook, Muzzeroll Brook, the Main Southwest River in Juniper, the Northwest Millstream, and Little 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 2016 electrofishing surveys will be conducted upstream of dams breached/removed in 2015 to assess the impact of the program on fry production.

## **Acknowledgements**

The Miramichi Salmon Association would like to thank 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 for their helicopter donation to conduct aerial surveys on a section of the Southwest Miramichi River from 2013 - 2015, and DFO (RFCPP) for their funding contribution to the project over the last three years.

Appendix 1: GPS coordinates of breached/removed and washed out beaver dams in 2015.

Date	Site	Latitude	Longitude	Active/Inactive	Washed Out	Return Visit	Breached on Return
07-Oct-15	Little Sevogle	47.023151	-65.835995	UNK	Y	Y	N
07-Oct-15	Little Sevogle	47.024108	-65.835650	UNK	Y	Y	N
07-Oct-15	Little Sevogle	47.024540	-65.835800	UNK	Y	Y	N
10-Oct-15	NW Millstream	47.023826	-65.665233	UNK	Y	N	N/A
12-Oct-15	Little River	47.204830	-66.000170	Y	N	Y	Y
12-Oct-15	Little River	47.207381	-65.993882	Y	N	Y	N
12-Oct-15	Little River	47.207925	-65.991983	Y	N	Y	N
12-Oct-15	Little River	47.207402	-65.991212	Y	N	Y	Y
12-Oct-15	Little River	47.206447	-65.989251	Y	N	Y	N
12-Oct-15	Little River	47.206336	-65.988991	Y	N	Y	N
12-Oct-15	Little River	47.205939	-65.986025	Y	N	Y	N
14-Oct-15	Bartholomew	46.627798	-66.293046	Y	N	N	N
14-Oct-15	Bartholomew	46.637521	-66.257481	UNK	Y	N	N
14-Oct-15	Bartholomew	46.633310	-66.228450	Y	N	N	N
14-Oct-15	Bartholomew	46.636525	-66.214153	UNK	Y	N	N
14-Oct-15	Bartholomew	46.639415	-66.198137	UNK	Y	N	N
14-Oct-15	Bartholomew	46.637345	-66.193488	UNK	Y	N	N
14-Oct-15	Bartholomew	46.639449	-66.176238	UNK	Y	N	N
15-Oct-15	Big Hole Brook	46.570000	-66.249630	y	N	N	N
15-Oct-15	Big Hole Brook	46.570084	-66.249508	Y	N	N	N
15-Oct-15	Big Hole Brook	46.559842	-66.214634	Y	N	N	N
15-Oct-15	Big Hole Brook	46.549240	-66.179800	Y	Y	N	N
15-Oct-15	Big Hole Brook	46.549240	-66.179800	Y	N	N	N
15-Oct-15	Big Hole Brook	46.558602	-66.195183	UNK	Y	N	N
15-Oct-15	Big Hole Brook	46.556058	-66.188325	UNK	Y	N	N
15-Oct-15	Big Hole Brook	46.554216	-66.186349	UNK	Y	N	N
16-Oct-15	Muzzeroll Brook	46.497760	-66.033910	UNK	Y	N	N
17-Oct-15	Betts Mills Brook	46.493080	-66.200117	UNK	Y	N	N
17-Oct-15	Betts Mills Brook	46.496350	-66.196300	Y	N	N	N
17-Oct-15	Betts Mills Brook	46.500350	-66.189700	Y	N	N	N
17-Oct-15	Betts Mills Brook	46.510230	-66.192350	Y	N	N	N
17-Oct-15	Betts Mills Brook	46.514480	-66.193333	Y	N	N	N
17-Oct-15	Betts Mills Brook	46.520500	-66.183717	Y	N	N	N
19-Oct-15	Salmon Brook	46.584630	-66.537550	Y	N	N	N
20-Oct-15	Porter Brook	46.514040	-66.438330	Y	N	Y	Y
21-Oct-15	North Sevogle	47.131850	-66.117240	UNK	Y	N	N
22-Oct-15	East Sabbies	46.563213	-65.686426	UNK	Y	N	N
22-Oct-15	East Sabbies	46.564717	-65.694371	UNK	Y	N	N
22-Oct-15	East Sabbies	46.562960	-65.704003	UNK	Y	N	N
22-Oct-15	East Sabbies	46.566502	-65.707165	UNK	Y	N	N
22-Oct-15	Big Teague	46.552165	-67.230165	Y	N	N	N
22-Oct-15	Big Teague	46.552081	-67.229878	Y	N	N	N
22-Oct-15	Big Teague	46.551752	-67.230921	Y	N	N	N
23-Oct-15	Elliott Brook	46.615594	-67.341997	Y	N	N	N
23-Oct-15	Elliott Brook	46.622433	-67.370073	Y	N	N	N
23-Oct-15	Elliott Brook	46.620990	-67.366187	Y	N	N	N

<b>Date</b>	<b>Site</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Active/Inactive</b>	<b>Washed Out</b>	<b>Return Visit</b>	<b>Breached on Return</b>
23-Oct-15	Elliott Brook	46.624925	-67.371614	Y	N	N	N
24-Oct-15	Little Teague	46.612972	-67.298694	Y	N	N	N
24-Oct-15	Little Teague	46.612626	-67.298435	Y	N	N	N
24-Oct-15	Little Teague	46.573083	-67.247694	Y	N	N	N
24-Oct-15	Little Teague	46.572947	-67.247475	Y	N	N	N
25-Oct-15	Big Teague	46.552050	-67.230019	Y	N	N	N
25-Oct-15	Big Teague	46.550800	-67.230620	Y	N	N	N
25-Oct-15	Big Teague	46.550167	-67.231583	Y	N	N	N
28-Oct-15	NW Millstream	47.044673	-65.636463	Y	N	N	N