

Beaver Dam Management Project – 2014

Miramichi Salmon Association
Recreational Fisheries Conservation Partnership Program

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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

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 2014 were determined ahead of time based on last year's results and known beaver activities in given areas. The first flight was done September 25th using a helicopter and focused on seven tributaries on the Southwest system: Burnthill Brook, Clearwater Stream, Sisters Brook, Rocky Brook, Salmon Brook, Porter Brook, and Burntland Brook. Flights resumed on October 3rd and 6th using a fixed wing aircraft, and focused on nine tributaries on the Southwest system: the south branch of the Main Southwest River, Elliott Brook, Big Teague Brook, Little Teague Brook, Bartholomew River, Muzzeroll Brook, Six Mile Brook, McKinley Brook, and North Cains River, and five tributaries on the Northwest system: Little River, the north branch of the North Sevogle River, Sheephouse Brook, Little Sevogle River, and the Northwest Millstream. 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 8th and finished on October 28th. A small number of active dams were notched on multiple occasions following repairs by beavers.

Results

In the Northwest Miramichi basin, a total of 28 beaver dams were breached on four tributaries - Little River, the North Sevogle, Little Sevogle, and the Northwest Millstream (Fig. 1). In the Southwest system, beaver dam work was carried out on 21 tributaries and 139 dams were breached (Fig. 2a&b). An additional 14 dams in the Southwest basin were breached on second and third occasions. No dams on the Northwest system were breached a second time.

A total of 167 beaver dams were breached in 2014 on 25 tributaries throughout the Miramichi watershed.

