



ECS Lunch and Learn

Supporting internal knowledge transfer within TRCA

March 24, 2021

TRCA's Natural Heritage System Update

Presented by:

Namrata Shrestha, Senior Research Scientist

Andrew Chin, Research Analyst

Ecosystem and Climate Science

Watershed Planning and Ecosystem Science | Development and Engineering Services

24 Mar 2021

Outline

1. Background
2. Approach and Scope
3. Phase I to Phase III Details
4. Summary and Next Steps

BACKGROUND



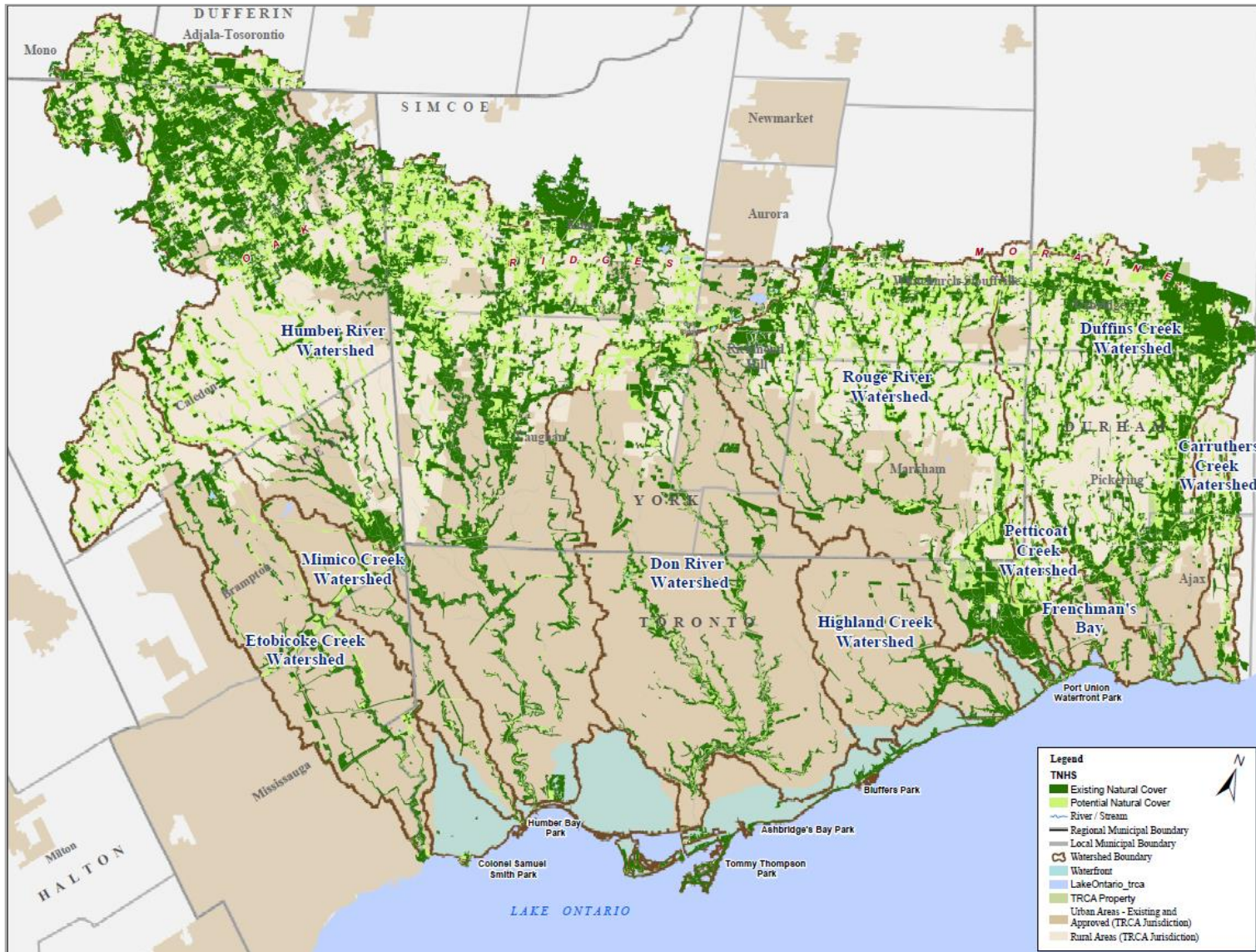
What is a Natural Heritage System?

“a system made up of natural heritage features and areas and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems.

These systems can include natural heritage features and areas, federal and provincial parks and conservation reserves, other natural heritage features, lands that have been restored or have the potential to be restored to a natural state, areas that support hydrologic functions, and working landscapes that enable ecological functions to continue.”

Provincial Policy Statement (1994, 2020)

TRCA's Terrestrial Natural Heritage System (2007)



- Focused on protecting existing and restoring potential natural cover
- Aimed to increase terrestrial biodiversity (habitat and species)
- Management action focus on protection, enhancement, and restoration of natural areas
- Informed TRCA and municipal initiatives

Why an update to the TNHS?

1. To consolidate and account for various municipal natural heritage systems
2. To account for climate change impacts on natural systems
3. To utilise updated science and practice of natural systems planning (urban)
4. To utilise the expanded field data and analytical capacity of TRCA
5. To inform TRCA and municipal partners in various strategies and initiatives

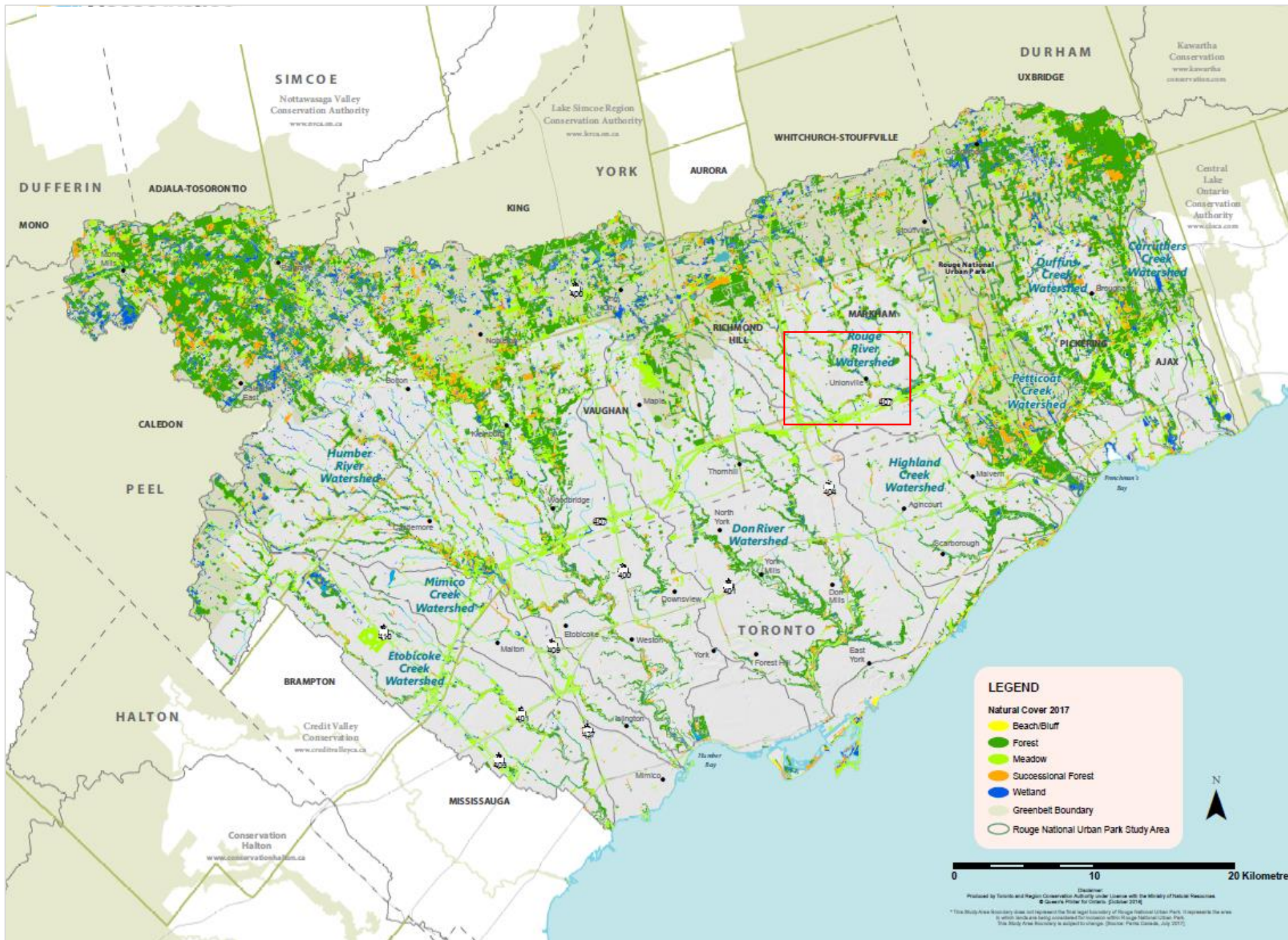
Approach

Toronto and Region Conservation Authority





Urban Ecosystems



Natural Cover

Total Area: 59006 ha

Forest: 34654 ha

Wetland: 3915 ha

Successional: 5026 ha

Meadow: 15237 ha

Beach/Bluff: 174 ha

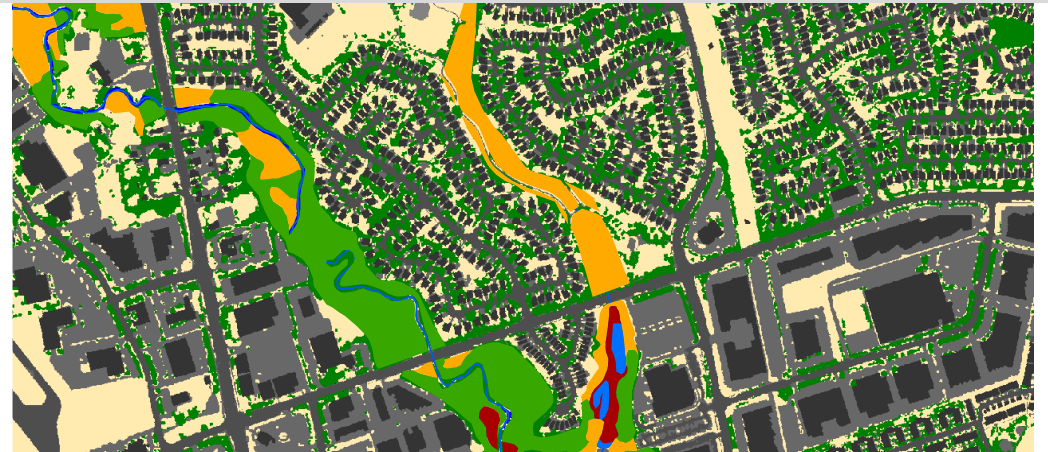
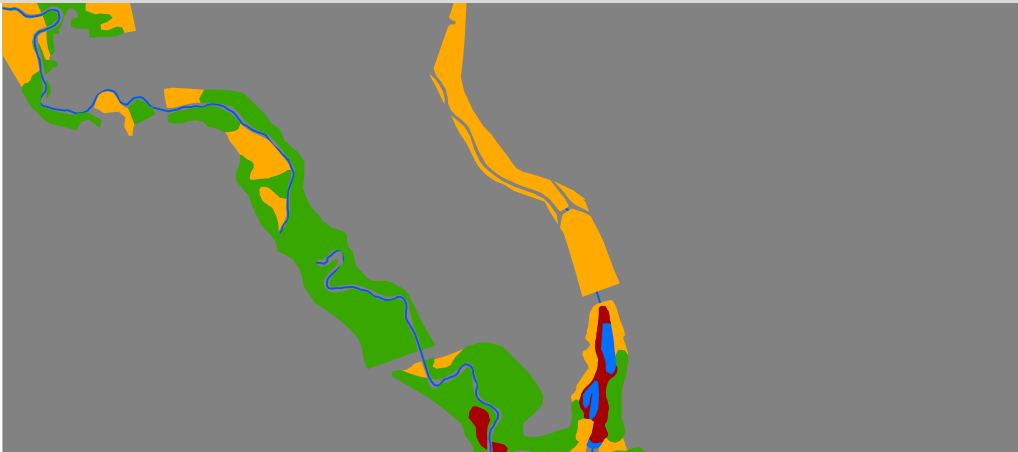
Natural area



