

LaHave River Watershed Project

2015 Field Report

Prepared by

S. Fredericks

Bluenose Coastal Action Foundation

37 Tannery Road

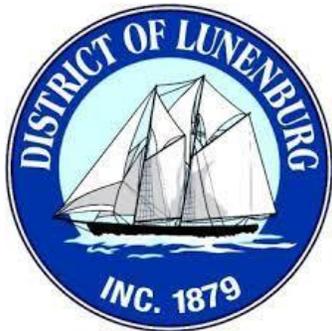
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LaHave River Watershed Project – 2015 Project Partners



Recreational Fisheries Conservation Partnerships Program



Fisheries and Oceans
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Contents

| | |
|--|----|
| Introduction | 1 |
| Bluenose Coastal Action Foundation | 1 |
| LaHave River Watershed Project | 1 |
| Water Quality Monitoring Program..... | 1 |
| LaHave River Sub-watershed Fish Habitat Restoration Plans..... | 4 |
| LaHave River Watershed Project - 2015 Field Activities | 5 |
| LaHave River Estuary Health Assessment Project..... | 5 |
| LaHave River Estuary Fecal Bacteria Monitoring | 6 |
| LaHave River Watershed Fish Habitat Restoration Projects..... | 7 |
| Main River Sub-watershed Aquatic Connectivity Project..... | 8 |
| Community Outreach and Education Activities..... | 10 |

List of Figures

| | |
|--|----|
| Figure 1 – Location of water quality sample sites in the LaHave River Watershed..... | 2 |
| Figure 2 – WQI health categories..... | 3 |
| Figure 3 – Sub-watersheds of the LaHave River Watershed. | 4 |
| Figure 4 – Location of sample sites for the LaHave River Estuary Health Assessment Project. | 5 |
| Figure 5 – Fecal bacteria monitoring results from five locations in the LaHave River Estuary. | 6 |
| Figure 7 – Restoring fish passage through the installation of a weir, chute (left), and baffles (right)..... | 7 |
| Figure 6 – Garbage removed from riparian and in-stream habitats in West Branch tributary..... | 7 |
| Figure 8 – Installation of a digger log (left) and enhancement of step-pool habitat (right) at Ross Brook.. | 8 |
| Figure 9 – Locations of culvert assessments performed in the Main River Sub-watershed in 2015..... | 9 |
| Figure 10 – Two culverts restored on Hebb Brook with baffles (left) and chutes (right). | 9 |
| Figure 11 – Two culverts restored on Cooks Brook by installing a tailwater control (left) and removing a debris blockage (right). | 10 |

List of Tables

| | |
|---|---|
| Table 1 – LaHave River Watershed annual WQI results for 2008-2015 (excluding 2013/2014). | 3 |
|---|---|

Introduction

Bluenose Coastal Action Foundation

Coastal Action is a community-based charitable organization with a mandate to address environmental concerns in the South Shore region of Nova Scotia. Coastal Action's goal is to promote the restoration, enhancement, and conservation of our ecosystems through research, education, and action. Coastal Action has over 20 years of experience managing environmental projects on the South Shore of Nova Scotia including water quality monitoring, fisheries research, species at risk projects, habitat management/restoration, climate change projects, environmental education, and environmental community initiatives.

LaHave River Watershed Project

Coastal Action initiated the LaHave River Watershed Project (LRWP) in 2007, in response to increasing public concern over the health of the river. The purpose of the project is to identify and reduce harmful environmental impacts within the LaHave River Watershed. Forestry, farming, recreation, and rural development are widespread throughout the system, while industrial and urban development is mostly restricted to the lower reaches of the watershed. These various forms of land-use can have a significant impact on the health of the entire watershed, including the LaHave River Estuary. Goals of the project include the development of a watershed management plan and a long-term water quality monitoring program to assess the river's health. Project activities include water quality monitoring, habitat assessments, restoration projects, and community outreach and education. The LRWP is guided by an advisory committee representing various government departments, academia, industry, non-profit organizations, and community members.

