



2017 Annual Report

A Healthy Environment for Future Generations





Species Illustrations

Page 2 Plymouth gentian (*Sabatia kennedyana*)

Page 5 Harbour porpoise (*Phocoena phocoena*)

Page 12 Canada lynx (*Lynx canadensis*)

Page 27 Common nighthawk (*Chordeiles minor*)

Page 44 Winter skate (*Leucoraja ocellata*)

Page 45 Atlantic wolffish (*Anarhichas lupus*)

Page 47 Piping plover (*Charadrius melodus*)



Bluenose Coastal Action Foundation

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Bluenose Coastal Action Foundation

2017 Annual Report

About Coastal Action

Bluenose Coastal Action Foundation is a community-based charitable organization with a mandate to address the environmental concerns along the South Shore of Nova Scotia. Coastal Action's goal is to promote the restoration, enhancement, and conservation of our ecosystem through research, education, and action. The organization has been an established member of the Lunenburg County community since its inception in December 1993. Over the past 20+ years, Coastal Action has successfully completed a number of projects in the South Shore region of the province. Project themes have included such issues as River Restoration on the Mushamush, Petite Rivière, Gold, and LaHave River systems; Water Quality Monitoring in the Petite, Gold, and LaHave River watersheds; Endangered Species Projects addressing the roseate tern, Atlantic whitefish, Atlantic salmon, and American eel; Climate Change and Pollution Prevention initiatives (i.e., Active Transportation, Water and Energy Conservation, Solid Waste Education, etc.); Environmental Education Programs; and Clean Boating.

A Healthy Environment for Future Generations

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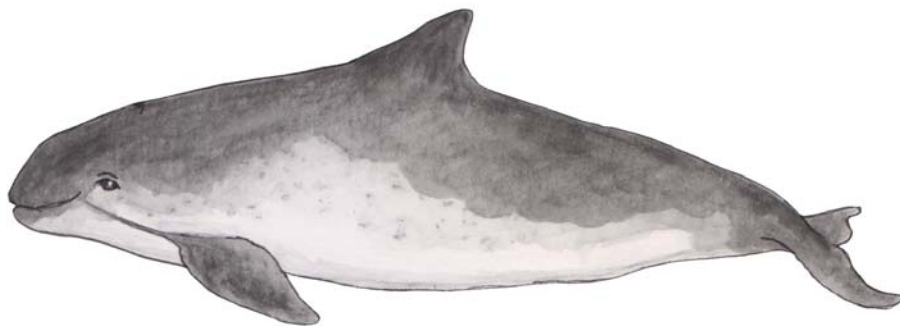
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Message from our Executive Director



Another successful year come and gone! The 2017-18 fiscal year turned out to be Coastal Action's most successful year to date with an approximate 25% increase in funds from the previous year, allowing us to do even more good environmental work within the South Shore region of Nova Scotia. Once again, this report showcases all of our projects, programs, contract work, and committee participation from the April 2017 to March 2018 fiscal year. A lot of effort was put into the development of this report; therefore, I would be remiss not to acknowledge all the hard work contributed by the Coastal Action senior staff members! If you would like more in-depth information on any of the topics summarized in this report, please visit the Coastal Action website at www.coastalaction.org or contact any of our staff (all staff contact information can be found on the website).

2017-18 marked the fifth and final year of Coastal Action's current strategic plan, therefore, in the fall of 2017, the organization committed to creating a new three-year vision with the help of business consultant and friend of Coastal Action, Jamie O'Neill with Uprise Consulting. We are now moving forward with a new mission, vision, and three-year strategic plan which focuses on growth, diversification, and creating a solid foundation. Coastal Action is excited to be working with Meg Craig and the staff at Skysail Brand on a brand refresh in anticipation of our upcoming 25th Anniversary. Stay tuned for a fresh new look, new website, and associated communications tools in the near future!

This past year also saw a commitment to staff training and building in-house capacity. Coastal Action staff became certified in backpack electrofishing, PADI Open Water Scuba diving, wetland delineation and plant identification, and participated in a Professional Writing for the Workplace training program.

Coastal Action would also like to take the time to officially thank all of those dedicated volunteers who continue to support and strengthen our organization - our success is your success! From our Board Members to the student projects to project-specific committee members to those who come out and support our events, every contribution is appreciated.

Brooke Nodding

2017 Coastal Action Board Members

Rick Welsford **CHAIR**

Biologist / Project Manager

Kelly Wilson **PAST CHAIR / TREASURER**

Retired Brew Master / Engineer

Granville Veinotte **VICE-CHAIR**

Retired DFO Fisheries Officer

Jeremy Hopkins

Michelin North America (Canada)

Karl E. Nauss

Councillor, Town of Mahone Bay

Mike Allen

Inspector, Nova Scotia Environment

Leif Helmer

Instructor, NSCC

Michael Graves

Councillor, Town of Bridgewater

Sharon Church

Councillor, Municipality of the District of Chester

John McGee

Councillor, Town of Lunenburg

Brian Gilbert

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Andre Veinotte

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Errol Knickle

Councillor, Municipality of the District of Lunenburg

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Coordinator



Danielle Pernette
American Eel Project Coordinator



Jennifer McKinnon
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Ariel Smith
Coastal and Marine Project
Coordinator



Clare Kellock
Environmental Education
Project Coordinator



Samantha Battaglia
Stormwater Management
Project Coordinator



Sam Reeves
Agricultural Stewardship
Project Coordinator



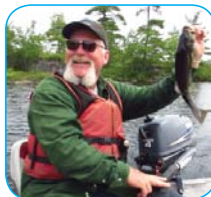
Sarah MacLeod
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Communications and Event
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Watershed Projects



Melissa Rafuse
NSYCC Intern
Watershed Projects



Kennedy Frittenburg
NSYCC Intern
Morton Centre Programs

Financial Statement

Table 1: Coastal Action funding breakdown for 2017-18.

Breakdown of Funding 2017-18	
Federal Government	\$393,814.00
	Canada 150 Fund
	Atlantic Ecosystem Initiative
	Habitat Stewardship Program - Species at Risk Stream
	Fisheries and Oceans Canada
	Recreational Fisheries Conservation Partnerships Program
	Agricultural Youth Green Jobs Initiative
	Habitat Stewardship Program - Prevention Stream
	Canada Summer Jobs Program
	Habitat Stewardship Program - Prevention Stream
	National Wetlands Conservation Fund
	EcoAction Community Funding Program
Provincial Government	\$74,848.00
	Thrive After the Bell Program
	NS 150 Forward Program
	NS Student Skill Incentive Program
	NS Dept of Fisheries & Aquaculture
	NS Dept of Transportation & Infrastructure Renewal
	NS Planning Assistance Grant
	Workforce Innovation and Productivity Skills Incentive
	Workplace Education Improvement Program
Municipal Government	\$88,372.00
	Municipality of the District of Lunenburg
	Town of Bridgewater
	Municipality of the District of Chester
	Town of Mahone Bay
	Municipality of the District of Lunenburg
Industry	\$104,920.00
	Michelin North America (Canada) Inc.
	Shell Canada's Social Investment Program
	Canadian Council for a Sustainable Eel Fishery Inc.
	Scott's GRO1000 Grassroots Grants
	RBC Bluewater Program
Charities / NGOs	\$161,355.00
	TD Friends of the Environment Foundation
	Community Foundation of NS
	Atlantic Salmon Conservation Foundation

Table 1: Coastal Action funding breakdown for 2017-18 (continued).

Breakdown of Funding 2017-18 (continued)	
	NS Federation of Agriculture Water Fund
	WWF - Canada Loblaw Water Fund
	NSLC Adopt-A-Stream Program
	Clean Foundation Science Horizons Youth Internship Program
	LaHave River Salmon Association
	EcoCanada Youth Internship Program
	Green Communities Canada Depave Paradise Program
	Small Change Fund
	Western Shore & Area Improvement Association
	Kingsburg Community Association
	Lunenburg & Queens Community Health Boards Wellness Grants
Academia	\$7,000.00
	Acadia University
Donations / Program Fees	\$16,281.00
	Donations / fundraising events
	Morton Centre Program Registration fees
Total	\$846,590.00

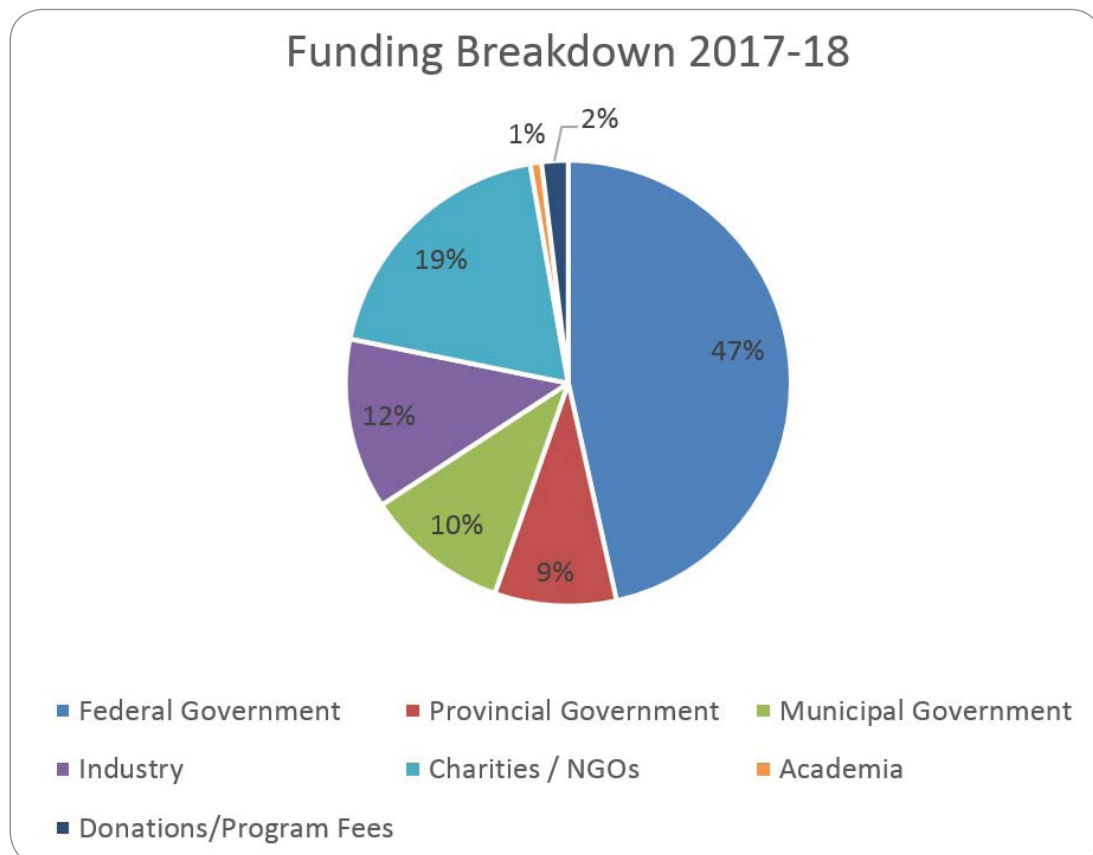


Figure 1: Coastal Action funding breakdown for 2017-18.

American Eel



Collecting data from an eel, captured while in silver phase, before releasing it back to the stream during autumn 2017.

American eel (*Anguilla rostrata*) have a complex lifecycle, using both salt and fresh water during various lifecycle phases. Geographically ranging from Venezuela to Greenland, American eel occupy the Eastern North Atlantic Ocean, and all accessible streams, lakes, and rivers. American eel are catadromous, meaning they spawn in salt water and spend most of their life in fresh water. American eels are born, and die, in the Sargasso Sea. **Eggs** hatch into larvae, called **leptocephali**, and float along ocean currents, metamorphosing into **glass eels** as they near the coast. As they enter freshwater rivers and streams, they become pigmented **elvers**. Elvers become **yellow eels**, the juvenile life phase, and may spend years maturing in fresh or salt water. Once mature, yellow eels turn silver, and **silver eels** return to the Sargasso Sea to spawn and, ultimately, die.

Following American eel migratory habits, the East River, Chester Elver Abundance Study, and East River, Chester and Oakland Stream Silver Eel Studies focus on both the upstream and downstream migratory life phases of American eel.

East River, Chester Elver Abundance Study

The East River, Chester Elver Abundance Study began in 2008, as a joint venture project between Coastal Action, Fisheries and Oceans Canada, and the Canadian Committee for a Sustainable Eel Fishery. The main objective is to estimate the number of elvers entering the river annually. Elvers typically begin arriving at the East River in early spring and continue into mid-summer. As in previous years, four traps consisting of a ramp and a holding box were placed below the falls, above the Highway 3 East River bridge.

As elvers search for the path of least resistance on their way upstream, they are attracted to the low water velocity created in the ramps and are then swept into the holding boxes. The



Elver traps in East River, Chester.

elvers are emptied from the holding boxes, placed in buckets, then carried upstream where they are counted, sampled, and released.

The traps were in place from April 21 to June 30, 2017 and checked seven days a week. Elvers were separated from juvenile eel and counted using weight-based estimates. Juvenile eels were hand counted and measured for length and weight. A subsample of elvers was collected and biologically sampled three times per week, as biological characteristics will change over the duration of a season. Each individual elver in the subsample was photo-documented and measured for length, weight, and pigment stage. A total of 176.555 kg of elvers (801,396 individuals) and 592 juveniles were estimated; however, the number of juveniles is known to be low due to escapement. The peak of the run occurred on May 22, catching 37.430 kg of elvers (163,435 individuals) overnight.

East River, Chester, Silver Eel

Stemming from the East River, Chester Elver Abundance Study, a Silver Eel Study was initiated in both the East River, Chester and Oakland Lake in Mahone Bay. Coastal Action conducted a silver eel monitoring study on the East River, Chester for the fourth consecutive year. The objective was to estimate the population of mature silver eel in the watershed and to monitor biological characteristics over the migration period. Traps were in place from August 28 to November 19, 2017. Traps were deployed in several areas of the watershed, including one recapture site in the main branch of the river, and three tagging sites further upstream.



Counting elvers.

