- News Bulletin -

Monitoring the effectiveness of wildlife passages for medium-sized and small mammals along HW 175

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Two news bulletins about this research project are published per year.

Contents:

Context of this research project

Roads and traffic negatively impact many wildlife populations and ecological processes because they act as barriers to the movements of animals, reduce habitat accessibility, and reduce habitat quality next to the road. These limitations can affect an animal's migration pattern, its access to resources, it mortality rate, gene flow, and the dispersal opportunities for the young. Roads also have several effects on the level of populations, such as changes in predator-prey relationships, decreases in species richness, and overall community composition. However, many of these higher-level effects have a response delay, therefore predicting their magnitudes can be difficult. For this reason, long-term monitoring projects are essential to arrive at more accurate impact predictions in the future. In addition, mitigation measures are needed to reduce a road's impacts on wildlife populations.

For example, wildlife passageways in combination with fencing along roads can be used to decrease road impacts on wildlife populations by reducing traffic mortality and increasing the permeability of the road. Most studies about road mitigation measures so far have focused on the effects of passageways on large mammals because large mammals are a concern for traffic safety, while very few studies have examined the passageway effects on medium-sized and small mammals. Medium-sized and small mammals are sometimes also a traffic safety concern, but the road impacts on these populations are a more important concern. Therefore, long-term monitoring is a fundamental necessity in determining the benefits of wildlife passageways on medium-sized and small mammals.

In 2012, the enlargement of HW 175 from two lanes to four lanes was completed. The highway runs between Quebec City and Saguenay and passes through natural forested areas such as the Reserve Fauniques des Laurentides. This enlargement increased the width of the road approximately three times and has created a major barrier and has fragmented wildlife habitat, especially for smaller-sized mammals, often preventing attempts to cross as well as increasing the danger of crossings due to traffic mortality and higher detectability by predators.

In order to reduce their impacts, wildlife passageways for small, medium-sized and large mammals and fences for large and medium-sized mammals were put in place along HW 175. Fences along the road prevent animals from crossing and direct them to the passageways where they can cross safely under the highway. This restores habitat connectivity between the two sides of the highway if there are enough wildlife passages. Such measures have been in place to increase connectivity in many countries such as France, Germany, Switzerland, and the Netherlands for more than 20 years. The passageways along HW 175 are among the first to be built in Quebec, which provides a good opportunity to study their effects on the surrounding wildlife populations.

Main objectives of this project

This research project will determine whether the passageways are effective for medium-sized and small mammals and whether further road management is needed. The effectiveness of the mitigation measures for large mammals has been studied in a separate project. This four-year project will provide important information for adaptive management and long-term monitoring of road mitigation.

This research project has three main objectives:

1. **To characterize the locations and rates of vehicle collisions with small to medium-sized mammals and to evaluate the difference in the frequency of highway-related mortality between areas of the highway with mitigation measures and areas without.**
2. **To determine the performance of the five types of passages for small to medium-sized mammals.**
3. **To assess how well the mitigation measures provide for the permeability of the highway for individuals and for gene flow across the road, with a focus on the American marten.**

Traffic mortality survey (Objective 1)

We conducted daily road mortality surveys between June and October 2012 and 2013 to determine the effectiveness of mitigation measures at reducing road mortality. In both years, the species detected the most often was the North American Porcupine (*Erethizon dorsatum*) with 206 mortalities detected. The groups with the two next highest mortalities detected was unidentifiable mirco-mammals (*n* = 55) and mouse species (*n* = 43). Table 1 shows the mortalities detected for all mammalian species in both 2012 and 2013. A map of all locations of mammal carcasses found along Route 175 does not exhibit an obvious pattern of road collisions (Figure 1).

Statistical analysis of the data will reveal the relationship with the wildlife passages and fences for all species separately. We expect that the number of mortalities will be lower at the locations where wildlife passages and fences are installed, at least for medium-sized mammals. However, small mammals can move through the meshes of the fence. It is possible that animals follow the fence in the wrong direction, i.e., away from the entrance to the wildlife passage, and then may try to cross the road at the end of the fence. Therefore, we also will determine if the number of road-kill detections is higher at fence-ends than within the fenced sections and in the unfenced sections.

CODE	Species Name	Espèces	2012	2013	Total
ERDO	North American Porcupine	Porc-épic d'Amérique	94	112	206
MICRO	Unidentified small mammals	Micro-mammifère non-identifié	40	15	55
PERO	Mice spp.	Souris spp.	40	3	43
UNKN	Unidentified mammals	Mammifère non-identifié	18	23	41
VUVU	Red Fox	Renard roux	19	15	34
MEME	Striped Skunk	Mouffette rayée	14	18	32
ARVI	Vole & Bog Lemming spp.	Souris campagnol	27	1	28
LEAM	Snowshoe Hare	Lièvre d'Amérique	16	10	26
SOXX	Shrew spp.	Musaraigne spp	19	3	22
MAMO	Woodchuck	Marmotte commune	8	9	17
TAHU	American Red Squirrel	Écureuil roux	9	3	12
PRLO	Raccoon	Raton laveur	9	1	10
ZAXX	Jumping Mouse spp.	Souris sauteuse spp.	5	2	7
CACA	North American Beaver	Castor d'Amérique	1	5	6
Bat spp.	Bat spp.	Chauves-souris spp.	4	1	5
MUXX	Weasel spp. unidentified	Mustela spp.	0	2	2
GLSA	Northern Flying Squirrel	Grand polatouche	2	0	2
URAM	Black Bear	Ours noir	2	0	2
NEVI	American Mink	Vison d'Amérique	1	0	1
		TOTAL	328	223	551

Table 1: Mammal mortalities detected in the field sessions of summer 2012 (June 11 to October 24) and summer 2013 (June 3 to October 2). No martens were found on the road.

