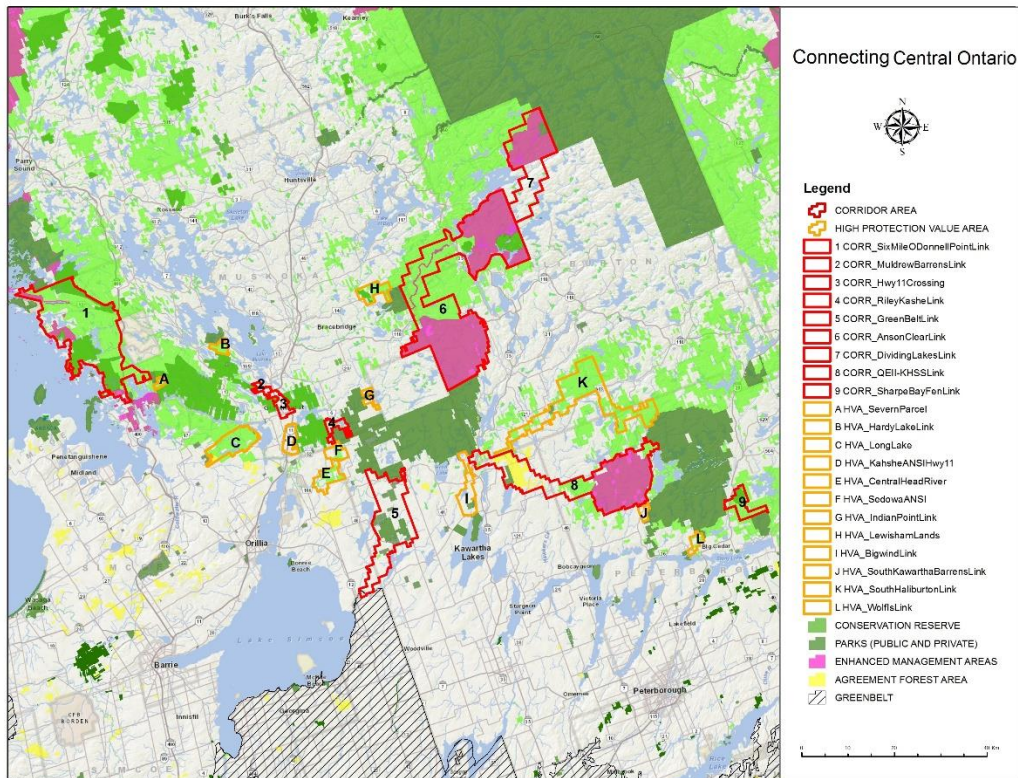


Integrating Road Ecology for Species at Risk in Central Ontario

31-January-2022

FINAL



Connecting Central Ontario with high value protection areas and corridor linkages

A strategy document for the Eastern Georgian Bay Initiative 2021

As trusted by Ganawenim Meshkiki ("GMI")

This document was led and compiled by Eco-Kare International with materials and knowledge from our project team:

Wildlands League

Couchiching Conservancy and Muskoka Conservancy

4Directions Conservation Consulting Services

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1 Executive Summary

A team of relevant expertise was assembled to implement road ecology initiatives into an established framework of defined core and corridor areas identified in a mapping project that connects Central Ontario to Algonquin Park, Georgian Bay and the Greenbelt. Our strategy combines and builds on efforts and works already completed and for the first time combines road ecology science with First Nations Engagement and Land Trust acquisition processes.

Our team focused on a key core and corridor area in the Black River Wildlands and the neighbouring Muskoka Kahshe River corridor where several conservation and nature reserves and unique habitat types support several Species at Risk including the Blanding's Turtle and Spotted Turtle. Several roads were identified that require mitigation and include Houseys Rapids Road, Coopers Falls Road, Monck Road and Highway 11. We examined these roads for drainage crossings to evaluate opportunities for underpass structures for safe crossings for SAR. Further work entails, field visits and feasibility studies for a wildlife overpass along Highway 11.

Next, we conducted a citizen science workshop in Couchiching Conservancy to establish interest and feedback for formalizing a road ecology citizen science program with volunteers. We created a baseline database that integrates hydrology and wildlife on roads data along one kilometer road segments. The database is meant to be a guideline to target specific roads during stewardship activities and also to identify opportunities for road ecology mitigation. The database can built-on with new information.

We engaged several partners and groups in this phase of our project and we hope to build on these relationships. A workshop that targets relevant road agencies and expertise is essential. We have identified seven First Nations for our engagement and have devised a plan for implementation within the Williams Treaty Area formally known as the Treaty 20 area.

Future work is prioritized for the short-term and includes implementation of meaningful engagement with First Nations, land acquisition and implementation of road ecology measures. The team identified one opportunity for 'hands-on' implementation of wildlife exclusion fence at a selected Provincially Significant wetland / creek site at Monck road where a culvert replacement project occurred in 2021. This installation is relatively straightforward and could be implemented as part of a 'grassroots' activity but requires engagement with the respective agencies and communities, e.g. Simcoe County. This site is ideal for these types of measures and it is predicted that turtle road mortality will be reduced by at least 90%.

2 Project overview and purpose

The primary purpose of this project is to develop a process that combines Indigenous Engagement, land use, habitat protection, connectivity, and road ecology into a collective approach that targets Species at Risk (SAR). Our scope of interest includes areas of land acquisition by the two land trusts in Central Ontario: Couchiching Conservancy and Muskoka Conservancy. Recent SAR observations include Blanding's Turtles, Spotted Turtles, and Hog-nosed Snakes. These species are affected by road mortality and fragmentation. Road mortality is an identified top threat to reptiles second to habitat loss. This project will strive to connect habitat across roads with land acquisition and road mitigation measures. We will also engage the Indigenous Community, local citizen scientists and educate land owners about road ecology and solutions.

Road ecology mitigation such as crossing structures requires long-term planning and habitat management to be effective for wildlife movement. Crossing structures are essentially ecological corridors through roads and are required to connect naturally occurring habitat. Wildlife crossing structures that provide connectivity across transportation infrastructure can be expensive to install and maintain. That investment can go to waste if the adjacent land that supports the species is developed or disturbed. That is why it is important to establish crossings in association with land that has some form of protection and conservation value. Land acquisition is the most secure method of habitat protection and to ensure that road mitigation can be properly installed, maintained and remain effective.

Our project will be implemented in a two phased process as described below:

Phase 1: September to December 2021 (funded); The project team will prioritize areas for road mitigation efforts with a focus on SAR. Criteria for prioritization include areas of protected land and/or where land acquisition is prioritized. We will also engage and educate local citizen scientists about road ecology data collections in key areas as well as define a targeted Indigenous Engagement process;

Phase 2: April 2022 to December 2022 (funding pending); The project team will implement land acquisition process, road mitigation activities in prioritized locations and implement our defined indigenous engagement process.

3 Prioritization

The project team first defined the area of focus for this project that was situated within the Central Ontario Connectivity map (Figure 1, black circle) and areas of land acquisition by the two Land Trusts: Couchiching and Muskoka Conservancies (Figure 3). The areas of focus were within the defined municipalities of Simcoe County, and the District of Muskoka and Kawartha Lakes to the east.

The Central Ontario Connectivity map was created by the Ministry of Environment, Conservation Parks for the Nature Connectivity Project with a larger network of partners including the Land Trusts. This mapping product is a connected system of corridors and high protection core areas

derived from digital layers provided by Land Information Ontario and the Land Trusts. The corridors and core areas were defined using Circuitscape (Bowman & Cordes 2015), a ranking flow chart and model builder.

This area embodied in the black circle in Figure 1 is dominated by the Kahshe Conservation Reserve that is largely a roadless area with extensive bedrock barrens and wetlands situated on 3,169 hectares of crown land (Figure 2). There are also several areas of natural and scientific interest (ANSI designation), several Land Trust properties, the Jevins and Silver Lake Conservation Reserve, one highway corridor, the Canadian National railway and several other major roads: Housey’s Rapids Road and Coopers Falls roads.

All basemap digital layers used for this project were obtained from the GeoHub managed by Land Information Ontario (<https://geohub.lio.gov.on.ca/>) as well as other digital layers within our respective libraries.

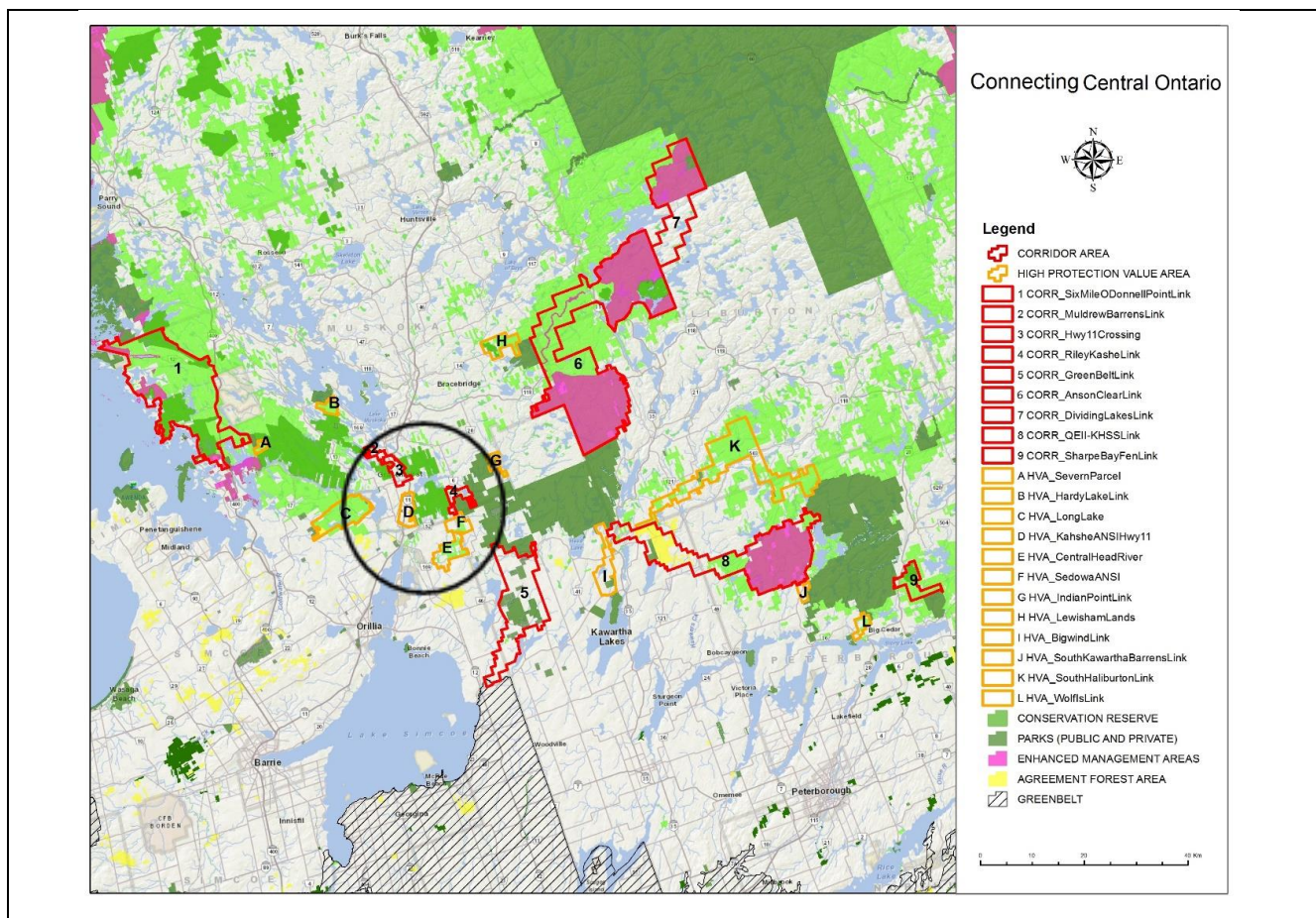


Figure 1: Central Ontario connectivity map completed by the Ministry of Environment, Conservation and Parks for the Nature Connectivity Project. Black circle indicates our focus area.

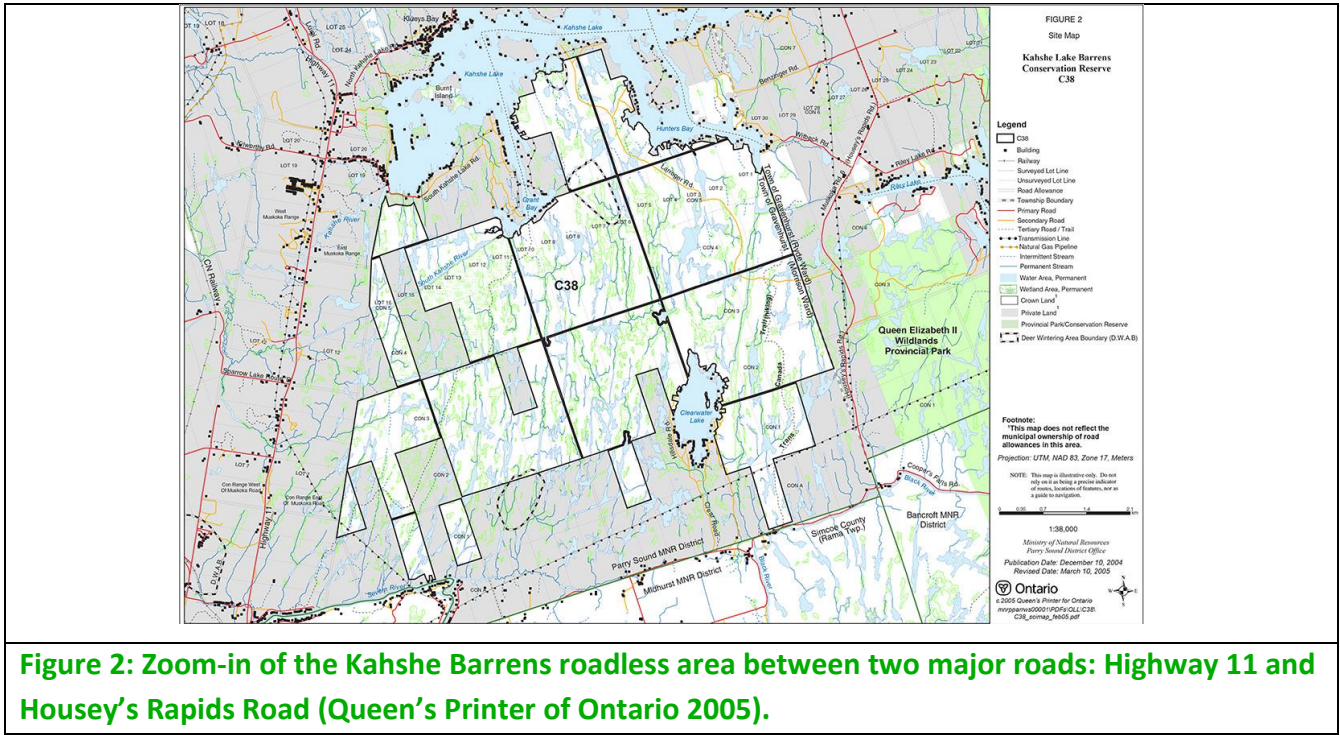


Figure 2: Zoom-in of the Kahshe Barrens roadless area between two major roads: Highway 11 and Housey’s Rapids Road (Queen’s Printer of Ontario 2005).

