

Clean Annapolis River Project



2022-2023 YEAR IN REVIEW

June 27, 2023

EXECUTIVE DIRECTORS MESSAGE

The last year has been a very big, eventful, and exciting year for CARP. Owing to the hard work of our very dedicated staff, and our extensive partnerships and collaborations with the conservation community within the Annapolis River watershed, throughout Nova Scotia and beyond, we have led and contributed to more projects and initiatives than ever before in CARP's thirty-three years of operation.

This has not come without its challenges. As our capacity became stretched a lot of effort was required to recruit new staff to meet the demands of our ever-expanding work. This has required re-arranging and expanding our organizational structure to ensure adequate availability of resources and support to the people responsible for carrying out our mission. We have been fortunate to have had several very talented and passionate people join our team over the last year, bringing their own unique skills along and adding greatly to our collective ability.

The scope and impact of our work is greatly enhanced by a multitude of partnerships, some long-standing and others relatively new. From the many organizations and institutions that make up the Kespu'kwitk Conservation Collaborative that is focused on integrated ecological stewardship in southwest Nova Scotia, to industry organizations, and many academic institutions, our collaborations make many things possible that would be out of reach if we acted alone.

I feel very proud of what has been accomplished over the past year by our staff with support from our partners and volunteers. We have established a fish tagging project focused on Striped Bass and Atlantic Sturgeon in the Annapolis estuary, the first of its kind here, which has led to new insights into those species' behaviour in this system. We have completed the enhancement of a wetland site along with an associated accessible recreational trail in the Town of Middleton. We are involved in a transnational multi-partner "Living Labs" project that aims to measure the ecological benefits of implementing beneficial management practices in agricultural systems over a five-year period. These projects, and many more, are highlighted in this review of CARP's accomplishments over the 2022-2023 program year.

Levi Cliche
Executive Director



PRESIDENT'S MESSAGE

It has been another busy year for the volunteers that make up the CARP Board of Directors. In addition to the regular monthly meetings, there have been numerous meetings of the Finance Committee, Fund Development Committee, Human Resources Committee, and the River Festival Committee. These committees focus on various important aspects of organizational management and development, and sustaining CARP financially continues to be an important one.

Like so many other community events, the Annapolis River Festival had to be canceled last year. However, we are happy to see it's the return on July 15th at Jubilee Park in Bridgetown. We hope to see you there!

The year-end review clearly shows the wide range of projects being carried out in the watershed and the level of community engagement. It is encouraging to see the number of volunteers and their various backgrounds. Connecting residents of the watershed to the watershed is an important part of the stewardship process.

We have an excellent CARP staff, CARP Board and working relationship between the two. This winning combination and continued community support allows CARP to be a leader in community-based environmental science. With your continued support, things can only get better.

From being a director, lending a hand with River Festival, taking samples as a River Guardian, or searching for Wood Turtles. None of these things would happen if it were not for the support of volunteers. Thank you to all our volunteers.

Sincerely,
Mark Hebert
Board President



2022- 2023 BOARD OF DIRECTORS

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ANNAPOLIS ESTUARY MONITORING & RESEARCH

The Annapolis River estuary provides important spawning, rearing and overwintering habitat for anadromous fish species during their migration upstream from the Atlantic Ocean. The main objective of CARP's estuary monitoring and research project is to fill knowledge gaps that will support the long-term restoration and stewardship of the Annapolis River estuary ecosystem, including the species at risk and other biodiversity it supports.

Historically, thriving populations of anadromous fish persisted in the river, but increased anthropogenic disturbances in recent decades have put local populations and their key habitats at risk. Three species of particular interest are Striped Bass, Atlantic Salmon, and Atlantic Sturgeon; the Annapolis River populations of all three species are listed as threatened or endangered by COSEWIC and were estimated to experience the greatest population-level impacts due to turbine mortalities during the operation of the Annapolis Tidal Generating Station (ATGS)

2022 Highlights

- Conducted 12 water quality sampling events at 14 sites
- An 18 site acoustic network was established within the estuary
- Externally tagged 21 Atlantic Sturgeon and 35 Striped Bass, with acoustic tags also equipped to a subset of 10 sturgeon and 10 Striped Bass
- Conducted 80 beach seine surveys at 17 sites
- Conducted Striped Bass egg surveys using stationary plankton nets at a historical spawning site, with no Striped Bass eggs being recovered

Future Directions

A third year of this project is planned for 2023, with the goal of sustaining this work in the longer term. Activities planned for 2023 include water quality sampling, ongoing acoustic monitoring, additional tagging of Atlantic Sturgeon and Striped Bass, as well as tagging of American Eel, repeat beach seine and Striped Bass spawning surveys, and volunteer angler recruitment to support citizen science data collection.