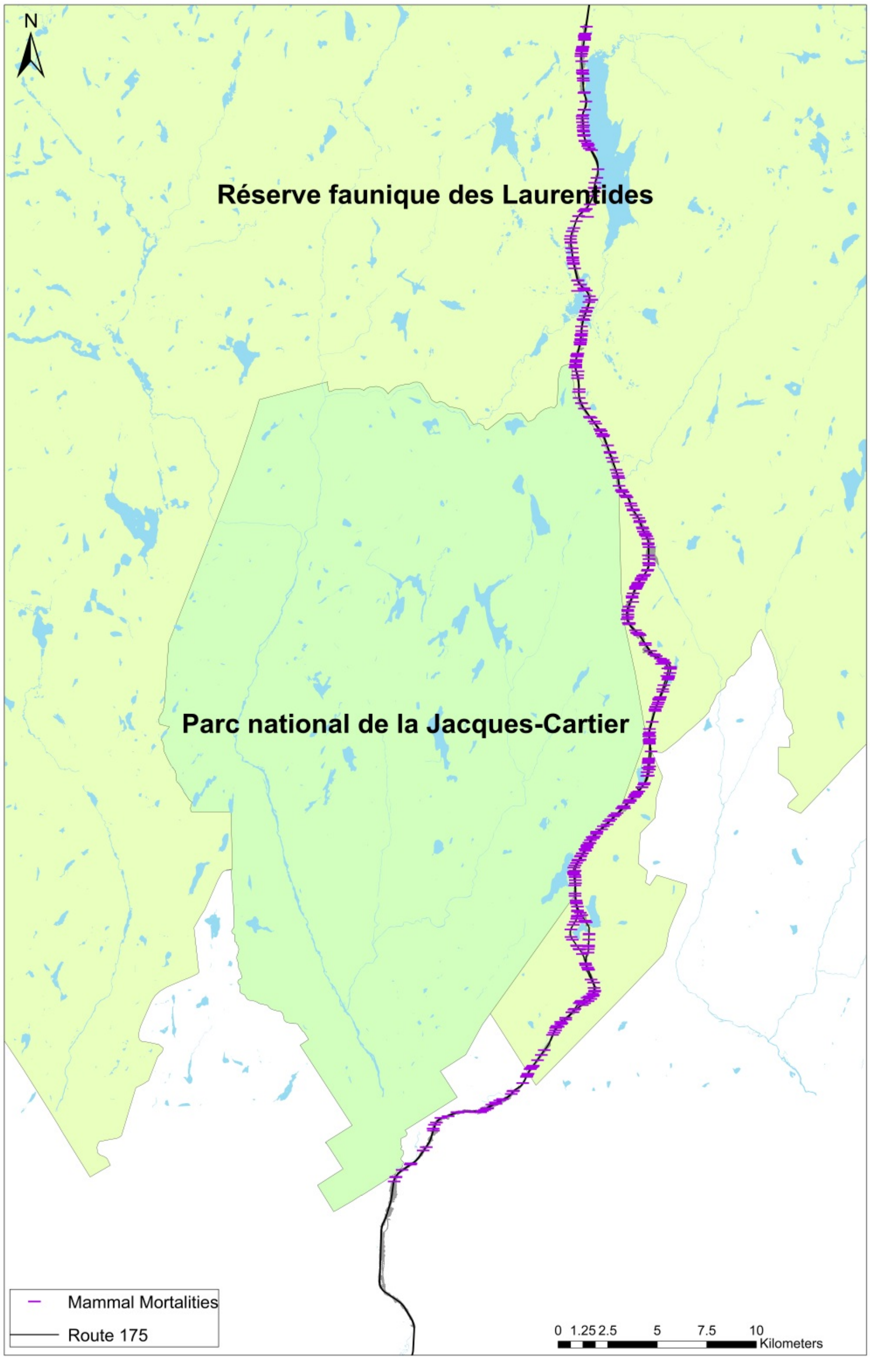

Figure 1: Distribution of mammal mortalities along Route 175 in 2012 and 2013 combined

Monitoring the use of wildlife passages using cameras (Objective 2)

We used cameras in the wildlife passages to identify the species using the wildlife passages (see text box 1 about how species were identified). The wildlife passages are monitored year-round with motion-sensing infrared Reconyx HyperFire HC500™ cameras. We collected over 180,000 images between June 2012 and October 2013 and documented 7160 passage explorations or crossing events. We have further divided the 7160 passage-use detections by passage-type and if the passage use was a confirmed crossing event, an exploration, or an unknown crossing type (Figure 2).

Additionally, Figure 3 displays passage-use by four species (American Mink, North American Porcupine, Red Squirrel, and Woodchuck). These preliminary results demonstrate that species differ in their passage-use and preference of passage types.

