Recreational Fisheries Conservation Partnership Program
2013 Final Report

Miramichi Salmon Association
Beaver Dam Management Project 2013

Alex Parker
Biologist
Miramichi Salmon Association

Introduction

Beaver dams are known to act as barriers to adult Atlantic salmon during upstream spawning migrations, impeding access to habitat in the higher reaches of brooks and streams. Female salmon have been documented to congregate below beaver dams in large numbers, building multiple redds in small confined portions of the stream, at times in habitat of lower quality than that which would otherwise be available. These redds can become overlapped and highly crowded, reducing overall egg survival and negatively impacting the production of juvenile salmon within the stream. The areas of stream rendered inaccessible through damming are typically excellent spawning and juvenile habitat, often of higher quality than would be available in downstream stretches. These areas are generally characterized by a high percentage of gravel and cobble substrate, cold ground feed water, and low densities of large fish and avian predators. After multiple years of habitat blockage, these upstream stretches risk becoming devoid of salmon fry and parr, which over time has the potential to lower the number of stream imprinted adult salmon returning to these locations. Improving access to upstream habitat could have a beneficial effect on egg survival and juvenile production on individual streams, and if completed on multiple streams within a watershed has the potential to increase the total number of returning adult salmon in subsequent years.

In order to achieve maximum benefit from dam breaching efforts, it is important to consider the behaviour changes and movement timing of salmon. Atlantic salmon on the Miramichi River typically begin moving out of holding pools on large river systems to seek out spawning habitat from late September to late October. During this time salmon begin moving into low order streams to establish territory for the creation of redds. As these fish begin migrating into the upstream portions of small lotic systems they are likely to encounter dams on streams with high populations of beavers. Although smaller dams may be overcome during high water flows, large dams act as a barrier to further upstream movement. Active beaver dams are often repaired within a relatively short (<24 hours) time frame, meaning that removal or notching of dams must be aligned with the upstream salmon migration, otherwise the effort and resources required to remove the fish movement barrier could be wasted.

Past initiatives of the Miramichi Salmon Association have shown the potential for beaver dam management as a tool for salmon conservation. Beaver dam notching during the critical salmon run period has had recent success within the watershed, with several examples showcasing improved juvenile recruitment. Prior to 2006 few salmon fry were found on Betts Mills Brook near Doaktown NB despite the construction of a fish ladder at a major highway crossing, a short distance upstream from the brook mouth. In 2006, a major beaver dam that had been blocking the fish ladder was removed, as well as 21 additional beaver dams were notched or removed, and this resulted in adult salmon access to more than 50,000m^2 of spawning habitat. Electrofishing results by the DFO and MSA

revealed the presence of fry in Betts Mills Brook the following year. Additionally, Porter Brook and Big Hole Brook each have high quality salmon habitat and when salmon were able to access spawning habitat upstream of their respective beaver dams, high densities of salmon fry were present during electrofishing surveys the following year.

Providing access to spawning habitat for adult Atlantic salmon will ensure that the Miramichi River maintains strong juvenile production. High numbers of juveniles emigrating to sea has the potential to increased adult salmon returns, improving the prospects of continued conservation of this iconic species and providing the Miramichi outfitters, guides, and local fishermen the highest quality Atlantic salmon fishing in the province.

Methods

In early October of 2013, Miramichi Salmon Association staff flew fixed wing and helicopter reconnaissance flights throughout the Southwest and Northwest Miramichi watersheds to locate and mark tributaries of high beaver activity. Beaver dam locations were marked with Garmin GPS units and mapped using Google Earth in order to plan and coordinate dam management activities. Beginning in mid-October, MSA staff as well as contracted crews started the notching and removal of beaver dams from selected tributaries. Dams were accessed by foot in locations where logistics allowed, otherwise stream portions were canoed in order to access beaver impoundments. All dams management actions were completed by the end of October. A small number of active beaver dams were re-notched on a second occasion following dam repair by beavers.

Results

The first reconnaissance flight for beaver dams was taken September 18th, 2013. During the flight it was determined that water levels within in the river system were too high to allow for high accuracy location of beaver ponds. After water levels subsided to more manageable levels, fixed wing flights were undertaken September 30th and October 1st, and a helicopter flight October 5th, 2013. Beaver dam management initiated October 12th and continued until October 29th, 2013. In the Northwest Miramichi basin 7 tributaries (Fig. 1) were worked on, removing a total of 34 beaver dams. Five of these tributaries including the Northwest Millstream, Catamaran Brook, Little River, Little Sevogle, and Sheephouse Brook contained all 34 active dams which were breached, while portions of the North and South branches of the Sevogle were cleared of dead falls which may have impeded salmon movement. On the Southwest system beaver dam work was completed on 15 tributaries (Fig. 2), including the breaching of 63 individual dams, with an additional 13 active dams being breached on a second occasion. The total number of dams removed was 112 dams on 22 tributaries throughout the Miramichi watershed.

