



# 2017-2018 FINAL REPORT

NEW BRUNSWICK WILDLIFE TRUST FUND

NASHWAAK WATERSHED ASSOCIATION INC.

1 MARCH 2018

## 2017-2018 FINAL REPORT

### PROJECT NAME:

Assessing and Restoring the Connectivity of the Nashwaak Watershed

### EXECUTIVE SUMMARY

The Nashwaak Watershed Association Inc. (NWA) received \$6,000 from the NB Wildlife Trust Fund in the 2017-2018 fiscal year for our aquatic connectivity project. Match funding was provided by the Atlantic Salmon Conservation Foundation. The project deliverables were as follows: 1) conduct a preliminary field survey of at least 50 culverts in the lower watershed, 2) prioritize them for remediation in terms of barriers to fish, 3) produce an aquatic connectivity map of the watershed, and 4) begin to remediate priority culverts, using a local hydraulic engineering company's expertise as a guide.

The objectives of the project were met and surpassed. All deliverables were completed within the time frame of the grant; however, the project was set up to be a multi-year project. Therefore, the deliverables will carry over into the 2018-2019 field season and beyond.

The grant allotted from the Wildlife Trust Fund was approximately half of what we had initially requested, which required a scope reduction for the WTF-funded part of the project. No permits were required for the field survey. We will submit a WAWA application in the winter/spring of 2018 for our first large remediation project.

We believe that the project had, and will continue to have, the intended socio-economic and environmental impacts. By remediating culverts, we have facilitated fish passage through these barriers and increased the amount of available upstream aquatic habitat for migratory fish, especially Species of Concern such as the Endangered Atlantic salmon.

### IMPORTANCE

Significant urbanization has occurred in the lower Nashwaak watershed in the last decade, leading to an increase in roads and associated stream crossings. Poorly designed, installed, or maintained culverts can restrict Endangered Atlantic salmon from reaching upriver spawning habitat, feeding grounds, or cold-water refuges, which can have significant impacts on their populations. A single culvert acting as a barrier can restrict fish from accessing several kilometres, or more, of important upstream habitat.

Additionally, culverts can change water velocity, river hydrology, and become blocked with debris causing flooding and costly damage to infrastructure. Habitat fragmentation is a prolific issue in the Maritimes. The Clean Annapolis River Foundation found that 70% of culverts they assessed were barriers to fish passage and 80% of the culverts surveyed by the Petitcodiac Watershed Alliance in 2015 were either partial or full barriers to fish passage.

Prior to 2017, the aquatic connectivity of the Nashwaak Watershed was unknown. Therefore, the NWA requested funds to conduct multi-year project to assess, prioritize, and restore barrier culverts in the Nashwaak watershed from the mouth of the river working up, to re-establish salmon access to important upstream habitat.

The project was developed from a High Priority Action Item in our 2017-2020 Action Plan. The Nashwaak River is an important salmon-producing tributary of the Saint John River and is one of DFO's priority rivers for restoration under their 2014 "Recovery Potential Assessment". This work is also in line with

Atlantic Salmon Federation's 2013 "Recovery Strategy for Wild Atlantic Salmon". Habitat fragmentation and blocked access to cold-water or spawning habitats have been recognized as limiting factors for salmon populations.

