

Planning Considerations for Wildlife Passage in Urban Environments.

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Scope

As urban populations grow and expand into rural areas there are changes in land use patterns and natural habitat that lead to increased motorist–wildlife conflicts. Development in the urban-rural interface can include, but is not limited to, riparian areas consisting of river valleys, creek drainages and ravines. Highways may obstruct wildlife movement and access to important habitats. Stakeholders are increasingly requesting that AT projects consider wildlife passage in urban environments. These guidelines will provide project-specific guidance to assist AT in determining if wildlife accommodation is warranted and, if so, what Best Practices Guidelines (BPGs) to consider for incorporation into environmental assessments.

Transportation and Urban Ecology

The impacts to wildlife resulting from urbanization, including highway development, range from habitat loss and fragmentation to disrupting animal movement and traffic related mortality of wildlife. The two main functions of providing wildlife passage across highways are: 1) to maintain connectivity between habitats and wildlife populations and 2) increase motorist safety and reduce mortality of wildlife on highways. This is especially true in suburban areas where nearby wildlife habitat and high traffic density combine. Animals move between habitats in order to survive, by finding food, mates and areas of refuge. In urban areas roads invariably bisect or run parallel to riparian areas, which are known to be important habitat and movement corridors for wildlife. As urban areas continue to expand and highway networks and traffic volumes increase, AT will need to have an awareness of effective practices for the planning and design of safe roadways for both motorists and wildlife.

Regulatory Requirements

While there is no specific legislation mandating the use of wildlife passage there is legislation that may be applicable to a project if sensitive wildlife species are identified within close proximity of a project. In these cases it is recommended that regulatory authorities be consulted early in the planning stages to determine specific requirements with respect to mitigation measures.

Federal legislation

The *Species at Risk Act* (SARA) provides protection for Canadian indigenous species, subspecies, and distinct populations to prevent them from becoming extirpated or extinct, and provides for their recovery and that of their habitat.

The Migratory Bird Convention Act (MBCA) and the Migratory Birds Regulations (MBR) are directed at the protection and preservation of migratory birds and migratory bird habitat.

Provincial legislation

The *Wildlife Act* requires that species listed as threatened or endangered in Alberta are required to have a recovery plan put in place to help minimize the risk of extinction.

Municipal Bylaw

Some municipalities have bylaws and Area Structure Plans (ASPs) that ensure the protection of natural environments, including wildlife and their habitat. Bylaws and ASPs generally define areas included for special protection and stipulate that an environmental review process must take place for each development project within.

Project-Specific Planning Considerations

The following four planning aspects are to be considered as part of a step-wise decision making process that will help determine whether an urban wildlife passage is warranted on a highway facility.

1. Land-use planning considerations

Area Structure Plans and Bylaws guide current and future land use decisions in urban areas and will influence decision-making when determining whether to incorporate a wildlife passage as part of the highway infrastructure. The effectiveness of passage structures can be compromised if current land-use within the municipality is not conducive to protecting wildlife movements/corridors through urban areas (e.g. residential housing development including urban parks/playgrounds).

Alteration of a wildlife corridor by future activity (e.g. commercial/industrial or residential developments) may negatively affect wildlife movement and, hence, the function and performance/usage of wildlife passage structures. These passage structures should not be considered in areas where future planned development or increased human activity will negate the benefits of their construction. Additionally, wildlife management plans may also exist at the provincial and municipal levels. Consultants should identify these plans where they exist and thoroughly review them to ensure that the wildlife movement objectives in these plans are carefully considered.

2. Project vs. regional considerations for wildlife movement/corridors in urban areas

Planning for urban wildlife passage structures requires determining the scale at which wildlife movement is potentially impacted by highway infrastructure. Local, or project-scale, impacts are restricted to relatively small habitat areas, i.e. those lands within the highway corridor. Regional-scale impacts generally occur when key parts of a larger habitat corridor system are affected by the presence of urban development. Regional-scale habitat connectivity planning considers how the passage structure fits into the larger landscape and an established (or protected) regional wildlife corridor network that extends beyond the highway corridor. Wildlife passage structures should maintain adequate connections between important habitats.

3. Animal Vehicle Collision History

Animal-vehicle collision (AVC) history should be analyzed to verify the magnitude of the problem in the project area. A review of these data can identify locations, and to a degree frequency, where wildlife are known to regularly cross a highway. A thorough environmental assessment (e.g. review of: road-kill data, wildlife habitat maps, winter tracking survey data) can identify areas where wildlife-highway interactions are high. This information can be used to consider whether a wildlife passage structure is warranted.

Motorist safety is an important consideration when evaluating the need for a wildlife passage structure on a given project. In 2006, there were more than 16,000 AVC recorded in Alberta. Recent advances in evaluating the monetary cost and benefits of AVC countermeasures provide information for decision-making and better understanding the societal benefits. Wildlife fences are cost-effective at reducing AVCs; however, the negative impacts of fencing on habitat connectivity across the highway are an undesirable outcome of this measure. In addition to AVC concerns, site specific information on the requirements of wildlife in the surrounding area need to be evaluated.