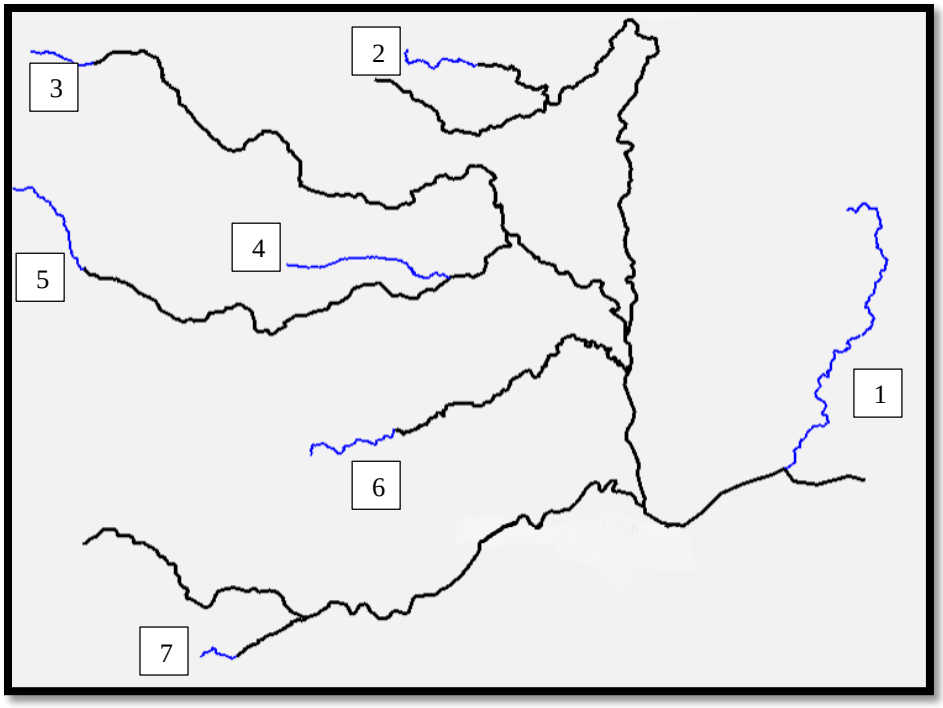

Figure 1. Tributary streams, highlighted in blue, in the Northwest Miramichi watershed in which active beaver dam breaching was undertaken. (In order from 1 to 7: Northwest Millstream, Little River, North Sevogle, Sheephouse, South Sevogle, Little Sevogle, Catamaran Brook)

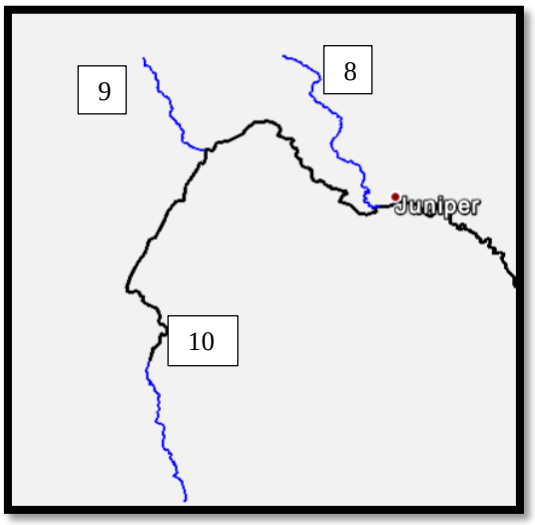

Figure 2. Tributary streams, highlighted in blue, in the headwaters of the Southwest Miramichi watershed in which active beaver dam breaching was undertaken. (In order from 8 to 10: Big Teague, Elliot Brook, South Branch of Southwest Miramichi)

