TRCA Watershed-based Resource Management Strategy

Toronto and Region Conservation Authority

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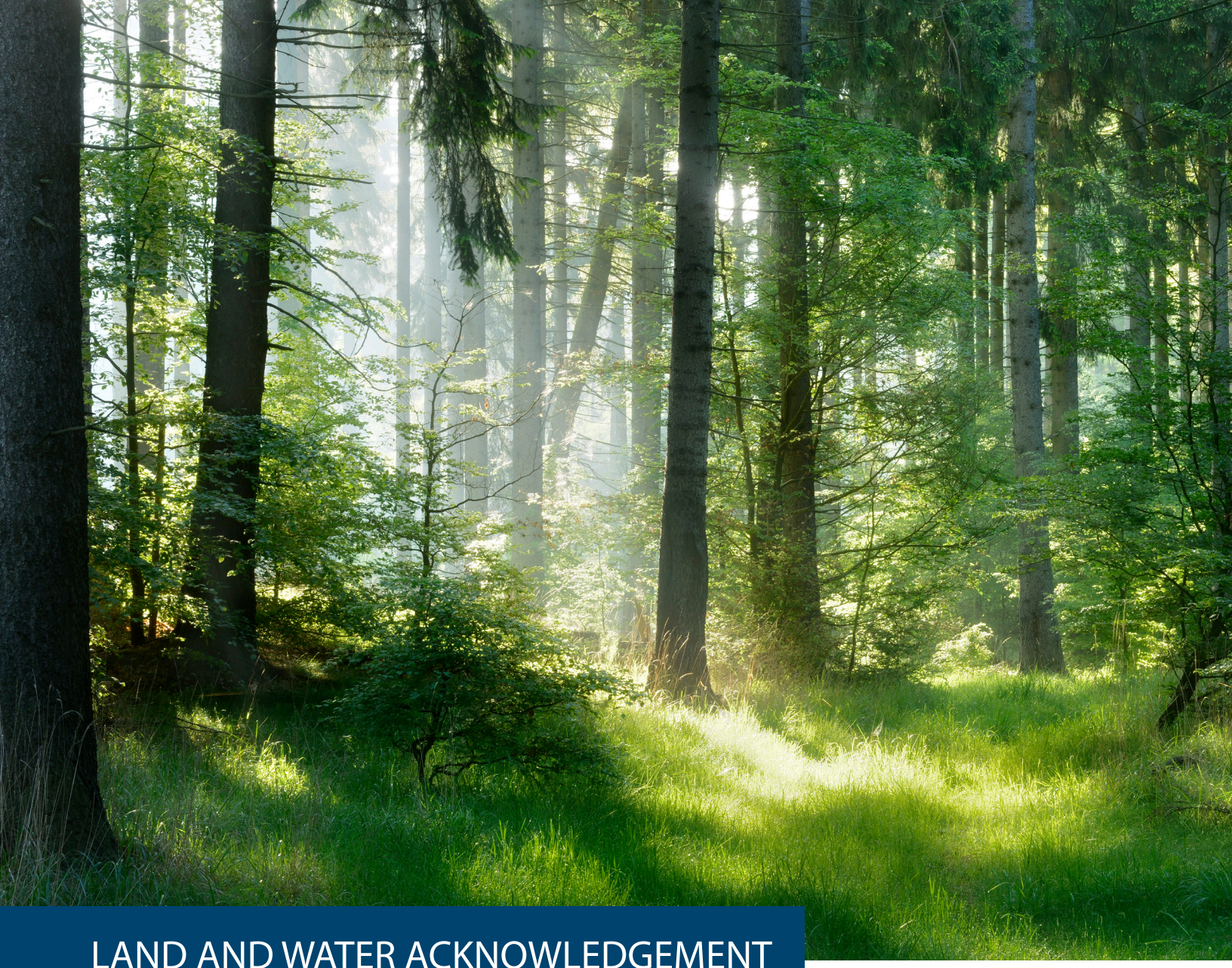


LAND AND WATER ACKNOWLEDGEMENT

We respectfully acknowledge the lands and waters where we conduct our work are Treaty Lands and Traditional Territories of the Mississaugas of the Credit, Six Nations of the Grand, and the Williams Treaties First Nations. These lands are also the Traditional Territories of the Huron-Wendat and are now home to many diverse First Nations, Inuit and Métis peoples.

Through our work, Toronto and Region Conservation Authority appreciates and respects the history and diversity of these lands and waters and is grateful to have the opportunity to work and be in relation with this territory. We are also grateful for the continued work of many First Nations and Indigenous peoples, who are the original and current caretakers of these lands and waters.

We humbly acknowledge our responsibility to respect First Nations' rights and Indigenous perspectives, elevate Indigenous voices, and honour our relationship with First Nations and Indigenous peoples.

INTRODUCTION

About Toronto and Region Conservation Authority

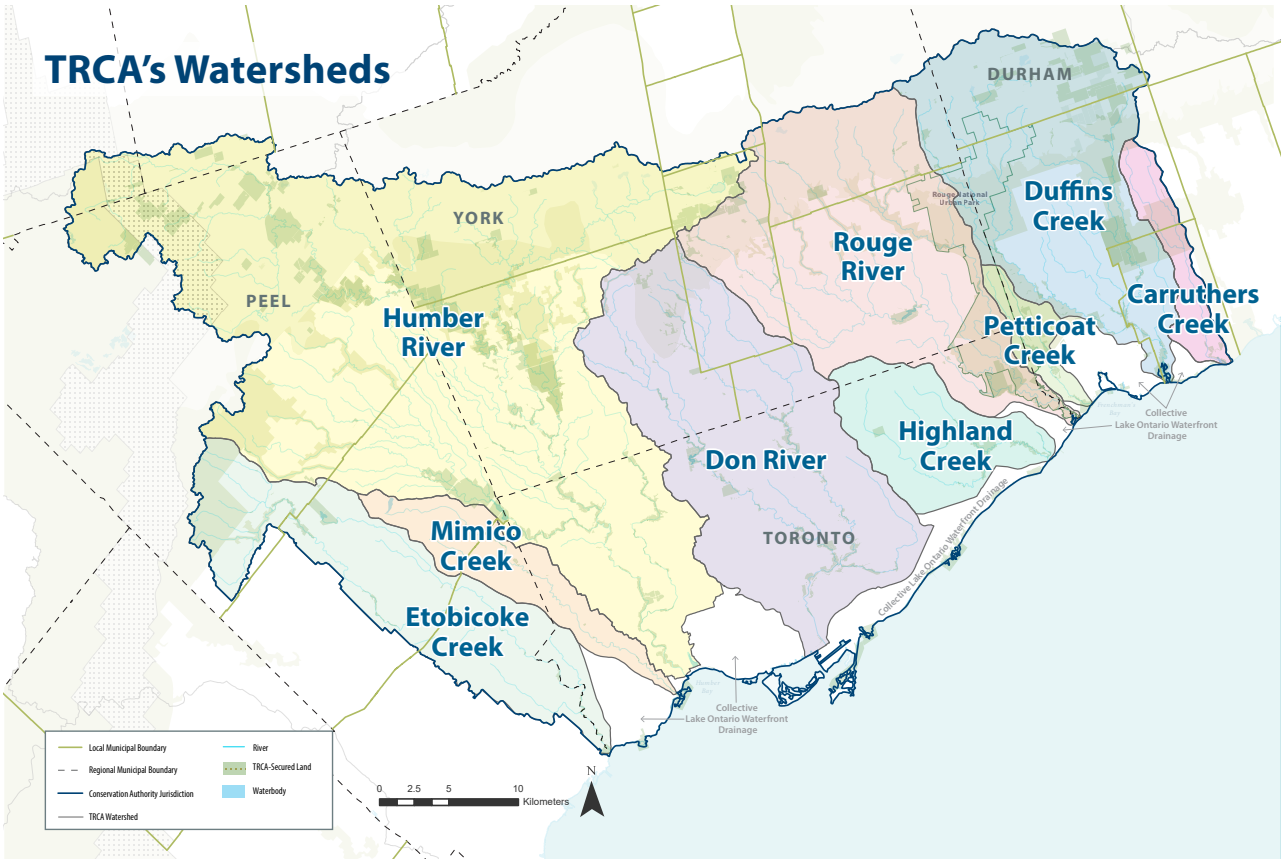
Since 1957, Toronto and Region Conservation Authority (TRCA), as enabled through the provincial Conservation Authorities Act, has taken action to enhance our region's natural environment and protect our land, water and communities from the impacts of flooding, erosion and increasingly extreme weather events — Ontario's leading cause of public emergencies.

As the region's first line of defense against natural hazards, TRCA maintains vital infrastructure and provides programs and services that promote public health and safety, protecting people and property.

TRCA mobilizes a local, science-based approach to provide sound policy advice, leveraging its position as a watershed jurisdiction collaborating with Indigenous communities, our member municipalities, and other partners and stakeholders to achieve collective impact within our communities and across all levels of government. TRCA's jurisdiction includes nine watersheds and their Lake Ontario shorelines as shown in Figure 1:

- Carruthers Creek
- Mimico Creek
- Etobicoke Creek
- Humber River
- Duffins Creek
- Rouge River
- Don River
- Petticoat Creek
- Highland Creek

These watersheds are the ancestral and treaty territories of diverse Indigenous communities that span all or parts of some of the largest municipalities in Canada, including the City of Toronto and the regional municipalities of Durham, Peel, and York. The entire jurisdiction comprises 3,467 square kilometres, and represents almost 5 million people, approximately 10% of Canada's population.



Legislative Background

The purpose of the Conservation Authorities Act ("the CA Act") is to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario. The CA Act categorizes conservation authority (CA) programs and services as:

- Mandatory programs and services (Category 1)
- Municipal programs and services provided on behalf of a municipality under a memorandum of understanding or other agreement (Category 2)
- Other programs and services determined by the CA to be advisable to fulfill the purposes of the CA Act (Category 3).

Ontario Regulation 686/21: Mandatory Programs and Services ("the Regulation") sets out the mandatory programs and services under the CA Act which must be delivered by CAs in Ontario. Section 12(1)3 of the Regulation requires all CAs to prepare a "Watershed-based Resource Management Strategy" or "Watershed Strategy".

The Watershed Strategy includes Category 1 programs and services provided by the CA. It may also include both Category 2 and Category 3 programs and services, where the relevant agreement permits the inclusion of these programs or services in the Watershed Strategy (section 12(6)). However, these programs and services will maintain their Category 2 and 3 classifications.

Category 1 programs and services are set out in the Regulation. Category 2 programs and services are agreed to by participating municipalities through the annual budget process and associated agreements and memorandums of understanding. Category 3 programs and services will continue to be funded outside of the municipal levy. Sections 12(4)-(7) of the Regulation set out the required components to be included in the Watershed Strategy. Herein, we refer to Category 2 and 3 programs and services as "supporting" programs and services.

Purpose

The purpose of the Watershed Strategy is to assist with evolving or enhancing the delivery of TRCA's programs and services. The Watershed Strategy improves efficiency and effectiveness of Category 1 programs and services, and where the relevant agreements or funding allows, Category 2 and 3 programs and services.

Herein we summarize the existing technical studies, monitoring programs, and other information that informs the delivery of mandatory programs and services as required by the Regulation. We also outline how the programs and services are reviewed for compliance with the Regulation and provide the process through which the programs and services will be adapted, as needed.

WATERSHED CONTEXT

CAs are organized around watersheds, which are the areas drained by a river and its tributaries. Healthy watersheds deliver important benefits to humans, our economy, and our environment as described in the infographic below (Figure 2).

TRCA watersheds are home to one of the most heavily urbanized regions in Canada, and forecasts anticipate significant additional growth in the coming decades. To ensure this growth and the cumulative effects it generates avoids, minimizes, and mitigates risks from natural hazards and that the many benefits of nature-based solutions to the communities within the region are realized, an integrated approach to watershed management is needed. This integrated approach is described in more detail below.

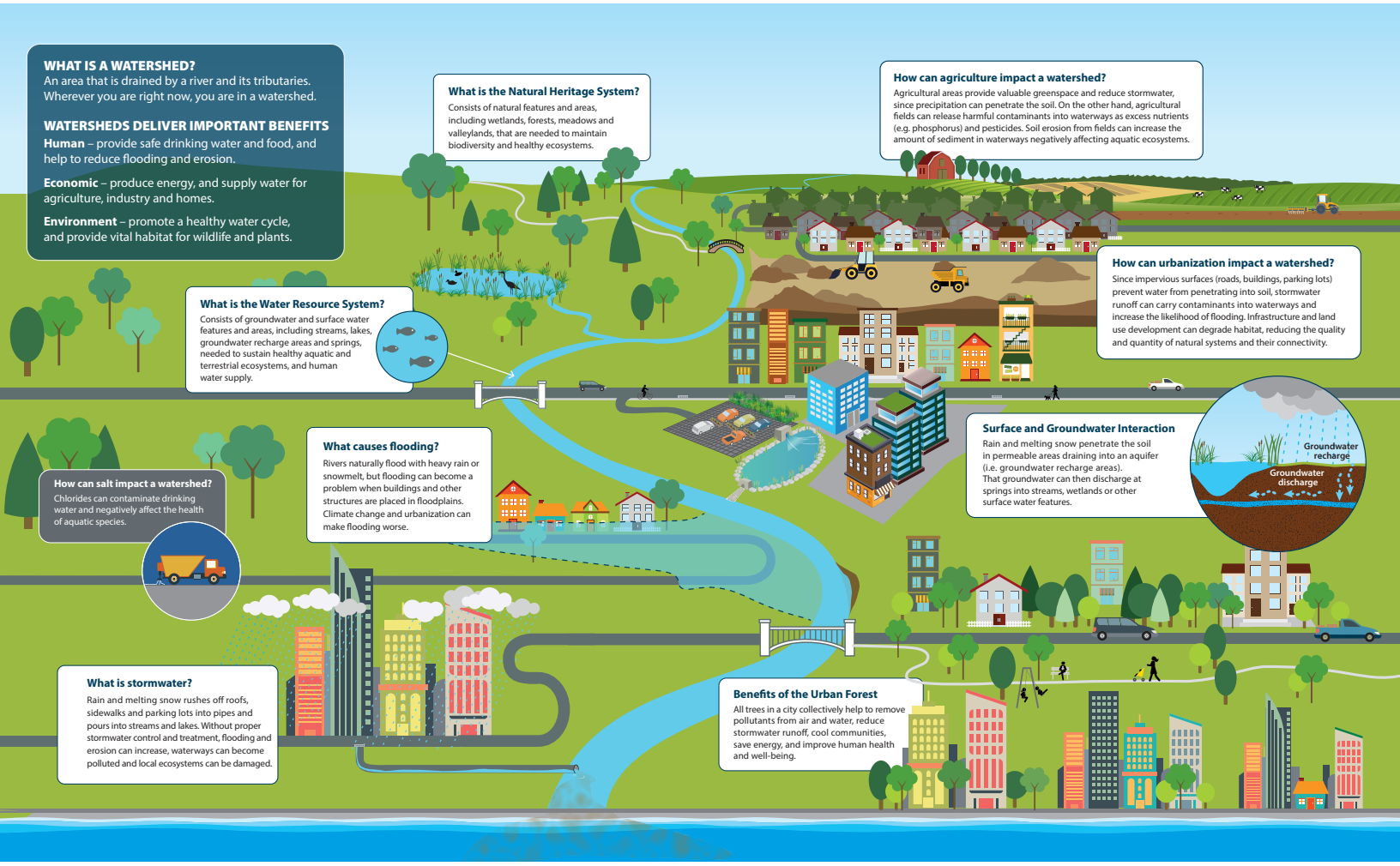


Figure 2: Infographic describing the inter-dependent components, issues, and benefits of a watershed.