Project Partners: Nova Scotia Power; Acadia University's Striped Bass Research Team; Fisheries and Oceans Canada; Nova Scotia Community College's Applied Geomatics Research Group; and our volunteer anglers

Project Funders: RBC Tech for Nature



FISH PASSAGE RESTORATION AND HABITAT ENHANCEMENT

This two-year project draws on the collaboration of CARP and Jijuktu'kwejk Watershed Alliance (JWA) to identify and remediate barriers to fish passage for anadromous species, focusing on habitat for Atlantic Salmon in the Cornwallis and Annapolis River watersheds. Habitat fragmentation caused by barriers within a watercourse (e.g. culverts) can impede the upstream and downstream movements of fish through a river system. Insufficient water depths, incorrect sizing, steep slopes and large outflow drops are potential problems that can characterize a culvert as a barrier. When fish migration is restricted, populations can be negatively impacted.

2022 Highlights

- 27 watercourse crossing assessments were conducted in the Annapolis River watershed and 18 in the Cornwallis River watershed. Of the crossings assessed, 25 were found to be a type of culvert.
- 12 watercourse crossings received remediation work, restoring access to 21.19 km of upstream fish habitat. Remediation activities included 8 debris removals, 3 tailwater control structure installations, and 1 low-flow barrier installation.
- 4 targeted outreach events were delivered within the Annapolis and Cornwallis River watersheds to encourage future action to remediate barriers and prioritize habitat connectivity.

Future Directions

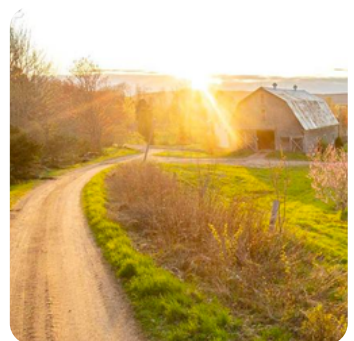
Year two of the project will be taking place during 2023, continuing to assess and remediate watercourse crossings in the Annapolis and Cornwallis River watersheds. Fish Passage Restoration and Habitat Enhancement is an ongoing program for CARP and is planned to continue past the end of this two-year project.

Project Partners: Nova Scotia Salmon Association; Jijuktu'kwejk Watershed Alliance

Project Funders: Nova Scotia Salmon Association's Adopt-a-Stream Program; Habitat Stewardship Program for Aquatic Species at Risk

HABITAT AND BIODIVERSITY ASSESSMENT TOOL

Under the leadership of the Canadian Forage and Grassland Association, CARP is part of a collaborative team that is working to develop an online habitat and biodiversity assessment tool for agricultural producers. CARP's role is to lead the development of the Nova Scotia and New Brunswick versions of the tool. The overall objectives of this national scale project are to reach as many agricultural producers as possible through the integration of a virtual tool into provincial Environmental Farm Plan platforms, provide producers with awareness of what key habitats might be present on their land and the measures that will improve their suitability for likely species at risk, prioritize the compatible management actions that can be taken to conserve or improve those habitats and provide further resources to support producers in their implementation and awareness of species at risk.





2022 Highlights

- Launch of the Nova Scotia Habitat and Biodiversity Assessment
- Tool Phase 1 of the development of the New Brunswick Tool

Future Directions

In Nova Scotia, future work will focus on the promotion of the tool and the provision of training for individuals and organizations who work in agricultural extension or conservation. For New Brunswick, it is anticipated that work will be completed in order to launch version 1 of the tool in 2023.

Project Partners: Canadian Forage and Grassland Association; Nova Scotia Federation of Agriculture; Nova Scotia Department of Agriculture; Nova Scotia Department of Lands and Forestry; The Center of Geographic Sciences

Project Funder: Environment and Climate Change Canada

LIVING LABS

Living Labs is a collaborative project being implemented across Canada that aims to bring together farmers, scientists, and other collaborators to co-develop and test beneficial management practices (BMP's) that may address agri-environmental issues, at farm-scale.

