



Integrating Road Ecology Principles into Municipal Processes

Fact Sheet, November 2018

What is Road Ecology?

Road ecology is defined as the study of the interaction of roads and vehicles with the environment (Forman et al. 2003). Roads can have various effects on the natural environment and unfortunately they are often negative. These can include:

1. Habitat loss – building roads and related infrastructure often requires the removal of natural heritage features, resulting in less habitat available.
2. Habitat fragmentation – roads can cut through habitats, leaving them in smaller patches than can support some populations.
3. Barrier effects – roads can act as barriers since some species won't or can't successfully cross the road. This limits their access to resources, mates and other habitats.
4. Habitat degradation – road pollutants like salt and oil, as well as light, noise, and litter can reduce the quality of habitats adjacent to roads.
5. Vehicle-wildlife collisions – as some species attempt to cross roads, they can be injured or killed by passing cars. The rate of collisions is dependent on the road design (eg. speed, size, location), as well as the species crossing (ie. faster-moving and larger species less likely to be hit).

All of these effects work together to reduce population sizes and increase the risk of local extinction.

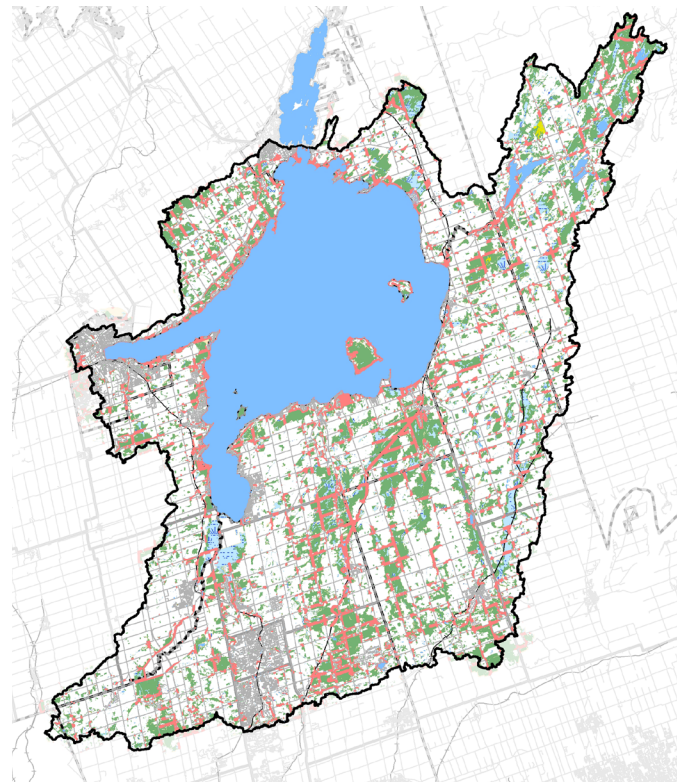
It doesn't have to be expensive!

There are a variety of low-cost solutions to reduce wildlife road mortality – contact the LSRCA to discuss options for your project

Mapping Road Mortality Hotspots

There are over 5,000 km of roads in the Lake Simcoe watershed, many running through natural heritage features where wildlife live and travel to fulfil the requirements of their breeding cycle. Where roads pass through these wildlife habitat features, wildlife road mortality is more likely to occur. To better understand the scope of the issue, LSRCA has mapped potential vehicle-wildlife collision hotspots, which represent over 37% of the roadways in the watershed.

Map of Potential Vehicle-Wildlife Collision Hotspots in the Lake Simcoe Watershed



Legend

- Grassland
- Wetland
- Forest
- Lake
- Roadside hotspots

0 2 4 8 12 16 20 24 Kilometers

This product was produced by the Lake Simcoe Region Conservation Authority and some information depicted on this map may have been compiled from various sources.

While every effort has been made to accurately depict the information, data mapping errors may exist. This map has been produced for illustrative purposes only.

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These hotspots represent areas where reptiles and amphibians are more likely to be killed on roads, and can help project managers decide where to build roads, areas to avoid and areas that could benefit from road ecology best management practices (eg. wildlife ecopassages, signage, or fencing).

