

Why did the mammal cross the road?

Evaluating the effectiveness of wildlife passages for smaller mammals

Transports Québec 🖥 🖥

April Robin Martinig¹ • André Desrochers² • Jochen A. G. Jaeger³ Department of Biology, Concordia University; Email: april@boun.cr

² Centre d'étude de la forêt, Pavillon Abitibi-Price, Université Laval ³ Department of Geography, Planning, and Environment, Concordia University



Many studies have looked at how large mammals respond to road mitigation measures, but few have examined the effects on smaller mammals at a multispecies level. 2.3.4.8.10

Research Questions

(1) Does passageway success differ (2) Does and if so, what environmental and passage structural characteristics of the use differ passages explain these differences? | by species?

Crossing success should decrease with: •limited cover and openness: increases predation risk4.5.10 •artificial light: areas of human activity are

generally avoided by wildlife4.12 •open median: may act as an additional

barrier by interrupting movement³



Highway 175 lies in the Laurentian mountains of the Laurentides Wildlife Reserve connecting Quebec City and Saguenay (Figure I).¹ In 2012, 17 small fauna passages (grouped into three types) were monitored with remotely triggered cameras year round from May 2012 to August 2014 (Figure 2).



Figure 2. Passage types. (a) Pipe culvert (PC) (n=6). (b) Box culvert with dry concrete ledge (DCC) (n=7). (c) Box culvert with dry wooden ledge (DWC) (n=4).

A generalized linear mixed model allowed for a binomial response variable (successfully crossed [1] or failed [0]) with both fixed and random effects (culvert ID). Analysis was run in R 3.1.1.

Three models were generated:

(1) a model ignoring species (2) a model including species (3) species specific models for micromammals and weasels

Results

To date, 176,197 photos have been taken, capturing snowshoe hares, river otters, beavers, porcupines, martens, marmots, skunks, mink, weasels, muskrats, red squirrels, chipmunks, red foxes, black bears, micromammals, cats, birds, and amphibians (Figure 3).



Figure 3. Number of complete crossings by species.

Passages were significantly less likely to be crossed if the structure: •was a pipe culvert (Figure 4) •had an open median (with the exception of weasels)

•had a low openness ratio •was located at higher latitudes

Micromammals were the only species where artificial light had a significant (negative) effect on crossing success.



Discussion

Crossing success for smaller sized mammals appears to be a function of environmental and structural characteristics associated with the monitored passages.

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Passages with low openness ratios and medians are crossed less.

Results highlight how agencies can reduce these additional barriers to movement across highways by building wider, less segmented passages.





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