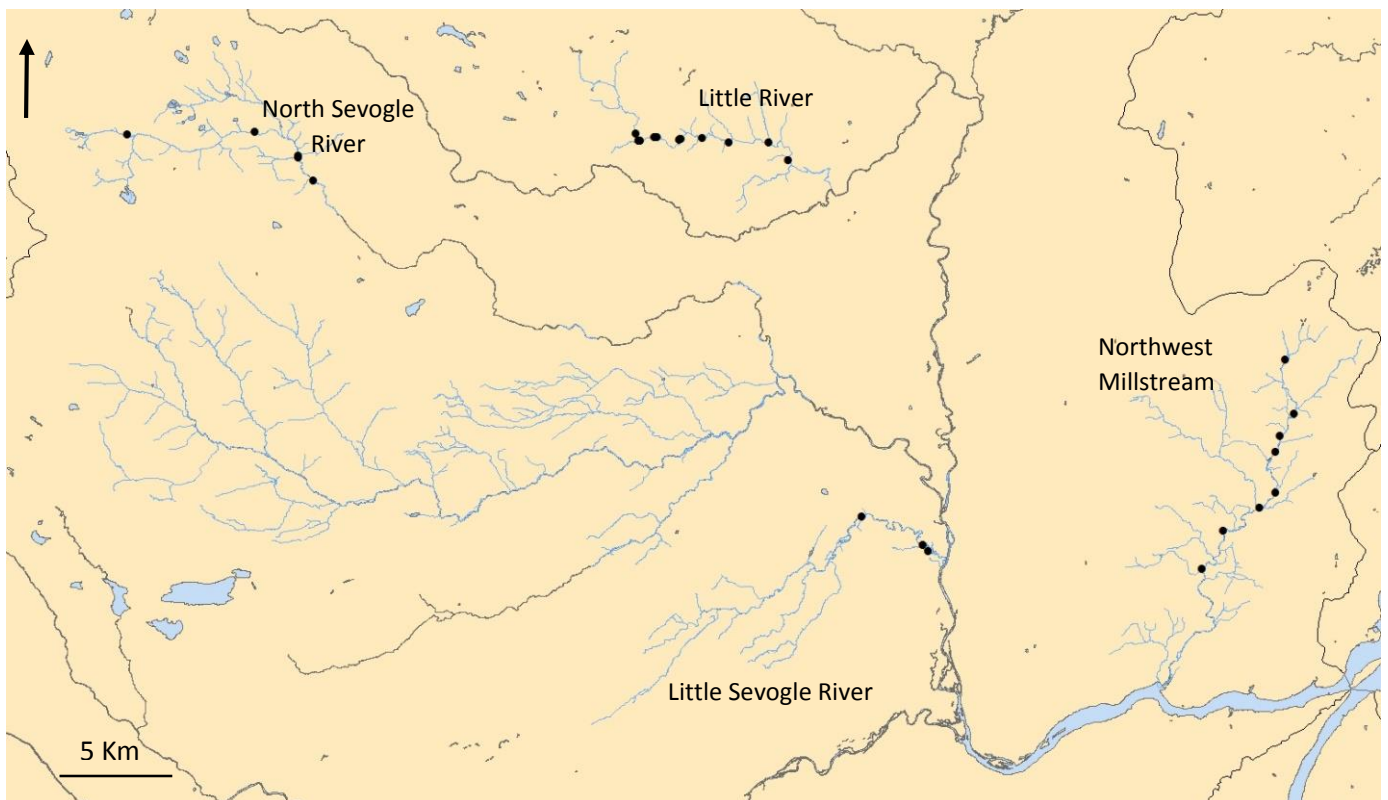


Figure 1: Tributary rivers and streams in the Northwest Miramichi watershed where beaver dam breaching/removal took place in 2014. Dams removed/breached are marked with a “•”.