## DELIVERABLES

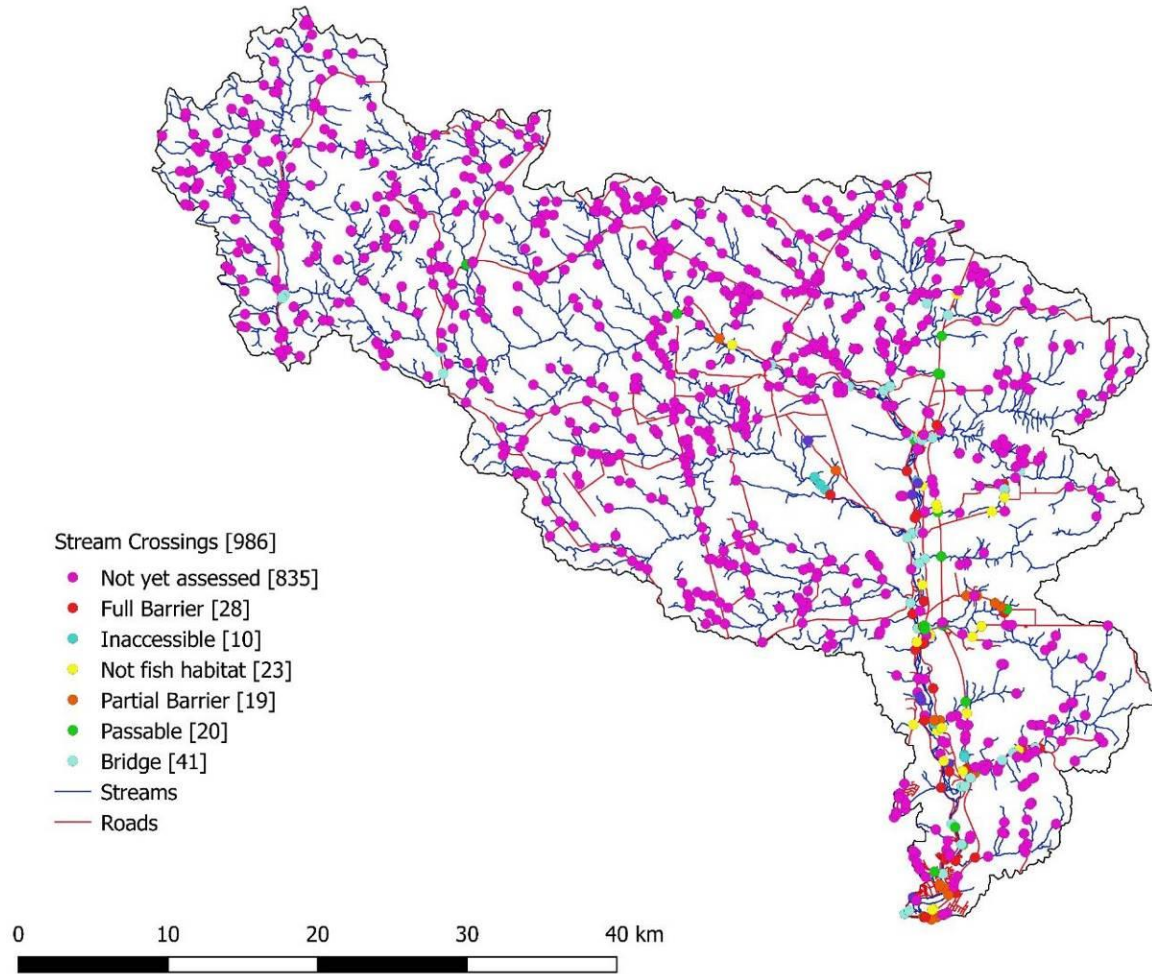
The objectives of the project were:

- 1) to increase the capacity of the NWAI to survey the Nashwaak River watershed;
- 2) to increase our knowledge of the aquatic connectivity and fragmentation of the watershed;
- 3) an overall decrease in habitat fragmentation within the Nashwaak watershed and an overall increase in habitat availability for the Atlantic salmon; and
- 4) to communicate the connectivity of the river to the public.

## RESULTS

Over the course of 2017, NWAI's capacity to survey the Nashwaak watershed has greatly increased, as has our knowledge about the connectivity and fragmentation of our watershed. We were mentored by the Petitcodiac Watershed Alliance (PWA). Three staff and two board members attended a training day in May 2017 and the PWA shared their database and field sheets with us. We mapped all the stream crossings in the watershed thanks to the assistance of an NBCC student this spring. This was above our Year 1 goal of mapping only the stream crossings in the lower half of the watershed.

To date, we have assessed 138 stream crossings in the watershed with a full survey done on 67 of those crossings (using a survey rod and level), which was above our Year 1 goal of 50 full surveys. We focused on culverts in the lower watershed (from Nashwaak Bridge to Barker's Point) that were within 1 km from the main stem of the Nashwaak River. All crossings on Route 8, Rte. 148 below Nashwaak Bridge, and Rte. 628 were surveyed (except those on private land where we could not get landowner permission). 115 km<sup>2</sup> of the watershed were assessed for aquatic connectivity. Data were entered into the Atlantic Canada Culvert Assessment Toolkit (ACCAT) datasheet, which allowed slope and outflow drop to be calculated and the culvert to be categorized as a Full Barrier, Partial Barrier, or Passable. By following this protocol, it also allows our results to be compared to others in the Atlantic Provinces and to uploaded on a centralized web map. We mapped all the surveyed culverts using GIS. Photos of all culverts are available [HERE](#). Online mapping is available [HERE](#).



**FIGURE 1. STREAM CROSSINGS IN THE NASHWAAK WATERSHED**

We have begun working with the Nature Conservancy of Canada (NCC) to use a GIS add-on developed by their American counterpart (TNC): the Barrier Assessment Tool (BAT). This has allowed us to 1) prioritize sub-watersheds for assessment in the future and 2) prioritize assessed barriers for future remediation based on ecological and structural priority. We shared the information with NBDTI at a meeting on December 13<sup>th</sup>. Working with NCC on this pilot project that combines the BAT with their unpublished Freshwater Ecological Classification and Aquatic Blueprint, will allow us to contribute our data to an international effort focused on restoring connectivity for both ecological and climate change adaptation (flooding – emergency services provisioning- risk to culverts) purposes: the North Atlantic Aquatic Connectivity Collaborative. We are also contributing the data to a regional database: the Atlantic Canada Culvert Assessment Toolkit.