Incorporating Road Ecology BMPs into Road Design

Transportation infrastructure is important to our growing population and the movement of people and goods. While it's impossible to stop building roads, they can be designed and built in ways that minimize the impacts on wildlife through the use of best management practices (BMPs).

Some examples of road ecology BMPs include:

- Sizing and siting roads to avoid critical habitats and movement corridors
- Facilitating safe wildlife movement across road infrastructure through ecopassages
- Wildlife exclusion fencing and escape measures
- Roadside warnings signs and detection systems
- Temporary or seasonal road closures
- Right-of-way vegetation management
- Road lighting strategies

Did you Know?

Wildlife ecopassages installed by LSRCA reduced the number of road-killed turtles by 81%, compared to sites without ecopassages.

The Ontario Ministry of Transportation has drafted an Environmental Guide for Mitigating Road Impacts to Wildlife (MTO 2017), which outlines wildlife mitigation measures that can be incorporated into road design:

1. **Avoidance** – Plan for a route that avoids and/or minimizes impacts on wildlife and ecosystems.
2. **Mitigation** - Identify and implement a suite of mitigation approaches in the road design for habitat protection and facilitating wildlife movement.
3. **Habitat creation and management** – Strategies such as wetland substrate salvage, topsoil salvage,

habitat creation or improvements, and more ecologically based road vegetation management.



An American toad

4. **Monitoring** – Evaluate whether a mitigation strategy for wildlife is effective and strive to determine if wildlife populations are affected by the mitigation, and which designs work best.

The Ontario Ministry of Natural Resources and Forestry has developed Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario (MNRF 2016). This document details the impacts of roads on reptiles and amphibians, presents an overview of road mitigation BMPs, and outlines techniques to monitor the effectiveness of implemented BMPs.

These and other documents can assist municipalities in incorporating road ecology BMPs into the planning, design, assessment and construction of new roads, as well as the management, maintenance and retrofitting of existing roads.

Template Policies

In order to empower municipalities to implement road ecology BMPs into their processes, the LSRCA has drafted template policies for road ecology which can easily be built into municipal planning documents. Since many of the road ecology principles for wildlife also apply to fish, the policies have been scoped to include both groups.

The policies have been drafted specifically for incorporation into the transportation section of official plans, but can be adapted for use in other planning tools and practices, as outlined in section 1.2.

Policies for Incorporation into the Transportation Section of Official Plans

1.0 It is the policy of the municipality to require that road ecology practices be incorporated into the process of road location selection, design, construction, and maintenance practices. This includes the expansion and replacement of existing road infrastructure.

1.1 Where applicable, road ecology practices, including but not limited to the following, shall be implemented, monitored and maintained through processes associated with Planning Act, Environmental Assessment Act and Conservation Authorities Act as part of any transportation project.

- a. Areas of significant fish and wildlife movement and/or mortality should be identified and avoided. Where avoidance is not possible, appropriate mitigation and offsetting shall be implemented.
- b. Fragmentation of natural heritage corridors with roads and infrastructure should be avoided.
- c. The movement of fish and wildlife should be facilitated between natural areas to provide corridors and connect natural areas. Fish and wildlife corridors such as key natural heritage features and key hydrologic features should be maintained, improved or restored.
- d. Where appropriate, new and replacement watercourse crossings shall be designed to facilitate the movement of appropriate fish and wildlife.
- e. In rural areas, roadside plantings to discourage wildlife habitat and movement immediately adjacent to infrastructure should be considered.
- f. Roadside warning signs should be placed in areas of significant wildlife movement
- g. Temporary or seasonal road closures should be implemented in high wildlife mortality zones.
- h. A roadway directional lighting strategy should be implemented that avoids too much lighting in environmentally vulnerable sites.



Snapping turtle found on the road

- g. Municipal Road Maintenance and Upgrade Standards/Protocols/Manuals
- h. Any other related plans

Testing a Mitigation Approach

From 2015 to 2017, the LSRCA implemented a turtle ecopassage pilot project to test the effectiveness of wildlife exclusion fencing at reducing road mortality at five sites in the watershed. Staff installed 0.51m tall Animex plastic fencing alongside the roadway and attached it to existing culverts and bridges.



