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Ministry of Forests, Lands, Natural Resource Operations, and Rural Development
Honourable Doug Donaldson, Minister
Improving Wildlife Management and Habitat Conservation in British Columbia
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July 31, 2018

Dear Minister Donaldson,

In response to your call for public input, the attached document (*Improving wildlife management in British Columbia by reducing the negative impacts of roads and railways on wildlife*) and this cover letter comprise the written submission of the Wildlife Collision Prevention Program to the public engagement process of *Improving Wildlife Management and Habitat Conservation In British Columbia*.

I would appreciate receiving updates about the *Improving Wildlife Management and Habitat Conservation In British Columbia* process, and a copy of the final report, when it is available.

Thank you for the opportunity to provide input and suggestions into how the management and conservation of BC's wildlife populations could be improved.

Sincerely,

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Photo credit: Roy V. Rea

**Improving wildlife management
in British Columbia
by reducing the negative
impacts of roads and railways
on wildlife**



BRITISH COLUMBIA
CONSERVATION
FOUNDATION

Prepared for:

**Ministry of Forests, Lands, Natural Resource
Operations and Rural Development
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Background

Honourable Doug Donaldson, Minister of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), announced that the government of British Columbia would “*open up a discussion among Indigenous peoples, rural communities, wildlife and habitat organizations, natural resource development industry stakeholders and the public, so that together we can identify ways to effectively sustain wildlife and habitat, both in the short and the long term.*” The public has been invited to share comments and suggestions to assist in the creation of a new wildlife management and habitat conservation strategy for BC.

The Wildlife Collision Prevention Program (WCPP), administered by the BC Conservation Foundation, works to reduce wildlife vehicle collisions (WVCs) and subsequent wildlife mortality and injury on BC highways through research, collision mitigation activities, and public awareness projects. In answer to the Minister’s request for public input, WCPP has prepared this document “*Improving wildlife management in British Columbia by reducing the negative impacts of roads and railways on wildlife*” which provides recommendations to mitigate the habitat fragmentation and direct mortality threats that transportation corridors present to many wildlife species.

Although the mandate of WCPP lies primarily with wildlife mortalities and habitat fragmentation associated with roads and highways (not generally involving wildlife train collisions), we maintain an interest in wildlife train mortality and follow existing research and projects associated with it. Therefore, we have also provided several recommendations for this specific type of wildlife mortality.

The BC Ministry of Transportation and Infrastructure (MOTI) maintains records on the numbers of wildlife carcasses removed from BC highways in their Wildlife Accident Reporting System (WARS). The last published WARS report (Sielecki 2010) contains data from 1988 to 2007. In the last five years of published WARS data (2003-2007), an average of ~6,100 animal carcasses per year were removed from BC highways. Of these carcasses, ~80% were deer, ~7% were moose, ~3% were elk, and ~3% were bear.

MOTI acknowledges that WARS captures only about 25% to 35% of the actual numbers of animals killed (Sielecki 2010). When this WVC underreporting rate of 75% is applied to the known number of carcasses, it can be estimated that over 24,400 animals are involved in WVCs each year. This number demonstrates the seriousness of the WVC issue in BC, particularly for mammal species that are endangered, threatened, or of concern (caribou, badger, wood bison, moose, grizzly bear). Also, the significant impact of highways on wildlife habitat connectivity must also be considered.

Further to the numbers of wildlife killed on BC highways, there are also considerable human costs that must be mentioned. ICBC five-year averages (2012-2106) show that 610 people are injured and three people are killed each year in animal-related crashes.

This report provides recommendations to reduce the negative impacts of transportation corridors on wildlife, specifically related to Challenges Two, Three and Seven as described in FLNRORD (2018).

Challenge Two: How to increase the involvement of non-governmental conservation organizations as well as a broad range of wildlife and habitat stakeholders and the general public in wildlife management and habitat conservation.

The first step in addressing and reducing WVCs is to form a multi-agency provincial working group with a mandate to identify and implement appropriate actions. Appropriate resources of staff time and funding need to be allocated to all government agencies involved. Non-government partners and other stakeholders need to be identified and included in this working group to broaden expertise and knowledge, and to achieve agreement with, and participation in, any proposed actions. A multi-agency committee would provide opportunities for:

- Supporting non-government organizations participation in wildlife management.
- Engaging and collaborating with a wider range of stakeholder groups.
- Providing input into governance models for improved decision making models.

Challenge Three: Some wildlife populations are declining across the province.

Challenge Seven: Concerns about human-wildlife conflicts are increasing, including those related to agricultural impacts, urban wildlife, wildlife-vehicle collisions and dangerous wildlife.