Water Quality Monitoring Program

The LaHave River Watershed is one of the largest watersheds in Southwestern Nova Scotia (1,700 km²), with its headwaters reaching into Annapolis and Kings Counties and the majority of the watershed stretching across Lunenburg County. This highly branched river system has several large sub-watersheds and many tributaries. Coastal Action has been monitoring the water quality of the LaHave River Watershed since 2007 to create a long-term record of the river's health. This water quality monitoring program was designed in consultation with several knowledgeable project partners, and has been carried out under a well-defined set of sampling protocols and methodologies.

The health of the LaHave River is influenced by the interaction of air, land, and water throughout the entire watershed, which is why the water quality monitoring program was designed at a watershed scale. Fifteen sample sites were chosen in order to capture the water conditions throughout the entire watershed (see Fig. 1.0). Monitoring occurs from the headwaters to the estuary, including the confluence of each major sub-watershed branch, the

main stem of the river, and downstream of three waste-water treatment plants. These sites are monitored on a monthly basis for physical, chemical, and biological water quality parameters using a YSI Professional Plus water meter and through the collection of water samples for laboratory analysis. In addition, a total of 30 different metals are monitored on a bi-annual basis. With over 8 years of water quality data, the monitoring program has contributed greatly to our understanding of both the natural variability of the system and the environmental impacts of various activities throughout the watershed.