Tagging sites have been established in the Canaan River, the outflow of Whistler Lake, and the outflow of Little Whitford Lake. The recapture trap site was established in the main branch, below the Highway 103 crossing, roughly 880 m from the mouth of the river. Traps were checked daily; occasionally at night if a run was expected. The season was slow and steady, as warm temperatures and a lack of heavy rainfall prevented a rush of eels migrating at the same time. A total of 557 eels were tagged and 13 previously tagged eels were recaptured. Most of the captured eels were silver, or in the process of silvering; only 34 of the 999 eels caught were yellow. Males outnumbered females. The largest eels

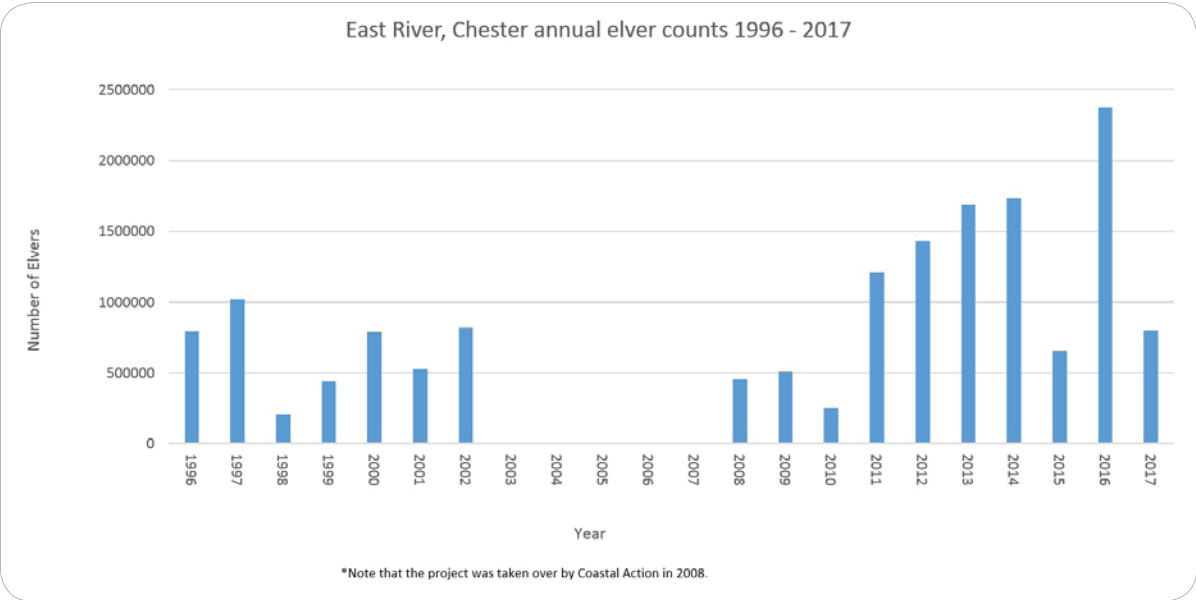


Figure 2: East River, Chester annual elver counts from 1996 to 2017.



Blaire holding an American eel, a female in her silver phase during autumn of 2017, which measured 98 cm long!

were caught at the end of the season when three eels measuring over 900 mm were captured in one trap. The largest of the three measured 980 mm in length!

A total of 75 silver eels were randomly selected and sacrificed, based on length frequency from 200 mm to 1,000 mm. Biological characteristics examined included eye diameter, fin length, body length and weight, gonad weight, sex, and the presence and abundance of the invasive swim bladder parasite *Anguillicoloides crassus*. Of the 75 eels sacrificed, 23 were female and 52 were male. Thirty-two of the silver eels sacrificed were infected the *A. crassus*; of those, 13 were female. The highest prevalence of parasites was found in a female measuring 488 mm in length, where 20 swim bladder parasites were observed.

Oakland Lake Silver Eel

The Oakland Silver Eel Study began in 2009, with the purpose of capturing and sampling eel migrating from Oakland Lake into the Mahone Bay estuary. A wire trap was set in Oakland stream, funneling any fish migrating downstream into the trap. A small, round fyke net was placed 10 m downstream of the wire trap to catch any fish that may have slipped past the funnel. The trap was fishing from August 28 to November 20, 2017. Catches varied over the season and consisted of one main run, accompanied by periods of time with no eels to sample. The trap fished the entire season with no known escapements or mortalities. The total catch for 2017 was 378 eels, including four previously tagged during the Oakland Lake Potting Study (2008-2014). Of the four recaptured eels, two had been initially tagged in the lake in 2010, one in 2011, and one in 2012. Only one of the eels captured was yellow and was one of the recaptures from 2010. The 2017 catch was lower than previous seasons.



Atlantic Whitefish



Adult Atlantic whitefish.

The Atlantic whitefish (*Coregonus huntsmani*) is Canada's rarest fish species. Although naturally anadromous, the remaining population is landlocked and confined to three interconnected lakes in the Petite Rivière watershed (Hebb, Milipsigate, and Minamkeak Lakes). The total adult population is unknown but thought to be less than 500 fish. In 1984, the Atlantic whitefish was the first Canadian fish species to be listed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The Atlantic whitefish is protected under the *Federal Species at Risk Act (SARA)* and the *Nova Scotia Endangered Species Act*.

Coastal Action has been a committed partner in Atlantic whitefish conservation since our invitation to join the Atlantic Whitefish Conservation and Recovery Team in 2003. In the early years, our focus was primarily education and outreach, providing information about the species to the local community. Throughout 2017, Coastal Action continued its Atlantic whitefish awareness program and gave several presentations at local schools and other community events.

Several notable Atlantic whitefish related events happened in 2017:

CBC's Land and Sea documentary series aired "Saving the Atlantic whitefish from extinction" in February 2017. The documentary provided an excellent account of emerging threats facing Atlantic whitefish and the Federal Government's response; furthermore, it detailed the closure and demolition of the Mersey Biodiversity Facility. The Federal Fisheries Minister gave assurances, at the time, that the hatchery was no longer required, and this decision would not affect the conservation of the Atlantic whitefish. The documentary also discussed the illegal introduction of chain pickerel (*Esox niger*) and the implications for all native species in the Petite Rivière watershed. Finally, it focused on mitigation methods implemented to control the invasive species population.

The Rotary Screw Trap (RST) was again, for the third year, our only source of positive news. The RST, deployed at the base of Milipsigate Dam, intercepted 37 larval Atlantic whitefish. Unfortunately, there was no plan in place to transport these fish to the Coldbrook Biodiversity Facility to resume a captive breeding program, and, therefore, these larval fish were released at the capture site. On a positive note, after recent discussions with Fisheries and Oceans

Canada, expectations are once again high; moreover, in 2018, any larval fish caught will be transferred to the Coldbrook Biodiversity Facility.

Historically, the Milipsigate Dam area was the premier site for observing wild Atlantic whitefish. This was the location of the original broodstock collection in the early 2000's, and the last sighting of adult Atlantic whitefish occurred here in 2014. In addition to the deployment of the RST, a floating trap net was used to monitor invasive species, native species, and Atlantic whitefish. The trap net has been placed in the same location on three occasions over the last five years. Results from the trap net study were particularly discouraging when we compared native fish captures from 2012 to 2017. The graph below (Figure 3) shows a 99.7% decline in the number of white perch (*Morone americana*) over the five-year period and a decline of 98.5% of white sucker (*Catostomus commersonii*). The number of Gaspereau (*Alosa pseudoharengus*) increased over the five year period; however, before the opening of the Hebb Dam Fishway in 2013, this species was not able to access Hebb Lake. Finally, the incidental capture of smallmouth bass (*Micropterus dolomieu*) in the trap net decreased by 87.5%.



Rotary Screw Trap and Floating Trap net at Milipsigate Outlet, June 2017.

Catch Per Unit Effort (CPUE) data revealed a decrease in the abundance of smallmouth bass as a result of angling activities during May 2017 in the Milipsigate Outlet. Figure 4 shows that the CPUE has decreased from 8.2 fish per hour in 2013 to 0.6 fish per hour in 2017. Therefore, Coastal Action believes that targeted angling can have an effect on invasive populations in certain circumstances.

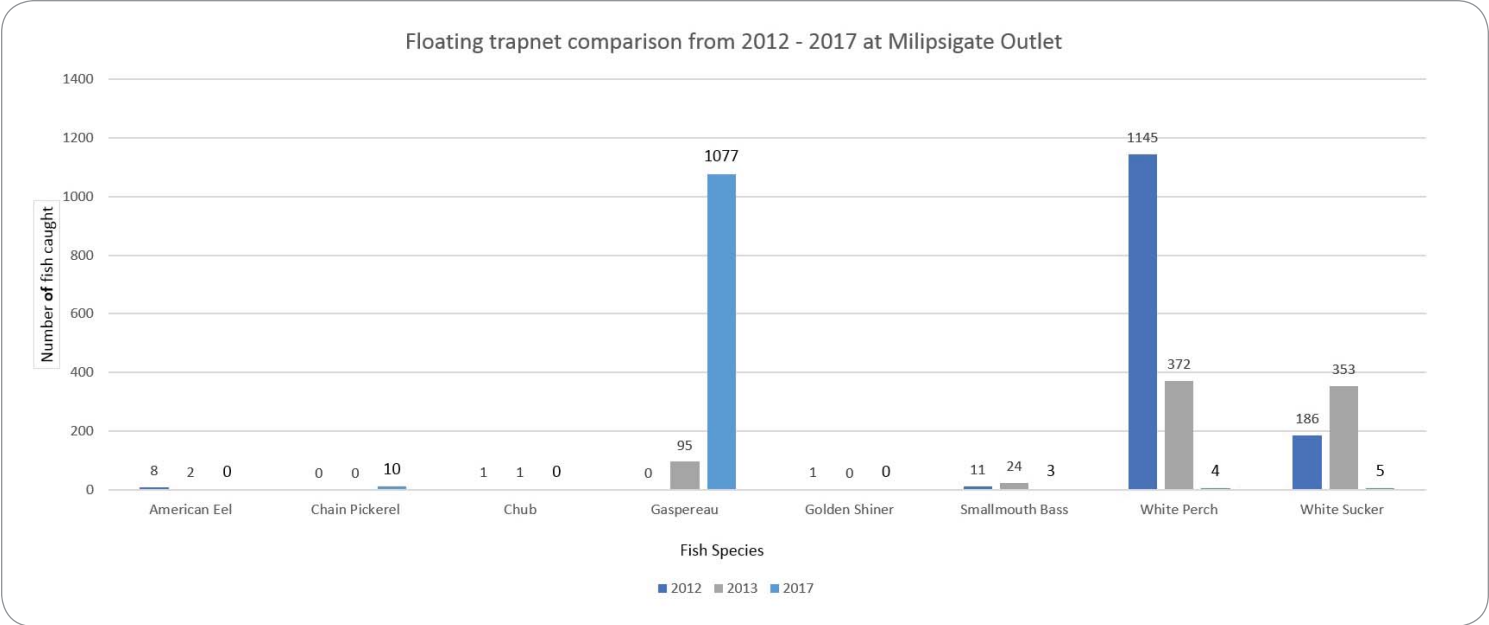


Figure 3: Fish captures at the floating trap net; a comparison between 2012-2017 at the Milipsigate Outlet.

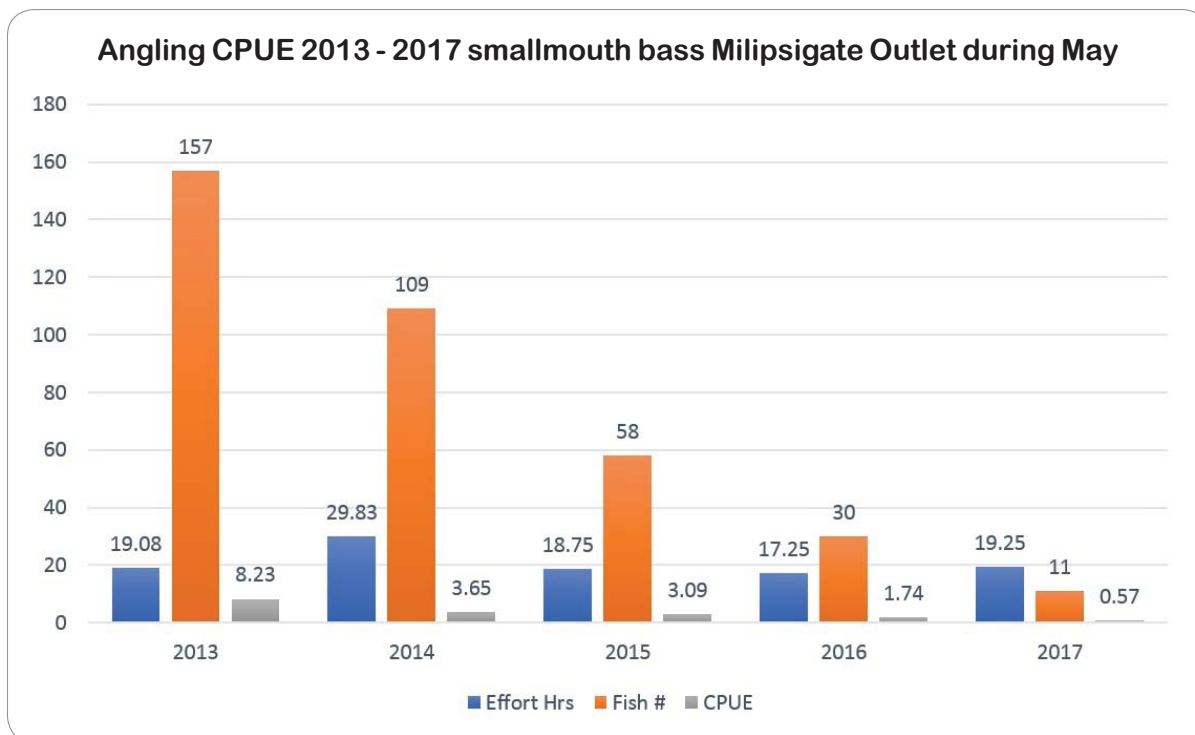


Figure 4: Catch per unit effort data over the past five years targeting smallmouth bass at the Milipsigate Outlet.

Coastal Action Stories: Rum & Chowder Social

Coastal Action's 5th Annual Rum & Chowder Social was hosted at the Lunenburg School of the Arts on June 9, 2017. This new partnership allowed us to work with local artists and offer their original art pieces for sale, with 50% of sales being donated to Coastal Action. We were pleased to showcase the art of 22 local artisans. The event was supported by 14 restaurants and individuals who donated chowder, two local bakeries who donated rolls, and as always, Iron Works Distillery who supported the event. We also welcomed the Petite Winery who shared a variety of wines and ciders as well as contributions from the Mug and Anchor Pub who created a "rum punch", alcoholic and non-alcoholic versions available, for the event. We were thankful for the contributions of the South Shore Breaker, who acted as our advertising sponsor again this year.