CARP has partnered with the Nova Scotia Federation of Agriculture to establish and study forested riparian buffer zones (FRBZs) and shelterbelts on working farms. The shelterbelts will be implemented in lowbush blueberry fields, with potential co-benefits including increased habitat for native pollinating insects, snow capture for improved soil coverage, and reduced injury of lowbush blueberry plants due to winter winds.

Trees and shrubs within riparian zones will be planted along agriculturally influenced waterways where buffer zones of various quality and width currently exist. The effects of this planting on measures of overall water quality, insect abundance and diversity, soil carbon, greenhouse gas emissions from soil, and soil health will be monitored over the 5-year duration of the project. A partnership with Nova Scotia Museum will also assess the development of bryophyte (i.e., mosses, liverworts, and hornworts) and aquatic vascular plant communities over the restoration period.

Implementing this Living Lab will improve CARP's institutional knowledge regarding shelterbelt and FRBZ establishment techniques and effects, provide opportunities to promote agricultural BMP's with the help of participating farms, and broaden the network of connections CARP has in the agricultural community across Nova Scotia.



2022 Highlights

- Three FRBZ and three shelterbelt sites were identified, and partnerships were formed with six different landowners to implement the Living Lab. Lowbush blueberry sites are located near Yarmouth and Parrsboro, while annual cropland and pasture sites with planted FRBZ's are in Kings and West Hants Counties.
- Over 2000 native trees and shrubs have been planted across all six sites as of May, 2023, including cuttings propagated from locally abundant flowering shrubs.
- Data for water quality, insect abundance and diversity, soil carbon, greenhouse gas emissions from soil, and overall measures of soil health is actively being collected.

Future Directions

Over the next 4 years, each Living Lab site will be continuously monitored to detect changes in the relevant variables of interest, including water quality markers, insect abundance and diversity, soil carbon, greenhouse gas emissions from soil, and overall measures of soil health. Trees will be cared for with regular maintenance to ensure the highest success rate possible, and replacement trees will be ordered and planted where needed.

The start to this field season has provided opportunities to assess potential native seed sources for trees and shrubs which are important to restoration efforts, but more difficult or expensive to acquire via the standard nursery trade. We will attempt to propagate from viable seed trees found on-site to further enhance biodiversity and value to wildlife in subsequent years. Some of these target species include American Elm, Beaked Hazel, Northern Red Oak, and Sugar Maple.

Collaboration will continue between CARP, NSFA, and other external partners, such as a socio-economic research team at Acadia University, who are studying financial viability, cost-effectiveness, and other important factors related to BMP adoption in the broader farming community.

Project Partners: Nova Scotia Federation of Agriculture; Marianne Manuge; David Harrison; Jeff Orr; Angus Ells; , Patrick Ueffing; Dean Manning; and Catherine Manning.

Project Funders: Agriculture and Agri-food Canada





ANNAPOLIS VALLEY SAND BARRENS STEWARDSHIP

The Annapolis Valley Sand Barrens is a unique and often unrecognized ecosystem that is home to rare and endangered species. The Annapolis Valley Sand Barrens have experienced steep declines due to various forms of human land use, with only about 3% of them estimated to be remaining. The purpose of this project is to work with partners to gain a better understanding of this under-studied ecosystem, and through community engagement, promote the conservation of this rare ecosystem.

2022 Highlights

- Distribution of the "Guide to the Annapolis Valley Sand Barrens"
- 10 school-based field trips to sand barrens sites with local schools and 2 guided interpretive walks for the public
- Site assessment and planning underway for a demonstration garden at the NSCC Kingstec Campus
- Land-cover change analysis project completed by Masters of Applied Geomatics candidate Nina Harvey

Future Directions

Education and outreach efforts, including guided walks and field trips, are planned to continue to help increase the awareness of this rare ecosystem in local communities. Demonstration garden creation is planned for 2023, which will provide a place for community members to learn about native landscaping opportunities. In order to help landowners reduce the negative impacts of invasive plant species, educational resources will be produced. Work to engage landowners and municipalities in ecosystem stewardship will be ongoing in future years of the project.

