

# **Wildlife-Vehicle Mitigation on Northeastern Ontario Highways**

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## **Abstract**

Wildlife collisions on Ontario's highways are an increasing problem. It is estimated that each year, approximately 14,000 (6%) of Ontario's vehicle collisions involve wildlife. Approximately 10% of these occur in Northeastern Region with an estimated cost of \$110 million per year. Collisions with wildlife can result in driver injury or fatality. The cost to wildlife is even higher as it is estimated that as many as half of wildlife collisions are unreported but nonetheless can result in either serious injury or mortality to the animal. In addition to collisions with large wildlife, smaller wildlife, including species-at-risk wildlife are also hit on highways.

The science of wildlife-vehicle collision mitigation is emerging and as such trials are still being completed to demonstrate the effectiveness of various mitigation strategies and techniques in specific terrain and conditions. In addition, the collection of wildlife collision data is based on reported collisions and does not include more minor collisions or all collisions with large commercial traffic. The aforementioned factors present challenges in addressing wildlife-vehicle collisions, particularly when the implementation of mitigation is costly.

Northeastern Region MTO has struck a Wildlife Mitigation Team to begin to systematically address priority wildlife collision locations. The group has taken several approaches to addressing collisions which include strengthening data collection and analysis, provision of grade-separated crossing opportunities, installation of wildlife fencing, installation of wildlife reflectors and plans for the use of technologies such as the Radio-Activated Detection System or similar. Included in these efforts is a Sharepoint website accessible to the environmental function where experiences with mitigation techniques can be documented. Northeastern Region has also undertaken to maintain a current list all available wildlife mitigation literature, also available Ministry-wide through Sharepoint. This represents an innovative approach to addressing wildlife-vehicle collisions since prior to this effort, these were examined on a project by project basis.

The purpose of this paper is to present the efforts to date and experiences of the Wildlife Mitigation Team, including challenges encountered and lessons learned.

## **Background**

In Ontario each year, an estimated 14,000 collisions with wildlife costs Ontarians roughly \$1.1 billion. Approximately 10% of these wildlife collisions occur in the Northeastern Region of the MTO with a cost of \$110 million. These costs include direct and indirect costs such as subsequent long-term requirements for health care.

Perhaps even more outstanding is that roughly only half of all of the large mammal collisions are reported and none of the collisions with smaller wildlife or even species at risk are reported. Collisions are reportable when the value exceeds \$2000 and as such collisions that cause less damage are not reported. This annual road mortality can be significant for many species.

The science of mitigating vehicle-wildlife collisions is emergent and available literature lacks evidence on the effectiveness of given mitigation measures under varying conditions. In addition to this, the cost of implementing mitigation is high which is confounded by the fact that because so many collisions are unreported, the identification of hot spots to address via mitigation is imperfect. Mitigation measures that prevent wildlife collisions and mitigation measures that protect wildlife are not always consistent. Mitigation measures can be as harmful to wildlife populations as highway mortality as they may fragment wildlife habitat leading to a lack of genetic diversity or a concentration of disease.

The application of wildlife-vehicle collision mitigation measures, although bearing high initial costs, can result in significant long-term financial savings. Intrinsic savings can also be realized through reducing the impact to wildlife and wildlife habitat if benefits to wildlife are considered in the design of the mitigation measure.

Northeastern Region MTO is undertaking to identify hotspots within the region through the regular capital program and through an initiative called the “Wildlife Mitigation Team” and is beginning to systematically address areas of concern in ways that are beneficial to both the traveling public and wildlife. All mitigation implemented will also be monitored with sufficient rigour that the Ministry can begin to focus on those measures that are most effective. This approach to addressing wildlife collisions is innovative for this Ministry given that prior to now priority areas for wildlife were identified on a project-by-project basis through the traffic analysis done as part of the design process for capital endeavours. The list of tools available to address identified issues was also not as extensive as it now is.

The approach to addressing wildlife-vehicle collisions is four-fold:

- 1) Avoid wildlife habitat in the planning of new highways;
- 2) If wildlife habitat cannot be avoided, separate wildlife and vehicles with grade-separated crossings;
- 3) Alter driver behaviour; and,
- 4) Alter wildlife behaviour.