Importance of an Integrated Approach

Integrated Watershed Management (IWM) requires us to manage human activities and nature together, on a watershed basis, considering the inter-connected interests and needs of the environment, economy, and society. It is an approach that is regarded globally as one of the most effective ways of managing natural resources and is depicted in Figure 3.

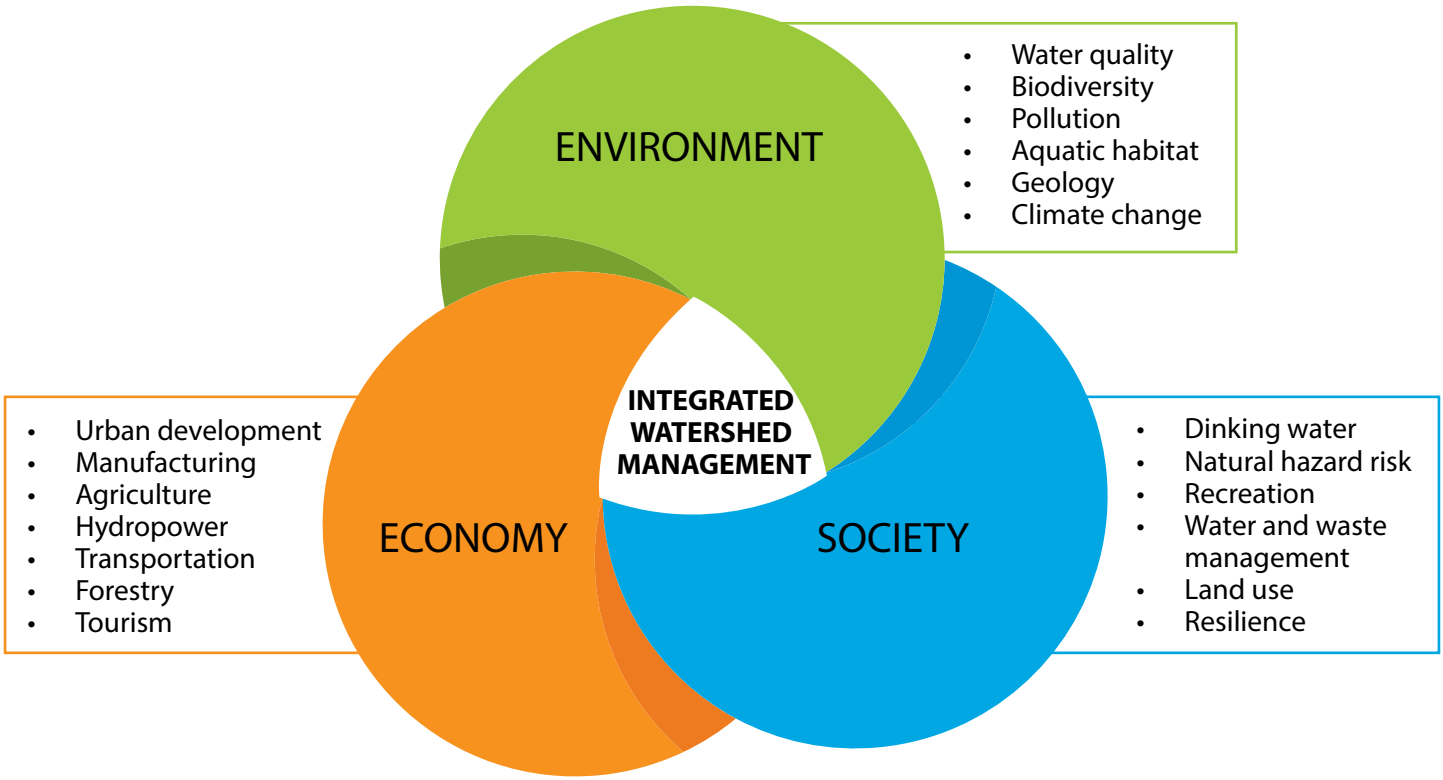


Figure 3: Describes how Integrated Watershed Management considers economy, society, and environment together to guide decision-making (Adapted from: Conservation Ontario).

The need for IWM is amplified by anticipated future impacts of a changing climate, as nature likely provides the best solutions to climate change challenges. Effective natural hazard management and resilience to climate change are strongly linked to natural heritage and water resource protection and management. Having a holistic understanding of the complex interactions between diverse watershed components is essential to effective management. It is the foundation of why CAs were formed and underpins everything we do as organizations. Although IWM is an important foundational tool for managing watersheds, its effectiveness can be greatly strengthened by recognizing the knowledge and perspectives of Indigenous peoples in stewarding their lands and waters.

Watershed Planning

One of the main ways by which TRCA and our partners comprehensively undertake IWM is by integrating the information from all our science-based programs and engagements through the development and periodic update of our watershed plans.

TRCA already has extensive monitoring programs and undertakes sophisticated studies that help to inform the mandatory programs and services required by the CA Act. Long-term environmental data is essential to identify physical and biological changes in the local environment over time to distinguish between natural trends and human-induced changes and to evaluate the success of conservation management efforts. Data and analysis that are generated from watershed planning programs are critical to informing decisions of many cross-jurisdictional partners. This important information is shared with partner municipalities, provincial and federal governments, developers and their consultants, and others as part of infrastructure, development, restoration, and remediation planning and implementation projects across the region. Sound planning and decision-making are dependent on ongoing collaboration and access to this information.

Watershed plans will continue to be one of the main strategic documents that provide joint municipal and TRCA recommendations on management actions needed to comprehensively address watershed issues within TRCA's jurisdiction. This Watershed Strategy provides an overarching framework to guide the development and update of watershed plans, taking a risk-based approach. However, many of TRCA's existing programs and services, such as flood and erosion risk management, restoration and remediation, property acquisition and management, plan input and review, and education and outreach programs directly implement the recommendations of TRCA's watershed plans and of this Watershed Strategy more broadly.

STRATEGIC DIRECTION

Framework

The Watershed Strategy is developed using a data-based framework, from which knowledge is derived. This informs planned actions throughout the watershed, through a collaborative partnership approach. Figure 4 provides the overarching framework.

The Watershed Strategy framework begins with setting guiding principles and objectives reflecting watershed issues. The watershed is characterized through a summary of existing science-based studies and information. The next step is to identify and assess issues and risks that may impact the effective delivery of Category 1 mandatory programs and services, while also identifying gaps in addressing the issues and risks (i.e., whether additional programs and services are needed).

Actions to address such risks are then identified and implemented throughout the watershed. In TRCA's case, these actions will be identified through the development of watershed plans, which are specific to each watershed within TRCA's jurisdiction. To support continuous improvement, the Watershed Strategy is reviewed and updated periodically. Consultations with stakeholders and the public are required during the development of the Watershed Strategy and its subsequent reviews and updates. TRCA has opted to engage with First Nations and Indigenous communities in the development of this Strategy as well.

The Watershed Strategy identifies Category 2 and 3 programs and services recommended to support the delivery of mandatory CA programs and services. It provides a mechanism to update the TRCA programs and services inventory and could identify where opportunities exist for improving and/or maintaining watershed health. Where there are connections between the implementation of the Watershed Strategy through watershed plans and Category 3 programs and services, these programs and services will continue to be funded through means other than municipal levy

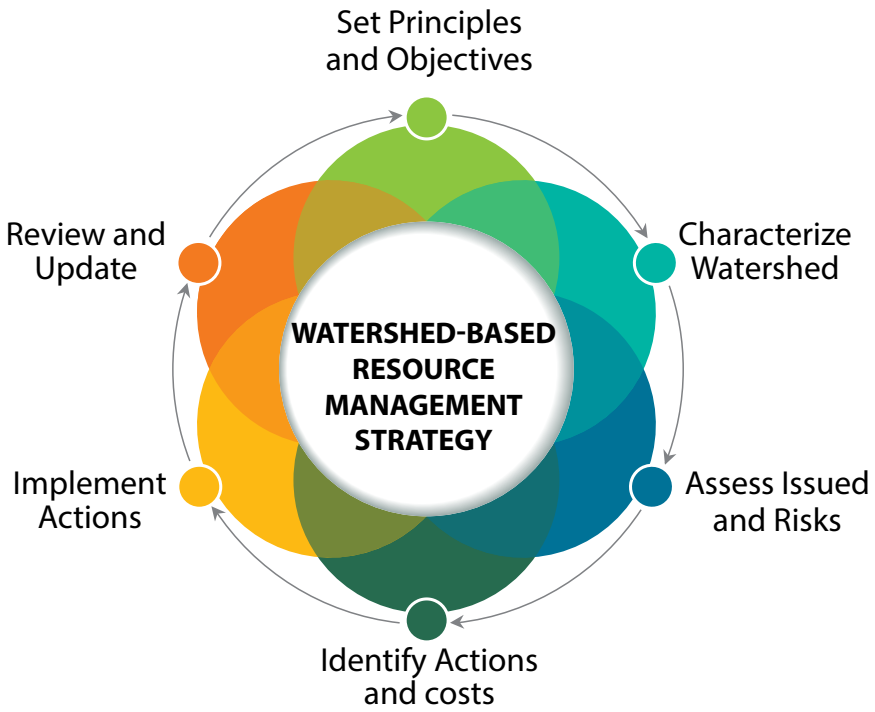


Figure 4: Framework of the Watershed-based Resource Management Strategy which is an ongoing process but usually starting with setting principles and objectives.

Guiding Principles and Objectives

To further the integrated approach that considers the role nature plays in risk-based watershed management, all relevant programs and services will be reflected in this Watershed Strategy. These programs and services are described in Sections 21.1, 21.1.1, and 21.1.2 of the CA Act, and in Ontario Regulation 686/21.
The following summarizes the Guiding Principles and Objectives that direct the management framework for TRCA decision-making. The principles are derived and adapted from TRCA's The Living City Policies (2014). TRCA's recently published updated Strategic Plan (2023) provides overarching goals and watershed-wide direction to inform decision-making. The objectives outlined below tie to these Strategic Plan goals, in particular:

- Pillar 1 Goal: Mitigating hazard risks to communities and protecting the natural environment

The Watershed Strategy is also informed and supported by:

- Pillar 2 Goal: Contributing to environmental targets through knowledge advancement

For Pillar 2, TRCA recognizes the importance of both western science and traditional ecological knowledge.

Principles and objectives include both mandatory and supporting categories below. Mandatory categories refer to principles and objectives for mandatory services as outlined in 21.1, while supporting categories refer to those captured in 21.1.1 and 21.1.2 of the CA Act, as supported through agreements. The objectives below identify what should be addressed in each watershed plan.

Guiding Principles

- Sound development and resource management decisions in an urbanizing region are best made in a watershed context that considers an adaptive, preventative, and proactive systems approach and reflects both incremental change and cumulative impacts over time.
- The long-term function, integrity, and resilience of watersheds and ecosystems is best achieved through a collaborative and adaptive science-based approach that incorporates traditional ecological knowledge, and Indigenous ways of knowing, being, doing, and relating as important components of integrated watershed management.
- Protection of life and property from flooding, erosion and other natural hazards is dependent on natural heritage system protection, restoration, and natural hazard avoidance and remediation, inclusive of valley landforms, stream corridors, wetlands, watercourses, and shorelines in their natural or restored state.
- Development and redevelopment should contribute to the prevention, elimination, and reduction in risk to drinking water, flooding, erosion, low water/drought, slope instability, and cumulative impacts on ecosystem functions, biodiversity, and Indigenous values.
- Healthy natural heritage and water resource systems are important in mitigating urbanization and climate change impacts. Natural systems and nature-based solutions are essential to Indigenous peoples and are a foundation for sustainable and resilient communities and ecosystems.
- The planning and development of sustainable and resilient communities requires a collaborative approach among TRCA, First Nations and Indigenous communities, our partner municipalities, the public, and other stakeholders to incorporate innovative and integrated community design that maximizes long-term community benefits.

Objectives

- Identify, mitigate, and/or remediate natural hazard risks to communities and improve the surrounding natural environment.
- Identify measures to protect, enhance, and restore the areas and features that make up the Water Resource System, Natural Heritage System, and urban forest to ensure ecosystem resilience and sustainability.
- Identify vulnerable areas as defined by the Clean Water Act to assist with mitigating the risks to municipal drinking water sources and informing a sustainable and clean water supply for communities.
- Identify measures to achieve more sustainable land use and infrastructure development patterns and practices to protect, enhance, and restore water quality and maintain stable water balance.
- Identify, understand, communicate, and manage current and predicted key watershed conditions and issues and the primary stressors that cause them.
- Identify how watersheds will be monitored over time to track changes resulting from land use and climate change, and actions to protect, restore, remediate, and mitigate impacts.

More specific goals may be identified through the watershed plan development process relevant to each watershed. TRCA has developed Terms of Reference (TOR) and templates outlining the processes and scope of our current generation of watershed plans. Each watershed plan will follow these processes unless otherwise directed by our partners.

Managing Risks

Areas with the greatest need and risk will be prioritized for further study through watershed planning and other studies to identify areas for implementation of watershed-based management efforts. Risk is based on areas where future growth is expected and where existing communities are at risk, and additional updated science-based information is needed to inform decision-making. Figure 6 shows where many of these risk-based areas occur within TRCA's jurisdiction.

Priority areas include where regional planning partners have identified future urban areas and the need for Settlement Area Boundary Expansions (SABE) through the recent Municipal Comprehensive Reviews, through local municipal Official Plan Reviews, or where Ministerial Zoning Orders have been issued.

There are also risks present with new and existing infrastructure that is proposed to be upgraded or retrofitted to accommodate new or improved servicing. The information from watershed plans should be used in infrastructure planning and design to ensure safety and resiliency. For example, details on flows and hydrology that may be impacted by urbanization or other factors can be important in determining the design e.g., span of a new bridge structure. It is also important to consider factors, such as existing erosion prone areas and other physical factors that may influence the performance and resilience of infrastructure over the long-term.

Ideally watershed and subwatershed plans will be completed and updated to help inform the planning, design and delivery of infrastructure, such as roads, transmission mains, and stormwater management facilities across the jurisdiction. Costs of damage and disruption due to flooding can be avoided and or mitigated through watershed planning that is translated into the design and construction of resilient infrastructure in the context of extreme weather events and a changing climate.

At a high level, urbanization and climate change are the main drivers that increase the levels of risk within TRCA's watersheds. These factors are the main contributors to watershed issues within the Toronto region, such as increased risk of flooding and erosion, increased heat, loss and degradation of habitat, declining ecosystem functions, invasive species, impacts to water resources, and water quality degradation. These issues form the foundation of technical analyses for watershed characterization and the assessment of potential future conditions as part of the watershed planning process. Through these technical analyses, specific actions to address watershed risks and issues are identified during the watershed plan development process.