3.1 Expert opportunities for road ecology

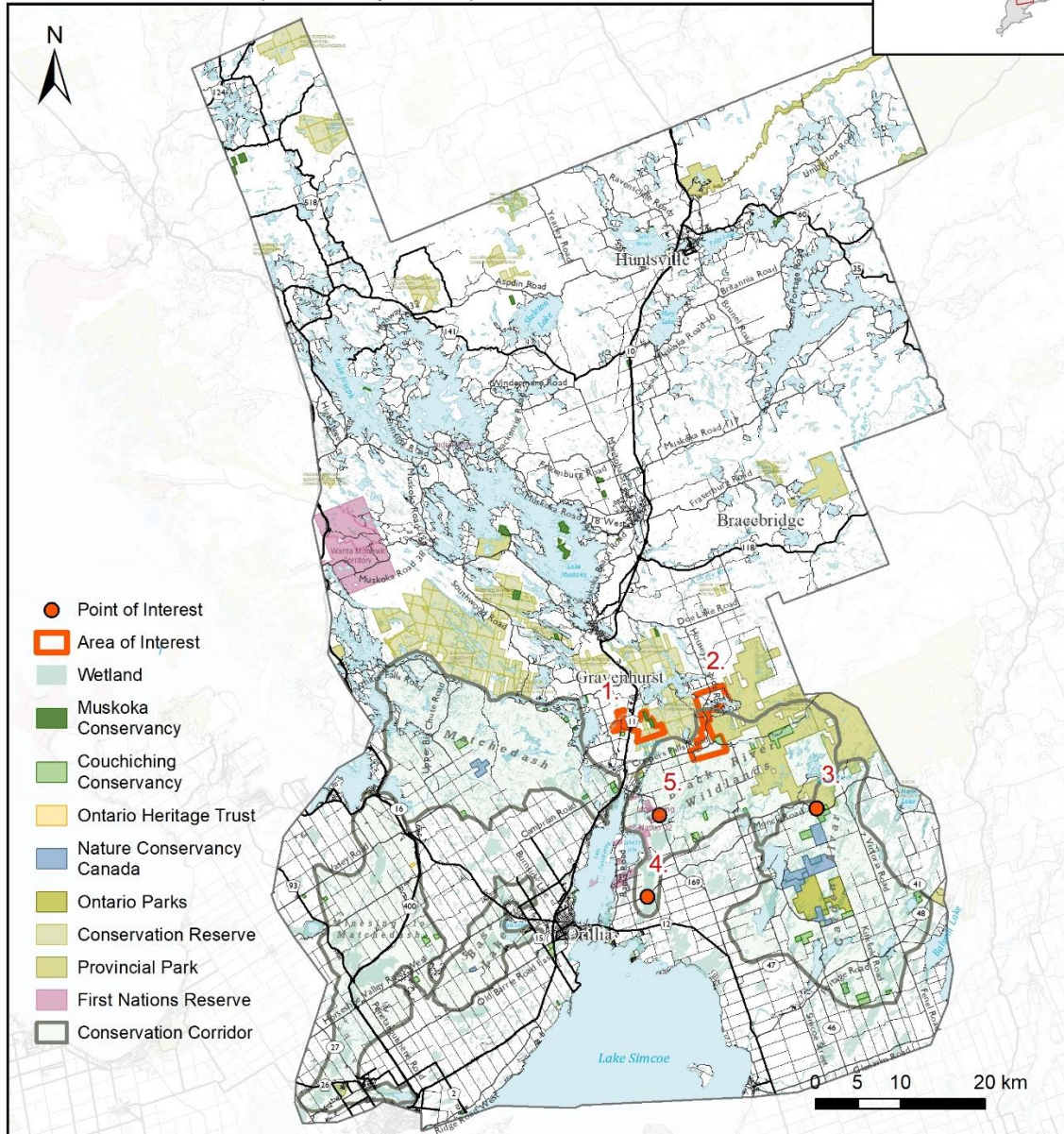
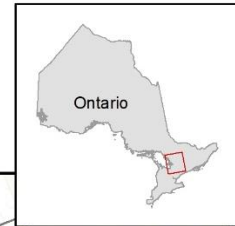
After an initial reconnaissance stage, the project team met by zoom and discussed the relevance of the defined areas of interest within the two Land Trust for road ecology on October 26th, 2021 (Appendix B; Figure 3). There were two areas of interest (labelled 1 and 2) defined by each land trust as well as other points of interest (labelled 3-5) defined for various road ecology activities explained throughout the report. These areas reflect areas of interest for land securement and stewardship activities for the Land Trusts and are within the boundaries of Treaty 20 for purposes of First Nations Engagement (see Section 4).

Road Ecology in Central Ontario

Study Area

Areas of Interest

1. Kawshe River Corridor (Highway 11)
2. Black River Wildlands (Coopers Falls Road & Housey's Rapids Road)
3. Kris Starr Sanctuary (Monck Road)
4. Whitney Wetland Nature Reserve (Monck Road)
5. Black River Wilderness Park (Simcoe County Road 169)



Author: The Couchiching Conservancy with guidance in road ecology concepts and data collation from Kari Gunson, Eco-Kare International. Date: 1/23/2022. Coordinate System: NAD 1983 UTM 17 N. Projection: Transverse Mercator. Data: Land Information Ontario, Couchiching Conservancy /2021 Contact for details. This is NOT a plan of Survey and is not for navigation or legal use. The Couchiching Conservancy operates within the territory of the Indigenous Peoples of Treaty 18, Lake Simcoe – Nottawasaga and The Williams Treaties.



Figure 3: Areas of interest for land acquisition in Couchiching Conservancy and Muskoka Land Trusts with areas of interest for road ecology.

3.1.1 Areas of Interest 1 & 2: Black River Wildlands and Kahshe River Corridor

The primary area of interest were described and examined collectively in Figures 5 & 6:

1. The Kahshe River corridor that connects the Kahshe Lake Barrens Conservation Reserve with Sparrow Lake in the west separated by Highway 11 as defined by Muskoka Land Trust (label 1 in Figure 3 and Figure 5)
 - a. Road proposed from Sparrow Lake Route D at highway 11 to Grant’s Bay
2. The Black River Wildlands east-west corridor (see Couchiching Conservancy Acquisition Strategy (Figure 4, Couchiching Conservancy 2020) that connects Queen Elizabeth II Wildlands Provincial Park and Taylor Nature Reserve to the Kahshe Lakes Barrens separated by Houseys Rapids Road (label 2 in Figure 3 and Figure 5)
3. The Black River Wildlands north-south corridor (Figure 4) that connects high biodiversity crown land and a candidate ANSI to QEII and Taylor Nature Reserve separated by Coopers Falls Road (label 2 in Figure 2 and Figure 3).

These areas of interest overlap with corridor area 4 (Riley-Kahshe Link); corridor area 3 (Highway 11 crossing) and corridor area 2 (Muldrew Barrens Link) in the Central Ontario Connectivity mapping (Figure 1). Also these areas contain the High Protection Value Area D (Kahshe ANSI) and Area E (Sedowa Candidate ANSI) (Figure 1). In addition, further north of the Riley-Kahshe link is the Hwy 11 Link spanning between the Muldrew Barrens and Jevins and Silver Lake Conservation Reserves (Figure 5).

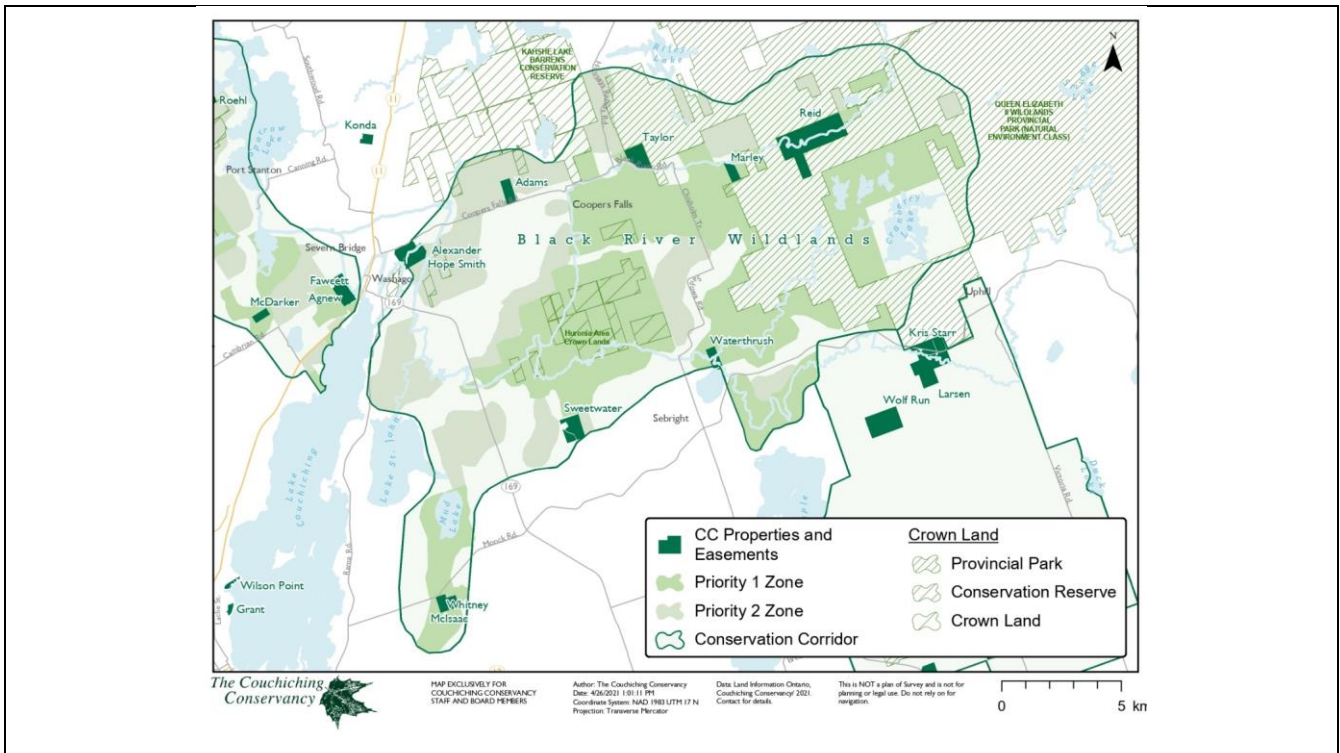
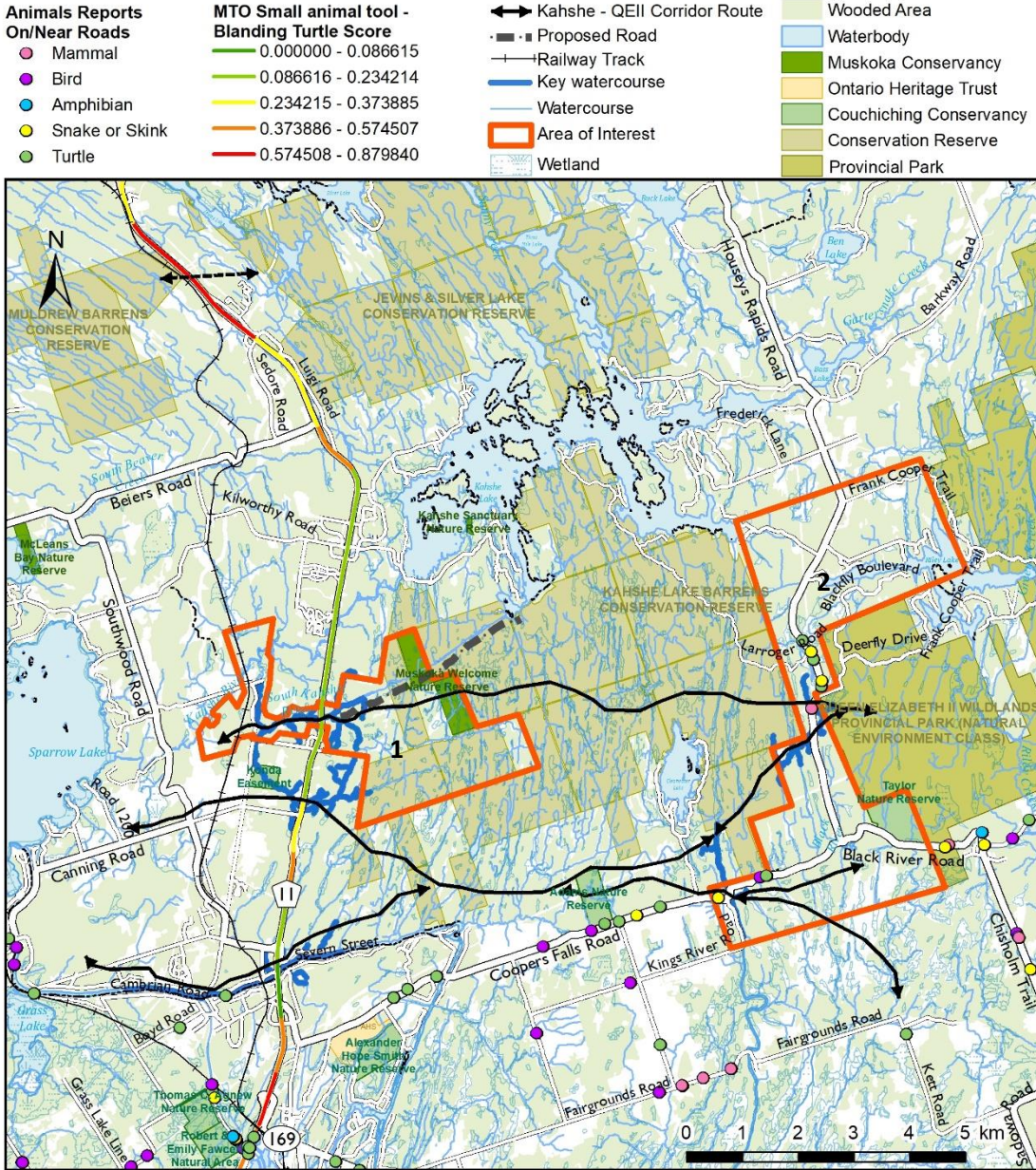


Figure 4: Zoom-in of the Black River Wildlands Corridor area with priority zones as defined by the Couchiching Conservancy Acquisition Strategy 2020.