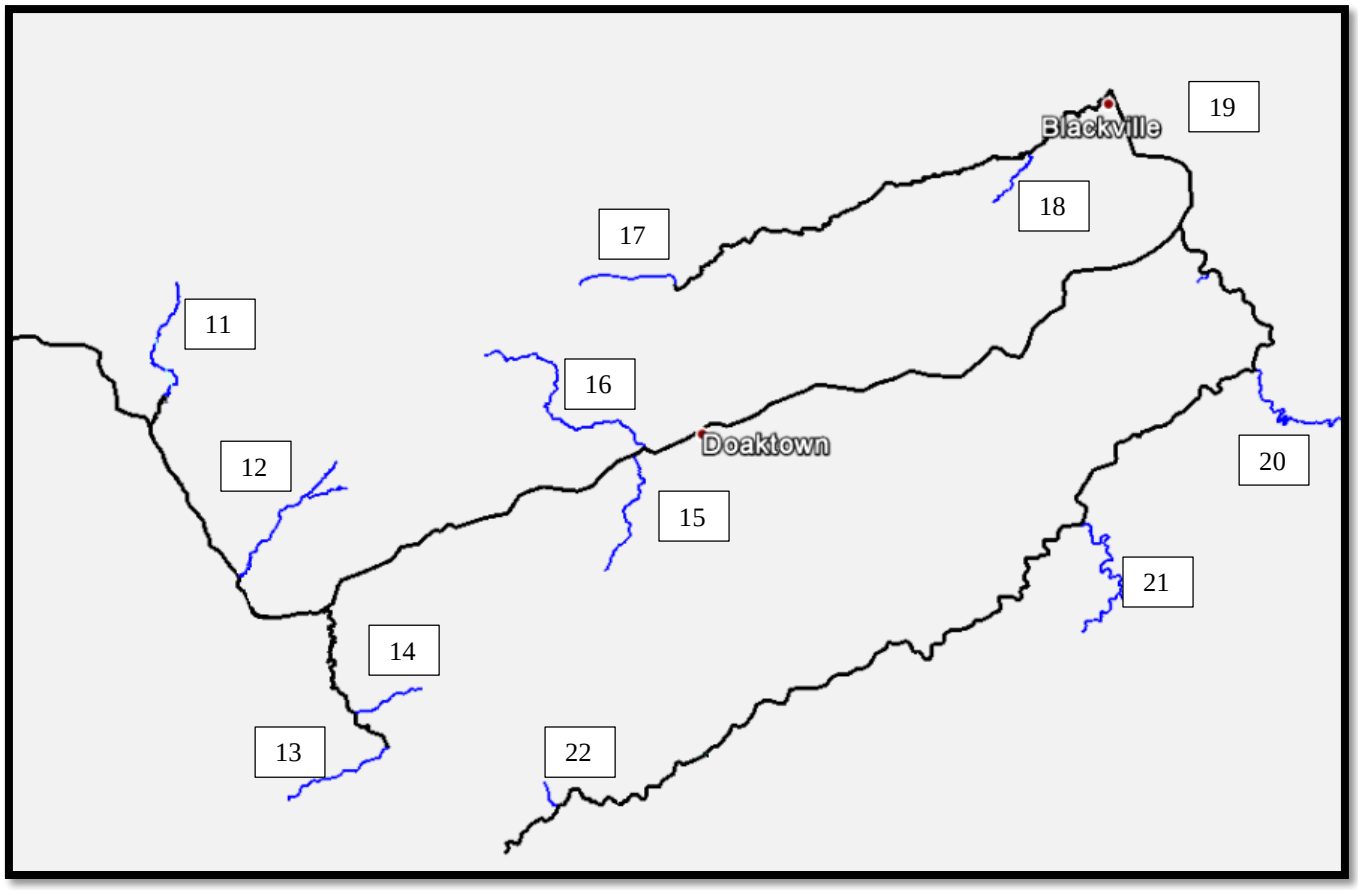

Figure 3. Stretches of tributary streams, highlighted in blue, in the Southwest Miramichi watershed in which active beaver dam breaching was undertaken.