This paper will focus on the latter three since new highway alignments are not the typical scenario being addressed.

### **1) Avoid wildlife habitat in the planning of new highways**

When a new highway alignment is being considered, consultation is undertaken with the Ontario Ministry of Natural Resources and local First Nations communities towards the identification of areas of concern. Wildlife populations are especially sensitive to the impacts of new roadways. In addition to this, field investigations during the planning process are carried out to confirm areas of critical habitat for wildlife. Collision statistics from an adjacent or parallel highway corridor can sometimes be extrapolated for consideration in this analysis. This information is used in combination with all of the other factor areas considered through MTO's Environmental Assessment process to assess the most appropriate options for new alignments.

## **2) Separate wildlife and vehicles**

Other jurisdictions have long used various versions of crossing concepts that allow wildlife and vehicles to travel the same area without conflict. This is a relatively new tactic for the Ministry of Transportation, but it is being embraced on new construction.

Figure 1 and 2 are conceptual renderings of the first large scale (often referred to as "high quality") wildlife crossing east of the Rocky Mountains. This structure is currently nearing the end of detail design and will be constructed over the new 4-lane Highway 69 North of the future interchange for Highway 637. This area is referred to as "Burwash" and during the planning of this section of highway, concerns were brought forward by the local Ontario Ministry of Natural Resources about the impact of the highway on mortality of a recently re-introduced elk herd in this area. In addition to this, traffic data was extrapolated from existing Highway 69 in this area and a high-rate of wildlife-vehicle collisions was predicted for the new highway. In response to these concerns, MTO undertook a study to determine the feasibility of constructing a passage over the highway to allow wildlife movement. The roadway protection in this case will be many kilometers of wildlife fencing. The wildlife crossing is being constructed to ensure that the new highway does not create a barrier to wildlife movements.

Adjacent to this over-crossing (1km to the North) will be an under-crossing in the form of a 5m x 5m concrete box culvert. This culvert is intended to be multi-use as there is a forestry license in this area which may mean a logging event in the future. During this period of time, logging vehicles would have access to the culvert. The remainder of the time, access to the culvert will be blocked by physical means from vehicular use.

Figures 3 and 4 represent efforts along this new corridor to protect smaller wildlife species. Highway 69 passes through areas with significant Eastern Massassauga Rattlesnake (EMR) habitat. EMR are protected by the Species at Risk Act and are an imperiled species. Because their habits lead to their presence on the highway and the highway in some areas destroyed EMR habitat, MTO constructed culverts intended for the passage of herpetofauna in consultation with the Ministry of Natural Resources. Fencing is being used to direct herpetofauna to the culverts and to deter them from entering on to the highway. The type of fencing employed was selected in consultation with the Ministry of Natural Resources.

Also planned for a new section of Highway 69 are a series of culverts located in Blandings turtle habitat. Blandings turtles are also protected under the Species-At-Risk Act. These culverts were located in consultation with the Ministry of Natural Resources and a turtle specialist from nearby Laurentian University. At the ends of each of these passages, artificial nest sites will be constructed with a southern exposure to ensure that they are thermally appropriate for turtle use. Similar turtle nest sites were constructed in Algonquin Park last year in the vicinity of a logging road that was creating some concern. Lessons learned from the monitoring of these nests will feed back into the construction of the new nests to ensure that they are maximally effective.

Bridges in Northeastern Region are being constructed with wider spans than required to pass the body of water beneath in order to provide wildlife passage opportunities along the banks of rivers and creeks. This is occurring through the capital program where bridges are being replaced and topographically a larger structure can be accommodated. New bridges and culverts are also being designed larger than required where research and input received during the EA process indicate there is a need.

