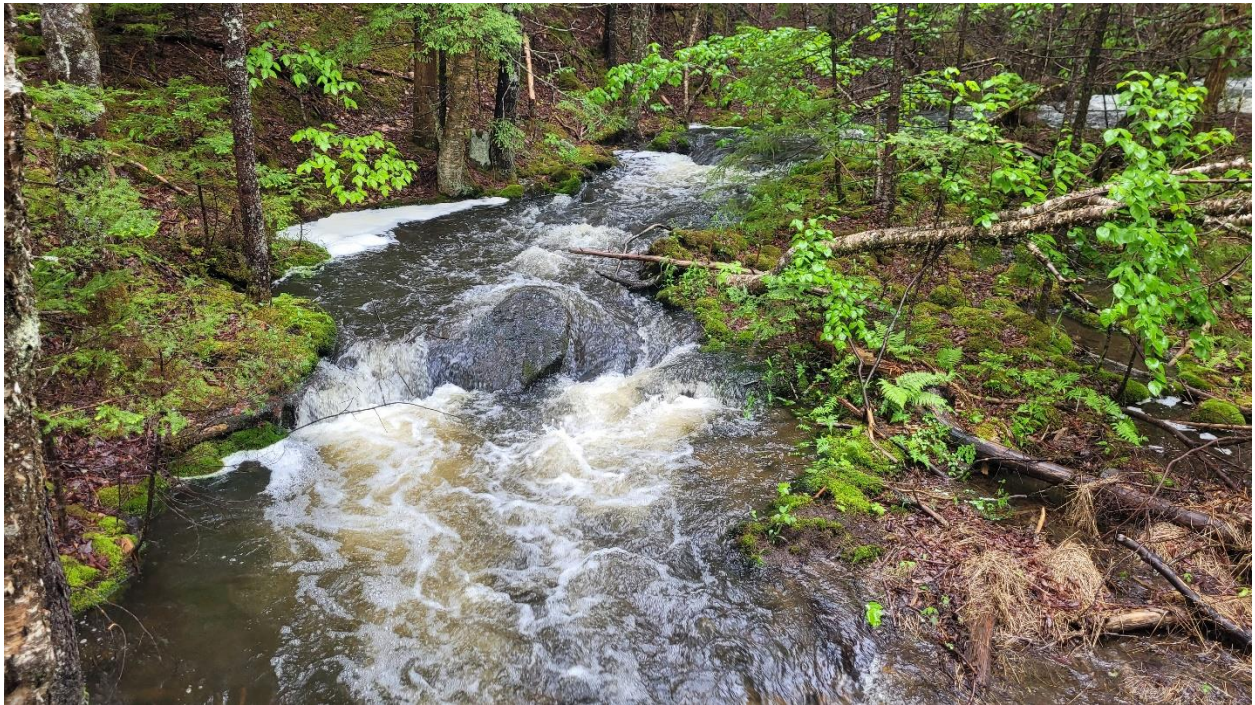




River Restoration 2023 Final Report  
December 2023



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## **Introduction**

Sackville Rivers Association's (SRA) River Restoration 2023 project had provided fish habitat restoration and other work on Drain Lake Brook in the Sackville River Watershed – in the community of Middle Sackville (Indigo Shores).

This project was a continuation of past projects within the Sackville River watershed and involved the installation of habitat restoration activities/structures at 11 sites, as well as other restorative work, resulting in approximately 320 square meters of restored habitat as well as restoring fish passage to 1.5km of habitat on Drain Lake Brook and more than 3km of habitat on the Little Sackville River (as annual maintenance work on past projects).

The purpose of this project was to support directly the population of the Atlantic salmon (and indirectly the other 12 species in the Sackville River watershed), which on Nova Scotia's Atlantic coast (Southern Uplands) is a species considered endangered, through restoration of its habitat. At this point every salmon is crucial, as is every square meter of accessible habitat (which is one of the limiting factors to salmon's success in this watershed). Due to this, SRA strives to restore and protect every watercourse known to carry Atlantic salmon currently in the Sackville River watershed, as well as those which would have carried salmon in the past before development and other land use had impacted this critical habitat.

