DEVELOP HABITAT CONSERVATION PLANS AND RESTORATION FOR RIVERS IN BAY ST. GEORGE 2019

CRABBES RIVER

ROBINSONS RIVER

BAY ST. GEORGE SOUTH AREA DEVELOPMENT ASSOCIATION

ACKNOWLEDGEMENTS

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1.0 INTRODUCTION

The Bay St. George South Area Development Association (BSGSADA) has taken on an active role since early 1990's to assist in restoring and maintaining natural environmental status of watersheds which provide habitat for Atlantic salmon in Bay St. George. This report will look at the success of the developed habitat conservation/improvement plans for two specific rivers in Bay St. George, through habitat inventory and removal of barriers affecting fish passage. Development of Habitat Conservation Plans will involve compiling existing available habitat information, conducting surveys of rivers and tributary streams to compile a current inventory of habitat factors that could or are affecting salmon production on Crabbes and Robinsons River as well as the removal of identified barriers to assist in increasing fish passage.

Atlantic salmon stocks in Bay St. George rivers have several traits that are different than stocks elsewhere in the province of Newfoundland and Labrador. Rivers in Bay St. George have seen a decline in salmon stocks. Although there are many factors that can lead to a decline, this report includes natural and/or manmade obstructions affecting salmon habitat on these rivers. These restoration efforts will not only increase Atlantic salmon spawning habitat but will also increase connectivity among these river systems which will help improve salmon abundance.

Habitat assessment on Crabbes River and Robinsons River was conducted during the months of July, August and September 2019. Under the direction of Project Coordinator Travis Hulan and Field Supervisor Jonah Hulan, crew members collected data and photographed obstructions such as large woody debris (LWD), deteriorating stream bank conditions, siltation and possible sources of pollution. Manmade obstructions/barriers identified include damaged culverts and collapsed bridges affecting fish passage.

This study is important for several reasons, not to mention the time lag of several years since prior habitat restoration was conducted. Salmon populations have been facing many threats in recent year, both at sea and in their spawning rivers. High water temperatures and low water levels were experienced on rivers in Bay St. George during the 2019 season. Poor habitat conditions including obstructions to fish passage further exacerbated the situation for adult migrating salmon.

2.0 METHODOLOGY

Accessible sections of Crabbes River and Robinsons River were studied using topographic maps. Both rivers (including their tributaries) were divided and separated into manageable sections of walking distance. Assessments began at the mouth of each river and proceeded upstream. When an obstruction was located, measurements of length, height, width, plunge depth and water levels were recorded. A minimum of two (2) technicians were required to record measurements.

When a new obstruction was encountered, the distance to the previous obstruction was recorded. This would allow the calculation of habitat positively impacted after each obstruction was removed. Other observations recorded include the percentage of bank erosion and the presence of undercut banks. For each obstruction, comments were made regarding the type of obstruction, a brief description of the placement of the obstruction relative to the stream, possible negative impacts the obstruction may be causing and recommendations on how to properly remove the obstruction.

Materials used to conduct habitat surveys include a Garmin GPS, waterproof camera, waterproof notebooks, measuring tape, meter stick and data forms. Technicians kept dry by wearing chest waders and rain gear during the assessment. Hard hats, safety vest, gloves and protective eyewear were also recommended.

3.0 RESULTS AND DISCUSSION

3.1 Crabbes River

3.1.1 Main Stem

In 2019 a total of 29.5 km was surveyed along sections of Crabbes River and its tributaries. On the main stem, 19 km were surveyed, and no obstructions were observed. Minimal bank erosion was recorded and no other observations of any factors negatively impacting salmon migration. Spawning habitat is less abundant with most suitable areas occurring within the first 10km on Crabbes River.

3.1.2 Little Crabbes

The mouth of Little Crabbes is located roughly 2.0 km off a cabin access road, just before an old railway track (N 48.196426°, W -58.829838°) (Fig 1). Little Crabbes is a major tributary of Crabbes River and a total of 10.5 km was surveyed.