Large numbers of animals are killed on BC's highways (Sielecki 2010, Hesse and Rea 2016) and railways (Snetsinger 2013, Kerr 2016), including mammal species that are endangered, threatened, or of concern (caribou, badger, wood bison, moose, grizzly bear).

Wildlife and Railways

Recommendations to reduce moose mortality on railways in BC have been made by Child (1987), Child et al. (1991), and Rea et al. (2010). Continued efforts to understand and address rail-caused wildlife (particularly moose) mortality must be undertaken.

Reducing wildlife train mortality - Specific recommendations:

- Improve transparency around reporting of rail-caused wildlife mortality numbers.
- Improve and standardize data collection in order to capture mortality information more fully.
- Install permanently-mounted and continuously-running video cameras to provide information on wildlife mortality and kill locations.
- Use GPS to record mortality locations and other biologically/ecologically necessary information.
- When wildlife are regularly killed as an expected result of routine operations (as is the case with trains) then monetary compensation should be required from the organization responsible for the mortality. This compensation would be an excellent way to fund research, conduct population inventories, enhance wildlife habitat away from the rail lines, and otherwise generally assist in wildlife (moose) management in BC, as well as provide an incentive for rail companies to drive innovation in reducing wildlife mortality. This would be similar to other

mitigation programs where, if habitat or resources are damaged as a result of industrial operations, then specific compensation measures are required from the organization responsible for the damage.

Wildlife and Roads

Many agencies (MOTI, ICBC, highways maintenance contractors, and others) make decisions that directly impact wildlife (and human) safety and well-being on, or adjacent to, roads. Recommendations to reduce WVCs on BC highways often include actions and activities that fall under the mandate of MOTI. The Wildlife Collision Prevention Program and other road ecologists in BC have made many recommendations to MOTI to reduce WVCs in various reports and publications since 2006 (Hesse 2006, Rea and Klassen 2006, Rea 2008, O’Keefe and Rea 2012, Rea et al. 2014, Hesse and Rea 2016). In order to adhere to its mandate for stewardship of BC’s natural resources, FLNRORD must find ways to influence the actions of road safety managers to protect wildlife and wildlife habitat along BC highways. Agency policies and decision-making processes must be coordinated to minimize the human wildlife conflict that occurs on and along roads and highways so that best management decisions are consistently made and implemented.

Recommendations are provided to reduce habitat fragmentation and the numbers of wildlife killed on BC’s roads and highways.

MOTI Wildlife Accident Reporting System (WARS) data – collection and use

Data on WVCs is collected by highways maintenance contractors and recorded by MOTI through WARS. Although MOTI maintains a comprehensive and successful WVC data recording system (Huijser et al. 2007), some limitations do exist. The WARS data are subject to inaccuracy and incompleteness both during field data collection and at the database management stage.

We acknowledge that management of WARS data is outside the mandate of FLNRORD. However, without accurate and reliable data on when, where, what species, and the numbers of animals being killed, it is difficult to make appropriate recommendations for mitigation. The accuracy and reliability of the WARS data would be improved by the following changes.

WARS data collection - Specific recommendations

- Require that carcass locations be reported by GPS coordinates (not the current MOTI system of Landmark Kilometre Inventory or Roadside Feature Inventory markers).
- Capture incidents where there is no carcass to remove, but the maintenance contractor knows that a WVC has occurred.
- Develop a WARS App for mobile electronic devices so that maintenance contractors can quickly and accurately capture the required WARS information, geo-reference the location, and add a photograph of unusual circumstances where necessary.

- Until implementation of electronic data capture at the field level, develop an electronic system for data entry, either at the primary data reporting level where the maintenance contractor can enter the data directly, or at the secondary level, when the District office receives the data.
- To ensure the integrity of the WARS data, at the MOTI District level, hold the highways maintenance contractors to the highest standard, with respect to timely, accurate, and complete reporting of wildlife carcass recording and reporting.
- At the Branch level, provide appropriate financial and staffing resources so that errors in the WARS database can be corrected, and produce regularly published WARS reports, summarizing WVCs on a highway, district, regional, and provincial basis.

Defining WVC hotspots

The WARS data are integral to understanding WVCs. WARS data, together with habitat mapping, wildlife corridors, and species distribution and movement information, must be analyzed and interpreted to provide WVC hotspot definitions, so that stretches of road with known safety concerns due to frequent WVCs can be identified. This allows for the prioritization, planning, and implementation of site specific mitigation methods in appropriate locations.

