

Item for the Information of the Regional Watershed Alliance

TO: Chair and Members of the Alliance
Wednesday, May 22, 2024 Meeting

FROM: Anil Wijesooriya, Director, Restoration and Infrastructure

RE: **ECOLOGICAL RESTORATION SUMMARY REPORT**
An overview of TRCA's ecological restoration program 2012-2022

KEY ISSUE

To provide a summary of TRCA's ecological restoration activities over the last ten years.

RECOMMENDATION:

THAT the Regional Watershed Alliance receive the Ecological Restoration Summary Report, for information.

BACKGROUND

TRCA has a long history of habitat restoration from single species tree planting in the 1960s and 70s to complex coastal wetland restoration in the early 2000s. It was in the early 2000s that TRCA expanded its ecological restoration program and today restoration projects include all habitat types, from forests and wetlands to grasslands and shorelines.

The natural ecological function of TRCA's watersheds have been severely altered because of urbanization, agricultural development, and climate change. The TRCA jurisdiction has experienced significant habitat loss, soil degradation, altered hydrology, topography changes, and loss of native vegetation. These alterations combined with a changing climate impairs ecological function of the natural system and results in negative impacts to water quantity and quality, increased erosion and sedimentation, proliferation of invasive species, and a loss of natural habitat and native species. To address these impacts, TRCA's Restoration and Resource Management (RRM) team within the Restoration and Infrastructure (R&I) division, has planned and implemented thousands of projects that have enhanced natural ecosystem functions, improved biodiversity of native species, and improved the health and resiliency of TRCA's watersheds.

The deliverables and achievements of TRCA restoration programs support the objectives of our many programs, and strategies, as well as the needs and initiatives of our partners. In 2011 the progress of our restoration programs between 2006 and 2011 was summarized and presented at Authority Meeting #11/11 held on January 6, 2012, This current report is a 10-year synopsis of our restoration programs and the progress since 2012.

Implementation Achievements

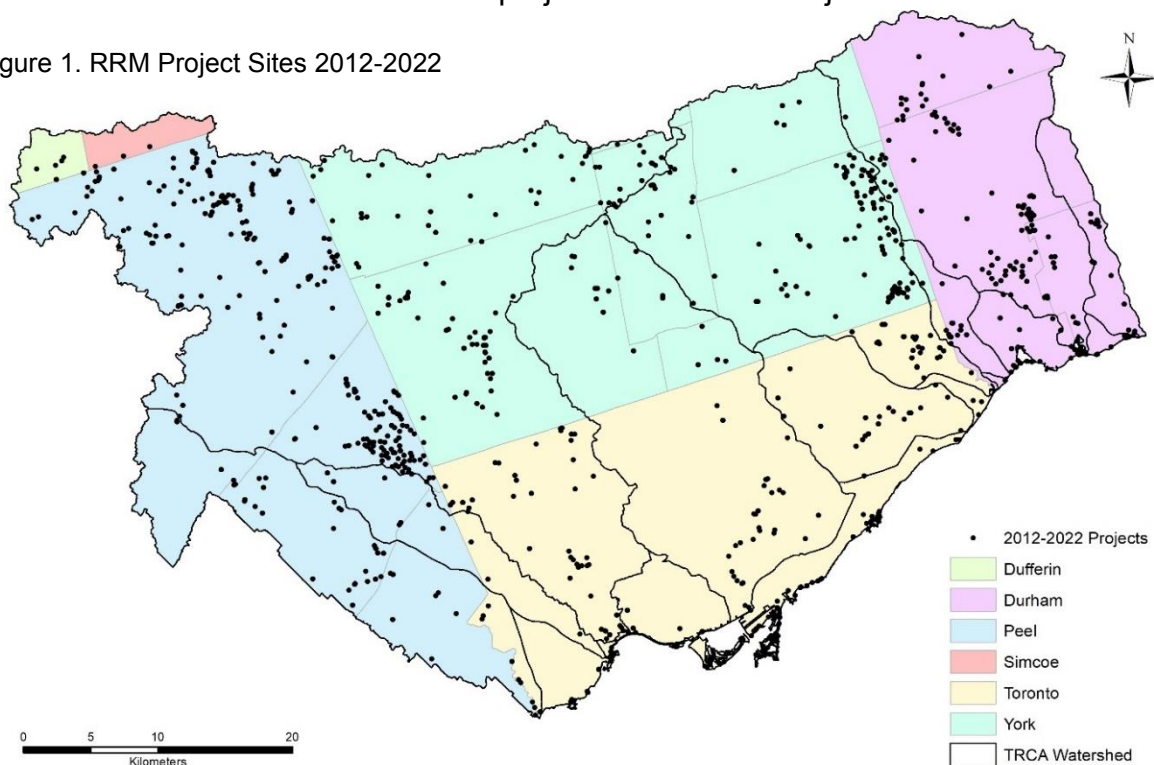
The following table summarizes the main ecological restoration implementation deliverables from the RRM group for the last 10 years. The table is not a complete list of RRM activities and actions and does not include erosion risk mitigation projects without an ecosystem restoration focus.