An ecopassage site before (top) and after (bottom) the exclusion fence installation



The fencing was dug into the slope to avoid any drainage issues or impacts to operations (ie. plowing and mowing). This design works to reduce turtles' access to roadways, while maintaining connectivity across habitats by guiding them towards the culverts or bridges to safely cross under the roads.

Artificial nesting structures were also built to provide safe areas for female turtles to lay their eggs. They were installed inside the fencing so when the eggs hatch, the young are directed away from the road and towards the wetland habitat.

Monitoring of the sites demonstrated an 81% decrease in turtle road mortality after the exclusion fencing was installed. Before the ecopassages were created, on average 32 turtles were killed per km of road; the fencing reduced this number to 6 turtles killed per km. Because of turtles' slow reproductive rate and long lifespan, this decrease in road mortality can have huge implications for the survival of local populations.

Implementing similar mitigation measures in other hotspots throughout the watershed can provide safe connectivity for wildlife populations and safer roads for motorists.

Other Areas to Incorporate Road Ecology Policies and Practices

1.2 Road ecology practices that reduce vehicular-wildlife interaction and impact on wildlife pathways while still providing a safe transportation environment should be included in the creation, review, and update of the following documents:

- a. Watershed and Subwatershed Plans
- b. Master Plans such as Transportation and Environmental Servicing
- c. Municipal Class Environmental Assessments
- d. Secondary Plans
- e. Neighbourhood/Community/Block Plans
- f. Natural Heritage Evaluations/Environmental Impact Studies

Ecopassage Guide

LSRCA has also drafted a guide to implementing reptile and amphibian ecopassages in the Lake Simcoe Watershed. It was created to assist project managers in incorporating road ecology BMPs into road design, with a focus on reptile and amphibian ecopassages.

The guide provides an overview of the planning process, important considerations for project planning, and some helpful tips learned from completing similar projects. The guide is available for download here: www.LSCRA.on.ca/RoadEcology

Recommended process for planning wildlife crossing projects

1. Identify and prioritize road sections that could negatively impact connectivity or increase mortality of reptile and amphibian populations, using the hotspot map
2. Consult with relevant stakeholders, including conservation authorities, municipalities, and provincial ministries (eg. MTO, MNRF) to determine regulations/permit requirements and to obtain relevant available data.
3. Identify the species in the area that will be affected by the road project, including potential species at risk. Design a strategy to aid as many species as possible without in avertedly impacting other species



Garter snake safely excluded from the roadway by ecopassage fencing

4. Design and determine the location of mitigation measures such as crossing structures by combining ecological and engineering data
5. Plan the construction process, considering timing to avoid active wildlife periods, temporary mitigation measures, sediment and erosion control and other relevant aspects of project planning
6. Develop a monitoring and maintenance plan to evaluate the effectiveness of the mitigation measures and ensure their ongoing function.

Implementation and Next Steps

Road ecology best management practices can be incorporated into both new roads and retrofitting existing roads. Consideration for road ecology can not only protect native species and their habitats, but also provide safer roads for motorists. The ecopassage guide and other related guidance documents should be consulted at the outset of any road projects in the watershed.

When municipalities are updating their Official Plans, Secondary Plans, Transportation Master Plans and other planning tools, the above template policies should be adapted and incorporated, as appropriate. If required, LSRCA staff can be available to assist with this process and ensure that the goals of the policies are being implemented.

The ecopassage guide and template policies are available for download here: www.LSCRA.on.ca/RoadEcology



Female snapping turtle nesting on roadside

For further information or assistance with the template policies or ecopassage guide, please contact Lake Simcoe Region Conservation Authority at info@lsrca.on.ca or 905-895-1281.



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Established in 1951, the mission of Lake Simcoe Region Conservation Authority is to work with our community to protect and restore the Lake Simcoe watershed by leading research, policy and action. To learn more visit www.LSRCA.on.ca.