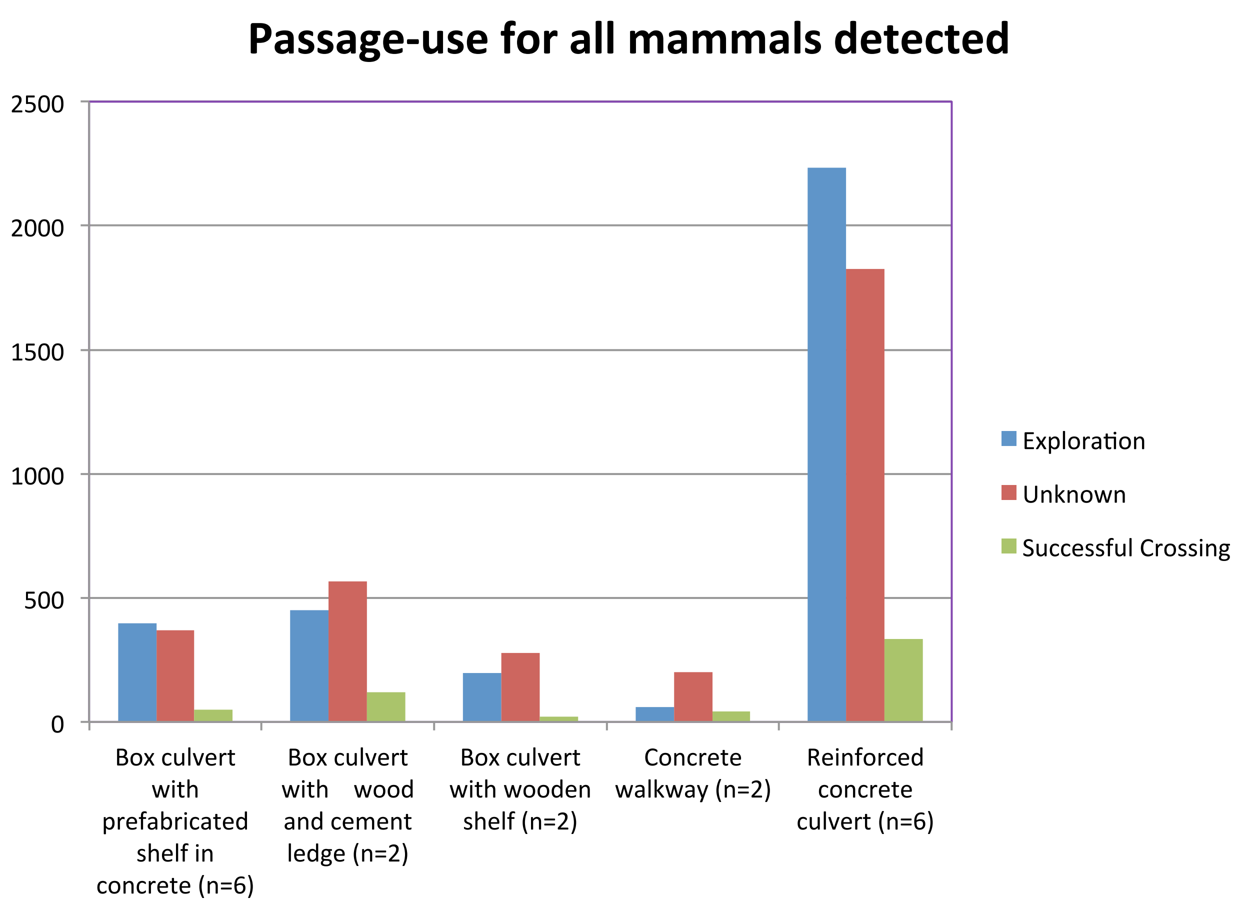

Figure 2: Detected passage-uses by passage-type, showing all 7160 detection events. Note that the total numbers are shown (not average values for one passage of each type).