12 obstructions were recorded on Little Crabbes, most of which were identified as large woody debris (LWD). A description of the obstructions recorded are listed in table 1. After surveying Little Crabbes and analyzing the recorded obstructions, two obstructions required immediate attention. Obstruction 6 (N 48.19420°, W -58.81852°) (Fig 19-25), and obstruction 11 (N 48.19044°, W -58.78660°) (Fig 42-45) were removed due to their impact on salmon migration. The remaining obstructions were not posing an actual threat to salmon passage therefore making it more harmful to remove them. In some cases, obstructions provide shelter, food source and habitat for salmon. An example would be obstruction 10 (W 48.19241°, N -58.80455°) (Fig 40-41), where a tree has fallen in the mainstream of the tributary not causing an obstruction to salmon passage but rather providing shelter and food source.

A fair amount of bank erosion was identified on this tributary with a few areas of concern, where the banks appeared to be unstable due to lack of vegetation. Three (3) areas experiencing heavy erosion include (N 48.195087°, W -58.822737°), (N 48.194981°, W -58.821597°), and (N 48.183026°, W -58.764320°). The second location listed (N 48.19481°, W -58.821597°) was remedied by our crew, where seedlings were planted around the eroding banks as an attempt to promote more bank stability.

A description of the obstructions recorded are in Table 1 and photos of the obstructions including removal are in figures 2 to 48.

3.2 Robinsons River

3.2.1 Main Stem

Located northwest of Crabbes River, Robinsons River was the second river surveyed. A total of 15 km was surveyed on the main stem, from the estuary (N 48.250060°, W -58.818646°) upstream. There were no obstructions reported and minimal bank erosion due to the immense

amount of wooded area surrounding the main stem. Despite there being larger amounts of farmland in the area there were adequate buffer zones in place.

3.2.2 Northern Feeder

Northern Feeder is the main tributary on Robinsons River. The mouth of Northern Feeder (N 48.239209°, W -58.708742°) (Fig 52) is located 2.2 km off an old cabin road that is directly opposite to Robinsons turnoff, along route 403 on the TCH. A total of 12 km was surveyed. When Northern Feeder was surveyed, water levels were low, and average air temperature was approximately 25 degrees Celsius.

Eight (8) obstructions were observed (Table 2), most of which were large woody debris (LWD) which have the potential to restrict salmon migration. Despite there being eight (8) obstructions only five (5) were obstructing salmon passage to the point that removal was required. Obstruction 2 (N 48.24019°, W -58.64141°), obstruction 4 (N 48.23866°, W -58.74192°), obstruction 5 (N 48.24024°, W -58.63396°), obstruction 6 (N 48.23651°, W -58.61260°), and obstruction 8 (N 48.23906°, W -58.60662°) were all removed due to their impact on salmon migration (Figs. 55-87). Obstruction 1 (N 48.24019°, W -58.64079°), obstruction 3 (N 48.23944°, W -58.65159°), and obstruction 7 (N 48.23898°, W -58.60681°) were not removed as they were not restricting salmon passage to an extent that required removal. These three (3) obstructions provide great habitat and food source for salmon. A description of the obstructions recorded are included in Table 2 and photos of the obstructions with removal are in figures 50 to 84.

Bank erosion was minimal on Northern Feeder due to large amounts of wooded area surrounding the brook. However, one area of higher erosion (N 48.239219°, W -58.606685°) was reported and has the potential to negatively affect salmon habitat. There were no environmental factors such as effluent or grey water runoff that would potentially negatively impact salmon.

4.0 CONCLUSION

Habitat assessment and obstruction/barrier removal was conducted on sections of two (2) scheduled salmon rivers and their tributaries in Bay St. George; Crabbes and Robinsons River. In total, 29.5km was surveyed on Crabbes River and 27km on Robinsons River.

The 2019 assessment was conducted in the months of July and August. Most obstructions identified were large woody debris including smaller beaver dams. The findings of the assessment were, 12 obstructions on Crabbes River, and eight (8) obstructions for Robinsons River. The obstruction removal was also in 2019, in the months of August and September. Out of the 12 obstructions reported on Little Crabbes two (2) were removed, and out of the 8 reported on Northern Feeder tributary five (5) were removed. The obstructions that weren't removed did not pose an immediate threat to salmon migration as they were identified as partial barriers.

Total in-stream habitat improved for Little Crabbes, tributary of Crabbes River was approximately 1,020.28 m (8,162.24 m^2). Total in-stream habitat improved for Northern Feeder, tributary of Robinsons River was approximately 3,902.62 m (23,415.72 m^2).

The information collected during this assessment will be used to further develop a Habitat Conservation/Improvement Plan for rivers in Bay St. George. Removal of priority obstructions will enable adult Atlantic salmon to migrate successfully to the headwaters of the rivers and reach their spawning grounds.