Road Ecology in Central Ontario

Kahshe River Corridor (Highway 11) and Black River Wildlands (Coopers Falls Road & Housey's Rapids Road)



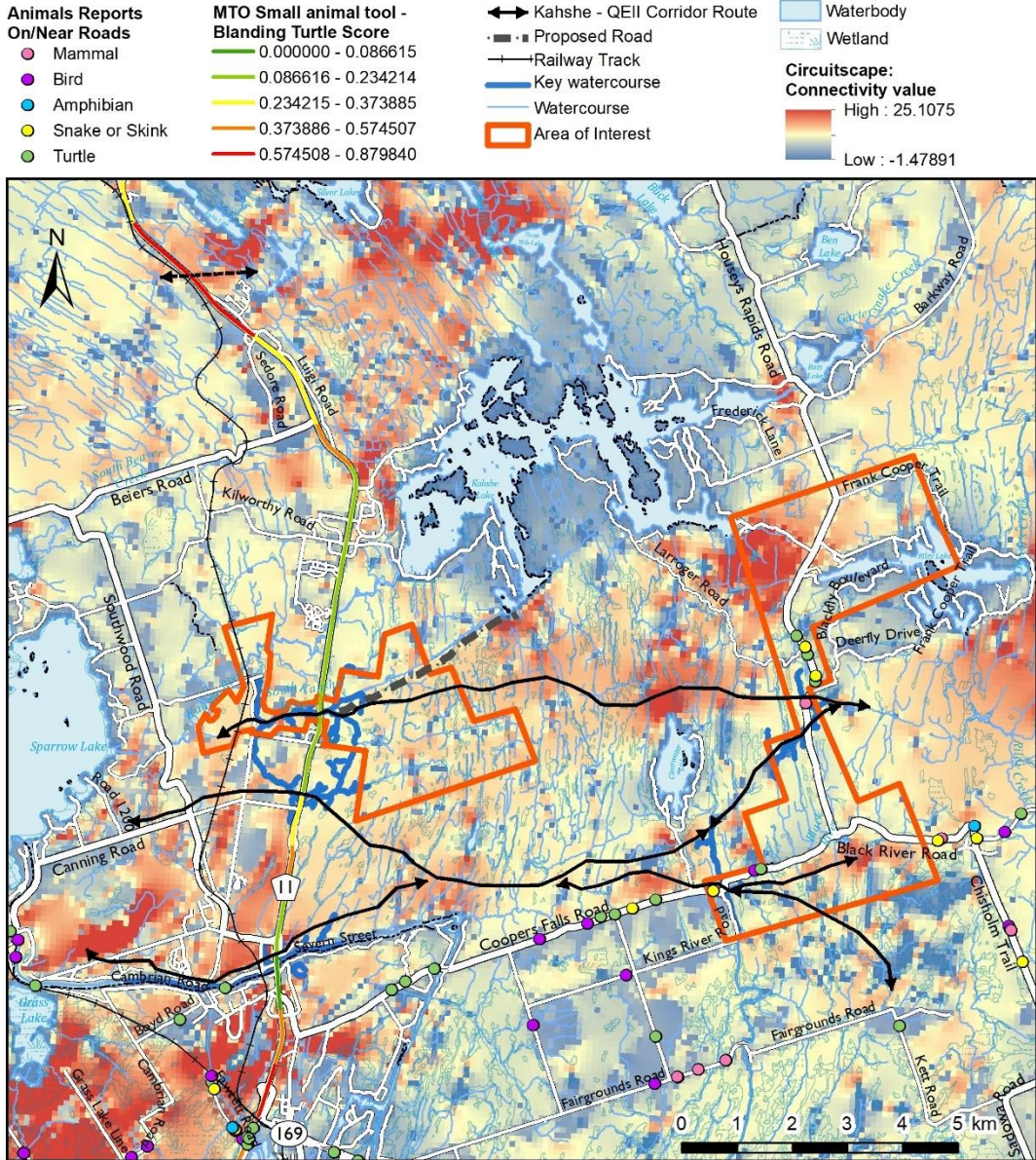
Author: The Couchiching Conservancy with guidance in road ecology concepts and data collation from Kari Gunson, Eco-Kare International. Date: 1/23/2022. Coordinate System: NAD 1983 UTM 17 N. Projection: Transverse Mercator. Data: Land Information Ontario, Couchiching Conservancy, iNaturalist, Scates Nature Park/ 2021, Ontario Turtle Trauma Centre/2018, NHIC/2013. Contact for details. This is NOT a plan of Survey and is not for navigation or legal use. The Couchiching Conservancy operates within the territory of the Indigenous Peoples of Treaty 18, Lake Simcoe - Nottawasaga and The Williams Treaties.

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Figure 5: Kahshe River Corridor and Black River Wildlands corridor examined for connectivity across roads to enable safe Species at Risk movements across the area of focus.

Road Ecology in Central Ontario

Kahshe River Corridor (Highway 11) and Black River Wildlands (Coopers Falls Road & Housey's Rapids Road)



Author: The Couchiching Conservancy with guidance in road ecology concepts and data collation from Kari Gunson, Eco-Kare International. Date: 1/23/2022. Coordinate System: NAD 1983 UTM 17 N. Projection: Transverse Mercator. Data: Land Information Ontario, Couchiching Conservancy, iNaturalist, Scales Nature Park/ 2021, Ontario Turtle Trauma Centre/2018, NHIC/2013, Circuitscape (Koen et al.). Contact for details. This is NOT a plan of Survey and is not for navigation or legal use. The Couchiching Conservancy operates within the territory of the Indigenous Peoples of Treaty 18, Lake Simcoe - Nottawasaga and The Williams Treaties.

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Figure 6: Kahshe River Corridor and Black River Wildlands corridor examined for connectivity across roads using Circuitscape information as defined by Bowman & Cordes 2015.

The two connected areas of interest are east-west linkage that connects Georgian Bay to the Kawartha Highlands. Major protected areas include the Queen Elizabeth II Wildlands Provincial Park and Kahshe Conservation Reserve (CR) in the east across Highway 11 to natural areas such as Sparrow Lake and Muldrew Barrens reserve. The areas were identified by both the Land Trusts and are important areas of connectivity with important habitat for species at risk. Other Species at Risk that occur in the areas are Blanding's Turtle, Northern Map Turtle, Common Snapping Turtle, Painted Turtle, Eastern Hog-nose Snake, and the Massasauga Rattlesnake all impacted by road mortality.

We conducted a road ecology assessment study focusing on each road within the cores and corridor areas. Our primary objective was to locate opportunities for road ecology mitigation and prioritize these areas.

We first compiled all the available spatial data sets for the area. These included the following:

- Circuitscape layer evaluating landscape connectivity in the Great Lakes Basin (Bowman & Cordes 2015)
- Hydrology layers
 - Rivers and wetlands (wetlands derived from Southern Ontario Land Information System version 2 (not available for Muskoka District) and open data layer with Land Information Ontario)
- MTO large animal and Species at Risk reptile hotspot mapping tools (Ministry of Transportation 2015)
- Wildlife on road data from various sources (see Section 2.2)

Other data sets that are required from road agencies and conservation programs:

- Wetland data layer from Forest Resource Inventory for Muskoka Conservancy
- Culvert and bridge layers from the relevant township and or county
- Upcoming road upgrade projects from each road agency for the area of interest
- Updated Natural Heritage Information Centre data, Scales Nature Park SAR data etc.

After the mapping layers were assembled, we investigated potential movement corridors through roads in the core and corridor areas. The black lines in Figures 5 & 6 connect road-drainage intersections along Highway 11, Houseys Rapids and Coopers Falls roads. The lines through the natural areas are meant to illustrate probable movement corridors by visually examining low resistant areas (red cells) in the Circuitscape layer (Figure 6). We then examined each road-drainage intersection with aerial and streetview imagery in Google Earth and Google Maps (Appendix C).

These drainages need to be assessed in the field to evaluate adequacy of permeability for the wildlife community including deer and black bear (See Appendix D datasheet). The structures should be flagged for upsizing with the responsible road agency. Collectively, these road crossings provide landscape level connectivity at a broader scale connecting Kawartha Highlands to Georgian Bay (Figure 1).

Scales Nature Park has compiled hundreds of wildlife on road observations in the focal study area. To assess road mortality impacts on these roads, Jeff Hathaway at Scales Nature Park conducted an

expert evaluation. Scales Nature Park works extensively in the area surveying roads and adjacent habitat for SAR as part of the Saving Turtles at Risk Today (S.T.A.R.T.) program (Table 1). Blanding's Turtles are being road-killed on all of the roads identified in our area of interest and is summarized in Table 1.

Table 1: A summary of roads within the core and corridor areas evaluating road mortality and connectivity impacts and potential opportunities for mitigation.

Table removed from report due to data sensitivity.

There is a proposed road by a Gravenhurst residence in Grant's Bay that will travel from Sparrow Lake Route D at Highway 11 to Grant's Bay and travel through the Muskoka Welcome Nature Reserve a protected area owned by Muskoka Conservancy and the Kahshe Barrens CR. See article at the following: <https://www.thestar.com/local-gravenhurst/news/council/2021/10/22/access-to-21st-century-resources-gravenhurst-s-grant-s-bay-residents-still-pushing-for-cottage-access-road.html?rf>

This road will have serious direct (road mortality) and indirect impacts (lead to further development and human use) on the natural environment and its proposal should be rejected by the township of Gravenhurst, District of Muskoka, and the provincial Government due to the sensitivity of the area. In addition, there is an existing road northerly – Kahshe Lake Road that can accommodate traffic to Grant's Bay.

Roadless areas are rare in Central and Southern Ontario and all over the world, in fact the Infra Eco Network Europe designated the preservation of roadless areas as their 2014 declaration because of the following:

Roadless areas are of particular importance for biodiversity conservation, because these areas are:

- the least disturbed natural areas in the world
- characterized by high ecological value, integrity and connectivity
- act as refuges for native and endangered wild animals and plants
- provide vital ecosystem services such as clean water and air, opportunities for recreation, and protection against pests and invasive species
- more resistant to and resilient from catastrophic events
- new roads will lead to increased residential development, resource extraction, and other human use impacts
- help species to adapt to new conditions created by climate and landscape change

See (<http://iene2014.iene.info/iene-2014-declaration/>). It was on this foundation above that the Ostrander Point Wind Farm Development did not occur in a highly undeveloped roadless area on Crown Land. The Ostrander Point Crown Land is now undergoing the process of being designated a Conservation Reserve by the South Shore Joint Initiative.

3.1.2 Kris Starr Sanctuary Point of Interest-Monck Road

Kris Starr Sanctuary and Larsen Easement are bisected by a 2 km section of Monck road. The habitat adjacent to Monck road is comprised of wetlands and drainages surrounding the road (Figure 7).