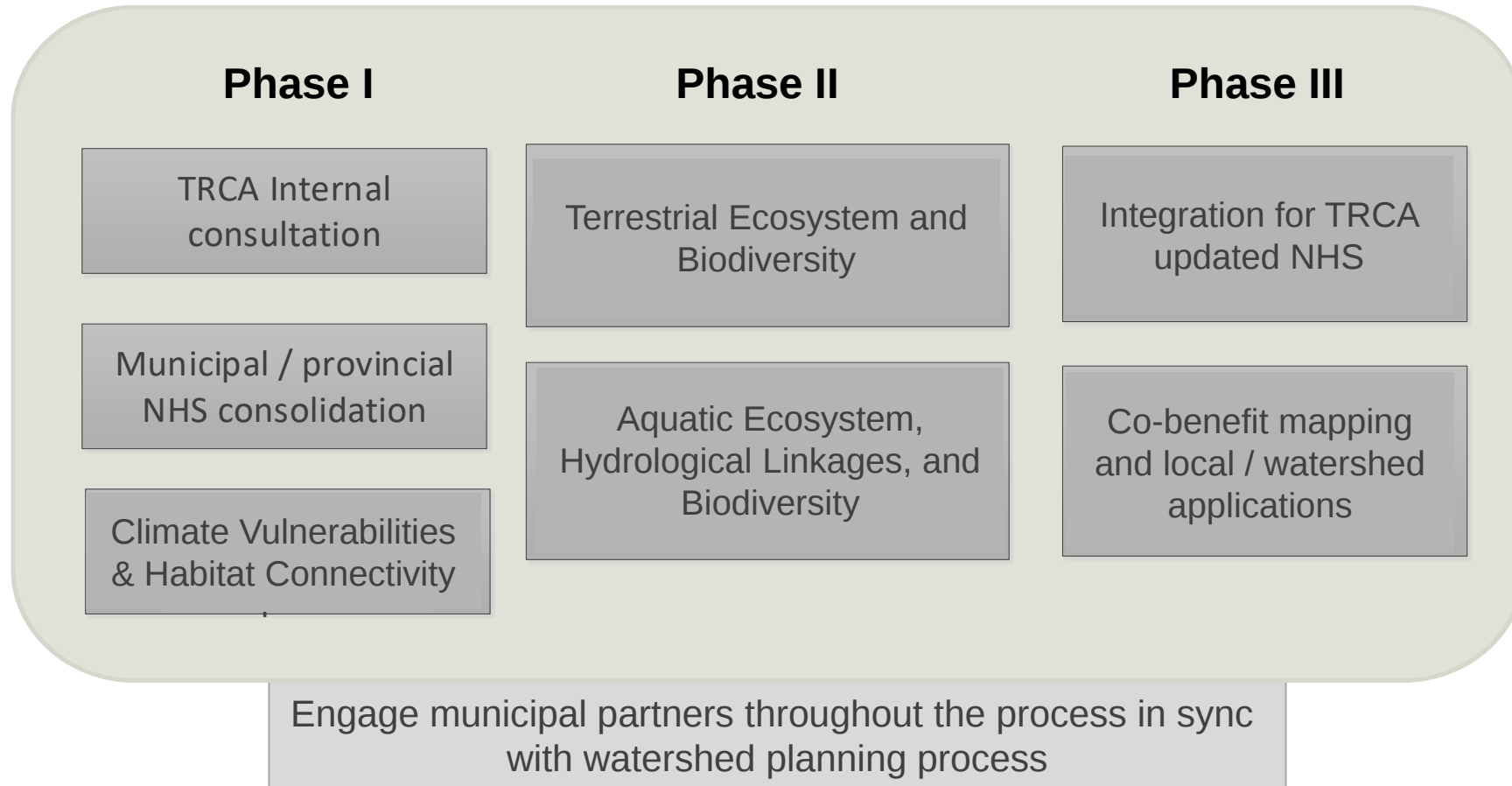
Natural area + Urban canopy



1. How can natural & built areas complement each other to achieve NH objectives?
2. How can science inform policy and practice to make this happen?



Project Scope

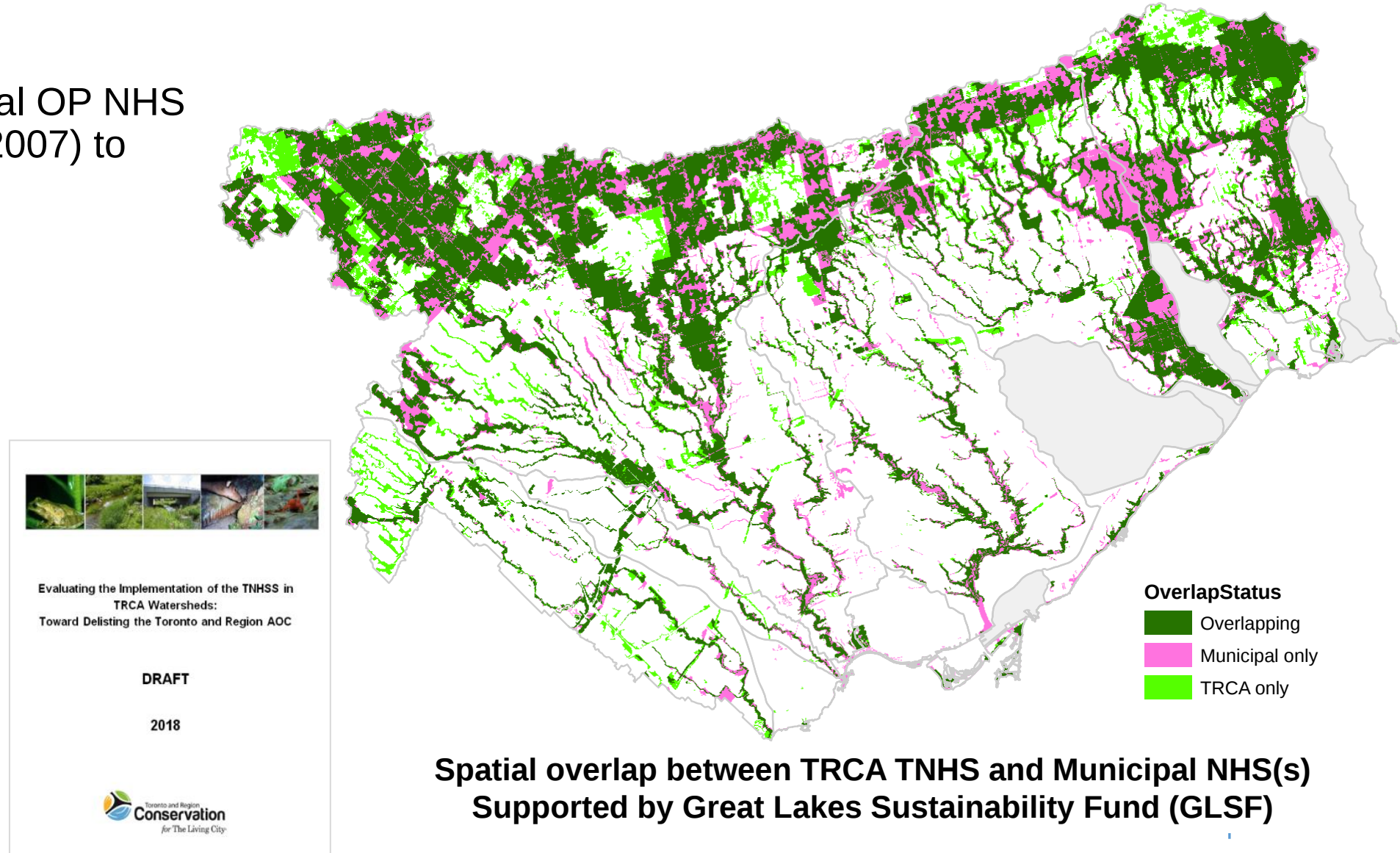


Phase I

Toronto and Region Conservation Authority

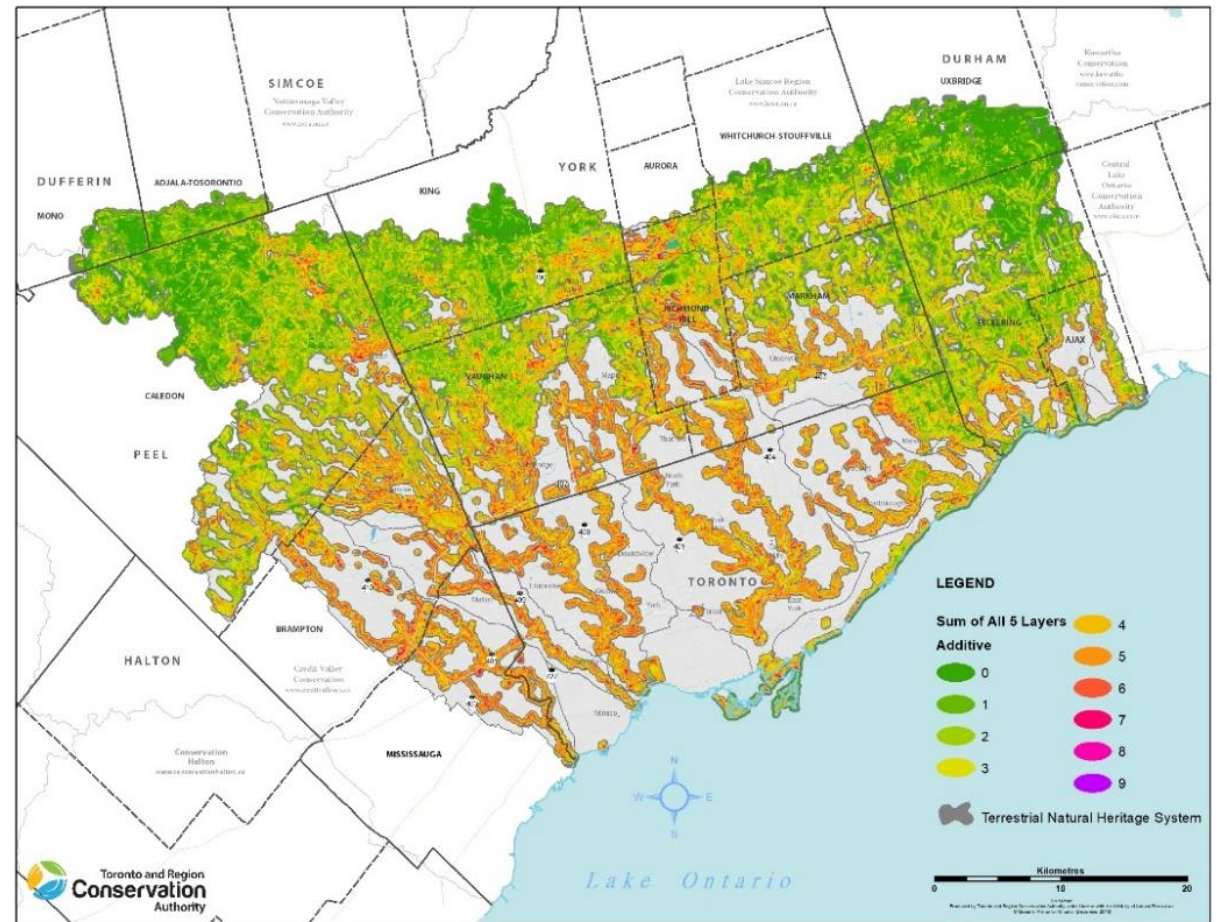
1. Municipal NHS Consolidation

- Consolidated municipal OP NHS data with the TNHS (2007) to identify synergies and discrepancies