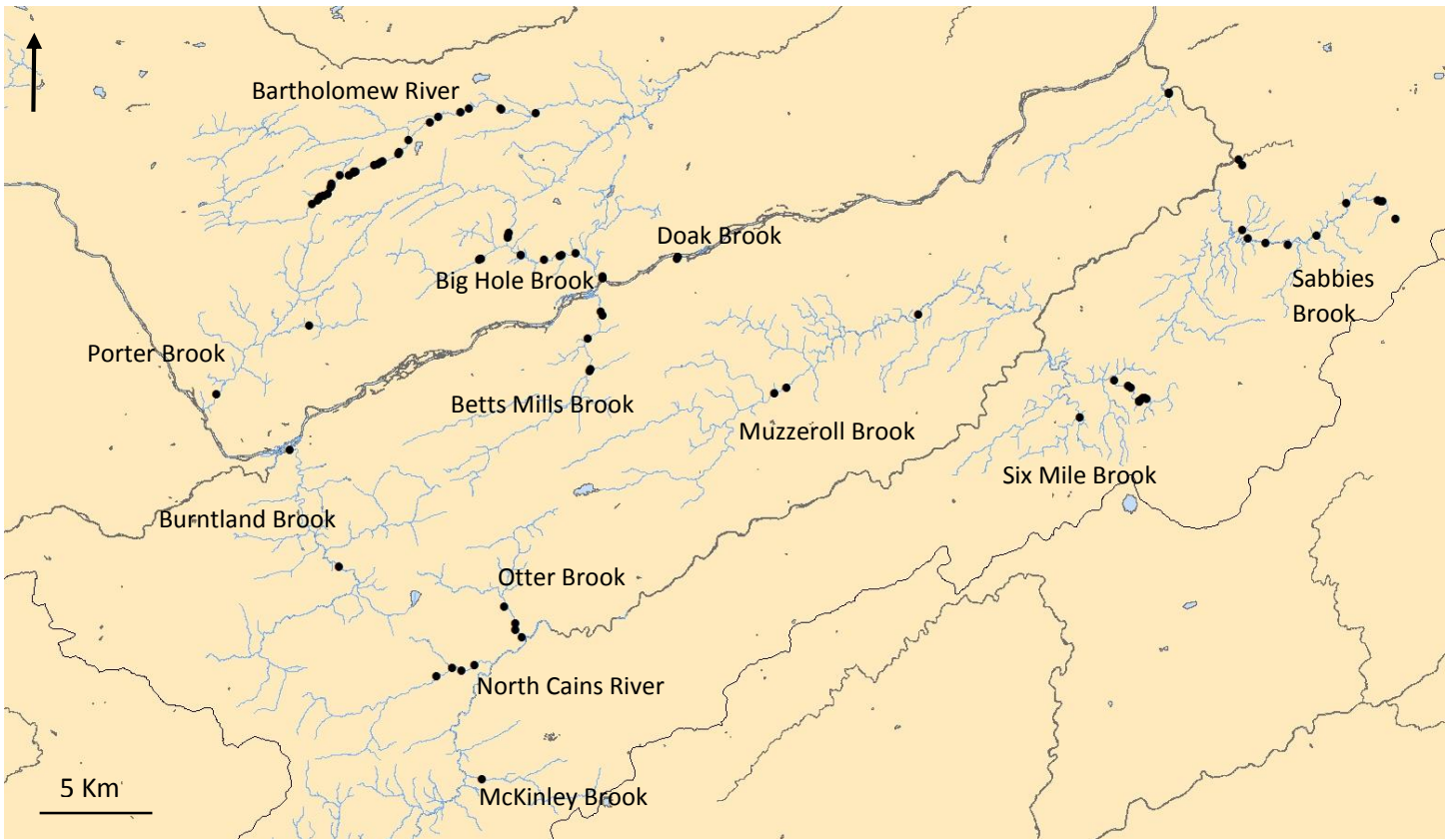


Figure 2a: Tributary rivers and streams in the Southwest Miramichi watershed where beaver dam breaching/removal took place in 2014. Dams removed/breached are marked with a “•”.

