“Bridging the Gap”: TRCA’s Restoration Opportunities Database as a Potential Compensation Bank

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TRCA Restoration Projects
Presentation Outline

- Strategic Restoration Planning Tools
  - Restoration Opportunities Planning (ROP)
  - Integrated Restoration Prioritization (IRP)

- Utilizing ‘Bank’ of Restoration Opportunities to Address Compensation Requirements
  - General Regulatory Permit/Approval Requirements
    - Example: MTO Hwy 407 Overall Benefit
  - Proponent-led Habitat Banking (*Fisheries Act*)

- Prioritizing Urban Stream Restoration Projects
  - Example: Spring Creek & Alfred Kuehne, Brampton
Restoration Goals and Objectives

• Restoration* goal is to protect and restore ecosystem structure and process to improve ecosystem function. Healthy functioning ecosystems are needed to produce ecological goods and services.

• Restoration objectives are based on identifying ecological impairments to structure and process.
Restoration Objectives

- To restore natural hydrologic processes and associated ecological systems by reversing, repairing or mitigating alterations and impairments

- To restore and/or increase natural cover

- To maximize size, shape and connectivity of natural heritage features

- To enhance landforms and restore soil and soil processes to promote self-sustaining natural communities
Restoration Opportunity Planning and Implementation Workflow

- Demonstrate to funders where meaningful and effective restoration can occur across the jurisdiction
- Track and report deliverables
Hydrologic Approach to Restoration Planning

• In TRCA jurisdiction many headwater features have been highly altered through wetland loss, drainage infrastructure (ditching, tile drainage, etc.), and removal of vegetation.

• Restoration Opportunities Planning (ROP) process highlights these drainage features as the first point for restoration.

• Restoring hydrology of the area serves as a means to achieve fundamental system improvement.

• In-stream restoration opportunities focus on impairments to stream health and staff suggest ways to restore.
Restoration Opportunities Planning (ROP)

- Method of identifying and ranking individual restoration opportunities (also includes rehabilitation and creation opportunities)
- Terrestrial Opportunities
- In-Stream Opportunities
- Opportunities are catalogued, and ranked by quality of potential restoration project (Excellent, Good, Poor)
We currently have approximately 10,000 identified restoration sites.

Let’s take a closer look…
• For implementation we generally target the highest quality opportunities

• Can also query opportunities based on specific restoration targets (e.g., wetland cover, movement barriers, etc.)

• How to select the best for overall watershed health?
Solution = Integrated Restoration Prioritization (IRP)

- A watershed perspective to site-level restoration
- Considers multiple objectives for terrestrial and aquatic ecosystem health
- A comprehensive, consistent, repeatable framework to help guide restoration planning/investment/implementation
IRP Methods

- To utilize the environmental data collected under Watershed Strategies, Fish Management Plans, Terrestrial Natural Heritage Strategy that inform TRCA Watershed Report Cards.

- To apply metrics and thresholds to this data to identify priority and to measure change.

- To develop a standard decision-making tool for restoration prioritization that is strategic, defendable and replicable.

**TRCA STRATEGIES**
- Watershed Plan Report Cards, FMP, TNHSS, ROD

**BASE DATA**
- Natural Cover, Aquatic, Hydrology, Terrestrial Natural Heritage

**CATCHMENTS**
- Delineated through DEM and Arc Hydro across entire jurisdiction

**LIMITS**
- Applied to data to identify impairment and ecological value

**ANALYSIS**
- Level of impairment and potential ecological value are compared

**PRIORITIZATION**
- High, medium, low or protection designation based on overlay results
Spatial units

Catchments (Archydro ~30 ha)  Watersheds
IRP Data

10 Data Inputs (Natural Heritage, RWMP, FMP, CIRCUIT-modelling)

** scored based on impairment to natural system function (i.e. 1 for below average riparian cover, 1 for below average forest cover, 0 for above average forest cover, 1 for unstable in-stream temps…etc)

Below average riparian cover  
Below average wetland cover  
Below average forest cover  
Unstable in-stream temp  
Barriers (i.e. weirs, ponds)  
Water quality (IBI/FBI)  
Altered hydrology (straight)  
Terrestrial corridors w/ low cover  
Wetland corridors w/ low cover  
Ecological value w/ low cover

4 Categories

- **NATURAL COVER**
- **AQUATIC**
- **ALTERED HYDROLOGY**
- **NATURAL HERITAGE / CONNECTIVITY**
Sample Natural Cover Scoring

ArcGIS spatial analysis: percent cover of existing forest/successional habitat cover within catchments / watersheds

Watershed average (Don) = 5.26%

Catchment averages:

if greater than or equal to 5.26% = 0

if less than 5.26% = 1

(repeated for existing riparian and wetland habitat)
Sample Water Quality Scoring

OSAP temp. stability rating:

“stable” or “moderate” = score 0

“unstable” or “extreme” = score 1
Riparian cover (0-1)

In-stream barriers (0-1)

Ecological Value (0-1)

Wetland cover (0-1)

Water Quality (0-1)

Terrestrial Corridors (0-1)

Forest/Successional Cover (0-1)

In-stream temperatures (0-1)

Wetland Corridors (0-1)

Altered Hydrology (0-2)
• Identify **high quality restoration opportunities** in **high priority catchments**

• Highlight areas for **future ROP** assessments

• Demonstrate improvements to catchments overtime as a result of restoration
Utilizing ‘Bank’ of Restoration Opportunities to Address Compensation Requirements

• Readily available catalogue of strategically identified restoration opportunities

• Aquatic habitat Compensation is often required for development and infrastructure works; which continues to grow in GTA
  – Example: MTO Hwy 407 Overall Benefit