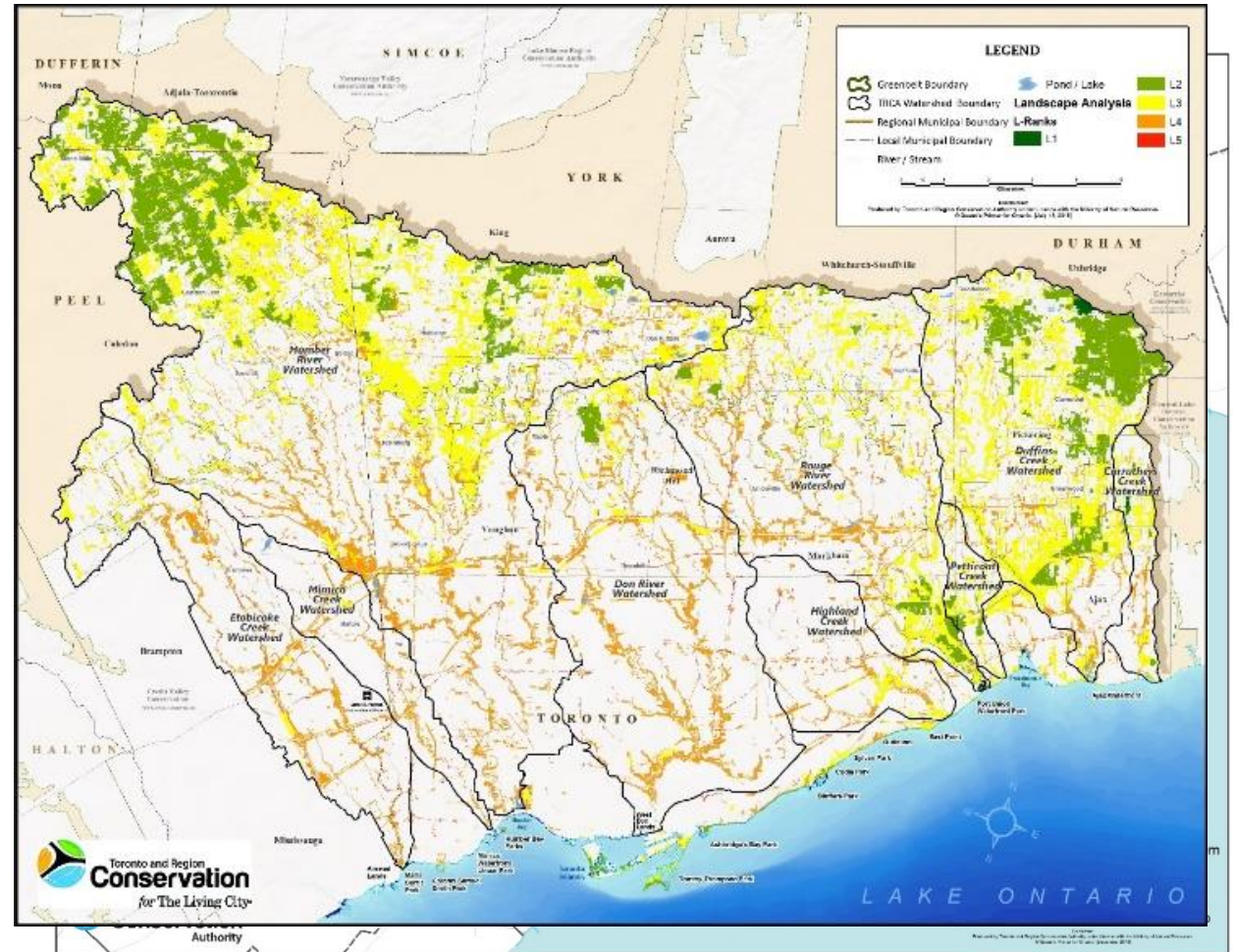
2. Climate Change Vulnerability Assessment

- Identified climate vulnerable areas for terrestrial systems based on
 - Habitat patch quality
 - Climate sensitive vegetation
 - Wetland vulnerability
 - Soil drainage
 - Ground surface temperature