Table 1. RRM Deliverables 2012-2022

Deliverables (2012 - 2022)	Amount
Wetland restoration	218 ha
Stream restoration	31 km
Barriers removed/mitigated	83
Riparian restoration	64.6 km
Shoreline restoration	7.8 km
Forest/Woodland restoration	630 ha
Meadow restoration	118 ha
Woody Stems planted	3,194,644
Aquatics/herbaceous planted	390,923
Native Seed installed	2,388 kg
Native Plants Grown and Supplied	3,767,814
Forest management	2621 ha
Invasive management	421 ha
Nestboxes & structural habitat installed	8,072

Restoration project locations are determined strategically; however, it is funding dependent. In cases where capital funds are limited, securing other sources of funding via grants, partnerships, or fee-for-service agreements are needed. Below is the spatial distribution of 2012-2022 restoration projects within TRCA's jurisdiction.

Figure 1. RRM Project Sites 2012-2022



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Notable Projects and Programs

The RRM team has completed hundreds of restoration projects over the last 10 years. A few project and program highlights are summarized below:

Terrestrial Restoration

TRCA excels in urban and near urban natural cover projects and has restored and/or managed approximately 3,983ha of natural cover in the last 10 years. Through the operation of our native plant nursery, and in partnership with Credit Valley Conservation and private nursery growers, TRCA has supplied and sourced 3,767,814 plants for use in TRCA's restoration projects and programs.

TRCA undertakes a large variety of terrestrial planting programs and has planted 3,194,644 woody stems in both urban and rural environments over the last 10 years. Our programs target a broad range of stakeholders, partners, NGOs, and private landowners to increase canopy cover, restore habitat, create resilient ecosystems, and engage the community.

Over the last 10 years TRCA's Community Stewardship Programs have engaged volunteers and community groups to plant over 150,000 native plants across the jurisdiction. Each year, the team hosts approximately 100 events, engaging over 5000 community volunteers and students in restoration projects across the jurisdiction.

With the approval of TRCA's Invasive Species Management Strategy in 2020, increased awareness of invasive species, and dedicated funding from the Region of Peel, TRCA's efforts to manage invasive species have expanded over the last several years. The RRM team's efforts focus mainly on invasive plant species, however, the 2020-21 spongy moth (LDD moth) infestation was notable for much of Southern Ontario, with TRCA taking action to protect our conservation parks in 2020 (at the height of the pandemic) and partnering with four other conservation authorities to deliver a successful public education campaign that included printed material, meetings with municipal officials and well attended webinars.

Wetland Restoration

Coastal wetland restoration has also been a major focus of the RRM. From 2014-2016 TRCA completed the restoration of the second confined disposal facility (CDF) known as Cell 2 CDF, as well as restoration of a natural embayment at Tommy Thompson Park in Toronto, Ontario. Combined, these projects equate to 16 hectares of coastal marsh restored on Toronto's waterfront, providing habitat opportunities for a wide range of species. The significant investments made into coastal wetland restoration and invasive species management at Tommy Thompson Park are also paying off with increased observations of northern map turtles, amphibians, and even a family of northern river otters. Coastal wetlands are significant drivers for the nearshore fish community, and TRCA's waterfront monitoring program documented positive changes in response to TRCA restoration projects, meeting fish community targets at all restored sites. Warmwater fish and the piscivore community are increasing in abundance, which aligns with targets stated in the [Toronto and Region Remedial Action Plan](#).

