

EXECUTIVE SUMMARY

Habitat fragmentation resulting from development pressures including rapid population growth and unplanned development that necessitate the expansion of transportation infrastructure affects the viability of wildlife populations and landscape and habitat connectivity. The effects of roads on wildlife populations – habitat loss, reduced habitat quality, reduced landscape connectivity, and road-related mortality – have both immediate and cumulative deleterious effects. These include the degradation of remaining habitat, the disruption of ecological processes including animal migration and breeding, and the reduction or local extinction of wide-ranging species including carnivores, whose decline can destabilize entire biological communities.

Where these effects cannot be avoided through planning and management, implementation of wildlife crossing structures and associated mitigation measures may assist in the maintenance or restoration of connectivity by providing landscape-level linkages that facilitate the safe passage of wildlife across transportation corridors.

In Ontario, areas of the greatest species richness in the province coincide with the greatest density of people and roads. Significant forthcoming highway developments linking the Niagara and Halton regions to the Greater Toronto Area are threatening to encroach into the Niagara Escarpment and

Greenbelt, which represent provincially protected natural heritage systems (NHSs).

The use of wildlife crossings to mitigate the effects of transportation developments on protected landscapes, habitats, and wildlife is a developing practice in Ontario, with some significant projects completed or underway. Provincial policy provisions explicitly support connectivity within and between NHSs, while the *Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005* (Ontario Ministry of Natural Resources [MNR], 2010) cites the use of wildlife crossings as appropriate mitigation.

This research investigated the linkage function of wildlife crossings as *constructed corridors* with the potential to restore landscape and habitat connectivity within NHSs in Ontario that are transected by major transportation routes. Case studies of two exemplary wildlife crossing projects present best practices from which lessons can be learned to inform the implementation and success of wildlife crossing projects in Ontario's NHSs.

Research Methodology

This report addresses the following research questions:

- + How do wildlife crossings mitigate the effects of habitat fragmentation resulting from the transection of landscapes by transportation infrastructure?

- + Are wildlife crossings an appropriate tool in the planning of natural heritage systems in Ontario?
- + Is the application of wildlife crossings consistent with existing provincial policy directions in Ontario?
- + What lessons can be learned from the south Florida I-75 Project and Banff Wildlife Crossings Project that can inform the integration of wildlife crossings in Ontario's natural heritage systems?



Wildlife overpass, Trans-Canada Hwy, Banff, AB.
Credit: Anita Sott, 2012.

A literature review outlined the translation of theoretical knowledge into practical mitigation practices related to the concept of corridors, the scholarly debate surrounding their efficacy in restoring habitat linkages between severed landscapes, and their relationship to wildlife crossings. The literature review consolidated research on the design, implementation, and monitoring of wildlife crossings and was used to derive a matrix of potential project components through which to organize case study data.

Using the matrix and content analysis of case study documents, the Interstate 75, south Florida and Trans-Canada Highway, Banff wildlife crossing projects were examined for lessons in design, implementation processes and requirements, and monitoring program structures. They are presented using a framework adapted from the recent publication *Safe Passages: Highways, Wildlife, and Habitat Connectivity* (Beckmann et al., 2010).

Lessons Learned

Planning for wildlife crossing project locations is not an arbitrary practice and requires the employment of needs assessment tools to determine where wildlife movement is impeded and where it would be best facilitated, especially between areas of high habitat quality. Adjacent land management is essential to maximize the efficacy of crossing structures beyond the mitigated right-of-way.

The design of wildlife crossing structures should be selected to suit the needs of focal species but also feature elements that encourage use by multiple species, often facilitated by the provision of a diversity of structures. In combination with crossing structures, the installation and maintenance of exclusionary fencing on both sides of a mitigated roadway is the most comprehensive design solution to achieve both landscape connectivity *and* the reduction of wildlife road mortality.

Successful project implementation and post-construction management benefit from project champions (whether an individual or an organization), explicit roles and responsibilities for agencies and players involved, and public support campaigns or initiatives. These can build project momentum and relay successes and information from monitoring data back to the public and funding contributors.

Long-term monitoring programs should accompany all wildlife crossing projects and are necessary to evaluate post-construction project success. Under an adaptive management approach, monitoring can inform any required changes to improve the efficacy of crossing structures, inform future projects, and ensure public funds are being put to good use with the highest return on investment through maximal species use.

These and other best practices derived from the literature review and case study information were synthesized into key recommendations for the integration of wildlife mitigation in planning for Ontario's NHSs. Recommendations consider the application of provincial policy directions to enable the development of wildlife crossings to address habitat fragmentation, emphasized as a provincial priority.

Recommendations

- 1 Conservation needs and the restoration or maintenance of connectivity in NHSs should be incorporated early in the planning process and integrated into transportation corridor designs.
- 2 Wildlife crossing design and mitigation guidelines should be developed with sensitivity and specificity to the habitat and landscape features in Ontario's NHSs and the consideration of multiple species needs.
- 3 All wildlife mitigation projects should feature an adaptive management approach supported by long-term monitoring activities to ensure accurate post-construction evaluation of mitigation efficacy.
- 4 Information dissemination, public education initiatives, and efforts towards public support building should be prioritized and continued after project construction.

This report highlights successful project strategies requiring multi-disciplinary collaboration which can be used by planners and other professionals in order to maximize the success of future wildlife crossing projects. This information may be useful for the proactive consideration of wildlife crossings at initial stages of transportation planning and infrastructure design or retrofit. In Ontario, planners have the capacity, tools, and policies in place with which to prioritize the connectivity of natural heritage systems at the forefront of transportation planning processes and designs, towards a province-wide corridor system and leadership in wildlife mitigation.