This project's purpose was to increase habitat, improve fish passage, and increase the flow of water through channel definition, flow consolidation, and debris dam removal, in Drain Lake Brook. All of these activities will assist in the recovery of the Atlantic salmon, while also indirectly supporting populations of Brook trout, gaspereau, and to a lesser extent American eel. The success of the project will be determined through inspections by SRA, and the installed structures for the years to come will be part of our annual inspection and maintenance activities. This project was very important for the various communities of the Sackville River watershed as it will show how suburban and urban streams, if restored and protected, can be healthy and can support viable populations of Atlantic salmon.

To mitigate past and current impacts on this watercourse, as well as to reduce the impact of future events, we had performed the following actions on Drain Lake Brook:

- installation of instream habitat restoration structures – rock sills and deflectors
- clearing of debris jams
- definition of channels (thalweg creation/improvement)
- pool creation/enhancement

This work is generally for the improvement of fish habitat, but will improve the overall health of the river systems and everything in it. Our main species of concern are salmonids.

## **Project Overview**

### **Drain Lake Brook**

22 Structures in total were installed in Drain Lake Brook (11 rock sills and 11 deflectors) at 11 sites as part of our River Restoration 2023 project. This work in a reach of approximately 145m, where further work was completed (such as pool enhancement, thalweg definition, etc.) of brook restored approximately 320m<sup>2</sup> of fish habitat.

This project also restored fish access to 1.5km of habitat by removing several solid blockages to fish passage near the bottom of Drain Lake Brook between McCabe Lake and Drain Lake. As part of tis project, we had also removed several large debris blockages on the Little Sackville River – one of two most important tributaries to the main Sackville River, and the most important salmon-rearing habitat due to the higher pH of the waters in the Little Sackville River. These blockages, several of which were complete blockages to fish passage, were a result of Hurricane Fiona from the Fall of 2022. These blockage removals had resulted in the return of fish passage to more than 3 kilometers of upstream habitat and two headwater lakes on the Little Sackville River

This project will benefit the entire Sackville River Watershed by increasing the overall productivity of the watershed – the Sackville River and its' many feeder brooks. All of the work planned was outlined in the SRA Sackville River Watershed Restoration Plan (SRWRP). The SRWRP is the SRA's current guiding plan for restoration work on tributaries on the Sackville River Watershed. The work was done using the established methods and practices in the Nova Scotia Adopt-A-Stream manual.

## **Project Challenges**

Unfortunately, the River Restoration 2023 project had experienced a variety of unforeseen issues during its implementation – entirely a result of extreme weather conditions impacting the rivers and surrounding areas throughout the Sackville River Watershed, and indeed the Province of Nova Scotia, as well as the Maritime Provinces in general.

The first impact had its origins in 2022, with fall conditions being incredibly dry, ending a season of drought-like conditions through the spring, summer, and fall. A lack of rejuvenating September/October rains, coupled with a relatively low-precipitation during the winter of 2022/23 resulted in one of the lowest flows witnessed in the Sackville River and it's tributaries in the spring of 2023. The very low flow in our project watercourse, Drain Lake Brook, made early project planning difficult.

These drought conditions that lingered from the year before culminated in a large forest fire in the adjacent watershed, starting the day before the project work crew started their summer work term. Dry conditions across the region, and an abundance of caution taken, led to a ban of woods travel until fire conditions changed, resulting in an extended period of not being able to access

the project site. To make the situation more consequential, the project site was in the projected path of the forest fire in Upper Hammonds Plains, and the residential subdivision in which the project site was located was evacuated for some time, making accessing the project site even by road impossible due to police barricades closing off the area. A second fire broke out within the Sackville River Watershed not far from the project site, making it clear that the fire could spread further at any point, given the conditions. This had been one of the worst forest fire conditions in the province/region in memory.

Once fire conditions had changed, woods travel had been restored, and the surrounding area of the project site was opened back up for residents to return (although access was still restricted for a short period of time as the area was under a stand-by evacuation order), the project had begun in Drain Lake Brook, much later than expected, and with low water levels persisting.