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Inland wetland restoration is critical to restoring and maintaining healthy watersheds and ecosystem function. Inland wetland restoration has evolved into a robust program of partnerships and implementation across TRCA's jurisdiction. Larger scale program highlights include wetland restoration projects in Peel using capital funding to leverage partnerships with lower tier municipalities to tackle issues related to habitat loss and climate change; The Brock Lands and other wetland projects in Durham in partnership with a variety of government and non-government agencies; and our extensive wetland restoration program in Rouge National Urban Park in partnership with Parks Canada.

In Peel Region, RRM and teams from the Watershed Planning and Ecosystem Science groups are monitoring specific wetlands for Key Performance Indicators (KPIs) such as wetland storage capacity during storm events, water quality benefits, and biodiversity changes following restoration. The intention is to use this data to model expected outcomes for future wetland restoration projects. This research has shown that TRCA's restored wetlands can hold up to 100-year storm events, they also have a measured improvement to water quality, and are showing improvements in biodiversity.

Biodiversity improvements are a key objective for all restoration projects. TRCA restoration projects have contributed directly to improving habitat opportunities for several species-at-risk. Restored coastal wetlands at Duffins Marsh and at Tommy Thompson Park have hosted nesting least bitterns, a threatened species both federally and provincially. Habitat restoration targeting western chorus frog, a federally threatened species, has been very successful and recent monitoring shows that 80% of western chorus frog calls in the Claireville Natural Area were within TRCA's restored wetlands.

Stream Restoration

A report titled "Ten Year Strategic Plan for Urban Stream Restoration in City of Brampton" was produced by TRCA in 2018 at the request of the City of Brampton to identify and prioritize potential urban stream restoration projects. Five priority reaches were identified where concrete lined channels, that have reached their end of life, could be restored using natural channel design principles. Projects like these contribute to increasing flood capacity, decrease erosion, improve water quality, improve in-stream habitat, and restore valley land connectivity. The Jefferson, Jordan and Jayfield Parks Natural Channel Project was initiated in 2020 and the [Eastbourne Park Natural Channel Project](#) is also now underway. Once complete, both projects will have built 2kms of restored watercourse in Brampton.

Aquatic communities benefit from ecological restoration projects. Monitoring from the Etobicoke-Mimico watersheds shows that benthic invertebrate communities, a common measure for water quality, is positively changing following restoration works. Post restoration monitoring of the Alfred Kuehne Natural Channel Project in 2013 showed a strong improvement of 5 times as many in fish species sampled 2 years after completion. A total of 83 fish barriers have been removed or mitigated over the last 10 years, with free-running salmon being easily observed as benefiting from this activity.

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Meadow Restoration

The Meadoway has transformed what was a biological desert of mown turf grass, into a healthy meadow dominated by native plants where nesting savannah sparrows, bumblebees and other urban wildlife now thrive. Meadow restoration is among the more challenging restoration initiatives due to historic land degradation and invasive plants. The Meadoway is one of TRCA's most successful meadow restoration projects, which upon its completion will see the restoration of 104 ha of meadow across 16 linear kilometers of a previously mown utility corridor in Toronto, Ontario. This project is a globally recognized example of effective urban restoration and has received several awards, including an award for [Global Model of Ecological Restoration and Protection](#) in 2022.