5.0 RECOMMENDATIONS

Not all obstructions encountered during the 2019 habitat assessment needed to be removed. Although several have the potential to become total barriers, a lot of the fallen trees were still securely attached to the bank which creates bank stability, secures sediment along the bank, reduces erosion and limits siltation on the rivers. A lot of times obstructions less than 75 percent provide important shelter and feeding habitat for juvenile salmonids.

When a river system is clean and well-connected, its salmon population is typically healthy and robust. When a river ecosystem is not clean or well-connected, its salmon population will usually decline. To ensure improved salmon habitat is achieved, it is recommended that habitat assessments be conducted more frequently. The constantly changing river conditions is unpredictable and natural barriers is a constant occurrence. Therefore, making it crucial to conduct habitat assessments on these rivers along with their tributaries.

5.1 Crabbes River

5.1.1 Little Crabbes

Little Crabbes, tributary of Crabbes River, had a few areas of higher erosion that if left untreated have the possibility of causing greater siltation in the area. It is recommended that the areas (N 48.195087°, W -58.822737°), and (N 48.183026°, W -58.764320°) all be reassessed, and proper seedlings/trees be planted if possible, to increase the bank stability in the designated areas. Rock gabions would be another way of helping prevent further erosion on Little Crabbes. There were 12 obstructions reported on this tributary and only two were removed due to their impact on salmon migration. The remaining obstructions were smaller in size but still should be monitored due to the chance of them becoming greater over time.

5.2 Robinsons River

5.2.1 Northern Feeder

Northern Feeder is a waterbody with minimal debris build up. There were eight (8) obstructions reported with five (5) being removed, most of which were large woody debris. Although most obstructions were removed on Northern Feeder, there was one obstruction that should be monitored due to the high amounts of erosion in the area. Obstruction 7 (N 48.23898°, W -58.60662°) (Fig 76-79) was not removed as there was suffice water flow; however, there is increased risk of higher blockages and siltation due to the higher erosion in the area. One area of higher erosion (N 48.239219°, W -58.606685°) was reported and if left untreated has the potential to cause greater erosion overtime, which would result in increased siltation which can impact salmon and their habitat. It is recommended that seedlings/trees be planted along the eroding banks to give greater bank support to combat the immense erosion in the area.

Another alternative solution to help prevent erosion would be to use rock gabions to create support along the deteriorating banks.

5.3 Crabbes River and Robinsons River Main Stem

Another concern that arises regarding salmon habitat is the number of resting/staging pools for migrating salmon in these river systems. Many factors like higher water elevation and passing ice over the colder months have the possibility of restructuring water systems. One way of combating this would be to increase the number of resting/staging pools on a desired river system as an attempt to increase salmon stocks. Crabbes River and Robinsons River could both benefit from pools being placed on the mainstem.

Appendix A

Obstructions on Little Crabbes,

A Tributary of Crabbes River

Table 1: Obstructions on Little Crabbes, a tributary of Crabbes River.

Obstruction #	Obstruction Type	Obstruction Height(m)	Obstruction Length(m)	Obstruction Width(m)	Channel Width(m)	Longitude	Latitude	Bank Erosion (Y/N)	Undercut Banks (Y/N)	Bank Stability (G/F/P)	% of Section Affected	Plunge Depth(m)	Comments
1	LWD	1.5	11	2	5.9	48.19488	-58.82264	Y	N	P	35%	0.7	High erosion causing numerous trees to fall in stream; will result in greater blockage to mainstream.
2	LWD	0.25	6	6	7.6	48.19492	-58.82083	Y	Y	F	65%	0.25	Erosion causing trees to fall across stream bed. Debris getting lodged against trees over time.
3	LWD	1	14	4.6	10	48.19478	-58.82165	Y	Y	F	60%	1	Erosion causing numerous trees to fall across stream bed.
4	LWD	0.3	5.5	2	9	48.19458	-58.81876	Y	Y	F	60%	0.15	Trees fallen due to high erosion. Over time will result in greater blockage to stream flow.
5	LWD	0.6	11	8.7	10	48.19451	-58.81862	Y	Y	P	50%	0.25	Numerous trees fallen due to high amounts of erosion. 50% of stream flow blocked.
6	LWD	3	13	8	7	48.19420	-58.81852	Y	Y	P	75%	0.25	Large amounts of trees fallen due to high erosion. 75% of stream flow blocked.
7	LWD/ BEAVER	1.2	15	9	13	48.19378	-58.81306	N	N	G	60%	0.2	Large amounts of trees fallen due to high erosion. Beaver has built dam along fallen trees. Dam is inactive.
8	LWD	0.8	10	4.2	8	48.19337	-58.81046	Y	Y	P	40%	0.15	Large patch of trees fallen in to mainstream due to high amounts of erosion.
9	LWD/ BEAVER	9	24	11	14	48.19238	-58.80906	N	Y	F	60%	0.5	Beaver has used tree to build large dam causing 60% blockage. Dam is inactive.
10	LWD	2	16.4	2.3	7	48.19241	-58.80455	Y	Y	P	50%	0.25	Large trees fallen in mainstream due to high amounts of erosion.
11	LWD	2.5	20	11	8.5	48.19044	-58.78660	Y	Y	P	75%	0.3	Trees fallen due to high erosion. Causing 75% blockage. Over time will result in higher blockage to mainstream.
12	LWD	1.5	12	13	9.5	48.18909	-58.78472	N	Y	F	60%	0.25	60% blockage caused by large woody debris.