Coastal Action had incredible support from our local politicians, who acted as guest servers for the evening; Senator Wilfred Moore, South Shore - St. Margaret's MP Bernadette Jordan (our emcee for the event), MLAs Suzanne Lohnes-Croft and Mark Furey, as well as local Mayors Rachel Bailey of the Town of Lunenburg, David Mitchell of the Town of Bridgewater, Carolyn Bolivar-Getson of the Municipality of the District of Lunenburg, and David Devenne of the Town of Mahone Bay. It was a great representation of all levels of government, joining us in celebrating Canada 150 and World Ocean's Day. A good time was had by all in attendance!



Coastal Action staff take a break from running the show for a group shot at the 2017 Rum and Chowder Social.

LaHave River Invasive Species Project



Angling for invasive fish species.

Chain pickerel (*Esox niger*) and smallmouth bass (*Micropterus dolomieu*) are both invasive, predatory fish species now common in Nova Scotia. First introduced in the 1940s to potentially improve the sport fishery, both species have since been introduced into many freshwater ecosystems throughout the province. Due to their aggressive and piscivorous nature, chain pickerel (CP) and smallmouth bass (SMB) have caused dramatic declines in populations of native fish species throughout the province. In 2017, Coastal Action initiated a project to assess the impacts of CP and SMB on migrating Atlantic salmon smolt in the LaHave River. One of the project objectives was to prove CP and SMB were directly preying upon smolt in the LaHave River during their spring migration to the ocean.

The Atlantic salmon (*Salmo salar*) is an anadromous species of fish that is a member of the salmonid family. Adult Atlantic salmon range from 50-100 cm in length and often weigh between 10 to 20 kg. After spending one to two years at sea, adult salmon return to their native rivers to spawn. During the spawning process, female Atlantic salmon build a nest called a redd, where they will lay up to 1,500 eggs per kilogram of body weight. Once hatched, the young salmon spend their first life stages hidden amongst the substrate. At the end of their first year of life the young salmon average 6-12 cm in length and are known as parr. Depending on food availability, Atlantic salmon remain in the parr stage for 1-5 years before maturing into smolt. Each spring the smolt migrate to the ocean to feed on small fish and crustaceans, during this time they will more than double their size, averaging 12-24 cm in length, which makes them vulnerable to predation by smallmouth bass and chain pickerel.

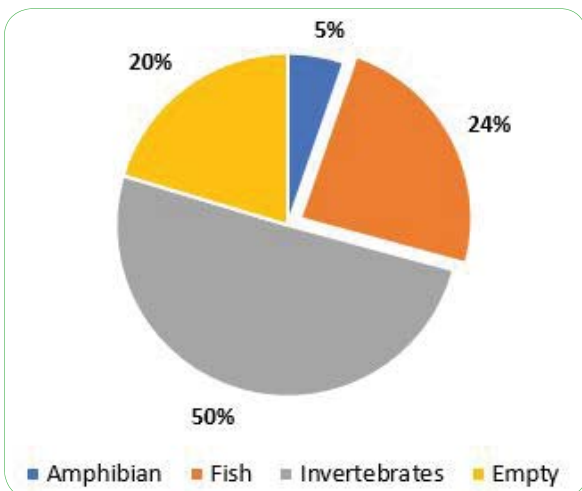


Figure 5: Sample of chain pickerel diet, as observed following stomach content analysis.

In the past, the LaHave River has supported a healthy population of an estimated 4,000 Atlantic salmon; however, numbers have since declined to fewer than 200 adult salmon returning to spawn.

Considered an index river by Fisheries and Oceans Canada (DFO), the LaHave River plays an important role in estimating the remaining Atlantic salmon numbers for the Southern Upland region of the province. Adult salmon migration is monitored on the main stem of the river near New Germany at the Morgan Falls fishway by DFO staff.

Although Atlantic salmon populations are currently facing multiple threats, the presence of CP and SMB has had a perceived negative impact on native fish species in the LaHave River. To better understand their impacts on the Southern Upland Atlantic salmon population in the LaHave River, Coastal Action has conducted extensive scientific angling throughout the watershed specifically targeting smallmouth bass and chain pickerel. Each individual SMB and CP captured was analysed for length, weight, mouth gape, sex, and stomach content. During the month of May, angling efforts were focussed on Wentzells Lake, where the main stem of the river and the North Branch tributary converge. In May, a total of 13 smolt were found during stomach content analysis of CP and SMB, confirming that both species were directly preying on salmon smolt during that time. Figure 5 displays the results from the stomach content analysis conducted on chain pickerel during the month of May.



Estimated range of invasive species in the LaHave River.

The majority of the prey items consisted of invertebrates; however, many chain pickerel were found to be preying on fish as well. Figure 6 shows the breakdown of fish species found in the stomachs of chain pickerel during May. The graph shows that during salmon migration, chain pickerel are targeting smolt over other species of fish available to

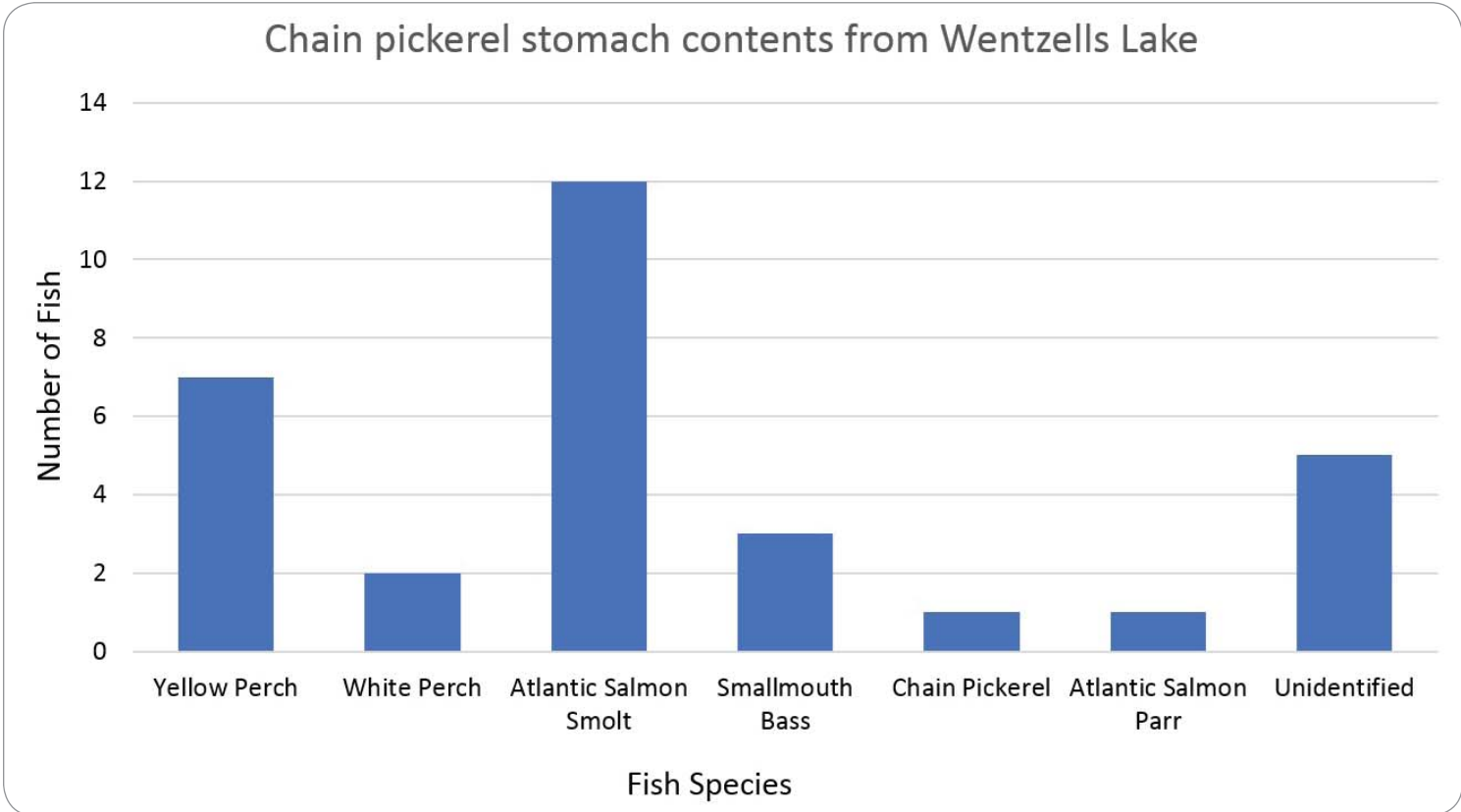


Figure 6: Fish species found in the stomach contents of chain pickerel sampled from Wentzells Lake, Nova Scotia.

them. If this is in fact the case, Atlantic salmon smolt will continue to be negatively impacted from predation by CP in the LaHave River.

Once the smolt migration had commenced, angling began in other sections of the watershed to determine ranges for both SMB and CP. Chain pickerel and smallmouth bass were present throughout the entire North Branch sub-watershed, aside from a few small lakes and tributaries. In the Main River sub-watershed, both species were found downstream of Morgan Falls, all the way downstream to the Town of Bridgewater. After spending several hours on New Germany Lake, using both angling and baited traps, no chain pickerel were observed or captured. However, CP were observed directly below Morgan Falls earlier in the season suggesting that the water velocity through the fishway may be impeding pickerel migration upstream into New Germany Lake. SMB were found throughout the entire Main River sub-watershed, aside from a few lakes and tributaries. CP were found to be present in the West Branch sub-watershed up to a certain point but were impeded by a barrier which prevented them from reaching the headwaters of this section. SMB were observed in most sections of the West Branch sub-watershed, aside from a few lakes and tributaries. No CP were observed in the North and West River sub-watersheds, SMB were, however, present in both.

During 2017, Coastal Action successfully analyzed and removed over 500 chain pickerel and smallmouth bass from the LaHave River. Predation of salmon smolt by these invasive species was confirmed during the spring smolt migration. Coastal Action plans to continue the project in 2018 to further study the impacts of CP and SMB on Atlantic salmon smolt in the LaHave River.

Coastal Action Stories: Nature New Brunswick Partnership

Coastal Action was approached by Nature New Brunswick to act as a regional partner on their project entitled “Planning for Climate Change: Integration of Ecosystem Functions and Services into Land Use Planning and Decision Making” which is funded through Environment and Climate Change Canada’s Atlantic Ecosystem Initiative Funding Program. Nature New Brunswick has engaged various environmental organizations across Atlantic Canada to share information and gather data on environmental monitoring and land-use activities on a watershed scale.

Coastal Action provided this group with monitoring and restoration data from one of the sub-watersheds in the LaHave River system (North Branch) including water quality data, riparian and in-stream habitat assessment data, aquatic connectivity assessment data, and land-use information. In addition, Coastal Action collected surveys from several individuals and organizations who live in or use the North Branch sub-watershed area for various purposes such as recreation, private land ownership, fishing, or agriculture. This survey gathered a wealth of information from this section of the watershed including landscape features, environmental threats, land-use practices, species distributions, and water usage.

Coastal Action is grateful to Nature New Brunswick for the opportunity to be involved in this project and appreciates the valuable contributions of local knowledge from watershed residents.



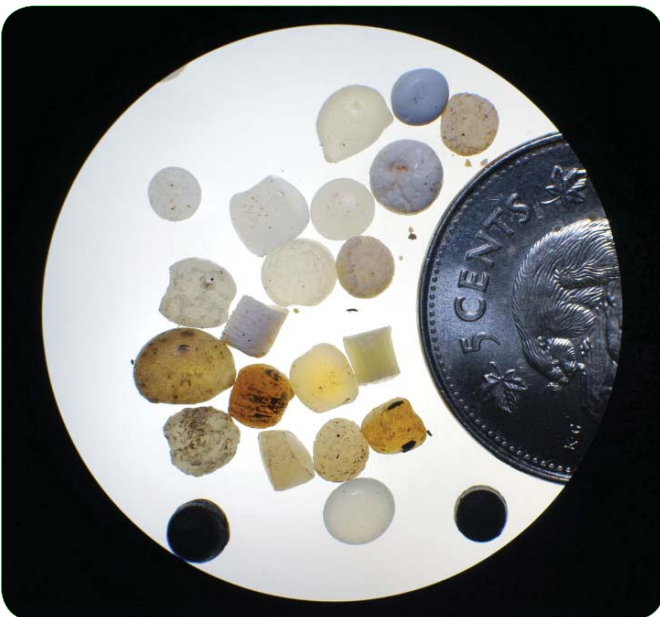
Sub-watershed land-use survey feedback.

Atlantic Canada Microplastic Research Project



Low-tech Aquatic Debris Instrument (LADI) during testing, created by Memorial University's Civic Laboratory for Environmental Research (CLEAR).

In the summer of 2017, Coastal Action's *Atlantic Canada Microplastic Research Project* (herein 'the project') was awarded funding from Environment and Climate Change Canada's Atlantic Ecosystem Initiative (AEI) Funding Program. The 3-year project (2017-2020) will fill the gap in Atlantic Canadian-specific microplastic research, as well as add to existing research, using sampling methods from studies in the St. Lawrence and Great Lakes. The project will sample both surface water and benthic sediment at three coastal locations in Atlantic Canada: Bay of Fundy, Nova Scotia; Bay of Islands, Newfoundland; and LaHave River Estuary, Nova Scotia.



Industrial pellets (nurdles) under a microscope. Photo: Civic Laboratory for Environmental Research (CLEAR), Memorial University.

The primary goal of the project is to quantify microplastic in the Atlantic Canada region. Although plastic pollution comes in a variety of sizes and from many sources, this project will investigate microplastics less than 5 mm in size. Such plastics can either be **primary** or **secondary microplastics**. Primary microplastics are manufactured as 'microbeads' in products such as face washes, toothpaste, and industrial abrasives. Secondary microplastics are fragments of larger plastics which have been broken down by wave action and sun exposure. Due to plastic's ubiquitous nature and ability to break into microscopic pieces, the material has been discovered in most waterbodies around the world.