11. Salmon Brook
12. Porter Brook
13. Burntland Brook
14. East Burntland Brook
15. Betts Mill Brook
16. Big Hole Brook,
17. Bartholomew River
18. Otter Brook (Bartholomew)
19. Otter Brook (Cains)
20. Sabbies Brook
21. 6 Mile Brook
22. Lower Otter Brook

Discussion

Aerial surveys throughout the entire watershed revealed a large number of tributaries with high levels of beaver dam impoundment, more than would be possible to remove during the scope of this project. Streams selected for dam breaching were chosen based on suspected quality of stream habitat for Atlantic salmon spawning and rearing purposes, as well as ease of accessibility for field crews. Due to the large scope of this project, both in the number of dams targeted for breaching (>100) and the significant size of the watershed (13,552 km^2), aerial surveys proved extremely valuable for efficient coordination and deployment of available field crews. The quality of data gained from aerial surveys was highly dependent on air craft type and water levels. During our initial flight, high water levels made spotting head ponds above beaver dams difficult, which are typically the best indicator for finding dams. Furthermore, the location of the wings on the plane only accommodated the spotting of dams while banking. All other flights used a push-pull designed plane or a helicopter, both of which allowed for easy viewing, with the helicopter allowing the holding of position over dams for the most accurate GPS coordinates. In past years the MSA has been involved in tributary specific dam breaching activities, which allowed for canoeing entire stretches of a limited number of small streams. This approach would have been in-effective for the 2013 program, as limited man hours would have been allocated to streams which did not require dam breaching activities. As such it is recommended that push-pull or helicopter based aerial surveys continue for the second year of this program.

Although beaver activity was present throughout the entire watershed, the level of activity varied significantly between river systems. The Little Southwest River, Renous River, Clearwater Stream and Burnthill Brook had very low levels of beaver activity within most of their major tributaries. Streams with low beaver activity were often characterized by riparian zones dominated by coniferous tree species (predominately spruce), or by fast flowing runs on steep gradient tributaries such as the North Pole Stream. However, other systems including the Bartibog and Taxis Rivers appeared to have favorable conditions for beaver but lacked evidence of high beaver activity. Activity was most abundant in the upper stretches of tributaries where channel widths were reduced. Stream habitat in these upper stretches was often characterized with slow flowing, low gradient runs surrounded by peat bog, where water acidity would be sub-optimal for salmon egg and juvenile survival. Stream stretches selected for breaching activity typically had gravel and cobble substrate and significant riffle habitat.

High water levels from late July to early October in the Miramichi watershed likely aided upstream migrating adult salmon in overcoming small beaver dams. This was evident on the Bartholomew River, where field crews noted the presence of redds up stream of multiple beaver dams. However, field crews operating on both the Little Sevogle and Elliot Brook observed that salmon holding downstream of beaver dams moved up immediately

following dam breaching. In 2014 efforts will be made to record the number of dams with salmon observed downstream in order to assess the habitat made available for additional spawning, as well as the number of dams with redds or salmon immediately upstream to estimate the number of dams which did not impede upstream migration. In the summer of 2014 electrofishing surveys will be conducted on select streams to assess the impact of the 2013 program on fry production.

Appendix 1. GPS Coordinates of Breached Beaver Dams

Branch	River/Tributary		Lat.	Long.	Comments
Northwest	Northwest Millstream	NMS1	47.11785	-65.64007	
		NMS2	47.11726	-65.64016	
		NMS3	47.11761	-65.64007	
		NMS4	47.11809	-65.63809	
		NMS5	47.12198	-65.63007	
		NMS6	47.12005	-65.62149	
		NMS7	47.10796	-65.61944	
		NMS8	47.09816	-65.62139	
		NMS9	47.07069	-65.62527	
		NMS10	47.08313	-65.61523	
		NMS11	47.05764	-65.62925	
		NMS12	47.10648	-65.62103	
Northwest	Little River	NLR1	47.20698	-65.99281	
		NLR2	47.20396	-65.96815	
		NLR3	47.2076	-65.99612	
		NLR4	47.20624	-66.01759	
		NLR5	47.20602	-66.01553	
		NLR6	47.21243	-66.02724	
		NLR7	47.20422	-66.0263	
		NLR8	47.20734	-66.02777	
		NLR9	47.20173	-66.00571	
Northwest	Little Sevogle	NLS1	46.98526	-66.03356	
		NLS2	46.98754	-66.03274	
		NLS3	46.97728	-66.08926	
		NLS4	46.97679	-66.08749	
		NLS5	46.96933	-66.10909	
		NLS6	46.96691	-66.11916	
		NLS7	46.96787	-66.11655	
Northwest	Catamaran Brook	NCB1	46.85701	-66.16598	
		NCB2	46.86132	-66.1792	

