Natural Capital Inventory
Habitat Connectivity Concept

THE DISTRICT MUNICIPALITY OF MUSKOKA

This project is part of the extended I**ntegrated Watershed Management (IWM)** initiative, focusing on reducing flooding impacts and enhancing Muskoka River Watershed (MRW) health. It's one of seven chosen for expansion from the original twelve projects. This initiative supports and advances the implementation for an IWM approach for the entire MRW.

You can find more information on the Phase One Report – "Natural Capital Inventory" and the accompanying Summary Factsheet on the District of Muskoka Website at: **www.muskoka.on.ca/iwmprojects**

Background

Landscape connectivity plays a crucial role in maintaining healthy ecosystems, especially in areas like Ontario's MRW where development and infrastructure are causing fragmentation. Preserving corridors between habitat patches is essential as connected features enhance genetic diversity, bolstering resilience against stressors and climate change.

At Issue

The challenge lies in identifying and conserving these corridors amidst ongoing land development, infrastructure expansion, and road construction all of which can fragment natural areas and impact how wildlife moves across the landscape.

Scope

Evaluate the significance of identified corridors for ecological connectivity in the MRW.

- ✓ Employ Linkage Mapper tools powered by Circuitscape for a comprehensive wildlife habitat analysis in the Muskoka River Integrated Watershed Management Study.
- ✓ Focus specifically on mapping White-tailed Deer *(Odocoileus virginianus)* winter habitats as core areas within the watershed.
- ✓ Develop a habitat connectivity model integrating resistance values from land cover types and topographic indices to estimate deer movement energy costs across the watershed.
- ✓ Utilize the Linkage Pathways tool to assess and map potential corridors connecting identified deer wintering habitats.

Methodology

Identifying Core Areas

- Utilized White-tailed Deer winter habitat data from Ontario's Geohub, clipped to Muskoka River IWM study area.
- Supplemental Winter Yard data added from the Muskoka River IWM Study Natural Capital Inventory.

Assigning Resistance Scores

- Assigned resistance values outside core areas to estimate energetic cost for deer movement (i.e., how "difficult" is it to move across a given area).
- Derived scores from land cover types, topography, and aspect, referencing Forest Management Guidelines for White-tailed Deer Habitat.

Linkage Pathway Analysis

- Utilized the Linkage Pathways Tool to:
    - Create a network of core areas.
    - Calculate cost-weighted distances and least-cost paths for potential linkages.
- Implemented processing efficiency measures:
    - Pruned the network to connected neighbors.
    - Specified corridor distances within feasible dispersal ranges.

Parameter Scenarios for Processing Efficiency

Scenario	Bonding Circle Buffer	Maximum Straight-line Corridor Distance	Cost-weighted Distance Threshold
1	10,000 m	40,000 m	6,000 m
2	20,000 m	60,000 m	15,000 m
3	25,000 m	60,000 m	15,000 m

Results and Deliverables

The linkage analysis identified corridors associated with 515 White-tailed Deer Winter Yards and Wintering Areas, covering approximately 617 km² of habitat. The results, presented across three scenarios from conservative (scenario 1) to relaxed (scenario 3) models, demonstrated a gradual increase in both the number of corridors and total area of habitat coverage.

Corridor Trends

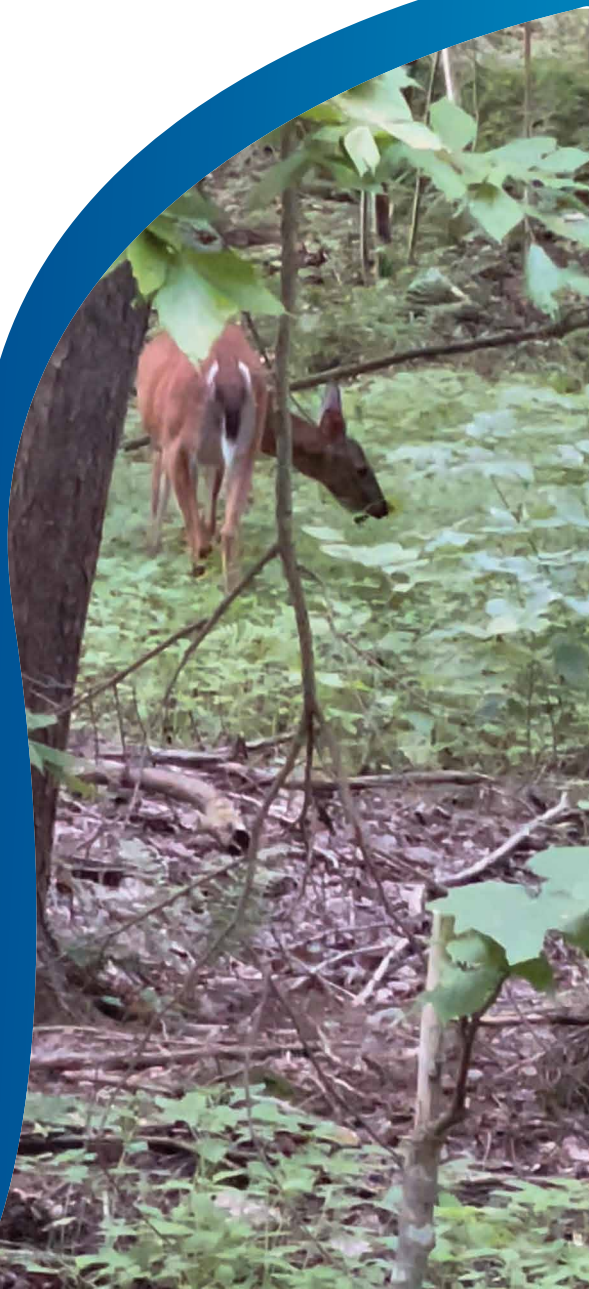
- Notable increases in corridor numbers and areas were observed between the conservative and moderate scenarios, predominantly in central and eastern regions of the MRW.
- While Scenario 3 showed less dramatic increases than Scenario 2, a general upward trend in corridors was visible across most subwatersheds, primarily concentrated in eastern portions of the watershed.

Interpretation and Limitations

- The analysis represents one interpretation of potential White-tailed Deer linkage based on assumptions and resistance values.
- Limitations include potential underrepresentation of winter deer habitat in certain subwatersheds and constraints within the MRW boundaries.

Future Considerations

- Recommendations include validating and refining identified corridors using occurrence data for better accuracy.
- Exploring vehicular collision data associated with White-tailed Deer can aid in understanding high connectivity areas and guide mitigation measures.
- Consideration of linkage analysis for various species with different habitat associations can offer a holistic understanding of landscape connectivity, aiding conservation prioritization.



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For the complete report and further information on Integrated Watershed Management (IWM), the twelve projects (including the seven extended ones), and efforts towards an Integrated Watershed Management approach for the Muskoka River Watershed, please visit www.muskoka.on.ca/iwmprojects.

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