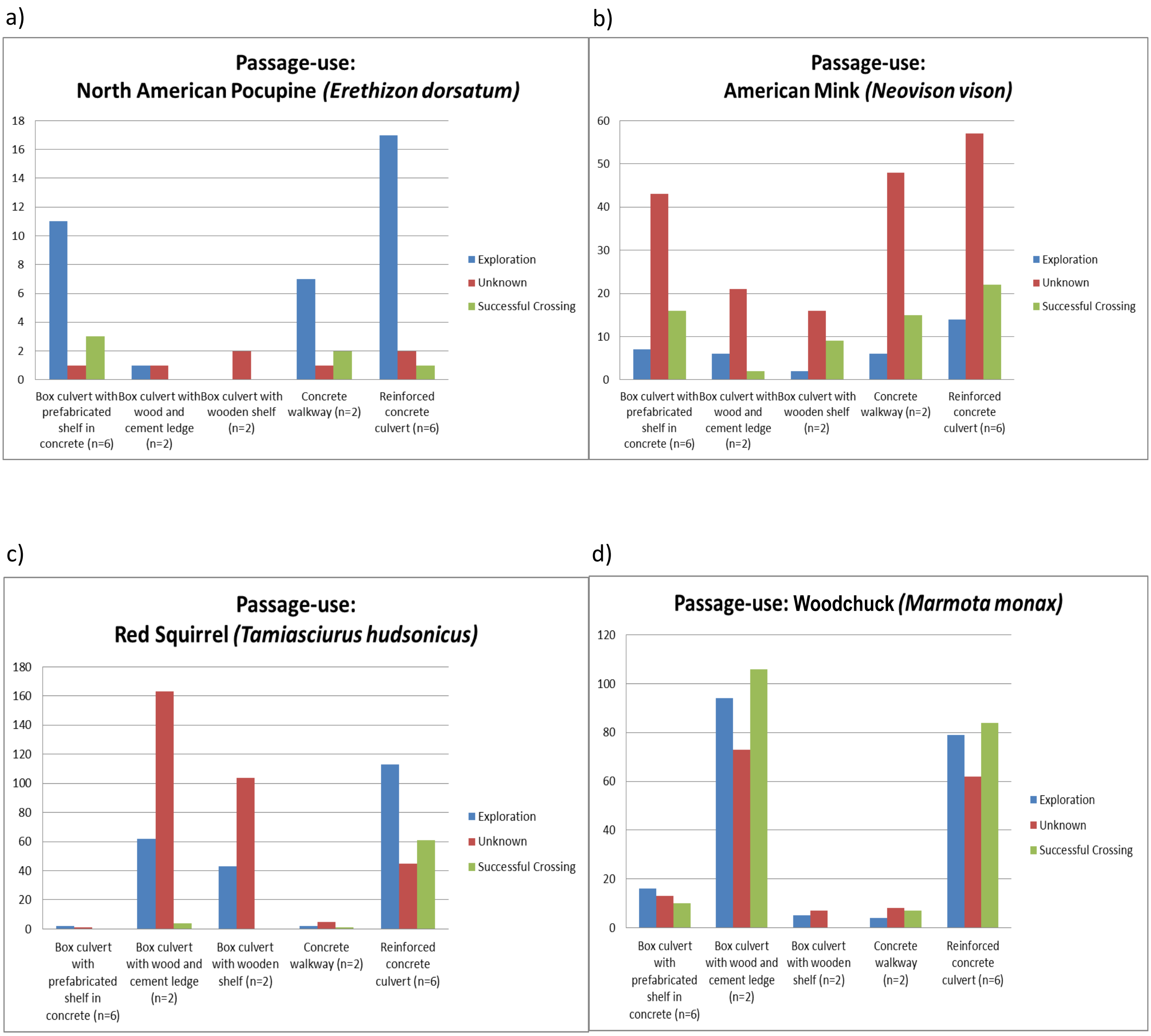

Figure 3: Wildlife passage-use by four examples of species. The four species differ in their usage of different types of wildlife passages. (a) North American Porcupine, (b) American Mink, (c) Red Squirrel, (d) Woodchuck. Note that the total numbers are shown (not average values for one passage of each type).

How to Identify Various Species on Remotely Activated Cameras ("Camera Traps")?

Using remotely activated cameras to observe animal behaviour in natural surroundings is a technique that is highly effective, non-invasive (as animals do not need to be trapped), and provides researchers with accurate data and rare observations without the need to be physically present. The Reconyx HyperFire HC500™ cameras used in this study are sensitive to heat and motion, which activate their infrared sensors. Each time the sensors are triggered a series of 5 pictures is taken. In accordance with each photo the camera records the date, time, temperature, camera location and orientation (east or west). To monitor the use of wildlife passages by medium-sized and small mammals, cameras were installed at either entry point (east and west) of the wildlife passage. In longer passages, where the highway is divided by a meridian, there were two additional cameras installed in the center of the passage below the meridian.

All photos are uploaded from the SD cards to a computer. The images are classified and stored in a database for viewing. Images from both sides of a passage need to be viewed simultaneously, in order to determine if any animal has traveled through the entire passage, i.e., from one end to the next (Figures A and B). If the animal is seen at one end but not the other (and is not seen turning around) we cannot determine whether a full crossing of the passage was made and therefore the state of the passage of the animal is recorded as "unknown".

The observer records the animal species, direction of travel, maturity (adult or not), and number of individuals (Fig. C). Generally, identification of a species in the photos is straightforward. The best picture of an individual animal out of the set of 5 (or more) is chosen for identification.

The animals most observed in the passages – skunks, red squirrels, chipmunks, minks, porcupines, raccoons, beavers, and marmots (Fig. I-L) – have very obvious characteristics that separate them from one another. Ermines and long-tailed weasels can be more difficult to separate from each other. Therefore, a wooden reference block was placed in the field of view of the cameras. Each reference block is painted with alternating black and white vertical stripes each representing 1 cm. This reference allows the observer to get a rough estimate of the tail length in order to distinguish ermine from long-tailed weasel (Fig. D). In addition, this ruler is a good reference for determining body size of micro-mammals (mice, voles, and shrews) who can, at certain camera angels and lighting, look similar (Fig. E). It is always a nice surprise to find unexpected animals, such as various species of birds and even a black bear, which were also observed in the passages (Fig. F and G).

The American marten (*Martes americana)* is of special interest to this project and it is necessary to be able to distinguish the marten from the other species that closely resemble it, such as the fisher (*Martes pennanti)* and the mink (*Mustela vison).* Martens are smaller than fishers, although female fishers can be approximately the same size a male marten, but larger than minks**.** Martens have large triangular shape ears whereas fishers and minks each have rounder and much smaller ears. All three species have similar fur colour (along a spectrum of light brown to black), however, the marten has a relatively distinct light brown to orange throat patch.

At times, the animals move too quickly in the culverts and only a tail or blurry outline is captured, or the sensors are triggered and photos are taken but the animal is absent from the image altogether (Fig. H). Wind and precipitation can also set off the camera sensors, resulting in images where no animals are present.