### **3) Alter driver behaviour**

The first course of action to alter driver behaviour with respect to wildlife is to erect wildlife warning signage. In cooperation with the Ministry of Natural Resources and the Ontario Provincial Police, MTO Northeastern region developed enhanced signs as seen in Figure 5. Drivers become complacent when encountering the same signs and these signs were designed to create a heightened awareness about the risk of encountering wildlife. The outline of the deer and its eyes were painted with reflective paint in such a way as to give drivers an idea of what they would see were there to be wildlife in their path. Concurrent with the introduction of these signs was a public education campaign with posters and tray liners that were distributed to local food outlets and tourist information booths. The poster can be seen as Figure 6. Effectiveness is limited with most driver education programs aimed at reducing wildlife-vehicle collisions because of driver complacency.

The use of a wildlife warning system is currently planned for two locations in Northeastern Region. The premise behind this system is that radio waves communicate with receivers erected sequentially along a stretch of highway. If this communication is interrupted by wildlife stepping across the radio frequency, then the system activates flashing lights that warn drivers of imminent danger of encountering wildlife. Use of this system will be implemented in a stand-alone trial as well as in a second trial where the system will be combined with fencing. The second application of this type of technology is innovative in there are not currently documented examples of employing this system within a gap in highway wildlife fencing. In this way, animal movements are concentrated to one section of a larger area of concern such that the system can ensure a higher level of driver focus.

#### **4) Alter wildlife behaviour**

Figures 7 and 8 depict the first example of wildlife specific fencing in the province. This fence is 2.8m in height to prevent wildlife from jumping and also has a 1m buried apron to prevent wildlife from digging under. The mesh size is graduated with the smallest at the bottom to prevent the passage of smaller wildlife. At regular intervals are alternating one-way gates and jump-out ramps that allow wildlife that may become trapped within the right-of-way to escape. This fencing is located in an area where two low volume low speed roads traverse under the highway so that wildlife can use as an alternate means of travel. This wildlife fencing design is being used to create the standard for the Ministry. Fencing in other jurisdictions has been proven to be as much as 100% effective at reducing wildlife vehicle collisions.

On Highway 540, Manitoulin Island, wildlife reflectors were installed over an 800m stretch. Figures 9 and 10 show the wildlife reflector stretch and a close up of one unit. The idea behind the reflectors is that light from oncoming vehicles is projected away from the right-of-way alerting wildlife to the presence of an approaching vehicle. These reflectors have been tested in other regions with varying results. Cameras are installed to commence monitoring the response of wildlife to the reflectors. These cameras are motion activated and will thus take pictures when they recognize the presence of an animal and will document whether the reflector system is activated and if it is whether wildlife continue to cross the highway.

A trial is being undertaken on Highway 17 within Lake Superior Provincial Park to address a high rate of moose/vehicle collisions. This trial includes clearing to increase visibility and efforts to reduce the amount of standing salty water in the right-of-way. The salty water will be addressed by creating channels to encourage positive drainage or where this is not possible infilling the area with rip rap. This trial is based on suppositions that through this stretch of highway the presence of moose is strongly related to the consumption of salt, in particular in the early spring when they are mineral-starved.

#### **Additional measures**

Wildlife collision data is officially collected through the reports of the OPP. This data includes “reportable” collisions which mean two criteria apply: 1) someone called the police and 2) the collision is valued at more than \$2000. In order to augment the data available for identifying collision hot spots, the Ministry of Transportation, Northeastern Region is working with our outsourced maintenance contractors to collect additional data on wildlife carcasses that are collected from the side of the highway. Collisions with wildlife that are not serious, but still result in wildlife mortality are included in the data through the use of this additional collection. This information is then mapped and combined with data derived through OPP collision reports. This additional source of data also provides the species of the animal and some other biological information which is

unavailable from the collision reports but is vital in selecting the most appropriate mitigation technique.

Northeastern Region also actively searches for the most current documentation on wildlife-vehicle mitigation. This information is stored on a Sharepoint website available to MTO staff responsible for environmental assessment and environmental protection. Northeastern Region MTO manages the content of this site and in addition to available literature; upcoming events and training notices, reports on the successes, and recommendations on the use of various mitigation measures will be included as they become available. This will include monitoring reports from the all mitigation installations.