Obstruction Types: Large Woody Debris (LWD), Beaver Dam (BEAVER), and water culvert (CULVERT).

Figure 1: Map of Obstructions on Little Crabbes, a tributary of Crabbes River.

Figure 2: Downstream view of obstruction 1, Little Crabbes.

Figure 3: Side view of obstruction 1, Little Crabbes.

Figure 4: Bank erosion causing obstruction 1, Little Crabbes.

Figure 5: Upstream view of obstruction 2, Little Crabbes.

Figure 6: Side view of obstruction 2, Little Crabbes.

Figure 7: Downstream view of obstruction 2, Little Crabbes.

Figure 8: Looking upstream at obstruction 3, Little Crabbes.

Figure 9: Downstream view of obstruction 3, Little Crabbes.

Figure 10: Sideview of obstruction 3, Little Crabbes.

Figure 11: Showing the erosion that caused obstruction 3, Little Crabbes.

Figure 12: Sideview of obstruction 4, Little Crabbes.

Figure 13: Upstream view of obstruction 4, Little Crabbes.

Figure 14: Closer view of obstruction 4, Little Crabbes.

Figure 15: Looking upstream at obstruction 5, Little Crabbes.

Figure 16: Closer upstream view of obstruction 5, Little Crabbes.

Figure 17: Erosion causing obstruction 5, Little Crabbes.

Figure 18: Downstream view of obstruction 5, Little Crabbes.

Figure 19: Upstream view of obstruction 6, Little Crabbes.

Figure 20: Sideview of obstruction 6, Little Crabbes.

Figure 21: Downstream view of obstruction 6, Little Crabbes.

Figure 22: Closer downstream view of obstruction 6, Little Crabbes.

Figure 23: Looking downstream after sections of obstruction 6 were removed, Little Crabbes.

Figure 24: Closer look at improved area on obstruction 6, Little Crabbes.

Figure 25: Upstream view of improved area on obstruction 6. Remaining parts provide great shelter and food source, Little Crabbes.

Figure 26: Downstream view of obstruction 7, Little Crabbes.

Figure 27: Closer downstream view of obstruction 7, Little Crabbes.

Figure 28: Sideview showing river being diverted due to obstruction 7, Little Crabbes.

Figure 29: Closer view of river being diverted from obstruction 7, Little Crabbes.

Figure 30: Upstream view of obstruction 8, Little Crabbes.

Figure 31: Downstream view of obstruction 8, Little Crabbes.

Figure 32: Sideview of obstruction 8, Little Crabbes. This is a great example of where the obstruction is providing great shade and food source for salmon.

Figure 33: Showing the erosion that caused obstruction 8, Little Crabbes.

Figure 34: Upstream view of obstruction 9, Little Crabbes.

Figure 35: Closer upstream view of obstruction 9, Little Crabbes.

Figure 36: Sideview of obstruction 9, showing the inactive beaver dam, Little Crabbes.

Figure 37: Downstream view of obstruction 9, Little Crabbes.

Figure 38: Closer view looking downstream at obstruction 9. This obstruction provides great shelter for salmon, Little Crabbes.

Figure 39: Looking downstream at obstruction 10, Little Crabbes.