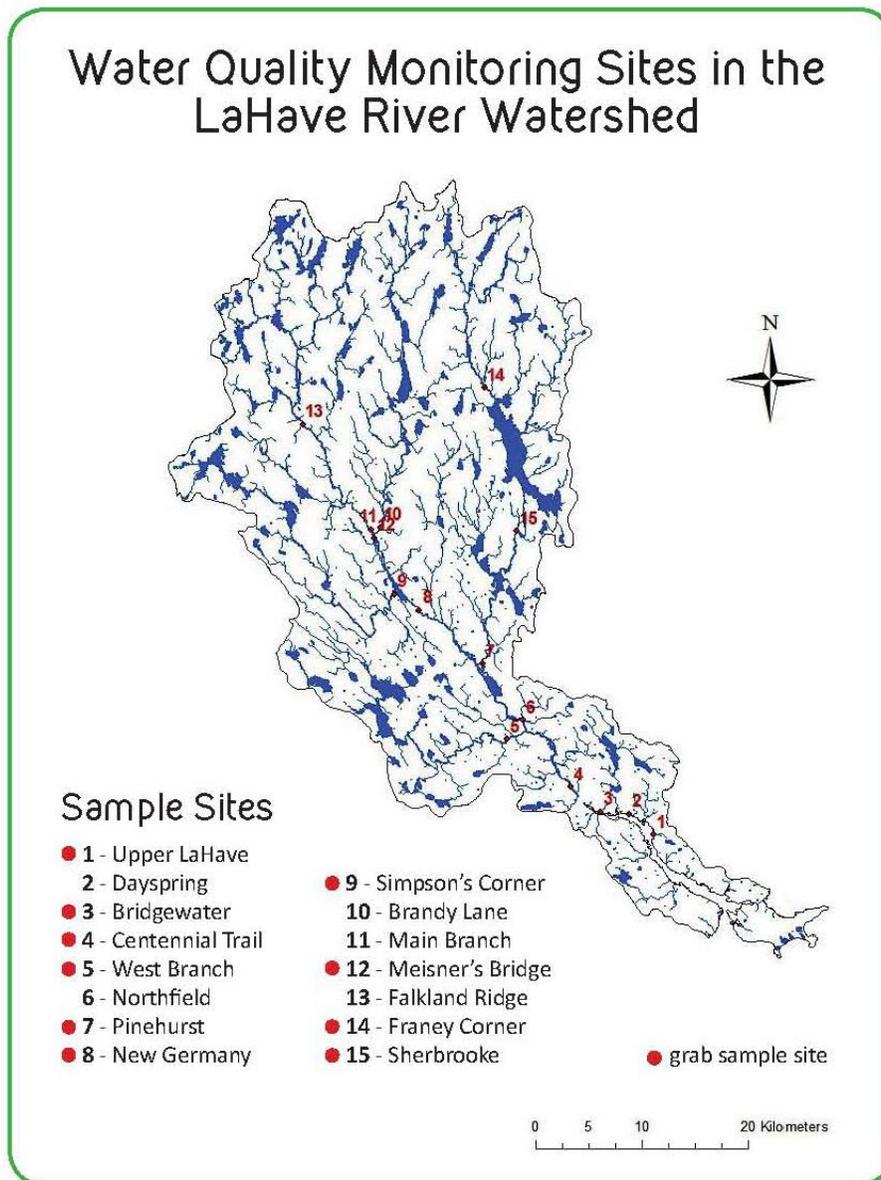


Figure 1 – Location of water quality sample sites in the LaHave River Watershed.

With over 8 years of water quality data collected from the LaHave River Watershed, it is beneficial to summarize annual results in a clear and concise manner (see Table 1.0). The Water Quality Index (WQI) provides a general description of water quality. Using the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines, the WQI combines multiple parameters in order to summarize complex data into a single value ranging from 0 (worst water quality) to 100 (best water quality). This index is calculated based on the number of parameters that do not meet water quality guidelines, the number of times the guidelines are not met, and the amount by which the guidelines are exceeded. A total of 8 water quality parameters were used to calculate the WQI values and these values correspond to WQI health categories (see Fig. 2.0).

| WQI | Category |
|----------|---|
| 95 - 100 | EXCELLENT • absence of threat • close to pristine levels |
| 80 - 94 | GOOD • minor degree of threat • conditions rarely depart from desired levels |
| 65 - 79 | FAIR • occasionally threatened • sometimes not at desired levels |
| 45 - 64 | MARGINAL • frequently threatened • often not at desired levels |
| 0 - 44 | POOR • almost always threatened • usually not at desired levels |

Figure 2 – WQI health categories

The annual WQI results range from Fair (occasionally threatened; sometimes not at desirable levels) to Good (minor degree of threat; conditions rarely depart from desired levels) for most of the sample sites throughout the watershed from 2008-2015 (excluding 2013-2014). WQI results for Bridgewater and Upper LaHave fall predominantly within the Marginal health category (frequently threatened; often not at desirable levels). These two sample sites are located within the most heavily developed part of the watershed and receive drainage from surrounding intensive land-use activities including urban, residential, commercial, and industrial development.

Table 1 – LaHave River Watershed annual WQI results for 2008-2015 (excluding 2013/2014).

| Sample Site | 2008 | 2009 | 2010 | 2011 | 2012 | 2015 |
|------------------|------|------|------|------|------|------|
| Franey Corner | 82 | 74.1 | 81.5 | 73.9 | 91.6 | 84.5 |
| Sherbrooke | n/a | n/a | 74.8 | 66.1 | 83.3 | 77.7 |
| Meisner Bridge | 66.2 | 74.4 | 82.7 | 83.2 | 83.4 | 85.3 |
| Simpsons Corner | 73.9 | 74 | 82 | 82.1 | 66.5 | 69.2 |
| New Germany | 66 | 65.8 | 82.5 | 82.9 | 75 | 77.5 |
| Pinehurst | 66.6 | 74.8 | 83.3 | 83.3 | 91.4 | 85.4 |
| West Branch | 75.2 | 66.8 | 74.9 | 75 | 91.6 | 77.7 |
| Centennial Trail | 66.4 | 75 | 66.6 | 75 | 91.4 | 78 |
| Bridgewater | 55 | 56.6 | 45.9 | 52.6 | 69.7 | 63.9 |
| Upper LaHave | 62.3 | 75.8 | 55 | 61.1 | 61.8 | 52.3 |

LaHave River Sub-watershed Fish Habitat Restoration Plans

One of the goals of the LaHave River Watershed Project is to develop a comprehensive watershed management plan, which addresses land and water resources through collaborative efforts with government and various stakeholders to ensure the sustainable management and health of the entire watershed. This plan is currently under development and will become a valuable tool for the management of the LaHave River Watershed into the future.