Given their ease of use and accuracy, remotely activated cameras are highly valuable for gathering wildlife data that may otherwise be difficult to obtain. Their application can also serve an important role in presenting scientific research in a way that is exciting and tangible. The images of wildlife taken with remote cameras can be used to engage the public by presenting them with the opportunity to witness and observe wildlife in their natural habitats. Such an increase in public engagement with wildlife research may lead to a greater awareness of conservation related issues.

Useful reference guides for animal identifications are:

Desroisers N., Morin R., Jutras J. 2002. *Atlas des micromammifères du Québec*. Société de la faune et des parcs du Québec. Direction du développement de la faune. Québec. 92 p.

Smithsonian Institution. *National Museum of Natural History North American Mammals*. http://www.mnh.si.edu/mna. September 2013.

Figure B: East end camera observed the woodchuck exiting the passage at the east end at 11:19 a.m. This provides evidence that the woodchuck completely traversed the entire passage

Figure A: Full Crossing: A woodchuck (*Marmota monax)* observed at the west end camera of a passage at 11:17 a.m. traveling east

Figure C: Red fox (*Vulpes vulpes)* and kit

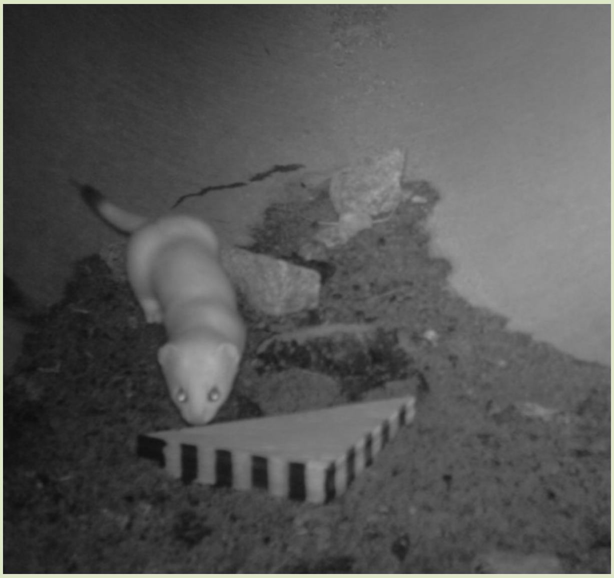

Figure D: Short-tailed weasel (*Mustela erminea)*

Figure E: Vole next to a reference block

Figure F: Black bear (*Ursus americanus)*

Figure G: Great blue heron (*Ardea Herodias)*

Figure H: Blurred photo of a red squirrel (*Tamiasciurus hudsonicus)*

Figure J: Woodchuck and kits (*Marmota monax)*

Figure I: Striped skunk (*Mephitis mephitis)*

Figure K: Mouse species (*Peromyscus)*

Figure L: Beaver (*Castor canadensis)*

Estimating the relative abundance of wildlife populations in the vicinity of the passages

To evaluate the performance of the each wildlife passage, we need to estimate species abundance outside of the wildlife passages. In order to do this, we used track and camera stations installed near the passageway entrances. The track stations were active from August 20th to October 23rd in 2012 and from June 17th to October 1st in 2013. They were equipped with a scent lure of castorium to attract a wide variety of species.

A total of eleven two-week sessions of track papers were collected, which total 1,584 track papers. From these papers, 1,609 tracks were identified that belong to 20 species or taxonomical groupings (see text box 2 about how tracks were identified). Some species overlap in their track measurements, especially during the summer months when juveniles are among the population.

Therefore, we have identified tracks to the species level wherever possible. However, for the analysis we may combine some species into taxonomic groupings to account for this potential source of error. This issue in the track identification occurred in particular with weasels, squirrels and chipmunks as well as micro-mammal species.

In addition, we installed camera stations to enable us to evaluate the presence of species which may be hesitant to enter a track box, in particular the canines: red foxes, coyotes, and wolves. We baited the camera stations with a scent lure made up of vaseline and skunk scent. In the fall when temperatures are lower, we also included beaver meat to act as an attractant.

All the species detected by the cameras are recorded, even those who cannot use the passages such as moose and deer, as this information may be useful in future research. A "detection event" was considered if the camera captured a photo of an individual within a one hour time sequence. This means if a red fox was captured on camera 20 times within a hour then it was counted as one "detection event" or one individual. In total the camera stations recorded 509 detection events comprising 18 species.

How to identify tracks?

In order to estimate the relative abundance of the wildlife populations around the wildlife passageways (and therefore the expected use of the passages), track boxes were installed in the forest. Track papers were placed in the center of each track box, ink lining both openings and a scent lure placed in the center. Animals, attracted by the lure, were able to enter the track box from either opening, allowing them to step into the ink and leave their tracks on the paper in the center. Papers were removed and replaced with a new sheet every two weeks and subsequently, the tracks were identified.

In order to identify a track, several different aspects of the track need to be considered: the substrate used, morphology, size, and track pattern. The substrate, the material that aids in creating the track, can influence both the morphology and the size of the track. We used ink, a substance not harmful to wildlife. Morphology is the overall form of the track. It includes claws/ nails, toe pads, metacarpal pads, heel pads, and negative space (space between the pads).