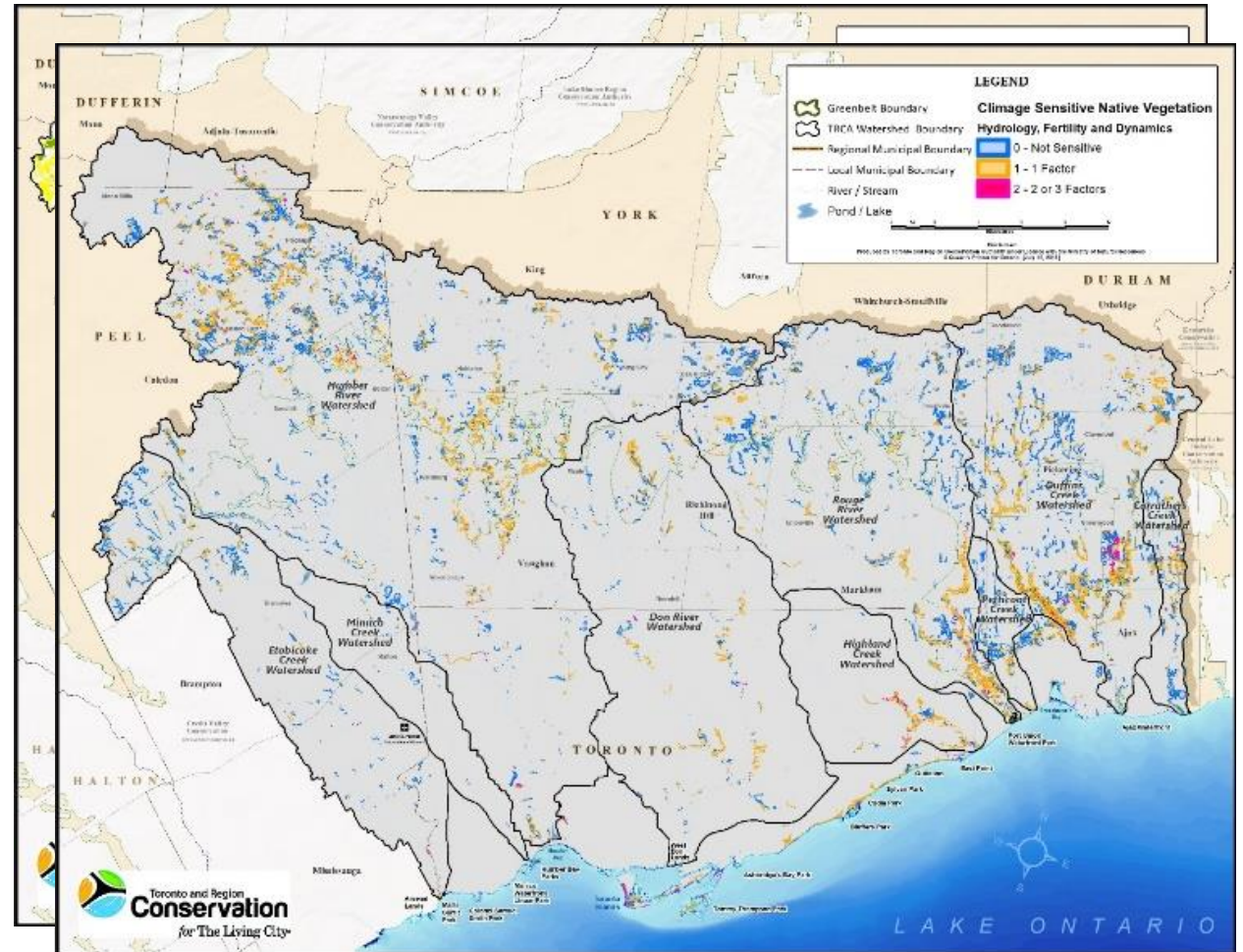
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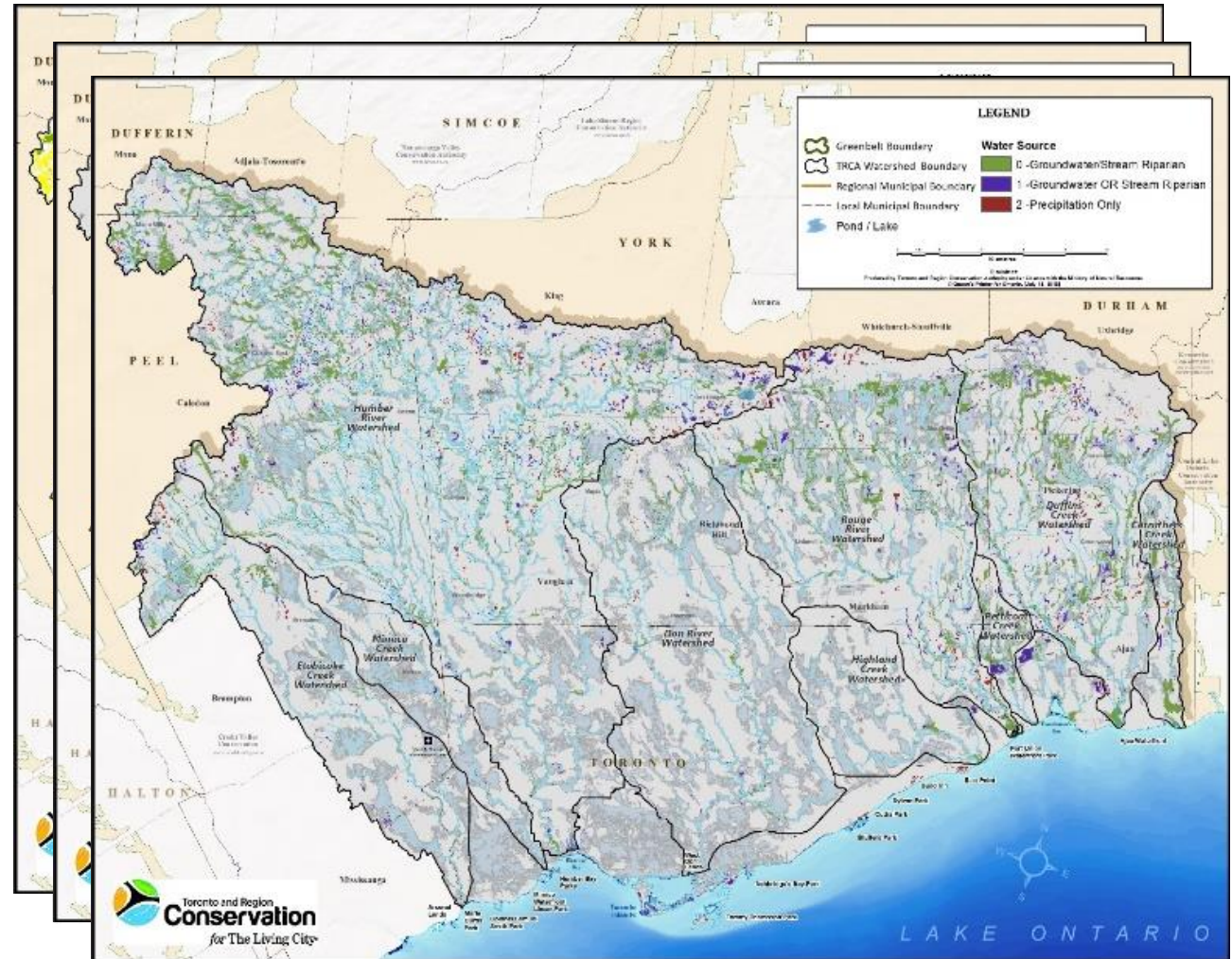
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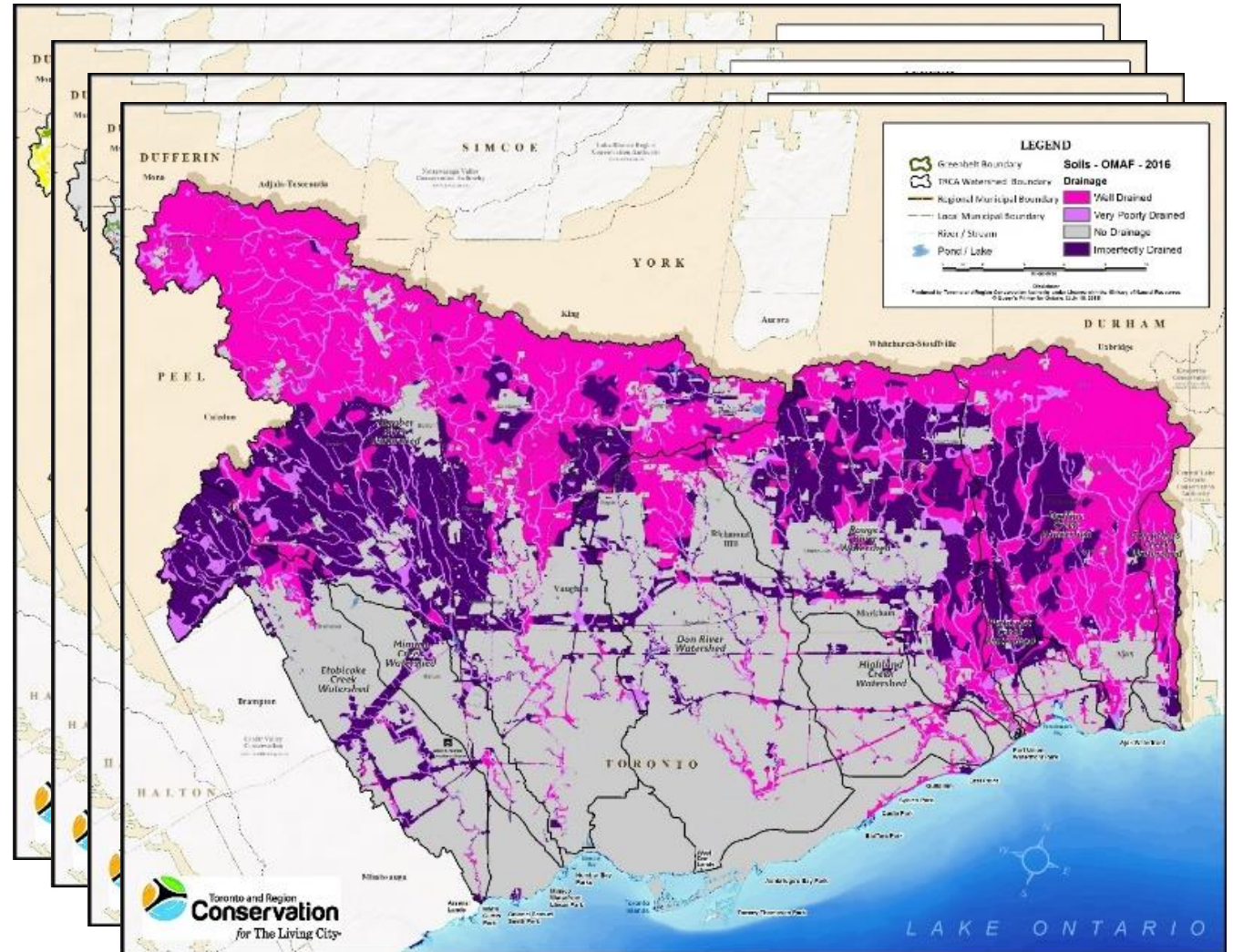
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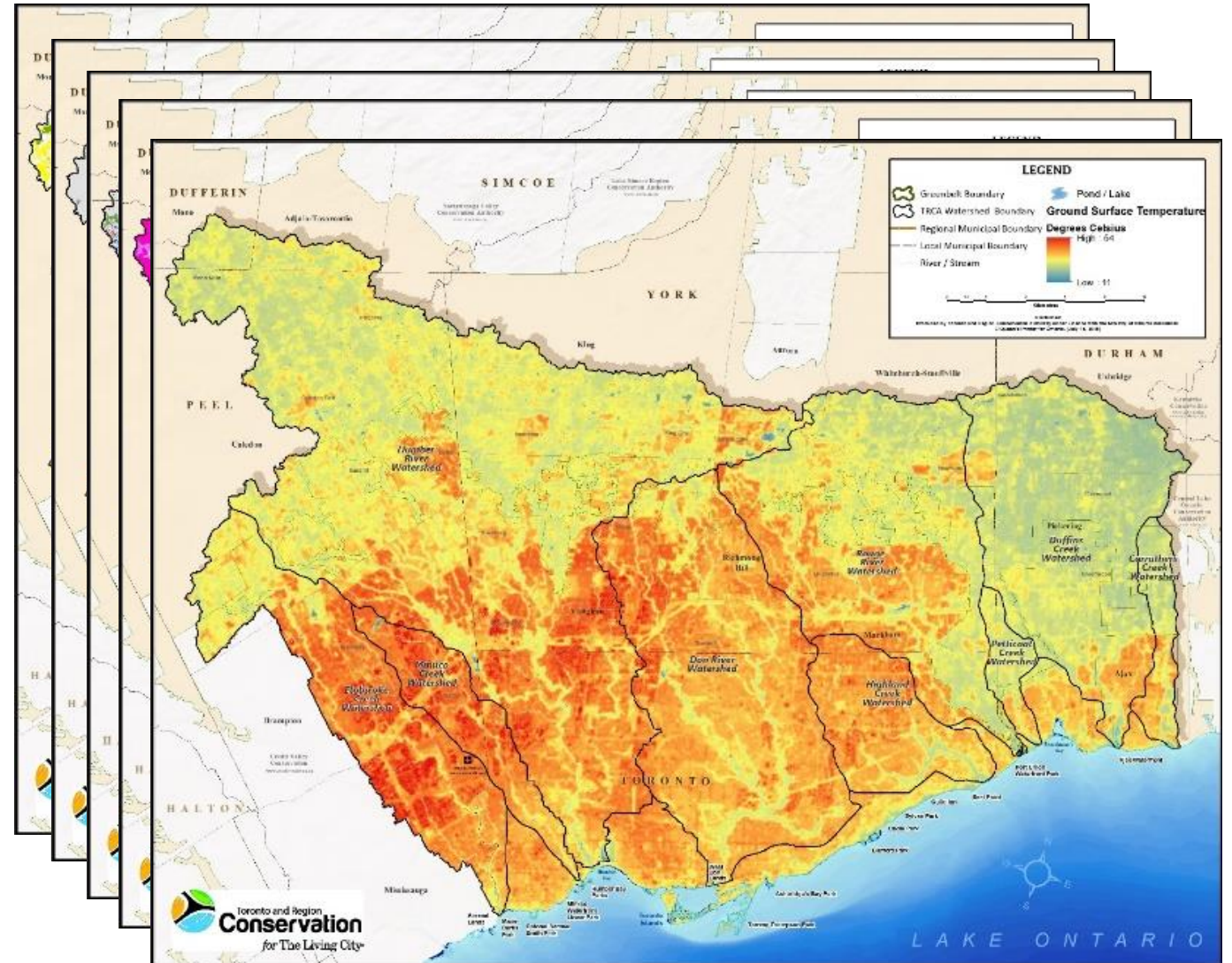
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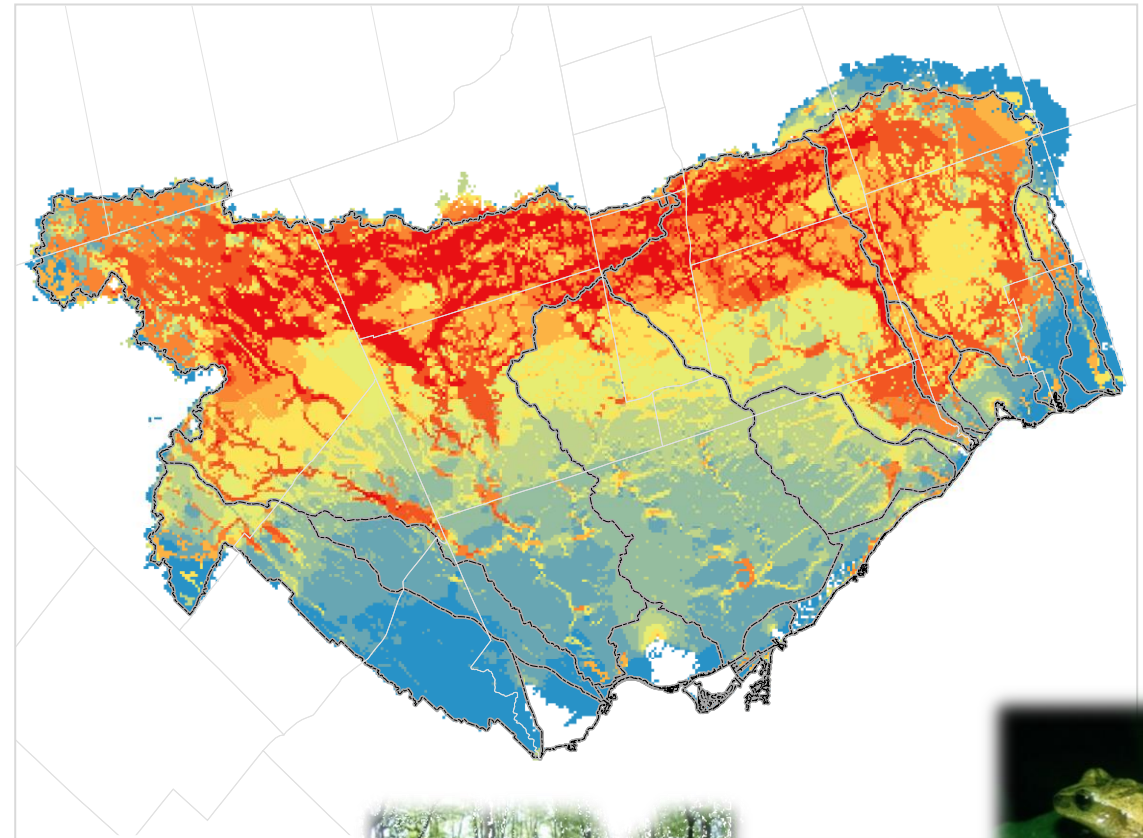
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3. Habitat Connectivity Priorities