Due to the size and complexity of the watershed, habitat assessment and restoration efforts have been carried out at a more feasible sub-watershed scale (see Fig. 3.0). Sub-watershed Fish Habitat Restoration Plans have been developed for 4 of the 6 sub-watersheds (West River, West Branch, North Branch, and Main River), using a template created by Nova Scotia Salmon Association’s Adopt-A-Stream Program. These plans include background information on the ecological conditions of the area, assessments of riparian and in-stream habitat conditions, water quality monitoring, land-use surveys, aquatic connectivity assessments, and recommendations for future assessments and restoration activities needed to address harmful environmental impacts. This sub-watershed analysis improves our understanding of how water resources are being used, how land-use activities are influencing water quality, and how stream and riparian habitat conditions are influencing the quality and availability of fish habitat.

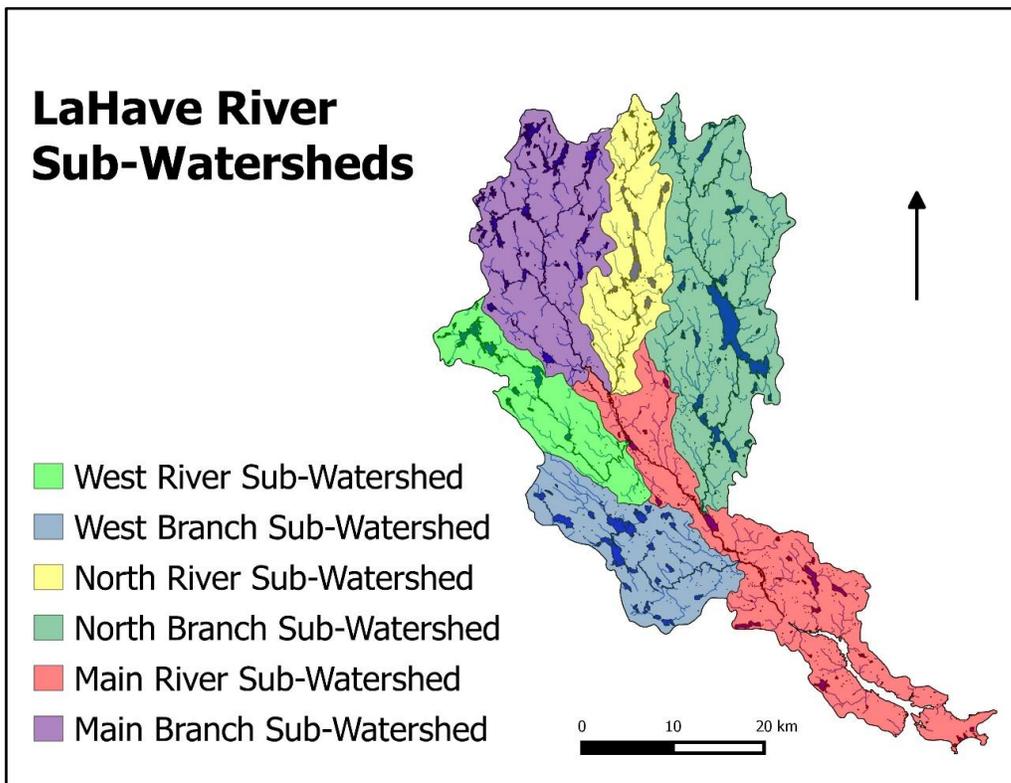


Figure 3 – Sub-watersheds of the LaHave River Watershed.