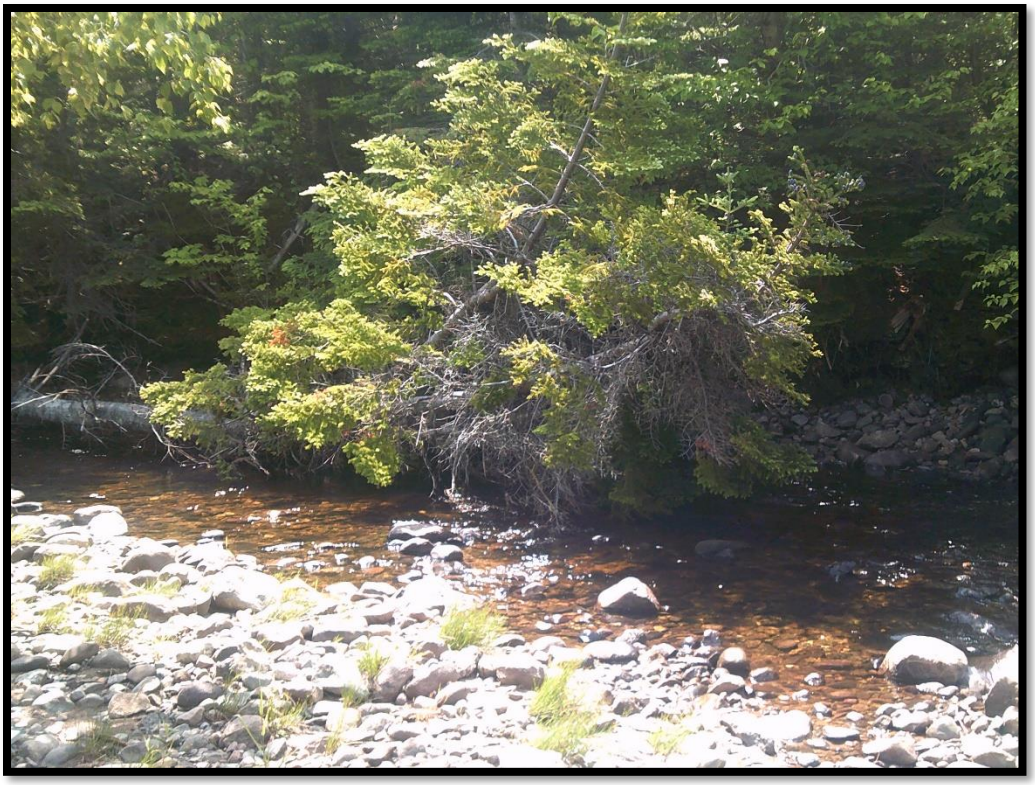

Figure 40: Sideview of obstruction 10, Little Crabbes.

Figure 41: Upstream view of obstruction 10. The trees are providing excellent shelter and food source for salmon, Little Crabbes.

Figure 42: Downstream view of obstruction 11, Little Crabbes

Figure 43: Upstream view of obstruction 11, Little Crabbes.

Figure 44: Downstream view of improved area on obstruction 11. Remaining woody debris acts as a good shelter for salmon, Little Crabbes.

Figure 45: Upstream view of improved area on obstruction 11, Little Crabbes.

Figure 46: Looking upstream at obstruction 12, Little Crabbes.

Figure 47: Closer upstream view of obstruction 12, Little Crabbes.

Figure 48: Sideview of obstruction 12. The fallen trees act as a food source for salmon, Little Crabbes.

Appendix B

Obstructions on Northern Feeder,

A Tributary of Robinsons River

Table 2: Obstructions on Northern Feeder, a tributary of Robinsons River.