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Stream Restoration (km)</td>
<td>2.3</td>
</tr>
<tr>
<td>Barriers Removed (#)</td>
<td>7</td>
</tr>
<tr>
<td>Plantings (ha)</td>
<td>16</td>
</tr>
<tr>
<td>Wetland (ha)</td>
<td>4</td>
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</table>
Utilizing ‘Bank’ of Restoration Opportunities to Address Compensation Requirements

• Benefits include:
  • Targeting compensation to areas most in need of restoration
  • Maximizing habitat gains by addressing issues that are limiting in those areas (e.g., wetlands, canopy cover, morphology, barriers, etc.)
  • Restoration opportunities can be implemented prior to impact to reduce issues and uncertainty associated with lag time (e.g., Proponent-led Habitat Banking – Fisheries Act)
Prioritizing Urban Stream Restoration Projects

• **Problem:** Multiple channelized/hardened urban stream systems requiring maintenance throughout TRCA jurisdiction

• **Solution:** Identify and prioritize which ones can be restored using natural channel design/principles
Identifying Suitable Sites for Natural Channel Restoration

• Site Selection based on:
  – IRP and ROP Information
  – Flood constraints/opportunities
  – Adjacent property and infrastructure constraints/opportunities
  – Access constraints/opportunities

• Prioritization based on:
  – Condition of existing channel (e.g., failed vs. failing concrete)
  – Potential for greatest habitat gains over current conditions (e.g., going from concrete lined to natural channel with floodplain connectivity and habitat features)
  – Proximity to existing habitat to facilitate integrated habitat function (i.e., colonization by vegetation, invertebrates, fish, and wildlife)
Alfred Kuehne Stream Restoration Project

Integrated Restoration Prioritization (IRP) Summary
(The IRP framework gives scores to ~30 ha catchments for their relative impairment compared to other catchments in the same watershed. It is used to prioritize restoration opportunities.)

Aquatic Score = 2
Hydrology Score = 2
Natural Cover Score = 3
Terrestrial Natural Heritage Score = 1
Final Score = 8
Priority = HIGH

Notes:
- Straightened channel does not allow for dispersal of energy, adequate deposition of sediment, or interaction with the groundwater table. Straightening has effects downstream.
- Straightened channel provides poor habitat.
- Channel is characterized by major erosion, failed revetments, and exposed infrastructure.
- Multiple maid outfalls discharge into the valley.
- Habitat: Intermediate Riverine Wetland
- MGMT Zone: Darler Species
- Small Approach identified the area as a historic wetland lost before 1967

Legend:
- Streams
- Erosion Control Structures
- Bridge
- Check Dam
- Channel

- Outfall
- Drainage Channel
- Drainage Culvert
- Culvert
- Catch Basin
- Sheet Pile
- Revetment
- Water Table

Disclaimer:
The data used to create this map was compiled from a variety of sources and dates. The Toronto and Region Conservation Authority takes no responsibility for errors or omissions in the data and retains the right to make changes and corrections at any time without notice. For further information about data on this map, please contact the TRCA Restoration and Infrastructure Division. (416) 691-8600.

MNR Verified Wetlands have not been evaluated per CWES and are of unknown type.

1976 aerial imagery of what is now Kuehne Park North and South. The channel was straightened between 1976 and 1978.
Alfred Kuehne Plant Material
Bio Plugs 1352m² = 8112 plugs
River Willow
Slender Willow
Riparian Planting 9,480m² = 4740 shrubs
Speckled Alder
Red Osier Dogwood
Buttonbush
Highbush Cranberry
Silky Dogwood
Floodplain Planting 21,700m² = 8680 shrubs
Nannyberry
Common Elderberry
Buttonbush
Highbush Cranberry
Silky Dogwood
Wetland Planting 9,080m² = 4540 shrubs
Spleckled Alder
Buttonbush
Red Osier Dogwood

Legend
- Access
- Upland Terrestrial Planting
- Bio Planting
- Wetland
- Floodplain Planting
- Riparian Planting
- Wetland Planting

Alfred Kuehne Channel Naturalization
Phase 3 Planting Plan

Toronto and Region Conservation for The Living City

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TORONTO AND REGION CONSERVATION AUTHORITY
Northern reach: Previously straightened concrete channel

Southern reach: Erosion threatening infrastructure. Poor overall stream health
Restoration Success

Before

After
**Restoration Success**

**2010 Pre-restoration:** 92 fish were sampled. Only 2 species

**2013 Post restoration:** 529 fish were sampled. 8 species

<table>
<thead>
<tr>
<th>Fish Captured</th>
<th>2010</th>
<th>2013</th>
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<tbody>
<tr>
<td>Blacknose Dace</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>Longnose Dace</td>
<td>84</td>
<td>398</td>
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<tr>
<td>White Sucker</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Bluntnose Minnow</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Fathead Minnow</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Creek Chub</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Central Stoneroller</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Green Sunfish</td>
<td>0</td>
<td>55</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>92</strong></td>
<td><strong>529</strong></td>
</tr>
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• Spring Creek Pilot Project report completed by TRCA in 2014

• Fluvial Geomorphological Characterization report completed by Dr. Paul Villard and the University of Guelph in 2015

• Identified reaches within Spring Creek Watershed suitable for Restoration
TRCA is currently in the process of prioritizing these sites for a 10 year Restoration Plan.

TRCA is in the early stages of establishing candidate sites for Proponent-led Habitat Banking.
Next Steps

• Mapping extent and condition of hardened channels in TRCA jurisdiction

• Utilize TRCA’s existing data and data collection methods (e.g., ROP, and the Stream, Erosion, and Infrastructure database, etc.)

• Evaluate and prioritize restoration sites using standardized approach

• Explore sites best suited for Proponent-led Habitat Banking opportunities
THANK YOU!

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