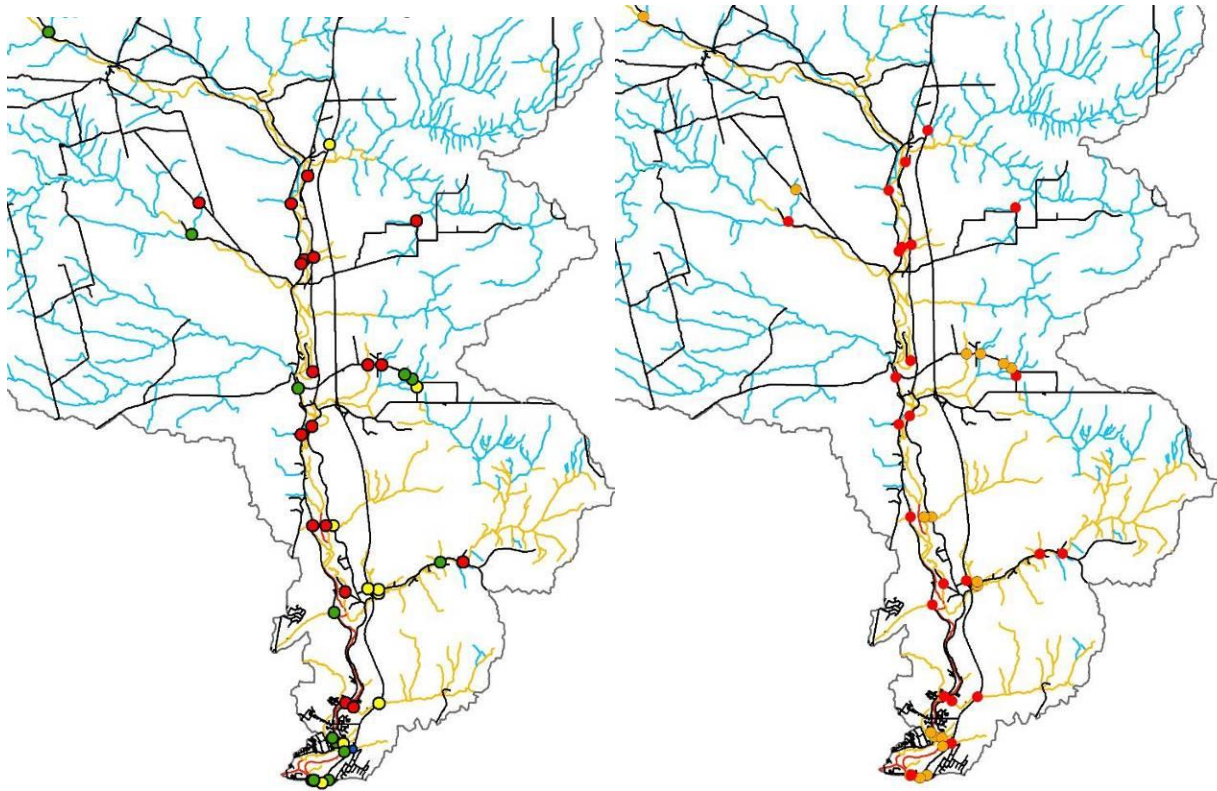


FIGURE 2. (LEFT) STRUCTURAL CONDITION OF THE CULVERTS ASSESSED AS BARRIERS [GREEN = GOOD, YELLOW = FAIR, RED = POOR]. (RIGHT) BARRIER CLASSIFICATION [RED = FULL BARRIER, ORANGE = PARTIAL BARRIER].

Twenty-eight (42%) surveyed crossings were Full Barriers, 19 (28%) were Partial Barriers, and 20 (30%) were Passable. Major issues preventing fish passage included 1) beaver activity completely blocking several culverts, especially along Rte. 8 (reported to DTI), 2) older wooden box culverts on Rte. 148 and Rte. 628 collapsing (these are slated to be replaced by DTI in coming years, and, therefore, we were told not to focus remediation efforts on these culverts), and 3) culverts installed at steep slopes without baffles.