		NCB3	46.85919	-66.18714	
		NCB4	46.8592	-66.18609	
		NCB5	46.85597	-66.19082	
		NCB6	46.86016	-66.18225	
Northwest	Sheephouse Brook	NSB1	47.08324	-66.09134	
		NSB2	47.08361	-66.08967	
		NSB3	47.0848	-66.0851	
		NSB4	47.08501	-66.08466	
Southwest	South Branch Miramichi	SBM1	46.555	-67.28786	
		SBM2	46.565	-67.26086	
		SBM3	NA	NA	Approx. 8km downstream of Foreston
		SBM4	46.54553	-67.25653	
		SBM5	46.52789	-67.30558	
Southwest	Little Teague	SLT1	46.63444	-67.26264	
		SLT2	46.62789	-67.2585	
Southwest	Big Teague	SBT1	46.549	-67.22925	2 Dams at Brook Mouth
		SBT2	46.5647	-67.24219	
		SBT3	46.56542	-67.24117	
		SBT5	46.60483	-67.28942	
		SBT6	46.60555	-67.29058	
		SBT7	46.61553	-67.30194	
		SBT8	46.61903	-67.30444	
		SBT9	46.61298	-67.29844	
Southwest	Elliot Brook	SEB1	46.61559	-67.34337	
		SEB2	46.56178	-67.28925	
		SEB3	46.61728	-67.34658	
		SEB4	46.61436	-67.33708	
Southwest	Salmon Brook	SSB1	46.5915451	-66.546841	Breached on multiple occassions
		SSB2	46.5947247	-66.545345	Breached on multiple occassions
		SSB3	46.6007921	-66.542943	Breached on multiple occassions
		SSB4	46.6152683	-66.53086	Breached on multiple occassions
		SSB5	46.6228359	-66.528261	Breached on multiple occassions
		SSB6	46.6080134	-66.537857	Breached on multiple occassions
		SSB7	46.627414	-66.529929	Breached on multiple occassions
Southwest	Big Hole Brook	SBH1	46.56138	-66.198817	
		SBH2	46.5716865	-66.247676	
		SBH3	46.5769941	-66.243944	
		SBH4	46.5901743	-66.246528	Breached on multiple occassions
		SBH5	46.5934066	-66.257827	Breached on multiple occassions
		SBH6	46.5958481	-66.262052	Breached on multiple occassions
		SBH7	46.5970361	-66.289132	
Southwest	East Burntland Brook	SEBB1	46.4118647	-66.378262	

		SEBB2	46.4194606	-66.350519	
		SEBB3	46.4206815	-66.350389	
Southwest	Burntland Brook	SBB1	46.3932203	-66.361277	Breached on multiple occassions
		SBB2	46.3640774	-66.431442	Breached on multiple occassions
Southwest	Lower Otter Brook	SLO1	46.3618252	-66.241911	
		SLO2	46.3645396	-66.238274	
		SLO3	46.3630526	-66.240047	
Southwest	Porter Brook	SPB1	46.4940696	-66.464845	
		SPB2	46.515828	-66.440195	
		SPB3	46.5132983	-66.434745	
		SPB4	46.5209464	-66.426129	
		SPB5	46.5217297	-66.414206	
		SPB6	46.5315227	-66.415195	
		SPB7	46.5390071	-66.409195	
Southwest	Otter Brook (Cains)	SOBC1	46.6409886	-65.757098	
		SOBC2	46.6413071	-65.757007	
		SOBC3	46.641398	-65.756939	
		SOBC4	46.6416091	-65.756893	
		SOBC5	46.6408168	-65.757066	
Southwest	Betts Mill Brook	SBM1	46.4904481	-66.201343	
		SBM2	46.4978543	-66.19231	
		SBM3	46.5002452	-66.189658	
		SBM4	46.503066	-66.189063	
		SBM5	46.5086045	-66.191482	
		SBM6	46.5136083	-66.193871	
		SBM7	46.5200573	-66.183933	
Southwest	6 Mile Brook	S6M1	46.4536633	-65.856879	
		S6M2	46.4548833	-65.85465	
		S6M3	46.4547242	-65.855285	
		S6M4	46.459023	-65.854104	
		S6M5	46.4593279	-65.853964	
		S6M6	46.4618374	-65.842656	
		S6M7	46.4739453	-65.828549	
		S6M8	46.4831875	-65.828062	
Southwest	Sabbies	SSB1	46.58086	-65.71706	
Southwest	Otter Brook (Bartholomew)	SOBB1	46.69760	-65.89807	
Southwest	Bartholomew	SB1	46.636065	-66.189811	
		SB2	46.637869	-66.166877	
		SB3	46.635932	-66.157994	