Project Partners: NSCC Centre of Geographic Sciences; Fern Hill Institute; NSCC Kingstec; Department of Lands and Forestry

Project Funders: Environment and Climate Change Canada; Nova Scotia Department of Natural Resources and Renewables; Nova Scotia Habitat Conservation Fund

WETLAND RESTORATION AND RECREATIONAL TRAIL DEVELOPMENT IN THE TOWN OF MIDDLETON

In late 2019 CARP commenced a new project in partnership with the Town of Middleton, focused on the restoration of a complex of infilled and degraded wetlands on Town-owned land, and the establishment of an accessible recreational trail that will allow community members to enjoy the site.





2022 Highlights

- Restoration of 2.95 ha of wetland habitat and the creation of an additional 2305 m² of open water habitat
- Trail development, including the construction of two water crossings and a 16' x 16' outdoor pavilion
- Design for a series of 10 interpretive panels that will be installed at the site

Future Directions

Final trail work will be completed in spring 2023, followed by interpretive panel installation. The site will be used to host a variety of educational and recreational activities and programs by CARP and other partners.

Project Partners: Town of Middleton, East Coast Aquatics

Project Funders: Environment and Climate Change Canada, Nova Scotia Habitat Conservation Fund, Atlantic Canada Opportunities Agency, Bonneville Environmental Foundation, Wildlife Habitat Canada

NATURAL INFRASTRUCTURE FOR STORMWATER MANAGEMENT

The overarching goal of this project is to support communities in the utilization of natural infrastructure techniques to improve stormwater management. Natural infrastructure refers to naturally occurring landscape features and/or nature-based solutions that promote, use, restore or emulate natural ecological processes. This project is being co-delivered in partnership with Coastal Action, to allow for greater impact across the region.

2022 Highlights

- The identification of three sites for future implementation of natural infrastructure projects (Town of the Digby, Beacon United Church in Yarmouth and Memorial Arena in Mahone Bay)

Future Directions

Natural infrastructure projects will be implemented during the 2023 field season. Volunteer days and public education sessions will be hosted at each site to create hands-on learning opportunities. In order to increase awareness about natural infrastructure techniques that can be used in our communities, workshops specifically geared towards local business owners, municipal staff, and planning students will be held in fall 2023.

Project Partners: Coastal Action, NSCC Middleton, Town of Digby, Town of Yarmouth, Beacon United Church.

Project Funders: Environment and Climate Change Canada





AGRICULTURAL STEWARDSHIP

CARP is involved in various projects focused on the stewardship of agro-ecosystems, which are ecosystems found in lands managed for food and fibre production. Despite the extensive modifications made for agricultural purposes, certain species at risk, such as the Bobolink and Barn Swallow, can find suitable habitat within these areas. Given the abundance of agriculture in our watershed, CARP collaborates with local farmers and stakeholders in the agricultural sector to enhance habitats for species at risk, preserve or restore ecosystem services and increase biodiversity. These partnerships aim to improve the overall conditions for these species and contribute to the conservation of important ecological functions.

2022 Highlights

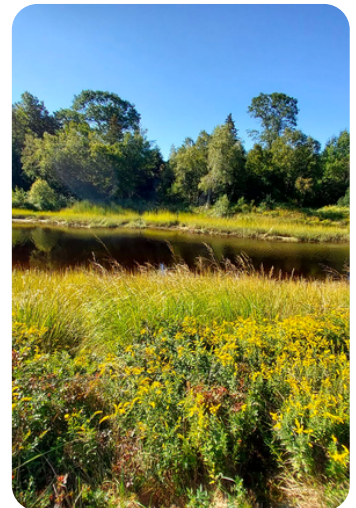
- 30 landowners who were identified as having SAR on or adjacent to their property were provided with SAR outreach packages.
- 13 Agricultural Biodiversity Conservation Plans (ABCs) were developed for farms in southwest Nova Scotia.
- Habitat restoration activities were conducted on 3 properties resulting in 3.33 ha of restored habitat and 7.19 ha of improved habitat structure and/or habitat created.

Future Directions

CARP will maintain its leadership in strategic planning for agro-ecosystems within the Kespu'kwitk Priority Place, with an objective to implement strategies that effectively address the significant threats faced by species at risk and biodiversity in the region. CARP will offer resources to increase landowners' awareness of potential management practices that can contribute to habitat conservation and threat mitigation, and support farmers in the implementation of these actions. CARP will continue delivering the Agricultural Biodiversity Conservation program, which provides farmers with a comprehensive document outlining the various habitats present on their properties and recommendations for the stewardship, restoration or enhancement of biodiversity.