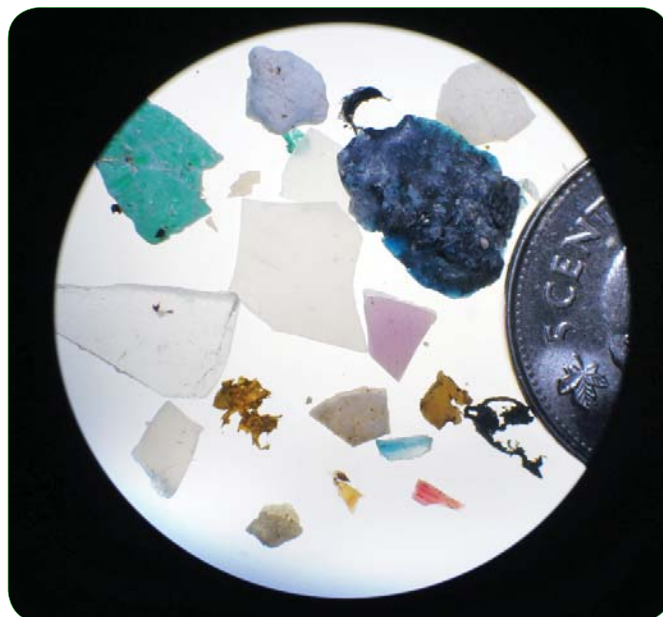
Over the course of the 3-year project, Coastal Action will focus on three main research questions:

1. What are the abundance of surface microplastics and benthic (sediment) microplastics quantified in three coastal locations in Atlantic Canada?

2. Where are the concentrated ‘hot-spots’ of microplastics across three locations in Atlantic Canada?

3. How can this data inform action initiatives aimed at feasible solutions for mitigating microplastic accumulation?

The project began in the fall of 2017, with the overall goal of research and development. Specific objectives of Year 1 (September 2017 to March 2018) focused on research, expert consultation, presentations, project methodology, and preparation for the 2018 sampling season (June 2018 to September 2018). Although the volume of research on microplastics has grown in the last five years, little is known about the abundance of microplastics in Atlantic Canada’s near-shore marine environments or the extent to which plastic particles can impact specific species and habitats that are vital to the region’s coastal ecosystems. To address this knowledge gap, the project will collect data that can be used to inform decisions and actions (i.e., waste management and plastic reduction strategies) on the growing issue of microplastic accumulation in Atlantic Canadian environments.



Plastic fragments under a microscope. Photo: Civic Laboratory for Environmental Research (CLEAR), Memorial University.

The project will conclude with a workshop to communicate the data collected and meet with stakeholders across academia, industry, business, government, and non-government organizations to foster practical and effective solutions for the significant issue of plastic pollution.

Coastal Action Stories: Park View Education Centre

On June 1, 2017, Coastal Action staff Sam Reeves and Shawn Feener traveled to Park View Education Centre to present a lesson on fish anatomy to the Biology 11 class. The students learned how to identify internal and external fish anatomy and had an opportunity to dissect and analyze the stomach contents of invasive fish species.

Approximately 30 fish, including both smallmouth bass (*Micropterus dolomieu*) and chain pickerel (*Esox niger*), were used for the workshop. The students collected several measurements; fork length (cm), weight (kg), and mouth gape (cm), which were later entered into a database for Coastal Action’s LaHave River Invasive Species Project. Students then made an incision along the torso of their fish to investigate the internal organs, determine the sex of the fish, and identify the stomach contents.



Park View students dissecting invasive fish species.

Morton Centre Environmental Educational Programs



Participants in the wizard-themed Earth Adventure Day Program releasing their natural 'potions' to defeat the trolls.

The Morton Centre

The Morton Centre (MC) is located within a 99-acre property on Heckman's Island, near Lunenburg, Nova Scotia. The property is ecologically diverse and contains five different ecological areas; secondary-growth mixed coniferous and deciduous forest, two large hay fields, freshwater ponds, a salt marsh, and nearly two kilometers of shoreline. The property boasts a network of trails, as well as a cottage with full amenities to accommodate summer staff and retreat visitors. A variety of outbuildings, including a 17-foot yurt, provide further programming space during the summer months.

The MC was originally an active farm owned by Dr. Harry and Rachel Morton. The couple wished to see their property protected and used for environmental research and education. The Morton's gifted their property to Acadia University in 1995; since then, the MC has been used primarily as a field station for Acadia student research. Acadia later shifted the purpose of the MC to become a place for public environmental education, and in 2013, partnered with Coastal Action to deliver environmentally-themed programs to engage and educate local youth.



Nature Detectives participant discovering natural treasures.

The initial goals of the programs have expanded to include building connections between youth and the natural world, increasing environmental stewardship and awareness within the community, and addressing the lack of environmental programming within the public school system, primarily through the Earth Education method. Earth Education is a philosophy focused on connecting youth to nature through the head, the heart,

and the hands - in other words, through understanding, feelings, and action. All Earth Education programs at the MC are developed with these concepts in mind. Tied together with an engaging narrative and a variety of activities, the programs aim to improve the participants' understanding of scientific concepts (e.g., What is a habitat? How does the water cycle work?), to create an environment in which the participants feel a sense of wonder and appreciation for the natural world (i.e., getting down on the ground and looking at plants and mushrooms up close or sitting silently in the forest, observing and listening to their surroundings), and to incite action in the form of something the participant can do at home or in their community to reduce their impact on the environment (e.g., walking to school instead of getting a drive, planting a garden, organizing a community clean up, etc.). Coastal Action's MC programs have grown considerably since 2013, with the addition of spring and fall programming, and a growing suite of summer programs.



A group of campers becoming birds and flying down the trail.

Overview of Programs Offered in 2017

Coastal Action delivered several environmental education programs in 2017, including the Trailblazers After-School Program, the Grade three Learn-to-Grow Gardening Program, an Environmental Leadership Training Program, two summer day camps, four Family Nature Events, the Grade four Cycle Savers Program, two Earth Adventure Day Programs, and more! All programs took place outdoors and were designed to provide participants with opportunities to enjoy experiential learning, science, discovery, and being active in nature. Each program included games, stories, creative projects, exploration and physical activity, as well as hands-on learning related to the theme.

Trailblazers

This was our second year running Trailblazers, an all-outdoors after-school program for students in Grades six to nine at Bluenose Academy. We run Trailblazers in the spring and fall seasons, and this fall we expanded to offer the program twice a week to accommodate the



A camper making a 'whiff sundae' at the Morton Centre.

growing number of interested students. A typical day involves two leaders meeting the group at the school at dismissal time and then walking to a nearby 'wild' area once a week for approximately 10 weeks. We play active, heart-pumping games, prepare and eat a nutritious snack, and spend structured and unstructured time playing and building skills in the forest. The program is offered free-of-charge and runs in all kinds of weather. The overall goals are re-connecting kids to nature, stimulating outdoor free play, and building outdoor leadership skills. In 2017, we had 16 participants in the spring and 26 participants in the fall. Because this program allows leaders to meet regularly with the participants, it is easier to gauge the success of the program by observing the changes in the participants and having frequent conversations about their engagement in the program. Leaders of the program observed growth in leadership and teamwork development, reduced stress, an increased desire to play

and use imagination, participants choosing to be physically active, and spending time outdoors during their free time at home and school. The participants have remarked that they enjoy the unstructured nature of the program, would like for the program to be longer, and want to return to participate in 2018.

Learn-to-Grow

Learn-to-Grow was a pilot program developed and run in the spring of 2017. The purpose of the project was to engage local youth in an experiential and educational program promoting physical activity and the consumption of healthful food; as well as to encourage self-sufficiency by providing local youth with the opportunity to gain valuable skills, such as how to sustainably seed, plant, weed, and harvest their own food. To do this, Coastal Action developed and delivered curriculum-linked educational programming for grade three students in Lunenburg and Queens Counties. Coastal Action delivered six weeks of programming with two Grade three classes at Bluenose Academy in Lunenburg, NS and four weeks of programming with three Grade three classes at John C. Wickwire Academy in Liverpool, NS. In total, 92 students participated in the program. In addition, there was an eight-week summer volunteer program at John C. Wickwire Academy where families registered to do garden maintenance for one week at a time. Each weekly spring workshop had three lesson components: a lesson that was linked to the Grade three science curriculum, such as learning about soil type and composition, or plant life cycle; a physical garden activity, like planting seeds, watering, weeding, or harvesting; and often, a reflective exercise, such as writing or drawing about what they learned or their predictions for how the garden would change over time. The teachers of these participants commented that their students were engaged with the interactive, hands-on style of learning, and the outdoor setting. The sessions included games, discussions, hands-on garden time, crafts, and other activities, which kept the students engaged and having fun. Furthermore, the participants expressed an interest and excitement in eating fresh vegetables and fruit and looked forward to the late summer harvest.



Participants in the Learn-to-Grow program tending to the garden.

Environmental Leadership Training

The Environmental Leadership Training Program was adapted from the Junior Leadership Training Program which was developed in 2016. Building on the success of the 2016 program, an extra training day was added to give participants more time to become comfortable in their role as a leader for our two Earth Adventure day camps. Six local youth were given two days of program and leadership training. The youth leaders were acquainted with the program site and staff, introduced to the principles of Earth Education, and to the benefits of leadership and team-building. The youth also practiced leading games and activities and then assisted the on-site program coordinators and program supporter during the day camps. Many of these youth volunteers had never worked in a leadership role with children and expressed an appreciation for having the opportunity to build their leadership skills. Each participant also remarked on how much they appreciated spending time being active outdoors and disconnecting from technology.

Summer Day Camps

Nature Detectives

Nature Detectives was a new half-day camp offered in Summer 2017. It was adapted from a program designed by the Adventure Earth Centre in Halifax, NS for younger participants, ages 6-8. In 2017 there were seven participants in total, who were immersed in a week of exploration and challenged to solve the mystery of the disappearance of the mythical shapeshifters. Throughout the week, campers participated in activities that were designed to increase their appreciation and wonder for the natural world and wild habitat; gain skills in discovering the natural world using multiple senses; and understand that all creatures depend on their home (habitat) for their basic needs (food, air, water, and shelter).

This new program was successful and received positive feedback from both the participants and their families. The campers were so enthralled by the story of the shapeshifters, that they were excited to learn and participate each day.

Wild Adventurers

Wild Adventurers is one of the most popular programs that has been delivered during summer programming at the MC since 2015. It is a full-day camp for youth ages 9-12, and in Summer 2017, there were eight participants in total. With the help of new summer staff and volunteers, this program was completely revamped to improve the flow of the program and to keep the story exciting for returning campers. During this program, campers become adventure-seekers that learn from wild creatures about how to explore and survive in the natural world and how to live in harmony with our environment. At the end of the week, campers put their wilderness survival skills to the test by building and sleeping in their own tarp shelters and participating in the mysterious Council of All Beings. Wild Adventurers was successful and received positive feedback from both the participants and their families. The leaders were able to observe how much the youth had learned at camp during the magical Council of All Beings meeting that was held on the beach on the evening of their camp-out in the woods. This was an opportunity for the campers to tell the Council members what they had learned throughout the week, and that they were ready to become Council members. The leaders were thrilled to see that they had met the outcomes for the program, which were to improve their skills in working with others; learn outdoor skills to live in the natural world with minimal impact; have increased appreciation for the natural world; gain knowledge of ecological systems (air, water, soil cycles); and identify ways to live more harmoniously with the Earth.



The Wild Adventurers returning after spending the night in tarp shelters in the woods.

Summer Family Nature Events

Coastal Action's other events at the MC include the Annual Open House & Family Picnic along with our Family Nature Events. The Annual Open House & Family Picnic is a fun, community-building and awareness-raising event which includes a free barbeque lunch, informational displays, nature activities, crafts for kids, and a walking tour of the property. In Summer 2017, there was a turnout of around 50 community members who came out to learn about Coastal Action's projects and the MC property. The Family Nature Events are intended to reconnect families with nature and build awareness about the MC property and Coastal Action within the community. In 2017, events included themed nature walks and activities, GPS and geocaching activities, and evenings with stories, songs, and snacks around a campfire. The four Family Nature Events held at the MC were a success this summer and continued to provide a great opportunity for more community members to visit the MC property and experience a sample of Coastal Action's education programming.



Participants in a Family Nature Event watching a leaf slide show.

Cycle Savers

Cycle Savers is an intriguing, hands-on, Earth Education program for Grade four students based on a mystery

code and club theme. Coastal Action has been running this program at the MC since the education programs began in 2013. This program also incorporates a leadership component for high school students, who are given two days of program and leadership training, then lead the groups of Grade fours, in pairs, on a captivating adventure to appreciate, understand, and respect the air, water, and soil cycles through an action-packed field trip at the MC. Students complete activities in a natural setting, which address Grade four science curriculum outcomes, as they decipher the lost manual of the Cycle Savers Club, learn how their household is affecting the environment, and what they can do to make a difference. Three Grade four classes participated in the program during Fall 2017; a total of 76 participants. We also had a group of eight students from Park View Education Centre who were trained to lead this program. Coastal Action continues to receive positive feedback from the teachers, chaperones, youth leaders, and Grade fours that participated in the Cycle Savers program. Two Grade four teachers at Bridgewater Elementary School returned for their third Cycle Savers field trip at the MC. They continue to enjoy the program each year and plan to return in 2018.



Cycle Savers participants hanging out inside a 'leaf'.

Earth Adventure Days

One of Coastal Action's new education programs in 2017 was the Earth Adventure Day program that was led on school in-service days. These day programs were created out of a camp being developed for 2018, called World of Wizards. During this program, campers need to protect a mystical forest that is being threatened by polluting trolls. Through adventurous activities in the forest and on the beach, the participants engage their curiosity in the exploration of the natural world and use their senses as valuable tools in understanding the natural world. The program was offered to 6-8-year-old children, and we had 20 participants total over the two days. Both the participants, and the parents, were happy with the program, and with having the option for adventuresome outdoor programming on in-service days.

Other Events and Activities

In addition to the main programs delivered in 2017, Coastal Action also led a few day programs and workshops at the Morton Centre for other groups. Two programs were delivered for the local Lunenburg Sparks (ages 5-7) group, in spring and fall. The groups were led on an 'Earthwalk' around the Morton Centre property, following clues left behind by fairies and gnomes. Throughout these programs, the participants engaged with their senses in nature and gained an appreciation for the natural world. There were 23 participants total over the two program days. In Fall 2017, Coastal Action also delivered a workshop for a local group of Duke of Edinburgh students. The participants learned some new wilderness skills including, 'Leave No Trace' principles, packing, and orienteering. Ten students in total participated in this workshop.