The definition of a WVC hotspot is arbitrary. It can vary by jurisdiction, by species, and by the purpose for which the definition is needed. The defining components of a hotspot – the distance over which the hotspot is measured, the number of collisions involved, and the time period covered by the hotspot – can also vary. Hotspot definitions can be specific (xx collisions over yy km in zz time period) or more general (highways segments ranked from highest to lowest in a gradient of collision frequency). Collision hotspots should not be solely defined as discrete areas where carcasses are found. Rather, the adjacent landscape ecology, habitat linkages, and species biology must be taken into consideration.

Building upon the existing WARS data, medium and fine scale analysis of the WARS data (possibly at the scale of the MOTI districts) would provide highway and wildlife managers with information to identify high risk sites and to develop plans to address the mitigation of areas prone to WVCs.

Specific regions of BC experience higher risk and occurrence of WVCs. These areas include highways in the Kootenays or Cariboo, where deer vehicle collisions commonly occur, and northern BC highways, where moose vehicle collision occurrence is high. These areas should be prioritized for WVC mitigation.

Defining WVC hotspots – Specific recommendations

- Use WARS data to refine and standardize the criteria for WVC hotspot definitions, which may differ by species, and by geographic area.
- Incorporate adjacent landscape ecology, habitat linkages, and species biology into WVC hotspot identification.
- Utilize these updated (as above) WVC hotspot definitions to determine high risk WVC hotspot locations, determine appropriate mitigation treatments, and prioritize these areas for WVC mitigation treatments.

Wildlife Signage

Wildlife warning signs are MOTI's most commonly used WVC mitigation measure because they are inexpensive and easy to maintain and install (Sielecki 2010). Wildlife warning signs are most effective when sign design and configuration reflect the risk of WVCs along a particular stretch of highway, when sign locations are reviewed and updated as landscape conditions change, and when sign designs are re-evaluated periodically.

A variety of wildlife warning sign sizes and configurations are available in BC (BC MOTI 2010) and some direction on sign placement does exist. However, a consistent approach throughout the province, allowing for placement of smaller signs in areas of defined lower risk, and larger, intelligent/advanced, LED-embedded traffic signs (LETS), or non-traditional signage in areas of defined higher risk would provide motorists with improved messages about relative WVC risks.

In 2014, MOTI introduced the use of wildlife corridor warning signs (BC MOTI 2014). MOTI does not provide a specific definition for a wildlife corridor, but it appears to refer to stretches of highway greater than ten kilometres in length where WARS data has indicated high numbers of WVCs and where drivers might reasonably expect to encounter wildlife over extended distances. There are various configurations of the corridor signs, depending upon the length of the wildlife corridor and the species involved.

We acknowledge that management of MOTI signage is outside the mandate of FLNRORD. However, public awareness about the dangers of wildlife on the road, and appropriate notification about the risks that wildlife presents to drivers, is important in reducing the numbers of wildlife killed on BC's roads.

Wildlife signage - Specific recommendations

- Develop and implement a provincial standard for wildlife warning signs, relating sign size, style, and configuration to site specific WVC risk.
- Evaluate the potential uses of intelligent/advanced signage, LED-enhanced traffic signage (LETS), non-traditional signage, and seasonal signage and include them in the hierarchy of signage countermeasures to increase sign conspicuity and prevent driver desensitization and complacency.
- Continue to add wildlife corridor and/or gateway signs to highways province-wide.
- Review existing wildlife warning sign locations relative to WVC hot spot areas and changes in the landscape that occur over time; concurrently remove old signs where WVC risk has decreased.
- Review, re-evaluate, and redesign wildlife sign designs as appropriate.
- Post recommended night-time driving speeds at hotspot sites in moose collision prone areas.
- If new sign designs or technologies are implemented, ensure that appropriate financial and staffing resources are in place to allow science-based evaluation of sign efficacy.

Roadside Brushing

Brushing activities are conducted in rights-of-ways along BC highways to improve driver sightlines for oncoming traffic and also to improve driver sightability of other road hazards, such as approaching wildlife. Roadside areas are brushed on an as-needed basis, when they are identified either by the highways maintenance contractor or by MOTI staff, as and when funding is available, and when brushing fits into operational schedules. Although brushing is carried out to improve road safety, it does promote the growth of early seral stages of woody browse species that are attractive to herbivores like moose (Rea 2003) and so must be carried out mid-summer to reduce re-sprouting.

We acknowledge that the management of highway rights-of-way is outside the mandate of FLNRORD. However, highway management practices that can attract animals to the roadside must be prudently conducted in ways to reduce the risk of wildlife being killed.