- Identified regional connectivity priorities for climate adaptation and gene flow for biodiversity
- Identified local connectivity priorities for avoiding / mitigating road kills and supporting local populations of biodiversity



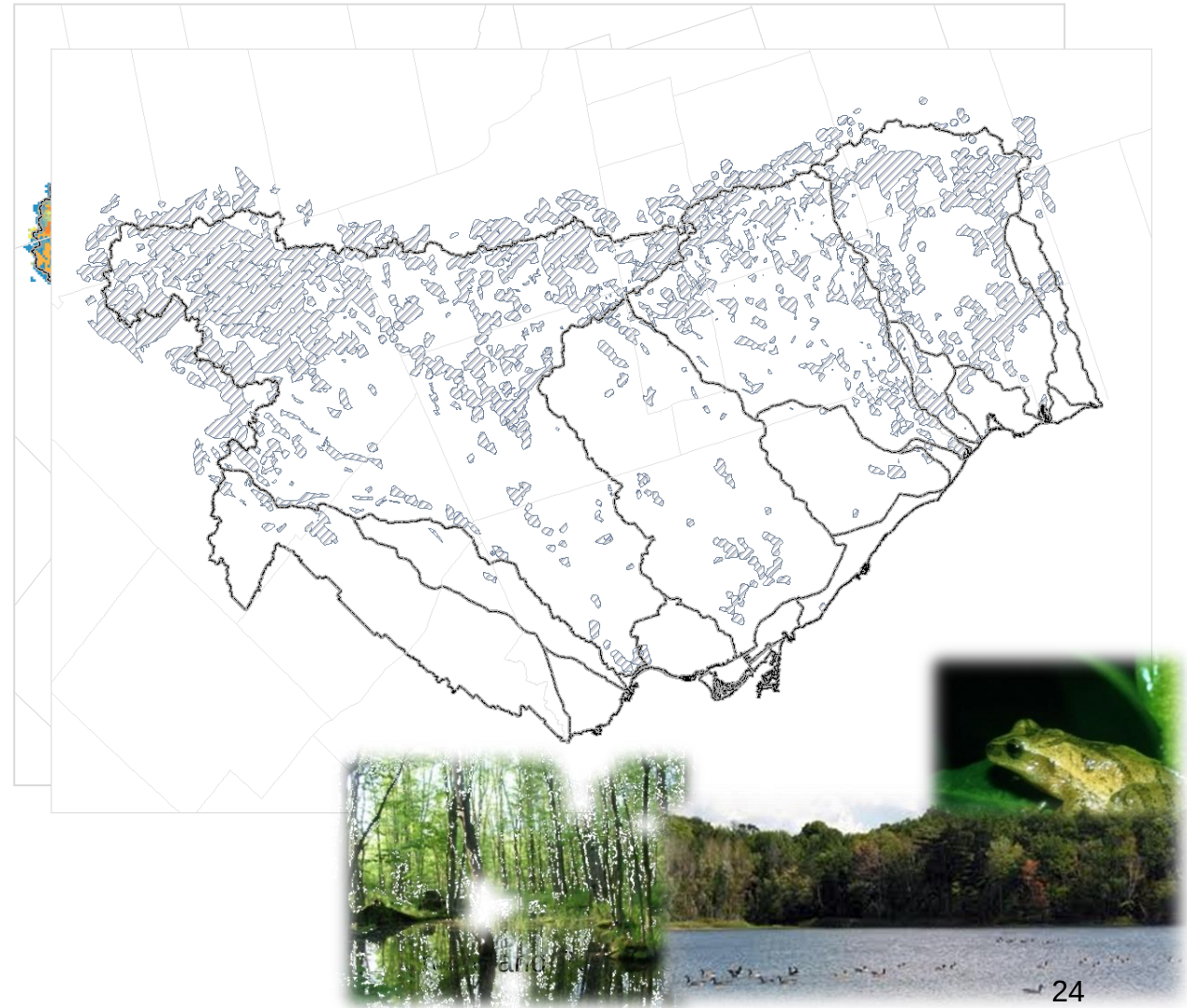
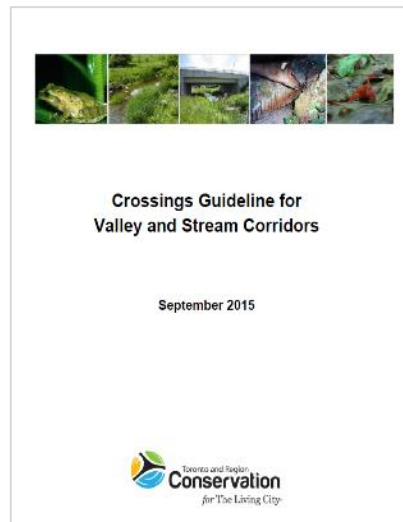
Crossings Guideline for
Valley and Stream Corridors

September 2015



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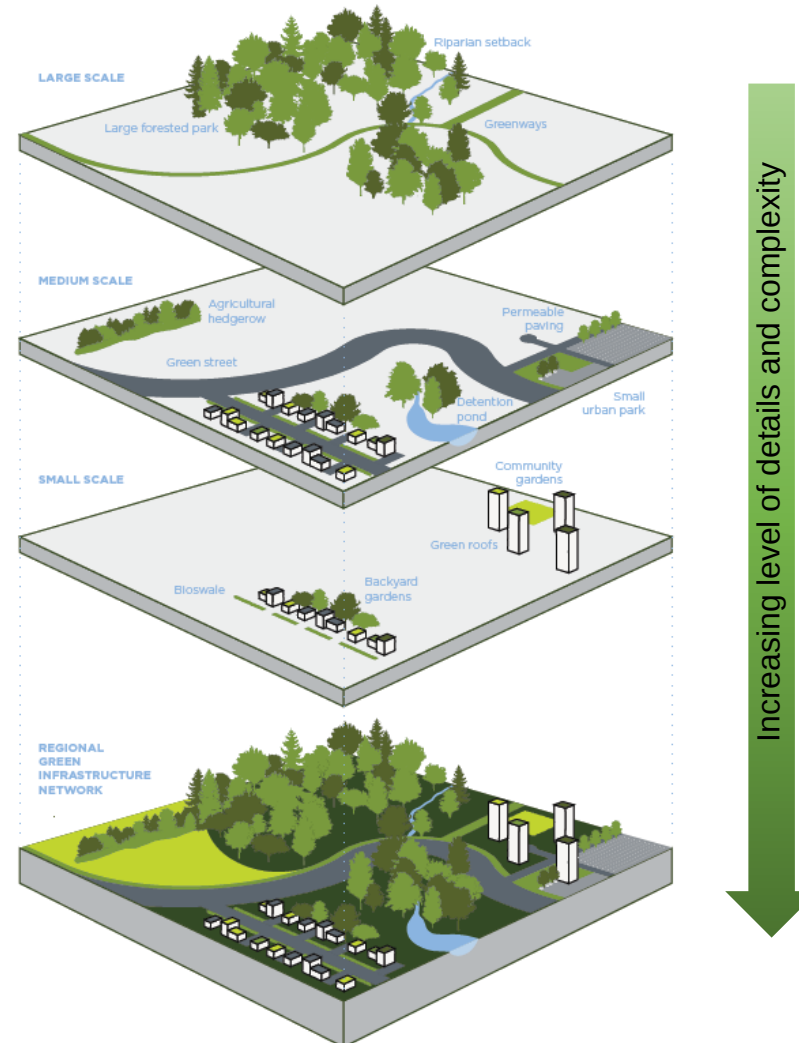
Phase II

Toronto and Region Conservation Authority

4. Updated Science and Practice

Urban Ecology Framework

- Mapped out contribution of entire landscape to provide natural heritage functions
- Used data on urban living green infrastructure such as urban forest
- Identified potential “contributing areas” that recognizes built-up areas with higher contributions to natural heritage functions