Code	Species	Espèce	Total
MICRO (Pero/Arvi/Soxx)	Mico-mammal	Micromammifere spp.	669
MUER	Ermine	Hermine	174
ZAXX	Jumping mouse spp.	Souris sauteuse spp.	134
ERDO	North American porcupine	Porc-épic d'Amérique	120
TAHU	Red squirrel	Écureuil roux	108
TAST	Eastern chipmunk	Tamia rayé	85
LEAM	Snowshoe hare	Lièvre d'Amérique	81
TAXX	Red squirrel or Eastern chipmunk	Écureuil roux ou Tamia rayé	60
MAAM	American marten	Martre d'Amérique	49
MEME	Striped skunk	Mouffette rayée	39
UNKN	Unknown	Inconnu	36
MUFR	Long-tailed weasel	Belette à longue queue	33
MUXX	Weasel spp.	Mustela spp.	21
URAM	Black bear	Ours	16
PRLO	Raccoon	Raton laveur	12
CACA	North American beaver	Castor d'Amérique	3
LYCA	Canada Lynx	Lynx du Canada	2
GLSA	Northern flying squirrel	Grand polatouche	1
MAMO	Woodchuck	Marmotte commune	1
NEVI	American mink	Vison d'Amérique	1
LOCA	River otter	Loutre de rivière	0
MAPE	Fisher	Pékan	0
ONZI	Common Muskrat	Rat musqué	0
VUVU	Red fox	Renard roux	0

Table 2: Species identified at the track stations from most often to least often detected. Each monitored wildlife passage (*n* = 18) has 8 track stations (4 on either side, outside of the entrances), which resulted in a total of 1,584 track papers.

Code	Species	Espèce	Total
LEAM	Snowshoe hare	Lièvre d'Amérique	95
ODVI	White-tailed deer	Cerf de Virginie	93
ALAL	Moose	Orignal	78
URAM	Black bear	Ours	64
VUVU	Red fox	Renard roux	42
MAAM	American marten	Martre d'Amérique	31
MUXX (MUFR, MUER)	Weasel spp.	Mustela spp.	22
MEME	Striped skunk	Mouffette rayée	20
CALU	Eastern wolf	Loup	12
UNKN	Unknown	Inconnu	13
ERDO	North American porcupine	Porc-épic d'Amérique	11
TAHU	Red squirrel	Écureuil roux	10
LYCA	Canada Lynx	Lynx du Canada	7
PRLO	Raccoon	Raton laveur	5
CACA	North American beaver	Castor d'Amérique	1
CALU	Coyote	Coyote	1
GLSA	Northern flying squirrel	Grand polatouche	1
MAPE	Fisher	Pékan	1
TAST	Eastern chipmunk	Tamia rayé	1
LOCA	River otter	Loutre de rivière	0
MAMO	Woodchuck	Marmotte commune	0
NEVI	American mink	Vison d'Amérique	0
ONZI	Common Muskrat	Rat musqué	0

Table 3: Species detected at the camera stations. Each wildlife passage (*n* = 18) was equipped with two camera stations, outside the passages at a distance of 50 m inside the forest.

When observing the morphology of the track, it is important to look at a track's symmetry, number/ placement of the toes, shape of the pads, presence or absence of nails/claws and presence or absence of fur. All these features are essential in distinguishing one species from the next. Some species, for example the American Marten (Fig. A) and Long-tailed Weasel (Fig. B), have a large amount of fur in the negative spaces. Size is also an important aspect: We focused on track width and length for both front and back feet, trail width, and in some cases, also looked at stride and group length. There are many species within the same families that have similar morphologies but differ in size, for example, the red squirrel and eastern chipmunk. Both species have a similar track shape, but the red squirrel (Fig. C) has both a larger track width and length as well as a larger trail width. Track pattern denotes the way in which the animal is moving. Some animals present a 2x2 pattern (where their feet are one in front of the other) (figure D; right side), while others may present a 4x4 pattern (where their grouped tracks form a rectangle) (figure D; left side). An animal's track pattern can depend on its speed and behaviour, e.g., an animal will have a larger trail length if it is jumping rather than walking. Its track pattern will also change depending on whether the animal is trotting, running, hopping or standing. A track of the same species can have many different forms depending on the individual animal and their individual behaviour. As a result, each characteristic mentioned above was used to identify each track.

With the help of a guide book (Elbroch, 2003) and the help of several experts, tracks were identified. Once we had identified the species, we recorded species, track length, track width, and track type (hind or front). Over the past two years, we have collected 1,584 track papers and have identified 1,609 tracks, with 36 unknown tracks. We have found a variety of different species, as small as a shrew to as large as a black bear. Of these tracks, the most common tracks were micro mammals (species including shrews, voles and mice) (figure D) ermines, jumping mice (figure E) and porcupines (figure F). There were 49 marten tracks found.