Restoration Planning

An integral part of all TRCA Watershed Plans and watershed health is restoration planning that recognizes the importance of restoring natural cover, forests, wetlands, riparian habitat, and functioning stream and shoreline areas. Restoring impaired natural features is critical to maximizing ecosystem services that can improve water quality, mitigate flooding, and reduce erosion to name a few benefits. The RRM team has developed a desktop and field-based analysis process which catalogues ecologically and hydrologically appropriate restoration opportunities. This analysis helps staff identify priority restoration areas on a watershed basis using GIS tools and science-based prioritization methodology. Staff also ground truth potential restoration sites to verify the need for restoration and the habitat potential. This planning and field reconnaissance work is then used to develop two major implementation planning products: Restoration Opportunity Plans (ROP) and reach-based restoration concept plans. This type of analysis has been conducted in all the watersheds within TRCA's jurisdiction. The main product of this planning effort is an inventory of potential restoration sites that allows staff and stakeholders to plan for future restoration projects on a watershed and sub catchment basis. The plans enable TRCA and partners to target opportunities and develop multiyear implementation programs and strategies more effectively. This process has been especially helpful during large scale and multi-year partnership projects in Rouge National Urban Park (Rouge River, Petticoat Creek), Seaton Lands (Duffins Creek); Brampton's Ten-Year Urban Stream Restoration Strategy (Etobicoke Creek, Humber River), Municipal partnership programs and TRCA conservation lands master planning. These plans provide a mechanism by which the targets of the watershed strategies, fisheries management plans, Natural Heritage System Strategy and species recovery plans can be implemented.

RRM's restoration planning process has become a vital component in determining and identifying compensatory restoration opportunities when unavoidable losses to natural features occur through development projects. This process has been successful in providing new non-traditional sources of funding for habitat restoration projects. Since the TRCA Board adoption of the [Ecosystem Compensation Guideline](#) in 2018 and application on a trial basis which began in 2017, TRCA has received \$15,249,000 in compensation funds for natural feature restoration resulting in approximately 112 hectares of natural cover restoration, which is a net gain compared to 98 hectares of

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natural cover lost tied to funds received during that period. This net gain can be achieved due to the efficiencies of a robust restoration planning strategy and a streamlined in-house implementation program. More details on the program can be found in the 2022 Ecosystem Compensation Program and Finance Summary Report, brought to the TRCA Board of Directors in June 2023 (RES.#A 119/23).

Project Partnerships

TRCA recognizes the value and strength that partnerships provide and has worked with a variety of partners to achieve mutually beneficial goals and objectives. Partners have included: community groups; all three levels of government; NGOs; stakeholder groups; academic organizations; private landowners; private businesses; and individual volunteers. The following is a list of some of the partners TRCA has worked with over the past 10 years:

Federal

- Environment and Climate Change Canada
 - Canadian Wildlife Service
- Federal Economic Development Agency for Southern Ontario
- Fisheries and Oceans Canada
- Natural Resources Canada
- Parks Canada
- Transport Canada
- Ports Toronto
- Waterfront Toronto (three levels of government)

Provincial

- Ministry of Environment, Conservation and Parks
- Ministry of Natural Resources and Forestry
- Ministry of Transportation
- Ontario Power Generation
- Metrolinx
- Hydro One Networks Inc.
- Infrastructure Ontario

NGOs/ Not for Profit

- 10,000 Trees for the Rouge
- Alternative Land Use Solutions (ALUS)
- Aquatic Park Sailing Club
- Association for Canadian Educational Resources (ACER)
- Birds Canada
- Bonneville Environmental Foundation
- Centre for Community Energy Transformation
- Conservation Ontario and other conservation authorities
- Ducks Unlimited Canada
- Evergreen
- Fatal Light Awareness Program (FLAP) Canada

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- Forests Ontario
- Friends of the Rouge Watershed
- Grasslands Ontario
- Great Canadian Shoreline Cleanup (WWF/Oceanwise)
- Greater Toronto Airport Authority
- Green Shovels
- Heart Lake Turtle Troopers
- Humber River Citizens Alliance
- Local Enhancement & Appreciation of Forests (LEAF)
- Nature Conservancy of Canada
- Not Far From The Tree
- Oak Ridges Moraine Foundation
- One Tree Planted
- Ontario Federation of Anglers and Hunters
- Ontario Nature
- Ontario Streams
- Park People
- Powdermill Nature Reserve – Avian Research Center
- Salamander Foundation
- Scales Nature Park
- Toronto Ornithological Club
- Toronto Wildlife Centre
- Tree Canada
- Trees for Life
- Trout Unlimited
- Various Community Groups and Schools
- Waterfront Regeneration Trust
- Weston Family Foundation
- World Wildlife Fund