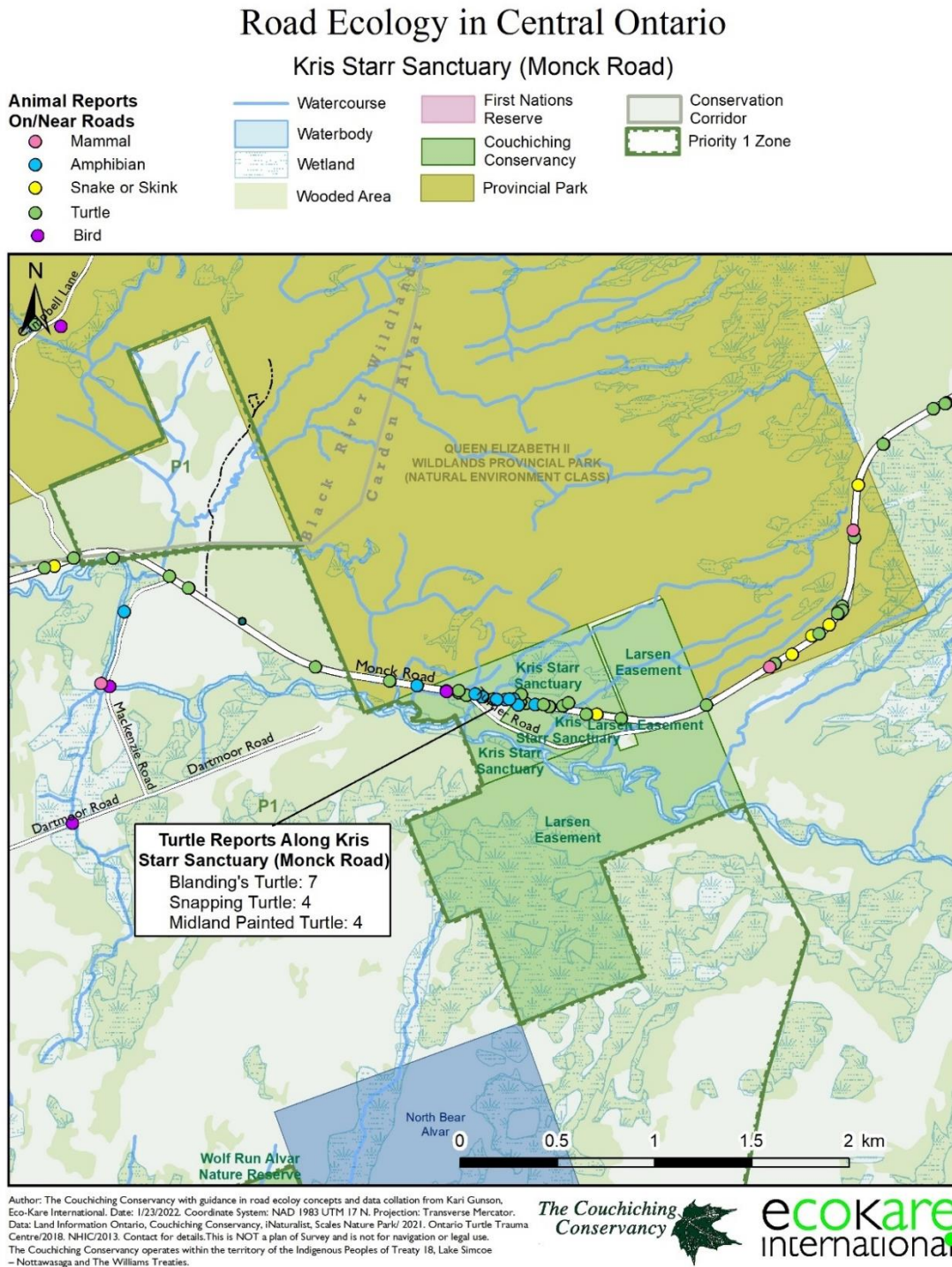
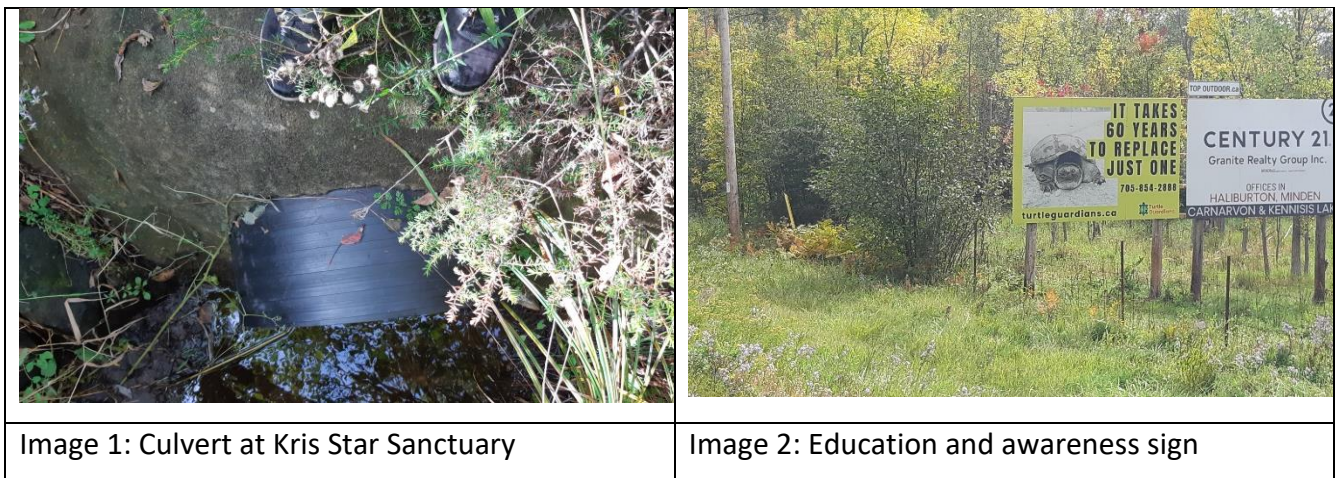


Figure 7: Kris Starr Sanctuary and Larsen Easement bisected by Monck Road where a citizen science workshop was held to document road mortality and examine potential culverts for wildlife passage.

The Couchiching Conservancy and Eco-Kare teamed up to host a citizen science gathering at Kris Starr Sanctuary on Monck Road (see Section 3) situated in the Black River Wildlands Corridor (Figure 3). The road was selected by the Land Trust because road-kill is often observed along the road (Figure 7). In addition, the road is spanned by the Queen Elizabeth II provincial park in the north and Kris Starr Sanctuary/Larsen Easement in the South.

The site-specific hydrology and wildlife on road analysis showed there were four drainages and wetlands next to both sides of the road. Collectively from the wildlife on roads dataset there were seven Blanding’s Turtles (2 dor, 1 aor, 4 unknown); four Snapping Turtles (2 dor, 2 unknown), 4 Painted Turtles (1 dor, 1 ior, 2 unknown), several Red Efts (dor), Frogs (dor) and a Nashville Warbler (dor).

This area should be prioritized for wildlife mitigation because of the abundance of road-kill including Blanding’s Turtle, it occurs between two protected areas, and there is suitable habitat for all wetland-forest animals on both sides of the road. One drainage culvert was examined during our site visit that was embedded in rock and was fairly small (80 cm) for wildlife passage. Other existing drainage culverts should be examined and flagged to be upsized when new road upgrades will occur. During the site visit a sign that was installed by the Land Between for turtle conservation and awareness was observed 1 km west of the Sanctuary (Image 2).



3.1.3 Whitney Nature Reserve-Monck Road

Monck Road situated in the Black River Wildlands Corridor bisects the Whitney Wetland and McIssac Wetland Nature Reserves in the south and a large provincially significant wetland complex (Mud Lake) on both sides of the road (Figure 8).

Road Ecology in Central Ontario

Whitney Wetland Nature Reserve (Monck Road)

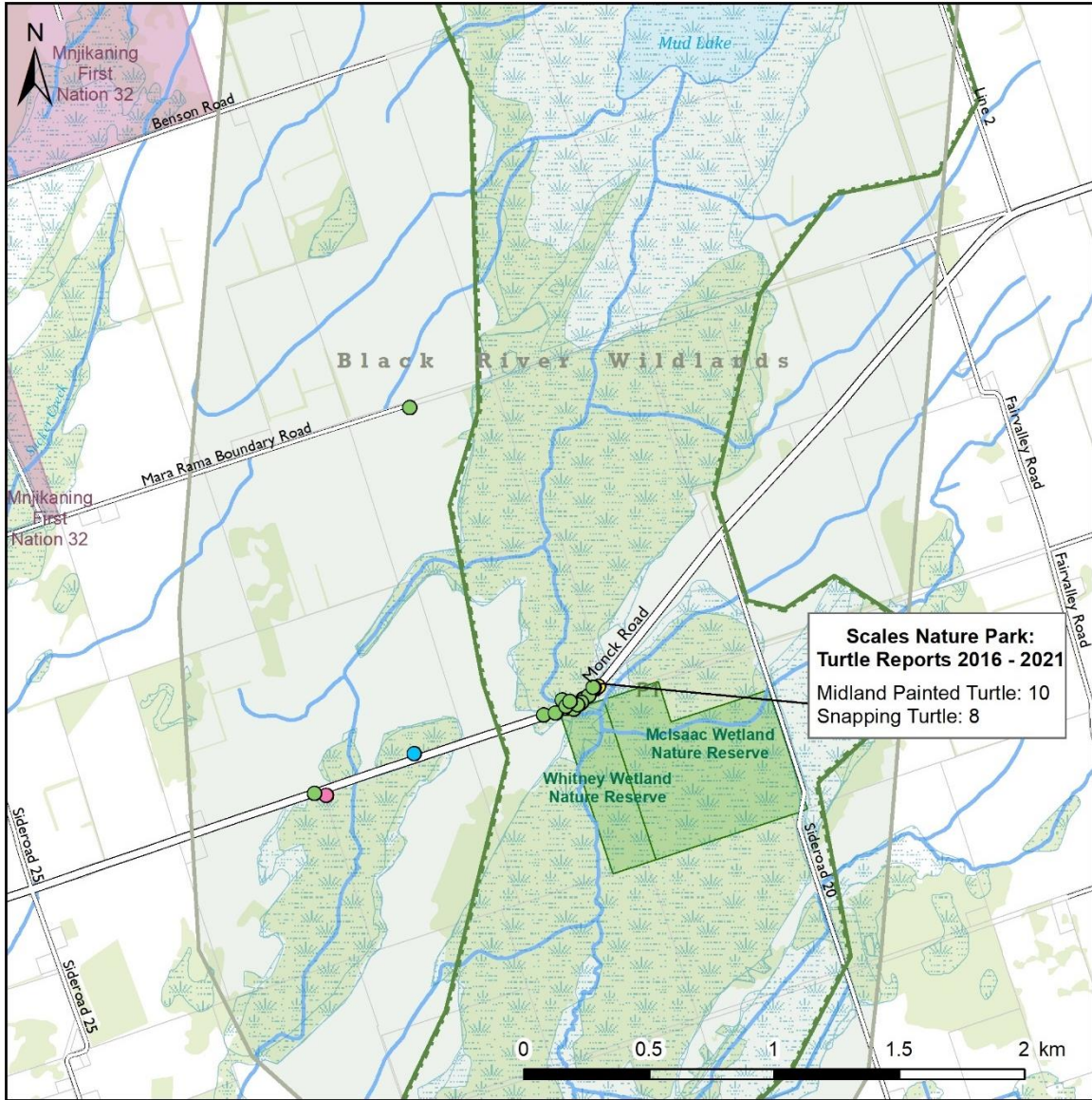
Animal Reports On/Near Roads

- Mammal
- Amphibian
- Snake or Skink
- Turtle

- Watercourse
- Waterbody
- Wetland

- First Nations Reserve
- Couchiching Conservancy

- Conservation Corridor
- Priority 1 Zone



Author: The Couchiching Conservancy with guidance in road ecology concepts and data collation from Kari Gunson, Eco-Kare International. Date: 1/23/2022. Coordinate System: NAD 1983 UTM 17 N. Projection: Transverse Mercator. Data: Land Information Ontario, Couchiching Conservancy, iNaturalist, Scales Nature Park/ 2021. Ontario Turtle Trauma Centre/2018, NHIC/2013. Contact for details. This is NOT a plan of Survey and is not for navigation or legal use. The Couchiching Conservancy operates within the territory of the Indigenous Peoples of Treaty 18, Lake Simcoe - Nottawasaga and The Williams Treaties.

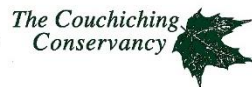


Figure 8: Monck Road separates Whitney Wetland and Mclsaac Wetland Nature Reserves in the south from the Mud Lake wetland complex in the north within the Black River Wildlands Conservation Corridor. There are known Snapping Turtle and Painted Turtles road-killed in this area.

In 2021, three 1800 mm corrugated steel culverts (Image 4) were replaced with one large 4200 mm wide by 2400 mm high precast concrete box culvert (Image 6) at Sucker Creek (Riverstone Environmental Solutions Inc. 2021; Image 3). This new culvert is ideal for turtle passage and other aquatic wildlife such as fish. Unfortunately, the existing conditions report did not recommend permanent exclusion fence at this site to funnel turtles to the new culvert and to mitigate the threat of road mortality.

In September 2021, Couchiching Conservancy found a predated turtle nest on the north side of Monck road (Image 5), roadside of the silt fence that was left on site after construction. The silt fence is a hazard for emerging hatchlings because they will have to navigate the fence to travel to water. A permanent exclusion fence that is placed properly will ensure turtles nest on the safe-side of the fence and funnel turtles to the drainage culvert for safe passage. Between 2016 and 2020, Scales Nature Park found eight dead on road Snapping Turtles, and ten Painted Turtles (nine dor, 1 aor). Scales also found two Snapping Turtles nesting on the road (Figure 8).

Fortunately, the drainage is delineated to a small area of natural habitat across the road, and turtle movement and therefore road-kill is clustered to a small section of road. It is recommended to install exclusion/funnel fencing at this site approximately 300 m on both sides of the road. There would also need to be directional fencing, sometimes termed as wing walls to both entrances of the culvert (Image 7 and Image 11). Exclusion fencing is expected to reduce turtle road-kill by at least 90% and would ensure turtles nest inside the fence, likely at the gravel mixture near the culvert entrances. Last, the fence would funnel animals to the culvert for safe passage across the road.

Installation of exclusion fencing is a relatively straight-forward at this site and could be achieved, managed and co-ordinated by Eco-Kare International. There are two options for installation that include attaching a barrier to the existing guard-rail or installing fencing inside the guard-rail between the wetland and road. Both types of fencing installations have been completed by Eco-Kare.

The necessary approvals and consultation would need to be obtained from Simcoe County and other relevant agencies in early spring 2022. Animex exclusion fence has previously been installed in Simcoe County by the Conservation Authority and has shown to be effective (Read & Thompson 2021). Eco-Kare worked with the Conservation Authority on this initiative.

It is recommended to systematically monitor this site in the spring/summer of 2022 to obtain a baseline of wildlife on road data and to evaluate road mortality. This data set would be ideal to compare to wildlife on road data after the exclusion fence is installed. The 500 m to 1 km road segment should be monitored at least from May 15th to July 15th to capture the turtle nesting season and evaluate the extent of nesting on the site. This could be surveyed as part of a citizen science project (see Section 3).



Image 3: Aerial view of culvert replacement project at Sucker Creek on Monck road (Google Earth).



Image 4: The three 1800 mm steel culverts that were replaced at Sucker Creek along Monck Road (Riverstone Environmental Solutions 2021).



Image 5: Predated turtle nest adjacent to silt fence on the north side of Monck road found by Toby Rowland with Couchiching Conservancy. Photo Credit: Toby Rowland.



Image 6: New box culvert installed on Monck road at Sucker creek with red lines depicting placement of permanent exclusion fence. Note the culvert is large providing maximum visibility and openness through the length of the structure. Photo Credit: Toby Rowland.



Image 7: New box culvert installed on Monck road at Sucker creek with red lines depicting placement of permanent exclusion fence that will abut the drainage culvert to funnel animals to the entrance. Photo Credit: Toby Rowland.



Image 8: Silt fence along the road corridor that needs to be replaced with more permanent exclusion fence. Note existing guard-rail that is ideal to protect exclusion fence from snow, and or could be used to attach exclusion fence onto the structure. Photo Credit: Toby Rowland.