Recap

Overall, Coastal Action celebrated many successes at the MC in the 2017 season. A new day camp and two new programs were offered, and the quality of our existing programming continued to improve. Participant numbers increased, with 321 children and youth engaged in total, and the feedback from participants, teachers, and parents continues to be overwhelmingly positive and encouraging. Coastal Action's goal is to continue delivering quality educational programs to youth and offer more opportunities for children, adults, and families to engage with the natural world.

Canada 150 Project



Canada 150 event in Lunenburg highlighting marine debris and microplastics.

Coastal Action developed a Canada 150 project celebrating Nova Scotia's coastal heritage with a focus on marine plastic pollution. With the help of our partners, ACAP Cape Breton and Clean Annapolis River Project (CARP), the Nova Scotia Heritage and Marine Stewardship C150 Project (herein the project) set up events and activities at four coastal locations across the province during the 2017 summer season (June to September). Each location (see Table 2) highlighted a unique facet of coastal Nova Scotian history while providing information, activities, and solutions around the impacts of plastic pollution on our coastal and marine environments.

In homage to the nation's 150th birthday, the project highlighted Atlantic Canada's sailing, fishing, and boat building communities by curating activities that featured cultural and environmental themes unique to Nova Scotia. The events engaged Canadians and visitors in marine stewardship initiatives to celebrate the natural beauty of our home and motivate us to protect and conserve its important ecosystems.

Table 2: Coastal Action Canada 150-related activities throughout Nova Scotia during summer 2017.

Location	Events and Activities	Partners
1) Lunenburg Waterfront	Ocean Arts and Crafts; Explore a Wooden Schooner and Learn about Plastic Pollution Prevention; Dory Rides (info and tours provided), Information booths, merchandise, and snacks; Boomerang Bags (supplies and bags available).	Fisheries Museum of the Atlantic; The Blue Dream Project; Canadian Dory Racing Association; Abundance Pops; Region 6 Solid Waste Management; Lunenburg Harbour Folk Festival; Waterfront Development Corporation.
2) Sydney Waterfront	Beach cleanups (Indian Beach, North Sydney; Dominion Beach, Dominion; Big Glace Bay Beach, Port Caledonia). Presentation from Dr. Bruce Hatcher and the dive team on harbour ecology at Indian Beach. Information and Activity Booth during Tall Ships arrival.	Event lead: ACAP Cape Breton

Location	Events and Activities	Partners
3) Annapolis Royal Causeway	During Natal Days, providing a marine education message and activities led by Clean Annapolis River Project (CARP). Interactive touch tank was set up at the AR Causeway where the children's parade and activities took place. Information on the work CARP does in the watershed as well as plastic pollution information and marine debris prevention.	Event lead: CARP
4) Digby Recreation Arena	Due to rain, the location was changed to the Digby Recreation Centre where family activities were set up as part of Scallop Days. Coastal Action and CARP both set up booths to provide marine debris and environmental education and activities, including CARP's interactive touch tank. Arts and crafts were available, as well as information and posters on pollution in the marine environment.	Event lead: CARP, Town of Digby



Canada

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Building Capacity Through Career Development



Coastal Action staff receiving their Professional Writing for the Workplace certificates from ThinkSmart owner Lisette Jones.

In 2017, Coastal Action invested time and resources to obtain a variety of certifications and develop our staff capacity. This internal capacity building will allow Coastal Action to continue delivering a well-rounded suite of environmental services to various stakeholders.

In November, Coastal Action staff, under the direction and support of Jamie O'Neill of Uprise Consulting, completed several days of Strategic Initiative Execution Team Training in order to develop a new 3-year organizational strategic plan. This training was funded through the Nova Scotia Department of Labour and Advanced Education's Workplace Education Initiative.

During the winter months, Coastal Action staff completed a 40-hour Professional Writing for the Workplace Course, delivered by Lisette Jones, owner of ThinkSmart Training and Consulting. The writing course was also funded through the Nova Scotia Department of Labour and Advanced Education's Workplace Education Initiative.

In addition to these valuable organization-wide training opportunities, several staff members received training and certification in the following courses: Standard First Aid, SCUBA Open Water Diver, Backpack Electrofishing, Wetland Delineation, Wetland Ecosystem Services Protocol (WESP), and Watercourse Alteration Installer for Fish Habitat Restoration.

Outreach Events



Coastal Action staff at the Lunenburg Academy of the Arts during the 5th Annual Rum and Chowder Social on June 9, 2017.

Coastal Action's outreach and education projects and events constitute a very important aspect of our work as an environmental organization. Public events, festivals, presentations, organized environmentally-themed challenges, meetings, and wildlife-centred awareness days make up just some of the outreach events we've been a part of in 2017.

Table 3: Coastal Action outreach events in 2017.

Date	Event
Friday, March 17, 2017	White Point Beach Resort March Break Fun for the Family Event
Saturday, March 25, 2017	Agriculture Day - Bridgewater
Wednesday, April 12, 2017	Canadian Wildlife Federation Walk for Wildlife - Morton Centre
Thursday, April 13, 2017	Wildcat Wetland Restoration Project presentation - Bridgewater Public Service Commission
Wednesday, April 19, 2017	Earth Day Litter Challenge
Saturday, April 22, 2017	Nova Scotia Salmon Association's NSLC Adopt-a-Stream Sale (Bridgewater)
Friday, April 28, 2017	Nova Scotia Salmon Association's NSLC Adopt-a-Stream Sale (Lunenburg)
Saturday, April 29, 2017	Nova Scotia Salmon Association's NSLC Adopt-a-Stream Sale (Mahone Bay)
Monday, May 1, 2017	LaHave River Watershed Committee presentation - Coastal Action office
Friday, May 19, 2017	Environmental Education and Communication presentation
Monday, June 5, 2017	Town of Lunenburg Garbage Clean-up
Tuesday, June 6, 2017	Park View Education Centre Field Day
Friday, June 9, 2017	Mahone Bay Garbage Clean-up
Friday, June 9, 2017	Crescent Beach Garbage Clean-up

Table 5: Coastal Action outreach events in 2017 (continued).

Date	Event
Friday, June 9, 2017	5th Annual Rum and Chowder Social
Saturday, June 10, 2017	Canada 150 Event - Lunenburg
Thursday, June 15, 2017	Coastal Action Annual General Meeting - Petite Rivière Vineyards
Friday, June 23 and Saturday, June 24, 2017	Bridgewater Growing Green Sustainability Festival
Tuesday, June 27, 2017	Coastal Action Highway Clean-up
Thursday, July 13, 2017	MTRI Chimney Swift Event- Lunenburg
Saturday, July 15, 2017	Fisheries Museum of the Atlantic's 50th Birthday - Lunenburg
Tuesday, July 25, 2017	World Ocean School - MARC, Bridgewater
Friday, August 4 and Saturday, August 5, 2017	Mahone Bay Boat Festival
Tuesday, August 8, 2017	MARC Open House for Straight Pipes
Thursday, August 10 and Friday, August 11, 2017	Tall Ships and Folk Harbour festivals - Lunenburg
Thursday, August 17, 2017	Exhibition Grounds Children's Fair
Tuesday, September 12, 2017	Michelin Outdoor Classroom Grand Opening - Bridgewater

Coastal Action Stories: Riv Temp Monitoring

The Riv Temp network is a partnership between universities, watershed organizations, and government agencies dedicated to Atlantic salmon conservation. This group has established a network of over 500 river temperature monitoring stations across Atlantic Canada.

Coastal Action joined the Riv Temp network in 2016. The network provides each partner organization with a water temperature data logger which gets deployed in a river in the spring to collect real-time temperature data throughout the summer. The data logger is then retrieved in autumn and sent back to the Riv Temp network for the extraction of data. The temperature data collected from all of the monitoring stations are stored by Riv Temp in a database, creating a valuable tool for the management and conservation of Atlantic salmon in eastern Canada.

Coastal Action has installed a water temperature data logger in the North Branch of the LaHave River in 2016 and 2017. Water temperatures in this section of the river displayed an average of 21.2°C from June 8 to September 26 in 2017.

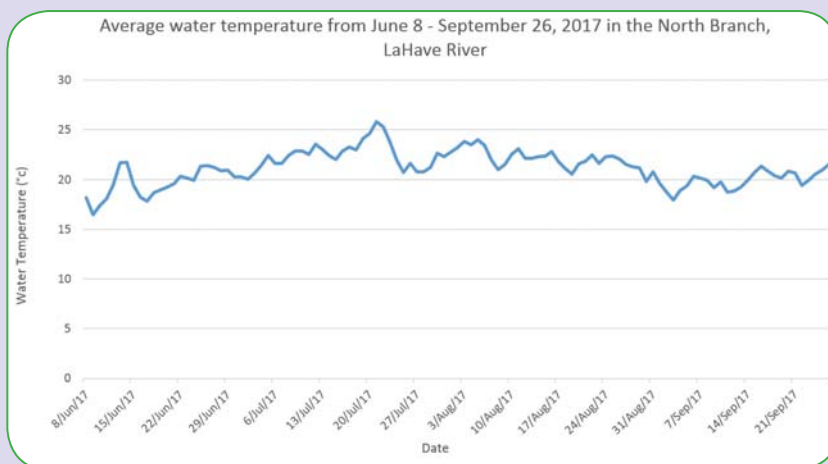


Figure 7: Mean water temperatures in a section of the North Branch of the LaHave River.

Stella's Science Project



Stella Bowles standing next to the LaHave River.

At just 14 years old, Stella Bowles has become one of Nova Scotia's greatest environmental advocates. Her efforts began as a science fair project, sampling fecal bacteria in the LaHave River estuary. Using her social media savvy and her unrelenting passion for the environment, Stella quickly drew national attention to her plea for the removal of illegal straight pipe sewage systems in the LaHave River. Stella played a significant role in the development of a \$15.7 million project, funded by federal, provincial, and municipal governments to have these straight pipes replaced by compliant septic systems over the coming years. The LaHave River Straight Pipe Replacement Project will begin replacing straight pipes in 2018 and aims to eliminate the estimated 600 pipes by the year 2023.

In addition to winning a silver medal at the Canadian-wide Science Fair in 2017, Stella won an impressive variety of national and international awards including the Gloria Barron Prize for Young Heroes International Award (USA); the Wade Lunzy Youth Conservation Award from the Canadian Wildlife Federation (Montreal, Canada); and Canada's Top Environmentalists Under 25 Award from Starfish Canada.

While much of her prize earnings have been ear-marked for Stella's education, she has decided to use some of that money to spearhead her next environmental initiative. Coastal Action has teamed up with Stella to help her create bacteria testing kits for youth groups across the province. In 2018, we'll be providing the training, resources, and support necessary for kids to test fecal bacteria in their own waterbodies. Stella's vision of a youth-driven environmental movement across Nova Scotia and beyond is impressive to say the least. One thing is for sure, this girl is unstoppable!

LaHave River Watershed Project



Collecting water samples from the LaHave River.

Coastal Action began the LaHave River Watershed Project (LRWP) in 2007. The goals of the project are to create a long-term record of the river's health, identify and reduce harmful environmental impacts, and foster a sense of watershed stewardship within the community. The LRWP is guided by an advisory committee with representatives from various government departments, academia, industry, non-profit organizations, and community members. Project activities completed in 2017 included aquatic connectivity and fish habitat assessments, fish habitat restoration projects, water quality monitoring, and community outreach and education.



Runaround channel constructed at Rhodenizer Lake.

Fish Habitat Restoration

Coastal Action began investigating aquatic connectivity in the LaHave River watershed in 2015 in order to identify and remediate stream crossings which act as barriers to fish passage. To date, these assessments have been conducted in the Main River, North Branch, and West Branch sub-watersheds of the LaHave system. A total of 274 stream crossings have been assessed since 2015. In 2017, 34 culvert assessments were conducted using a protocol developed by Nova Scotia Salmon Association's NSLC Adopt-A-Stream Program (AAS). A total of 38 fish habitat assessments were completed in several streams throughout the watershed as well for the purpose of identifying degraded aquatic environments and prioritizing restoration needs.

Seven of the fish passage barriers identified in the Main River and North Branch sub-watersheds were selected for remediation in 2017 based on a number

of considerations, including the amount and quality of upstream fish habitat, the cost and feasibility of remediation, and the presence of invasive fish species.

Main River Sub-Watershed Restoration Projects

Restoration activities in the Main River sub-watershed involved the installation of 12 fish habitat structures along Juniper Brook, Veinot Road Brook, Ross Brook, Silver Mill Brook, Indian Brook, and Rhodenizer Brook. Four of these sites were culverts which were restricting fish passage due to outflow drop barriers or a lack of water depth inside the culvert. Fish passage was restored by installing weir and chute structures on the outflow of the culverts.

The restoration site on Indian Brook involved a degraded riparian habitat caused by an unfenced cattle pasture. A six-meter-long culvert was installed at this site to allow cattle to cross the stream without damaging the streambed.