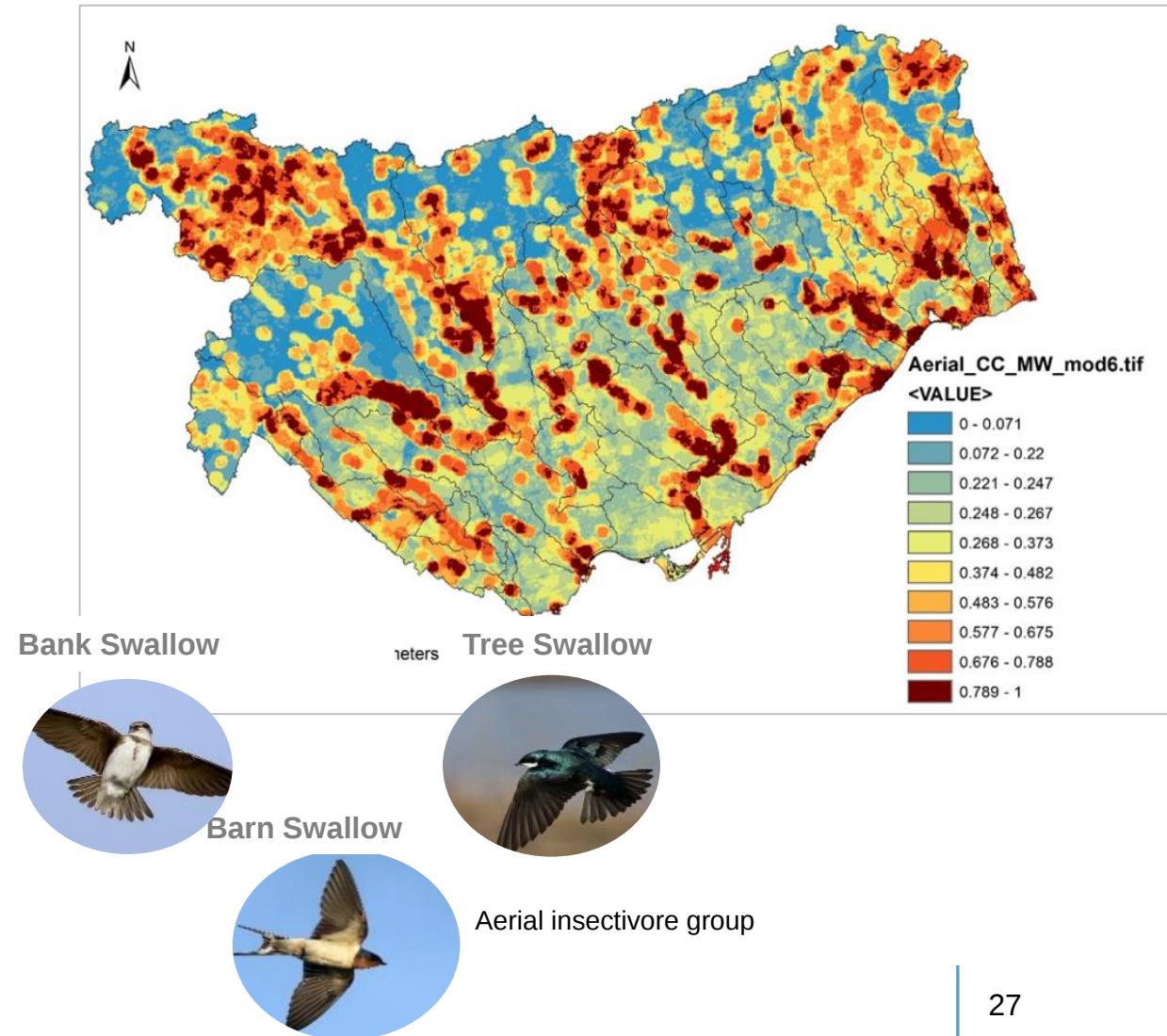


Source: Metro Vancouver, 2016

Components of green infrastructure link together to form a functional network

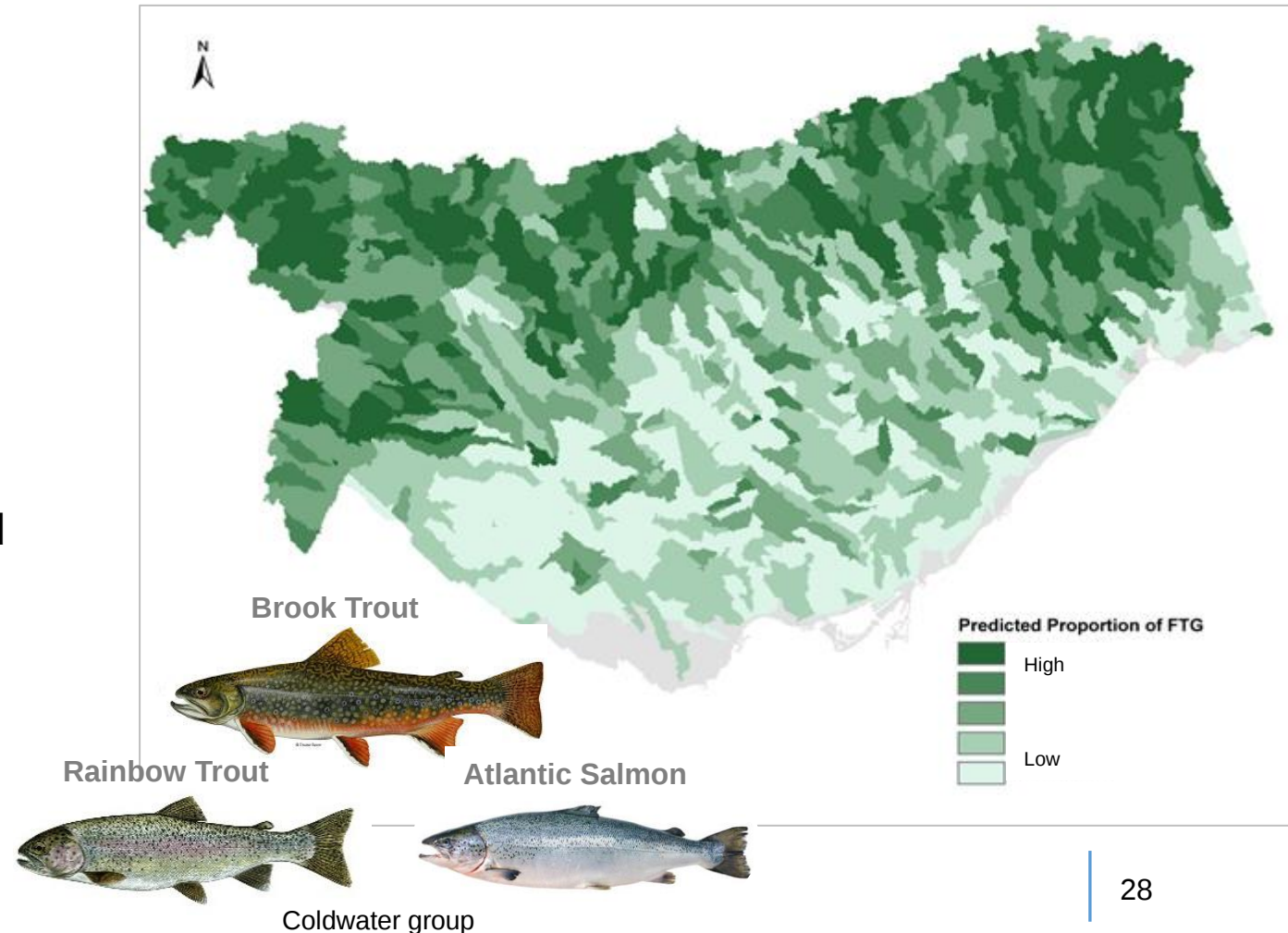
Terrestrial Priorities

- Used TRCA inventory data on birds and amphibians and landscape variables to identify 9 Functional Trait Groups (FTG) of biodiversity for management.
- Identified habitat suitability for each group ranging from urban adapted to sensitive species across the landscape
- Large natural areas and high connectivity areas were the most important habitat attributes for high suitability
- Also, urban adapted group had medium level suitability in areas with good urban canopy such as in older residential neighbourhood (contributing areas)



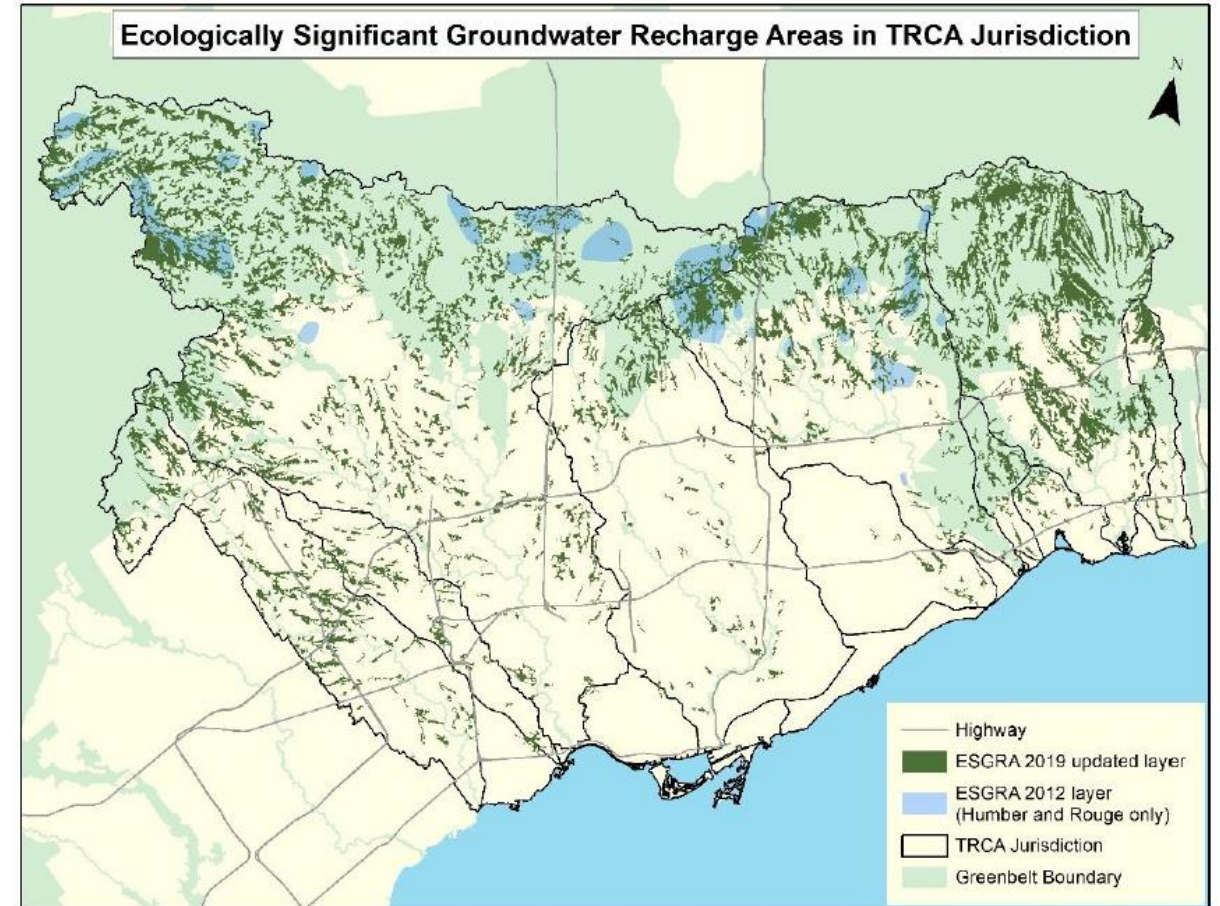
Aquatic Priorities: Above Ground Influence

- Incorporated terrestrial influences on aquatic ecosystems through delineation of Reach Contributing Areas (RCAs)
- Identified 4 Functional Trait Groups (FTG) of fish based on their traits, RCA variables, and instream variables
- Identified habitat suitability of RCAs for their contribution to instream habitat of each FTG
- Forest cover in RCA and stream flow seemed to be the most important factors
- Greater forest cover in RCA regulates thermal regime thereby supporting high quality aquatic habitats



Aquatic Priorities: Below Ground Influence

- Ecologically Significant Groundwater Recharge Area (ESGRA)
- Areas that are ecologically important for replenishing groundwater systems to support aquatic system
- Critical for thermal preference of fish species especially with climate change