Academic

- Centennial College
- Humber College/Humber Arboretum
- Niagara College
- Seneca College
- Sir Sanford Fleming College
- Trent University
- Toronto Metropolitan University
- University of Toronto
- York University

Municipal

- Regional and local municipalities
- The Toronto Zoo
- Various Friends of Groups

Private

- Apotex Inc.
- Birds & Beans
- Coca-Cola Canada
- Farmers
- Golf Courses
- Molson Coors Ltd.
- Ontario Science Centre
- Private Landowners
- Urban Forest Associates
- Wet'n'Wild Toronto
- Woodbine Entertainment Group

Monitoring and Key Performance Indicators

Measuring the performance of restoration projects is critical to their long-term success and facilitates continuous learning in the relatively new field of ecological restoration science. The RRM group engages with internal and external stakeholders to assess projects based on their performance, identify successes, and make recommendations on adaptive management strategies where projects are deficient. Most projects are included in RRM's Rapid Restoration Assessment (RRAs) as a standard practice. RRAs are a method for assessing if projects are on the trajectory for success. Individual projects typically are assessed at year 1, 3 and 5 after implementation. Project components are scored based on their plant survival, state of repair, presence of invasives, and level of succession. The target for overall program success is that 70% of the projects assessed each year receive a rating of "good" or "excellent", which has been achieved every year since this scoring was initiated 5-years ago.

TRCA also works closely with academia on research related to our ecological restoration approaches. Partnered research projects can span a wide range of topics including assessment of planting and reforestation projects, development of invasion resistant seed mixes, assessing heat island mitigation of restored meadows, and understanding bumblebee response to restored meadows. By helping to facilitate research on urban ecological restoration, TRCA gains a better understanding of restoration results, which can be used to refine future restoration, and fosters the development of improved restoration science.

RATIONALE

TRCA undertakes ecological restoration activities to meet the core mandate of Conservation Authorities, which is to undertake watershed-based programs to protect people and property from flooding and other natural hazards, and to conserve natural resources for economic, social, and environmental benefits (Conservation Ontario, 2023). The core objectives of Conservation Authorities include the development and maintenance of programs that will conserve natural resources, including the protection, restoration and management of lakes, rivers, streams, and groundwater, as well as woodlands, wetlands, and natural habitat.

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Urban and near-urban natural areas often have degraded habitats, where ecological form and function is compromised. In TRCA's jurisdiction, this degradation is widespread, necessitating a strategic approach to prioritize where and what to restore. To address this, TRCA developed the [Integrated Restoration Prioritization \(IRP\)](#) tool that combines various strategies, plans and initiatives for both terrestrial and aquatic systems where environmental data and threats to the ecosystem can be overlaid. Discrete areas are scored based on ecosystem impairments potential natural heritage value, resulting in areas being prioritized for restoration. Low scoring areas are less in need of restoration than high scoring areas. Very low scoring areas are labelled for protection where very acute impairments can further benefit high functioning natural areas (e.g., on-line pond removal). IRP has proven to be a successful tool for strategically targeting areas most in need of restoration that have the biggest potential benefit to the natural system if restored. In 2022, the development of a Waterfront Integrated Restoration Prioritization (WIRP) tool began and will be completed by year-end 2023. The IRP tool is complemented by TRCA's Restoration Opportunities Planning program, where desktop analysis and field verification are used to identify, develop, and implement site/project specific ecological restoration plans.

Watershed plans provide a comprehensive understanding of the state of watershed health and help TRCA, and our partners manage the potential impacts of growth, climate change and other stressors. As such, watershed plans provide an integrated and systematic tool in strategically planning ecological restoration projects. Restoration priorities (IRP) and opportunities (ROP) are utilized during the development of the watershed plans to target areas and guide action planning. Completed restoration projects provide important information in future updates to the watershed plans to characterize landscape changes and track natural heritage gains and other co-benefits.