Figure A: Tracks from an American marten

Figure B: Tracks from a Long-tailed Weasel

Figure C: Tracks from a Red squirrel

Figure D: Animal's direction of movement. Tracks from shrews, voles and mice

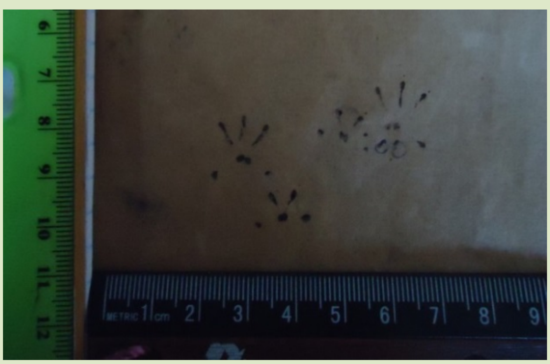

Figure E: Tracks from ermines and jumping mice

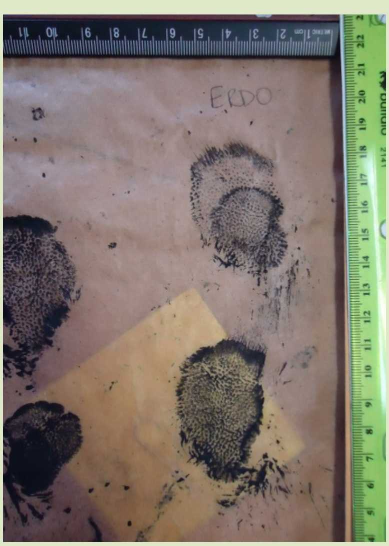

Figure F: Tracks from a porcupine

In some cases, however, some tracks were impossible to identify, e.g., due to a partial track or a faint track. In these cases, tracks were categorized as unknowns. We also had cases where track boxes were destroyed or disturbed, mostly due to bear damage.

Reference: Elbroch, M. (2003). Mammal Tracks & Signs: A Guide to North American Species. Mechanicsburg, PA: Stackpole Books.

Permeability of the highway for the American marten (Objective 3)

The objective of this part of the project is to assess how well the passageways provide permeability of the highway for individual martens and gene flow across this barrier. Permeability in this context is a measure of how much the highway impedes or facilitates movement and dispersal of individuals. For comparison, we replicated this study on Highway 381, a two-lane highway. We can therefore assess how much stronger the barrier effect of a 4-lane highways is compared to a 2-lane highway.

We performed a capture-mark-recapture study, where we compare 'along road' against 'across road' movements in summer and fall 2013. We are continuing this work in summer and fall 2014.

There is a concern that the 4-lane road is a significant barrier to marten movement. So far, they do not (or not yet) use the designated wildlife passages along HW 175, contrary to what has been observed for many other species in the study area.

We are using radio-telemetry to follow the movements of individuals through the year. We installed cameras in passageways and in drainage culverts to identify individuals using them. In culverts along the 2-lane HW 381, martens were photographed regularly.

We are currently analyzing our telemetry data and will report about the results in future news bulletins.

Were to find more information

You can find more information about the wildlife passages along HW 175 here:

Bédard, Y., É. Alain, Y. Leblanc, M.-A. Poulin, M. Morin (2012) : Conception et suivi des passages à petite faune sous la route 175 dans la réserve faunique des Laurentides. *Le Naturaliste Canadien* 136(2) : 66-71.

More information about the ecological effects of roads and various mitigation measures is given here:

Carsignol, J., V. Billon, D. Chevalier, F. Lamarque, M. Lansiart, M. Owaller, P. Joly, E. Cuenot, P. Thievent, P. Fournier (2005): Aménagements et measures pour la petite faune. Guide technique. Sétra (service d'études techniques des routes et autoroutes). Bagneux Cedex, France.

Fahrig, L., T. Rytwinski. 2009. Effects of roads on animal abundance: an empirical review and synthesis. Ecology and Society 14(1): 21. [online] URL: http://www.ecologyandsociety.org/vol14/iss1/art21/

Forman, R. T. T., D. Sperling, J. A. Bissonette, A. P. Clevenger, C. D. Cutshall, V. H. Dale, L. Fahrig, R. France, C. R. Goldman, K. Heanue, J. A. Jones, F. J. Swanson, T. Turrentine, and T. C. Winter. 2003. Road ecology: science and solutions. Island Press, Washington, D.C., USA.

Jaeger, J. A. G., J. Bowman, J. Brennan, L. Fahrig, D. Bert, J. Bouchard, N. Charbonneau, K. Frank, B. Gruber, and K. Tluk von Toschanowitz. 2005. Predicting when animal populations are at risk from roads: an interactive model of road avoidance behavior. Ecological Modeling 185: 329–348.

Van der Ree, R., E. van der Grift, C. Mata, and F. Suarez. 2007. Overcoming the barrier effect of roads—how effective are mitigation strategies? An international review of the use and effectiveness of underpasses and overpasses designed to increase the permeability of roads for wildlife. Pages 423–431 in C. L. Irwin, D. Nelson, and K. P. McDermott (editors): Proceedings of the 2007 International Conference on Ecology and Transportation. Center for Transportation and Environment, North Carolina State University, Raleigh, North Carolina, USA.

Members of the project team and project partners

To put this project into place, the Quebec Ministry of Transport (MTQ) brought together a team of scientific researchers:

- Yves Bédard, Direction de la Capitale-Nationale of the MTQ. He is the responsible person at the Ministry of Transport.
- Dr. Jochen Jaeger, Concordia University, Montreal. He is the principal investigator of the project.
- Katrina Bélanger-Smith, MSc student in Biology at Concordia University.
- Judith Plante, MSc student in Geography, Planning and Environment at Concordia University.
- April Martinig, MSc student in Biology at Concordia University.
- Rodrigo Lima, research associate at Concordia University (until April 2014).
- Robby Marrotte, research associate at Concordia University (since February 2014).
- Carlos Zambrano, field technician.
- Dr. Marianne Cheveau, researcher at the Ministère des Forêts, de la Faune et des Parcs du Québec.
- Sarah Sherman Quirion, field technician at the Ministère des Forêts, de la Faune et des Parcs du Québec.
- Mary-Helen Paspaliaris, Honor's student in Geography at Concordia University.
- Dr. André Desrochers, Université Laval, Québec City.