Obstruction #	Section #	Obstruction Type	Obstruction Height(m)	Obstruction Length(m)	Obstruction Width(m)	Channel Width(m)	Longitude	Latitude	Bank Erosion (Y/N)	Undercut Banks (Y/N)	Bank Stability (G/F/P)	Percent of Section Affected	Plunge Depth(m)	Comments
1	2	LWD	1	12	5.5	6	48.24019	-58.64079	Y	Y	P	60%	0.25	Trees fallen due to large amounts of erosion. 50% stream blockage.
2	2	LWD	1.9	12	4	4	48.23954	-58.64141	N	N	G	75%	0.25	Trees fallen from high winds causing 75% blockage. Risk of more debris being caught on effected area.
3	2	LWD	0.25	11.5	10	5.5	48.23944	-58.65159	Y	Y	G	40%	0.5	Two trees fallen due to land erosion causing 60% blockage to stream flow.
4	2	LWD	1.1	14	7	7	48.23866	-58.74192	N	N	G	75%	0.5	Large amounts of trees built up from higher water elevation. 75% blockage to stream flow.
5	3	LWD	1.1	9.5	1.6	5.3	48.24024	-58.63396	Y	N	G	80%	0.25	Large amounts of woody debris caused by land erosion.
6	3	LWD	1.3	12	4	6.7	48.23651	-58.61260	N	N	G	70%	0.5	Woody debris and larger trees washed down mainstream causing a 70% obstruction to stream flow.
7	3	LWD	2	8	8	8	48.23898	-58.60681	Y	Y	P	60%	0.5	Large amounts of trees fallen due to high erosion. Debris and smaller trees are continuing to wash down stream into blockage.
8	3	LWD	1.4	6.6	5.3	4.6	48.23906	-58.60662	N	Y	F	80%	0.5	Tree washed down river due to higher water elevation. More debris continues to flow down stream causing greater blockages.

Obstruction Types: Large Woody Debris (LWD).

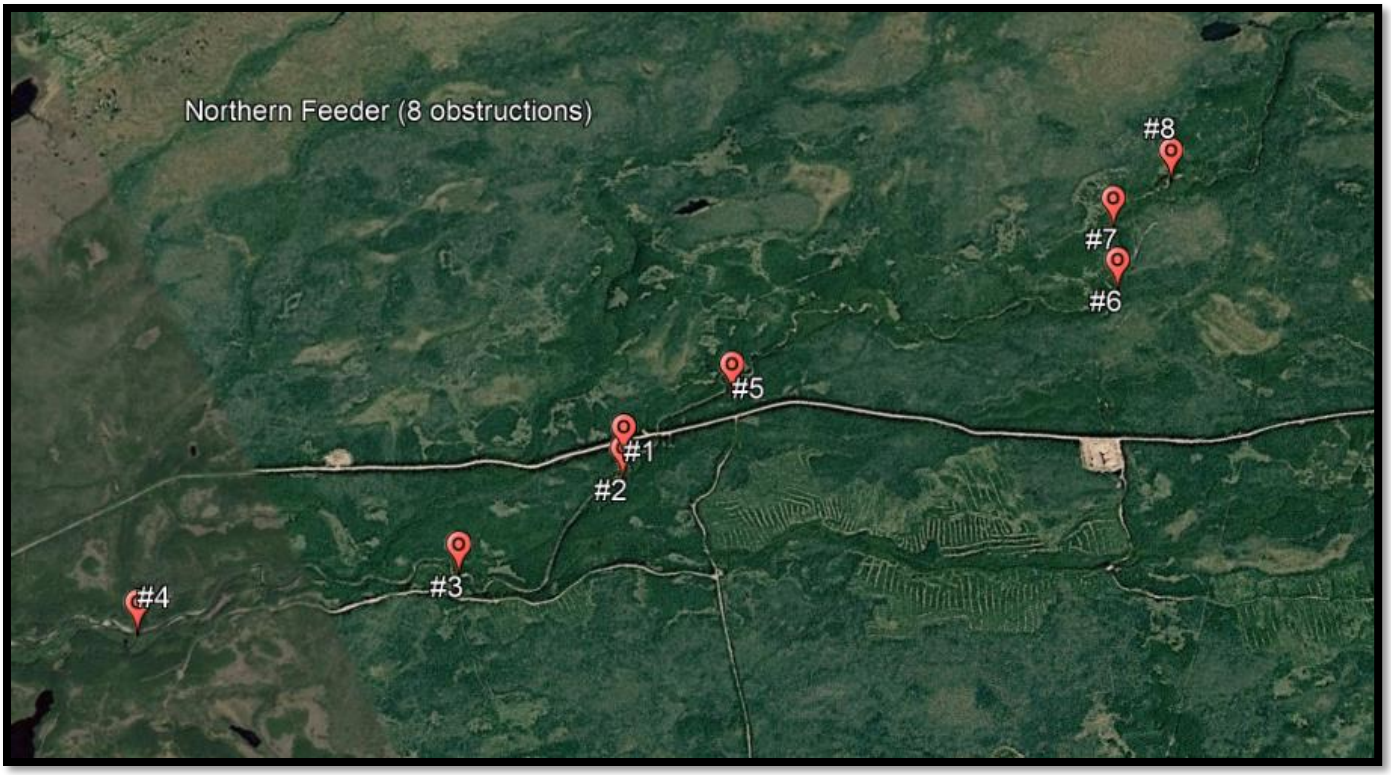

Figure 49: Map of Obstructions on Northern Feeder, a tributary of Robinsons River.