Phase III

Toronto and Region Conservation Authority

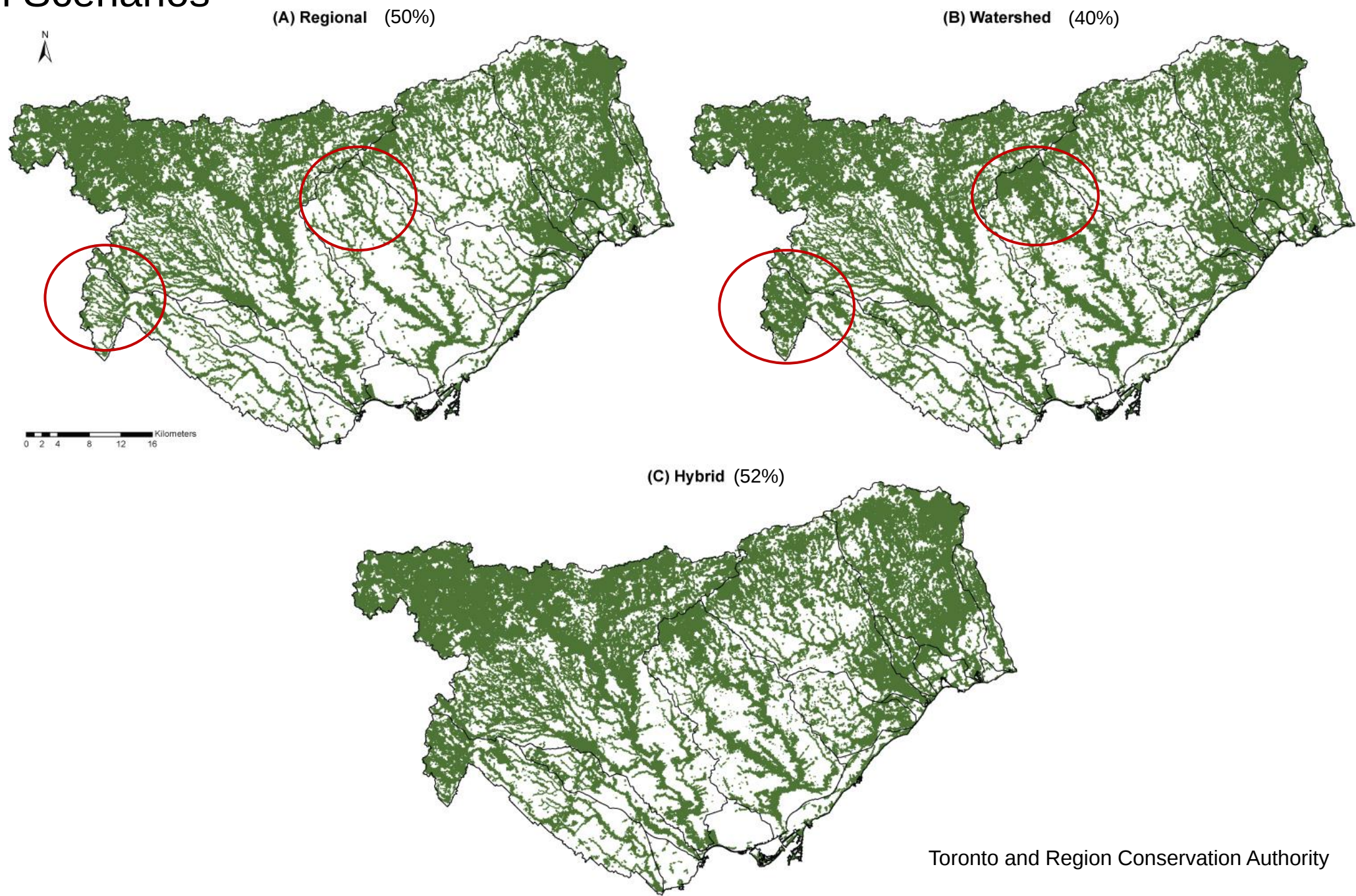
Integration for Updated NHS: Criteria List

Locked in Features & Areas (9)	Aquatic Functions (6)	Terrestrial Function (21)	Municipal NHS (1)
• Wetlands (TRCA 2020) • Fish Habitat (Watercourses & CoS / some buffer) • Woodlands (forests & successional) • Valleylands (CoS – included above as well) • Wildlife Habitat (Toronto ESA, Migratory bird areas) • Habitat of ES&TS (Mostly included in above layers) • ANSI (Earth and Life Sciences) • NC in conservation areas (Included in above layers)	• Habitat suitability (fish) • Riparian natural cover • ESGRA	• Remaining Natural cover • Vegetation communities (ELC alpha and beta) • Species (Fauna/Flora alpha and beta) • Habitat connectivity (birds and amphibians) • Habitat suitability (birds and amphibians)	• Consolidated Municipal NHS (local and regional)

Marxan Method

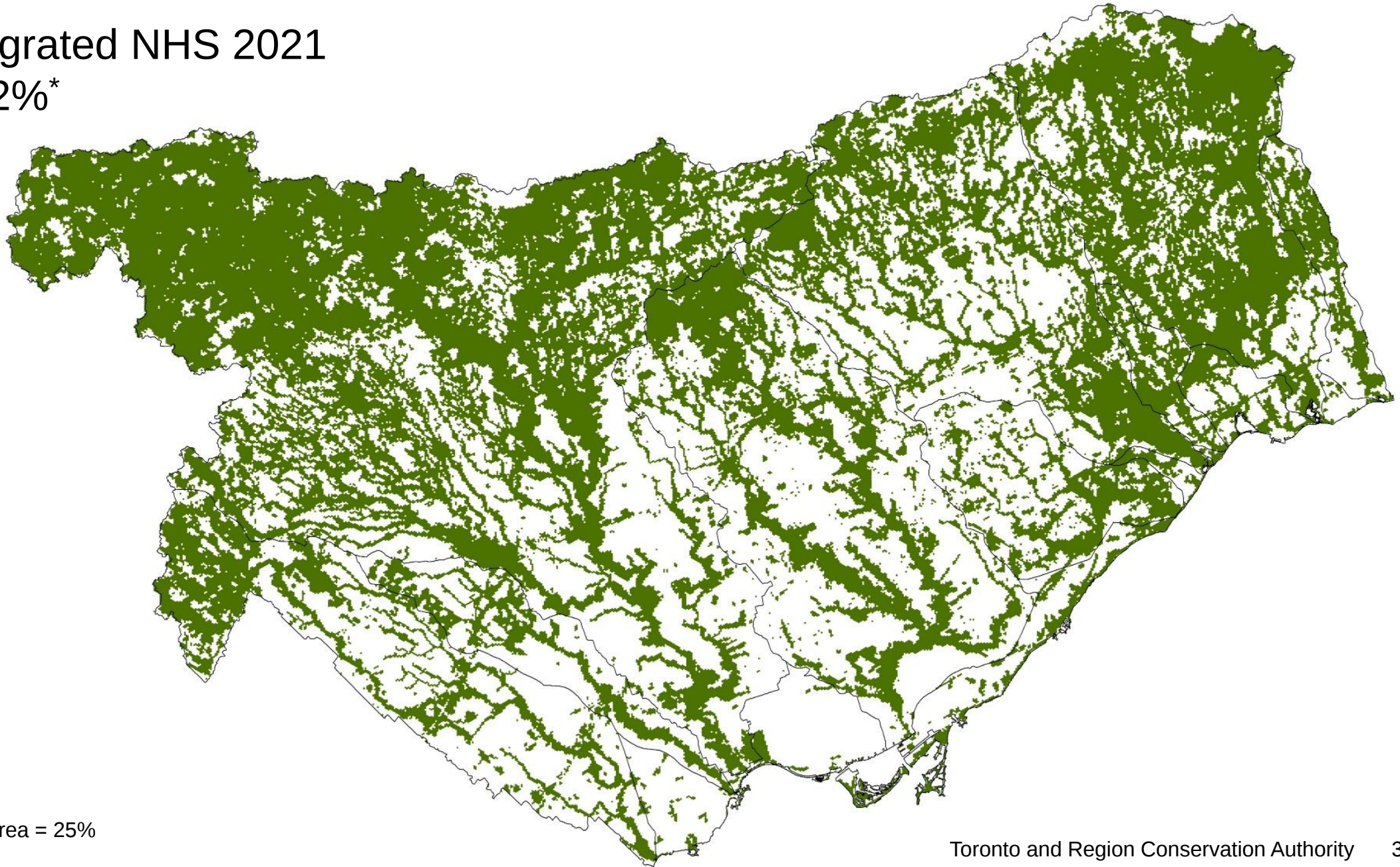
- Marxan is an optimization tool for reserve design based on specified criteria and targets for management (Ball et al. 2009)
- The algorithm aims to achieve targeted representation of all specified criteria for the smallest possible cost. While doing so it identifies the most optimal areas that tries to maximize all targets.
- The tool allows for multiple scenarios and combination of criteria to identify the strategic locations for TRCA's updated NHS
 - Level of representation of each criteria = 30%, 40%, and 50%
 - Scale of analysis = Regional and Watershed

