Credit Valley Conservation
inspired by nature

# Fish and wildlife passage at bridges and culverts: existing conditions and priorities for mitigation

STEP webinar

April 28, 2022

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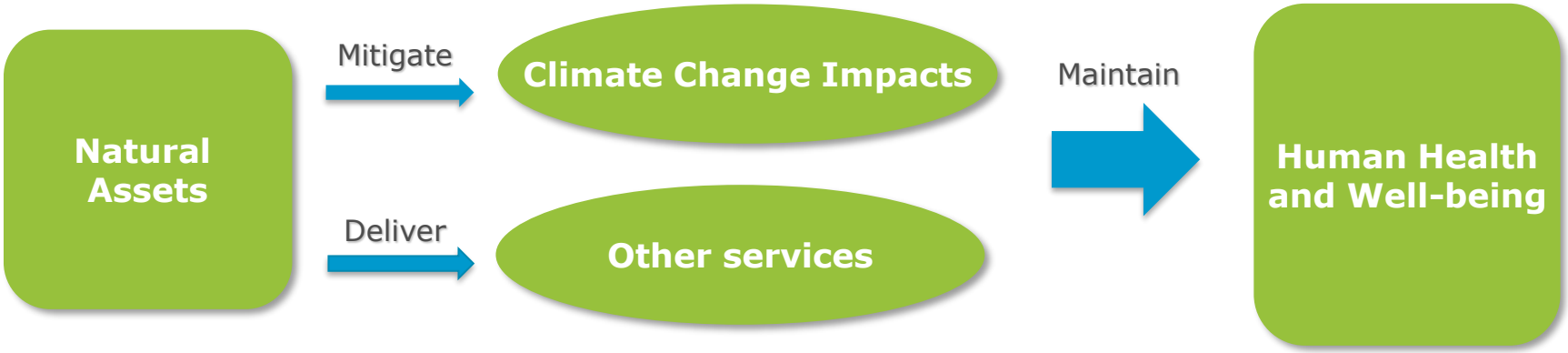
# Climate Change:  A Risk Business……


Photo: Rob Bieber

# Role of Natural Assets in Addressing Climate Change




| Mitigation of Climate Change Impacts | Delivery of Services |
|---|---|
| • Carbon sequestration and storage<br>• Stormwater management<br>• Urban heat island reduction | • Recreation and tourism<br>• Waste assimilation<br>• Real estate value appreciation<br>• Drinking water quality enhancement |

- **Physical**
- **Mental**
- **Social**
- **Economic**

# Natural Heritage System Protection and Climate Resilience

*Protecting and restoring the natural heritage system is one of the most important climate change actions we can undertake for local ecosystems.*

# CVC STEP Webinars Related to Natural Asset Management

- March 31 – Overview of the Ecological Land Classification System
- April 7 – Natural Asset Inventory and Condition Assessment (Part 1)
- **April 28 – Fish and Wildlife Passage at Bridges and Culverts**
- May 5 – Level of Service, Valuation and Life-Cycle Costing for Natural Assets (Part 2)
- June 2 – Climate Considerations for Management of Natural Features
- June 23 – CVC Ecosystem Offsetting Guidelines
- September 8 – Building Business Case for Natural Assets (Part 3)
- September 29 – Biodiversity Matters in Managing Natural Assets

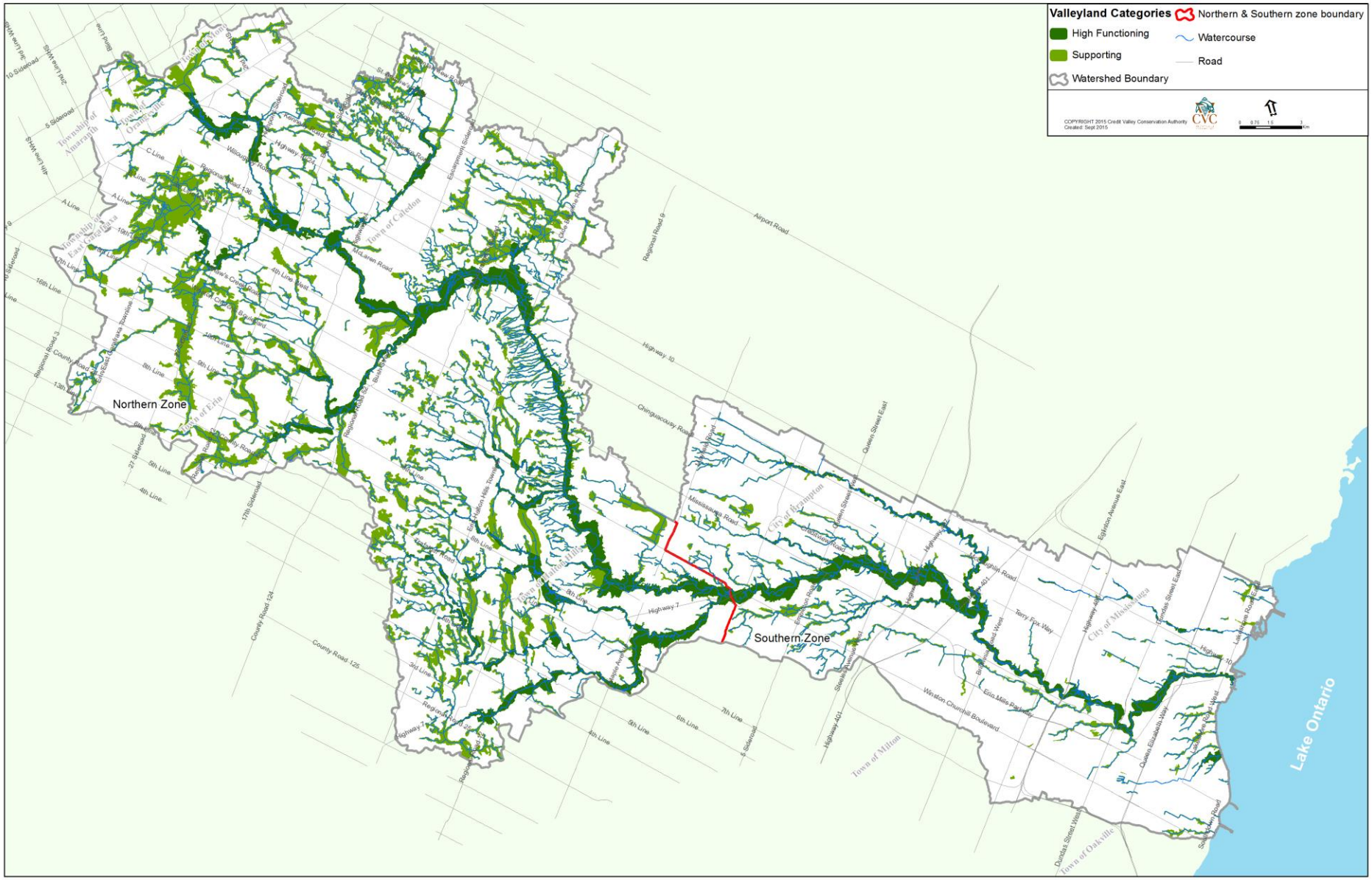
https://sustainabletechnologies.ca/events/2022-webinar-series/

# Outline

- Background: the Credit River Watershed and road ecology
- Road and Valley Crossings project overview
- Results: Wildlife
- Results: Fish
- Applications, implementation, and next steps

# Background


# The Credit River Watershed




# Valleylands of the Credit River Watershed Natural Heritage System (NHS)


Road ecology focuses on the interactions between roads and the natural environment
MIDLAND
Photo:
Carl Hiebert

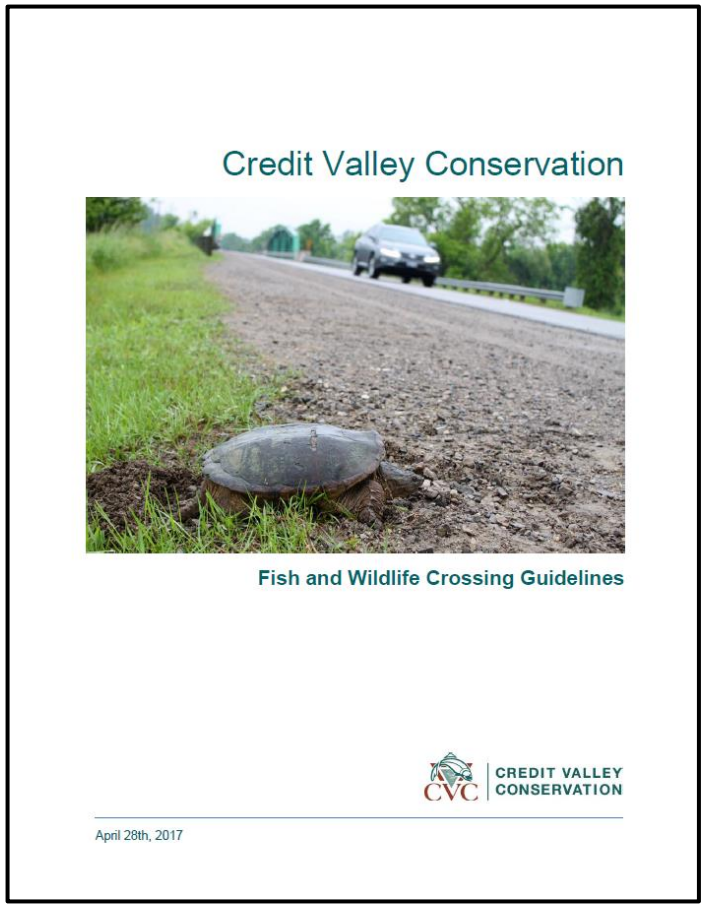
# Connectivity and the Natural Heritage System

**Where are the best locations to improve habitat connectivity?**

# Road and Valley Crossings Project Overview

# Background of Road Ecology at CVC

- Region of Peel requested priorities and guidance from CVC
- CVC has undertaken:
  - **Site-level tool for implementation:** CVC Fish and Wildlife Crossing Guidelines
  - **Landscape-level tool for strategic planning:** Road and Valley Crossings project



# CVC Road and Valley Crossing Project Goals

To identify priority bridges and culverts for improvements to fish and wildlife passage

To help guide the work of CVC and partners to strategic locations within the Credit River watershed

To enhance connectivity of valleylands for both fish and wildlife

# CVC Road and Valley Crossings Project

## Phase 1: Existing Conditions (2015 – 2018)

- Field work at 1100+ locations
- Mapping characterizing existing conditions
- Photo library
- Used internally by CVC staff

## Phase 2: Priorities (2020 – 2021)

- Fish and wildlife priority mapping
- Update of shapefiles, maps, user guide
- Consultation with CVC staff and municipalities

## Phase 3: Implementation (2021 onwards)

- Final report
- Roll out of results internally and with municipalities and other partners

# Data Collection

Measurements at each bridge and culvert included:

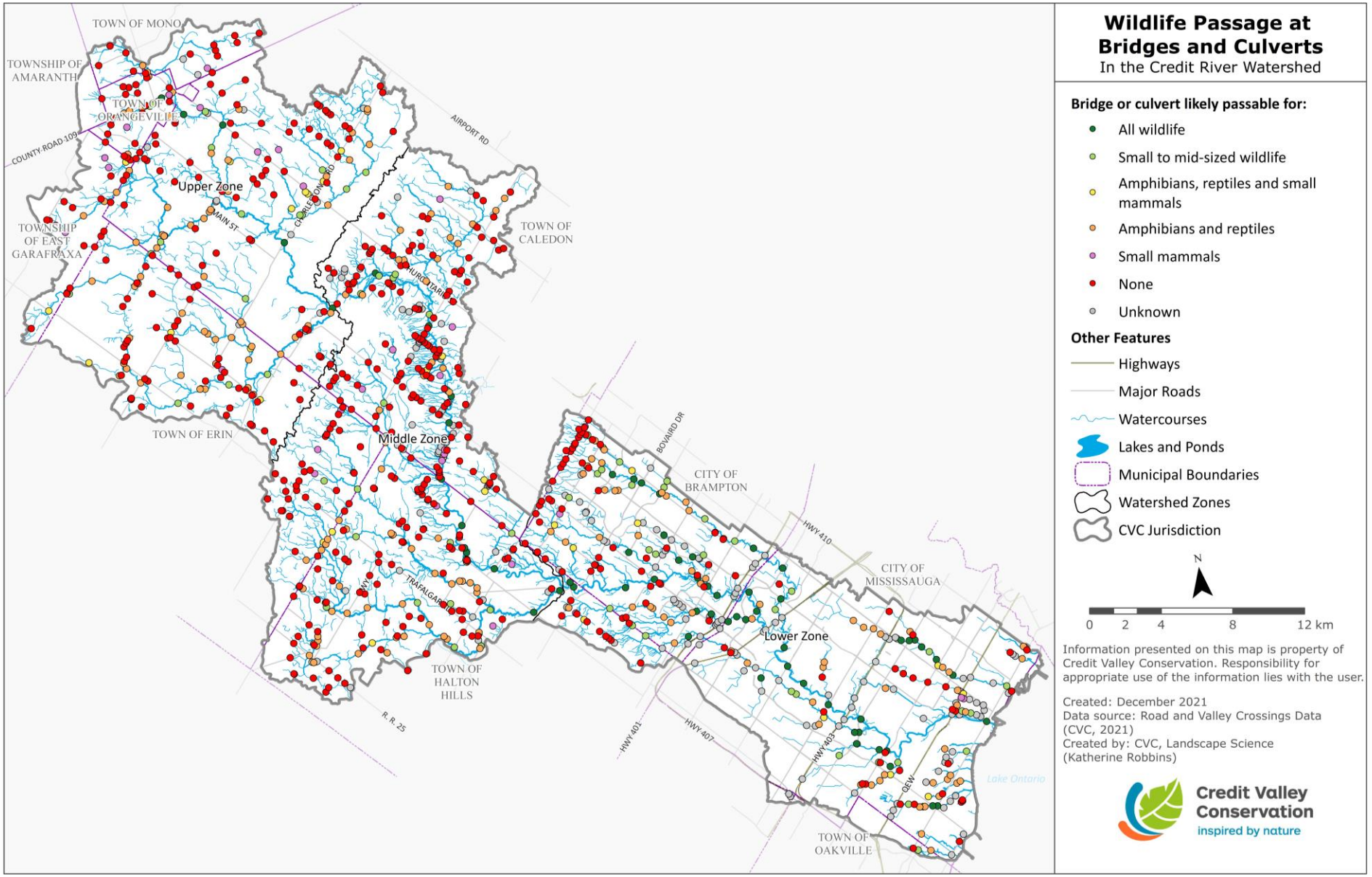
- Location
- Road attributes
- Structure attributes and dimensions
- Stream flow information
- Evidence of fish and/or wildlife passage

**> 1100 crossings inventoried!**

# Results:
# Existing Conditions and Priorities for Wildlife

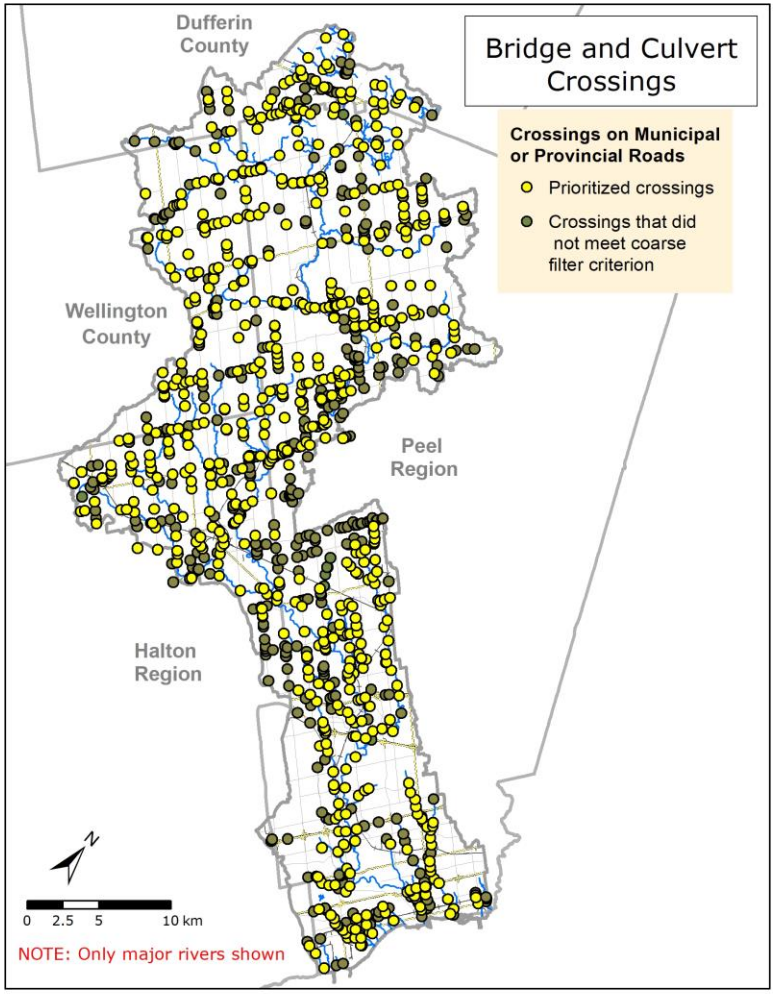
# Wildlife Passage Existing Conditions

- Dimensions of structure
- Presence of dry passage
- No major damage or obstruction
- Clear line-of-sight




# Existing Conditions for Wildlife Passage

# Wildlife Passage Priorities: First Cut



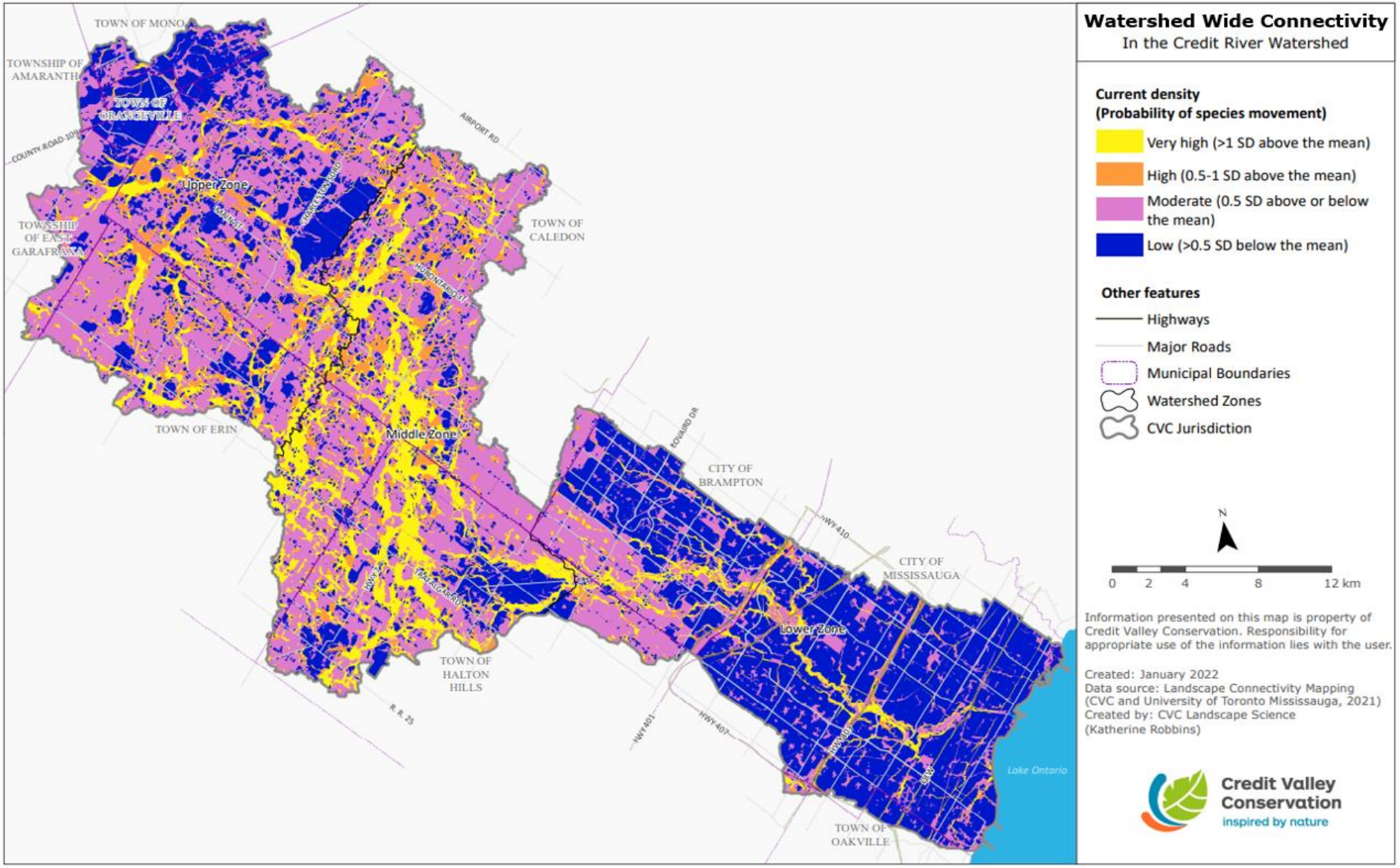

**Sites must have habitat on both sides of the road**

- **1,111** bridges and culverts on municipal and provincial roads (excluding those already known to be designed for wildlife)