Figure 50: Side view of obstruction 1, Northern Feeder.

Figure 51: Looking at the erosion that caused obstruction 1, Northern Feeder.

Figure 52: Downstream view of obstruction 2, Northern Feeder.

Figure 53: Closer downstream view of obstruction 2, Northern Feeder.

Figure 54: Downstream view of improved fish passage from obstruction removal, Northern Feeder.

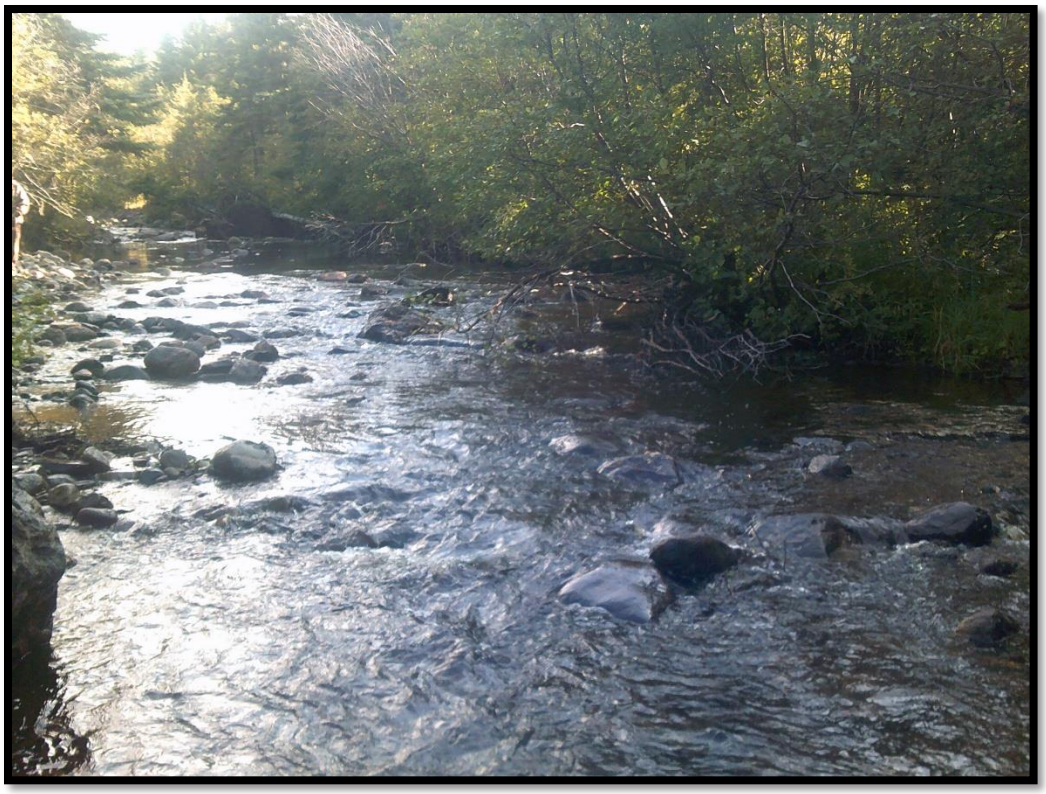

Figure 55: Upstream view of improved habitat after obstruction removal, Northern Feeder.

Figure 56: Sideview of obstruction 3, Northern Feeder.

Figure 57: Upstream view of obstruction 3, Northern Feeder.

Figure 58: Sideview of obstruction 3. Tree provides great shelter for salmon, Northern Feeder.

Figure 59: Downstream view of obstruction 4, Northern Feeder.

Figure 60: Sideview of obstruction 4, Northern Feeder.

Figure 61: View of debris removed from obstruction 4, Northern Feeder.

Figure 62: Downstream view of improved habitat after obstruction 4 removal, Northern Feeder.

Figure 63: Upstream view of improved habitat after obstruction 4 removal, Northern Feeder.

Figure 64: Looking upstream at obstruction 5, Northern Feeder.