Watershed characterization is organized around four integrated and inter-dependent components, and is depicted in Figure 5:

- Natural Hazards
- Natural Heritage System and Urban Forest
- Water Resource System
- Water Quality

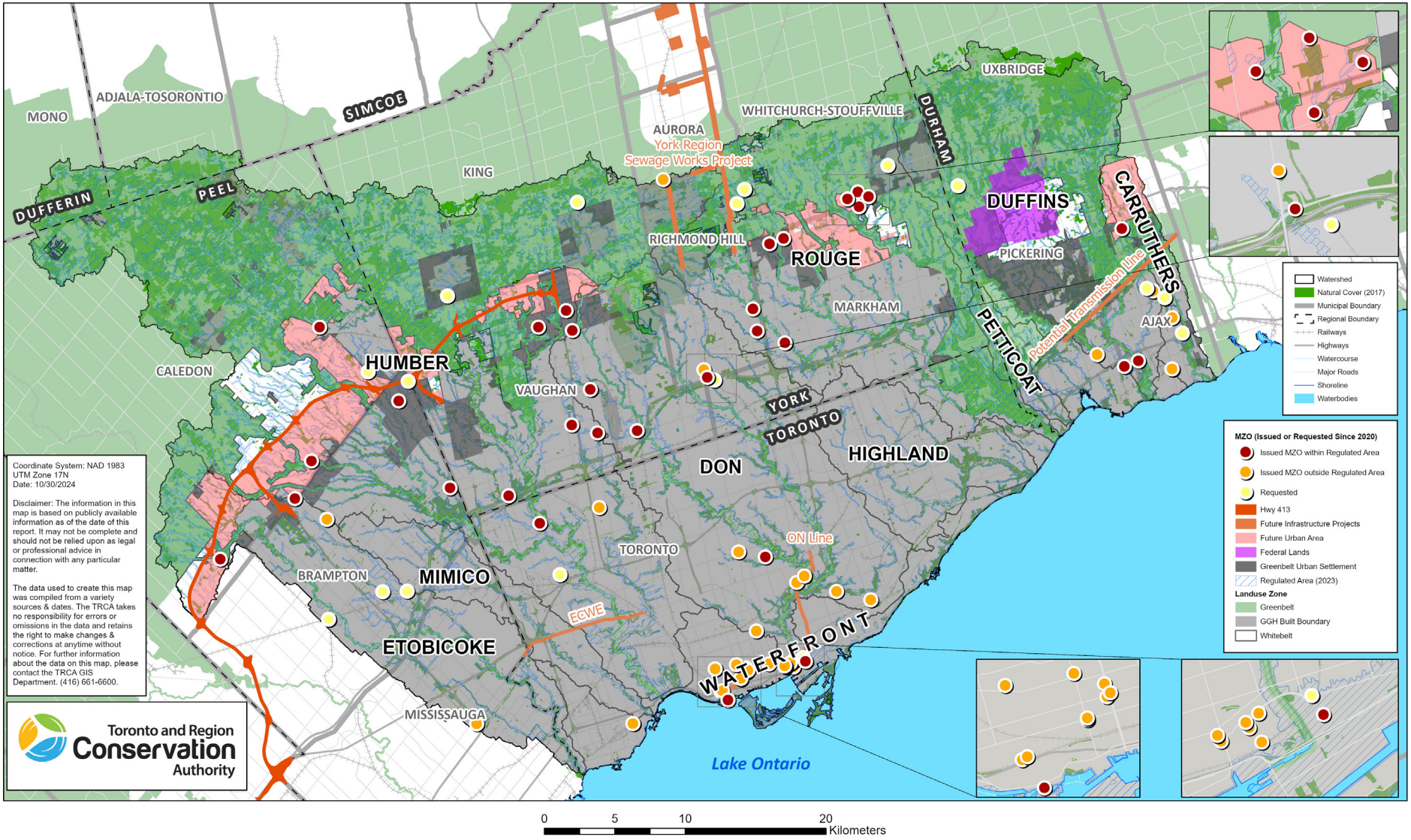


Figure 5: TRCA's jurisdictional context, showing locations of anticipated future growth, including where Settlement Area Boundary Expansions (SABE), and Ministerial Zoning Orders (MZOs) (e.g. Future Urban Areas) occur, and siting for several major infrastructure projects. The information in this map is based on publicly available information as of August 30, 2024. It may not be complete and should not be relied upon as legal or professional advice in connection with any particular matter.

WATERSHED CHARACTERIZATION AND DIRECTIONS

TRCA has a wealth of existing monitoring data and technical studies to draw upon to help characterize our watersheds and inform the development of integrated watershed plans. Watershed plans are where the findings of individual studies and monitoring results are analyzed together in one comprehensive strategy for the watershed.

Much is already understood in our watersheds and TRCA has been proactive in undertaking comprehensive studies to inform sound planning and decision-making that promotes watershed health and resilience. However, it is critically important that the robust science behind these studies is periodically updated to ensure that the best information is used. TRCA continues to advance new or update existing studies to maintain current, science-based information to inform watershed decision-making.

The Regulation requires that the Strategy include a summary of existing technical studies, monitoring programs and other information to support delivery of programs and services. The following is a listing of existing studies authored or co-authored by TRCA prior to and in support of this Watershed Strategy, and relevant monitoring programs. A summary description of each of the studies and programs listed below can be found in Appendix A. There are other studies that TRCA may have contributed to or that can be used to inform watershed planning, including a number of municipally led subwatershed studies. A few of these subwatershed studies are listed below, however summaries for these are not provided in the appendix.

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Watershed and Subwatershed Planning and Related Studies and Tools

All Watersheds

- Watershed and Ecosystems Reporting Hub (online platform)
- Flood Plain Map Viewer
- Regulated Area Search Viewer
- Regulated Area criteria layer viewer
- Flood Forecasting and Warning Real-time Gauging (online platform)

Etobicoke and Mimico Creek Watersheds

- Etobicoke Creek Watershed Plan (TRCA, 2024)
- Etobicoke and Mimico Creeks Watersheds Technical Update Report (TRCA, 2010)
- Etobicoke Creek Headwaters Subwatershed Study Synthesis Report (TRCA, 2008)
- Centreville Creek Subwatershed Study Synthesis Report (TRCA, 2008)
- Turning Over a New Leaf: The Etobicoke and Mimico Creeks Watershed Report Card (TRCA, 2006)
- Greening Our Watersheds: Revitalization Strategies for Etobicoke and Mimico Creeks (TRCA, 2002)

Humber River Watershed

- Humber River Watershed Plan (Update in progress)
- Purpleville Creek Subwatershed Study (City of Vaughan, 2021)
- Humber River Watershed Plan: Pathways to a Healthy Humber (TRCA, 2008)
- Humber River Watershed Plan Implementation Guide (TRCA, 2008)
- The Centreville Creek Subwatershed Study Synthesis Report (TRCA, 2008)

Don River Watershed

- Don River Watershed Plan: Beyond Forty Steps (TRCA, 2009)
- Don River Watershed Plan Implementation Guide (TRCA, 2009)
- Forty Steps to a New Don (TRCA, 1994)

Highland Creek Watershed

- Highland Creek Watershed Greening Strategy (TRCA, 2020)

Rouge River Watershed

- Future Urban Area Subwatershed Study (City of Markham, 2019)
- Rouge River Watershed Plan Implementation Guide (TRCA, 2008)
- Rouge River Watershed Plan: Towards a Healthy and Sustainable Future (TRCA, 2007)
-

Petticoat Creek Watershed

- Petticoat Creek Watershed Action Plan (TRCA, 2012)
-

Duffins Creek Watershed

- A Watershed Plan for Duffins Creek and Carruthers Creek (TRCA, 2003)

Carruthers Creek Watershed

- Northeast Pickering Subwatershed Study (in progress)
- Carruthers Creeks Watershed Plan (TRCA, 2021)
- A Watershed Plan for Duffins Creek and Carruthers Creek (TRCA, 2003)

Conservation Authority Policy and Procedure Documents

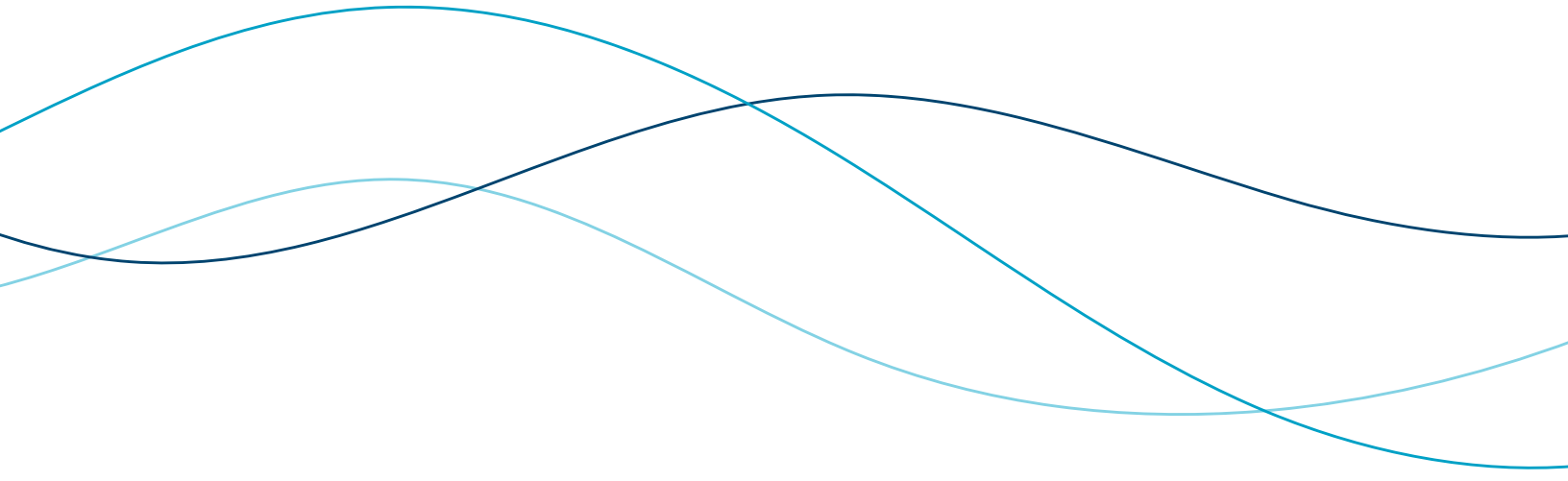
- Watershed and Ecosystems Reporting Hub (online platform)
- Flood Plain Map Viewer
- Regulated Area Search Viewer
- Regulated Area criteria layer viewer
- Flood Forecasting and Warning Real-time Gauging (online platform)
-

Source Water Protection Assessment Reports and Plans

- Credit Valley, Toronto and Region, and Central Lake Ontario (CTC) Source Protection Plan, and its associated Assessment Reports (CTC, CVSPA, TRSPA, CLOSPA, 2015)

Climate Change Studies

- Durham Region Natural Systems Climate Change Vulnerability Study (TRCA, 2021)
- Aquatic System Climate Vulnerability in TRCA's Jurisdiction (TRCA, 2021)
- Future Climate Projections for TRCA's Jurisdiction (Ontario Climate Consortium, 2020)
- Climate Vulnerability Assessment of Streams and the Mitigation Potential within TRCA's Jurisdiction (TRCA, 2020)
- TRCA Terrestrial Ecosystem Climate Change Vulnerability Assessment (TRCA, 2020)
- Peel Climate Change Partnership Action Plan (PCCP, 2017)
- Natural Systems in Peel Region: Vulnerability Assessment (TRCA and Ontario Climate Consortium, 2017)
- Assessing and Mitigating Municipal Climate Risks and Vulnerabilities in York Region (Fausto et al., 2016)
- Climate Trends and Future Projections in the Region of Peel (TRCA, Ontario Climate Consortium and Risk Sciences International 2016)
- Historical and Future Climate Trends in York Region Summary Report (Fausto et al., 2015)
- Peel Climate Change Strategy (Peel Region, 2011)
- TRCA Action Plan for The Living City: Meeting the Challenge of Climate Change (TRCA, 2008)



Great Lakes Studies

- Lake Ontario Tributary Loading Study (in progress)
- Western Lake Ontario Land to Lake Initiative (in progress)
- Waterfront Integrated Restoration Priorities (2024)
- TRCA Shoreline Hazard Mapping Update (Baird & Associates, 2022)
- Lake Ontario Lakewide Action and Management Plan (ECCC and EPA, 2018, update in progress)
- Toronto and Region Remedial Action Plan:
  - Within Reach: 2015 RAP Progress Report (TRCA 2016a)
  - Moving Forward: 2007 RAP Progress Report (TRCA 2009)
  - Clean Waters, Healthy Habitats: 2001 RAP Progress Report (TRCA 2001)
- Lake Ontario Collaborative Phase 1 Reports (2008)
- Toronto Waterfront Aquatic Habitat Restoration Strategy (2003)

Natural Systems Studies

- Urban Forest Studies (2009-2016 and 2019-2025)
- Guideline for Determining Ecosystem Compensation (TRCA 2018, Updated in 2023)
- Natural Heritage System Update (TRCA, 2022)
- Water Resource System Mapping (TRCA, 2022)
- DRAFT Don River Fisheries Management Plan (MNR & TRCA, 2017)
- Watershed Integrated Restoration Prioritization: A Multiple Benefit Approach to Restoration Planning (TRCA, 2016)
- Crossings Guideline for Valley and Stream Corridors (TRCA, 2015) [NB: Also relevant to natural hazards]
- Rouge River Fisheries Management Plan (MNR & TRCA 2011)
- Terrestrial Natural Heritage System Strategy (TRCA, 2007) and Refinements
- Etobicoke Creek: The Aquatic Ecosystem (TRCA, 2006)
- Humber River Fisheries Management Plan (MNR & TRCA, 2005)
- DRAFT Mimico Creek Fisheries Management Plan (TRCA, 2004)
- Duffins Creek Fisheries Management Plan (MNR & TRCA, 2004)

Flood Hazard and Water Quantity Studies

All or Multiple Watersheds

- Peel Region flood vulnerable road and crossing assessment (TRCA, ongoing)
- Peel Region ditch characterization and sewershed delineation (TRCA, ongoing)
- Hwy 401 Crossing Constraints (TRCA, 2024)
- TRCA Shoreline Hazard Mapping Update (Baird, 2022)
- Jurisdictional Spills Assessment and 2D Modelling Studies (TRCA, 2022)
- Durham Road Capacity Study (TRCA, 2020)
- TRCA Flood Risk Assessment and Ranking Study (IBI Group, 2019)
- Flood Protection Landforming Design Considerations (Aecom, 2018)
- Flood Forecasting and Warning Decision Support System Workplan (Matrix Solutions, 2018)

Etobicoke Creek Watershed

- Etobicoke Creek Flood Plain Mapping Extension in the Region of Peel (TRCA, 2022)
- Downtown Brampton Flood Protection Environmental Assessment (Aecom, 2020)
- Spring Creek 2D Modelling Extension and Flood Plain Mapping Update (Matrix Solutions Inc., 2019)
- Malton Flood Characterization Study (Matrix Solutions Inc., 2018)
- Downtown Brampton Flood Plain Mapping Update (Valdor Engineering Inc., 2017)
- Spring Creek Zone 7 Flood Characterization (Aecom, 2017)
- Etobicoke Creek Flood Plain Mapping Update (Aquafor Beech Ltd., 2016)
- Spring Creek Flood Plain Mapping Update Study (MMM Group, 2015)
- Flood Plain Mapping in Applewood and Dundas/Dixie Special Policy Area (MMM Group Ltd., 2015)
- Etobicoke Creek Hydrology Study (MMM Group Limited, 2013)
- Etobicoke Creek Hydrology Study (TSH Associates, 2007)

Mimico Creek Watershed

- Mimico Creek Flood Plain Mapping Update (Valdor Engineering Inc., 2020)
- Mimico Creek Hydrology Study (MMM Group Limited, 2009)

Humber River Watershed

- Humber River Floodplain Mapping Extension in Peel Region (TRCA, 2024)
- Lake Wilcox SPA 2D Study and Floodplain Mapping Update (Valdor, 2024)
- Toporowski Creek Flood Assessment (TRCA, 2023)
- Rockcliffe Riverine Flood Mitigation Project – Municipal Class Environmental Assessment (Morrison Hershfield, 2020)
- Rockcliffe SPA Flood Plain Mapping Update (DHI, 2020)
- Black Creek at Rockcliffe Special Policy Area Flood Remediation and Transportation Feasibility Study (Wood, 2020)
- Rockcliffe SPA: 2D Modelling and Mapping Update (DHI Water and Environment Inc., 2018 & 2020)
- Humber River in York Region Floodplain Mapping Update Final Report (Aquafor Beech Limited, 2019)
- Dam Safety Review of the Palgrave Dam (Sanchez Engineering Inc., 2019)
- Claireville Dam Downstream Flood Remediation Study (Stantec, 2019)
- Humber River in Toronto Flood Plain Mapping Update (Wood 2018)
- Humber River in Peel Flood Plain Flood Plan Mapping Update (Cole Engineering Group Ltd. 2018
- Humber River Hydrology Update (Civica Infrastructure Inc., 2015, amendment in 2018)
- Bolton Berm Remediation Study – Restoration/Remediation Alternatives Report (Valdor, 2018)
- Lower Humber 2D Modelling (Valdor Engineering Inc. 2017)
- Black Creek Dam Safety Review (Sanchez Engineering Inc., 2017)
- Bolton Berm Remediation Study – Existing Conditions Report (Valdor, 2017)