TRCA's [Invasive Species Management Strategy \(ISMS\)](#) is another tool to help guide ecosystem restoration and management. Invasive alien species are a primary driver of biodiversity loss, impacting ecosystem functions and services. TRCA's ISMS provides a high-level framework to address invasive alien species, while recognizing that the decisions to manage widespread invasive alien species in highly altered and continually disturbed urban ecosystems is extremely complex with limited resources available. TRCA's jurisdiction is also home to several species at risk, including plants, invertebrates, herptiles, fish and birds. Ecological restoration can play a key role in halting and reversing species declines. TRCA works with government agencies, as well as academia, other researchers, and community groups, to target actions that will benefit species at risk, including habitat restoration and community stewardship. Municipal official plans and other strategies are another key tool that TRCA uses to coordinate restoration projects to achieve mutually beneficial objectives. Some examples of key strategies that link directly to TRCA's restoration projects are the Peel Climate Change Partnership, York Region Greening Strategy and the City of Toronto Ravine Strategy, Biodiversity Strategy, Pollinator Strategy, Carruthers Creek Watershed Plan and Toronto's Strategic Forest Management Plan.

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On a broader scale, our worsening climate change and biodiversity crises provide a more urgent rationale for action on ecological restoration. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) notes that ecosystem restoration is fundamental to biodiversity conservation and the rehabilitation of ecosystem processes (IPBES, [2019](#)). In fact, the United Nations General Assembly has proclaimed 2021-2030 as the [Decade on Ecosystem Restoration](#). On a national level, Canada adopted a [Global Biodiversity Framework](#) to address biodiversity loss, restore ecosystems and protect Indigenous rights at the United Nations Biodiversity Conference (COP15) in 2022. Canada has also adopted climate change targets as part of the [2015 Paris Agreement under the United Nations Framework Convention on Climate Change](#). To help achieve these targets, Canada must champion Nature-based Climate Solutions, which include the restoration of wetlands, forests, grasslands, and shorelines, all of which TRCA excels in and can support our partners on.

FINANCIAL DETAILS

Funding for the RRM section is provided from both traditional and non-traditional sources. The traditional sources originate through the capital budget process from City of Toronto, and Regions of Peel, York, and Durham. However, habitat restoration projects are also supported from a variety of non-traditional sources and partners. TRCA staff has been successful in pursuing non-traditional funding sources with outside agencies that share TRCA's common interest in habitat restoration. These agencies contribute to both the planning and implementation of habitat restoration projects.

As seen in Table 2, total funding in 2011 was approximately \$6.2M compared to \$27.4M in 2022. On average, over the past 10 years over 50% of the RRM group's funding has come from non-traditional sources. These non-traditional sources include partnerships with private and government agencies, grants, and fee-for-service agreements with regional and local municipalities.

Table 2. Funding Comparison 2011 versus 2022

Funding Type	Year	
	2011	2022
Capital	\$ 2,700,000	\$ 13,400,000
Other	\$ 3,500,000	\$ 14,000,000
Total	\$ 6,200,000	\$ 27,400,000

DETAILS OF WORK TO BE DONE

TRCA is a global leader in ecological restoration in part because of our science-based approach and outstanding ability to build partnerships while seeking traditional and non-traditional sources of funding. TRCA will continue to work with our partner municipalities to strengthen these relationships through developing and implementing mutually beneficial restoration projects. The RRM team will continue to work with the Strategic Business Planning and Performance team to identify and pursue grant funding to increase the number and scale of our restoration projects. Staff will also look for opportunities to build restoration components into redeveloping areas, as a condition of

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new infrastructure, and as part of infrastructure renewal projects, similar to the Brampton channel restoration projects described earlier in this report. Ecological restoration is a rather new science, and TRCA will also continue to refine key performance indicators to improve our restoration efforts. Collectively, TRCA will also pursue opportunities to tell others about our restoration efforts, to inspire and teach others, and to learn about different approaches to restoration.

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