Project Partners: Department of Lands and Forestry; Nova Scotia Federation of Agriculture; Perennia

Project Funders: Environment and Climate Change Canada through the Canada Nature Fund and the Habitat Stewardship Program for Species at Risk, Nova Scotia Department of Natural Resources and Renewables





ANNAPOLIS RIVER GUARDIANS

Annapolis River Guardians is CARP's long-term water quality monitoring program that has been running continuously since 1992. The River Guardians program provides information about a variety of water quality parameters, provides training to community members in water stewardship, and has established a long-term record of the river's health. The parameters monitored by the Annapolis River Guardians have varied throughout the years. The following parameters have been monitored continuously since the start of the program: fecal coliform bacteria, dissolved oxygen, air and water temperature, and weather conditions.

2022 Highlights

- Bi-weekly sampling from May through mid-September
- Production of a full 2021 monitoring report in addition to the annual report card
- New sign design completed

Future Directions

Although securing funds to support this project is an ongoing challenge, CARP plans to continue annual monitoring in order to preserve the long-term data set. Funding is also being sought to support the installation of new signage that we developed to report on E. coli results at each of the monitoring sites.

Project Funder: Rotary Club of Middleton

THANK YOU TO ALL OF OUR 2022-2023 FUNDERS:



CARP membership holders



MEET OUR TEAM

Levi Cliche- Executive Director

Levi Cliche, CARP's Executive Director, has been involved with the organization for over 20 years. Levi has strong family ties to the Annapolis River watershed, and was inspired to pursue a career in environmental stewardship through the example and stories of his grandparents and family members, time spent exploring the Nictaux River, and summers spent canoeing, swimming and fishing local lakes and rivers. His first job with CARP was directly out of high school as a field worker on CARP's fish habitat restoration program. This experience led him to complete the Fish and Wildlife Technology program at Fleming College's School of Environmental and Natural Resource Sciences. He is interested in and has worked in many areas related to environmental restoration, stewardship and management, but aquatic habitats and fisheries remain his primary passion.



Susan Lane- Administration Manager

Susan Lane joined the CARP organization in July 2002 following a decade with King's Theatre in Annapolis Royal. Susan has spent the majority of her career as an administration manager in the not-for-profit sector. Her work with CARP entails the day to day management of the organizations, management of CARP's financial operations, providing support to the Board of Directors as requested, assisting with the administration of CARP's human resources. Since moving to the Annapolis Royal area she has volunteered on the Board of several local not-for-profit organizations and currently serves as the Treasurer of the Annapolis Royal Historic Gardens. When not working, Sue loves to try her hand growing vegetables in containers, strolling around the Annapolis Royal Historic Gardens and the Annapolis Royal Marsh taking photos, learning to play the clarinet, and dabbling with watercolours and pencil drawings.



Rachel Walsh- Aquatics Program Manager

Rachel is a Nova Scotia Community College graduate, with a diploma in Natural Resources Environmental Technology. She has been part of the CARP team for 4 years and is in the current position of Aquatic Program Manager. Upon hire in 2019, Rachel has gained experience managing and delivering freshwater aquatic habitat sampling, monitoring, and restoration initiatives in the Annapolis River watershed. Rachel looks forward to furthering her experiences and gaining new opportunities as her time at CARP continues.



Shaeralee McCutcheon- Terrestrial Program Manager

Shaeralee joined CARP in 2022 as the program lead for the Sand Barrens and Natural Infrastructure projects. More recently, she has transitioned into the Terrestrial Programs Manager position. Shaeralee received her Undergraduate degree in Environmental Studies from York University in 2021, after returning to school to pursue her passion in environmental work; more specifically, renewable energy and sustainability in agriculture, after working as a Registered Nurse for over 17 years. Shaeralee is looking forward to engaging and partnering with local farm landowners to promote biodiversity and protection for Nova Scotia's species at risk.





Grace Bowen-MacLean- Estuary Project Coordinator

Passionate about nature since she was little, she never strayed away from any bug or snake. Grace is originally from Dartmouth, Nova Scotia but now is residing in the Annapolis Valley. She completed her B.Sc. honors with Co-op in biology from Acadia University (2022). She is currently expecting to finish her Master of Environmental Science specializing in conservation and biodiversity from the University of Toronto in October 2023. She joined CARP in April 2023 as the Estuary Project Coordinator. Her previous relevant work experience is with Acadia ACER project, DFO, and Sackville Rivers Association. She is excited to keep this amazing and interesting project going!