- Flood Plain Mapping in Jane and Wilson Special Policy Area, Black Creek (Valdor Engineering Inc. 2016)
- Claireville Dam – Dam Safety Review (KGS Group Ltd., 2016)
- Black Creek Dam Sediment (TRCA, 2015)
- Digital Flood Plain Mapping for the East Humber River within the Town of Richmond Hill (R.J. Burnside and Associates Ltd., 2014)
- Bolton Special Policy Area Flood Plain Mapping (R.J. Burnside and Associates Ltd., 2014)
- Black Creek (Rockcliffe Area) Riverine Flood Management Class Environmental Assessment (AMEC Environment & Infrastructure, 2014)

Don River Watershed

- Don River Flood Plain Mapping Update Phase II (KGS Group, 2020)
- Don River Floodplain Mapping Phase II (WSP, 2020)
- Don River Hydrology Update (AECOM Canada Ltd., 2018)
- Peer Review of the 2018 Don River Watershed Hydrology Update (CHI, 2018)
- Lower Don River Subwatershed 1D-2D Modelling Project (Stantec, 2017)
- Don Mouth MIKE FLOOD Modelling and Analysis Project (DHI, 2017)
- Yonge Street and Elgin Mills Road Floodplain Mapping Update (Valdor Engineering Inc., 2016)
- Don River Hydrology Update (MMM, 2004)

Highland Creek Watershed

- Highland Creek Hydrology Model Update (Matrix Solutions 2020)
- Highland Creek Hydraulic Model and Flood Plan Mapping Update (Matrix Solutions 2020)
- Highland Creek Markham Branch (Corporate Dr.) Flood Remediation Class Environmental Assessment (Morrison Hershfield, 2019-active)
- Highland Creek Hydrology Update (Aquafor Beech Limited, 2004)

Rouge River Watershed

- Rouge River Floodplain Mapping Update Phase I Final Report (Wood Environmental & Infrastructure Solutions, 2020)
- Rouge River Floodplain Mapping Update Phase II Final Report (Wood Environmental & Infrastructure Solutions, 2020)
- Unionville 2D Update (TRCA, 2020)
- Unionville SPA 2D Study and Floodplain Mapping Update (Valdor Engineering Inc. 2019)
- Rouge River Watershed Hydrology Study Update (Wood Environment & Infrastructure Solutions, 2018)
- Rouge River Hydrology Update (MMM, 2002)

Petticoat Creek Watershed

- Petticoat Creek Flood Plain Mapping Update (TRCA 2021)
- Petticoat Creek Hydrology Update (WSP 2020)
- Petticoat Creek Hydrology Update (Greenland Consulting Engineers, 2006)

Frenchman's Bay Watershed (Waterfront)

- Frenchman's Bay Hydrology and Flood Plain Mapping Update (Matrix Solutions, 2023)
- Pine and Dunbarton Creeks Hydrology and Hydraulic Study (Greenland Consulting Engineers, 2007)
- City of Pickering Amberlea Creek Hydrology and Flood Plain Mapping Study (Aquafor Beech Limited, 2005)
- Krosno Creek Floodplain Mapping Study (TRCA, 2002)

Duffins Creek Watershed

- Duffins Creek Floodplain Mapping Update (Wood Environment & Infrastructure Services, 2020)
- Conservation Ontario Class Environmental Assessment for the Rehabilitation of the Pickering and Ajax Flood Control Dykes (KGS Group, 2020)
- Stouffville Dam Flood Remediation Study (Stantec, 2019)
- MIKE Flood 1D-2D Model Development and Regulatory Flood Plain Mapping Pickering/Ajax SPA (Valdor, 2018)
- Pickering Ajax 2D Modeling and Dyke Assessment (Valdor, 2016)
- Duffins Creek Hydrology Update (Aquafor Beech Limited, 2013)
- Duffins Creek Hydrology Update (Aquafor Beech Limited, 2002)

Carruthers Creek Watershed

- Carruthers Creek Flood Plain Mapping Update (TRCA, 2018)
- Carruthers Creek Watershed Hydrology (Cole Engineering, 2011)
- Summary report for Digital Floodplain Mapping Carruthers Creek Spill Analysis (R.J. Burnside & Associates, 2009)

Erosion Hazard Studies and Mapping

- 2021 Infrastructure Hazard Monitoring Summary Report and Results (TRCA, 2021)
- Several site-specific projects throughout the jurisdiction – see link

Water Quality Studies

- A Summary of Water Quality Data in the Region from 1996 to 2002 (TRCA, 2003)
  - Regional Watershed Monitoring Program: Surface Water Quality Summary 2006-2010 (TRCA, 2011)
  - Regional Watershed Monitoring Program: Surface Water Quality Summary Temporal Trends Update, 2011-2015 (TRCA, 2017)
  - Regional Watershed Monitoring Program: Surface Water Quality Summary Spatial Trends Update, 2011-2015 (TRCA, 2017)
- Water quality modelling in support of watershed plans

Monitoring Programs

- Hydrometrics monitoring
- Low Flow Response Program
- Routine Monthly Water Quality Sampling
  - Sampling for MECP's Provincial Water Quality Monitoring Network (PWQMN)
  - Sampling for MECP's Provincial Groundwater Monitoring Network (PGMN)
- Regional Watershed Monitoring Program (RWMP)
- Lake Environmental Monitoring Program (LEMP)
- Site-specific environmental monitoring, including:
  - Road Ecology Survey
  - Seaton Lands Monitoring
  - Mayfield West CAMP Monitoring

Other Relevant Programs

- Flood Risk Management

TRCA MANDATORY PROGRAMS AND SERVICES REVIEW

TRCA has already established many of the programs and services required to fulfill or exceed the mandatory requirements set by the Province, which are largely informed by the wealth of data and technical analyses from the studies noted in previous sections. The Memorandums of Understanding for each participating municipality outlining programs and services, their associated CA Act category classification, and funding structure are provided on TRCA's webpage.

TRCA also has a robust process in place to identify gaps in programs and services that considers mandatory program and services compliance. Once these gaps are identified, there is a process to add these gaps to TRCA's Unfunded Priorities list described in more detail below. Section 12(4)(3)(ii) of the Mandatory Programs and Services Regulation requires that the Watershed Strategy include a component that "identifies and analyzes issues and risks that limit the effectiveness of the delivery" of mandatory programs and services. In essence, this is a Gap Analysis, which has already been completed by virtue of the Unfunded Priorities list outlined below.

Gap Analysis and Unfunded Priorities

TRCA's Unfunded Priorities List is a budget document outlining specific funding pressures for projects, programs or services that are not currently allocated within TRCA's existing budget. This may include an increase in service level, capital projects or infrastructure funding, additional staffing, or new programs or modifications that are not part of the base existing budget from the previous year. This work is informed by asset management planning, studies conducted by TRCA staff, and through input and advice of our partners and stakeholders.

The Unfunded Priority List is prepared by staff in coordination with divisional directors and managed by the Strategic Business Planning and Performance (SBPP) business unit. The procedure for amending a project or program to the list of unfunded priorities is outlined in TRCA policy SPP No. CS-6.03 and may include requests from partner municipalities, other levels of government or TRCA staff.

Through a consultative process, the SBPP team coordinates updates for the annual Unfunded Priorities List with key internal TRCA staff and prioritizes initiatives according to the evaluation matrix that was developed in consultation with partner municipalities. This list is reported on annually and includes cost estimates. Prioritized initiatives are placed into four equal groupings determined according to the distribution of the ranking values: A, B, C and D for TRCA's jurisdiction.

The prioritization process arranges initiatives based on several categories including but not limited to:

- Alignment
- Risk
- Potential Other or Leveraged Funding
- CA Act Classification.

Risk-based Approach to Identify Actions

One critical component of the mandatory programs and services review is reviewing the completion of watershed plans themselves. As stated earlier, watershed plans are the main vehicle through which joint TRCA and municipal watershed actions are identified that simultaneously address issues relating to both mandatory and supporting programs and services to achieve maximum community benefits.

Considering this, TRCA has developed a schedule to advance the current generation of our watershed plans to ensure that they are both up to date with respect to science and policy and that they address the geographical areas where updated knowledge is needed most. As outlined in the Watershed Characterization and Directions section above, TRCA's watershed plans are of various vintages, with some requiring updates as they are ten years old or more.

In previous sections, Figure 6 outlined where growth and infrastructure pressures occur within the Greater Toronto Area region within TRCA managed watersheds. These pressures follow planned growth identified through Municipal Comprehensive Reviews, Official Plan updates, and resulting settlement area boundary expansions. Approved Ministerial Zoning Orders and several planned major infrastructure projects are also identified within TRCA watersheds. Considering where these pressures are expected to occur and the potential impacts on TRCA watersheds, TRCA has developed the following approximate schedule for updating our watershed plans, as shown in Figure 7.

While TRCA has existing resources to undertake watershed planning, additional funding would assist with accelerating the pace at which watershed plan updates are completed. Ideally, watershed plans should be kept current and should be updated every 10 years to maintain up-to-date scientific information. While current resources and TRCA budgets are not sufficient to achieve this pace, program enhancements have been included in the Unfunded Priorities list to address this gap. Additional funding to better support First Nations' participation in the development of updated watershed plans would also be beneficial.

Current and ongoing processes may identify additional adjustments needed to improve TRCA programs and services. One example is that TRCA is currently reviewing the monitoring programs that support watershed planning. Some adjustments to our current monitoring programs may be required to achieve compliance with the CA Act or improve the information collected to support the development of watershed plans. If adjustments require budget enhancements, these will be added to the Unfunded Priorities list.

Watershed Plan Ownership and Implementation

Watershed plans are encouraged, or required in some instances, by Provincial policy to inform certain municipal decisions, such as those relating to planning for servicing and stormwater management. Watershed plans are usually co-developed by CAs and partner municipalities, and these documents should really be considered shared and collectively owned. Both CAs and municipalities are the primary implementers of watershed plans.

After TRCA completes a watershed plan, we set up an Implementation Steering Committee together with our partner municipalities, rights-holders, and other key stakeholders. Through these committees, members will coordinate and decide how to advance priority watershed plan recommendations through their internal budget processes. Completed projects will be tracked, and this, along with on-the-ground monitoring, will enable adaptive management to occur.

Our watershed plans are intended to be implemented over a 10-year period before being updated with new science. Collaborative and comprehensive implementation, tracking, and reporting of all aspects of the watershed plan will be essential to fully realize the vision for the watersheds, demonstrate accountability and transparency, improve watershed health, and ensure safe and sustainable waterways, ecosystems, and human communities.

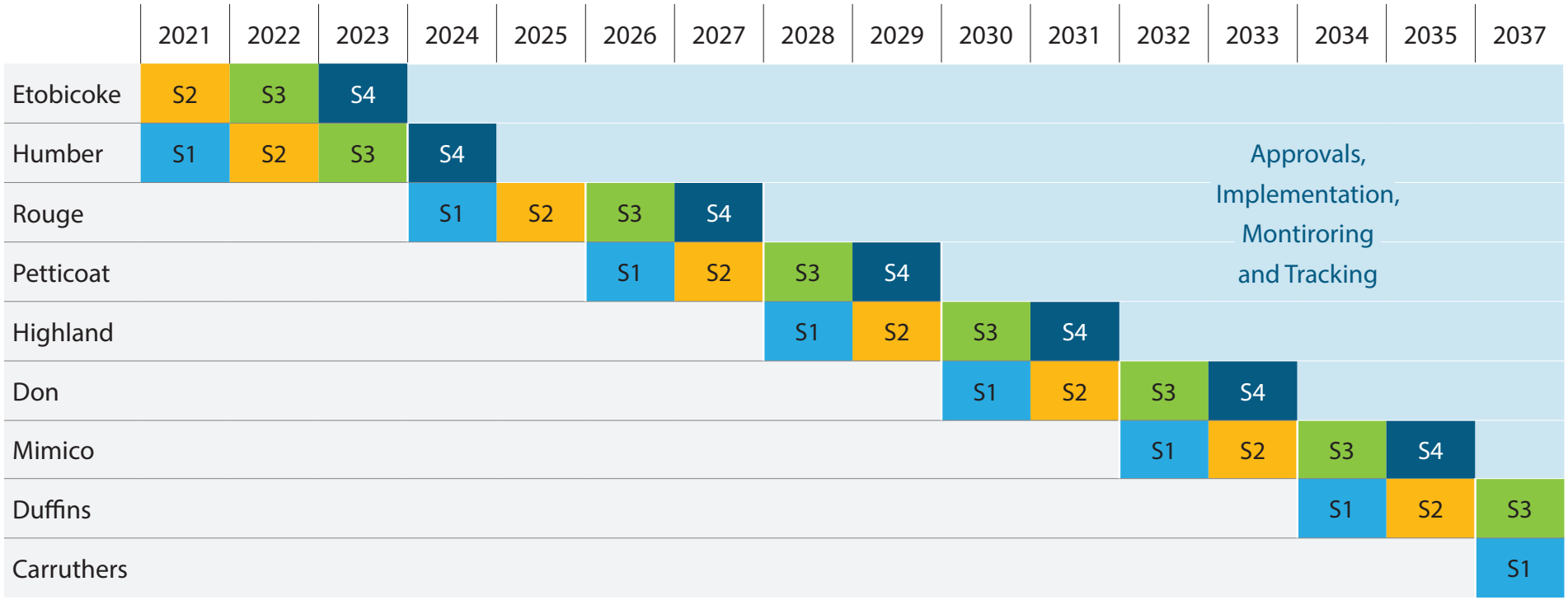


Figure 6: Generalized break-down of timing for future watershed plan updates. Past years have been included for context. This is based on existing funding resources but is subject to change.

ENGAGEMENT AND PUBLICATION OF THE WATERSHED STRATEGY

A report about the development of this Watershed Strategy, and the other strategies and plans required under the CA Act was taken to TRCA's Board of Directors on September 22, 2023. The report outlined the coordinated approach that TRCA would take to ensure public and stakeholder engagement on the CA Act strategies requiring consultation.

TRCA staff coordinated consultation on the development and progress of the Strategies and Plans, including this Watershed Strategy, throughout 2024. Engagements were held with partner municipalities, First Nations and Indigenous communities, the TRCA BILD Industry Working Group, and the Regional Watershed Alliance . TRCA also had online platforms to engage the public and seek input. Letters to all Treaty holding First Nations and First Nations with traditional territories within TRCA watersheds were sent out in early February 2024. TRCA has developed and retained a detailed record of all engagements, comments received, and proposed responses. Feedback from all engagements has been considered and incorporated, as appropriate, into this document. The final document is posted on the TRCA website as required.

PERIODIC REVIEW AND UPDATING OF THE STRATEGY

TRCA will commit to updating this Watershed Strategy generally every 5-10 years, depending on need and resources; it will be considered a living document. If there are any significant updates to the Strategy due to legislative or provincial directives, consultation with rights-holders, stakeholders and the public will be undertaken. Processes will be determined by TRCA as needed commensurate with the scale and scope of proposed changes and resulting affected stakeholders.