**FIGURE 3. BEAVERS HAVE FLOODED THE UPSTREAM PORTION OF THIS SMALL STREAM BY BLOCKING THE INLET OF THE CULVERT.**

The results of our survey have led us to focus on the remediation of culvert M102 that will open 28.04 km<sup>2</sup> of previously inaccessible habitat for salmonids. We chose this culvert to focus on because many of the culverts that we classified as Full Barriers were either 1) very old box culverts or cast in place arches that are slated to be replaced in the future, 2) the remediation was beyond our capacity (i.e., full replacement was needed), 3) were blocked by beavers, which we do not have a permit to move. Therefore, we will focus on culvert M102 as 1) Manzer Brook is one of the larger tributaries in the lower Nashwaak that has culverts as stream crossings, 2) it is on a well-travelled road meaning that it is higher priority for DTI, 3) the culvert is structurally in good condition and 4) there was a previous (failed) attempt to instate fish passage for salmonids. DTI attempted to rehab this culvert in 2000 by lining the culvert with concrete, installing baffles for fish passage, and putting in three rock weirs downstream of the outlet. However, the rock weirs have since washed out and a blind weir was not installed in the higher two culverts (meaning that at low flow water still goes through all three culverts instead of being concentrate through the lowest culvert). The culvert is currently blocking 19.6 km of stream. Drainage area upstream from the culvert is mostly forested with minor agricultural land. The stream has a moderate gradient and is cool water.

We have permission from DTI to move ahead with the design of a new fish passage option. The remediation will involve installing blind weirs on the higher two culverts to channelize the flow and building a mini-fish ladder to install on the lower culvert. The fish ladder was custom designed by HILCON Ltd., a locally owned engineering company specializing in hydraulics and hydrology, and will be custom-made over the winter by Tek Steel, a locally owned company. It will be light enough to be installed by hand and will be put in place in May/June 2018, depending on water levels. We have volunteers in place to help with the installation. It will remain in place year-round and will be regularly cleaned by NWA staff and volunteers. Please see the attached preliminary engineering sketches. The design is awaiting final approval from DTI. Final approval will allow us to proceed with the WAWA application.

Our work to remove debris, including car batteries, rims, beers cans, and other garbage, from all assessed culverts, and large debris blockages from at least 11 culverts, has decreased the overall fragmentation of the lower Nashwaak watershed and improved water quality downstream from these crossings. We are working hard to communicate the importance of connectivity of the river to the public via our social media channels, our annual newsletter, and conversations with landowners.



**FIGURE 4. A DEBRIS BLOCKAGE BETWEEN CULVERTS 2 AND 3 AT A CULVERT ON MANZER BROOK WAS REMOVED, WHICH IMPROVED THE FLOW OF WATER. CULVERT 1 HAD A LARGE TREE INSIDE OF IT THAT COULD NOT BE REMOVED WITH THE EQUIPMENT WE HAD.**

Field work has involved 90 volunteer hours (UNB students, Nature Conservancy of Canada staff, and NWA board members). In addition, at least 40 hours of volunteer GIS mapping work was done by an NBCC student this spring and the Nature Conservancy of Canada staff have volunteered their time to help us with their GIS add-on for prioritization. UNB also allowed us to borrow survey equipment valued at 500\$. More volunteer hours from two UNB Civil Engineering students are expected this winter as they will focus on the remediation of culvert M102 as a senior project.



FIGURE 5. BEFORE AND AFTER OF A DEBRIS BLOCKAGE REMOVAL DOWNSTREAM FROM A CULVERT ON MCLEAN BROOK.

### PROMOTION OF THE NB WILDLIFE TRUST FUND

We have acknowledged the NB Wildlife Trust Fund as a funder of this project on several occasions, including on our annual newsletter, which is distributed to 11,000 households and businesses; on social media; at our annual general meeting held in November attended by over 50 members (see attached PDF); and on a sign, which we display at all organization events.

Our social media posts reach ~700 people according to Facebook insights. We have an additional 400 followers on Twitter and 80 followers on Instagram. Aquatic Connectivity was a topic featured several times over the course of the field season. We have started using a #MyNashwaak tag to track engagement on posts.

### PUBLICATION OF RESULTS

All documents and maps will be available to the public on our website shortly. We will also prepare printed copies, which will be available for loan at our office. We have shared our GIS data with other watershed organizations using ArcOnline.

### ATTACHED DOCUMENTS

Document	Summary
<b>Excel database of culvert field survey data</b>	ACCAT database for all surveyed culverts
<b>Culvert descriptions</b>	PDF describing each culvert surveyed
<b>PDF of AGM presentation</b>	PDF of AGM presentation delivered by project coordinator Jillian Hudgins at our AGM, highlighting the aquatic connectivity project.
<b>2017 Newsletter</b>	Summary of the work done by the NWA in 2017 with thanks to our funders
<b>Engineering sketches</b>	Sketches of fish passage remediation by HILCON Ltd.

Submitted by: Jillian Hudgins, NWA Project Coordinator