Thomas Cornell-Living Labs/Agro-Stewardship Coordinator

Thomas earned his B.Sc. in Environmental Science, specializing in Ecology, from the University of Waterloo in 2019. While there, he gained field experience as a technician in the Environmental Geochemistry Laboratory, where he assisted graduate students in collecting and analyzing water samples for a variety of projects and parameters from the local Grand River watershed and across Canada.

Since graduating, Thomas has practiced intensive, organic home gardening and has an interest in promoting biodiversity in agricultural landscapes. Some practices he is particularly fond of include temperate agroforestry – the intentional integration of trees and shrubs into efficient agricultural systems – applied microbiology in the form of compost bio-amendments for soil health, and the improvement of pollinator habitat using native flowering plants.



As a coordinator at CARP for one of Nova Scotia's first four Living Labs, he values the opportunity to connect with the local agricultural and research community, and the chance to implement large scale restoration projects in degraded riparian areas.

Thomas lives in Clementsvale, NS, with his partner, Jessie, and their beloved feline friend, Blondie.

Allison Fortune, Species-at-risk Technician

With a diploma in Natural Resources Environmental Technology from Nova Scotia Community College, and four years of field experience with various other environmental non-profits, including The Mersey Tobeatic Research Institute and Coastal Action, Allison has had the privilege to work on projects aimed to conserve and promote recovery for species at risk such as the Eastern Ribbon Snake, Blandings Turtle, Atlantic Whitefish, Snapping Turtle, and the Little Brown Bat. In her current role, she works with the CARP team and a group of dedicated volunteers to collect scientific data on Wood Turtles, Ribbon Snakes, and at-risk grassland nesting birds, coordinate/conduct fieldwork, conduct community outreach, and data management. In her free time, Allison enjoys canoeing, hiking, and camping.



Katie McLean, Project Leader

Having joined the team in October 2013 and worked on a variety of projects during her time with CARP, Katie is now working part-time after welcoming a new addition to her family in December 2021. Katie has continued to lead delivery on the Middleton wetland restoration and trail development project and Habitat and Biodiversity Assessment Tool. Additionally, Katie works to fill in any gaps when needed and support new staff as the CARP team grows.

**Zackery Pate, Agricultural Ecosystems Stewardship Project Leader**

Zackery recently received a Bachelor of Arts Degree in Environmental Sustainability (ESST) with a minor in Environmental Science (ENVS) from Acadia University. His love of nature and all things outdoors inspired him to co-create the non-profit-making organization called the Annapolis Valley Bat Box Project (AVBBP) in 2020. He received the Acadia Environmental and Sustainability Studies 2022 Community Leadership Award for this work. Zackery is enthusiastic about deepening his understanding of scientific approaches to conservation work and is passionate about environmental politics through a sociological lens.

**Jessie Pearson, Environmental Stewardship Technician**

After graduating from the Honours Biology program at the University of Waterloo, Jessie worked for several years as a technician helping to study bird, insect, and plant communities in wetlands along the shores of Lake Erie as well as in peatlands in Alberta's Rocky Mountain region. She has also worked for Birds Canada, spending a season searching for elusive Bicknell's Thrush in northern New Brunswick. Now at CARP, Jessie works on agricultural biodiversity enhancement projects such as planting riparian buffer zones, shelterbelts, and alternative pollinator habitat as well as coordinates the rollout of the Agricultural Biodiversity Conservation Plan program aimed at identifying and protecting biodiversity present on local farms. Jessie spends her free time propagating native plants, embroidering, and starting a small-scale vegetable farm and orchard.

**Tatyana Vukovic, Water Quality Project Leader**

Tatyana is excited to be implementing CARP's Stormwater Management through Natural Infrastructure, River Guardians, and Salt Marsh Monitoring projects. Tatyana holds a Bachelor of Science in Environmental Management from the University of New Brunswick. Since graduating in 2020, she has worked as a Wildland Firefighter in northern Alberta and as a Regulations Officer at a Conservation Authority in Ontario. With a passion for watershed-based science and climate change adaptation and mitigation, she strives to contribute to the invaluable work of her peers by supporting sustainable communities and restoring critical ecosystems.





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