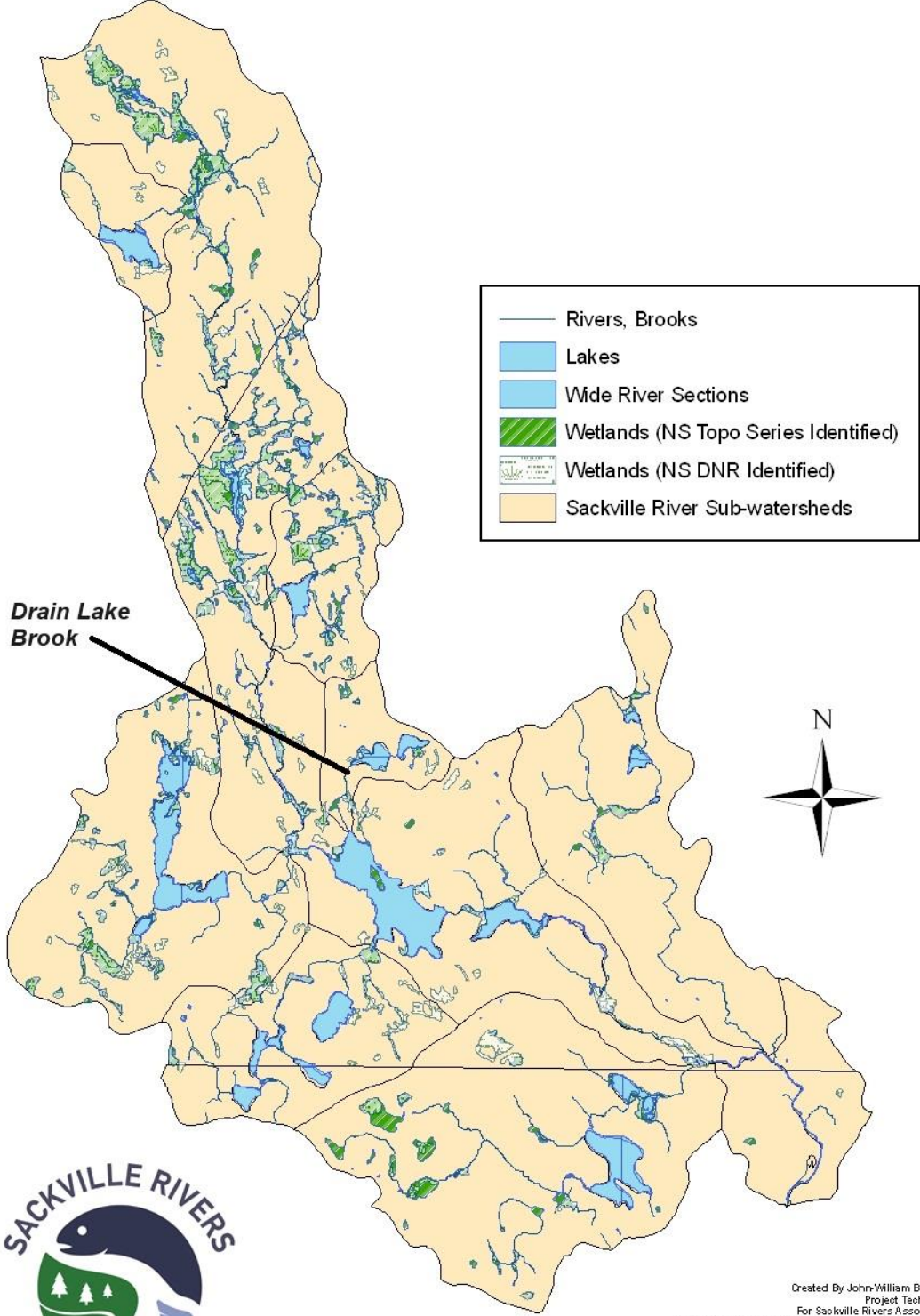
Relief came to the persisting dry conditions, but unfortunately it came at the cost of another natural disaster. During the summer, a 1 in a 1,000-year storm inundated the region with around 250mm of rain in a short period of time, resulting in a major flood event in the watershed. The wild swing from drought to flood conditions led to severe impacts throughout the watershed. Although the main Sackville River and the Little Sackville River were impacted the most, all watercourses in the watershed, especially those fed by headwater lakes, surged from nearly dry to raging overnight. And Drain Lake Brook was no exception, with Drain Lake receiving a large amount of runoff from the storm, causing the lake to rise to levels not seen previously.