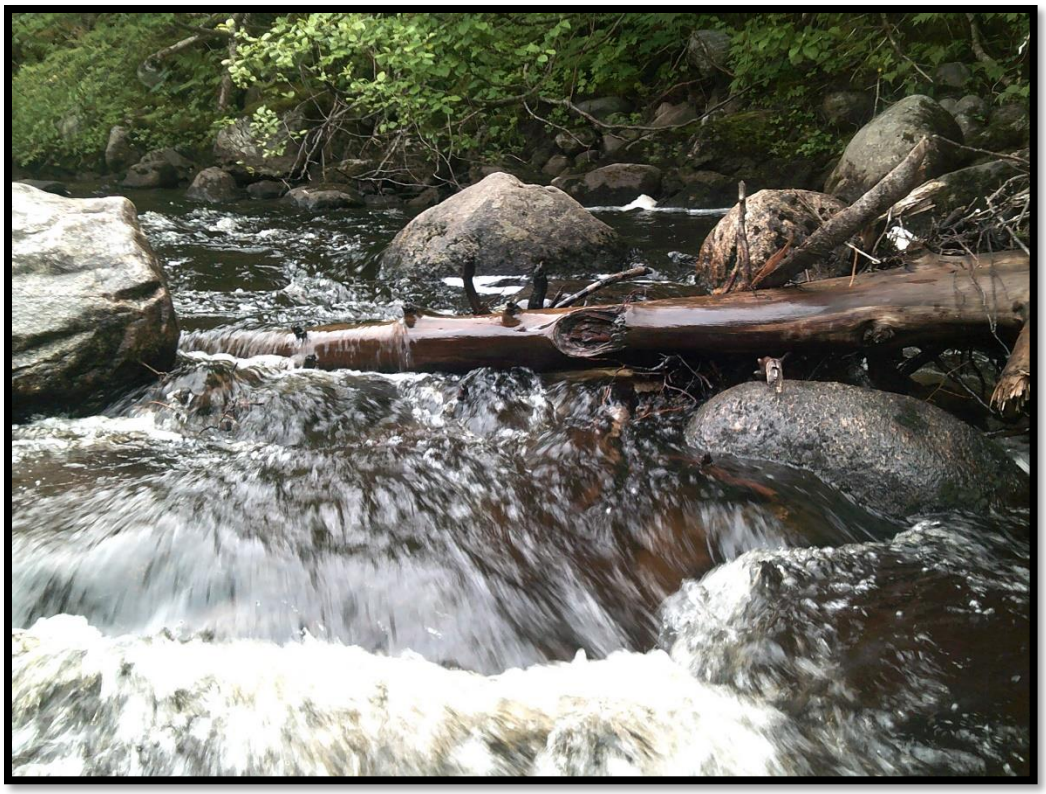

Figure 65: Closer upstream view of obstruction 5, Northern Feeder.

Figure 66: Sideview of obstruction 5, Northern Feeder.

Figure 67: Downstream view of obstruction 5, Northern Feeder.

Figure 68: View of debris removed from obstruction 5, Northern Feeder.

Figure 69: Upstream view of improved area after removal on obstruction 5, Northern Feeder.

Figure 70: Downstream view of improved area after removal of obstruction 5, Northern Feeder.

Figure 71: Downstream view of obstruction 6, Northern Feeder.

Figure 72: Looking upstream at obstruction 6, Northern Feeder.

Figure 73: Debris removed from obstruction 6, out of the flood zone area, Northern Feeder.

Figure 74: Looking downstream at improved area on obstruction 6, Northern Feeder.

Figure 75: Upstream view of improved fish passage, Northern Feeder.

Figure 76: Downstream view of obstruction 7, Northern Feeder.

Figure 77: Sideview of obstruction 7. Water depth is greater here with lots of flow underneath. This is an excellent example of shelter and food source, Northern Feeder.

Figure 78: Overhead view of obstruction 7, Northern Feeder.

Figure 79: Showing the erosion that caused obstruction 7, Northern Feeder.

Figure 80: Looking downstream at obstruction 8, Northern Feeder.

Figure 81: Closer look at obstruction 8, Northern Feeder.

Figure 82: Upstream view of obstruction 8, Northern Feeder.

Figure 83: Looking upstream at improved salmon passage, Northern Feeder.

Figure 84: Downstream view of improved area on obstruction 8, Northern Feeder.