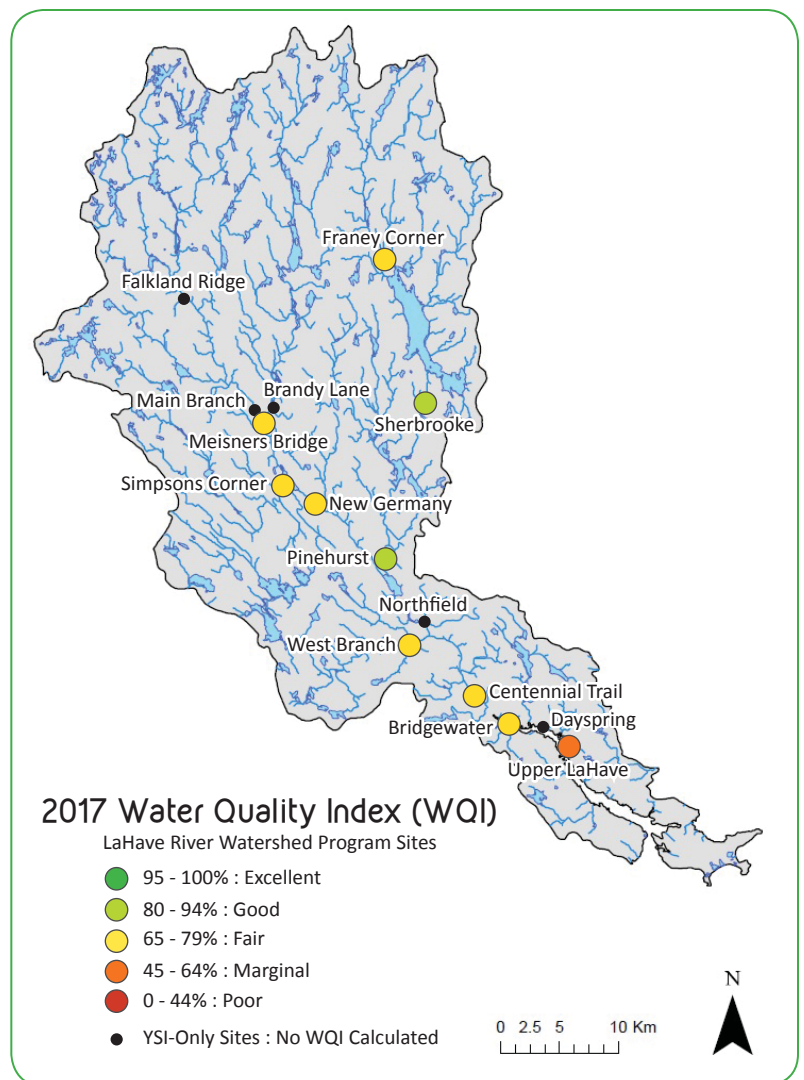
Restoration in Rhodenizer Brook in Dayspring involved an aging dam, which once had a functioning fish ladder but has since deteriorated to the point that fish passage is likely impossible. To restore passage, a three-meter by 30-meter runaround channel with six step-pools was constructed. The channel was reinforced with granite boulders and planted with native grasses to stabilize the newly created streambank.

North Branch Sub-Watershed Restoration Projects

Restoration work in the North Branch sub-watershed was conducted on Elmwood Brook near the community of Lake William. This restoration involved the installation of a metal weir and chute structure to restore fish passage through a culvert with a large outflow drop barrier. These remediation projects have restored fish passage to a total of 28,450 linear meters of upstream fish habitat, and several lakes, as well as restoring 60 m² of riparian habitat.

Water Quality

In 2017, Coastal Action continued the LaHave River Water Quality Monitoring Program, now in its 11th year. A total of 15 sample sites are monitored year-round, on a monthly basis, for a variety of physical, chemical, and biological water quality parameters. This program has become one of the strongest, longest-running water quality datasets in Atlantic Canada. The 2017 field season marked the 10-year anniversary of this program and 2018 will involve a 10-year trend analysis of the data.



Water sampling sites in the LaHave River watershed.

Petite Rivière Watershed Project



Coastal Action summer students conducting step-pool habitat restoration at Crousetown Dam.

Petite Rivière Watershed Project

The goal of the Petite Rivière Watershed Project is to assess fish habitat conditions, aquatic connectivity, and water quality to identify areas in the watershed that would benefit from restoration efforts. Project activities include culvert assessments, riparian and in-stream habitat assessments, and a water quality monitoring program.

The Petite Rivière watershed is 244 km² in size, with eight main tributaries, 26 lakes, and many wetland habitats. The largest bodies of water in the system are the Fancy, Milipsigate, Minamkeak, and Hebb Lakes. The health of this watershed is incredibly important as it hosts Canada's rarest fish species; the globally endangered Atlantic whitefish (*Coregonus huntsmani*) and serves as the drinking water supply for the Town of Bridgewater as well.



Water quality monitoring in the Petite Rivière watershed.

Fish Habitat Restoration

In 2017, Coastal Action conducted aquatic connectivity assessments on two privately-owned stream crossings and one fishway structure. Several potential restoration sites were prioritized from previous years' assessments, but upon further investigation, it was decided not to restore fish passage at these sites due to the risk of facilitating the spread of invasive species within the watershed.

Restoration efforts were focused on improving fish passage at the Crousetown Dam. This aging structure has a 19 m-long fishway channel which allows fish to bypass the dam and migrate upstream. Restoration activities included the enhancement of four step-pools in the channel, debris

removal, and surveying for the design and installation of a Denil fishway ladder. This fish ladder structure will be installed in 2018; restoring fish passage through the dam and reducing the ongoing issue of debris blockages at this site.

Water Quality

In 2017, Coastal Action continued the Petite Rivière Water Quality Monitoring Program (PRWP), which has been ongoing since 2010. Coastal Action monitors 18 sites monthly, testing the water’s physical chemistry (temperature, conductivity, dissolved oxygen, pH, pressure, salinity, and total dissolved solids).



Taking elevation measurements at the Crousetown Dam fishway.

For the first time since the beginning of the PRWP, data were compiled and analyzed for statistical trends. Of the parameters sampled by the PRWP, the biggest threat to the system’s aquatic health is the acidity of the water (measured as pH – a scale between 0-14, with 0 as acidic and 14 as basic). The Canadian Council of Ministers of the Environment (CCME) set a minimum threshold of 6.5-pH to protect aquatic life – only 6% of PRWP samples met this threshold (Figure 8). To help understand the source of the acidity, Coastal Action will be investigating how geology and abandoned mines are affecting water quality in the region and what can be done to protect from further acidification. The acidity of waters in the Petite Rivière watershed is a threat to aquatic life. Populations of endangered Atlantic whitefish call Petite Rivière home, in addition to American eel and Atlantic salmon. As 94% of all pH measurements are more acidic than the threshold set by the CCME for the protection of aquatic life, these species may be negatively impacted by chronic acidification throughout the watershed. To avoid the loss of species, Coastal Action will be considering various remediation methods, such as the application of crushed lime (a basic compound to decrease acidity), the restoration of natural wetlands, and the reclamation and remediation of abandoned mines.

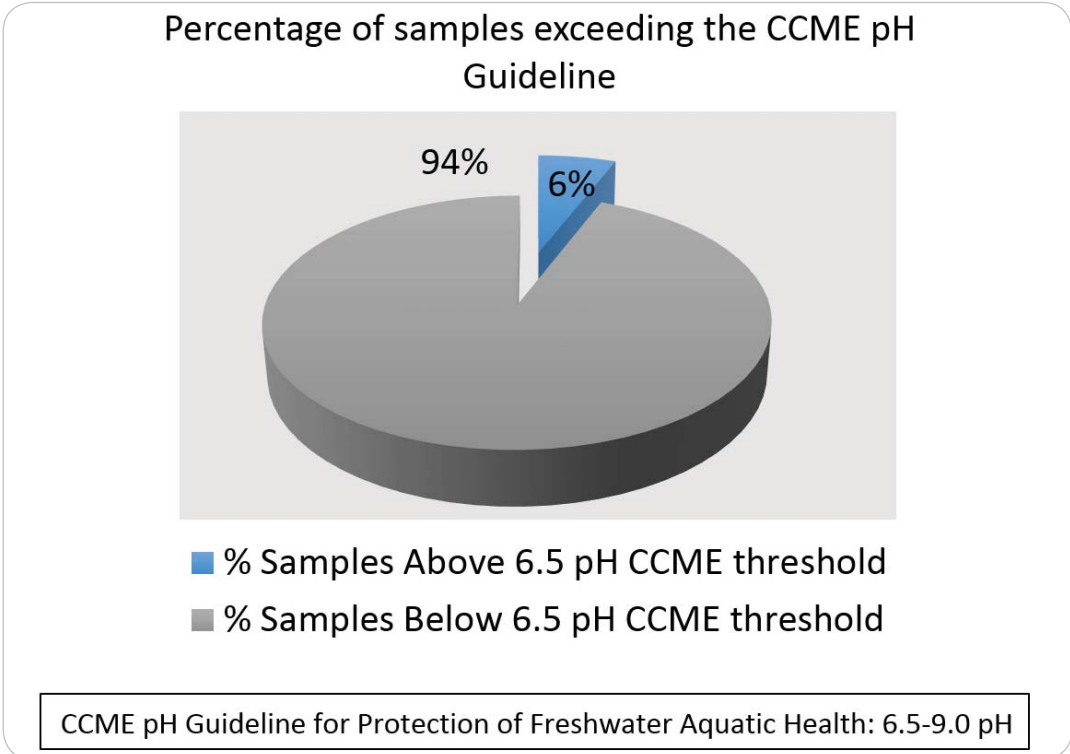


Figure 8: Percent of pH from Petite Rivière water samples collected between 2010 and 2017 greater than and less than the 6.5-pH threshold set by the CCME.

Stormwater Management & Climate Change Education



Volunteers at the Depave Paradise event tearing up pavement by hand.

Coastal Action's stormwater management projects aim to address one of many detrimental effects of climate change currently facing Nova Scotian communities; an increase in the severity and frequency of storm events resulting in large volumes of stormwater runoff and localized flooding. Stormwater management is a relevant and pressing issue in any developed landscape that has impervious surfaces and traditional pipe and ditch systems. Such aspects of the developed landscape inhibit water from infiltrating into the soil and increase the volume and speed of runoff into surrounding water bodies. The negative consequences of large volumes of fast-moving runoff include an increase in erosion; the transport of contaminants and sediment into surrounding watersheds; flooded infrastructure; and damage to aquatic, riparian, and coastal habitats.



Volunteers at the Depave Paradise event preparing soil for planting.

In some towns throughout southwestern Nova Scotia, combined storm/sewer systems can also release untreated sewage into surrounding water bodies when overwhelmed by heavy rainfall. In these areas, increased volumes of stormwater runoff will have consequences for water quality and public health. In response to these issues, Coastal Action has undertaken projects that work to provide communities with the necessary tools and infrastructure to manage stormwater more effectively. Hosting rain barrel workshops, initiating the Green Streets Stormwater Project, and hosting a Depave Paradise event have all been a part of this effort.

Depave Paradise

In 2016, Coastal Action was successful in receiving funding from Green Communities Canada to plan and execute a Depave Paradise event; the first of its kind



Local volunteer and Coastal Action staff member tearing up pavement at the Depave Paradise event.

and east sides of the building. The newly depaved area was excavated and landscaped with soil and rock to create a large kidney-shaped green space in the back lot, and a meandering river-style planting that extended around the front of the building and ended at another small green space. In total, 62 native plants, trees, and shrubs were planted on site, and are poised to divert over 175 m³ of stormwater and reduce 45 kg of water pollution annually. In total, 24 volunteers were trained to depave and plant, and 5 local youth participated in the event.

The project received a great deal of support from local businesses and organizations during the event. A team from RBC came out and volunteered for much of the event. Several local businesses donated their time, effort, and resources towards making the event a success. Mayor Carolyn Bolivar-Getson of the Municipality of the District of Lunenburg came to the event, as well as two council members from the Town of Bridgewater, and a representative from the Bridgewater Baptist Church. Each of these local representatives said a few encouraging words at the event and showed support and excitement for the project. Coastal Action looks forward to working with new community partners in 2018 to depave more unused pavement and replace it with green infrastructure for stormwater management on the South Shore.

The Green Streets Stormwater Project and LIDs

The Green Streets Stormwater Project aims to design and install small-scale green infrastructure projects throughout communities in southwest Nova Scotia. These green infrastructure projects will use low impact developments (LIDs) that function by using vegetation and soil to slow down, absorb, and filter stormwater runoff from impervious surfaces (like parking lots, roads, and sidewalks). Coastal Action plans to incorporate educational opportunities into these projects by hosting community planting days and using established LIDs as community

in Atlantic Canada. Depave Paradise is a community engagement project that brings community members together to tear up vacant or underutilized pavement and construct green spaces that capture stormwater, create habitat for pollinators and wildlife, and transform the way precipitation is managed in towns and cities. Coastal Action completed this Depave Paradise project at 307 King Street in Bridgewater, Nova Scotia, near the LaHave River.

The property selected was the site of the former Bridgewater Baptist Church which was recently purchased by local developer Craig Schrader in 2016. Schrader has since begun to turn the church into apartments. Being the former site of a church, the building was surrounded by asphalt pavement, which was used as parking for the congregation. In the fall of 2016, Coastal Action formed a partnership with Craig Schrader, and on May 5, 2017, a section of the old parking lot behind the building, approximately 115 m² in size, was depaved. The depaved area included a strip that went around both the north



Coastal Action staff during the Depave Paradise planting day (July 2017).

demonstration sites complete with educational signs.

These sites will create opportunities for community members and visitors to observe a working LID, as well as learn more about green infrastructure alternatives. In the fall of 2017, the Green Streets Stormwater Project made progress by acquiring additional funding, developing partnerships, conducting site suitability assessments, and selecting appropriate locations for LIDs. We have five LIDs confirmed for installation in 2018 and our new project partners include the Chester Area Middle School and Shoreham Village in Chester, NS. The LID sites will be designed throughout the winter months of 2018 and community planting events will be hosted in the spring and fall to install the gardens.



Local volunteer and Coastal Action staff member planting native species at the Depave Paradise site.

Rain Barrel Workshops

Rain barrels are an easy-to-install, low-maintenance solution for homeowners looking to decrease the volume of harmful stormwater runoff originating on their own property. By simply connecting rain barrels to an eave system, a homeowner can capture roof-water runoff, prevent it from contributing to overland flow or combined storm/sewer systems, and minimize the volume of pollutants that enter nearby waterbodies. Water captured in rain barrels can also be reused for activities like watering plants or washing cars which helps to reduce household water-use, decrease energy consumption associated with pumping water, and conserve fresh water, a finite resource on our planet.

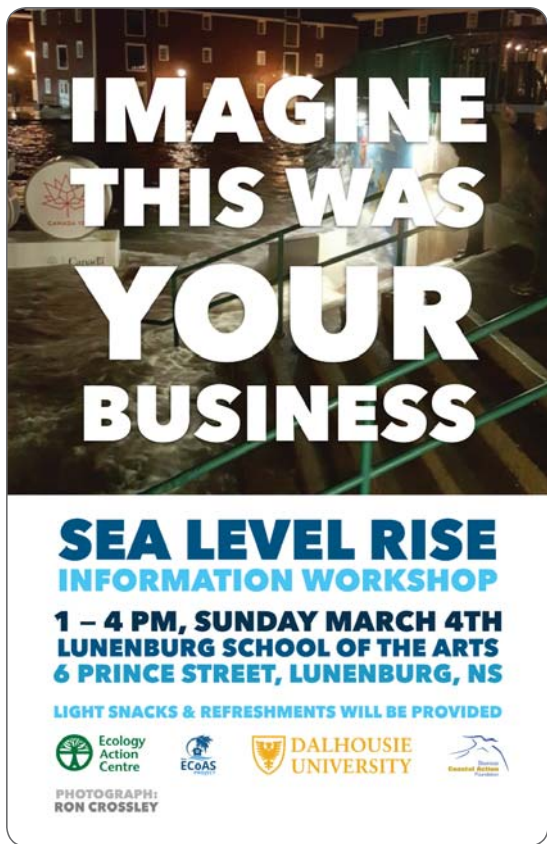
In Fall 2017 and Spring 2018, Coastal Action helped community members access this helpful tool for conserving water and managing runoff at home, by hosting rain barrel workshops in Lunenburg. During the workshops, participants were provided with a brief educational presentation and guided through the assembly of their own 55-gallon rain barrel. Coastal Action delivered one workshop at the Lunenburg Community Centre on November 4, 2017, and the other two were held at the Lunenburg School of the Arts on March 10 and 11, 2018. At the end of the series of workshops, 45 ready-to-install rain barrels were distributed to community members, complete with a guidebook on barrel construction, installation, and maintenance.