APPENDIX A – Study and Monitoring Program Summaries

Conservation Authority Policy and Procedure Documents

CAs regulate construction, alteration, interference, and development activities in and around valleys, streams, wetlands and along the Lake Ontario shoreline. This is done through the Conservation Authorities Act and associated regulations. Under the(amended) section 28 regulation, property owners need to apply for a permit from the applicable CA if they are planning to undertake development activities within a CA Regulated Area. This is apart from development approved under a Minister's Order under s.34.1 or s.47 of the Planning Act, for which CAs must issue a permit. Ontario Regulation 41/24 requires that each authority shall develop policy and procedure documents (see next section on TRCA's Living City Policies). In addition, CAs must develop maps depicting the areas within the authority's area of jurisdiction where development activities are prohibited without a permit. CAs maintain regulation mapping, indicating the location and estimated extent of regulated features, hazards and areas where development activities would require a CA permit.

While CAs may be in a decision-making role as a regulator of development, they are also a public commenting body in the review of projects within Environmental Assessment Act processes and applications under the Planning Act and, including the review of proposed comprehensive updates to municipal Official Plans and By-laws. In our review role, CAs are required to comment on the risks related to natural hazards consistent with the natural hazard policies in the policy statements issued under section 3 of the Planning Act and with an awareness of natural features' importance for the management of natural hazards.

The Living City Policies (TRCA, 2014)

The Living City Policies guide the implementation of TRCA's legislated and delegated roles and responsibilities in the development and infrastructure review and approval processes. The document guides TRCA staff in their plan review and plan input roles to support municipalities in building safe and resilient communities through the management of natural hazards, and conservation of regulated valleylands, shorelines, watercourses and wetlands.

Since the Province amended the Conservation Authorities Act and introduced Ontario Regulation 41/24, there are elements of The Living City Policies that require updating. It is important to note, however, that the document's fundamental principles, goals and policy objectives are still applicable in the context of the updated legislative framework.

TRCA Planning and Development Procedural Manual (TRCA, 2008)

TRCA's Planning and Development Procedural Manual provides technical guidelines and procedural information for many of the policies found in The Living City Policies. The intent of the procedural manual is to enhance TRCA's cooperative working relationship with municipal partners, the development community, public infrastructure providers, and permit applicants regarding the implementation of TRCA's planning and regulatory functions, including opportunities to increase procedural transparency and streamline the review process where feasible.

Climate Change Studies

Durham Region Natural Systems Climate Change Vulnerability Study (TRCA, 2021)

To support the Durham Regions Municipal Comprehensive Review (MCR) TRCA undertook a Natural System Climate Change Vulnerability Assessment (NS-CCVA) in 2021-2022. This initiative identifies the natural heritage features and areas that may be more vulnerable to future climate conditions using methodologies developed in previous studies completed by TRCA (TRCA 2017, TRCA 2020).

The results of this study are expected to inform identification and implementation of Durham Region's Natural Heritage System and help to ensure it can adapt to a changing climate.

Aquatic System Climate Vulnerability in TRCA's Jurisdiction (TRCA, 2021)

Using temperature and fish records collected from 2001-2017 TRCA has demonstrated that both climate and land use and land cover change have a strong and significant impact on instream temperature, thereby affecting cold, cool, and warm water stream habitats. This study has assigned vulnerability to different stream reaches based on both predicted climate change and land use and cover change. Exploring likely climate (RCP 4.5) and forest cover scenarios (~30% under Municipal Official Plans), reaches that may maintain cold water reaches with forest cover enhancements within reach contributing areas can be identified.

By prioritizing conservation and restoration efforts in these catchments, there is a higher likelihood of conserving the most at-risk thermal regime, cold water reaches, to maintain biodiversity at current levels within the TRCA jurisdiction. This prioritization approach can be used to prioritize restoration and conservation efforts by identifying areas where potential enhancement of natural cover may have the greatest overall benefit. This is particularly useful for Watershed Planning, Natural Heritage Planning, and other development planning processes.

Future Climate Projections for TRCA's Jurisdiction (Ontario Climate Consortium, 2020)

With grant funding from the Greenbelt Foundation, TRCA worked with Durham Region to develop updated climate projections for Durham Region and its eight local area municipalities. Using available dynamically downscaled climate data from the North American Coordinated Regional Downscaling Experiment (NA-CORDEX), the Ontario Climate Consortium (OCC; now part of TRCA's Ecosystem and Climate Science program) produced bias adjusted climate projections for 52 climate variables. The updated climate projections under the RCP 8.5 (high emissions) and RCP 4.5 (moderate emissions) scenarios for the short (2011–2040), mid (2041–2070), and long (2071– 2100) term are currently available through Durham Region's open data portal.

An accompanying guidance document was developed to enable municipalities within the Greenbelt to develop their own climate projections and help improve consistency in the climate information used across Ontario municipalities, which supports the climate change goals and policies outlined in the Greenbelt Plan (2017). This process was subsequently used to produce climate projections for all of TRCA's jurisdiction as well as Ganaraska Region Conservation Authority and Niagara Region. Results for TRCA's jurisdiction can be found in the Future Climate section of TRCA's Watershed and Ecosystems Reporting Hub and TRCA's open data portal. As climate science continues to evolve, TRCA will continue to develop and apply the best available climate projections for TRCA's jurisdiction and our partners.

Climate Vulnerability Assessment of Streams and the Mitigation Potential within the TRCA Jurisdiction (TRCA, 2020)

TRCA recently completed the draft Climate Vulnerability Assessment of Streams and the Mitigation Potential within TRCA's Jurisdiction. The main goals of this work were to provide an assessment of vulnerabilities of instream temperatures to climate change impacts, and to inform where to best implement strategic adaptation measures to reduce impacts on in-stream temperature and fish communities.

The results of this assessment identified high, medium, and low priority Reach Contributing Areas based on their capacity to mitigate the impacts of climate change on aquatic ecosystems. The output from this assessment can be incorporated into various TRCA and municipal initiatives such as watershed and sub-watershed planning, natural heritage system planning, restoration planning as well as on the ground activities, especially activities that strive to increase forest cover.

TRCA Terrestrial Ecosystem Climate Change Vulnerability Assessment (TRCA, 2020)
TRCA has developed a Climate Change Vulnerability Assessment (CCVA) framework that provides an approach to identify and map terrestrial natural system features and areas that are most vulnerable to climate change impacts. This framework has been applied to Peel Region (Tu et al., 2017) and subsequently expanded to terrestrial systems throughout TRCA's jurisdiction. This framework involves desktop geospatial analysis using the best available data and information to map the relative degree of vulnerability of terrestrial ecosystems within TRCA's jurisdiction, including forests, wetlands, and meadows, to climate change stressors.

With the identification of mapped climate vulnerabilities, the results provide useful information about where protection or additional enhancements in the natural heritage system (NHS) are needed to build long-term resilience. Enhancements could include both localized actions to improve resilience and expansion of the NHS through the municipal comprehensive review process, to areas where existing natural cover is insufficient to meet ecosystem goals.

Peel Climate Change Partnership Action Plan (PCCP, 2017)

In 2009, the City of Brampton, City of Mississauga, Town of Caledon, CVC, TRCA, and the Region of Peel formed the Peel Community Climate Change Partnership (PCCP) to develop an intergovernmental climate change strategy. This was in response to the urgent need to respond to climate change at the local level and was guided by senior representatives from each of the partners.

In 2017, the PCCP completed an assessment of the current state of the partnership, as well as the original *Peel Climate Change Strategy* (Peel 2009). To position the partners to have a significant collective impact over the next five years, several sub-strategies were developed to reduce community greenhouse gas (GhG) emissions and address vulnerability to extreme heat and flooding. These sub-strategies were Flood Resiliency, Low Carbon Communities, Green Natural Infrastructure / Heat Resiliency, and Public Education.

Peel Region Natural Systems Vulnerability Assessment (TRCA and Ontario Climate Consortium, 2017)
In 2017, a natural systems climate change vulnerability assessment was completed, which studied the impacts of climate change on natural systems in the Region of Peel. Urbanization is the principal land use stress on natural systems in Peel. Climate change will interact with other stressors to amplify and exacerbate impacts on natural systems (Table 4). The groundwater, aquatic and terrestrial systems examined in this vulnerability assessment are tightly linked, and climate change will have complex and overlapping effects on them. Because many aspects of Peel's natural systems display a more or less north-south gradient in condition, climate change will have uneven effects throughout the Region.

Assessing and Mitigating Municipal Climate Risks and Vulnerabilities in York Region (Fausto et al., 2016)

As part of the Assessing and Mitigating Municipal Climate Risks and Vulnerabilities in York Region project, OCC partnered with York Region, the Clean Air Partnership, and GLISA to undertake a case study vulnerability assessment of the City of Vaughan's municipal stormwater system. The goals of this case study were to support the characterization of vulnerabilities to climate change, further develop the capacity of staff to conduct risk and vulnerability assessments, and to support the ongoing adaptation planning efforts in the City of Vaughan by incorporating the adaptation tools developed. Stormwater-specific vulnerability indicators were developed and analyzed to understand how the system responds to a climate driver and how to define risk and possible adaptation measures.

Climate Trends and Future Projections in the Region of Peel (TRCA, Ontario Climate Consortium and Risk Sciences International, 2016)

As a foundational piece and precursor to characterizing climate change vulnerability and risk across the Region of Peel, a climate trends and projections study was developed between 2015 and 2016 in partnership with TRCA and a consulting firm, Risk Sciences International (RSI). The purpose of this study was to characterize climate trends in recent past (since 1981) and future projections in climate across an array of climate indicators until the end of the century. Taking an approach recommended by the international climate science community, this study used an ensemble of global climate models to obtain the future climate conditions in the 2020s (short term), 2050s (medium term), and 2080s (long term). Future emissions scenarios, or Representative Concentration Pathways (RCPs), are provided to tell the potential range of Peel's future climate conditions.

Climate projections produced in this report have been leveraged across vulnerability assessments and other studies produced by TRCA and CVC within the Region of Peel. Ongoing work seeks to update these climate projections in Peel but also across all of TRCA watersheds based on more localized, regional climate models to explicitly capture and model the influence of the Great Lakes.

Historical and Future Climate Trends in York Region Summary Report (Fausto et al., 2015)

OCC partnered with York Region, the Clean Air Partnership, and Great Lakes Integrated Sciences and Assessments (GLISA) to develop a summary report to characterize climate trends in York Region based on available datasets. Historical trends covered the 1990s (1981–2010) and future trends covered the 2050s (usually the time period between 2041–2070) under a high-emissions scenario (RCP 8.5). Thirty-three climate variables were analyzed, including variables under temperature, precipitation, extreme precipitation, ice storms, extreme cold, extreme heat, growing season, and dry days.

Peel Climate Change Strategy (Peel Region, 2011)

In 2011, the Peel Climate Change Strategy (Peel Region 2011) was adopted by Regional Council and aimed to improve coordination of activities related to climate change among municipal and CA partners. *The Peel Climate Change Strategy* is meant to be a roadmap for addressing climate change impacts and identified a Vison, Mison, and six objectives:

For each objective, the Strategy identifies specific actions to be initiated, within five years, to support effective mitigation of, and adaptation to climate change. From 2013 through 2016, TRCA, CVC and the Region of Peel discussed priority actions coming from the Strategy and advanced the implementation of Action 1.1, which was to compile a vulnerability and risk assessment of all infrastructure, of the community (such as assessment of human health impacts) and of natural heritage.

TRCA Action Plan for The Living City: Meeting the Challenge of Climate Change (TRCA, 2008)

This proactive strategy was intended to address the impacts of climate change within the TRCA jurisdiction and provided a business planning framework. Climate adaptation and mitigation are at the core of TRCA efforts, and TRCA is in a strong position to exemplify leadership and support our communities and partners in dealing with climate change. This Action Plan builds on CA strengths in adaptive watershed management and leadership in the application of sustainability at the local level.

Climate trends and projections are provided across southern Ontario based on Government of Ontario data and analyses, and a series of impacts and system responses in TRCA's jurisdiction are identified.
Through the completion of this strategy, the following key priority action areas were determined, each with specific actions and recommendations:

Adaptation

- Increase our knowledge and understanding
- Reduce risk to communities
- Build a resilient natural system in the GTA

Mitigation

- Promote a culture of conservation through market transformation
- Green TRCA's Operations
- Lead through Partnerships

Erosion Hazard Studies and Mapping

2021 Infrastructure Hazard Monitoring Summary Report and Results (TRCA, 2021)

In 2020, York Region and TRCA staff jointly developed a new framework for the Streambank Erosion Control Management Program that assesses risk to Region owned linear infrastructure in erosion vulnerable areas. This report outlines a risk framework and probability of failure matrix/grading system, a new condition grading system for TRCA rankings, and a condition assessment frequency schedule. According to this framework and the newly developed inspection frequency matrix, field inspections are conducted annually based on an inspection schedule that prioritizes the infrastructure sties at greatest risk based on the monitoring data gathered to date. Field assessments are further supported by topographic and/or depth of cover surveys, in addition to engineering studies as required, prior to the final prioritization of the candidate project sites and implementation of infrastructure protection works.

The program is currently assessing erosion risk at 546 active intersection and proximity sites and 8 emergency overflow outfalls that span multiple watersheds and municipalities. At of the end of the 2020 monitoring season, TRCA compiled a list of prioritize project sites to inform capital planning for select sites where infrastructure was deemed to be at greatest risk. This list is intended to be dynamic with priorities updated following future flood and erosion events.

Site-Specific Erosion Studies

A comprehensive erosion study for all areas of TRCA land has not been conducted. The Streambank Infrastructure Erosion Control Management Program only conducts studies and remedial works where municipal-owned water or wastewater assets are at-risk of erosion. Since 2011, site-specific erosion studies have been undertaken, and hazard mitigation has been completed at several locations under this program.

Flood Hazard and Water Quantity Studies

Flood Plain Mapping

Flood plain mapping updates are multi-phased projects that require several studies to be completed before maps can be generated. The first phase consists of the development of a detailed hydrology model to obtain peak flow estimates at any point within the watershed. The second phase consists of the development of a detailed hydraulic model of the watershed to obtain water surface elevations throughout valley and stream corridors. The final phase is the development of topographic maps which identify surface elevations and geospatial data like roads, houses, bridges, and other base-map elements.

A list of recent hydrology model updates as well as their funding source is available for view in Table 1 below:

Table 1: Summary of Hydrology Updates

Watershed	Date	NDMP Project
Humber River	2015 (Addendum 2018)	No
Rouge River2	2019	No
Don River	2019	No
Highland Creek	2020	Yes
Mimico Creek	2020	Yes
Petticoat Creek	2020	Yes

As noted above there are a number of processes, procedures, and on-going initiatives related to TRCA's flood plain mapping program which will require input from across the organization. Furthermore, staff have recently been informed that a new intake of the NDMP funding program is likely for projects to be completed in the 2021/2022 federal fiscal year. TRCA staff will continue to pursue NDMP funding to complete flood plain mapping updates for remaining watersheds (Frenchman's Bay and Petticoat Creek), expand flood plain mapping coverage, and undertake further assessments for spills and areas with complex hydraulic conditions.

The policy guidance and technical standards on flood plain mapping are set by the Province. CA hydrology and hydraulic modelling is built for the primary purpose of riverine flood plain mapping, following the MNR Technical Guide (River and Stream Systems, Flood Hazard Limit), and as such does not incorporate future climate scenarios at this time. MNR has included climate change as one of the topics that the Flood Plain Mapping Technical Team is working on as part of updates to the MNR Technical Guide. In addition, TRCA requested in our messaging to Ontario's Special Advisor on Flooding and the Provincial Climate Change task force that guidance be provided, as per the commitments in the Ontario Environment Plan, to support the application of climate change science in decision making, including the consideration of the extreme precipitation increases expected with our changing climate, for both flood plain mapping and infrastructure design.

The Provincial Planning Statement (PPS 2024) directs planning authorities to prepare for the impacts of a changing climate that may increase the risk associated with natural hazards. In addition, the PPS 2024 requires planning authorities to collaborate with conservation authorities to identify hazardous lands and manage development in these areas in accordance with provincial guidance. Lastly, part of the Vision in the PPS 2024 asserts that potential risks to public health or safety, or of property damage from natural hazards, will be mitigated, including the risks associated with the impacts of climate change.