Roadside brushing – Specific recommendations

- Increase funding for roadside brushing.
- Identify sites where roadside forage is providing attractive browse and cover for ungulates and where such vegetation may impact driver sightlines, and investigate WARS data in these locations to identify WVC frequency at these sites.
- In WVC hotspots containing forage attractive to ungulates, or where driver sightlines are impeded, conduct brushing in mid-summer (Rea 2003) at three or four year intervals (after conducting nesting bird surveys; *Wildlife Act*, Part 1, Section 34(c)).

Speed Reduction

Reduced speed increases the ability of drivers to see wildlife on the road due to the effective distance of headlights. It is particularly difficult to detect moose on the road at night because their coat is dark and anecdotally, seems to “absorb” light. Also, moose are so tall that their eyes are above the level of many passenger car headlights, so that reflected eye shine, which could act as a warning to the presence of moose on the road, does not always happen.

Highways with recurrent moose vehicle collisions are of most concern. An Ontario study of motorists’ ability to detect moose on the road at night using moose decoys and vehicles with different headlights at both high and low beams suggested that most drivers, travelling over about 70 km/hour on a highway at night, were likely to be overdriving the capabilities of their headlights and would be unsuccessful in detecting a moose on the road in front of them (Rodgers and Robins 2006).

On northern BC highways, moose collisions peak in December and January (Sielecki 2010, O’Keefe and Rea 2012). Analyses of ICBC data indicate that moose collisions peak between 5:00 pm and 7:00 pm during December and January and remain elevated during all night-time hours (O’Keefe and Rea 2012). Rodgers and Robins (2006) findings regarding motorists’ poor ability to detect moose on highways at

night at speeds over 70 km/hour, plus BC's peak in moose collisions during the winter months when driving conditions are poor, supports a recommendation for a reduction in night-time speed limits in winter months, on highways where moose collision risk is highest

Speed reduction – Specific recommendation

- During winter months, implement lowered night-time speed limits for highest risk moose hotspot locations.
- Research clearly shows that slower speeds (i.e., less than 70 km/hour), especially at night, reduce the likelihood of moose collisions (Rodgers and Robins 2006), therefore, we recommend including night-time driving speed tabs of 70 km/hour on signs posted in WVC hotspots.
- Increase speed limit enforcement in hotspot sites.

Roadside Mineral Licks

Mineral/muck licks occur in highway rights-of-way, and can be either naturally occurring or the result of road construction. Licks are wet, muddy, seepage areas where nutrient-rich soils have accumulated due to the percolation action of below-ground mineral springs or natural surface drainage patterns. Roadside licks are an attractant to moose and other ungulates and are a contributing factor to WVC risk.

In Quebec, mineral lick deactivation significantly reduced mineral lick visits by moose and subsequent moose vehicle collisions (LeBlond et al. 2006). In MOTI's Northern region, five deactivation techniques (rocks, fencing, logs, cedar bark mulch, and human hair/dog fur) have been used on 14 licks in six locations to decommission roadside licks.

Research results to date (Rea and Hesse 2018) show that for untreated licks, moose visits have declined (likely as a result of moose population declines). For treated licks, moose visits dropped precipitously in the years following treatment. Ongoing analysis of WARS data shows fewer collisions after decommissioning than before treatment, with some sites showing clear decreases in the years following decommissioning. These data must be statistically analyzed in relation to moose visitation patterns and to declines in local moose populations over those same years.

Again, we acknowledge that managing roadside attractants, such as mineral licks, falls under MOTI's mandate. But, similar to roadside brushing, prudent highway management practices to reduce the attractiveness of the roadside area to wildlife must be employed to reduce the risk of wildlife being killed.

Roadside mineral licks – Specific recommendations

- Identify roadside mineral licks suitable for deactivation.
- Deactivate roadside mineral licks where WARS data indicate that these sites are contributing to WVCs.
- Provide sufficient funding and resources so that any mitigation treatments can be monitored for ~10 years to assess efficacy.

Wildlife Corridors and Safe Passage for Wildlife to Move Across Roads

Transportation corridors negatively affect wildlife in several ways: direct loss of habitat, direct mortality, reducing habitat quality adjacent to roads, and providing barriers to wildlife movement across the landscape, resulting in habitat fragmentation and population isolation.

Wildlife exclusion systems (fencing) together with crossing structures (underpasses and overpasses) can mitigate road mortality and fragmentation effects. Fencing and associated crossing structures can reduce the numbers of WVCs by > 80% (Clevenger and Huijser 2011). As well as the direct reduction of WVCs, overpasses and underpasses provide safe passage to seasonal ranges and other migration routes, connect ecosystems and wildlife habitat, and prevent genetic isolation in wildlife populations.

