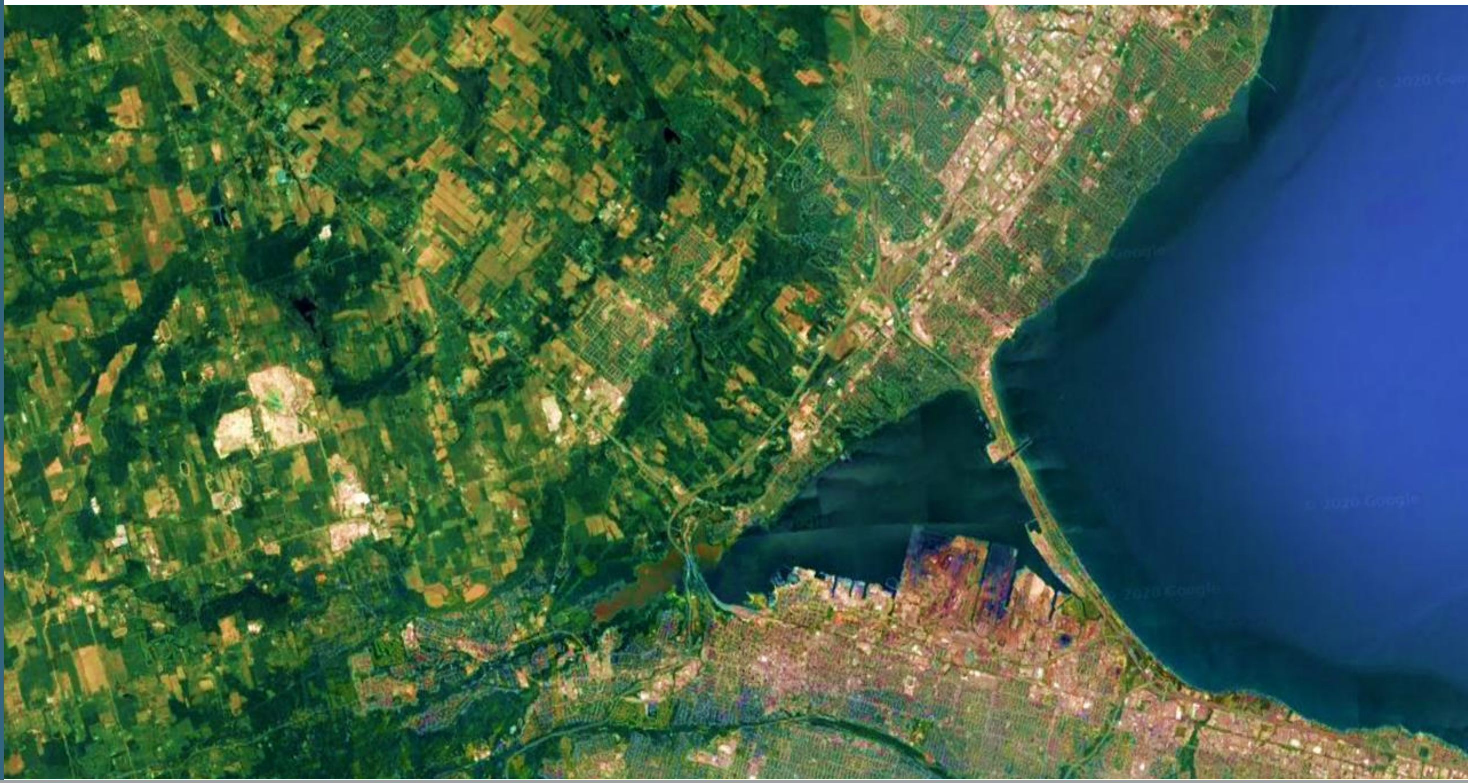

Summary Report
Wildlife Corridor Mapping in the Cootes To Escarpment EcoPark System

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Cootes to Escarpment EcoPark System Partners

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Cover Photograph: Google Map of Cootes Paradise Marsh in Hamilton, Ontario, Canada

The Cootes to Escarpment EcoPark System area is one of Canada's biodiversity hotspots, a complex landscape of protected lands, open space, urban development, and other uses at the western end of Lake Ontario, centred around Cootes Paradise Marsh in Hamilton and Burlington, Ontario (Figure 1). The protected lands are under threat because of habitat fragmentation, invasive species, climate change, water quality impairment, and other anthropogenic effects. Throughout spring and summer 2020, a study led by ApexRMS was conducted to help better understand the connectivity of natural areas within this region.

Protecting and restoring habitat connectivity is a widespread strategy for achieving biodiversity conservation. Connected landscapes enable wildlife to move between suitable habitat and gain access to the best available mates, nesting sites, and food resources. Landscape connectivity also maintains genetic diversity within wildlife populations and facilitates seasonal and climate-driven migrations across the landscape.

The goal of this wildlife corridor mapping study is to support biodiversity conservation and management activities in the Cootes to Escarpment EcoPark System by identifying habitat patches and movement corridors that promote landscape connectivity. Two complementary approaches were used:

1. A *generalized approach* which identified probable movement corridors for forest- and wetland-dwelling wildlife across the Cootes to Escarpment EcoPark System. We mapped the permeability (or 'resistance') of the landscape for animals that avoid unnatural landscape features such as roads and developed land and applied circuit connectivity methods to account for all potential paths across and within the landscape to identify probable movement corridors.