Marxan Scenarios

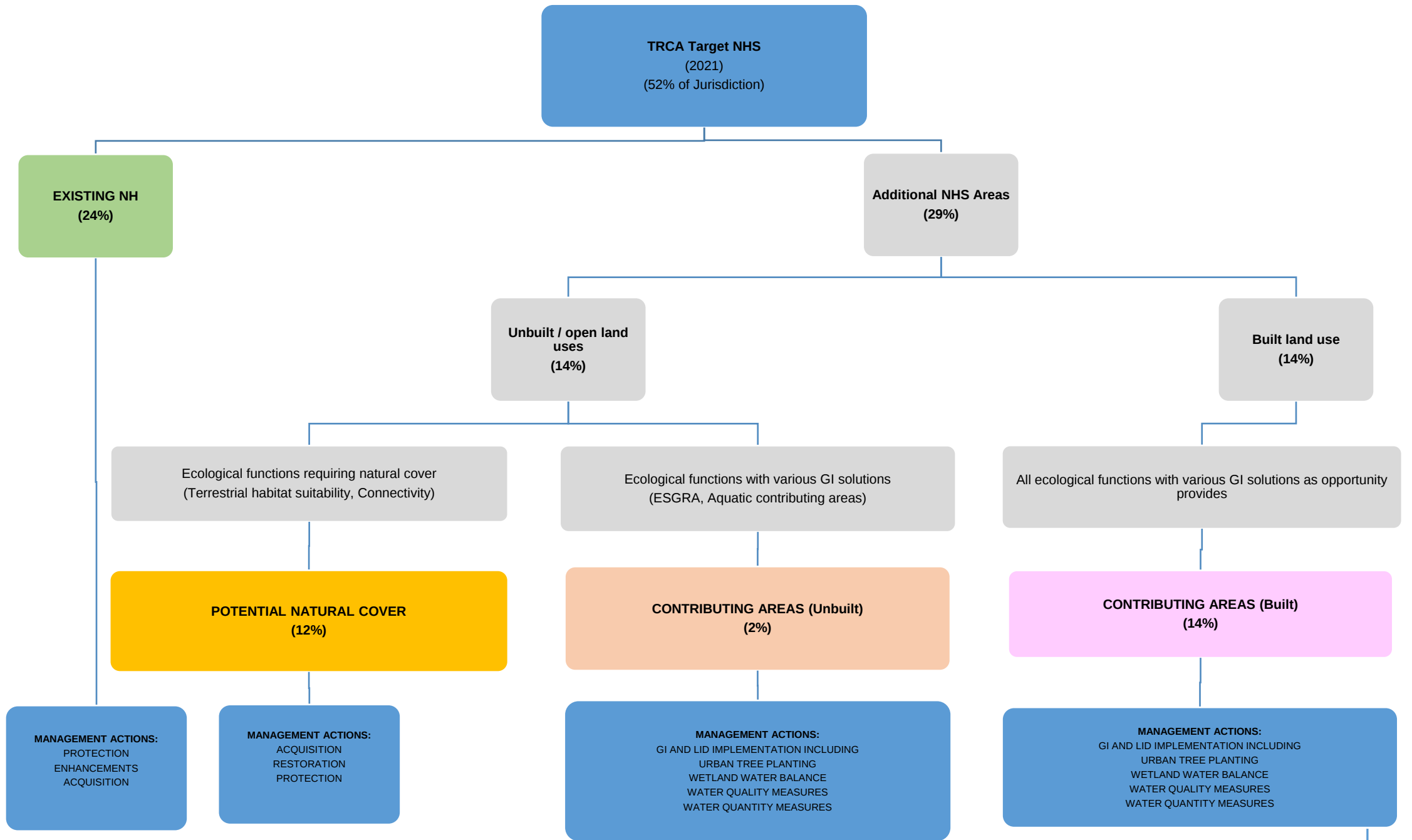


Integrated NHS 2021

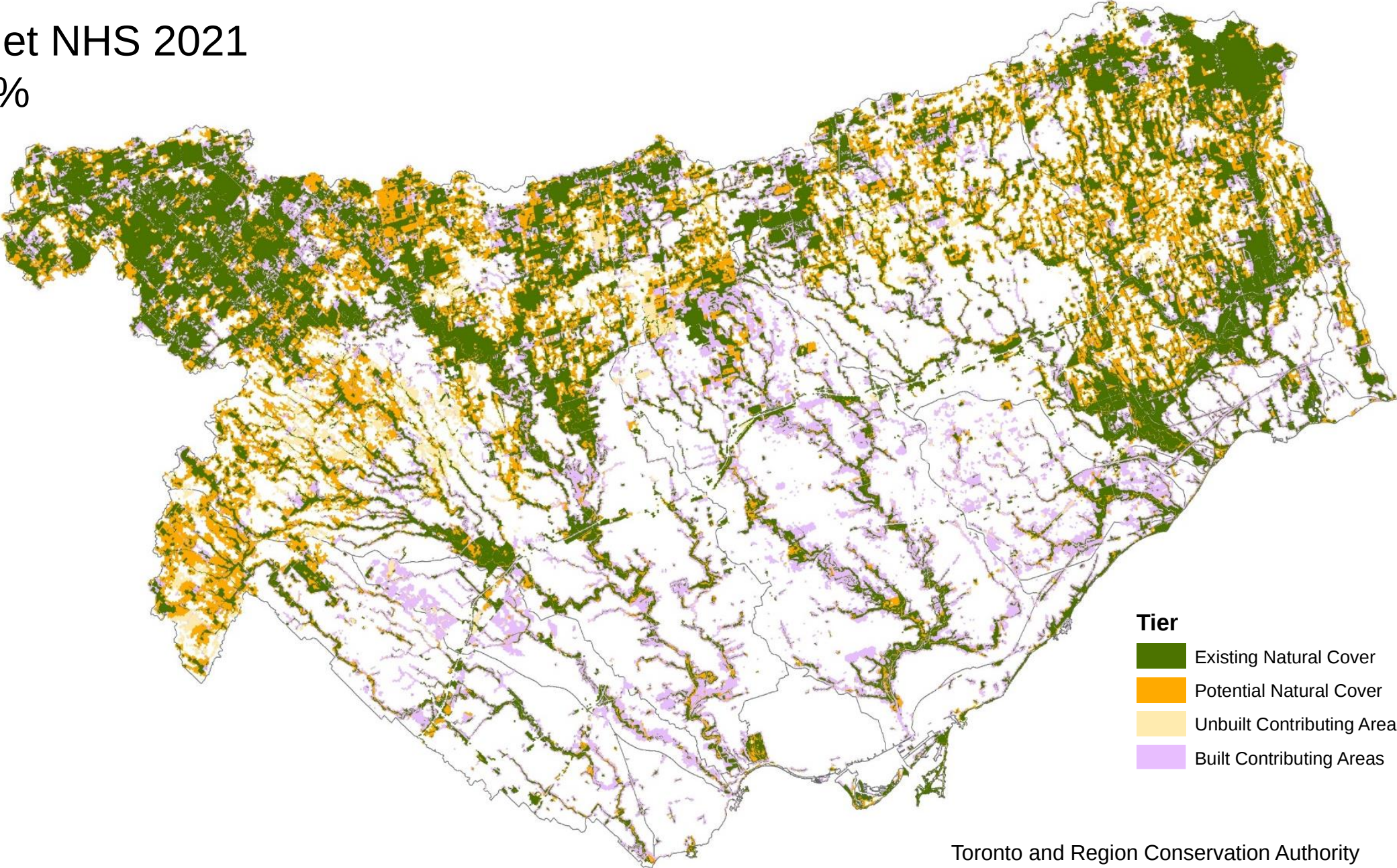
~ 52%*



*Locked in area = 25%



Target NHS 2021
~52%



Target NHS 2021
~52%



Management Implications

- **Total of 36% is target natural cover; additional 16% is target for contributing areas**
- Prioritize protection for all existing natural cover (24%) including those that are outside of reg limit (8%);
- Prioritize restoration for the potential natural cover (12%); all are within reg limit so stronger business case;
- Prioritize various green infrastructure (GI) and low impact development (LID) measures for implementation in the contributing areas (16%); these areas are constrained by existing land use so action should be driven by target function

NHS Tiers	Percent of Jurisdiction (%) (Inside, Outside Reg Line)	Management Actions
Existing Natural Cover	23 (16, 8)	Protect + Enhance + Acquire
Potential Natural Cover	12 (12, 0)	Acquire + Restore + Protect
Contributing Areas (Unbuilt)	2 (1, 1)	GI & LID Implementation (function driven)
Contributing Areas (Built)	14 (5, 9)	GI & LID Implementation (function driven)
TRCA updated NHS	52 (34, 18)	

Summary

Summary

- TRCA's updated NHS builds on the systems principals of TNHSS (2007)
- It adds new and updated science and information
 - Integrates terrestrial and aquatic ecosystems functions and needs
 - Accounts for municipal NHS, as supported by ecosystem features and functions
 - Accounts for the contribution of natural cover (existing and potential) and other parts of the landscape (contributing areas) for overall NHS health
- Provides high level targets at regional and watershed scale
- Provides scalable information for management actions and implementation
- Provides independent datasets for use in other TRCA operations

Next Steps

- Summary Report (April 2021)
- Director's approval and further direction; SLT (May 2021)
- NHS technical workshop with CAs and Municipal NHS staff (Q2 2021)
- Finalize TRCA's updated NHS (Q2 2021)
- Future Work:
 - Landscape Analysis Model assessment for habitat quality ranks (Mar 2021)
 - Co-benefit mapping at regional scale (Q2 2021)
 - Green infrastructure implementation best practices guide (Q3 2021)
 - Refinement at watershed scale and track changes – Etobicoke (Q2 2021)
 - Refinement at site scale and track changes – as opportunity arise (ongoing)

Special acknowledgement to the TRCA technical advisory committee and the technical team, without whom this work would not have been possible.

TRCA Technical Advisory Committee:

Noah Gaetz
Brad Stephens
Mary-Ann Burns
Laura DelGiudice
John Stille
Karen McDonald

TRCA Technical Advisory Committee and Technical Team:

Jonathan Ruppert
Parth Sheth
Sue Hayes
Paul Prior
Gavin Miller
Lyndsay Cartwright
Tracy Timmins
Andrew Ramesbottom
Neil Taylor
And numerous field staff who collected the data that were used here.

Project Contact

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Andrew Chin, Research Analyst, Andrew.chin@trca.ca

Ecosystem and Climate Science
Watershed Planning and Ecosystem Science | Development and Engineering Services

Upcoming ECS Lunch and Learns!

Wednesday, April 14
11:00am-12:00pm

Thermal Imaging for Restoration and Conservation

By Jonas Hamberg

Wednesday, April 21
11:00am-12:00pm

Lake Ontario Fish and Aquatic Ecosystem Health

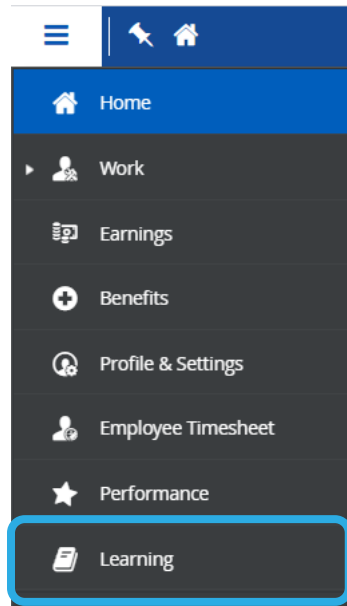
By Valerie Francella, Angela
Wallace, and Jan Moryk

Tuesday, April 27
11:00am-12:00pm

Lake Ontario Restoration Initiatives

By Andrew Ramesbottom,
Colleen Gibson, John Stille,
and Jennifer Smith

New Learning Management System!



 Course Catalog

CATEGORIES

FILTERS

Lunch and Learn

X

Q

4 items



New

Lunch and Learn: Teams, OneDrive and SharePoint

EN

Webinar



New

Lunch and Learn: Hobbies for Mental and Physical Health (Please read...

EN

ILT (Instructor-Led Training)



New

Lunch and Learn: Thermal Imaging for Restoration and Conservation

ENROLLED
EN

Webinar



New

Lunch and Learn: Natural Heritage System Update

ENROLLED
EN

Webinar

Past Recordings

Watersheds and Ecosystems Reporting

Draft Web Application

Laura Del Giudice, Senior Manager, Watershed Planning & Reporting
Kristina Dokoska, Project Coordinator, Ontario Climate Consortium

September 21, 2020



Introduction to the LID Treatment Train Tool

Presented by – Steve Auger, Sahila Abbasi and Yuestas David

November 5, 2020



TRCA's Recent Floodplain Mapping Updates

Wilfred Ho*, Christina Bright*, Mike Todd**

* Flood Risk Management, Development & Engineering Services
** Information Technology & Records Management

November 10, 2020



Working with Indigenous Communities

Lunch and Learn

November 17, 2020



Green Infrastructure in Asset Management Planning

Presented by:
Michelle Sawka, Senior Research Scientist
Tracy Timmins, Research Analyst

Ecosystem and Climate Science

December 8, 2020



Explore TRCA's Biodiversity

How to get the most from our enormous natural heritage data set.

Presented by: Gavin Miller, Flora Biologist, Paul Prior, Fauna Biologist, and Parth Sheth, GIS Technician.



December 17, 2020

Evaluating the effectiveness of fish habitat restoration across the Toronto waterfront

Kaylin Barnes¹, Lyndsay Cartwright¹, Rick Portiss¹, Jon Midwood², Christine Boston², Monica Granados³, Thomas Sciscione¹, Colleen Gibson¹, Olusola Obembe¹

ECS Lunch and Learn
January 14, 2021

¹ Toronto and Region Conservation Authority
² Fisheries and Oceans Canada
³ PREview.org



Erosion Risk Management Program

Lunch and Learn Presentation

Presented by: Matt Johnston, Associate Director
Ashour Rehana, Manager
David Gingerich, Analyst

January 27, 2021



The Meadoway Research Overview

The Meadoway
COMMUNITY-POWERED GREEN SPACES



Presented by: TRCA





Thank you

For questions about the ECS Lunch and Learn Series, please contact:

Sharon Lam
sharon.lam@trca.ca