LaHave River Watershed Project - 2015 Field Activities

LaHave River Estuary Health Assessment Project

An estuary health assessment project was completed in the LaHave River Estuary in 2015. This project was carried out in partnership with several environmental organizations across Atlantic Canada, with Eastern Charlotte Waterways Inc., in Blacks Harbour, NB, acting as the project lead. Each partner organization assessed the health of their local estuary by monitoring for bacteria levels, general water quality, contaminants in sediment, eutrophication indicators, and aquatic biodiversity at multiple sample sites (see Fig. 4.0). Results from this project will be used to produce an Estuary Health Report Card for the LaHave River Estuary, and the reports from each organization will be compiled to develop a Report on the State of Estuary Health in Atlantic Canada.

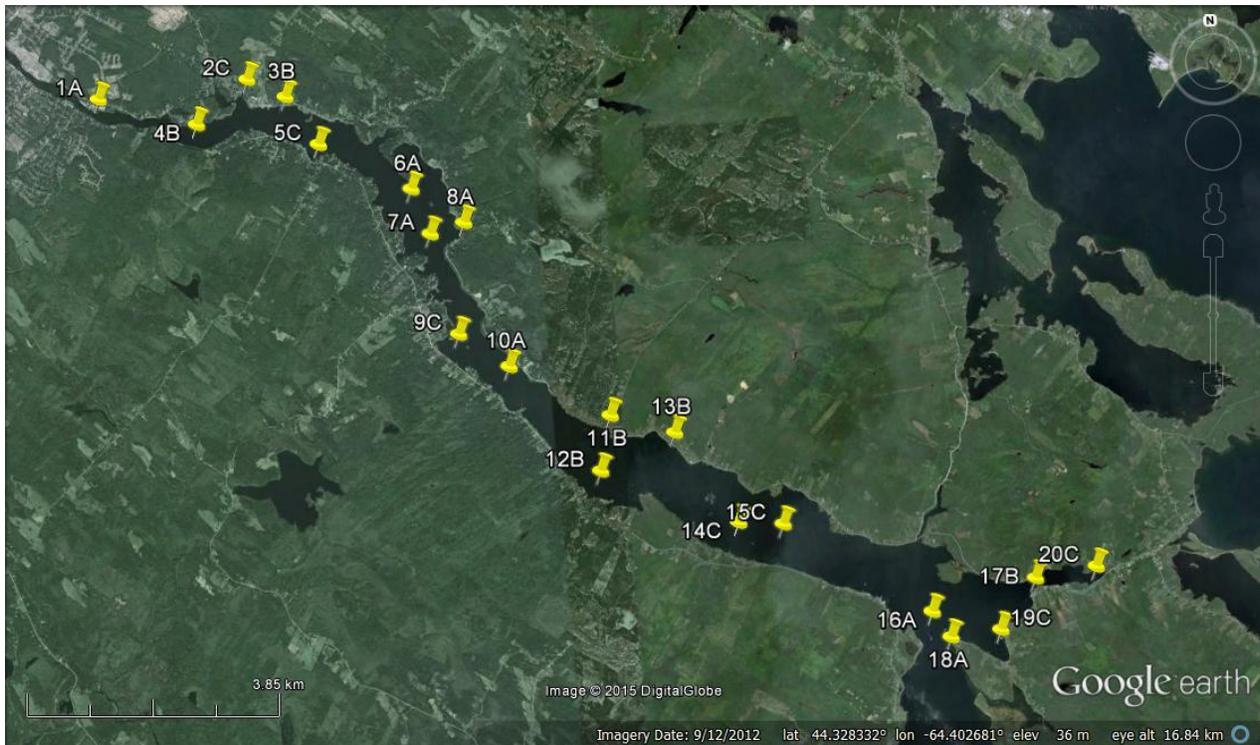


Figure 4 – Location of sample sites for the LaHave River Estuary Health Assessment Project.