4. Wildlife requirements

There are three key parameters to evaluate the value of a potential highway crossing site in an urban area and hence whether provision of wildlife passage may be warranted:

- i. *Focal species:* (habitat generalist vs. specialist) – The presence of habitat specialist species (e.g. black bear, swift fox, river otter) would result in a higher value. Common species are typically habitat generalists (e.g. whitetail deer, coyotes) and are more resilient to highway impacts than habitat specialists.
- ii. *Protection status:* Presence of protected species under provincial/federal law would result in a higher value.
- iii. *Habitat connectivity potential:* - Sites with greater habitat connectivity potential would have a higher value. The combination of habitat quality and potential level of use with passage provided determines the habitat connectivity potential at the site.
 - High potential: Sites with high quality habitats and key habitat corridors for wildlife movement at project or regional scales;
 - Moderate potential: Relatively intact or undisturbed habitats and adequate potential habitat corridors for wildlife movement;
 - Low potential: Habitats with human disturbance or regular human activity and little or no potential of a habitat corridor at the site.

BPGs for Wildlife Passage

If after evaluating the four planning aspects it is determined that mitigation for wildlife movement across the highway is warranted, measures consisting of non-structural or structural mitigation may be recommended.

Non-structural mitigation: Novel signage and recent advances in animal-detection technologies have proved effective in reducing AVCs on rural highways. These measures

may be applied to situations in urban environments and should be considered among the possible options. Fencing is generally required to make these measures effective.

Structural mitigation: Mitigation in urban environments may require below-grade passage of wildlife. If after an options analysis a below-grade passage is preferred, the following BMP's should be considered.

General guidelines for retrofitting existing structures for below-grade passage.

- Existing below-grade structures (e.g. open-span bridges, culverts) not designed intentionally for wildlife movement are a cost-effective means to provide wildlife passage in urban environments, if in a proper location.
- The amount of human use, vegetative cover, substrate, and infrastructure-opening dimensions are important factors affecting wildlife movement at retrofitted passages.
- Relatively low-cost adaptations such as installing wing fencing, planting vegetation and providing an appropriate walking surface may be required to make the passage structures suitable for wildlife movement.

The following are guidelines for new as well as retrofitted wildlife passage structures in urban environments.

General guidelines for accommodating wildlife passage structures across highways.

- In ravines and along creeks attempt to mirror habitat conditions found on both sides of the highway. Provide shrubs adjacent to the passage structure to allow cover for animals approaching the structure. In these cases revegetation is possible in areas closest to entrances, as light conditions tend to be better than in the center of the passage. No large vegetation (e.g. trees) should be planted directly under or adjacent to the structure as this can cause maintenance issues.
- To the extent possible, wildlife passage should be made available during non-flood conditions underneath bridge structures. Large rip rap, rocks or boulders do not provide an adequate walking surface for wildlife. Where practical, maximize microhabitat complexity and vegetative cover within the passage using salvage materials (e.g. logs, root wads, rocks, etc.) to encourage use by wildlife.
- If bridge structures also accommodate recreational pathways, use vegetation as a shield to separate human-use from wildlife where practical. If the passage is wide enough, human use (e.g. paths, riding trails) recreational pathways should be confined to one side, leaving a dedicated corridor for wildlife use on the other side.

General guidelines for wing fencing and escape ramps

- Wing fencing is the most effective and preferred method to guide animals to a passage in order to prevent intrusions onto the highway. Wing fencing is a section of fence secured to a wildlife passage entrance that extends out from the structure in both directions.
- Fences must be impermeable to wildlife movement in order to keep traffic-related mortality to a minimum and enhance wildlife passage use.

- Wing fencing for most large mammals should be 2.4 m high. In some cases fence height may not need to be designed for large ungulates and could be lower. Fence height <2.4 m may be adequate where there are commercial or residential concerns of visual effects and aesthetics of fencing.
- Escape ramps should be incorporated into the fencing for the first 500 m in length and then at least one escape ramp per kilometer on each side of highway thereafter.
- Outside walls of escape ramps should be high enough to prevent wildlife from jumping up onto the ramp and accessing the right-of-way. However, the walls should not be so high that they discourage wildlife from jumping off. The landing area outside the wall should consist of loose soil to prevent injury to animals.

Monitoring

Field research and monitoring of measures such as wildlife passages are required to advance the state of practice as results may be variable depending on type of problem, species involved and local situation. Where opportunity exists, post-construction monitoring of wildlife passage structures is recommended to further enhance this baseline knowledge for planning and design of future highway projects in urban areas.

General guidelines for maintenance of passage structures

- Periodic visits should be made to ensure that there are no obstacles or foreign materials in or near the passage that might affect wildlife use.
- If wing fencing is present, fences should be periodically checked, maintained and repaired (minimum once per year).

Contact

Questions or further information on this guideline may be directed to Environmental Management Services, Alberta Transportation.

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