Image 9: Example of exclusion fence abutting a large drainage culvert on the Scarborough-Pickering Townline road in Rouge Urban National Park. Photo Credit: Paul Yanuzzi.

3.2 Road Ecology Priorities for Land Trusts

In 2020, Couchiching Conservancy defined and mapped the natural corridor areas to focus land acquisition and other conservation priorities (Couchiching Conservancy 2020). Within each of the five corridor areas: Black River Wildlands, Carden Plain, Bass Lake, Minesing to Matchedash, and Matchedash there were also priority 1 and priority 2 zones. These corridor and priority areas were available for examination in a Geographic Information System.



Figure 9: The five Conservation Corridors within the Couchiching Conservancy Area of Interest for land acquisition and stewardship activities (Couchiching Conservancy, 2020).

The same level of mapping was not available from the Muskoka Conservancy, but as part of this project the Muskoka Land Trust properties were delineated into a shapefile and Google Earth file and was shared with Aaron Rusak, Land Stewardship Coordinator, Muskoka Conservancy. In addition, we also obtained from Muskoka District the roads that are within a 1 km buffered area of the natural heritage areas and sites as designated in the Official Plan Schedule C2 (available from <https://www.muskoka.on.ca/en/business-planning-development/land-use-planning-and->

[policies.aspx](#); Reid & Bergsma 1994). These roads are obvious priorities for road ecology and should be examined similarly to roads within the priority areas defined by the Couchiching Land Trust.

As a deliverable for this project, and also to provide a baseline network of roads for citizen science road ecology programs (see Section 2.3 and Section 3) we assembled a road priority database for the roads that were within the Couchiching Land Trust Corridor Areas. We only included the major roads as our baseline for this assessment and excluded cottage roads and subdivision roads. We assumed that cottage roads and subdivision roads had low traffic volumes and were not a priority for road mitigation. The roads database obtained from LIO was not complete for the road type, therefore much of the low-use volume roads were excluded visually by looking at underlying topographic maps.

There are many different ways to prioritize road segments for road ecology mitigation (see Section 2.2.2). The primary objective is to ‘flag’ roads as ‘hotspots’ of road mortality within a targeted road network, typically for specific target species. However, roads may also be prioritized by ‘loss of connectivity’ between two areas, i.e., within a defined linkage, corridor or natural heritage system and therefore mitigated for multiple species and maintaining intact ecosystem processes across roads.

Roads that are flagged can then be overlaid with planned road upgrades and extensions so that mitigation such as crossing structures can be budgeted and planned for prior to the road project. In addition, Government agencies and non-profit organizations can prioritize roads, for additional data collections such as existing culvert assessments and or wildlife on roads surveys. A perfect example of utility is the culvert replacement project that occurred on Monck Road. This site should have been previously flagged for freshwater turtle mitigation as well as fish. At the very least, the Environmental Assessment reports should have recommended a specialized wildlife crossing for both terrestrial and aquatic animals as well as appropriately designed permanent exclusion/funnel fencing.

We completed a series of steps to build a spatial database of information with criteria that can assist in categorizing 1 km road segments as likely turtle on road hotspots. These steps are outlined here:

- Selected roads that were within the 5 corridors
 - Selected major roads and excluding cottage and residential roads
- Roads were divided into 1 km segments
 - Dissolved roads by road name
 - Last segment of each road is less than 1 km
- Intersected roads by the watercourse/drainage layer as obtained from the Integrated hydrology network (LIO)
 - Yes or No for drainage intersection
 - Drainage intersections are logical locations where culverts and bridges can be assessed for potential wildlife passage (Appendix D)
- Evaluated presence or absence of wetlands on one or both sides of the road
 - Measured distance to closest wetland

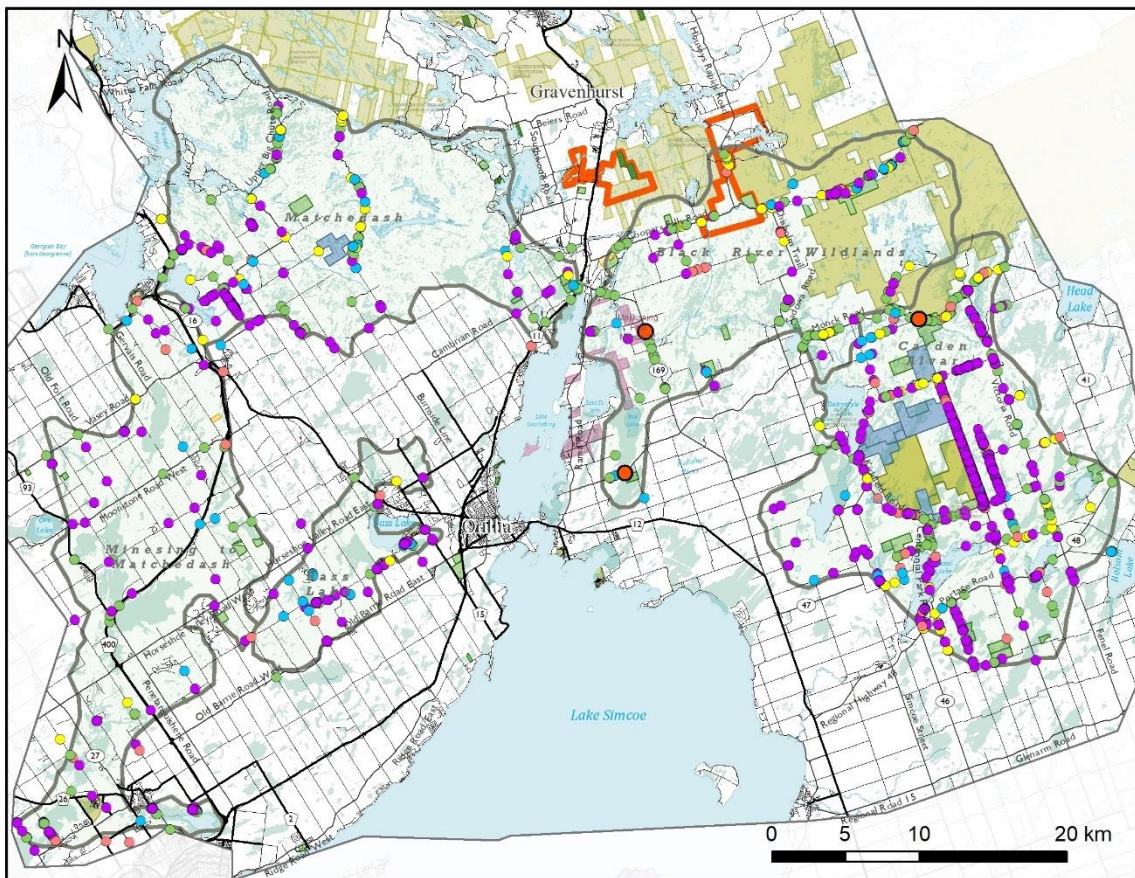
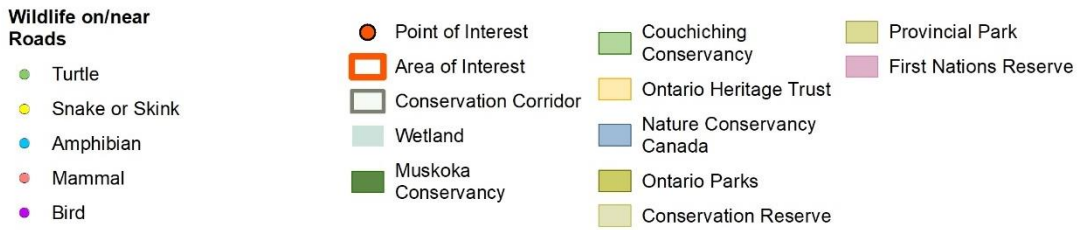
- Wetlands are not necessarily adjacent to each other along the 1 km segment
- The LIO wetland layers was not complete and therefore combined with wetlands from the SOLRIS layer
- More accurate wetland mapping is required for both Land Trust areas that may entail manually digitizing wetlands
- Wetlands were manually digitized at Coopers Falls road in the Muskoka District
- Improved wetland layers are available for Muskoka District with the Forest Resource Inventory
- A master wildlife on roads database was compile using iNaturalist, Ontario Turtle Conservation Centre, Natural Heritage Information Centre and Scales Nature Park data for Monck road and overlaid on 1 km road segments (Table 2; Figure 10).

Table 2: Wildlife on Roads data sources for the Couchiching Conservancy and Muskoka Conservancy land acquisition areas.

Data source	Years	Location	Number obs.	Comments
iNaturalist	2012-2021	Simcoe County, Kawartha Lakes, District Muskoka	2534 (357 reptiles)	Clipped to 50 m from road; not cleaned for obscured coordinates for SAR; all vertebrate taxa
Natural Heritage Information Centre	1975-2010	Ontario	215 (131 reptiles)	Clipped to 50 m from road; not cleaned for accuracy; all vertebrate SAR
Eco-Kare International	2012-2018	None in Couchiching Conservancy AOI, some in Muskoka primarily along highway 400, and highway 118	2391 reptiles (177 in study area)	Clipped to roads in Muskoka Conservancy natural heritage features
Scales Nature Park	2016-2020	Monck Road	97 (93 reptiles)	Over 4000 Blanding's observations from 2013-2021 across the study area
This project	September 2021	Monck Road, Kris Star Sanctuary	17 (2 turtles)	Section 3
Ontario Turtle Conservation Centre	2015-2021	Simcoe County, Kawartha Lakes, District Muskoka	70 (turtles)	Clipped to 50 m; spatial accuracy is poor; likely injured turtles only

Road Ecology in Central Ontario

Reports of Wildlife on/near Roads



Author: The Couchiching Conservancy with guidance in road ecology concepts and data collation from Karl Gunson, Eco-Kare International. Date: 1/23/2022. Coordinate System: NAD 1983 UTM 17 N. Projection: Transverse Mercator. Data: Land Information Ontario, Couchiching Conservancy, iNaturalist, Scafe Nature Park /2021, Ontario Turtle Trauma Center/2018, NHIC.2013. Contact for details. This is NOT a plan of Survey and is not for navigation or legal use. The Couchiching Conservancy operates within the territory of the Indigenous Peoples of Treaty 18, Lake Simcoe – Nottawasaga and The Williams Treaties.



Figure 10: Wildlife on or near (50 m from) a road within the five conservation corridors in the Couchiching Conservancy. Wildlife is shown by vertebrate taxa (mammals, birds, turtles, snakes or skink, and amphibians).

3.2.1 Next steps and opportunities

We recommend the compiled database be used to direct citizen science programs for road ecology such as data collections and mitigation planning. Each segment can be given a unique identification.

We recommend each road segment with a drainage be assessed along its length for presence of culverts or bridge. These structures should then be assessed for wildlife passage for both terrestrial and aquatic species (see Appendix D). Those road segments that have a wetland on one side and both sides within 100 m should also be assessed.

We also recommend for a list of criteria to be defined with the end user, i.e. road agencies, conservation authorities, non-profit organizations and land trusts to further identify road mortality hotspots. The baseline database is structured to enable additional criteria and metrics to be assembled. Criteria can be weighted and overlaid to obtain priority scores as desired (see Section 2.2.2).

Accurate and complete hydrology, land use and road data sets are instrumental for these types of assessments. Likely the respective road agencies have the most accurate road and wetland data as opposed to what is available with LIO because these agencies are continually updating their data sets. It is recommended to obtain road, wetland, culvert/bridge and traffic volume data sets from each respective township, county and district for additional iterations of priority mapping.

Aiesha Aggarwal, Conservation Research and Analyst with Couchiching Conservancy provided expertise and followed the process and is a trained individual that can assist with establishing priorities for surveying and mitigation. There is also a shared dropbox between EcoKare and Couchiching Conservancy with all mapping products and compiled materials.

3.2.2 Examples of indices and analyses that may be applied for establishing road ecology priorities

Below is a list of prioritization indices that have been compiled as part of developing a road ecology strategy for specific jurisdictions in Southern Ontario; please contact Eco-Kare for these reports:

1) Road mortality hotspots for Blanding's Turtles along the road network within Federal Properties in Ontario that include First Nations, Canadian Wildlife Service properties etc., 2020 - 2021

Eco-Kare has been retained by Environment and Climate Change Canada to develop a practitioners guide for road ecology for SAR in the context of federal lands. As part of this assignment Eco-Kare is developing Blanding's turtle wetland forest habitat networks that are within and adjacent (up to 10 km) of the federal properties. The road network will then be overlaid on-top of the federal properties and flagged for mitigation based on specific criteria.

2) Established hotspots for freshwater turtles along the regional road network in Grand River watershed, 2020 to 2021

Working with the Ontario Road Ecology Group and funded by the Ontario Habitat Stewardship Program Fund, Eco-Kare has mapped all freshwater turtle occurrences near roads, to predict where turtles are likely to be on roads using the Southern Ontario Land Information System. Supplementary to this analysis a Circuitscape layer was integrated and used to evaluate the connectivity score based on circuit density for each 1 km road segment in the road network.

3) Road Ecology Strategy for the Town of Oakville, Environmental Policy Office, Sept 2013 – Sept 2015

Retained by the Town of Oakville to develop a road ecology strategy for decision makers and practitioners to facilitate integration of road ecology concepts into existing and future municipal infrastructure development. This included reviewing and providing Best Management Practices (BMP) for reducing municipal road impacts on wildlife (road-kill and connectivity), vegetation (invasive and Right-of-Way management), and hydrology (connectivity and water quality). A mapping case study included using effective mesh size indices measured in km² as an index to measure loss of connectivity by new road development OR gain of connectivity by mitigating new roads in North Oakville as done previously in Switzerland (Jaeger et al. 2007) and in Canada (Roch & Jaeger 2014). of how these effects could be reduced with mitigation measures.