Toronto and Region Conservation Authority's (TRCA) flood plain maps are a key technical output necessary to fulfilling TRCA's mandate and TRCA's Strategic Plan objectives to reduce flood risks and protect communities. Flood plain mapping and the associated studies are the foundation of several programs within TRCA, including flood forecasting and warning, and land use planning and regulation. Leveraging National Disaster Mitigation Program (NDMP) funding, TRCA Engineering Services has completed a comprehensive, jurisdictional wide, flood plain mapping update over the past five years.

Flood Risk Management

TRCA has a dedicated Flood Risk Management (FRM) team who has a direct responsibility for flood preparedness and mitigation and who supports municipalities with flood response and recovery. In order to accomplish the task, FRM is organized into three groups: Flood Plain Mapping (FPM), Flood Mitigation Infrastructure Planning and Implementation (FMIPI), and Flood Emergency Management (FEM). TRCA has long been engaged in the identification of hazardous lands through regulatory flood line mapping and has identified 41 Flood Vulnerable Areas (FVAs) clusters and ranking them based on hazard, exposure, and vulnerability. The FRM team and its municipal partners are currently undertaking flood mitigation projects that reduce flood risk and provide opportunities for community revitalization in a number of clusters.

The Flood Plain Mapping group primarily focuses on identifying flood risk. This is accomplished by undertaking flood plain mapping studies, hydrology and hydraulic modelling updates, regulatory mapping updates, flood plain spill assessments and flood risk characterization studies. The group plays an important role in determining the flood hazard area that is subject to regulation. The FPM group conducts watershed-scale hydrology studies for each watershed using hydrologic modelling tools (Visual OTTHYMO, PCSWMM). These hydrologic models are used to simulate runoff and riverine flows which are in turn used to inform hazard management guidelines (such as storm water management standards) and are inputs into the hydraulic models.

HEC-RAS and MIKE Flood hydraulic models are used to simulate flood depth, velocity, and water surface elevation raster data. The high-resolution raster data is used to create regulatory flood plain maps and to categorize flood risk using criteria from the Ontario Ministry of Natural Resources and Forestry. A notable achievement from the output of this group work is the Flood Plain Map Viewer; an online GIS portal providing the public with free access to digital flood plain mapping within TRCA's jurisdiction, helping users determine if their property falls within the regulatory flood plain. All flood plain maps are kept up to date and are less than 10 years old. A total of 18 hydraulic model updates and flood plain mapping projects were completed between 2015 and 2020, producing updated mapping for 8 out of TRCA's 10 watersheds.

The Flood Mitigation Infrastructure Planning and Implementation group focuses specifically on capital projects that are intended to significantly reduce the risk of flooding before it occurs. The FMIPI group takes a leading role in conducting planning, design and implementation projects to rehabilitate, retrofit or build new structural and/or landform-based flood risk reduction or protection measures. The planning stage involves technical feasibility studies, Municipal Class Environmental Assessments (MCEA) or Conservation Ontario Class Environmental Assessments for flood remediation projects, ensuring compliance with natural, social, economic, and environmental requirements. Flood mitigation projects often involve capital works for municipal infrastructure. The FMIPI group works closely with our municipal partners to develop a flood mitigation solution that meets current and future municipal needs. Recent EA projects completed by this group include the Rockcliffe Riverine Mitigation Environmental Assessment, Downtown Brampton Flood Protection Class Environmental Assessment, the Pickering and Ajax Flood Control Dikes Rehabilitation EA and the ongoing Highland Creek Markham Branch (Corporate Dr.) Flood Remediation EA project. The Rockcliffe Riverine Mitigation project and Downtown Brampton Flood Protection Project are currently in the detailed design stage and will provide flood risk reduction or protection to a combined 77 ha of urban lands.

The Flood Emergency Management group is responsible for the implementation of TRCA's Flood Forecasting and Warning (FFW) program and for outreach to municipalities and the public to help them be better prepared for floods. TRCA's FFW program consists of activities implemented before, during and after a flood event occurs within the TRCA jurisdiction. The following operations are executed depending on the situation: Daily Operations, Flood Message Protocol, Storm Event Procedure, and Dam Operations. The Daily Operations are a series of tasks completed to determine the level of flood risk within the jurisdiction of the TRCA daily. Each morning, weather forecasts with a 3-day outlook are provided with the help of a state-of-the-art Flood forecasting and Early Warning System (Delft-FEWS) which is integrated with other forecast models and tools.

The Delft-FEWs system is a recent advancement in the FFW program at TRCA and has enabled faster, more consistent and location-specific forecasts which is a benefit due to TRCA's geographically large and population-dense jurisdiction. FEM also issues alerts and messages when water levels reach critical levels along the Lake Ontario shoreline. All flood messages are issued through the Flood Message Protocol, which is broadcast via website, email, text, and social media. Additionally, the FEM group has developed 8 Site Specific Flood Risk Packages in coordination with municipal emergency responders to enable a better flood response in these 41 Flood Vulnerable Clusters. 5 open houses and public information sessions have been held over the last 3 years to inform communities of their flood risk and help them be prepared. The FEM group is always actively engaged in protecting the community and society from flooding.

Great Lakes Studies

Lake Ontario Tributary Loading Study (in progress)

A multi-agency Lake Ontario tributary loading study is currently underway with the task of assessing watershed contributions to the lake. Monitoring stations have been established at 13 tributaries along the shores of western Lake Ontario, including Humber River, Don River, Highland Creek, Rouge River, and Duffins Creek, to better understand the amount and timing of nutrient delivery to Lake Ontario from local watersheds throughout all seasons. Monitoring stations have been collecting continuous water quantity and water quality monitoring during storm and baseflow events since 2018. The results of the tributary monitoring will contribute to modelling work being conducted by US and Canadian scientists to better understand nutrients and mixing throughout Lake Ontario.

Western Lake Ontario Land to Lake Initiative (in progress)

Lake Ontario is a large ecosystem, and as such watershed improvements will have to be widespread to be apparent lakewide. Knowledge sharing becomes an important component to the success of nutrient reduction initiatives and nearshore improvements. The Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health highlights that Canada and Ontario (ECCC and MECP, 2021) will support initiatives and lake specific priority actions to address current and future threats to water quality and ecosystem health, as identified through Lakewide Action and Management Plans, the nearshore framework, Ontario's Great Lakes Strategy and other means. Environment and Climate Change Canada (ECCC) plan to lead this knowledge sharing initiative and to pilot projects where regions and municipalities can work together to protect the lake and to make connections between actions on land and the health of western Lake Ontario.

Waterfront Integrated Restoration Prioritization (2024)

The Waterfront Integrated Restoration Prioritization (WIRP) is a tool that identifies ecological impairments across the waterfront and prioritizes restoration opportunities that would benefit coastal ecological health the most. TRCA will work with various agencies to continue building support and further developing restoration priorities into plans that will lead to implementation.

The WIRP provides a framework that consists of utilizing environmental monitoring data collected along the Toronto waterfront to identify priority restoration activities based on the level of impairment and potential contribution to the natural system if restored.

The WIRP is intended to be a defensible, repeatable, and consistent approach to restoration prioritization reflective of achieving multiple benefits to the natural system with a long-term outlook for future ecological restoration activities across the waterfront.

Implementation of the WIRP contributes to the Remedial Action Plan delisting targets for the Toronto Area of Concern pertaining to Beneficial Use Impairment (BUI) 14 "Loss of Fish and Wildlife Habitat" and BUI 3 "Degradation of Fish and Wildlife Populations".

TRCA identified restoration opportunities and worked with various agencies that monitor the health of the Toronto and Region Area of Concern (AOC) waterfront to develop restoration prioritization criteria and a short list of metrics to be used in the IRP analysis. These criteria were then applied to Lake Ontario ecotypes (open coast, sheltered embayments, coastal wetlands, and rivermouth/estuaries) across the Toronto and Region AOC to develop a prioritized list of restoration sites.

TRCA Shoreline Hazard Mapping Update (Baird & Associates, 2022)

TRCA completed a Shoreline Hazard Mapping Update along the 60-kilometer stretch of Lake Ontario shoreline under the TRCA's jurisdiction, which extends from the City of Mississauga and Etobicoke Creek watershed in the west to the Town of Ajax and Carruthers Creek watershed in the east. The Lake Ontario Shoreline Hazard maps are essential for TRCA's mandate to identify and mitigate flood and erosion risks and safeguard communities. The lands along the shoreline are subject to naturally occurring processes that give rise to shoreline hazards in the form of lake-based flooding, erosion, and dynamic beach movement.

The previous shoreline flood hazard standards were developed using information from the Ministry of Natural Resources in 1989, making them over 30 years old. This mapping update takes into account changes in information on Lake Ontario water levels including data from the recent high water level events in 2017 and 2019 as well as changes to the regulation of Lake Ontario under the International Joint Commission Regulation Plan 2014, which was implemented in 2017. These factors produce higher return period lake levels and larger flood hazard limits than those previously calculated which necessitated an update to the flood hazard limit.

The hazard assessment and mapping process was carried out on a reach-by-reach basis. The TRCA shoreline was divided into a total of 49 reaches and three hazard limits were determined: erosion, flooding and dynamic beach hazard limits. The erosion hazard limit comprises two components: an erosion allowance that considers long-term shoreline recession (over a 100-year period) and a stable slope allowance that considers the stable slope angle of a shoreline bank or bluff. The flooding hazard limit combines the 100-year flood level, including storm surge, with an allowance for wave uprush onto the shore. The dynamic beach hazard limit consists of two elements: the flooding hazard plus a 30-metre dynamic beach allowance which recognizes the changes in the shoreline position that can occur on a wide beach that responds to wave events.

Lake Ontario Shoreline Hazard Maps were created by overlaying technical study results on base maps. A total of 97 map sheets were prepared and sealed by a Professional Engineer. The project was approved in the TRCA's Board of Directors on October 28, 2022, following a recommendation that TRCA would communicate the results of its Lake Ontario Shoreline Hazard Mapping Project to member municipalities and stakeholders within its jurisdiction.

Lake Ontario Lakewide Action and Management Plan (ECCC and EPA, 2018, update in progress)

The Lake Ontario Lakewide Action and Management Plan (LAMP) is a binational ecosystem-based strategy for protecting and restoring the water quality of Lake Ontario, including the connecting Niagara River and St. Lawrence River. The LAMP is developed and implemented by the Lake Ontario Partnership, which is led by EPA and ECCC. TRCA is also a partner in its development and implementation. The Lake Ontario LAMP, 2018–2022 (ECCC and EPA, 2018), which is currently being updated, indicates collective action is required to address current threats to Lake Ontario including:

- Enhancing our understanding of nutrient dynamics.
- Improving the health of aquatic and wetland habitat and native species.
- Controlling aquatic invasive species.
- Reducing chemical contaminants (legacy and chemicals of emerging concern).

Toronto and Region Remedial Action Plan

Toronto and Region is one of 43 locations around the Great Lakes where local environmental degradation may be causing harm to the wider Great Lakes system. These locations, referred to as Areas of Concern (AOCs), are in Canada (12 sites), the United States (26 sites), and in some cases are shared between the two countries (5 sites). AOCs were formally recognized by the governments of Canada and the United States in the 1987 amendments to the Great Lakes Water Quality Agreement. This Agreement committed the governments of each country to clean up AOCs within their respective jurisdictions.

The status of an AOC is determined by assessing the state of local environmental conditions against fourteen different Beneficial Use Impairments (BUIs), as identified in the Great Lakes Water Quality Agreement. Each BUI describes a human or ecological use of the ecosystem that has been lost or impaired as the result of environmental degradation; an AOC is therefore considered impaired when local conditions meet the descriptions of one or more BUIs. The clean-up, or remediation, of an AOC occurs through a mandated process called a Remedial Action Plan (RAP). An individualized RAP is required for each AOC.

The Toronto and Region AOC extends along the north shore of Lake Ontario from Etobicoke Creek in the west to the Rouge River in the east. The 2000 km2 area includes six watersheds and 42 km of waterfront, spanning eleven municipal jurisdictions with over 3 million residents.

Toronto and Region is currently in Stage 3 (implementation) of the RAP process. Three major interim progress reports, Clean Waters, Healthy Habitats: 2001 RAP Progress Report (TRCA 2001), Moving Forward: 2007 RAP Progress Report (TRCA 2009), Within Reach: 2015 RAP Progress Report (TRCA 2016a) have been issued that detail environmental monitoring results, achievements in remediation initiatives, as well as how conditions in the Toronto region compare against the BUI criteria. Although the challenges are many, the Toronto and Region RAP team believes that completing all restoration actions by 2020 is within reach (TRCA 2016a).

Lake Ontario Collaborative Phase 1 Reports (2008)

Several stakeholders from across the north shore of Lake Ontario worked together to complete the technical work required for Lake Ontario drinking water systems for the first set of assessment reports under the Clean Water Act, 2006.

The Durham, Toronto, and Peel Phase I reports characterized surface water vulnerability of the water treatment plant intakes and vulnerable areas around the intakes known as Intake Protection Zones (IPZs), and provided scores based on vulnerability to contamination, using the guidance outlined in the MECP Draft Guidance Module 4, to meet the requirements of the Clean Water Act.

Toronto Waterfront Aquatic Habitat Restoration Strategy (2003)

The Toronto Waterfront Aquatic Habitat Restoration Strategy (TWAHRS) was developed by the Toronto and Region Conservation Authority with guidance from a committee of subject matter experts. TWAHRS was developed to provide practical information for decision makers, designers, and regulatory agencies to ensure that implementation of all waterfront projects incorporate opportunities to improve aquatic habitat. Implementing TWAHRS is identified under the Toronto and Region's AOC delisting criteria for BUI 14 "Loss of Fish and Wildlife Habitat" and BUI 3 "Degradation of Fish and Wildlife Populations" to restore open coast, coastal wetlands, sheltered embayments, and river mouths across the waterfront.

The TWAHRS includes an illustrated compendium of habitat restoration techniques intended to improve waterfront aquatic habitats for a diversity of species - fish, mammals, reptiles, amphibians, molluscs, invertebrates and plants; however, it focuses on fish because they are excellent indicators of the overall health of the ecosystem. In addition to an illustrated compendium of techniques, the TWAHRS proposes a strong framework for inter-agency cooperation prior to the start of waterfront development projects. The overall goal of TWAHRS was to develop and achieve consensus on an aquatic habitat restoration strategy that will maximize the potential ecological integrity of the Toronto waterfront.

Monitoring Programs

Hydrometrics Monitoring

TRCA's Hydrometric Monitoring Program was developed to support several core functions including flood plain mapping, development review, flood forecasting and warning, dam operations, infrastructure design, watershed planning, and climate change studies. The hydrometric networks that collect the data consist of real-time and non-real-time stream gauges, real-time and non-real-time precipitation gauges, snow courses, baseflow, and climate data. TRCA currently has 120 monitoring sites throughout the jurisdiction. Field data is collected and undergoes rigorous QA/QC assessment for accuracy. For stream gauging sites, TRCA develops stage/discharge relationships to covert water elevation to flow. Real-time data from stream and precipitation gauges is displayed on TRCA's Flood Forecasting and Warning website trcagauging.ca. Data is publicly available.

Low Flow Response Program

Through the Ontario Low Water Program, conservation authorities evaluate developing drought conditions, given their local knowledge and expertise of their watersheds, and communicate this information to municipalities and the interested public. TRCA monitors three indicators of drought:

- Precipitation Indicator
- Streamflow Indicator
- Groundwater Indicator

When indicators show declines that meet certain thresholds, TRCA informs affected municipalities and the public. Municipalities may implement water conservation measures if required. Information on current low water conditions and program details can be found at Ontario Low Water Program - Toronto and Region Conservation Authority (TRCA).