Local volunteers assembling a rain barrel during a Rain Barrel Workshop.

Sea Level Rise Workshop

In winter of 2017-18, Coastal Action participated in the Ecology Action Centre's Sea-Level Rise Workshop in Lunenburg. The workshop took place on Sunday, March 4, 2018 from 1:00pm-4:00pm at the Lunenburg School of the Arts. Approximately 60 community members were in attendance. This workshop series is part of the Educating Coastal Communities About Sea-Level Rise (ECoAS) Project; a co-led initiative designed to translate climate change research into useable information for coastal communities within Atlantic Canada. The Ecology Action Centre partnered with Fisheries and Oceans Canada to create an informative website (www.sealevelrise.ca), as well as workshops for coastal communities, fishers, and municipalities about rising seas that are regionally specific. The aims of the project are to help communities learn about sea-level rise and how it affects them; provide access to tools that have been developed locally with the latest climate change information available; illustrate where sea-level rise impacts are happening



Promotional poster for the Sea-Level Rise Workshop.

through interactive mapping; and show the need for incorporating sea-level rise into future planning strategies.

As an organization rooted in the South Shore, the Sea-Level Rise Workshop hosted in Lunenburg was one in which Coastal Action was keen to be involved. Knowing this, the Ecology Action Centre reached out to Coastal Action for help with facilitating community outreach and finding an appropriate location for the workshop. Coastal Action met with students from Dalhousie University's Sustainability Program, who were using the community engagement component of the workshop as their capstone project, to provide recommendations on how and where to promote the event in the South Shore community.

Coastal Action looks forward to seeing the interactive map being developed as a result of this project, and potentially using the data collected for further community engagement and future projects.

Coastal Action Stories: In the Field with the NSCC

Over the years, Coastal Action and the Nova Scotia Community College's Natural Resources and Environmental Technology (NSCC-NRET) class have collaborated on many outreach events, volunteer opportunities, and educational field trips.

In December of this year, Coastal Action took the NSCC-NRET class to a stream crossing within the Town of Bridgewater to teach them how to conduct a culvert assessment. The class learned how to set-up and use land surveying equipment, collect water quality data, and conduct stream assessment activities. The students learned about the importance of aquatic connectivity and how these culvert assessments are used to identify and remediate barriers to fish passage.

The group also visited a project site near Wileville, where Coastal Action has transformed an abandoned shale pit mine into wetland habitat. Students learned about the issue of acid rock drainage and how these exposed mining sites can degrade the water quality of nearby waterbodies if they are not remediated. The group discussed the many environmental benefits of wetland habitats and were blown away by the 'before photos' of this site compared to the habitat they witnessed during their visit.



NSCC students in the field.

Agricultural Stewardship Project



Newly constructed cattle crossing at DeLong Farm.

Lunenburg County plays host to a variety of both large-scale commercial farms and small-scale hobby farms. It is not uncommon to see many of these properties situated along waterbodies such as lakes, streams, or rivers. Due to its large size, the LaHave River watershed and its tributaries run through a significant amount of land designated for agricultural use. Often these areas can become degraded by stressors such as sedimentation, excessive nutrient loading, and algal blooms. Cattle farming can contribute to degraded riparian and in-stream habitats in many ways. Pastures that do not restrict cattle access to the water can lead to fecal bacteria contamination and excessive nutrient loading in streams, degraded riparian habitat, as well as erosion and sedimentation which can quickly destroy fish spawning habitat. The removal of riparian vegetation to expand pasture land results in the loss of the important ecological functions provided by these habitats; including flood control, filtering of pollutants, bank stabilization, and shading of streams for temperature control.



Impacted section of stream on DeLong Farm.

To address these issues, Coastal Action approached multiple farmers in 2017 to discuss potential restoration projects. Two farms agreed to participate in the project: Newbury Hill Farm and DeLong Farm both located in the Barss Corner area. The owners of Newbury Hill Farm had previously reached out to the Nova Scotia Department of Natural Resources (DNR) for recommendations on how to increase biodiversity on their farm. Coastal Action, along with Reg Newell, former Stewardship Coordinator with DNR, completed a biodiversity assessment on the farm. These assessments include mapping and categorizing habitats, which often include shelterbelts, hayfields, pasture, woodlands, riparian areas, and wetlands. Flora

Potential Biodiversity Enhancement

Overall, the amount and variety of shelterbelts on the farm in combination with the woodland edge are adding substantially to the biodiversity composition of the farm landscape. In addition to providing habitat for a wide variety of birds, mammals, amphibians/reptiles, and invertebrate species, these shelterbelts provide travel corridors and access to much of the farm. If possible, maintain the diversity of shelterbelts on the farm.



RECOMMENDATIONS:

- ◆ Continue to conserve these areas by doing minimal cutting/land development to ensure that the current habitat remains.
- ◆ Where possible and safe to do so leave standing dead trees along woodland edges, this will provide excellent places for birds and small mammals to nest in.
- ◆ If desired continue to increase the amount of shelterbelts on the farm through planting/seeding.

Summary of recommendations from Newbury Hill Farm's ABC Plan.

and fauna species are identified in each habitat and land-use recommendations are noted. Once the overall assessment is completed, an Agricultural Biodiversity Conservation (ABC) Plan is developed for the farmer. This plan includes a summary of each habitat along with recommendations for improving biodiversity; often referred to as beneficial management practices (BMPs).

One of the project highlights for 2017 was the DeLong Farm project. Initial discussions with the landowners identified a section of stream that runs through a cattle pasture as a potential restoration site. Upon inspection, it was clear that this section of stream would benefit greatly from restoration

activities. Working with habitat biologists from Nova Scotia Salmon Association's (NSSA) NSLC Adopt-A-Stream Program, Coastal Action determined that a large culvert crossing should be installed to allow cattle to cross the stream without damaging important fish habitat. Coastal Action staff, NSSA NSLC Adopt-A-Stream habitat biologist Will Daniels, and a local contractor worked together to successfully install the culvert and create a new cattle crossing. Prior to installing the culvert, Coastal Action conducted a fish rescue which involved electrofishing and relocating over five hundred native fish to a safe location in the stream. Coastal Action hopes to continue to engage local farms in 2018; focussing on riparian areas and stream restoration projects.

Coastal Action Stories: Hands-on Biology at Park View

Coastal Action teamed up with Park View Education Centre's biology teacher Jamie Mason to get high school biology students out of the classroom and into their local streams! Thirty biology students had the opportunity to visit Cooks Brook, a stream near their school, where Coastal Action has completed a fish habitat restoration project. The students learned how to collect water quality data using a YSI multi-parameter water meter. They also conducted in-stream and riparian habitat assessments by recording a variety of measurements and field observations.

The students learned about water quality guidelines and how various physical, chemical, and biological water quality parameters can influence the health of aquatic organisms and ecosystems. They were also introduced to the components of in-stream and riparian habitats and how the quality of these habitats influence the assemblage of aquatic organisms present. The students began to consider how these habitats would be used by wildlife and how they might be affected by habitat degradation.

This marks the third year that Coastal Action has provided this type of field trip for students at Park View and the activities have been well received by students. Students enjoyed their time out of the classroom and gained valuable skills and knowledge about environmental monitoring and restoration work.



Students learning how to assess fish habitat.

Wetlands Projects



Analyzing sediment cores at the Wetland Delineation Course.

In recent years, Coastal Action has begun restoring wetland habitats and acquiring various wetland-related training certifications, including a Wetland Delineation Course, and the Wetland Ecosystem Services Protocol (WESP) for Atlantic Canada. This training will allow us to conduct wetland surveys, identify and prioritize important ecosystem services provided by these habitats, and undertake a variety of restoration activities.

Coastal Action has successfully transformed an abandoned shale pit into a wetland habitat within the Petite Rivière watershed. The Wildcat Brook Shale Pit Remediation & Wetland Expansion Project was conducted on a 1.1-hectare abandoned shale pit property within the Wildcat Brook drainage area. The project goal was to limit the acidic discharge into adjacent waterways from this pit by capping the exposed bedrock with organic hydric soils and by revegetating the area - transforming the site into wetland habitat. Approximately 3,500 m³ of organic soil was spread over the site, followed by seeding and planting of native wetland species.

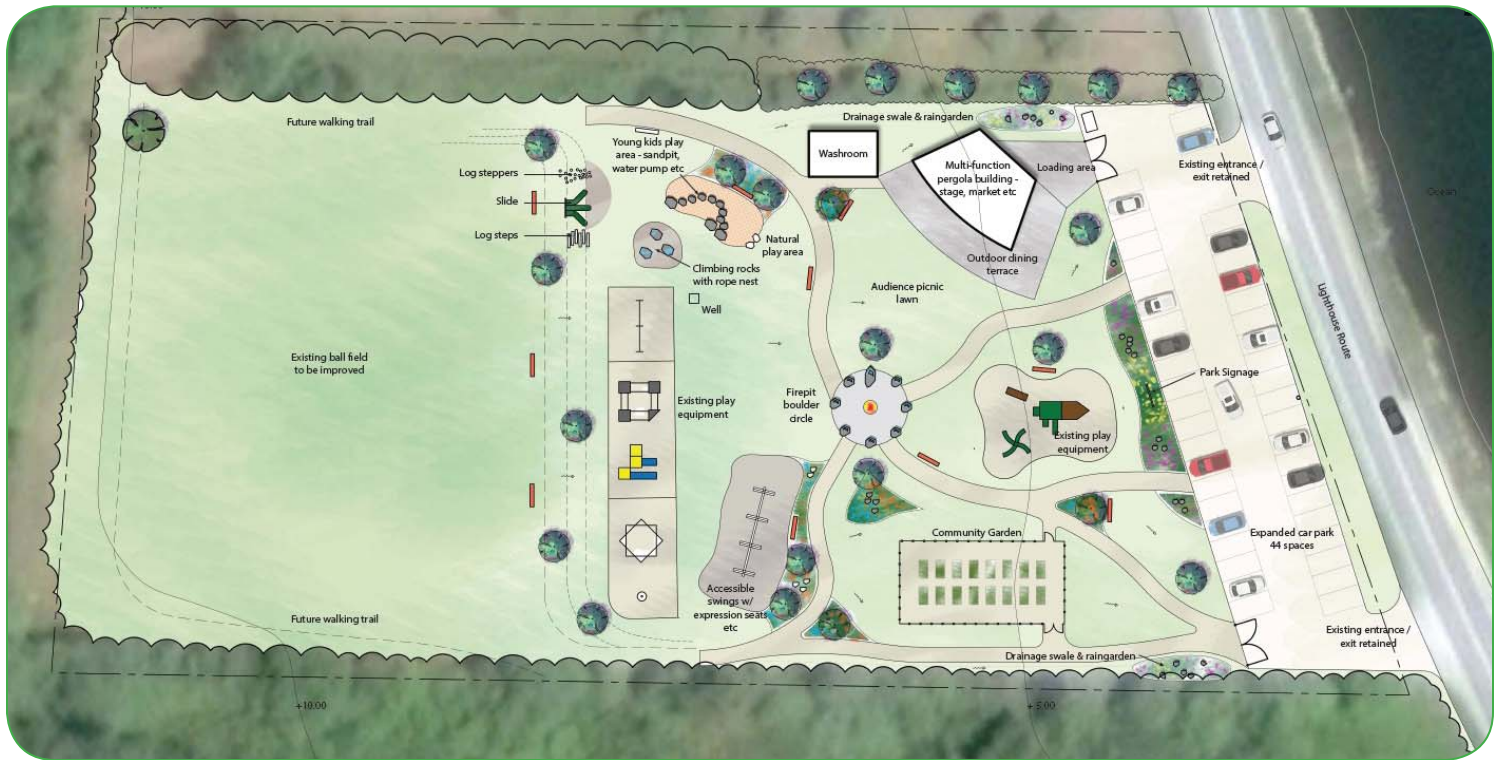
Restoration efforts were concluded in the fall of 2016; however, monitoring at the site has continued to document the successes of the project. Monitoring activities in 2017 included water quality monitoring, vegetation and wildlife surveys, CABIN sampling, and electrofishing surveys. Nest boxes for songbirds and waterfowl were installed throughout the new wetland habitat and will be monitored throughout the nesting season.

Coastal Action plans to use the project monitoring results to inform the development of remediation plans for other abandoned open-pit mines in Lunenburg County. Left unrestored, these sites can leach acid and heavy metals into nearby watercourses, degrading water quality and reducing the ability of these freshwater habitats to support aquatic life.



Collecting invertebrates at Wildcat Brook.

Gold River School Project



Conceptual illustration of development ideas including community input. Image: First Pen Studio.

Gold River Project: “Together We Can” Western Shore Park

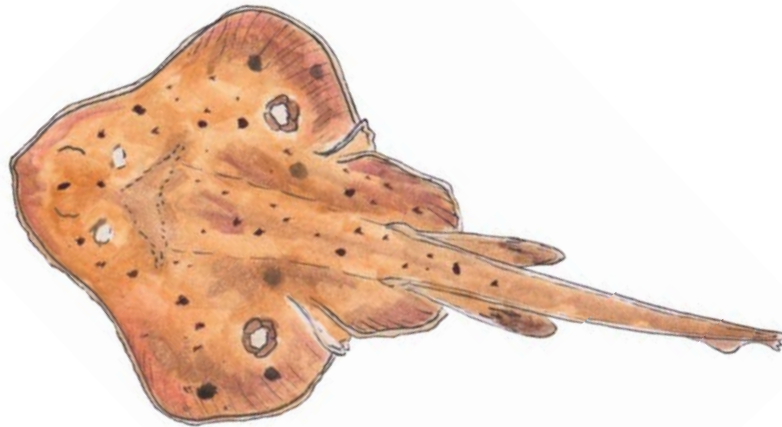
In 2017, Coastal Action began a new partnership with the Together We Can Committee (TWCC), a sub-committee of the Western Shore and Area Improvement Association (WSAIA). The TWCC initiated a project- the Together We Can Western Shore Park – which is a multi-year, multi-phased project aimed at creating an intergenerational community green space at the former Gold River – Western Shore Elementary School property. This property, turned over to the Municipality of the District of Chester in 2013 after the closure of the school, was the life blood of the tiny Gold River-Western Shore community; a community with a voting population of only 1,400. The community has a very personal attachment to the site and has a commitment from the Municipality for the property to remain in the public domain and to be developed as per the public vision.