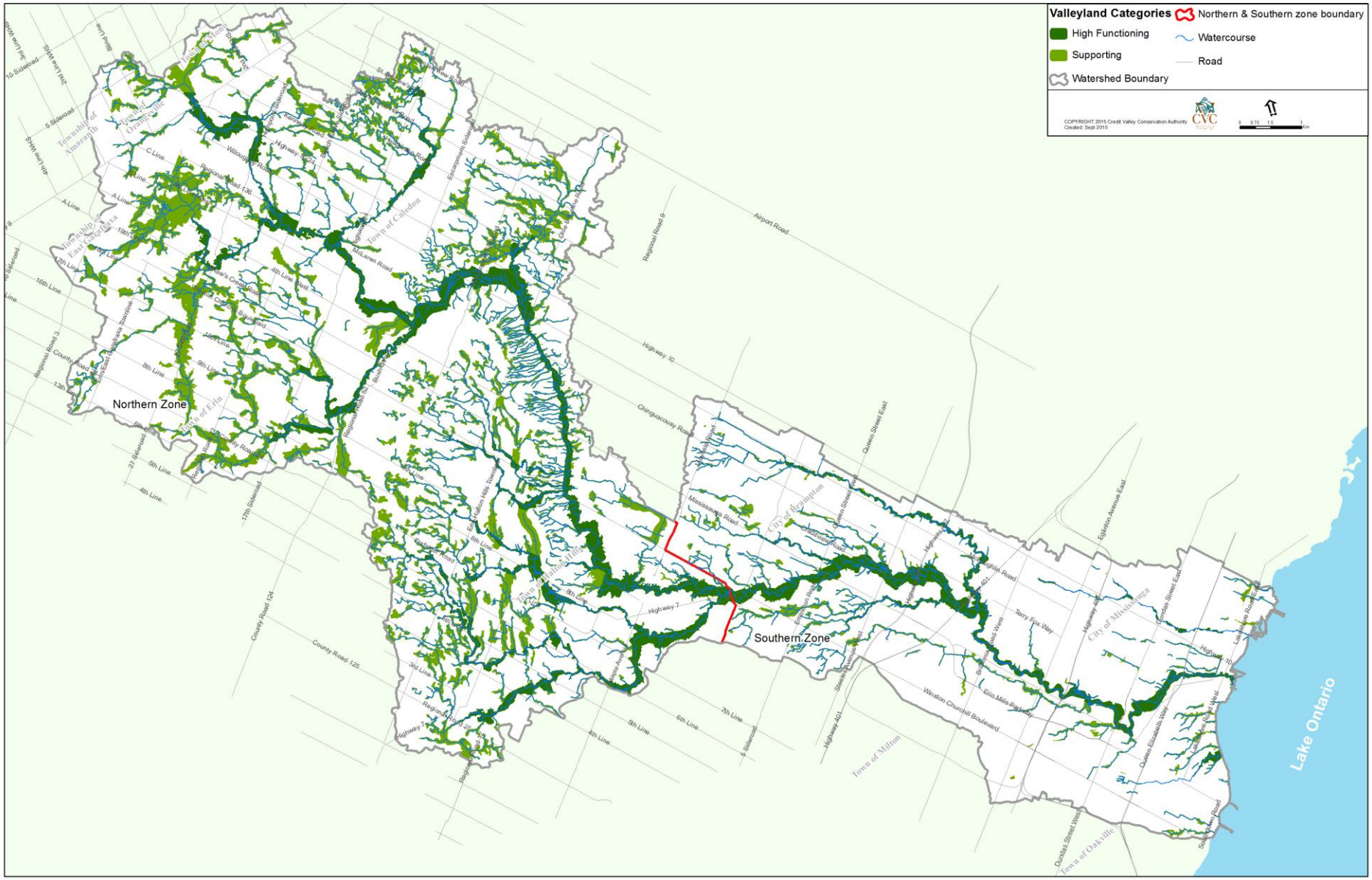
- **60% (666)** contain habitat on both sides of the road

# Wildlife Passage Priorities: Criteria

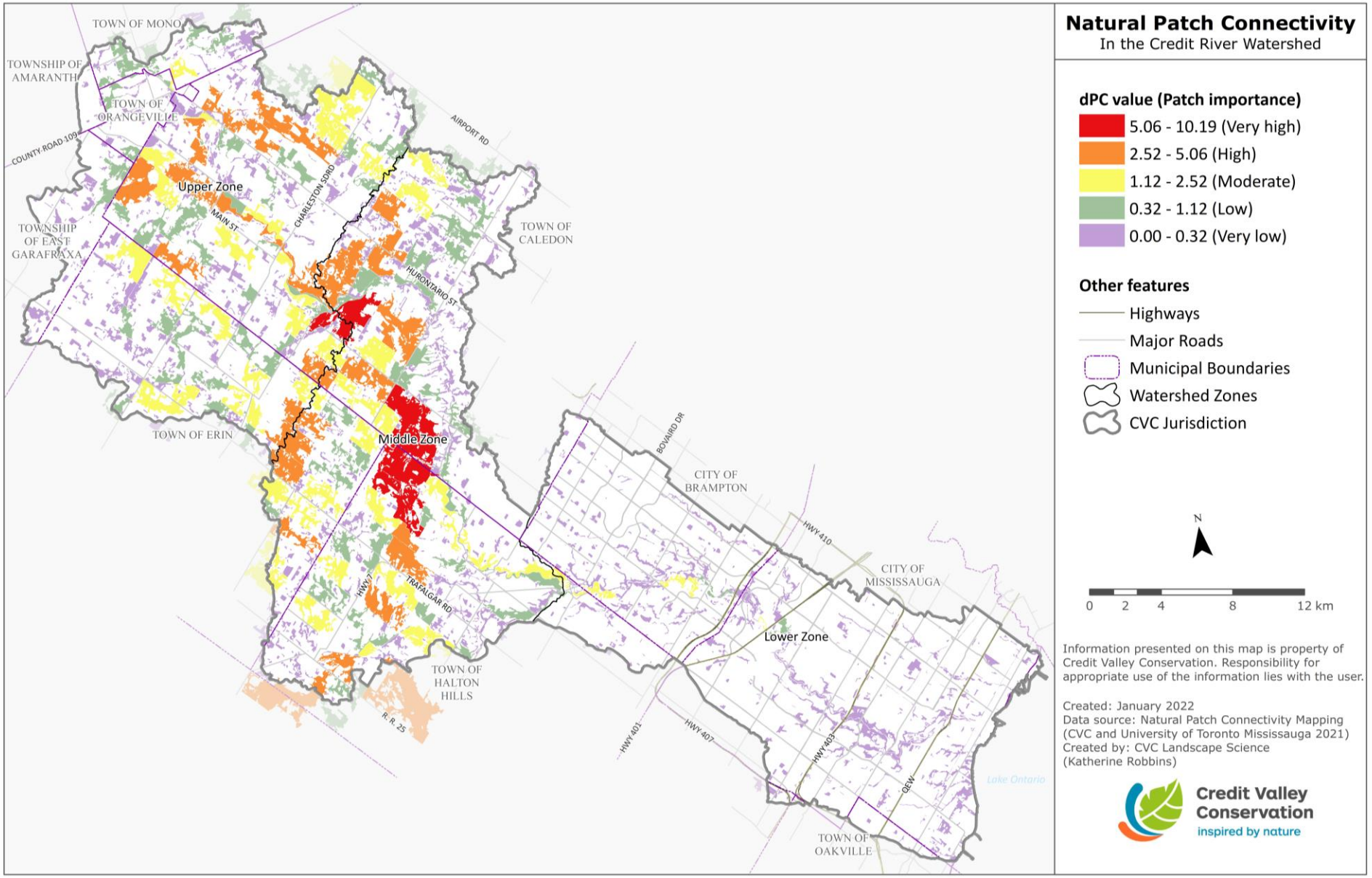
1. Landscape connectivity - Watershed-wide connectivity (based on Circuitscape modelling) and High Functioning valleylands of the NHS
2. Natural patch connectivity (based on Conefor modelling)
3. Centres for Biodiversity and Natural heritage features of the NHS
4. Wetland connections