Routine Monthly Water Quality Sampling

The Ontario Ministry of the Environment, Conservation and Parks (MECP) monitors surface water quality across the province under the Provincial Water Quality Monitoring Network (PWQMN) program. TRCA collects water quality samples monthly on behalf of MECP for the PWQMN and submits them to MECP for analysis.

Sampling for MECP's Provincial Water Quality Monitoring Network (PWQMN)

TRCA collects additional water quality samples across the Region as part of TRCA's Regional Watershed Monitoring Program (RWMP). Samples are submitted to the City of Toronto and York-Durham Regional Environmental Laboratory for analysis. The additional water quality samples supplement the PWQMN data and provide specific local information. The surface water quality grab samples are collected once per month, independent of precipitation. The samples are analyzed for a standard suite of water quality parameters, including heavy metals, nutrients, and bacteria.

TRCA's Watershed Planning and Ecosystem Science business unit produces a surface water quality report on a five-year cycle for the entire jurisdiction. The report looks at spatial and temporal water quality trends. Digital copies of the most recent reports can be found at: https://trca.ca/conservation/environmental-monitoring/environmental-monitoring-resource-library/

Sampling for MECP's Provincial Groundwater Monitoring Network (PGMN)

The PGMN program began in April 2000 with the provision of provincial funding to establish a long-term, province-wide, groundwater monitoring network in partnership with Conservation Authorities and Municipalities. Partnership Agreements were struck among the Ministry of Environment, Conservation and Parks (MECP) and Program Partners (36 conservation authorities and 10 Municipalities) outlining the over-arching principles under which the parties would agree to work with specific roles and responsibilities. Toronto and Region Conservation (TRCA) joined the program in June 2000.

The MECP accepted responsibility for major program components. The other Program Partners, including TRCA, accepted responsibility for the administration associated with the construction of the wells, the maintenance of well site integrity, the maintenance and operation of equipment at the well sites and the collection of field data, including water level measurements and collection of groundwater samples.

TRCA has 21 monitoring wells across our jurisdiction that are part of this program. Hourly water levels are recorded at all wells and annual water quality samples are collected from 13 selected wells. The data are stored within the Oak Ridges Groundwater Program database as well as the provincial WISKI Web Portal.

Regional Watershed Monitoring Program (RWMP)

TRCA's RWMP is a science-based, long-term monitoring initiative that was developed in 2001 to update "state and condition" information for the region's nine watersheds. Its purpose is to collect aquatic and terrestrial ecosystem data at the watershed and subwatershed scale, and across the region as a whole. Long-term ecological data is essential to identify physical and biological changes in the local environment over time, to distinguish between natural trends and human-caused changes, and to evaluate the success of conservation management efforts.

The ability to assess the biodiversity and ecological function of regional greenspace and water resources directly supports TRCA's 2013-2022 Strategic Plan (TRCA 2018). The data collected are used to inform the organization's key planning, implementation and reporting activities (e.g. Toronto Remedial Action Plan, water quality studies) and to support major capital and infrastructure projects. Data are shared externally with partner municipalities, consultants, academic institutions and other agencies. Since its inception, the program has enhanced the planning and coordination of monitoring activities, standardized protocols, and filled several key data gaps.

More program information (including reports) can be found on the TRCA's Environmental Monitoring and Data Management webpage: https://trca.ca/conservation/environmental-monitoring/. Many of the recent datasets are available through TRCA's Open Data portal: https://trca.ca/about/open/.

Lake Environmental Monitoring Program (LEMP)

Environmental monitoring along the Toronto waterfront is an important aspect of TRCA's and the City of Toronto's shoreline management activities. Understanding the shoreline's environmental conditions is necessary to provided crucial information to help decision makers, designers, and regulatory authorities ensure that waterfront projects incorporate improvements to aquatic habitats and fisheries resources to create a more livable and sustainable waterfront. This program provides standardized sampling and leading-edge science information for the planning, design and approval of restoration and erosion control projects. It also informs the projects led by Waterfront Toronto.

In addition, data collected are shared with the Toronto Remedial Action Plan team and other agencies such as the Department of Fisheries and Oceans, provincial environment agencies and academia. Monitoring activities focus on documenting the bio-physical attributes of the shoreline via fish and benthic invertebrate community surveys, sediment surveys, and physical habitat surveys to measure project performance and the overall ongoing health of the waterfront community.

Site-specific environmental monitoring

Road Ecology Survey

Over the past several years, TRCA has undertaken various studies and built decision support tools that can help identify strategic locations for mitigating road impacts and improving habitat connectivity. This work has focused on (i) identifying priority habitat connectivity areas across TRCA's watersheds to inform strategic planning, (ii) identifying priority road crossing structures (bridges and culverts) for mitigation and/or replacement to improve habitat connectivity for wildlife movement and priority barriers for fish passage, and (iii) identifying site level hotspots for road mortality and wildlife movement on select road segments using field surveys to inform road planning and design.

Seaton Lands Monitoring

The Seaton development lands refer to a large parcel of land (1200 ha) in Pickering, Ontario, which was identified for urban development. The Central Pickering Development Plan (CPDP; OMMAH 2006) outlines the blueprint for an urban community with up to 70,000 people and 35,000 jobs, along with a designated agricultural area on the west side of Duffins Creek. The urban development portion of the Seaton Community will incorporate advanced sustainability techniques such as low impact design (LID) to help mitigate the impacts of urbanization to the natural environment.

The Seaton development lands are unique because 53% of the community was zoned as a Natural Heritage System (NHS). The Ontario Ministry of Natural Resources and Forestry in cooperation with the Toronto and Region Conservation Authority (TRCA) identified the NHS for the Seaton lands area, which includes all wetlands, significant woodlands, streams and watercourses, and the Lake Iroquois shoreline.

Due to the size and scale of this development, its sustainability aspects and the sensitivity of the nearby ecosystems, the TRCA initiated a large-scale monitoring program to evaluate the natural heritage of Seaton development lands. The program includes monitoring both the aquatic and terrestrial ecosystem (pre, during, and post development) to determine if the sustainability practices and the part of the NHS not subject to development are sufficient to protect the ecological integrity of the sensitive natural heritage features within the project boundaries. Results from this monitoring program are expected to largely influence future planning decisions at the Seaton lands and in other parts of TRCA's watersheds. The Monitoring Program has been developed for Seaton by TRCA in consultation with the City of Pickering, the Ontario Ministry of Natural Resources and Forestry, and the Seaton Landowners Group.

Mayfield West CAMP Monitoring

The Mayfield West (Phase 1) development is part of the planned community of Mayfield located between Hurontario Street and Dixie Road, north of the Highway 410 extension in the Town of Caledon. Mayfield West has been designated as a "Rural Service Centre" and is the product of a substantial and comprehensive planning process. A Comprehensive Adaptive Management Plan (CAMP) was prepared by a consultant on behalf of the Town of Caledon. The goal of the CAMP was to design a long-term environmental monitoring program that would measure the performance and adherence to the Town's environmental management policies as well as to help provide guidance for future developments. TRCA was contracted by the Town of Caledon to conduct all the monitoring activities related to the CAMP. Ecological monitoring began in 2013 and activities are expected to continue for at least 10 more years. Aquatic monitoring includes stream flow, water chemistry, fish and benthic invertebrate habitat and communities, and fluvial geomorphology. Terrestrial monitoring includes amphibians, breeding birds and vegetation in forest, wetland and meadow habitats.

Natural Systems Studies

Urban Forest Studies 92009-2016 and 2019-2025)

TRCA has worked with York Region's Environmental Services division to conduct urban forest studies including canopy cover and iTree Eco assessments over two time periods (2009–2016 and 2019–2025). This has generated spatial data on land use (2021), existing tree canopy cover estimates, and potential plantable spaces across York Region. The information generated through urban forest studies can inform various strategic initiatives including improving urban canopy for natural heritage, natural hazards, and climate adaptation objectives. These assessments are conducted in partnership with regional and local municipalities across public and private properties. There are additional field level studies that complement iTree Eco assessments and result in a more complete data and understanding of urban forest structure and functions on the ground (e.g. area, age, composition, invasive species etc.).

Guideline for Determining Ecosystem Compensation (TRCA, 2018, Updated in 2023)

The Guideline for Determining Ecosystem Compensation was prepared by TRCA in 2018 (TRCA, 2018b). The purpose of the Guideline is to provide guidance on how to determine the total amount of compensation required to replace lost or altered ecosystems / natural features through the development and/or infrastructure planning processes, in a repeatable and transparent manner, after the decision to compensate has been made. The guideline was prepared to assist planners, ecologists, landscape architects, landowners and other practitioners and interested parties in understanding how compensation for ecosystem losses can be implemented. The guideline attempts to provide a standard and consistent approach, informed by science and decades of experience in the application of natural heritage planning and ecological restoration.

The guideline includes an overview of the context, rationale, roles and applicability of TRCA and other participants in compensation planning and outlines the principles that establish the intent of the guideline. The components of a compensation project are described including replicating ecosystem structure and the land base. An approach is outlined for determining compensation requirements that attempts to replicate, to the extent possible and without delay or lag time, the same ecosystem structure and associated level of ecosystem functions that are to be lost, in both the private land development process and the public infrastructure process.

Details are provided on the applications of compensation including important considerations/agreements in planning, implementing and documenting compensation projects. Finally, the guideline explains TRCA's strategic habitat restoration planning and implementation approach.

Natural Heritage System Update (2022)

In 2022, building on the principles of the Terrestrial Natural Heritage System Strategy (2007), TRCA completed an update to the technical component of the Strategy. Using updated data and an integrated approach, TRCA's updated regional target NHS (2022) identifies key natural heritage features and areas that are important for terrestrial and aquatic ecosystem across the landscape. It identifies strategic areas that should be targeted for protection, restoration, and enhancements to improve ecosystem health and resilience. The updated NHS was approved as a science-based screening tool by TRCA's Board in October 2022.

TRCA's updated regional target NHS identifies 35% of the TRCA's jurisdiction as target NHS comprising of existing natural cover (23.3%) and potential natural areas (11.9%). An additional 16.5% of the jurisdiction is identified as the Contributing Areas that support the NHS features and functions, but where traditional restoration opportunities may be limited due to its existing conditions (e.g., built areas) and/or future plans (e.g., approved for future development). The Contributing Areas are mostly within the urban land uses that have been identified as important for various ecological functions.

TRCA's updated regional target NHS provides an integrated and comprehensive decision support tool, as well as a series of stand-alone datasets, that helps to characterize terrestrial, aquatic, and hydrological priorities within and across the watersheds. This can inform various TRCA and municipal initiatives for ecosystem management and climate adaptation.

Water Resource System Mapping (2022)

The development of Water Resource System (WRS) data layers for Toronto and Region Conservation Authority (TRCA) provides robust decision support tools and information to guide various TRCA and municipal initiatives, including watershed planning, restoration planning, land use, and infrastructure planning. Notably, the development and update of the WRS within TRCA's jurisdiction is intended to assist municipal partners with achieving provincial policy conformity that requires them to identify the WRS through watershed planning. Components of the WRS are critical to the overall function and health of watersheds. The components of the WRS are:

Key Hydrologic Areas (KHAs)
- Significant Groundwater Recharge Areas (SGRAs);
- Highly Vulnerable Aquifers (HVAs);
- Significant Surface Water Contribution Areas (SSWCAs);
- Ecologically Significant Groundwater Recharge Areas (ESGRAs);

Key Hydrologic Features (KHFs)
- Permanent streams;
- Intermittent streams;
- Inland lakes and their littoral zones;
- Seepage areas and springs;
- Wetlands.

Draft Don River Fisheries Management Plan (MNR & TRCA, 2017)

A draft of the Don River Fisheries Management Plan was completed in 2017 but has not gone through an approval process with MNRF.

Integrated Restoration Prioritization: A Multiple Benefit Approach to Restoration Planning (TRCA, 2016)

The Integrated Restoration Prioritization framework addresses two objectives of the Living City Strategic Plan by ensuring that restoration activities will have multiple benefits to rivers, shorelines and biodiversity. This framework will help select priority restoration areas. The objectives of this framework include:

1. Restore natural hydrologic processes and associated ecological systems by reversing, repairing or mitigating alterations and impairments (e.g. drained headwater features, poor water quality)
2. Restore and / or increase natural cover (e.g. wetland, riparian, forest and meadow)
3. Maximize size, shape and connectivity of natural heritage features
4. Enhance landforms and restore soil and soil processes to promote self-sustaining natural communities

Crossing Guideline for Valley and Stream Corridors (TRCA, 2015)

The Crossing Guideline for Valley and Stream Corridors was prepared by TRCA in 2015 (TRCA, 2015), and outlines TRCA's study requirements and recommendations for the planning and design of valley and stream corridor crossings. It is intended to support TRCA partner municipalities and other agencies and proponents in the management of natural hazards and natural heritage issues associated with crossings of valley and stream corridors.

The Crossing Guideline provides an overview of the context, rationale, and role of TRCA in crossing planning and design, which sets the premise for the rest of the guideline. The guideline outlines a balanced approach to the planning and design of valley and stream corridor crossings as a means of achieving TRCA's natural hazard (flood, geomorphic, and geotechnical hazards) and natural heritage function (terrestrial and aquatic) objectives. TRCA's study requirements for new and existing crossings and the specific technical details needed to guide the required studies are provided in the appendices. The Guideline also supports the goals of other agencies in protecting the natural heritage system and protecting people and property from harm and risk due to natural hazards. Associated legislation and other considerations (i.e., recreation and trails, and driver safety) are also discussed.

Rouge River Fisheries Management Plan (MNR & TRCA, 2011)

The Rouge River Fisheries Management Plan was completed in 2011. The plan has been approved by TRCA's Board for use but has not gone through an approval process with MNRF.

Terrestrial Natural Heritage System Strategy (2007) and Refinements

TRCA's Terrestrial Natural Heritage System Strategy (TNHSS; TRCA, 2007b) was developed, through support of TRCA municipal partners, to establish, protect and restore a network of natural cover (forest, wetland, meadow, successional, bluffs and beach) across TRCA's jurisdiction. The core principles of the TNHSS are to improve the quantity, quality, and distribution of terrestrial biodiversity across the entire jurisdiction. These principles also enable a steady provision of other ecosystem services that are vital for human well-being, including flood protection, pest reduction, increased recreation, and aesthetic opportunities.

TRCA has collected natural heritage inventory and monitoring data on an ongoing basis since the mid-1990s. Analysis of TRCA natural heritage information determined that 'business as usual' had not resulted in the protection of ecological function and biodiversity, especially in the urban and urbanizing portions of TRCA's jurisdiction. TRCA had documented a significant decrease in the abundance and diversity of species (flora and fauna) within the nine watersheds of the jurisdiction. As well, the distribution of many of these species had been restricted to the very northern parts of our watersheds. The TNHSS was developed to address this decline.

Since 2007, the principles, science, and tools developed during the development of the TNHSS have assisted in informing the development of NHSs that have been incorporated into municipal Official Plans as required by the province and supported TRCA in its role as a public commenting body under the Planning Act. Since the NHS is a model and not based on the most current land use information, it was intended to be refined at the watershed scale through watershed plans for specific municipal use and supported by a policy framework that allows for site specific assessment, where appropriate. TRCA recognized the considerable challenges facing municipalities in accommodating the growth expected for this region.

Etobicoke Creek: The Aquatic Ecosystem (TRCA 2006)

The Etobicoke Creek: The Aquatic Ecosystem (TRCA 2006a) report was prepared specifically for the GTAA Etobicoke Creek Living City Project. Although not an official "fisheries management plan", the plan was developed to be consistent with MNR's Watershed-Based Fisheries Management Plan Guideline (MNR 2005). The draft plan was developed to protect and enhance the aquatic ecosystem within the watershed and serve as a guide for land use planners, consultants, farmers, private landowners, land developers, anglers, and nature enthusiasts. The plan features the most updated and comprehensive collection of current and historical information relevant to the aquatic ecosystem, as well as resource protection and restoration recommendations meant to provide direction for future fisheries management. The plan is a companion document to the Greening Our Watersheds: Revitalization Strategies for Etobicoke and Mimico Creeks (TRCA 2002) and uses seven general principles to guide management directions.