A committee was formed, the TWCC, consisting of representatives from all facets of the community including seniors (50%) and youth representation, to develop a vision and plan for the site. A public community meeting was held in August 2016, where the TWCC asked their friends and neighbours about their vision for the property and what they would like to see happen on the site. The overwhelming majority were all in favour of seeing the property turned into a vibrant, intergenerational, natural asset for the community where people of all ages can relax, play, socialize, learn, and grow. It was also felt that the project would be a wonderful opportunity to engage and share the valuable knowledge and experience of the seniors in the community with the younger generations. It seemed an obvious fit for the TWCC to lead the development of the overall concept and design for the park, especially in light of the existing capacity of the committee to engage both seniors and youth.

In the spring of 2017, the TWCC reached out to Coastal Action to discuss potential partnership opportunities. Although the TWCC had the support of the community, a vision for the project, and a ton of volunteer support, as a volunteer community group, they needed help in the overall management of the project and advice on how to get started. Coastal Action, with their 20+ years of experience in successful project development and delivery in working with natural environments was keen to come on board. The partnership with the TWCC and the Western Shore Park project provided a new opportunity for Coastal Action to engage and work with seniors as well as to bridge the gap

in our environmental education programs for youth in the area by including important conservation and stewardship lessons/messages from elders within their own community.

Coastal Action, the TWCC, and local landscape architect, Oliver Bence with First Pen Studio, worked together collaboratively on the development of an overall concept for the park trying to incorporate as much as possible from the community input provided in August 2016 through the public meeting. The main components include: a walking trail/loop; natural greenspace with native plants, trees, and shrubs; community garden with raised beds accessible for those with mobility issues; park/picnic area with benches, picnic tables, rain/sun shelters; as well as an area for public events (i.e., weekly farmers market, concert stage, etc.). The final concept plan, as well as a detailed technical design for Year 1 of the project, was completed in February 2018. Coastal Action looks forward to a continued partnership with the TWCC with the implementation of the Together We Can Western Shore Park project in 2018 and beyond.



Coastal Action Stories: Michelin Nature Discovery Park

The Bridgewater Development Association (BDA) initiated a project to improve bank stabilization along the LaHave River in 2007, and that project culminated this fall with the grand opening of the Michelin Nature Discovery Park on September 12. When the project began, the BDA drafted a plan to develop projects on both sides of the LaHave River- including a river restoration project, with a vision to stabilize the river bank and help filter pollutants out of the water. Coastal Action was invited to manage the project, and has since worked with the River Restoration Committee to create a beautiful outdoor classroom, surrounded by native plant species.



Children participating in a lesson at the 'outdoor classroom' in the Nature Discovery Park.

The grand opening of the park was attended by Michelin North America (Canada) Inc., MP Bernadette Jordan, Town of Bridgewater Mayor David Mitchell, Bridgewater residents, and one of Bridgewater Elementary School's Grade 3 classes. The students were the first to use the outdoor classroom, and they had a great time learning about the many creatures that live there. We look forward to more students benefiting from the new park, and using it to host future educational activities!

Fox Point Lake Water Quality Monitoring

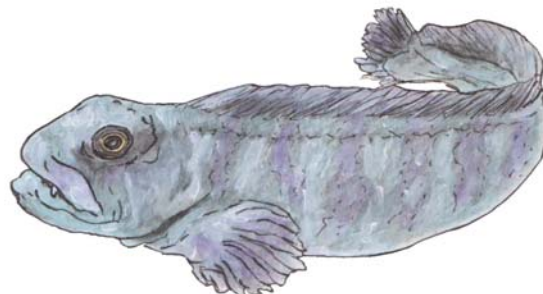


Fox Point Lake volunteers collecting data at an inlet stream sample site.

The Municipality of the District of Chester (MODC) contracted Coastal Action to deliver the Fox Point Lake Water Quality Monitoring Program in Mill Cove, Nova Scotia, in 2017. In 2015, MODC appointed a Water Quality Monitoring Committee in response to public concern over the Aspotogan Ridge development project and the potential impacts on the health of Fox Point Lake as a result of construction activities. Coastal Action designed a monitoring program and trained a small group of local volunteers to monitor the health of the lake and its inlet and outlet streams, as well as collect daily rainfall and water level data. Following the 2015 and 2016 monitoring seasons, Coastal Action provided MODC with water quality reports summarizing the results of the volunteer monitoring program.

In 2017, the Fox Point Lake Water Quality Monitoring Program ran from May to October, with the volunteer group collecting data on a bi-weekly basis and Coastal Action staff joining them monthly to assist in the collection of water samples for laboratory analysis. Water quality monitoring equipment was provided free-of-charge through St. Mary's University's Community-Based Environmental Monitoring Network.

Coastal Action has submitted a water quality report for the 2017 monitoring season to MODC and all reports are available on request from the municipal office.



Sherbrooke Lake Water Quality Monitoring



Coastal Action staff collecting water samples from Sherbrooke Lake; the Van Dorn sampler (seen in front) is used to collect water from specific depths.

In 2017, Coastal Action was contracted by the Municipality of the District of Lunenburg (MODL) to conduct water quality monitoring in Sherbrooke Lake and to sit as an ex-officio member on the newly-appointed Sherbrooke Lake Stewardship Committee, which is a joint committee of MODL and the Municipality of the District of Chester (MODC). The purpose of this Committee is to provide evidence-based advice to the municipalities regarding the water quality of Sherbrooke Lake throughout the development of a public access area on the lake's shoreline. The Committee was tasked with developing a water quality monitoring program to track any changes in the health of the lake as a result of various land-use activities and increased recreation in the lake.

As the Committee was being formed and beginning the long process of developing the comprehensive monitoring program, Coastal Action conducted preliminary monitoring in the lake from July to November in 2017. Several sites throughout the lake, as well as the major inlet streams, were monitored for a variety of parameters. This brief snapshot, along with the long-term data collected from upstream and downstream of the lake through the LaHave River Watershed Project's monitoring program, provides an important understanding of the current conditions prior to the lake being opened up for public access and increased usage.

Kingsburg Community Association



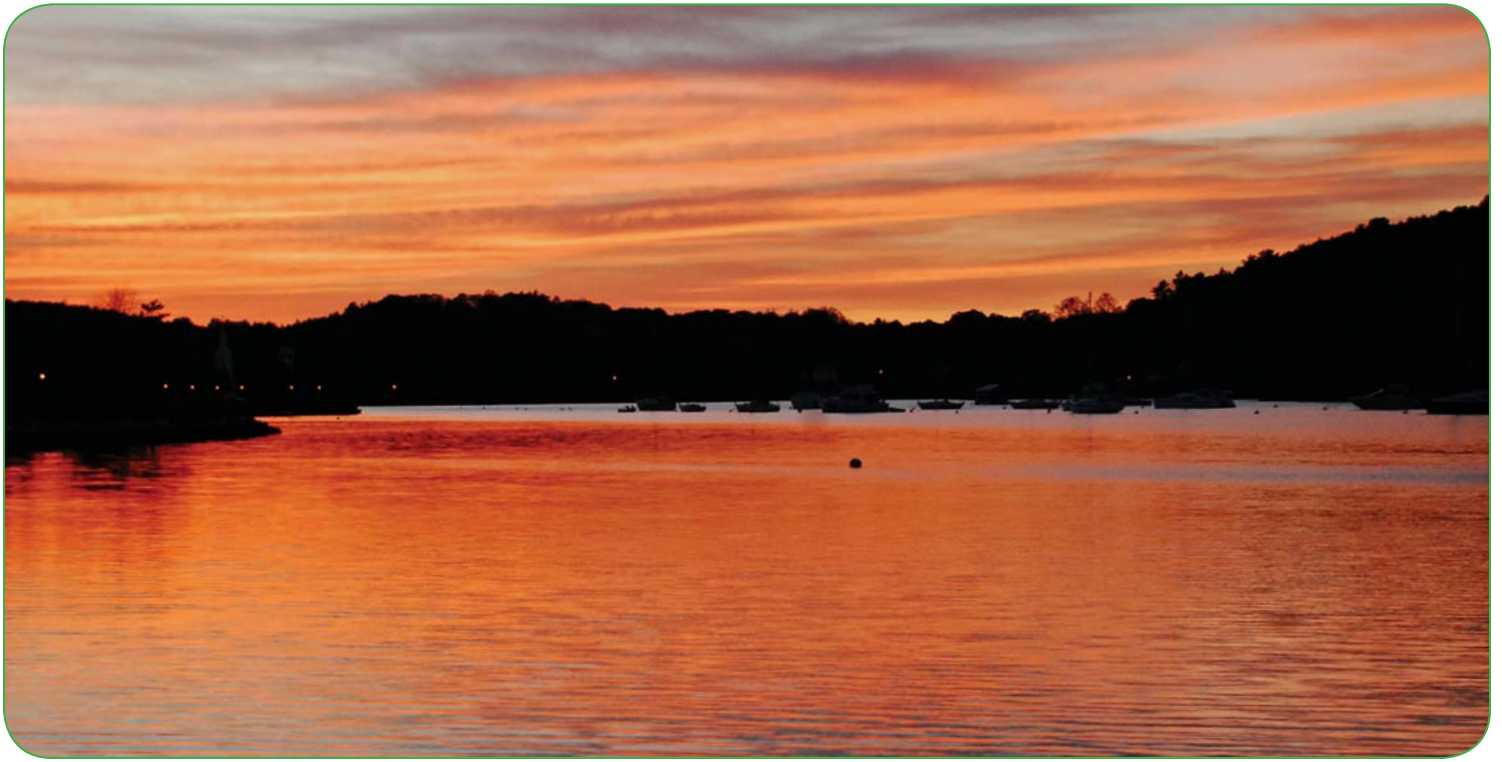
Water quality monitoring in the Kingsburg Ponds.

Coastal Action was contracted by the Kingsburg Community Association (KCA) to conduct preliminary water quality monitoring in Kingsburg, Hirtles, and Romkey Ponds in September 2017. The KCA hopes to gain insight into the health of these ponds on the Kingsburg Peninsula, which are used for various forms of water-based recreation. Two sample sites were established in each pond and were accessed by canoe. Several physical, chemical, and biological water quality parameters were analyzed using a YSI multi-parameter water meter as well as through the collection of water samples which were sent to an accredited laboratory for further analyses.

Based on this preliminary assessment of pond water quality, Coastal Action was able to make several recommendations for the KCA to assist their efforts of protecting the health of these valuable ponds in their community.



Sewage Options for Town of Mahone Bay



Mahone Bay.

In the Spring of 2017, the Town of Mahone Bay approached Coastal Action to discuss the development of a report outlining feasible options to address those properties within town limits that are not currently connected to the Town's central wastewater system. The sewage collection system for the Town of Mahone Bay consists of a combination of gravity sewer pipes and a sewage forcemain that all feed into a series of three wastewater collection pumping stations leading to a wastewater treatment plant constructed in 1994. The current system is a combined sewage - stormwater system that, on occasion, may overflow. Not all Town of Mahone Bay residents are connected to the Town's central wastewater treatment facility. There are approximately 30 properties not currently connected; some of which are presumed to have straight pipe septic systems directly discharging untreated sewage into Mahone Bay.

The objective of the project was to identify and document the existing on-site septic systems on each of the 30 properties not currently connected to the Town's central wastewater system. A study was performed that outlined feasible options and solutions to eliminate any untreated sewage from entering into Mahone Bay Harbour. The study also looked at the three existing wastewater pumping stations and provided a cursory high-level assessment of the future impact of climate change on their effective operation. Coastal Action partnered with a local engineering firm, ABLE Engineering, to undertake the work which started late summer-early fall.

Principal leads on the project (Brooke Nodding with Coastal Action, and project partners ABLE Engineering) drafted a final report and presented it to Mahone Bay Town Council on May 8, 2018. There were two separate solutions recommended for implementation; (1) for those properties on Edgewater Street, a series of on-site septic systems and (2) for those properties on Main Street heading out to Mader's Cove, it was recommended that the Town invest in extending their existing sewer connection to include these properties.

Energize Bridgewater



*The energy bike - an interactive demonstration tool which allows users to create and measure energy production - is put to use.
Image: Energize Nova Scotia.*

Coastal Action continued our partnership with the Town of Bridgewater in 2017-18 to help in the delivery of their Energize Bridgewater initiative. This program was launched by the Town of Bridgewater in 2016 to explore options for achieving a local, efficient, renewable energy economy for the area. Coastal Action has been a key partner in this energy program through our shared Events Planning and Communications Coordinator position, Bernice Williams, as well as our coordination of the Living Energy Lab and staff involvement in the Energy Partnership Program and the Planning Committee for the Energize Nova Scotia Discovery Fair.

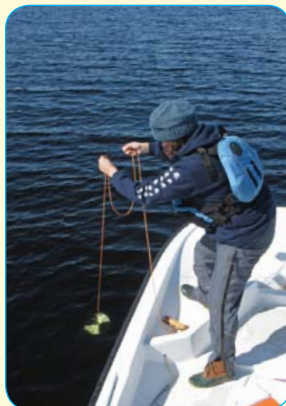
Energize Bridgewater highlights from this past year include:

- Hosting the highly successful Energize Nova Scotia Discovery Fair in October 2017.
- The development of the Community Energy Investment Plan which was just approved by Bridgewater Town Council in January 2018.
- Application submission to Infrastructure Canada's Smart Cities Challenge in April 2018 to tackle the issue of energy poverty in the Town of Bridgewater.

For more information about Energize Bridgewater please visit their website at www.energizebridgewater.ca.



A Healthy Environment for Future Generations



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