5) Established hotspots for the Snapping Turtle and Jefferson Salamander along the regional road network in Halton Region, 2015

Retained by the Region of Halton and funded by the Ontario Habitat Stewardship Program Fund, Eco-Kare was retained to map Snapping Turtle hotspots along the road network and to predict hotspots based on an observed - random logistic regression habitat analysis using the Southern Ontario Land Information System. We used where Jefferson Salamanders occurred within vernal pool and forest complexes in the Niagara escarpment to inform rule-based habitat use, where new roads were planned near or within habitat, mitigation was prioritized

6) Development of a province-wide wildlife mitigation strategy (WMS) for the Ministry of Transportation, Ontario, 2012 – 2016

Eco-Kare (Ms. Gunson) was the lead project manager and technical developer for two mitigation prioritization tools for the MTO. Each tool integrated available data, expertise and tools into a first generation framework that will define where road mitigation should be prioritized along Ontario's 19,000 km of highways for both large and small animals. Animals targeted include Species at Risk (SAR) turtles and snakes that are protected under the Endangered Species Act (2007) as well as large animals, e.g. moose, deer, and black bears that pose a public safety risk. The large animal decision tool uses crash data to define where high risk wildlife-vehicle collision (WVC) hotspots occur. Supplementary to the spatial analysis, metrics such as the proportion of WVCs, crash severity, and vehicle risk were evaluated at defined hotspots. The small animal tool was primarily based on habitat models that predict where road mortality will occur for Species at Risk habitat specialists such as the Blanding's Turtle, Foxsnakes, and Massasauga Rattlesnake.

7) Hotspot prioritization of road mitigation along a road network for turtles and amphibians in the Regional Municipality of Peel, 2015-2016.

Eco-Kare worked with the Toronto Region Conservation Authority (CA), and Credit Valley CA to develop a road ecology strategy to prioritize where road mitigation most specifically for reptiles and amphibians is required. We used ten years of amphibian call data to model the amount of forest cover surrounding wetlands where amphibians occurred as compared to where they didn't occur. This information was used to map habitat. Road layers were then overlaid in a Geographic

Information System to predict where amphibians would cross between wetland-forest habitat. The Regional Municipality of Peel was provided with a geospatial database to prioritize mitigation for implementation in road upgrade projects. The work was featured as a case study in the most recent text book of wildlife mitigation for small animals and methods developed have since been employed in other CA jurisdictions including Guelph, Halton Region and Raisin Region CA.

4 Citizen Science

A citizen science workshop was held with ten volunteers from the Couchiching Conservancy on September 25th, 2021 (Image 10). The team met at the Kris Star nature reserve and surveyed the 2 km of road identified in our priority mapping as a hotspot (see Section 2.1.2; Section 2.2).

See the following websites:

<http://couchichingconserv.ca/how-to-help/volunteer/resources-for-volunteers/>

<https://www.flickr.com/photos/90805956@N07/sets/72157719968019122/>

In summary we found 3 unknown frogs, 3 green frogs, 7 Red Efts (likely more), 3 old turtle bones, 3 unknown scat. The red efts were likely a fall migration that occurs each year at this location and should be evaluated (Figure 11). Also of note on was a large female road-killed Painted Turtle found on County Road 35 in the Carden Alvar corridor.

Prior to the field day workshop, Kari Gunson led a training webinar for collections of Wildlife on Roads for volunteers registered with Couchiching Land Trust on Eventbrite. Twenty-one volunteers signed up and nine attended the webinar. The recording of the webinar can be found here:

<https://www.youtube.com/watch?v=-uuIWkTTNU>



Image 10: Field day workshop with volunteers from Couchiching Conservancy on September 2021 on Monck road.

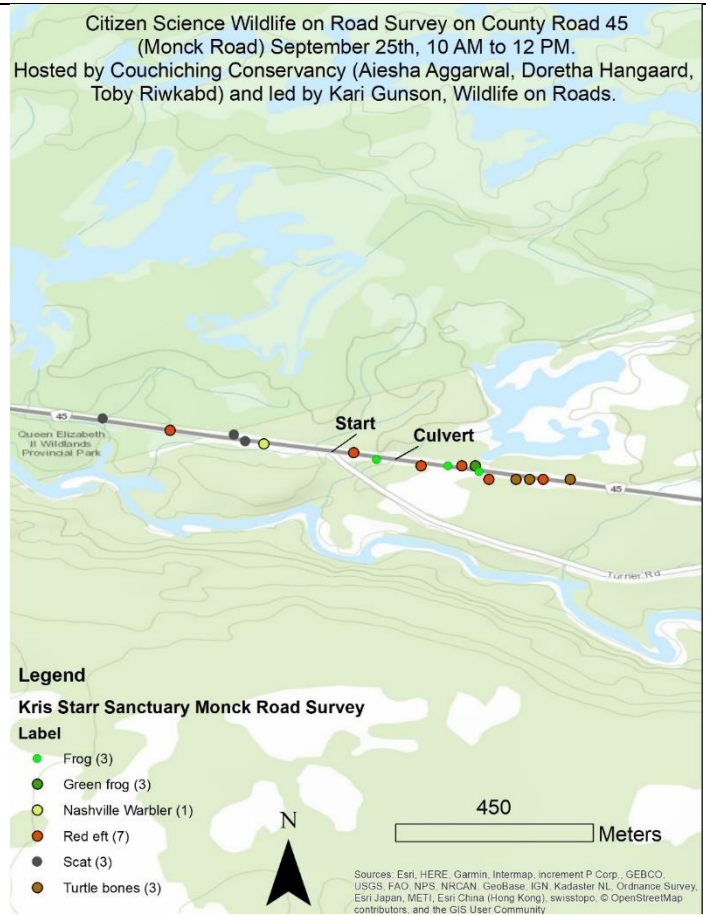


Figure 11: Mapped data collected during field day at Monck road at the Kris Star Sanctuary.



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Wildlife on Roads Resources

▾ About the Program



[PDF: Using iNaturalist for your wildlife on roads observations by Eco-Kare](#)

[YouTube: Road Mortality Workshop](#). If you watch this video, please use the [online form](#) to submit online training hours and feedback.

How are roads impacting species movement and mortality in our region? The Couchiching Conservancy is partnering with Kari Gunson (Principal Road Ecologist at [Eco-Kare International](#)) to map species (reptiles, amphibians, mammals, birds) observed on or near roads. Watch the training video linked above to learn how to use iNaturalist to report your observations to the 'Wildlife on Roads in Ontario' Project

4.1 Next steps and opportunities

Couchiching Conservancy has a well-established stewardship program with a large network of volunteers. In addition to well-trained staff. There are tremendous opportunities for volunteers to survey a designated 1 km road section to and from the Land Trust properties that are surveyed regularly (see Section 2.2).

The data base produced in Section 2.2 can provide this opportunity to coordinate volunteers. The materials and framework for training are available with several project frameworks. Scales Nature Park has an obvious presence in the area and is able to train individuals to obtain data. Alternatively, data can be submitted to iNaturalist on the Wildlife on Roads platform.

5 Land Acquisition Priorities and Road Ecology

A letter to request for partnerships and land acquisition was drafted and strategically sent out to landowners in Couchiching and Muskoka Land Trust areas near to the target areas. This includes landowners along Highway 169 across from Black River Wilderness Park, along Monck Road at Sucker Creek across from the Whitney wetland reserve, and around Houseys Rapids road within the Black River Wildlands Corridor.

The letter is relevant to road ecology and states the following:

Recently, we have also become aware that to build these corridors effectively, we will need to be able to help wildlife cross busy roads safely. We are currently working to identify places which might be good candidates for safe crossings. But before we invest in such road infrastructure, we need to be sure the existing habitat on either side of the road has some level of permanent protection.



Dec. 14, 2021

Dear landowner,

Have you ever thought it might be nice to somehow protect the natural habitat in your ownership from development as time goes on?

My name is Mark Bisset and I am the Executive Director of The Couchiching Conservancy, a non-profit, charitable land trust that operates in the Lake Couchiching region. Since 1993 we have worked with various partners to help create more than 14,000 acres of protected nature reserves in the region. We have done that by purchasing or accepting donations of land, or by creating conservation agreements with private landowners.

We are contacting you to see if you are interested in exploring the idea of protecting the landscape currently in your care.

We have developed an analysis of the region called The Couchiching Conservancy Conservation Priorities, 2020. It identifies several areas where it may be possible to build permanently protected wildlife corridors. Looking out many years into the future, such protected corridors would continue to provide habitat for dozens of species of wildlife at risk, provide flood mitigation and sequester carbon for generations to come – all critically important in this age of rapid climate change. They would retain the wild nature of our communities that so many of us love and enjoy. Your property falls within one of those areas of interest we have called the Black River Wildlands Corridor.

Recently, we have also become aware that to build these corridors effectively, we will need to be able to help wildlife cross busy roads safely. We are currently working to identify places which might be good candidates for safe crossings. But before we invest in such road infrastructure, we need to be sure the existing habitat on either side of the road has some level of permanent protection.

There are significant tax benefits to making a part or full donation of land to the Conservancy, but when that's not in the cards, there are also tax benefits available for creating a conservation agreement that would see your land protected while you still own it.

If any of this sounds interesting to you, we'd love to talk.

You can reach me directly at 705-326-1620, or by email at mbisset@couchconservancy.ca.

Thanks for reading through, and best wishes over the holidays.

Mark Bisset, Executive Director

Protecting nature for future generations

Mailing: Box 704, Orillia, ON L3V 6K7 | Office: 1485 Division Rd West, Orillia, ON L3V 0X6
www.couchichingconserv.ca | 705-326-1620

6 First Nations Engagement

The project team will focus mitigation efforts for road ecology within the Black River Wildlands Corridor and Kahshe River corridor identified in Section 2.2.1. This area overlaps with both Land Trusts and is also within the Williams Treaty First Nations Area (prior to 2018 known as the Treaty 20 Area). The seven communities identified are:

- Curve Lake First Nation
- Hiawatha First Nation
- Scugog Island First Nation
- Beausoleil First Nation
- Cippewas of Georgina Island
- Chippewas of Rama First Nation

We have attached a separate .pdf document for the proposed Indigenous Engagement Plan.

The primary objective of the plan is to inform the rights holders on the impacts to the local ecology by settler road development and maintenance practices.

As our engagement plan progresses we have identified the following opportunities for meaningful engagement:

- Workshops
- Engagement with Chippewas of Rama First Nation at Black River Wilderness park located on County Road 169
 - Turtle crossing area (Scales Nature Park, personal communication; this study).
- Results sharing
- Participation in installation of exclusion fence at Mud Lake Provincially Significant Corridor where Sucker Creek bisects Monck Road; the Whitney Nature Reserve is bordered southerly
 - Opportunity to install exclusion fence as a grassroots project or by contractor (see Section 3.1.3)

7 Partners and Collaboration Opportunities

Many of the potential partners were contacted during Phase 1 of this project and are outlined below:

- Non-profit groups conducting similar road ecology initiatives such as wildlife on road data collection, priority mapping and education and awareness, i.e. the Land Between and Scales Nature park
- Government agencies were contacted for data requests, however these groups are essential to engage for phase 2 of this work

- Conservation agencies such as the Ministry of Environment, Conservation and Parks was contacted focusing on individuals that work in QE II and the GIS mapping work, however Conservation Authorities still need to be contacted in phase 2 of this work
- Seven First Nation groups identified in the Treaty 20 area will be formally contacted as part 2 of this work.

8 Next Steps and Identified Opportunities

Scales Nature Park has compiled hundreds of wildlife on road observations in the focal study area. The priority roads in the Black River Wildlands and Muskoka identified in this work are monitored with high intensity by Scales, i.e. several times a day between 5 pm and 2 am during the turtle nesting season. Scales has shown that with intensive efforts just over 50% of the turtles found on Houseys Rapids road have been found alive and not road-killed. Any new volunteer programs led by the Land Trust require coordination with Scales Nature Park to co-ordinate efforts on selected roads so overlap doesn't occur. Scales has a 'hotline' that should be communicated to the Land Trust volunteers. Scales Nature Park is willing to provide training sessions for data collections and an overview of activities conducted by the park.

Our assessment focused on preliminary investigations of drainage intersections with roads. Drainage intersections present opportunities for wildlife mitigation that may be existing without construction. Next steps are to evaluate the feasibility and costs for overpass type structures on large highways such as Highway 11. Other mitigation measures such as education and awareness campaigns are also valid and can target motorists that use low-volume roads to access cottages etc.

More substantial and long-term recommendations are to assemble all conservation groups involved with creation of the MECP mapping as part of the Nature Connectivity project and the relevant road agencies and First Nations to participate in a shared-joint effort to plan for and assess feasibility for more permanent mitigation measures at identified roads. Priority mapping deliverables need to be available for transportation agencies so that planned road upgrade projects can include and plan for mitigation for SAR and other wildlife.

Site visits and additional hydrology assessments will convey the adequacy of existing bridges and culverts for wildlife passage as well as the required retro-fits. In the case that the existing hydraulic structures may be modified to facilitate wildlife passage, then opportunities to fund and implement wildlife exclusion and barrier walls connecting hydraulic structures should be sought. Inclusion of wildlife exclusion fencing at hotspots as a retro-fit has been led and implemented the Lake Simcoe Conservation Authority and has been very successful (Read & Thompson 2021). The presence of existing access roads and driveways along the roads will need to be assessed to determine continuity of exclusion/funnel walls.

Activities that should be prioritizing in the next year (short-term) as follows:

- Installation of permanent exclusion fence and removal of silt fence at Sucker Creek on Monck road

- Training and mobilization of volunteers to survey selected roads for wildlife to and from nature reserves in the Land Trust areas
- Field trips and assessments of drainage areas along the key roads, e.g. Monck road, Highway 11, Houseys Rapids road, and Coopers Falls road
- Obtain required road-related and hydrology data sets from most complete and accurate sources
- Build-on priority mapping assessments on roads in both Land Trust areas of interest
- Initiate First Nations engagement process with the identified seven First Nations groups
- Host a workshop with road agencies that include the Ministry of Transportation, District of Muskoka, Township of Gravenhurst, and Simcoe County
- Investigate the feasibility and cost of a wildlife overpass on Highway 11 to connect the Black River corridor and Kawartha Highlands to Georgian Bay.