• Dr. Anthony P. Clevenger, Montana State University. He is a wildlife researcher who has more than 14 years of experience in monitoring the effectiveness of wildlife passages along the Trans-Canada Highway in Banff National Park, Alberta.
• Dr. Jeff Bowman, Ontario Ministry of Natural Resources and Trent University, Peterborough.
• Dr. Paul J. Wilson, Trent University, Peterborough.
• Yves Leblanc, AECOM Inc., Quebec City.
• and various research assistants who worked in the field: Sandra Anastasio, Kenzie Azmi, Tanya Barr, Josephine Cheng, Melanie Down, Joey O'Connor, Sarah Courtemanche, Bertrand Charry, Megan Deslauriers, Valérie Hayot-Sasson, Gregor Pachmann; or in the office: Megan Chan, Lasoi Ketere, Lisa Bidinosti, Rochelle Methot.

The researchers are supported by the members of the Enlarged Advisory Committee which meets annually. This committee includes representatives of the main groups and organisations affected by the project (in alphabetical order):

- Éric Alain, Ministère des Transports du Québec
- Jean-Emmanuel Arsenault, Parc national de la Jacques-Cartier, Sépaq (until April 2014)
- Héloïse Bastien, Ministère des Forêts, de la Faune et des Parcs du Québec
- Dr. Pierre Blanchette, Ministère des Forêts, de la Faune et des Parcs du Québec
- Sylvain Boucher, Réserve faunique des Laurentides, Sépaq
- Julie Boucher, Ministère des Transports du Québec
- Mathieu Brunet, Parc national de la Jacques-Cartier, Sépaq
- Amélie D'Astous, Huron-Wendat Nation
- Louis Desrosiers, Ville de Stoneham
- Benoit Dubeau, Parc national de la Jacques-Cartier, Sépaq (since May 2014)
- Martin Lafrance, Ministère des Transports du Québec
- Michel Michaud, Ministère des Transports du Québec
- André Rouleau, Parcs nationaux des Hautes-Gorges-de-la-Rivière-Malbaie et des Grands-Jardins
- Hugues Sansregret, Forêt Montmorency

The committee is informed about the progress of the project and discusses the results and the next steps.

The organizations more or less closely involved in this project are (in alphabetical order):
• AECOM Inc.
• Association forestière des deux rives (AF2R)
• Association régionale des trappeurs Laurentiens
• Concordia University Montreal (Department of Geography, Planning and Environment, and Department of Biology)
• Forêt Montmorency
• Huron-Wendat Nation
• Ministère du Développement durable, Environnement et Lutte contre les changements climatiques du Québec
• Ministère des Forêts, de la Faune et des Parcs du Québec
• Ministère des Transports du Québec
• Parc national de la Jacques-Cartier
• Parc national des Grands-Jardins
• Société des établissements de plein-air du Québec – Réserve faunique des Laurentides
• Sureté du Québec
• Ville de Stoneham
• Zec des Martres

NOTICE TO TRAPPERS

This research project on **American martens** is being conducted at the Réserve Faunique des Laurentides, the Jacques-Cartier National Park, the Grands-Jardins National Park, and the ZEC des Martres. This project is developed by Concordia University in collaboration with the Ministère des Forêts, de la Faune et des Parcs and the Ministère des Transports du Québec.

Many martens have been captured and fitted with numbered ear tags or a radio collar. Telemetry monitoring will allow the study of habitat selection by martens and the relation between martens' movements and Highways 175 and 381. It is possible that you capture an animal fitted with ear tags or a black collar. We would like to count on your cooperation and we kindly ask you to please contact the persons mentioned below, so we can recover the radio collars which have precious information. To remove the collar from the animal's neck please unscrew the nut on the base of the collar; please do not cut the collar with a knife, which would make it useless.
Concordia University will pay a lump sum of $20 (+ shipment fees) to the trappers who return a collar in order to compensate for their help, and we will also send you a map showing the marten's movements before its capture. We thank you for your cooperation and we wish you an excellent trapping season.

If you trap an animal with ear tags or a collar, please contact:
Marianne Cheveau (MFFP) au 418-627-8694 (extension 7515)
or
Jorge Gaitan (Concordia Univ.) at 514 688-6795 or 514 848-2424 (extension 5484)
or
Jochen Jaeger (Concordia Univ.) at 514 848-2424 (extension 5481)

Affiliations of the authors:

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Dr. Anthony Clevenger: Western Transportation Institute, Montana State University (WTI-MSU).

You can find **more information** about this project in our previous news bulletins:
http://www.concordia.ca/content/dam/artsci/geography-planning-environment/docs/jaeger/wildlife_passages_effectiveness_HW175_Sept2012%20(1).pdf
and
http://www.concordia.ca/content/dam/artsci/geography-planning-environment/docs/jaeger/Jaeger_MonitoringWildlifePassages-Bulletin-2_2013-Engl.pdf
and
http://www.concordia.ca/content/dam/artsci/geography-planning-environment/docs/jaeger/Jaeger_et_al.2013_News_Bulletin_3_English-final.pdf