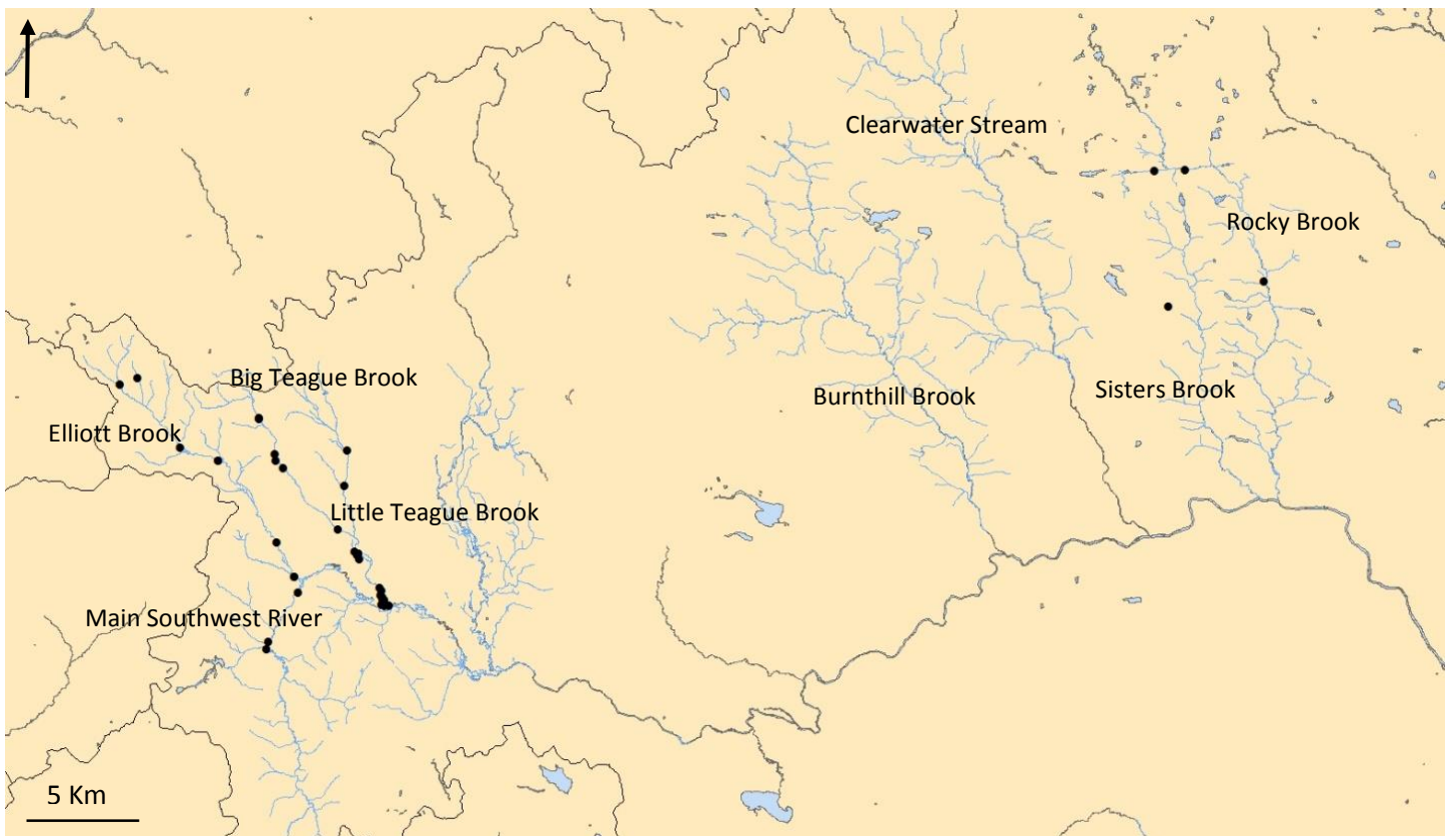


Figure 2b: Tributary rivers and streams in the Southwest Miramichi watershed where beaver dam breaching/removal took place in 2014. Dams removed/breached are marked with a “•”.

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 2014 were chosen based on beaver activity locations noted in 2013, 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). These changes in 2014 presented a decreased number of beaver activities located in aerial surveys (68 dams) compared to 2013 (>100 dams), but field crews were actually more efficient and able to remove more dams in 2014 than in 2013 – 167 compared to 112.

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, Six Mile 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. Dams were most abundant in upstream stretches of tributaries where channel widths are narrow and water is slow flowing.

Water levels in 2014 were low compared to 2013, making access to dams easier, but also increasing the importance of removing as many dams being as possible in high quality spawning areas because salmon returning would have decreased chances of making it up over these obstructions. One dam in particular on Muzzeroll Brook had to be breached on three separate occasions. On the last visit to this site, field crews noted approximately 30 salmon in the area waiting to move upstream. Dams located on Big Hole Brook, Burntland Brook, and Sabbies Brook were also breached a second time.

Over half the electrofishing surveys completed in the summer of 2014 by MSA focused on areas upstream of beaver dams removed in 2013; twelve sites on the Southwest and nine on the Northwest. Ten of these sites had fry present and were located on Big Hole Brook, Porter Brook, Salmon Brook, Six Mile Brook, Little River, Sheephouse Brook, and Little 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 2015 electrofishing surveys will be conducted upstream of dams breached/removed in 2014 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 (MHSE) for helping coordinate and remove dams in the Juniper area, JD Irving for their helicopter donation to conduct aerial surveys on a section of the Southwest Miramichi River in 2013 and 2014, and DFO (RFCPP) for their funding contribution to the project over the last two years.

Appendix 1: GPS coordinates of breached/removed beaver dams in 2014.