LaHave River Estuary Fecal Bacteria Monitoring

Fecal bacteria contamination in the LaHave River Estuary has been a concern for many years. Results of the LRWP water quality monitoring program have consistently shown elevated fecal bacteria levels below the Town of Bridgewater and throughout the estuary, while sites just above town and throughout the rest of the watershed rarely exceed water quality guidelines for fecal bacteria. Fecal contamination can come from a variety of sources including stormwater run-off, malfunctioning septic systems, straight pipes, wastewater treatment plant effluent, agricultural run-off, wildlife, and domestic animals. Given the location of the contamination, the most significant sources of this pollution are suspected to be stormwater run-off and straight pipe sewage systems. There are an estimated 600 illegal straight pipes still in use in the estuary today, from below the Town of Bridgewater to the Dublin Shore.

Coastal Action, in partnership with a group of volunteers called the Straight Pipe Citizens Group, has been collecting water samples from 5 shoreline locations throughout the estuary on a weekly basis during the summers of 2014 and 2015. These water samples were analyzed for enterococci, which are the most appropriate indicator of fecal contamination in marine recreational waters. The results of this monitoring showed several exceedances of Health Canada’s Guidelines for Canadian Recreational Water Quality for both primary contact (where ingesting water is likely) and secondary contact (where ingestion is possible but not likely) (see Fig. 5.0).

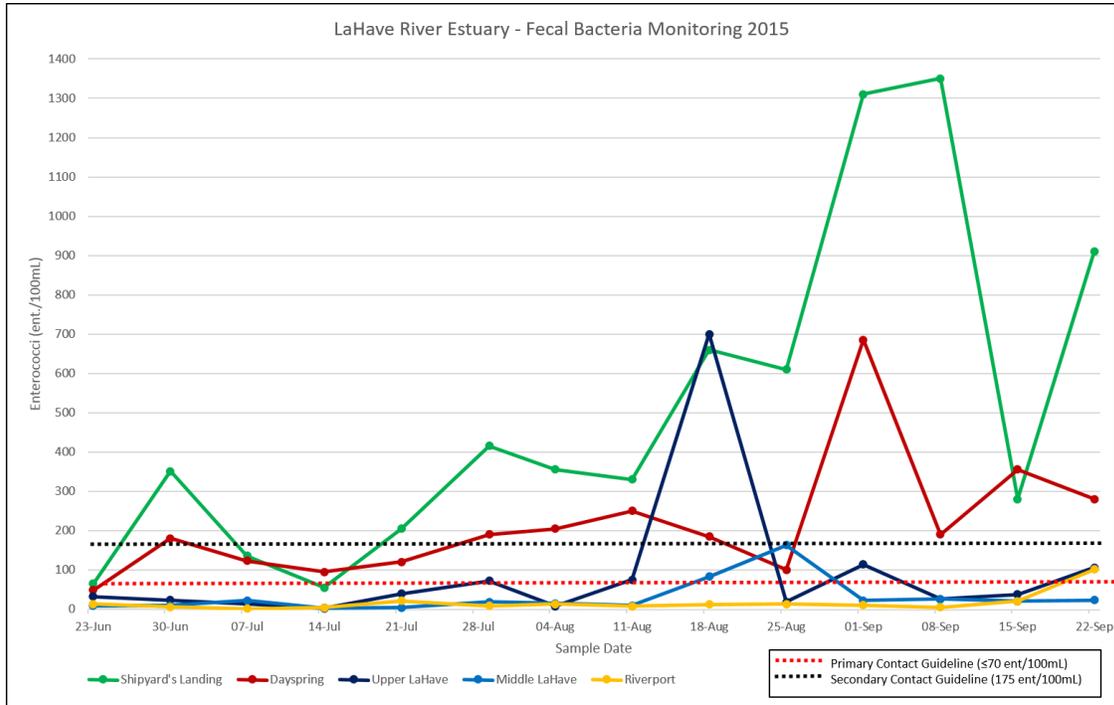


Figure 5 – Fecal bacteria monitoring results from five locations in the LaHave River Estuary.