9 Acknowledgements

Aiesha Aggarwal, Conservation Research and Analyst with Couchiching Conservancy performed the mapping associated with Figures 3,5,6,7,8 and 9. Dorthea Hangaard and Toby Rowland with Couchiching Conservancy helped coordinate the citizen science component of the project as well prioritizing the need for mitigation at Sucker Creek at Monck Road. Aaron Rusak with Muskoka Conservancy was an enthusiastic participant who attended the road ecology field day at Nobel Road and presented several interesting ideas for road ecology mitigation. Mark Bisset and Scott Young helped interpret and communicate the connectivity, constraints and opportunities that occur within the focus areas. Mark Bisset led the formal request for land acquisition in the focal area. Gary Pritchard and Jeffrey Driscott with 4 Directions Conservation Consulting Services created an Indigenous Engagement Plan that is relevant to this project for the Treaty 20 area. Dave Pearce with Wildlands League assembled the team, introduced the Nature Connectivity project and led the dialog with MECP.

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Appendix A Project Team and Roles

Kari Gunson, Landscape/Road Ecologist, project lead



Kari is both a landscape and road ecologist with a specialization in Geographic Information Science. Kari has been and is currently involved in several road ecology mapping initiatives in Ontario. These initiatives have been province or watershed level in scope. Kari's process entails designating the target species (typically Species at Risk wetland species), geographic scope, and available land use data to map preferred habitat of the target species. Kari integrates movement ecology and road ecology principals into each mapping exercise. Road ecology metrics include evaluating fragmentation impacts of roads, and hotspot analyses to delineate road-kill clusters. All these final products will be available for this project.

In addition, Kari has recently completed a book titled 'Wildlife on Roads' where she provides a tool to empower citizens, e.g.

individuals, agencies or maintenance workers to collect accurate and complete data collections of wildlife on roads to be used for mitigation planning. Citizen scientists are encouraged to collect data and to upload data into a user friendly platform, e.g. iNaturalist where it can be accessed and shared. The iNaturalist program obscures Species at Risk records so that sensitive data are not mis-used. All these data and data from partners will be secured for this project.

Gary Pritchard, Indigenous Engagement Specialist and Conservation Ecologist, Principle 4 Directions Conservation consulting.



Gary Pritchard of 4 Directions Conservation brings a wealth of expertise and experience in Indigenous engagement, education and environmental monitoring. Gary is a member of Curve Lake First Nation. He brings a wealth of knowledge, performing a wide variety of services including: Indigenous Community Planning, land-use/traditional knowledge studies, capacity building, mediator between western science and traditional science and peer reviewer on behalf of Indigenous communities. Gary has successfully collaborated with many stakeholder groups, researchers, institutes, government agencies and

Indigenous communities and political organizations to address environmental concerns and identify practical solutions to fisheries or environmental related issues. Every Indigenous Community consultation process is as unique as the community you are working with. Each project will have its own potential impact to the Indigenous rights and interests of the community, and will be examined independently.

Dave Pearce, Forest Conservation Manager Wildlands League, Coordinator



As part of the nature connectivity project (section 5.2) Wildlands League identifies the need to integrate connectivity in Southern and Central Ontario. Dave Pearce, brings to the project the ability to engage the necessary partners to piece together natural areas in the landscape. Wildlands league has participated in a connectivity mapping exercise that extends from Georgian Bay to Kawartha Lakes and northerly to Algonquin. He will be able to share the knowledge of this exercise with the team. Wildlands League will help to coordinate amongst the various proponents, setting up regular calls and meetings, assisting with drafting reports and communications and assisting with outreach. We will participate fully in Indigenous Engagement and Road Ecology Workshops.

We will work especially on the public lands portion of this area to identify crown, municipal and unceded lands that can contribute to the project goals. We will work with public land managers, including Westwind forest management to help with the identification of crown/unceded and other lands under forest management that may provide connectivity, habitat for listed species, and other ecological benefits to the project. We will coordinate with land managers to provide mapping information, values prescription assistance, habitat enhancement advice and activities, access management advice and activities and assistance with road ecology work on crown lands. Many aspects of this project overlap with our commitment to FSC certification processes and will compliment that work.

Scott Young, Executive Director, Muskoka Conservancy Land Trust



Nature conservation is Muskoka Conservancy’s mission. As a land trust, we do this primarily through acquiring and protecting properties. Volunteers help to steward and monitor our properties and work to define the species composition of our lands through citizen science. We inspire children and adults through our Eco-Club, trails, expert-guided hikes, and native plant program.

We are actively acquiring nature conservation land all over Muskoka. South Gravenhurst is an area of significant natural value, but one that has been fragmented by numerous developments. The most obvious barrier to natural connectivity is the Highway 11 corridor with its strip commercial developments. There is also a Canadian National Railway line, and several municipal roads servicing industrial, commercial and residential areas.

Muskoka Conservancy has defined a project area that features several of our existing nature reserves and conservation easements, but more significantly, the project area includes several

provincial and one federal conservation reserves. This is in the area of the South Kaskashe River where it crosses Highway 11. Another area of interest is the gap between the Queen Elizabeth 2 Wildlands and Kaskashe Barrens Conservation Reserve.

Mark Bisset, Executive Director, Couchiching Conservancy Land Trust



The Conservancy works with numerous partners to protect natural lands across six municipalities around Lake Couchiching and the City of Orillia. This region encompasses the ecological transition along the southern edge of the Canadian Shield and is highly diverse in its ecology. Species at risk (SAR), including the target SAR identified by the Eastern Georgian Bay Initiative, are at the heart of what we do. We believe that the most effective way to maintain and recover these species is to acquire, protect, connect and steward their habitat. Creating connected corridors makes all the difference to species who call this region home. Roadways, habitat destruction and fragmentation disrupt the natural processes and their chances of survival. In Ontario alone, there are over 200 species of plants and animals at risk of disappearing according to the provincial Ministry of the Environment, Conservation and Parks. Protecting and maintaining natural wildlife corridors is a key goal of the Conservancy, in order to create protected corridors for wildlife migration. We will work with our partners in the Black River Corridor, where habitat is largely still intact, but increasingly busy roads pose a barrier to connectivity.

Appendix B October 26th Meeting Minutes with updates

Meeting Oct 26, 2021-1:00 PM to 3:30 PM: **Road Ecology and Land Acquisition and Indigenous Engagement in the Muskoka and Couchiching Land Trust Areas of Interest with updates 21-Jan-22**

Link to meeting on Couchiching Conservancy YouTube. Only people with the link can access the video: <https://youtu.be/BJfbEwv3esY>

Attendance: Kari Gunson (Eco-Kare), Mark Bissett, Toby Rowland, Dorthea Hangaard, Aiesha Aggarwal (Couchiching Conservancy), Aaron Rusak (Muskoka Conservancy), Dave Pearce (Wildlands League); not present Scott Young (Muskoka Conservancy)

Agenda:

1 pm to 1:15 pm-Housekeeping items such as new team members, field trip Parry Sound in road ecology Nov 2, and 4

1:30 pm to 2:30 pm-Objectives, Geographic Information System show and tell, data compilations, data sources, partners, priority areas. case study (Whitney culvert), citizen science updates

2:30 pm to 2:40 pm-After understanding our priority areas as per maps what can we do for Indigenous Engagement? What Treaty's are in effect: Williams Treaty, Robins Treaty, Treaty 20? Letter to First Nations was mentioned in our September 2nd meeting.

2:40 pm to 3:00 pm-Action items, possible field trip to key areas for mitigation implementation (citizen science, underpass, overpass and fencing), partner data acquisition, report writing, map creation, specific land acquisition parcels?

Meeting Notes:

Our original ask was to implement road ecology mitigation together with land acquisition. Buy a parcel of land that connects to conserved lands, and is where animals are getting killed. We would want to put a wildlife overpass or underpass.

Sub-components – citizen scientists to collect data where we are lacking data where there could be lacking data. Engage with Indigenous community.

But there are other already attained protected land where we know road kill is already a problem. We are documenting these. These areas could have mitigation techniques installed, e.g. use exclusion fencing and existing culverts. For example at Whitney nature reserve and Kris Starr.

Land Acquisition:

Mark makes a point that land acquisition is a long process. Kari suggests if we already have a property acquisition in the works, the funding could go towards that.

Land acquisition is difficult now because land is over-valued because of the high cost of residential properties. A letter to landowners is a good deliverable to see if anyone is interested in selling their land in our focus areas. This fits into the Private Land Stewardship program that Toby is working on. We can identify the addresses and send out letters to people in the vicinities of the pinch points. We might not be able to spend the funding meant for land acquisition right away. Depends on availability, willingness of people to sell. If we obtain interest then we can be more direct with our funding ASK next year. Easements might be another option. The process for easements usually takes 8 months. Land Owner Stewardship relationships could be a way in to connect with the

landowners. In the letter, mention interested in working with private land owners for the mitigation measures.

Update 21-Jan-22: A Land acquisition letter was created that featured a mention of the importance of road ecology and land acquisition. Couchiching Conservancy sent out this letter to landowners in the southern half of the Houseys Rapids Road in the Couch area of interest. The letter was shared with Muskoka Conservancy with addresses to send out to property owners in Muskoka at the top end of the Houseys Rapids Road.

Other acquisition: the land across from Whitney is Priority 1. It is the one connection between the whole mud lake complex. We should send a letter to these land owners as well. Scott had identified an area for potential acquisition by the highway 11 pinch point.

Citizen Science:

Kari ran a webinar and workshop in the field with the Couchiching Conservancy. Very good reception. Resources on the Couchiching Conservancy Website. Dorteia added that we need to assign volunteers to specific sections of road. This could not be done this year because the warm season is over, however we could assign volunteers to specific sections of road to monitor. This is an action item for next year and future funding. For now, we should encourage volunteers to subscribe to the wildlifeonroads.com network and collect data opportunistically.

Update 21-Jan-22: A database of potential 1km road segments for monitoring was completed as part of this project and will be made available to Couchiching Conservancy. The database can guide data collections for citizen scientists, and guide where road mitigation is required.

Mapping:

SONC Group, Greenbelt, Wildlands League is putting in a proposal with them for funding for road ecology work. They need a full proposal. That proposal needs to be in by Nov 5th. The SONC project deals with corridors and land acquisition but there is nothing on road ecology and it is a piece that needs to be added.

Central Ontario mapping. The Nature Connectivity Project. We had an overview meeting with the QEII wildlands provincial park team on September 28th that Dave Pearce put together and a follow up meeting with Kari Gunson and Ardyth Barr, the GIS technician on October 4th, 2021 for this project. Ardyth shared with Kari an Excel file that outlined the datasets used. Ardyth thought she could share the final layers, but this may be difficult because it was done several years ago and it may be difficult to dig up all the files. Kari asked whether it is worth chasing this down but will give it another try in November.

Update 21-Jan-22: Kari received a high resolution .jpg of the final mapping as well as methods and partnerships for the mapping. This was integrated into our final report.

Kari is compiling Wildlife on Roads Data: from NHIC, Ontario Turtle Conservation Centre, Eco-Kare International, Other Sources from the Land Between and Scales Nature Park. She can use these data to verify where road ecology mitigation is needed near protected Land Trust lands and in the priority areas defined by Couchiching Conservancy.

Circuitscape was conducted by the MNR contact Jeff Bowman: it is likely based on data classified in early 2000's from aerial photography (Southern Ontario Land Information System version 1). The red shows high connectivity. If red crosses roads, it could be an area to look at.

Crown Land is – Unceded First Nation Territory land under Williams Treaty. This area is interest to Scugog Lake. Want QEII name changed. Gary suggests staying within the Treaty 20 area, because there are 7 FN in this area, moving out of this area complicates the Engagement piece with at least 20 FNs.

For this project, we should focus in the Black River Wildlands Priority Area. This is the Willaims Treaty area (formerly Treaty 20). This is within the area that overlaps Muskoka and Couchiching Land Trusts. There are several species at risk. Cooper's Falls Road and Housey's Rapid Road are 2 areas of interest. Muskoka Conservancy has 2 nature reserves west of Housey's Rapids Road. There are wetlands on either side of Housey's Rapid's Road. We need to assess the road to determine access and whether exclusion fence is continuous. There is a snowmobile trail and walking trail along here. There are private roads that connect to go into Kashe Barrens. The biggest hurdle with fencing is driveways and access roads. Exclusion fencing gate might be useful for access roads.

Highway 11 is another pinch point that Scott identified. This would be a good spot for a community group to monitor. It is an important spot for land connectivity. At this point the area has been identified with expert opinion and we need data collections to verify.

Scott defined this corridor in an email on October

I created this map back when the road ecology group expressed interested in identifying potential project areas close to Muskoka-Couchiching boundary. The reason I selected this area shaded in the aqua colour are:

Connections:

- It aligns with natural geography of the area by following the route of the South Kakshe River from Kakshe Lake across Highway 11 to where it joins the Kakshe River and eventually drains into Sparrow Lake.
- The area is a natural corridor for wildlife on the Kakshe Barrens Conservation Reserve to a major water body in Sparrow Lake.
- The area includes Muskoka Conservancy's 200-acre Muskoka Welcome Nature Reserve (shaded in orange).
- MC has two additional conservation properties on the shores of Sparrow Lake.

Barriers:

- obviously the major barrier is Highway 11 corridor and all the associated developments that occur there.
- Other barriers include Southwood Road, Baseline Road, Sparrow Lake Route D, Rainbow Circle, and the CN Rail line.
- A cottager community has successfully lobbied Town of Gravenhurst to advocate Provincial Government to approve a new road, this one proposed from Highway 11 to Kakshe Lake along the South Kakshe River. This is proposed to carve through the Conservation Reserve and MC's Nature Reserve.

Unknowns:

- I do not know if it has ever been studied.
- I do not know if any mitigation measures are already in place.

For our road ecology project, this area has it all. It represents an opportunity for connections through a highly fragmented environment. It is intensely developed so represents an urgent need, and it is facing an imminent new threat. That's why I identified.

Update 21-Jan-22: Highway 11 has been examined with all our mapping sources and road-kill and SAR presence was verified by Scales Nature Park. The corridors identified by the QEII mapping project were also examined along this highway.

The Land Between: they are also doing mapping. Their mapping shows where they think turtles are getting killed: where there are wetlands on either side of the road. They have grant funding and we are looking for collaboration opportunities. They also collaborate with Scales Nature park.

Update 21-Jan-22: Kari attended a mapping meeting to discuss methods and overlap with Bill Lougheed (Georgian Bay Land Trust), the Land Between GIS technician (Daniel Grenon), and Leora Berman, Chief Operating Director for the Land Between. Afterwards Kari sent her compiled data from highways in the Land Between Region and Georgian Bay area to the Land Trust and the Land Between.