Date	Site	Longitude	Latitude	Active/Inactive	# of Return Visits	Breached on Return
08-Oct-14	Doak Brook	-66.12387	46.55867	active		
08-Oct-14	Muzzeroll	-66.04356	46.49157	inactive		
08-Oct-14	Muzzeroll	-66.05246	46.48862	active	4	Yes (3)
08-Oct-14	Porter Brook	-66.39727	46.52424	inactive		
09-Oct-14	Burntland Brook	-66.37610	46.40025	active	1	Yes
09-Oct-14	McKinley Brook	-66.27002	46.29116	active		
12-Oct-14	Big Teague	-67.23078	46.55339	x		
12-Oct-14	Big Teague	-67.22983	46.55189	x		
12-Oct-14	Big Teague	-67.24781	46.57319	x		
14-Oct-14	Bartholomew	-66.39519	46.58640	active		
14-Oct-14	Bartholomew	-66.39137	46.58838	active		
14-Oct-14	Bartholomew	-66.39075	46.58878	inactive		
14-Oct-14	Bartholomew	-66.38975	46.58956	inactive		
14-Oct-14	Bartholomew	-66.38886	46.59018	inactive		
14-Oct-14	Bartholomew	-66.38740	46.59066	active		
14-Oct-14	Bartholomew	-66.38658	46.59074	inactive		
14-Oct-14	Bartholomew	-66.38396	46.59188	inactive		
14-Oct-14	Bartholomew	-66.38132	46.59507	active		
14-Oct-14	Bartholomew	-66.38081	46.59606	active		
14-Oct-14	Bartholomew	-66.38059	46.59671	inactive		
14-Oct-14	Bartholomew	-66.37431	46.60111	active		
14-Oct-14	Bartholomew	-66.36803	46.60106	active		
14-Oct-14	Bartholomew	-66.36797	46.60109	inactive		
14-Oct-14	Bartholomew	-66.36787	46.60110	inactive		
14-Oct-14	Bartholomew	-66.36459	46.60258	inactive		
14-Oct-14	Bartholomew	-66.36441	46.60265	inactive		
14-Oct-14	Bartholomew	-66.36396	46.60289	inactive		
14-Oct-14	Bartholomew	-66.36349	46.60292	active		
14-Oct-14	Bartholomew	-66.36285	46.60305	inactive		
14-Oct-14	Bartholomew	-66.34875	46.60659	inactive		
14-Oct-14	Bartholomew	-66.34647	46.60665	active		
14-Oct-14	Bartholomew	-66.34394	46.60762	inactive		
14-Oct-14	Bartholomew	-66.34255	46.60818	active		
14-Oct-14	Bartholomew	-66.33143	46.61206	inactive		
14-Oct-14	Bartholomew	-66.33038	46.61322	inactive		
14-Oct-14	Bartholomew	-66.32331	46.61928	inactive		
14-Oct-14	Bartholomew	-66.30752	46.62838	active		
14-Oct-14	Bartholomew	-66.30138	46.63131	inactive		
14-Oct-14	Bartholomew	-66.28474	46.63337	active		
14-Oct-14	Bartholomew	-66.27824	46.63531	active		
14-Oct-14	Bartholomew	-66.25504	46.63540	active		
14-Oct-14	Bartholomew	-66.25418	46.63462	active		