Humber River Fisheries Management Plan (MNR & TRCA 2005)

The Humber River Fisheries Management Plan is a cooperative resource management plan developed by the MNR and TRCA. The plan was completed in 2005 (approved in 2006), however it only includes data up to 2001.

The plan provides direction on three Remedial Action Plan (RAP) goals and actions:

- A self-sustaining fishery
- Rehabilitation of fish and wildlife habitat
- Protect and restore fish and wildlife habitat

Implementation of RAP recommendations, in conjunction with the recommendations of watershed-based rehabilitation plans, will eventually lead to the delisting of watersheds within the Toronto and Region Area of Concern. Development of the fisheries management plan was guided by a steering committee made up of representatives from government agencies, NGOs, the public, and comments from two rounds of public meetings.

DRAFT Mimico Creek Fisheries Management Plan (TRCA 2004)

The draft Mimico Creek Fisheries Management Plan (TRCA 2004) is available for information only. Due to changes at the provincial level, the plan was not approved by MNR before the fisheries management program was changed. The document provides current (at-the-time) and historical information relevant to the aquatic ecosystem, as well as resource protection and restoration recommendations meant to provide direction for future fisheries management.

Duffins Creek Fisheries Management Plan (MNR & TRCA, 2004)

The Duffins Creek Fisheries Management Plan was completed and approved in 2004.

Source Water Protection Assessment Reports and Plans

Credit Valley, Toronto and Region, and Central Lake Ontario (CTC) Source Protection Plan (2015)

The Ministry of the Environment, Conservation and Parks has organized Source Protection Areas (SPAs) largely using conservation authority boundaries. Conservation authority jurisdictions are organized by watershed, which are areas where water flows to a common collection point, such as a stream, lake or ocean. The watershed approach encourages holistic decision-making for resource management. In many cases, SPAs are grouped to make one Source protection Region (SPR).

The CTC SPR covers three conservation authorities: Credit Valley, Toronto and Region, and Central Lake Ontario. A 21-person committee (plus a chair) developed the original Source Protection Plan for the Region and continues to monitor the implementation of the Source Protection Plan and supporting necessary amendments. The CTC Committee led the development of the Source Protection Plan (SPP) and three Assessment Reports.

The CTC SPP sets out policies and programs to eliminate or manage significant drinking water threats and reduce the opportunity for low or moderate threats to become significant.

An Assessment Report is a technical document that provides scientific information used to develop Source Protection Plans. There are three Assessment Reports for the CTC Source Protection Region, one for each conservation authority, which:

- Describes the local watersheds and assesses the available water supply.
- Provides a water budget.
- Identifies and maps the vulnerable areas near municipal wells and intakes.
- Identifies the types and number of significant threats to water quality near wells and intakes.
- Identifies areas that could have low, moderate, or significant threats.

Vulnerable areas defined under the Clean Water Act, 2006 fall into five categories:

- Water quality threats to groundwater-based drinking water systems (WHPA-A, B, C, D and E);
- Water quality threats to surface water-based drinking water systems (IPZ-1, 2, and 3);
- Water quantity threats to groundwater or surface water-based drinking water systems (WHPA-Q1/Q2);
- Water quality and quantity threats to groundwater or surface water private drinking water systems and private residential wells (HVAs and SGRAs); and
- Past water quality issues to groundwater or surface water-based drinking water systems (Issue Contributing Areas).

Note: In the case of HVAs and SGRAs and their characterization at watershed-scale, the Growth Plan also requires these types of areas to be delineated.

Water Quality Studies

Regional Watershed Monitoring Program (RWMP)

Since 2002, TRCA has partnered with the Ontario Ministry of the Environment, Conservation and Parks (MECP) to monitor surface water quality across the region's watersheds. Water quality samples are collected monthly at sites unique to TRCA properties as well as some that have been adopted from Ontario's Provincial Water Quality Monitoring Network. The water quality grab samples are analyzed for a standard suite of water quality parameters, including heavy metals, nutrients and bacteria.

TRCA's Watershed and Ecosystem Science business unit produces annual summary reports that present the results for select parameters, with detailed reports analyzing spatial and temporal trends in water quality data across the region produced every five years.

The most recent water quality reports include:

- Regional Watershed Monitoring Program: Surface Water Quality Summary, 2020 (TRCA, 2021)
- Regional Watershed Monitoring Program: Surface Water Quality Summary Temporal Trends Update, 2011-2015 (TRCA 2017a)
- Regional Watershed Monitoring Program: Surface Water Quality Summary Spatial Trends Update 2011-2015 (TRCA 2017b)

A complete list of water quality reports can be found at: https://trca.ca/conservation/environmental-monitoring/environmental-monitoring-resource-library/

Water quality modelling in support of watershed plans

Large-scale, watershed-wide surface water quality modelling was conducted for the Humber River watershed as part of the technical work for the Humber River Watershed Plan (TRCA 2008a). The surface water quality monitoring for the Humber River watershed was conducted using HSP-F computer modelling with several possible future land use scenarios. Water quality simulations were performed using meteorological input data for a seven-month period from April to October 1991. This period was determined in the City of Toronto Wet Weather Flow study to be representative of average meteorological and flow conditions for the Greater Toronto Area.

Water quality calibration was undertaken using information collected at seven water quality stations within the Humber watershed collected between 2002 and 2005. Samples were from the MECP's Lake Ontario Tributary Priority Pollutant Monitoring Program and TRCA's RWMP.

Further details about the modelling work can be found in Humber River Watershed Scenario Modelling and Analysis Report (TRCA 2008).

Watershed and Subwatershed Planning and Related Studies

Watershed and Subwatershed Planning and Related Studies

Etobicoke Creek & Mimico Creek Watersheds (2024)

In 2010, TRCA completed a report called Etobicoke and Mimico Creeks Watersheds Technical Update Report, to update technical information from the Turning Over a New Leaf: The Etobicoke and Mimico Creeks Watershed Report Card (TRCA 2006) and Greening Our Watersheds: Revitalization Strategies for Etobicoke and Mimico Creeks (TRCA 2002). The purpose of this technical update was to develop an improved understanding of the watersheds and update the strategic management recommendations and implementation priorities, based on analysis of new technical information. The technical update consolidates and integrates updated information relating to groundwater quantity and quality, surface water quantity and quality, fluvial geomorphology, terrestrial NHS, and the aquatic system.

The information in the Technical Update Report was intended to support municipal partners in land use and infrastructure planning in conformity with the provincial Growth Plan (2006). Additionally, the Greenbelt Plan (2005) identifies where urbanization should not occur to protect the agricultural land base and ecological features and functions within the landscape, which includes the Etobicoke Creek Headwaters subwatershed.

The Technical Update Report outlined five strategic management directions for existing and future land uses. Part of the policy recommendations arising from these strategic management directions included the suggestion that master environmental servicing plans, done on a subwatershed scale, be required for major urban development, redevelopment, or regeneration, and major infrastructure projects. The Technical Update Report mentions the potential impacts of climate change as previously discussed in Turning Over a New Leaf. In recognition of what can be done at the local scale to mitigate and adapt to climate change, the Region of Peel developed a Climate Change Strategy in 2010. The Technical Update Report acknowledges that further investigations are needed into the impacts of climate change on these watersheds. Updates to the Etobicoke Creek Watershed Plan in 2024 has been completed.

Humber River Watershed Plan (TRCA, 2008)

The Humber River Watershed Plan: Pathways to a Healthy Humber was completed in 2008. The plan provides strategic recommendations regarding high priority remedial actions to assist in delisting impaired beneficial uses in the Toronto and Region Area of Concern for Lake Ontario, such as priority areas for improvement of stormwater management (SWM) controls and aquatic habitat restoration. Issues identified include uncontrolled stormwater runoff, increasing chloride in stream water, and a reduction in cold water fish habitat. Recommendations included using Low Impact Development (LID) and green infrastructure for future development, reducing the amount of impervious cover in developments where possible, and restoring and enhancing natural cover.

The Humber River Watershed Plan Implementation Guide (TRCA, 2008b) is intended to facilitate implementation of the recommendations contained in the Humber River Watershed Plan (TRCA, 2008a). This implementation guide outlines a ten-year work plan for numerous recommendations grouped according to implementation mechanisms: policy, regeneration, land securement, stewardship and education, operation and maintenance, enforcement, and monitoring. Updates to the Humber River Watershed Plan are currently in progress.

Don River Watershed Plan (TRCA, 2009)
The Don River Watershed Plan: Beyond Forty Steps was completed in 2009 as an update to the earlier Forty Steps to a New Don. Primary challenges in the watershed are better managing wet weather flows and restoring a more balanced flow regime to the river and its tributaries, which have led to ongoing flooding and erosion, poor water quality, and deteriorating aquatic and terrestrial communities. Strategic management themes included building and retrofitting communities with improved SWM, regenerating terrestrial and aquatic habitats, and engaging residents in the Don River's regeneration.

The Don River Watershed Plan Implementation Guide (TRCA, 2009b) is intended to facilitate implementation of the recommendations contained in the Don River Watershed Plan (TRCA, 2009a). This implementation guide summarizes a ten-year work plan of implementation projects, within the context of existing programs and likely implementing partners. It contains recommendations organized into the following categories: policy, regeneration, land securement, stewardship and outreach education, operations and maintenance, enforcement, and monitoring.

Highland Creek Watershed Greening Strategy (TRCA, 2020)
Although a comprehensive watershed plan for the Highland Creek watershed does not yet exist, a greening strategy was published in 2020. The goal of the Highland Creek Watershed Greening Strategy is to provide a strategic restoration action plan to enhance the Highland Creek valley system and overall watershed function. Issues identified include uncontrolled stormwater runoff, low levels of natural cover, impaired aquatic habitat, high levels of chlorides, bacteria, and total phosphorus, and existing flood prone areas. The strategy focuses on identifying greening opportunities that help address urban SWM and terrestrial natural heritage system (NHS) improvements and identifying opportunities for various stakeholders to implement projects at a neighbourhood scale.

Rouge River Watershed Plan (TRCA, 2007)
The Rouge River Watershed Plan: Towards a Healthy and Sustainable Future was completed in 2007 in collaboration with many partners and stakeholders as part of the Oak Ridges Moraine Conservation Plan conformity. Decades of urbanization in the watershed have contributed to increased surface runoff, more water pollution, greater annual stream flow volumes, increased erosion and sedimentation, channel instability, and loss of biodiversity. Key management strategies included establishing the targeted terrestrial natural heritage system, building more sustainable communities through reduced imperviousness and measures to maintain and restore water balance, and recognizing and developing a regional open space system.

The Rouge River Watershed Plan Implementation Guide (TRCA, 2008d) is intended to facilitate implementation of the recommendations contained in the Rouge River Watershed Plan (TRCA, 2007a). The implementation guide summaries a ten-year work plan of implementation projects, and contains recommendations organized into the following categories: policy, regeneration, land securement, stewardship and education, operations and maintenance, enforcement, and monitoring/research.

Petticoat Creek Watershed Action Plan (TRCA, 2012)
In 2012, TRCA developed the Petticoat Creek Watershed Action Plan in collaboration with its partners and stakeholders. This scoped plan focused on the compilation of available information, data analyses to improve the understanding of current watershed functions and health and preparing strategic management recommendations to guide future decisions. With large portions of the watershed protected by the Greenbelt and the Central Pickering Development Plan Natural Heritage System, conditions of this watershed were noted as "fair" overall. Management actions were intended to focus on actions such as increasing natural cover and land securement for high conservation value parcels, improving SWM in the developed portions, and promoting rural land stewardship.

The Petticoat Creek Watershed Action Plan includes a strategic plan of action to ensure implementation of the Plan including incorporating the following: municipal policies and programs, provincial initiatives, stewardship, outreach education and restoration, Rouge Park restoration, stewardship, monitoring, educational and outreach programs, operations and maintenance, and monitoring and further study.

Duffins Creek Watershed Plan (TRCA, 2003)
A Watershed Plan for Duffins Creek and Carruthers Creek was completed in 2003. Although the Duffins Creek watershed was generally in good condition overall, issues identified at the time included high levels of total suspended solids around construction activity, water quality contamination associated with wastewater discharges, and less than optimal riparian cover. Ten integral management actions were identified, including protecting and restoring an enhanced natural heritage system, providing stormwater quantity and quality controls for new and existing developments, and managing land uses and water withdrawals to reduce impacts.

Carruthers Creek Watershed Plan (TRCA, 2021)
The purpose of a watershed plan is to understand the current and potential future conditions of the watershed, and identify measures to protect, enhance, and restore the health of the watershed. Watershed planning integrates natural systems into land use and infrastructure decision-making by identifying natural features to protect and by recommending how to mitigate impacts from land use and infrastructure development on natural systems. Ontario's provincial planning framework recognizes that watershed planning is important to inform land use and infrastructure planning decisions.

The development of Carruthers Creek Watershed Plan has been a collaborative effort between the Toronto and Region Conservation Authority (TRCA), the Region of Durham, the Town of Ajax, and the City of Pickering. Additional stakeholders and members of the public have been involved throughout the watershed planning process. The development of the Carruthers Creek Watershed Plan was a multi-year process that consisted of watershed characterization, future scenario analysis, and implementation planning that led to the development of a management framework. This management framework is designed to address existing issues in the watershed and mitigate impacts from potential future land uses. It also recommends appropriate actions to protect, enhance, and restore the watershed. Decisions on the configuration of future growth and land use throughout the watershed are the purview of the applicable municipality. The CCWP was completed and was endorsed by Durham Council and approved by TRCA Board in 2021.

Subwatershed Studies

Humber River – Centreville Creek Subwatershed Study Synthesis Report (TRCA 2008)
To help evaluate the Region of Peel and the Town of Caledon evaluate the servicing options for new developments in Caledon East, TRCA undertook a subwatershed study for Centreville Creek. The study was initiated to collect, integrate and summarize information on baseline conditions in the subwatershed. It also provided an opportunity to examine local watershed management issues and opportunities and formulate recommendations for local actions that would contribute to achieving the objectives of the Humber River watershed strategy (TRCA 1997). The Centreville Creek Subwatershed Study Synthesis Report (TRCA 2008d) summarizes, integrates, and documents the findings and recommendations from work on the subwatershed planning study conducted. While the Centreville Creek Subwatershed Study Synthesis Report was finalized in 2008, the information on baseline subwatershed conditions represents what was available between January 2003 and December 2004.

Recommendations from this subwatershed study are organized according to three general management zones: existing and future urban areas; natural and cultural heritage; and rural and agricultural areas. There are 25 recommendations across these three types of management zones. Specific recommendations to Region of Peel and the Town of Caledon include: improving stormwater management; monitoring of groundwater levels; using more sustainable design principles for new development; and, avoiding and mitigating impacts to the natural and water resource systems.

Etobicoke Creek – Etobicoke Creek Headwaters Subwatershed Study Synthesis Report (TRCA 2008)
The Etobicoke Creek Headwaters Subwatershed Study Synthesis Report (TRCA 2008c) summarizes, integrates, and documents the findings and recommendations from subwatershed planning studies. The report describes subwatershed conditions (based on data available between October 2004 and November 2005) regarding land use, groundwater surface water quantity and quality, fluvial geomorphology, terrestrial and aquatic ecosystems and cultural heritage. There are also recommendations for further study.

Recommendations from this subwatershed study are organized according to four general management zones: existing urban areas; future urban growth areas; existing rural and agricultural areas and watershed wide. There are 34 recommendations across these four types of management zones. Specific recommendations to Region of Peel and applicable lower-tier municipalities include: improving stormwater management; avoiding and mitigating impacts to the natural and water resource systems; using more sustainable design principles for new development; and, expanding and improving monitoring programs to understand the impacts of development across the headwaters.