This storm not only kept the project crew out of the brook for many days (work cannot effectively occur with such high-water flows), but the raging flow also damaged the habitat restoration structures that the work crew had just managed to install after the woods travel ban had been lifted and police once again allowed non-residents to access the subdivision in which the project was based. After many days, the flow of the brook dropped to a rate acceptable to work in, the crew returned to work by making repairs to the damaged structures and rebuilding the ones lost (for the structures that were incomplete at the time of the flood, they were mostly lost to the high flows, but for the structures that were installed, the lack of time for the structures to settle and stabilize meant that repairs were needed after the flood waters receded).

Despite this historic flood event (a flood like this had not impacted the watershed since at least the 1970's) and three other heavy rainfall events leading to small setbacks in progress (i.e. further damage to newly-installed structures and days lost due to high water), the project was completed as planned, with structures installed at the number of sites as planned. In all, it is likely that the project had been set back by upwards of 3 weeks due to the woods travel ban, the project site being restricted of access, and high water, and set back by a further week or two with structure repairs and rebuild from the flood and subsequent smaller (but significant) rainfalls after the large flood event.



# Sackville River Watershed

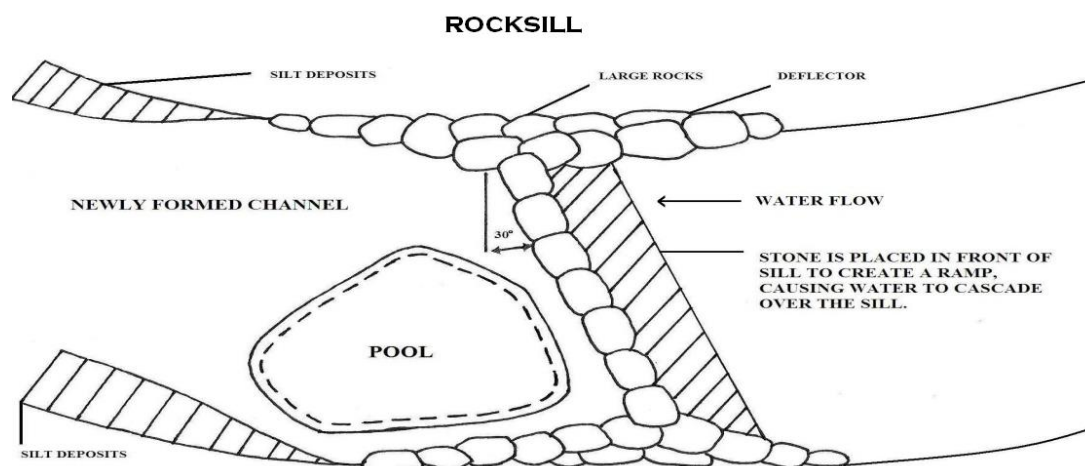


Drain Lake Brook in watershed context

## Project Benefits – Drain Lake Brook

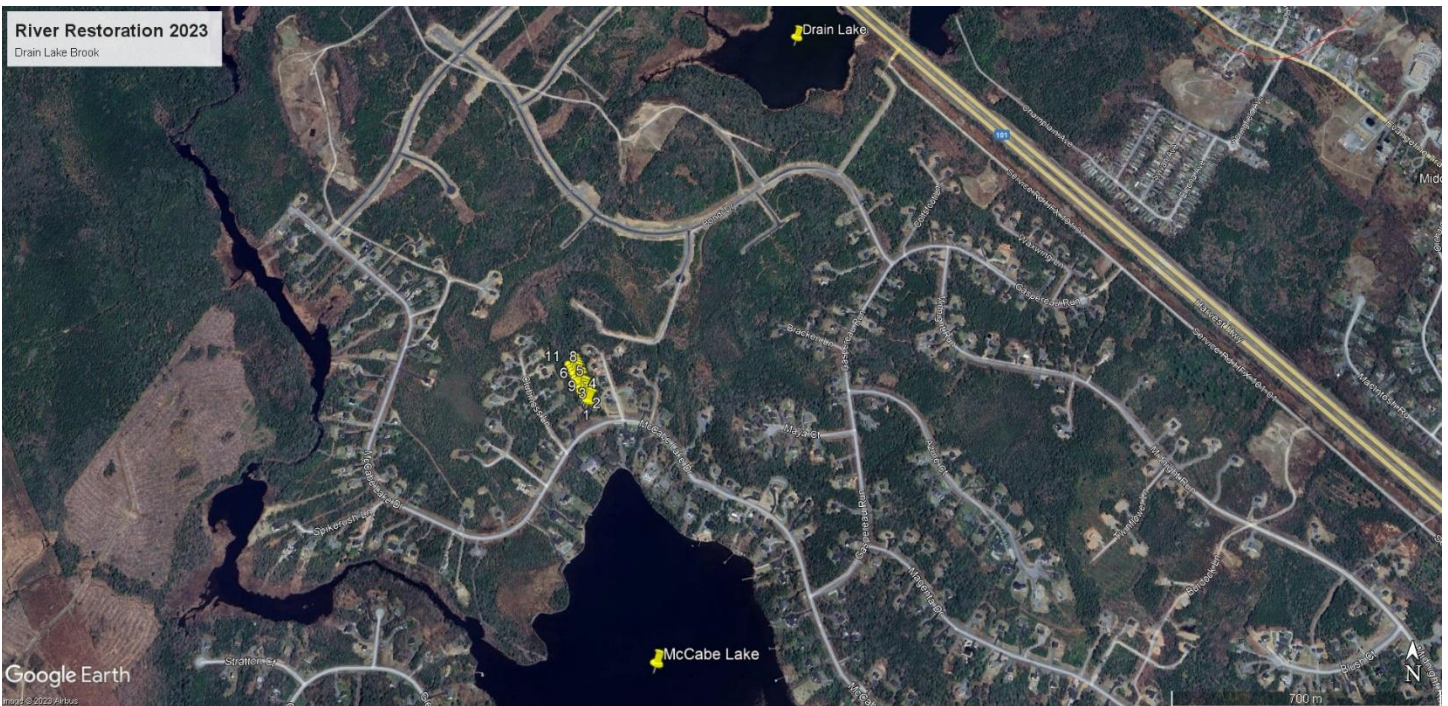
### 22 In-Stream Habitat Restoration Structures (Diggerlogs with deflectors) and channel work:

- Direct new restoration of 320m<sup>2</sup> of aquatic habitat.