14-Oct-14	Bartholomew	-66.22906	46.63284	active	1	Yes
14-Oct-14	Crooked Bridge Brook	-66.27143	46.55792	active	1	Yes
14-Oct-14	Crooked Bridge Brook	-66.27086	46.55821	active	1	Yes
14-Oct-14	Crooked Bridge Brook	-66.27016	46.55825	active	1	Yes
14-Oct-14	Crooked Bridge Brook	-66.26988	46.55839	active	1	Yes
15-Oct-14	Big Hole Brook	-66.19934	46.56083	inactive		
15-Oct-14	Big Hole Brook	-66.17965	46.54906	active		
15-Oct-14	Big Hole Brook	-66.17921	46.54801	active		
15-Oct-14	Big Hole Brook	-66.17970	46.54800	active	2	Yes (2)
15-Oct-14	Big Hole Brook	-66.24876	46.57130	inactive		
15-Oct-14	Big Hole Brook	-66.24957	46.57000	active		
15-Oct-14	Big Hole Brook	-66.25007	46.56926	active		
15-Oct-14	Big Hole Brook	-66.24036	46.56011	active	1	Yes
15-Oct-14	Big Hole Brook	-66.24014	46.56018	active	1	Yes
15-Oct-14	Big Hole Brook	-66.22286	46.55739	active	1	Yes
15-Oct-14	Big Hole Brook	-66.21117	46.55929	inactive		
15-Oct-14	Big Hole Brook	-66.21140	46.55932	inactive		
15-Oct-14	Big Hole Brook	-66.20982	46.56010	active	1	Yes
15-Oct-14	Doak Brook	-66.12334	46.55888	active		
15-Oct-14	Doak Brook	-66.12426	46.55763	active		
15-Oct-14	Little Sevogle	-65.84527	47.02746	inactive		
15-Oct-14	Little Sevogle	-65.84882	47.02989	active	1	No
15-Oct-14	Little Sevogle	-65.88731	47.04232	active	1	No
15-Oct-14	Rocky Brook	-66.64135	46.70102	inactive	2	No
15-Oct-14	Rocky Brook	-66.71530	46.75190	inactive	2	No
15-Oct-14	Rocky Brook	-66.69435	46.75257	inactive	1	No
15-Oct-14	Sisters Brook	-66.70550	46.68960	inactive		
16-Oct-14	Burntland Brook	-66.41197	46.46047	active		
16-Oct-14	Porter Brook	-66.46650	46.48883	active		
16-Oct-14	Salmon Brook (Cains)	-65.70596	46.60674	active	1	Yes
18-Oct-14	East Sabbies	-65.68644	46.56342	active		
18-Oct-14	East Sabbies	-65.69988	46.56606	active		
18-Oct-14	East Sabbies	-65.70395	46.57065	active	1	Yes
18-Oct-14	North Cains	-66.30389	46.34386	active		
18-Oct-14	North Cains	-66.29206	46.34849	active		
18-Oct-14	North Cains	-66.28506	46.34661	active		
18-Oct-14	North Cains	-66.27521	46.34967	active		
18-Oct-14	Northwest Millstream	-65.63708	47.04456	active		
18-Oct-14	Northwest Millstream	-65.67356	47.01865	active		
18-Oct-14	Northwest Millstream	-65.65977	47.03488	active		
18-Oct-14	Otter Brook (Cains)	-66.25311	46.37943	active		
18-Oct-14	Otter Brook (Cains)	-66.24537	46.37101	active	1	No
18-Oct-14	Otter Brook (Cains)	-66.24503	46.36760	active	1	No
18-Oct-14	Otter Brook (Cains)	-66.24025	46.36385	active	1	No
18-Oct-14	Otter Brook (Brophy's)	-65.75720	46.64077	inactive		
18-Oct-14	Otter Brook (Brophy's)	-65.75755	46.64144	inactive		

18-Oct-14	Otter Brook (Brophy's)	-65.75737	46.64147	inactive		
18-Oct-14	Salmon Brook (Cains)	-65.70346	46.60373	inactive		
19-Oct-14	East Sabbies (upper)	-65.59008	46.57538	active		
19-Oct-14	East Sabbies (upper)	-65.59930	46.58420	active		
19-Oct-14	East Sabbies (upper)	-65.60060	46.58429	active		
19-Oct-14	East Sabbies (upper)	-65.60286	46.58482	active		
19-Oct-14	East Sabbies (upper)	-65.62624	46.58343	active		
19-Oct-14	East Sabbies (upper)	-65.64884	46.56706	active		
19-Oct-14	East Sabbies (upper)	-65.67013	46.56260	active		
19-Oct-14	Little River	-66.02790	47.20735	x		
19-Oct-14	Little River	-66.02630	47.20430	x		
19-Oct-14	Little River	-66.02480	47.20452	x		
19-Oct-14	Little River	-66.01580	47.20595	x		
19-Oct-14	Little River	-66.01410	47.20603	x		
19-Oct-14	Little River	-66.00020	47.20492	x		
19-Oct-14	Little River	-66.00000	47.20510	x		
19-Oct-14	Little River	-65.99930	47.20527	x		
19-Oct-14	Little River	-65.98580	47.20560	x		
19-Oct-14	Little River	-65.96910	47.20345	x		
19-Oct-14	Little River	-65.94380	47.20345	x		
19-Oct-14	Little River	-65.93190	47.19577	x		
20-Oct-14	Six Mile	-65.82545	46.47501	active		
20-Oct-14	West Six Mile (upper)	-65.77603	46.48435	x		
20-Oct-14	West Six Mile (upper)	-65.77763	46.48467	x		
20-Oct-14	West Six Mile (upper)	-65.77840	46.48474	x		
20-Oct-14	West Six Mile (upper)	-65.77924	46.48412	x		
20-Oct-14	West Six Mile (upper)	-65.78159	46.48323	x		
20-Oct-14	West Six Mile (upper)	-65.78177	46.48303	x		
20-Oct-14	West Six Mile (upper)	-65.78774	46.48996	x		
20-Oct-14	West Six Mile (upper)	-65.78996	46.49115	x		
20-Oct-14	West Six Mile (upper)	-65.78180	46.48301	x		
20-Oct-14	West Six Mile (upper)	-65.79990	46.49406	x		
21-Oct-14	Betts Mills Brook (Upper)	-66.18947	46.50053	inactive		
21-Oct-14	Betts Mills Brook (Upper)	-66.18872	46.50127	active		
21-Oct-14	Betts Mills Brook (Upper)	-66.19070	46.51703	active		
21-Oct-14	Betts Mills Brook (Upper)	-66.17985	46.52884	inactive		
21-Oct-14	Betts Mills Brook (Upper)	-66.18063	46.53097	active		
21-Oct-14	North Branch North Sevogle	-66.34859	47.20787	x		
21-Oct-14	North Branch North Sevogle	-66.26803	47.20922	x		
21-Oct-14	North Branch North Sevogle	-66.24043	47.19862	x		
21-Oct-14	North Branch North Sevogle	-66.24049	47.19798	x		
21-Oct-14	North Branch North Sevogle	-66.23105	47.18811	x		
22-Oct-14	Northwest Millstream	-65.61950	47.10788	x		
22-Oct-14	Northwest Millstream	-65.61480	47.08495	x		
22-Oct-14	Northwest Millstream	-65.62370	47.07550	x		
22-Oct-14	Northwest Millstream	-65.62650	47.06837	x		