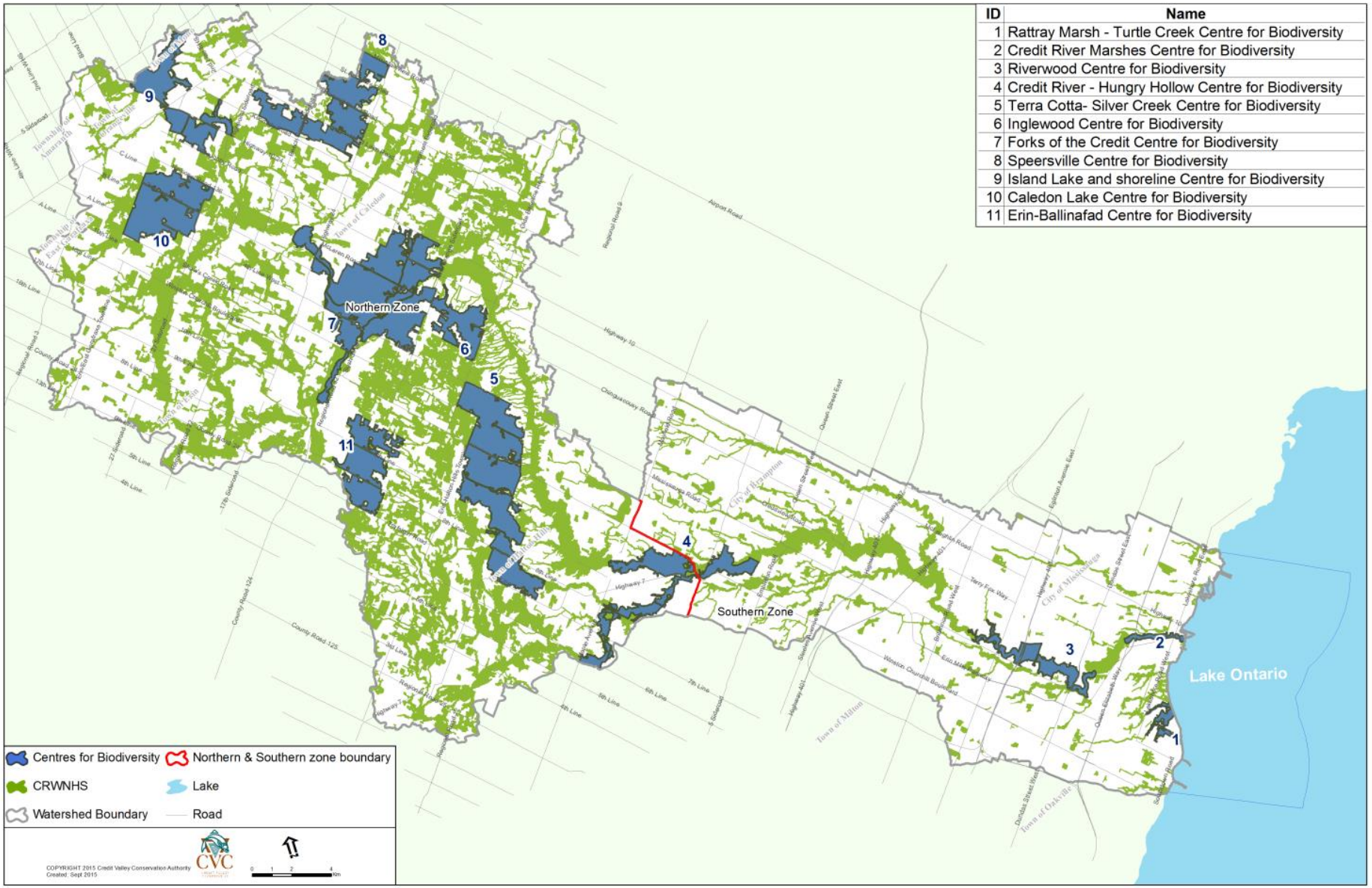

# 1a. Watershed-wide Connectivity



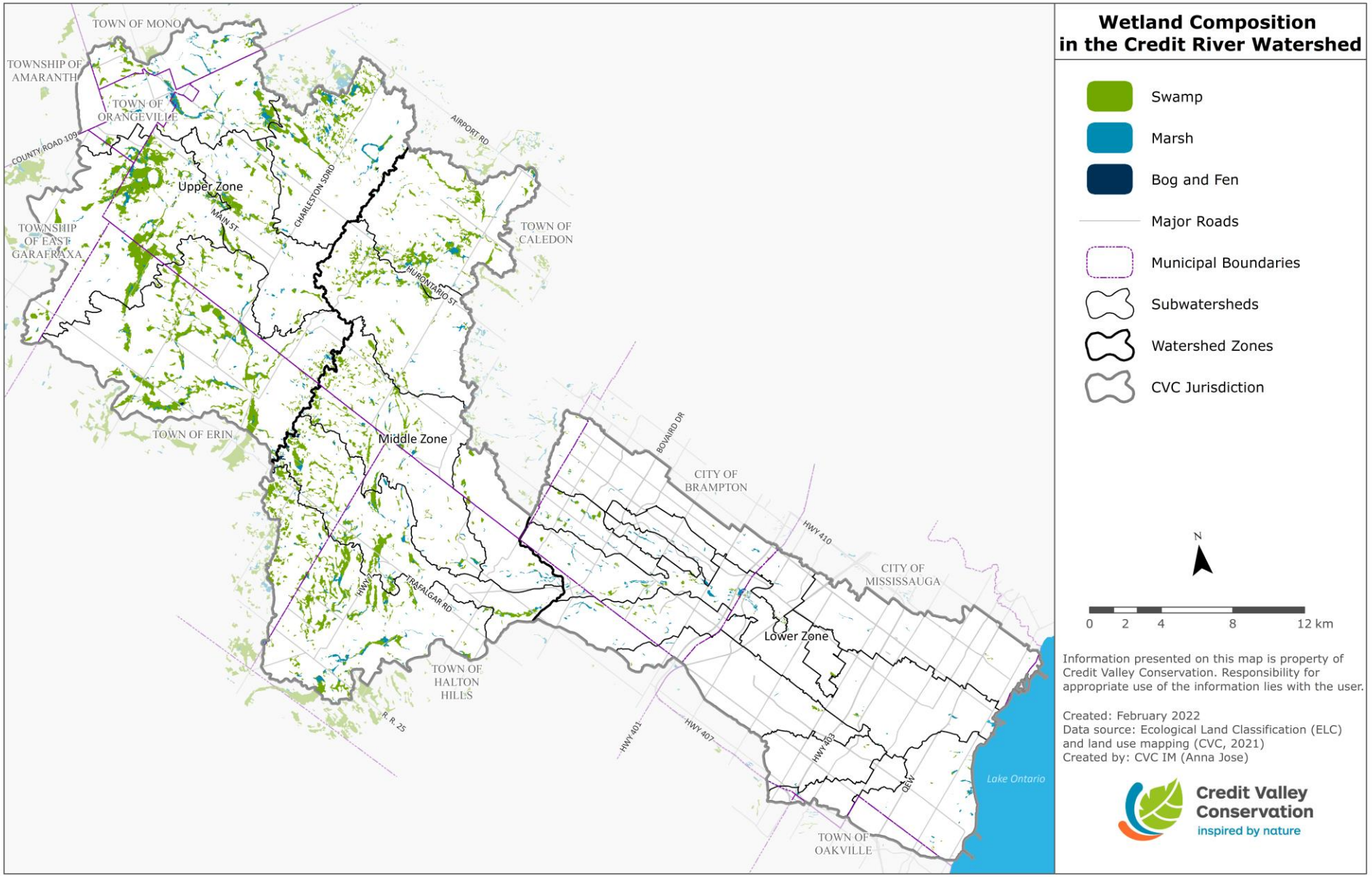

# 1b. Valleylands of the Credit River Watershed Natural Heritage System (NHS)



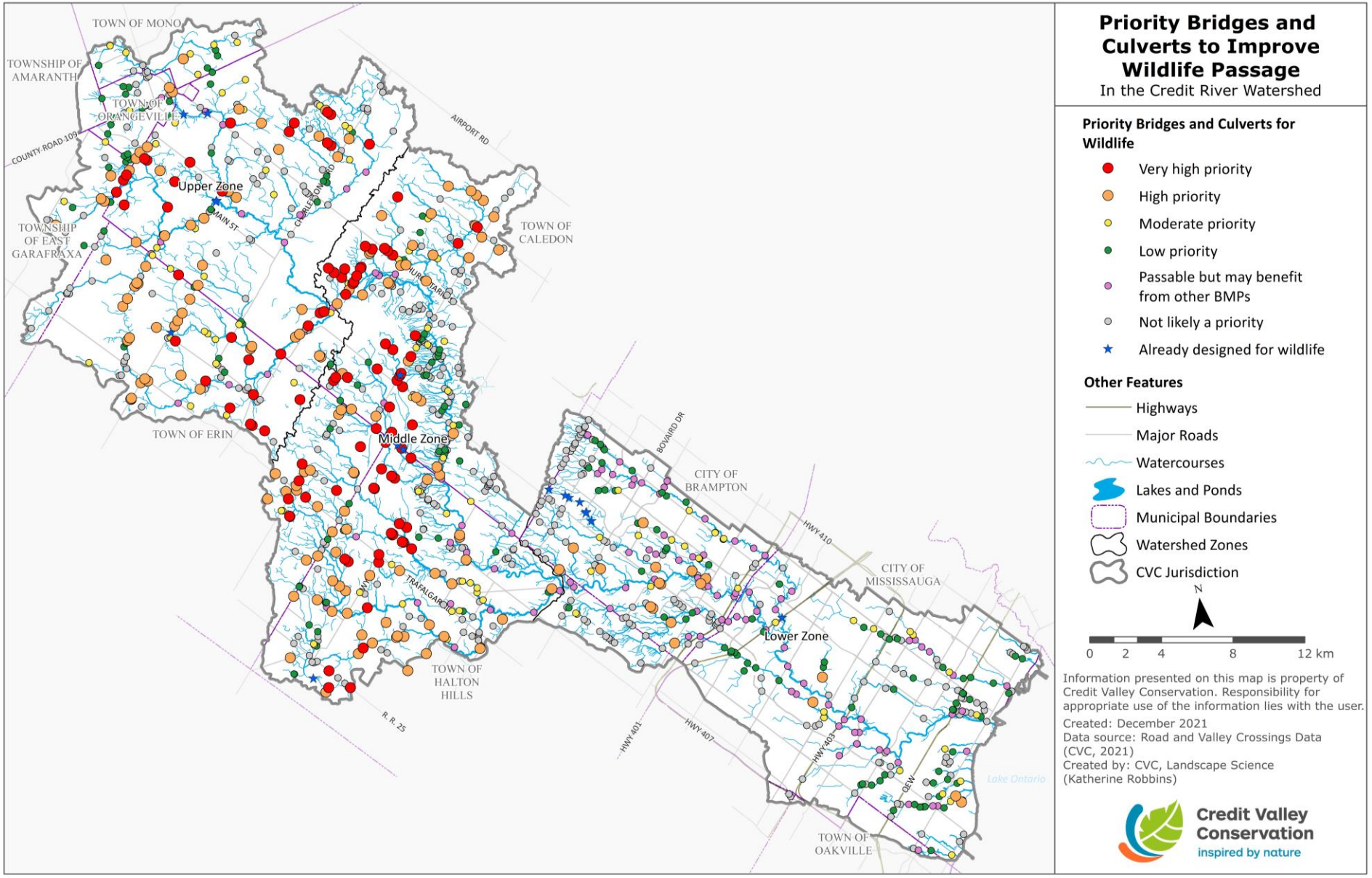

# 2. Natural Patch Connectivity




# 3. NHS Centres for Biodiversity and Natural Heritage Features




# 4. Wetland Connections




# Watershed Results: Wildlife Passage Priorities

# Watershed Results: Wildlife Priorities

| Priority level | Number of crossings | Percent of total crossings |
|---|---|---|
| Very High | 107 | 10% |
| High | 170 | 15% |
| Moderate | 110 | 10% |
| Low | 163 | 14% |
| Passable, but may benefit from other BMPs* | 116 | 10% |
| Already designed for wildlife** | 20 | 2% |
| Not likely a priority | 445 | 39% |
| **TOTAL** | **1,131** | **100%** |

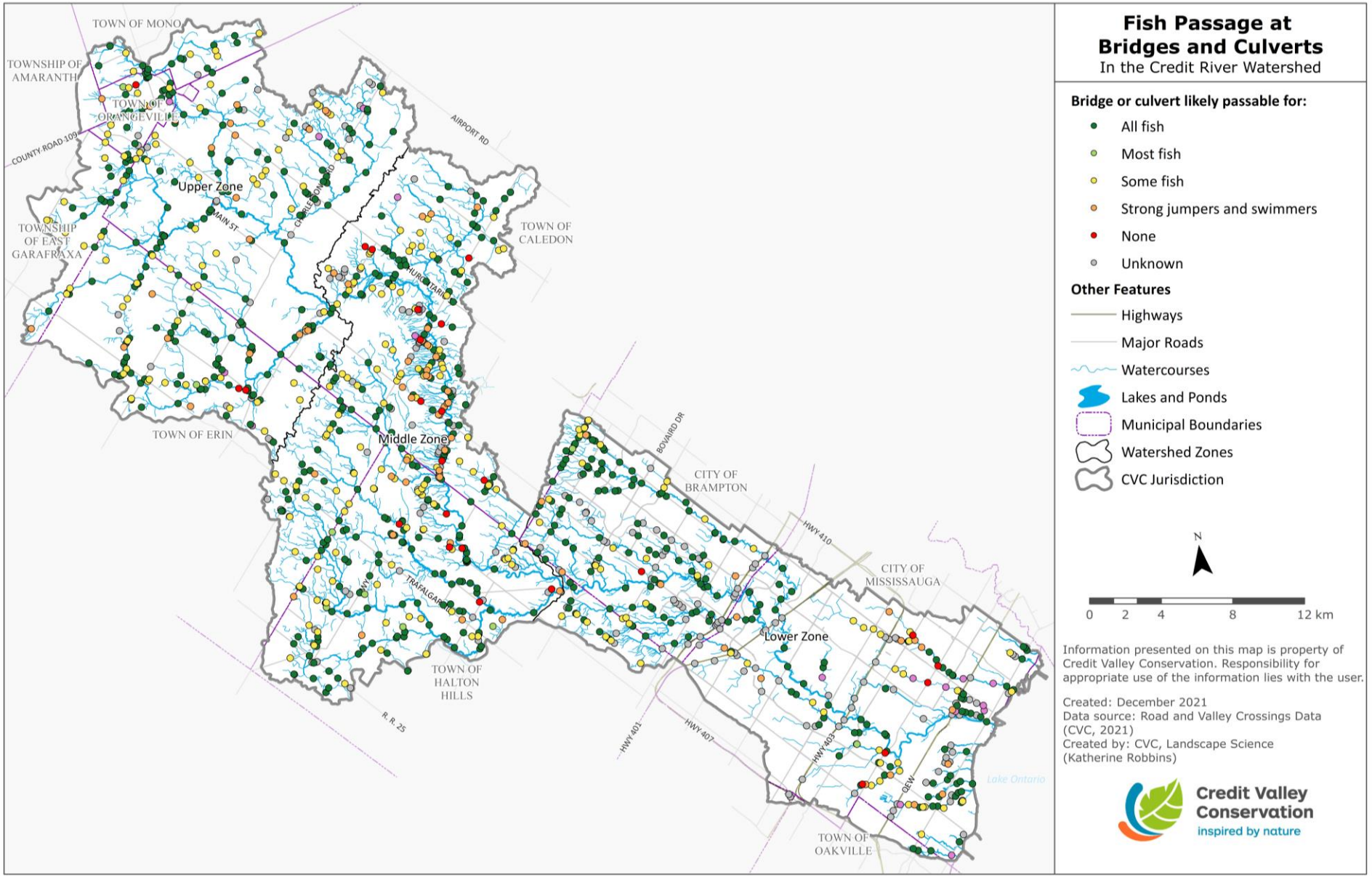
*Consider fencing or other best management practices as appropriate at time of upgrade
**Only mapped where known, likely an underestimate