  - Increased population of Atlantic salmon, Brook trout, Gaspereau and other fish species
  - Increased dissolved oxygen levels
  - Decreased water temperature
  - Decrease in suspended silt in watercourse
  - Reduced bank erosion
  - Pool creation (spawning area, protection from predators, refuge from winter ice)
  - Increased habitat connectivity
  - Decreased ice scouring of riverbed
- Indirect restoration effects:
  - Reduction of suspended sediments - improve the water quality in Drain Lake Brook and subsequently in Thompson Run
  - Increased and enhanced spawning and rearing habitat in the Drain Lake Brook will improve overall rearing productivity for the entire Sackville River Watershed for Atlantic salmon, Brook trout and other fish species.
  - Restoration of fish passage to 4.5km of upstream fish habitat



General rock sill specification





River Restoration 2023 – Drain Lake Brook project reach (center)



River Restoration 2023 – Drain Lake Brook habitat restoration installations (sites 1 through 11 – one rock sill and one deflector installation at each site).

What follows are pictures of the River Restoration 2023 project habitat restoration structure installations – the before pictures are from higher water, and the after pictures are from early fall during lower water.





Site 1 – Rock sill 1 with deflector - before (above) and after (below)







Site 2 – Rock sill 2 with deflector - before (above) and after (below)







Site 3 – Rock sill 3 with deflector - before (above) and after (below)







Site 4 – Rock sill 4 with deflector - before (above) and after (below)







Site 5 – Rock sill 5 with deflector - before (above) and after (below)







Site 6 – Rock sill 6 with deflector - before (above) and after (below)