The Ontario Road Ecology Group is an assemblage of representatives of various agencies and interest groups with intent to protect wildlife and MTO Northeastern Region maintains a representative in this group. Participation in this group as well as actively pursuing likeminded professionals has provided Northeastern Region MTO with a vast resource of contacts to discuss ideas and experiences with, and more recently, as our experience has grown, means we are also being contacted to provide advice.

A 5-year plan is being developed to secure advance funding for a set number of mitigation implementations for each year over the next five. This will also include funding for monitoring of these measures since determining their effectiveness is tantamount to justifying future expenditures. This plan will be based on a combination of the collision data provided by the provincial police, data collected by the maintenance contractors and data regarding species at risk provided by the Ministry of Natural Resources.

Monitoring is being planned for all of the mitigation measures being implemented so that future applications can apply any lessons learned. As examples: monitoring of the wildlife fencing on Highway 11 will include monitoring of adjacent highway sections to ensure that the presence of the fence is not forcing collisions elsewhere; monitoring of the wildlife reflectors will consist of photographic evidence of the reaction of wildlife to the presence of the reflectors; monitoring is being planned for the Highway 69 wildlife crossings that will include motion detected digital imagery designed to demonstrate whether wildlife are using the crossing. Results of monitoring will be shared through the above-noted Sharepoint website so that all MTO Regions can benefit from these experiences.

### **Benefits**

The systematic application of mitigation measures has many benefits. Reducing the number of wildlife on our highways will lead to obvious reductions in wildlife-vehicle collisions and subsequent cost savings. It will also lead to reduced impacts to wildlife populations by reducing wildlife road mortality and by consideration, through the mitigation design, of habitat requirements. Currently costs are quite high to implement

wildlife mitigation and the benefits realized may be less than anticipated since many of the techniques available are untested, or at least, untested under all conditions. As more monitoring is complete and these results disseminated, the risk in applying innovative measures will decrease. As well, costs for many of the products available may become less prohibitive as their use becomes more standard.

**Figures: Wildlife-Vehicle Collision Mitigation on Northeastern Ontario Highways**  
Ontario Ministry of Transportation, Northeastern Region



*Figure 1. Highway 69 future wildlife over-crossing conceptual rendering, aerial view*



*Figure 2. Highway 69 future wildlife over-crossing conceptual rendering, highway view*



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*Figure 3. Herpetofauna culvert, Highway 400, North of Tower Road, located in Eastern Massassauga Rattlesnake habitat*



*Figure 4. Herpetofauna culvert, dump road off of Highway 400, located in Eastern Massassauga Rattlesnake habitat*

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*Figure 5. Modified wildlife warning sign located on Highway 11 South of North Bay*

**Stay Alert! Stay Alive!**  
**Wildlife Collisions Occur...**

- Every minute of every hour in Canada
- On all roadways
- Most frequently between 5 am - 7 am and 6 pm - midnight
- In spring when animals seek road salt in the ditches
- In summer when animals try to escape biting insects
- In fall during the mating season

10 lbs 4.5 kg	200 lbs 90 kg	200-300 lbs 90-136 kg	1,000-1,500 lbs 455-680 kg

**Driving Tips**

- **SLOW DOWN!** Visibility is greatly reduced at night and so is your reaction time!
- Avoid driving during dusk or dawn if possible
- Use high beams when possible
- Scan the road continuously, shoulder to shoulder
- At night watch for reflection of animals' eyes - they will blink, glow and move
- Drive cautiously through areas identified as high risk by wildlife crossing signs
- **ALWAYS** slow down when passing wildlife - it may suddenly jump into your lane
- Keep braking after an animal has crossed - there are usually more
- **NEVER** attempt extreme manoeuvres to avoid a collision
- Don't assume the animal will move out of your way - most freeze in a vehicle's headlights

*Figure 6. Wildlife warning campaign trayliner/poster*

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***Figure 7. 2.8m Highway wildlife fencing, Highway 11 South of North Bay, one-way gate shown***



***Figure 8. Figure 7. 2.8m Highway wildlife fencing, Highway 11 South of North Bay, jump-out ramp shown***

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*Figure 9. Wildlife reflector, Highway 540, Manitoulin Island*



*Figure 10. Stretch of wildlife reflectors, Highway 540, Manitoulin Island*