Point of interest identified for mitigation:

The Whitney Culvert – is quite large, which is good. It is the same type of culvert that they put on Rama Rd. Curve Lake advocated for these box culverts. There were requirements with the Department of Fisheries and Oceans to upsize the culvert. The next step is to put exclusion fencing to funnel the species through the culvert. We want to write a letter to propose the plan for putting up exclusion fencing. The box culvert extend far into the wetland and we could use exclusion fence to construct wing walls to funnel animals into the culvert that are walking along the road. There is existing silt fence that was left on site that needs to be replaced with more permanent fence. The silt fence should be removed as soon as possible because it is hindering hatchling movement from nests that may have overwintered. It would be prudent to contact the road agency and Conservation Authority to discuss consultation and permits required to install the exclusion fence. This could be part of our Engagement process with FNs in the Treaty 20 area. Possibly a demo site.

Fencing examples: Animex fencing last about 10 years. Need to be careful with lawn mowers though. Concrete fencing is good. Fencing could also be attached to the guard rail. When digging down below 6 inches, need to locates and other permissions.

Highway 69 culverts are a good example of successful passage in a 3 m by 3 m culvert with wing walls and exclusion fence. Animals and turtles use these large culverts. The exclusion fencing is really important to tie it into the culvert, so that they have a guide to lead them right into the culvert. The fences need maintenance over time as well. Something to keep in mind.

Signs to watch for turtles could be useful.

First Nations Engagement:

Indigenous Engagement; Williams Treaty is comprised of seven first nations signed. Curve Lake, Hiawatha, Scugog. Rama doesn't have treaty rights prior to 2018. In 2018, collectively signed the Williams Treaty and there are 7 nations. Gary is writing the engagement strategy and letter. It will take until the new year to hear back. First Nations shut down Dec 15 for Christmas. We will get the letter into the cue. Need 1 map to show where we plan to do the project. Roads are placed

everyday in the territory without Indigenous permissions/knowledge. This is a violation of treaty rights.

Black River Wilderness park is on the Chippewas of Rama First Nation land and could be a potential area to focus on. Highway 169 runs beside it. There are observations of Blanding's turtle, snapping turtle. It is owned by Rama first nation. It is in priority area 1 and near priority area 2.

Prioritize looking at Black River Wilderness Park area for First Nations engagement, road ecology, and land acquisition. The other areas that we have pinpointed (Housey's, Coopers Falls, Highway11) could also be part of the database for mitigation.

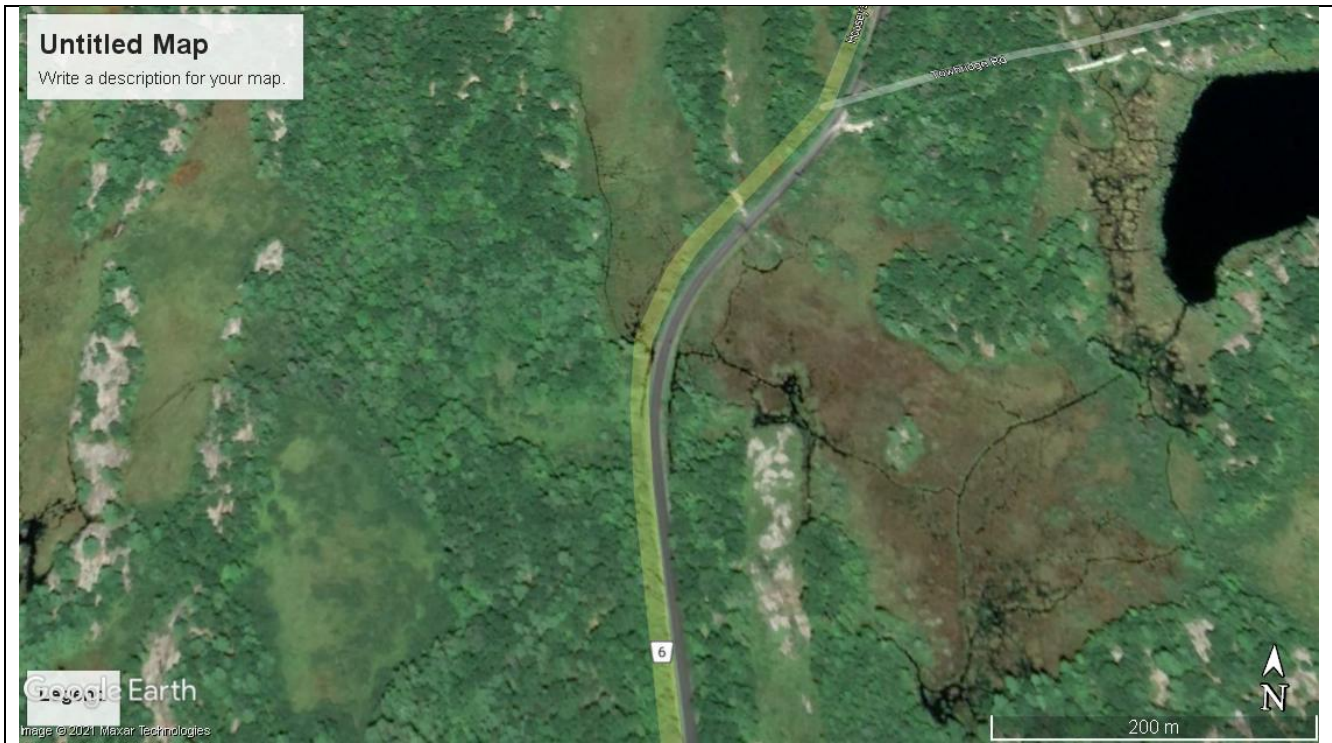
Action items

- Kml of Muskoka properties (obtained and a shapefile created)
- Township and County culvert and bridges data required (received for Simcoe County)
- Aiesha will start creating map templates for the final report
- Kari will continue with data sharing and mapping partnerships with the Land Between and Scales Nature Park
- Send the Whitney Culvert report to the rest of the group (this has been described in our final report, still need to contact relevant agencies for permissions to install).
- Letter for Engagement to indigenous communities. Need meaningful engagement -We can show this to the funders as one of our action items (this letter has been compiled as part of our submission and will be sent out pending on additional funding, our team prioritized the strategy document to be completed and the letter and engagement process to follow).
- Focus in on the red circle for indigenous engagement and land acquisition
- Kari will put together a report that ties everything together and prioritizes areas to focus for more funding for road ecology implementation and possibly land acquisition.
- Next spring need to send volunteers out to specific locations, but need to keep in mind this funding does not extend into 2022. At end of report, say what we want implemented and this will be the premise for our next funding ASK: Something on Housey's Rapids, Coopers Falls, exclusion fencing at Whitney, targeted citizen science etc.
- Couchiching will lead the letter of land acquisition send out and coordinate with Scott.

Appendix C Google Earth Images



Houseys Rapids Road stream and wetland crossing needs to be examined for potential wildlife crossing (utm 17n 641313 4964213)



Stream and wetland crossing at Housey's Rapids road that may have potential for wildlife crossing (utm 17n 641313 4964213; Google Earth image)



Stream crossing at Coopers Falls road showing location of a box culvert that has potential for wildlife passage located in the connection between the Sadowa Candidate ANSI and QEII provincial park (utm zone 17n 641112 4961373)



Highway 11 (north linkage) between between the Muldrew Barrens and Jevins and Silver Lake Conservation Reserve with CN railway within 100 m from highway (UTM 17N 632170 4962496)



Streetview of stream crossing at Highway 11 between between the Muldrew Barrens and Jevins and Silver Lake Conservation Reserve (UTM 17N 632170 4962496)

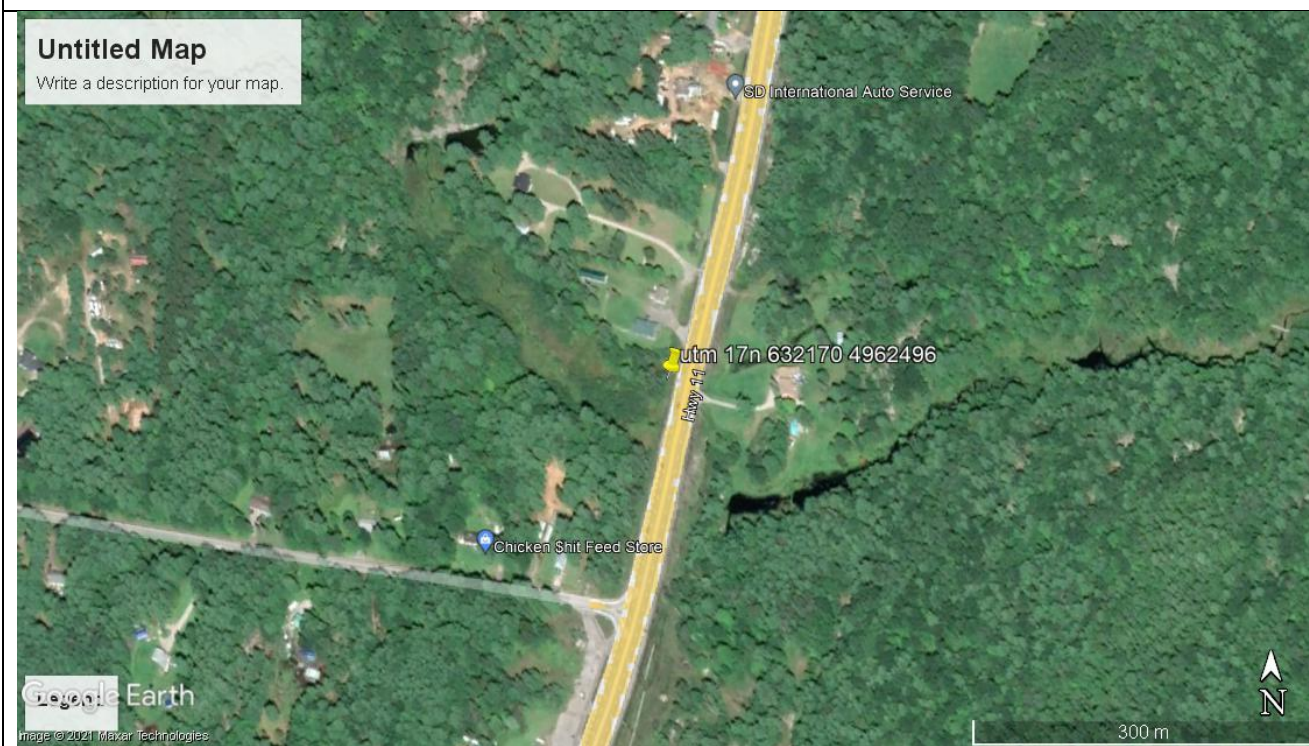


Highway 11 (one of three potential crossings in the south linkage) at Kahshe River (UTM 17n 632520 4964030)





Streetview: Highway 11 (one of three potential crossings in the south linkage) at Kahshe River (UTM 17n 632520 4964030)



Highway 11 (one of three potential crossings in the south linkage) about 1.5 km south of Kahshe River (UTM 17 n 632170 4962496)



Streetview Highway 11 (one of three potential crossings in the south linkage) about 1.5 km south of Kahshe River (UTM 17 n 632170 4962496)

Appendix D Datasheets

Culvert Inventory Datasheet

General Information

Date: _____ Observer: _____ Primary Hwy Direction: N – S E – W

Road name: _____ Divided or Undivided Median Y & width (m) _____ OR N

Lanes: _____ Parallel infrastructure? _____

Road Pavement width (incl. median) _____ Culvert ID #: _____ General Photo #'s: _____

GPS Wyp: _____ Lat: _____ Long: _____

Other notes: _____

Culvert Description & Measurements (circle one: estimated OR measured, indicate units)

Openness (observe by looking through): Clear Partial Blocked

If obscured or blocked, describe: _____

Height/rise: _____ Width/span: _____ Length: _____

Culvert material: Concrete Metal Plastic/fibreglass wood

Culvert shape: Round pipe Squash pipe Box culvert Arch culvert

Terrestrial or Aquatic If aquatic, is waterflow: Standing Moderate Heavy

Is culvert submerged? Y N What is the height of water over or in the culvert (cm): _____

Substrate Type: rock gravel cobblestone dirt/soil stream bed concrete/asphalt metal plastic or other _____

Describe proportion of substrate coverage at culvert bottom _____

Dry pathway through culvertNone Dry dirt Rock/Dirt Dry rocky

Describe pathway condition and width (cm) _____

Any other unique culvert features, e.g. skylight?: _____

Side 1: N S E W **Road Shoulder:** gravel paved width (m) _____ **Inflow or Outflow?**

Surrounding Habitat: _____

Entrance (1 m into culvert): Clear Partial Blocked **Describe:** _____

Condition of culvert: _____

Distance culvert extends past road shoulder: _____

Guardrail or Jersey barrier present? Y, above culvert only Y, along road segment N

Veg. within 3m of entrance: Y N **Type:** None Grasses Bushes Bushes/Trees

Beaver baffles? Y N **Description:** _____

Side 1 photo #'s: _____

Other comments: _____

Side 2: N S E W **Road Shoulder:** gravel paved width (m) _____ **Inflow or Outflow?**

Surrounding Habitat: _____

Entrance (1m): Clear Partial Blocked **Describe:** _____

Condition of culvert: _____

Distance culvert extends past shoulder: _____

Guardrail or Jersey barrier present? Y, above culvert only Y, along road segment N

Veg. within 3m of entrance: Y N **Type:** None Grasses Bushes Bushes/Trees

Beaver baffles? Y N **Description:** _____

Side 2 photo #'s: _____

Other comments: _____

Date:			Temp:			Time Start:		Route:					
Weather:			Name:			Time End:		Other Notes:					
Species	Time Found	Status (e.g. AOR, DOR)	Fresh /Old	Size (cm)	Sex	Location or Waypoint, or description		Habitat 1	Habitat 2	Where found on road	Road lane (e.g. EB)	Direc- tion	Comments
						Lat/civ- east	Long/civ- north						

Note datasheet developed by Eco-Kare International as modified from Wildlife on Roads program: <https://inaturalist.ca/projects/wildlife-on-roads-in-ontario>, please contact kequnson@eco-kare.com for questions.