22-Oct-14	Northwest Millstream	-65.62700	47.05103	x		
28-Oct-14	Muzzeroll Brook (lower)	-65.94534	46.52844	active		
Oct 2014	Big Teague	-67.26142	46.58428	x		
Oct 2014	Big Teague	-67.29819	46.61250	x		
Oct 2014	Big Teague	-67.31500	46.63517	x		
Oct 2014	Big Teague	-67.25000	46.57406	x		
Oct 2014	Big Teague	-67.24833	46.57253	x		
Oct 2014	Big Teague	-67.24714	46.57075	x		
Oct 2014	Big Teague	-67.23310	46.55769	x		
Oct 2014	Big Teague	-67.22647	46.54928	x		
Oct 2014	Big Teague	-67.23171	46.55618	x		
Oct 2014	Big Teague	-67.23228	46.55425	x		
Oct 2014	Big Teague	-67.23081	46.55236	x		
Oct 2014	Big Teague	-67.23144	46.54996	x		
Oct 2014	Big Teague	-67.23039	46.54981	x		
Oct 2014	Big Teague	-67.22983	46.54920	x		
Oct 2014	Big Teague	-67.31508	46.63511	x		
Oct 2014	Big Teague	-67.30328	46.61594	x		
Oct 2014	Big Teague	-67.30392	46.61889	x		
Oct 2014	Big Teague	-67.24778	46.57311	x		
Oct 2014	Elliott Brook	-67.29033	46.56231	x		
Oct 2014	Elliott Brook	-67.40850	46.65028	x		
Oct 2014	Elliott Brook	-67.39667	46.65339	x		
Oct 2014	Elliott Brook	-67.36758	46.62128	x		
Oct 2014	Elliott Brook	-67.34222	46.61558	x		
Oct 2014	Elliott Brook	-67.34203	46.61553	x		
Oct 2014	Elliott Brook	-67.29039	46.56225	x		
Oct 2014	Elliott Brook	-67.30225	46.57811	x		
Oct 2014	Little Teague	-67.25707	46.60458	x		
Oct 2014	Little Teague	-67.25558	46.62078	x		
Oct 2014	MSW	-67.30858	46.52878	x		
Oct 2014	MSW	-67.30692	46.53228	x		
Oct 2014	MSW	-67.28781	46.55492	x		