# Results:
# Existing Conditions and Priorities for Fish

# Fish Passage Existing Conditions

Characterized based on:

- Perch/jump height
- Substrate presence
- Slope and length of structure
- Major damage or obstruction
- Constriction of stream flow




# Existing Conditions for Fish Passage

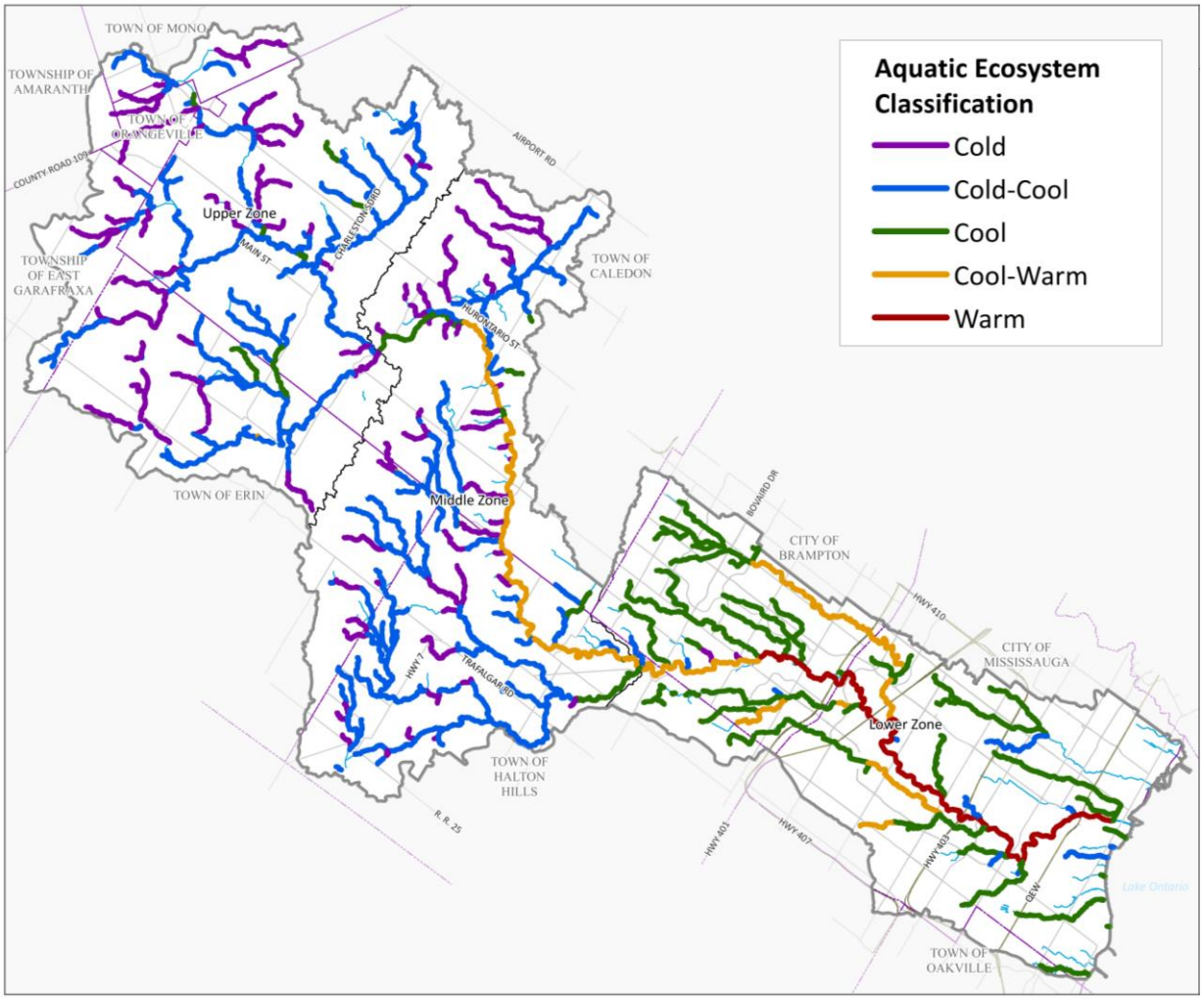
# Fish Passage Priorities: First Cut

**Sites must be complete or partial barriers to fish passage**

- **1,174** watercourse crossings in the watershed
- **32% (376)** are complete or partial barriers to fish

# Fish Passage Priorities: Criteria

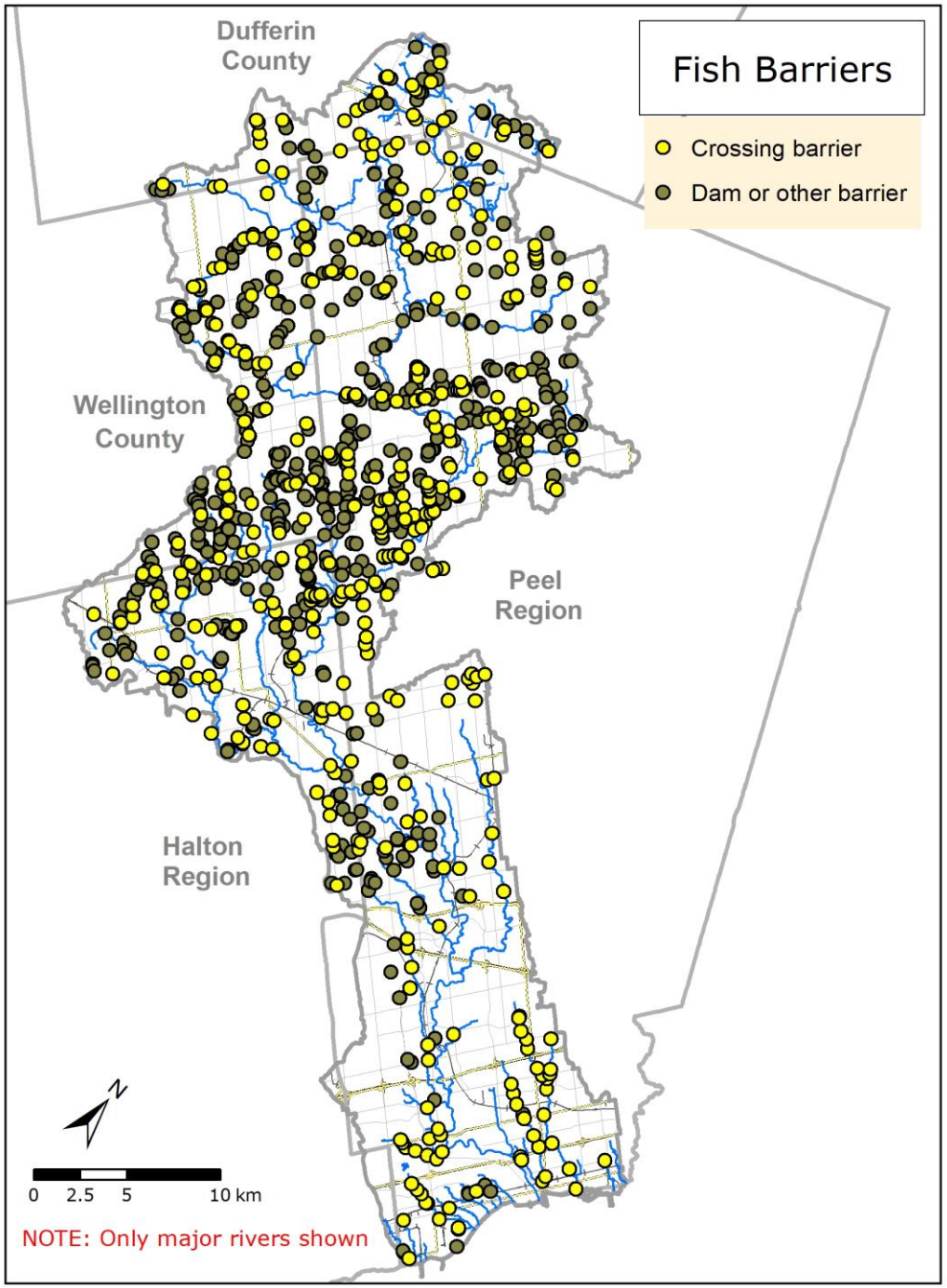
1. Fish community
2. Upstream connectivity
3. Passability of the structure
4. Location in the stream network (Stream order)