LaHave River Watershed Fish Habitat Restoration Projects

Every year, the LRWP field crew works to improve fish habitat in the watershed through various restoration activities. In 2015, fish habitat restoration projects were completed in the West Branch and Main River Sub-watersheds. Work in the West Branch Sub-watershed involved a 600 m tributary between New Canada Lake and Wagner Lake. This stream had aquatic connectivity issues and a significant amount of garbage in the stream and throughout the riparian habitat. A debris blockage was removed from the outlet of New Canada Lake to improve fish passage between the stream and the lake. Garbage was removed from 20,000 m² of riparian and in-stream habitat, including over 1,000 lbs of scrap metal (see Fig. 6.0). A culvert assessment was performed on a wooden box culvert on the stream and it was determined to be posing a barrier to fish migration. In order to restore fish passage through this culvert, the field crew installed 4 wooden baffles inside the culvert as well as a weir and chute system at the outflow, with the assistance of our project partner, Nova Scotia Salmon Association’s Adopt-A-Stream Program (see Fig. 7.0). This project has improved fish habitat conditions in the stream and the health of the riparian zone, as well as restored fish passage to 3,000 m² of in-stream habitat and a 41.6 ha lake.



Figure 6 – Garbage removed from riparian and in-stream habitats in West Branch tributary.



Figure 7 – Restoring fish passage through the installation of a weir, chute (left), and baffles (right).

Fish habitat restoration work in the Main River Sub-watershed was conducted in Ross Brook, a 5 km tributary of the main LaHave River. Restoration work took place along a 500 m stretch of the stream, near its headwaters. This area suffers from sedimentation as a result of an upstream pasture that allows cattle direct access to the stream. Restoration work at this site included alder thinning, debris blockage removal, step pool habitat enhancement, and the installation of two digger logs and one deflector (see Fig. 8.0). These activities have helped to reduce the sediment load in the stream, and restore over 2,500 m² of fish habitat. Further restoration work is planned for Ross Brook in 2016, involving a culvert restoration project where this stream crosses under the Trunk 10 Highway. Restoring fish passage at this location, near the confluence of Ross Brook with the main LaHave River, will improve access to the entire 5 km length of this stream for fish populations.



Figure 8 – Installation of a digger log (left) and enhancement of step-pool habitat (right) at Ross Brook.

Main River Sub-watershed Aquatic Connectivity Project

The LRWP field crew began assessing aquatic connectivity throughout the watershed in 2015, starting with the Main River Sub-watershed. Over 150 stream crossings were assessed and 52 culvert assessments were performed to identify crossings which do not allow fish to migrate up/downstream to access the various habitats they need throughout their life cycles. These assessments have identified a number of full and partial barriers to fish migration (see Fig. 9.0). Four of these barriers were chosen for remediation in 2015; two culverts on Hebb Brook (see Fig. 10.0) and two culverts on Cooks Brook (see Fig. 11.0). By removing debris blockages and installing baffles, chutes, and weirs in these culverts, access has been restored to 12,900 m (72,600 m²) of stream habitat for local fish populations.



Figure 11 – Two culverts restored on Cooks Brook by installing a tailwater control (left) and removing a debris blockage (right).

Community Outreach and Education Activities

Environmental education and watershed stewardship are important for the continued success of the LaHave River Watershed Project. Coastal Action is actively engaged in community outreach initiatives and stakeholder partnerships by providing presentations, attending local festivals and events, and providing training and volunteer opportunities for local high school classes and community college programs.

Coastal Action promoted the LRWP, along with other environmental projects, at over 15 events, presentations, and festivals in 2015, including the Bridgewater Children’s Fair, World Oceans Day, the Bridgewater Growing Green Festival, and at the NSLC Adopt-A-Stream Eco Events in the Mahone Bay and Lunenburg NSLC stores. These outreach initiatives engaged over 600 people and helped to promote awareness in the community of local environmental issues.