2. A *species-specific approach* identifying components of connectivity at the species-level (habitat suitability and habitat patch importance for landscape connectivity). Blanding's turtle, northern short-tailed shrew, and white-tailed deer were selected to reflect the local diversity in terrestrial habitat and connectivity needs.

Figure 1. Land cover map
Forest (green), agriculture (yellow), urban areas (red), open water (blue), and wetlands (brown) are the dominant land cover classes in the Cootes to Escarpment EcoPark System.

Our analysis predicts many corridors of movement within the Cootes to Escarpment EcoPark System but only a few corridors - to the south-west and to the north - connect the EcoPark System to the broader landscape. The habitat suitability values, summarized across species, confirms that much of the EcoPark System is either highly suitable for a specific species, or broadly suitable for multiple species. However, not all areas of high habitat suitability have high connectivity value and vice versa. Patches of particular importance for maintaining local connectivity are generally large and centrally located, allowing for wildlife movement within their boundaries and providing connectivity among neighbouring patches.

Stakeholder Consultation Workshops

Key research and mapping findings from this project were shared with partner agencies and stakeholders associated with the EcoPark System, in the fall, 2020. A series of five inter-active virtual workshops engaged participants in large and small group virtual discussions on the existing barriers and opportunities for wildlife movement and ecological restoration within and outside of the EcoPark System.

A broad range of stakeholders, representing diverse interests attended the workshop series. They included members of the EcoPark System Management Committee, City of Burlington and Hamilton Planning, Engineering and Parks and Recreation departments, the Region of Halton Planning Services, Conservation Halton, Hamilton Conservation Authority, Friends of the Cootes to Escarpment EcoPark System, McMaster University, Special Interest Groups, the Friends of the Greenbelt Foundation, and RBG staff. Over 40 individuals participated in this process, sharing their expertise, experience and ideas in large and small discussion groups.

Discussion and Potential Next Steps

The analyses and workshops presented in this report provide a high resolution (15 m) snapshot of current landscape connectivity across the EcoPark System and discuss potential opportunities and challenges when integrating landscape connectivity into management of the EcoPark System.

Landscape Connectivity Enhancement and Restoration

Based on the most up to date land use and land cover data available, the analysis assesses connectivity among natural areas both within and between EcoPark System partner owned properties and the surrounding landscape. The focal species analyses express connectivity for different scales of movement and for different habitat types within the EcoPark System. Together, these connectivity analyses paint a vivid picture of current connectivity hotspots, connectivity breaks, and conservation priorities.

The EcoPark System is connected to the broader landscape by five key movement corridors extending north-west and south-west. These corridors serve as critical connections between the natural areas within the EcoPark System to the natural areas in the broader landscape. Many of the high value areas fall within existing EcoPark System partner lands and defined management areas, such as Royal Botanical Gardens' Cootes Paradise Marsh.

EcoPark System partner agencies attending the workshops noted restoration opportunities to increase their value. For example, within existing grassland restoration projects, there may be an opportunity to incorporate forest corridors. Stakeholders noted that high value areas that fall outside of partner lands should be cross-referenced with the EcoPark System land securement strategy. Similarly, any proposed land-use projects that affect high value areas should be assessed in terms of the negative consequences they may pose for landscape connectivity.

In addition, culverts and bridges seem to play a role in maintaining connectivity. It is important to continue to manage these areas as both high quality habitat and as movement corridors. Workshop participants were interested in using these findings for culvert and bridge management, maintaining native vegetation, and minimizing human disturbances.

Ultimately, the results presented here are a hypothesis about high value connectivity areas and high quality habitat areas based on the best available data and science. They provide a strong for additional research. Stakeholders noted ground-truthing wildlife corridors to see if wildlife species are using them for dispersal and the degree of human use within these identified wildlife corridors to be able to manage potential human-wildlife conflicts (e.g. trail use policies) as priorities. In addition, surveying invasive species in these high connectivity areas to manage their spread.

Modeling Future Priorities

The EcoPark System secretariat sees the connectivity prioritization map as an opportunity to identify target areas for protection (land acquisition) or restoration. For example, unique open spaces such as cemeteries and hydro corridors may be managed to promote connectivity. As such, repeating these connectivity analyses in the near future to get an updated picture of connectivity, to incorporate any new data or more complete data (e.g. more complete culvert and bridge data), and to track connectivity trends will be considered.

A landscape change model to project spatial patterns of land use into the future driven by scenarios that combine land-use management plans with regional climate projections was recommended by workshop participants. The robustness of connectivity priority areas to these future scenarios could be assessed in terms of their ability to sustain connectivity across the landscape. Conservation priorities would be assigned to habitat patches and linkages based on their contribution to the connectivity of natural areas for all focal species and across the full range of possible future climate and land-use scenarios.

Lastly, these connectivity maps do not account for any expected changes due to land-use or climate change. Existing natural areas within the EcoPark System may continue to be further lost or fragmented due to urbanization and agricultural expansion while currently degraded lands may be restored. We expect improved outcomes for the biodiversity of the EcoPark System when habitat patches and linkages are prioritized based on their contribution to both present and future landscape connectivity.

This research and subsequent series of workshops introduced ideas for an integrated, broad-scale perspective which recognizes that declines in habitat suitability and connectivity in one part of the landscape may affect the habitat quality and connectivity in another part of the landscape. As such, an integrated, broad-scale perspective to help to assess the cumulative impacts associated with many small projects on overall landscape connectivity and biodiversity conservation will be encouraged by the EcoPark System partnerships and its stakeholders.