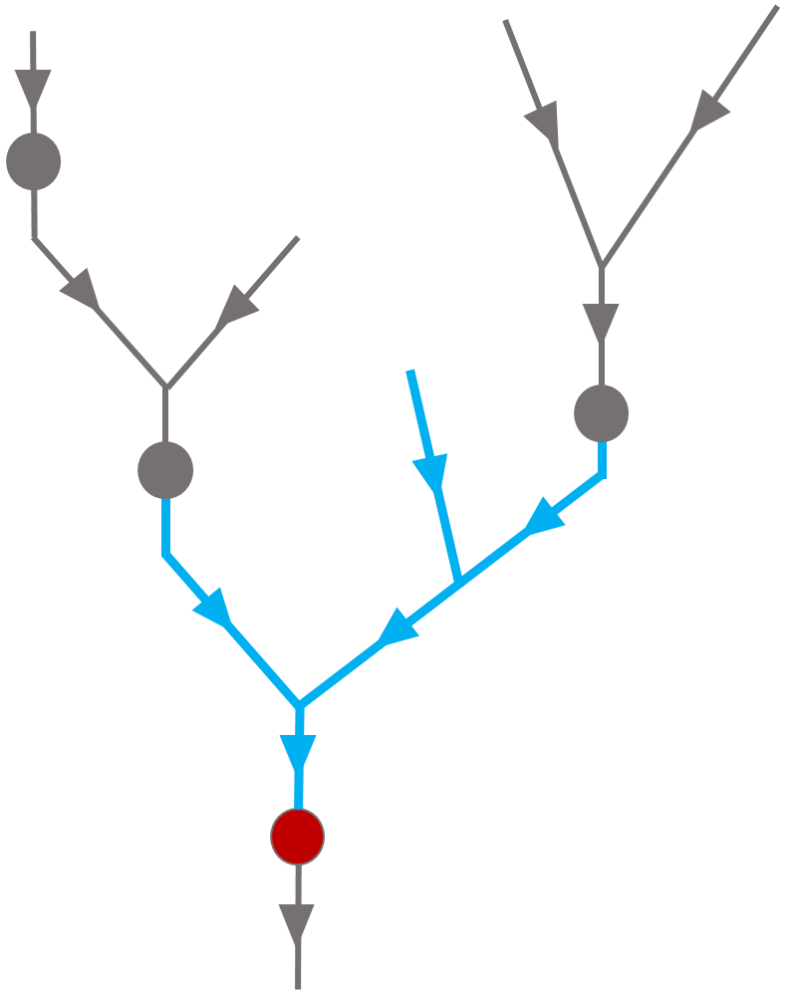

*Brook Trout*

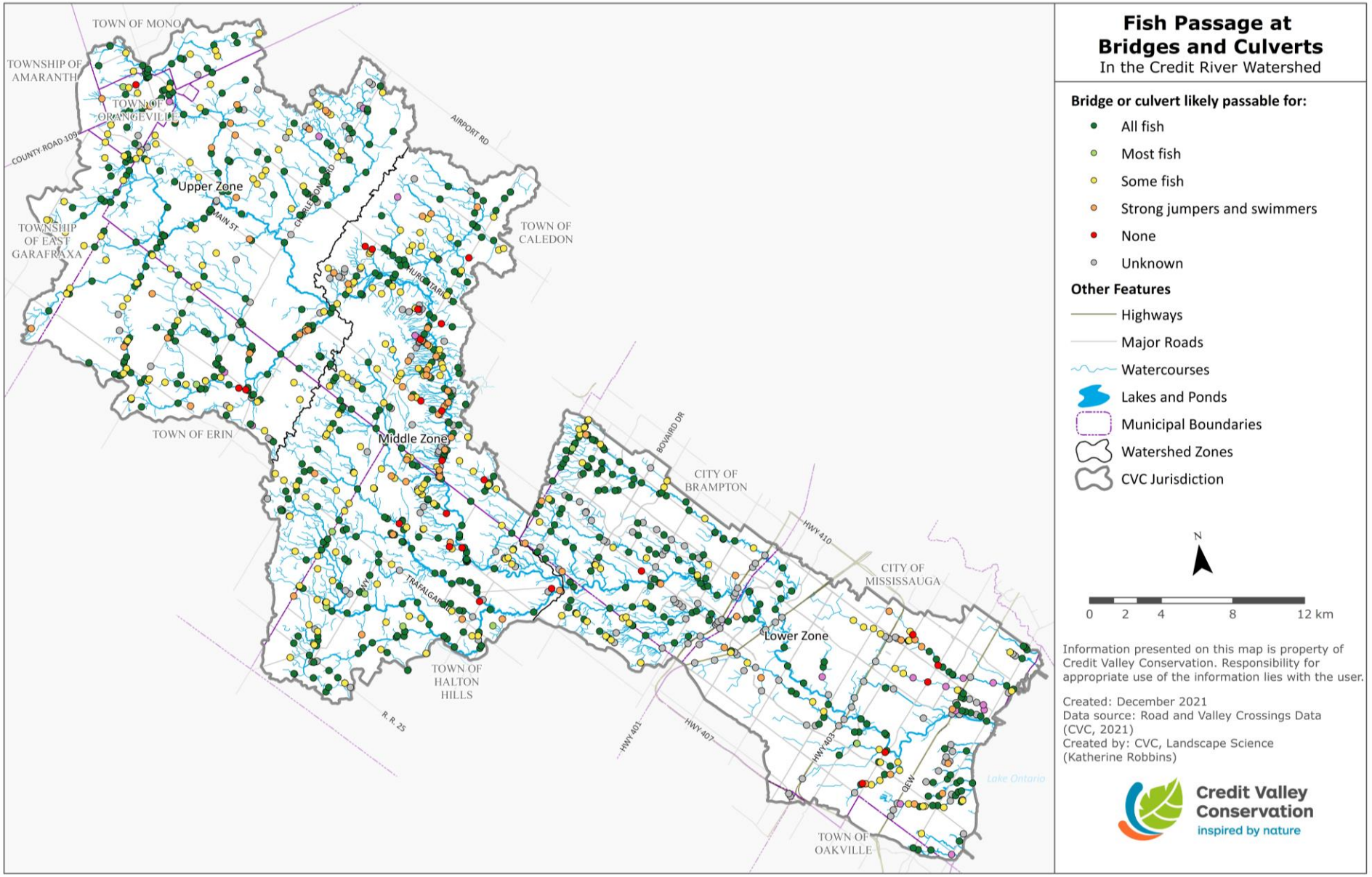
*Redside Dace*

# 1. Fish Community

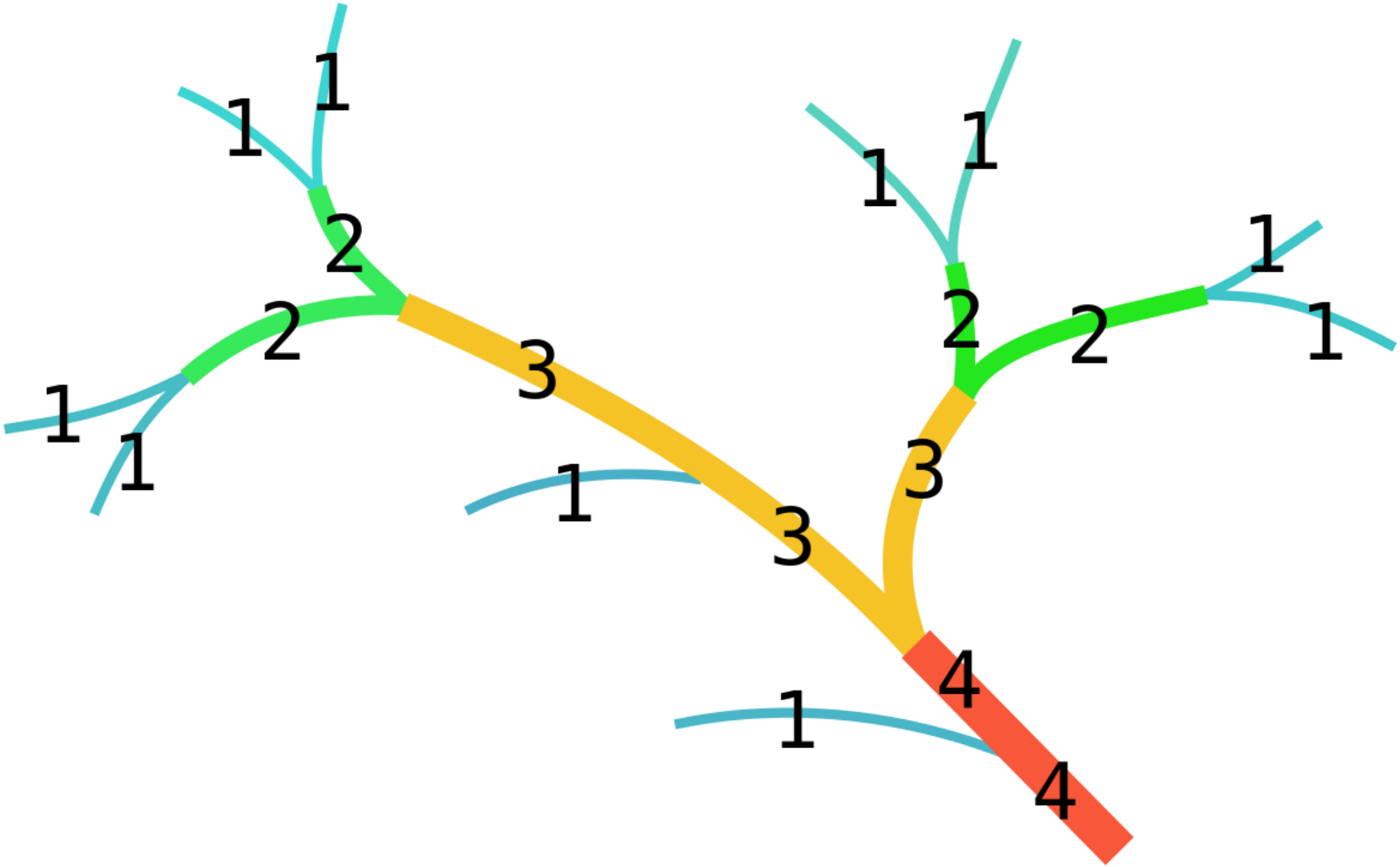



# 2. Upstream Connectivity Gain

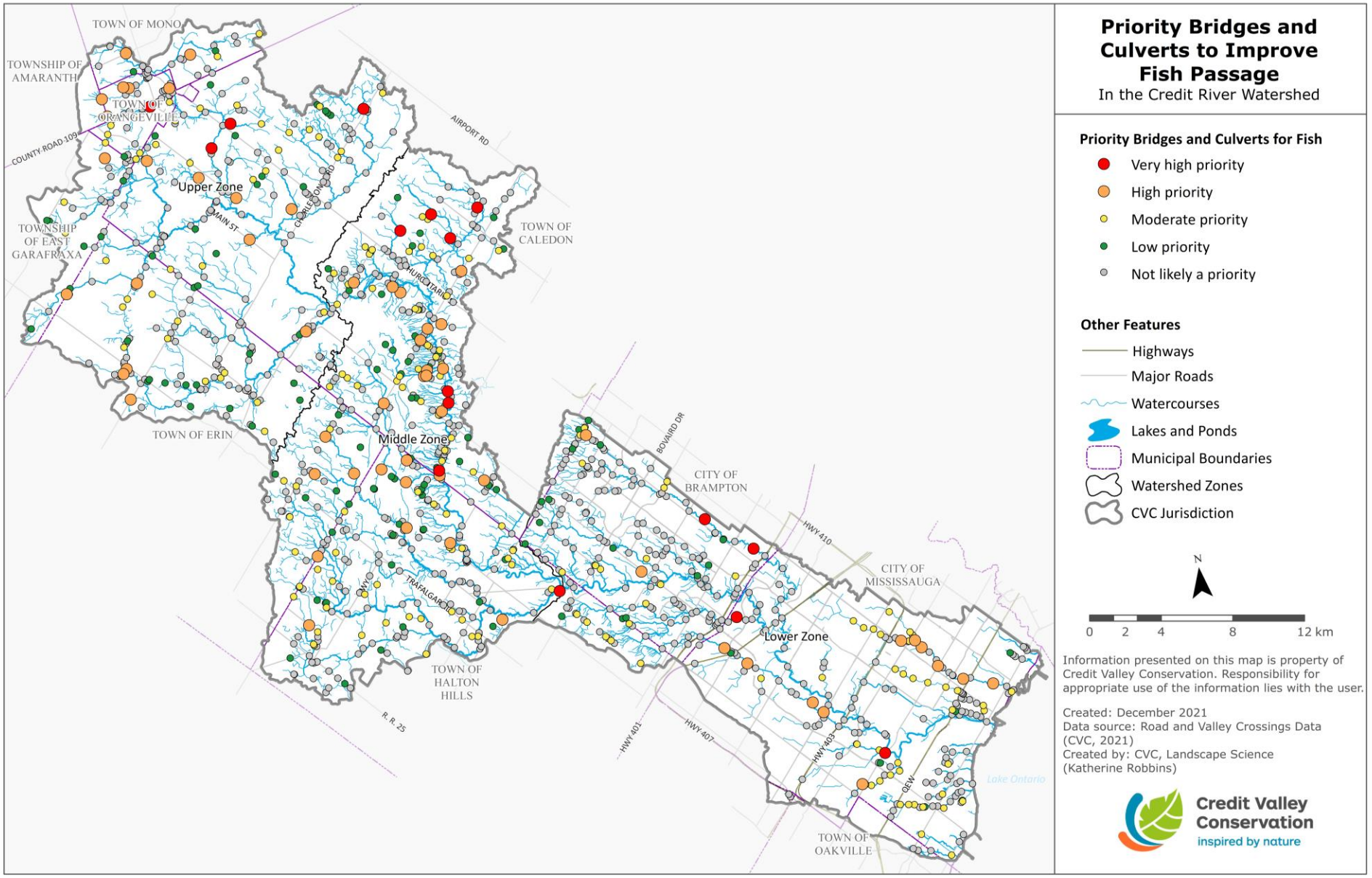





# 3. Passability of the Structure




## 4. Stream Order




# Watershed Results: Fish Passage Priorities

# Watershed Results: Fish Passage Priorities

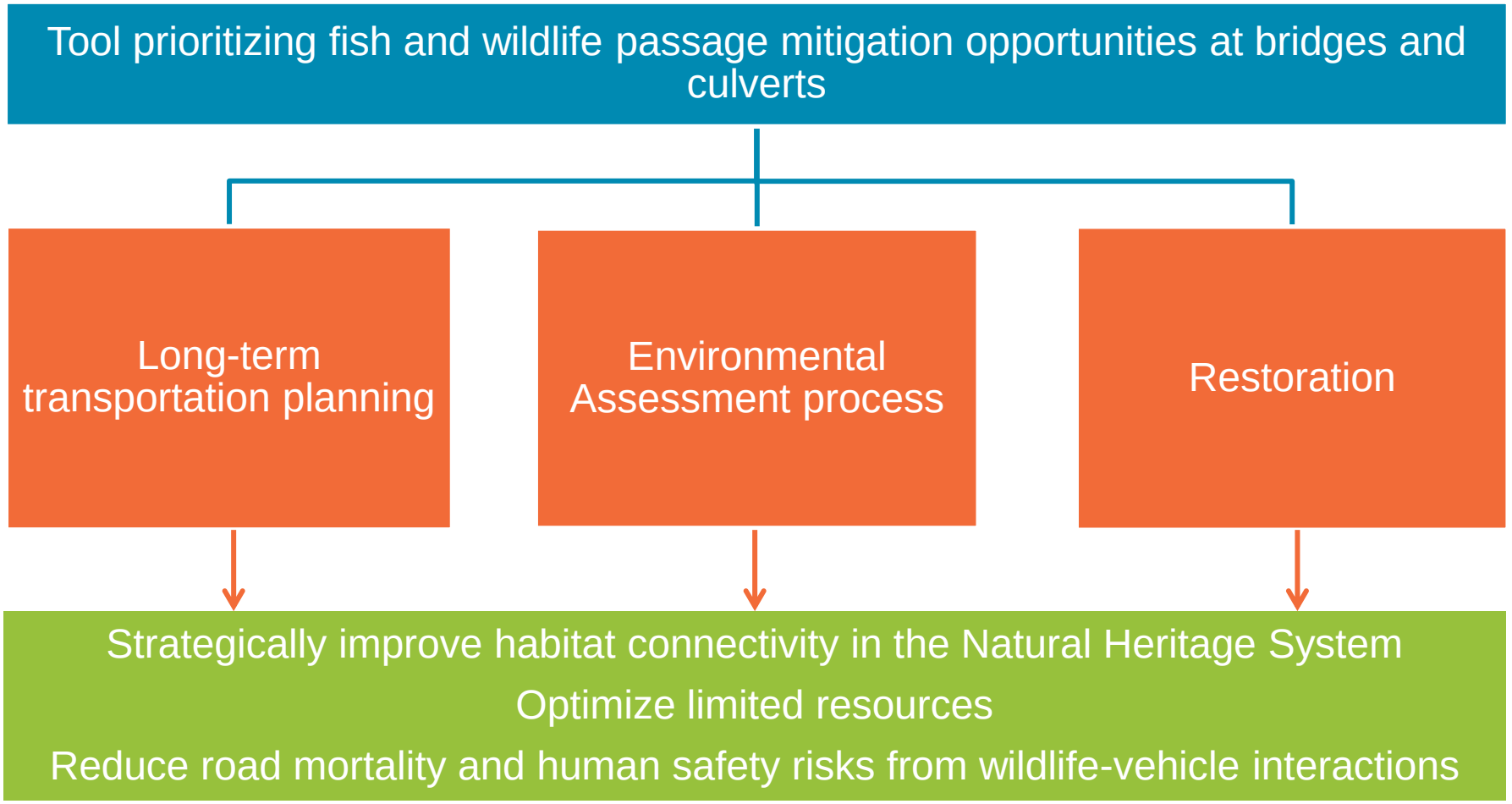
| Priority level | Number of crossings | Percent of total crossings |
|---|---|---|
| Very High | 16 | 1% |
| High | 58 | 5% |
| Moderate | 183 | 16% |
| Low | 119 | 10% |
| Not likely a priority* | 798 | 68% |
| **TOTAL** (all watercourse crossings) | **1,174** | **100%** |

*Includes crossings that are likely passable for all fish, as well as crossings that were not or could not be surveyed and were assumed to be passable