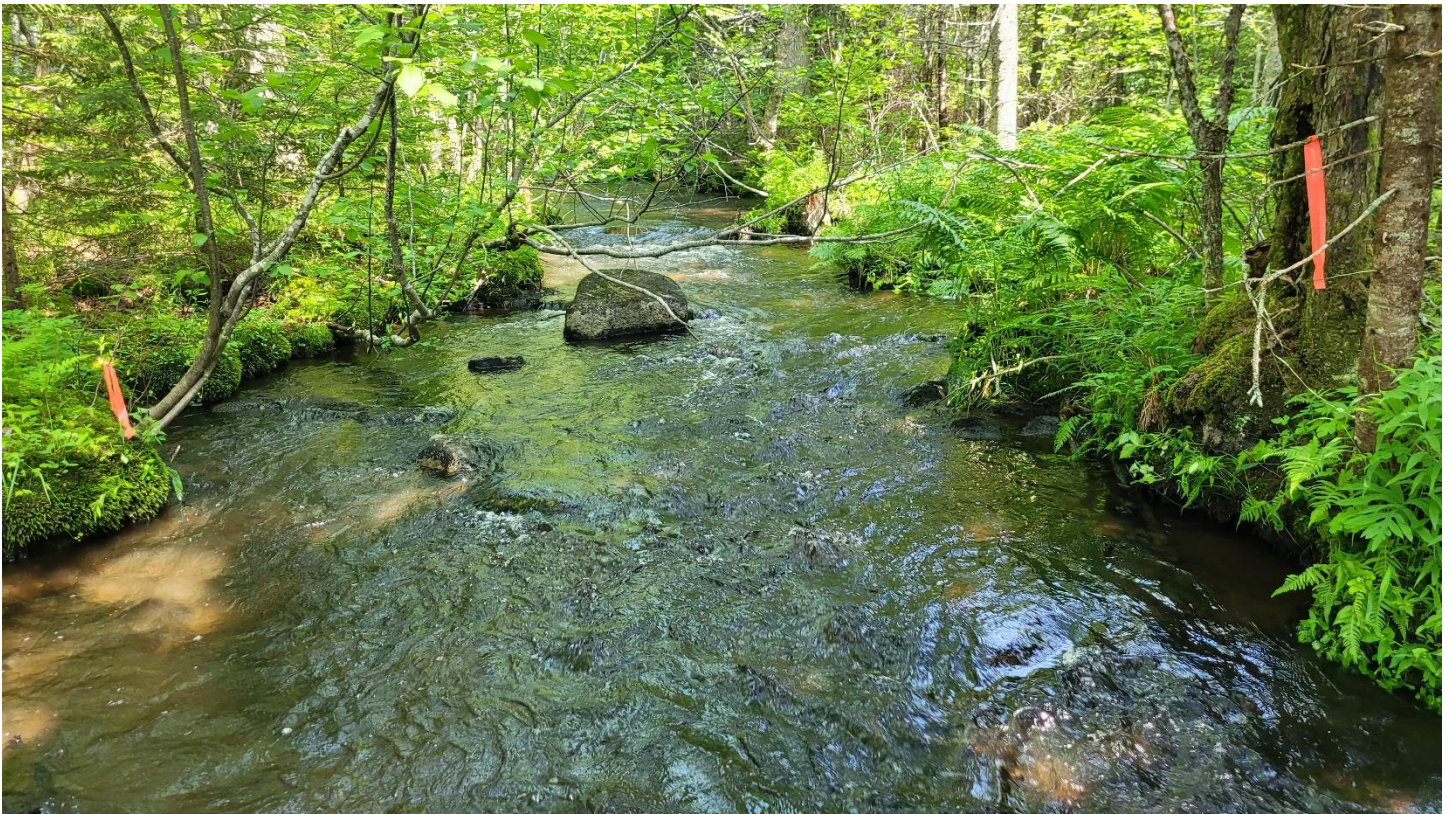




Site 7 – Rock sill 7 with deflector - before (above) and after (below)







Site 8 – Rock sill 8 with deflector - before (above) and after (below)







Site 9 – Rock sill 9 with deflector - before (above) and after (below)







Site 10 – Diggerlog 10 with deflector - before (above) and after (below)







Site 11 – Rock sill 11 with deflector - before (above) and after (below)







Electrofishing in Drain Lake Brook



Debris jam cleared on Drain Lake Brook





Project coordinator (left) and project crew in Drain Lake Brook