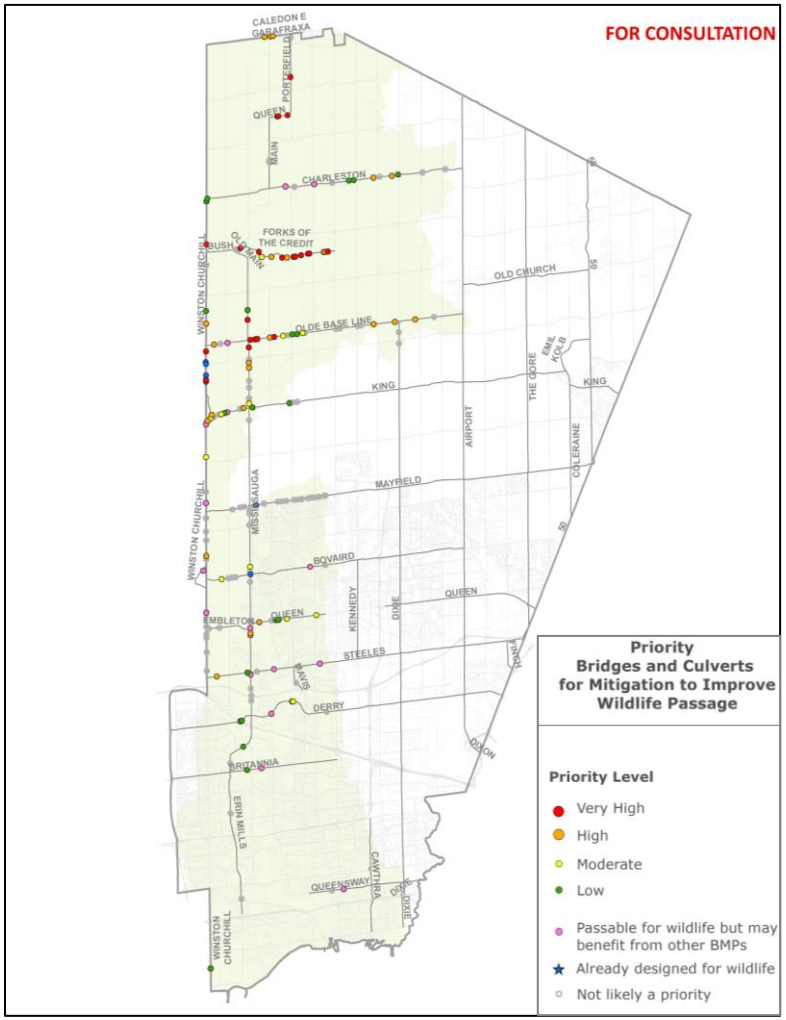

# Example: Very High Priority Site for both Wildlife and Fish Passage

# Applications, Implementation and Next Steps

# Applications and Benefits

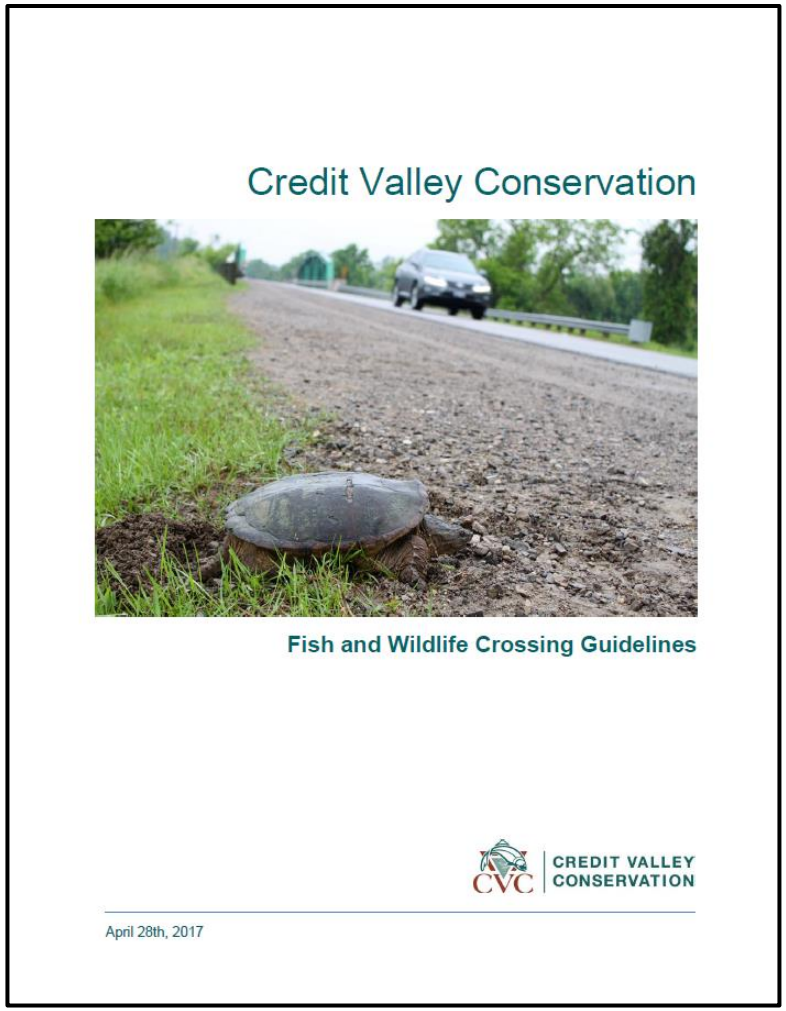


# Municipal Road Upgrades



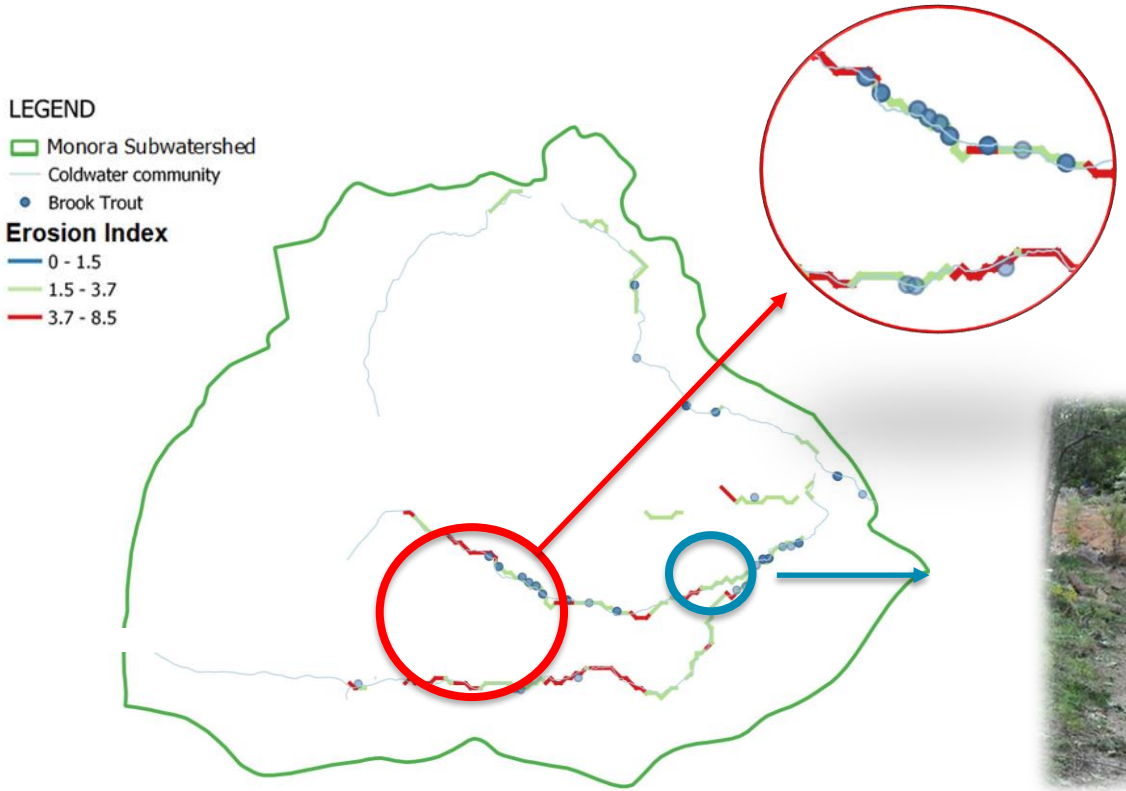

- CVC Planning staff have referenced data to help inform technical review of projects
- Tailored products:
  - Identify priority crossings on roads of individual municipalities
  - Flag priority crossings on road construction projects planned to occur over the next 10-20 years.

# Project Level Refinement



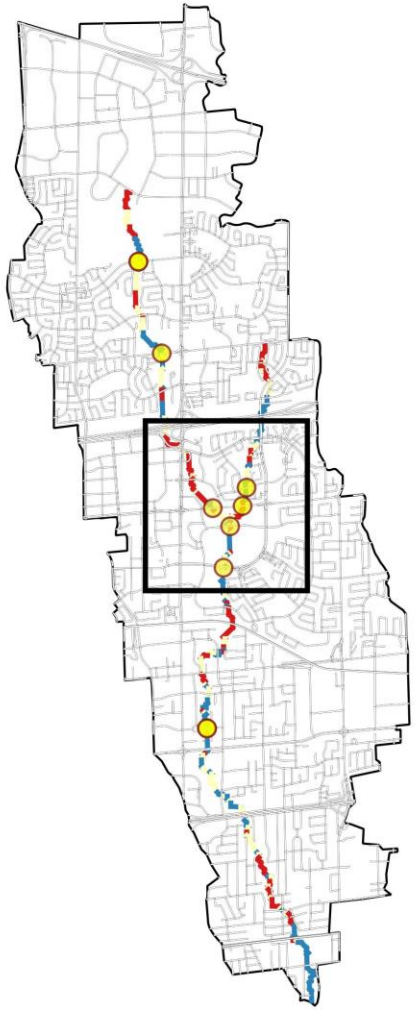

- What species are you planning for to inform design?
- Are there Species at Risk or Significant Wildlife Habitat present?
- Plan along the entire road segment

# Overlay with CVC's Risk and Return on Investment Tool (RROIT)




**Source: Chris Halliday, Orangeville Banner.**
**Orangeville reroutes trail near area suspected of aggravating flood waters**

**Create win-win opportunities for Municipal infrastructure, Aquatic and Natural Heritage System Restoration**



**LEGEND**

Cooksville_Boundary

Roads

**Wildlife Crossing Priorities**

Moderate

**Specific Stream Power Ratio (SSPR)**

3 - 5.6

5.6 - 7.1

7.1 - 14.1

# Wildlife priorities overlaid with RROIT in Cooksville Subwatershed

**LEGEND**

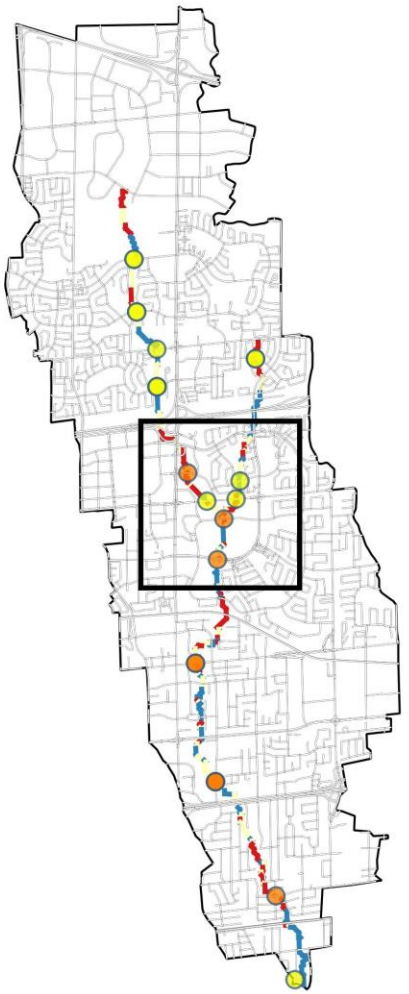
Cooksville_Boundary

**Specific Stream Power Ratio (sspr)**

- 3 - 5.6
- 5.6 - 7.1
- 7.1 - 14.1

**Fish Passage Priority**

- High
- Moderate
- Roads



# Fish priorities overlaid with RROIT in Cooksville Subwatershed

# Restoration and Management

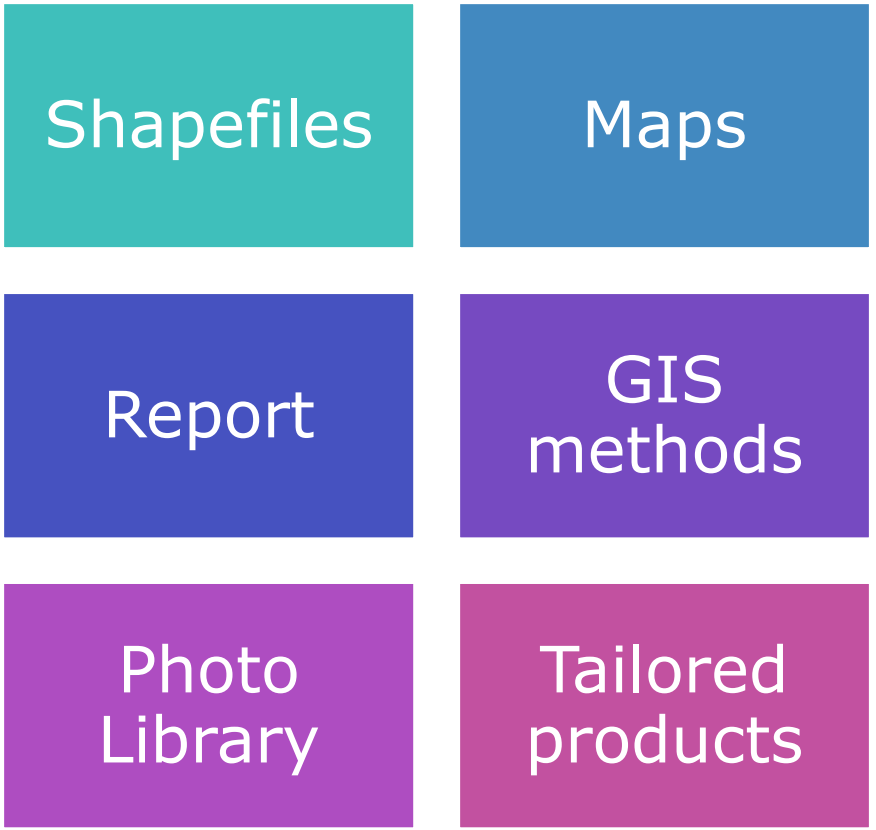
*Photo credit: USDA Forest service*


*Photo credit: Ontario Turtle Conservation Centre*

- Consider retrofit and mitigation projects to improve connectivity (e.g., clear clogged culverts, install baffles or rocky ramps, wildlife crossing signage)
- Focus on high priority sites that municipalities do not plan to upgrade in the next 20+ years

# Dissemination of results

- Sharing of products internally and externally
  - CVC staff
  - Municipalities
  - NGO partners
- Present to local municipalities



# Key Messages

- Project identifies existing conditions for fish and wildlife passage and priority locations to improve passage
- Results can inform restoration projects and municipal road projects
- Identifying priority locations up front increases the capacity of municipalities to incorporate the results into long term planning
- Implementing these results will enhance connectivity in the natural heritage system

# Acknowledgements


- CVC technical team
- External funders: Friends of the Greenbelt Foundation and The Neptis Foundation
- The Wagner Lab at UTM, CLOCA and TRCA, for earlier protocols and analysis


GREEN BELT

Possibility grows here.

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# questions?

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