In order to locate this type of infrastructure in the most advantageous and effective locations, appropriate funding and staffing support must be provided to carry out site and landscape-level research on wildlife habitat mapping, corridor identification, wildlife population surveys, species distribution, and animal movement patterns, all of which must then be tied to an analysis of WVC locations. Very few BC highway projects have undergone such in-depth analyses. Huijser et al. (2012) prepared a review of Highway 16 through Mount Robson Provincial Park, but none of the recommendations were implemented.

MOTI has installed wildlife exclusion systems and/or wildlife overpasses and underpasses on several highways (Highway 1: Kicking Horse Canyon; Highway 2: Tupper; Highway 5: Coquihalla; Highway 19: Vancouver Island Highway; Highway 97: Summerland to Peachland; Highway 97: Cottonwood River Bridge; Highway 97C: Okanagan Connector). Additionally, a large wildlife overpass across Highway 1 in Yoho National Park (designed, implemented, and funded by Parks Canada) was completed in 2017.

Although significant monetary investments were made in these infrastructure improvements, little monitoring of the resultant effects have been conducted or reported. It is critical that monitoring of these types of mitigation measures be carried out so that the impacts and efficacy of such mitigation can be assessed and reported to the public. Long-term monitoring is important as species adapt their use of overpasses and underpasses at different rates through time. Clevenger and Barrueto (2014) recommend monitoring periods of at least five years for ungulate species and a minimum of seven to eight years is recommended for carnivore species.

Wildlife corridors – Specific recommendations

- Commit sufficient funds and resources to carry out site and landscape-level research on wildlife habitat mapping, wildlife corridor identification, wildlife population surveys, species distribution, and animal movement patterns.
- Locate fencing and wildlife crossing infrastructure in areas where wildlife species are especially vulnerable to direct road-caused mortality and/or habitat fragmentation.
- Carry out long-term monitoring of mitigation methods so that treatment efficacy and effects can be determined.

Summary of Recommendations

Funding

- Provide appropriate financial and staffing resources to implement these recommendations.

Interagency cooperation

- Form a multi-agency working group to identify and implement appropriate actions.
- Work together with MOTI on initiatives to reduce the negative impacts of roads upon wildlife.

Wildlife and trains

- Improve data collection (GPS, video), implement compensation for wildlife mortality.

WARS data

- Improve accuracy of WARS data collection (GPS, mobile apps, electronic data entry).
- Maintain WARS database and produce regularly published WARS reports.

Define WVC hotspots

- Develop provincial definitions for WVC hotspots, by species and geographic area.
- Identify high risk stretches of highway with reference to the updated hotspot definitions.

Signage

- Develop provincial sign standards relative to wildlife collision risk.
- Evaluate the use of enhanced, intelligent, and non-traditional signage for highest risk areas.
- Review and relocate signs relative to WVC risk and landscape changes, as needed.

Roadside brushing

- Increase funding, identify WVC-prone locations, and implement brushing mid-summer.

Speed limits

- Implement lower winter night-time speeds on highways with elevated risk of moose collisions.

Roadside mineral licks

- Identify and deactivate roadside mineral licks where they contribute to WVCs.
- Carry out long-term monitoring of deactivation treatments.

Wildlife corridors

- Carry out site and landscape-level research on wildlife habitat mapping, wildlife corridor identification, wildlife population surveys, species distribution, and animal movement patterns.
- Locate fencing and wildlife crossings where wildlife species are especially vulnerable to direct mortality and/or habitat fragmentation.
- Carry out long-term monitoring of mitigation methods to assess treatment efficacy and effects.

This report provides recommendations that will assist FLNRORD to:

- Engage non-governmental conservation organizations, stakeholders and other government agencies in actions to reduce WVCs.
- Address wildlife mortality caused by vehicles and trains, particularly for mammal species that are endangered, threatened, or of concern (caribou, badger, wood bison, moose, grizzly bear).
- Mitigate the negative impacts of habitat fragmentation caused by transportation corridors on wildlife.
- Reduce human wildlife conflict resulting from the presence of wildlife on roads.

In order for FLNRORD to manage wildlife and conserve wildlife habitats effectively, appropriate financial resources and staff time must be allocated to understand the complex issues associated with WVC reduction and habitat fragmentation and to provide appropriate recommendations and support to other agencies to develop, implement, and monitor suitable mitigation.

Respectfully submitted,

A handwritten signature in blue ink that reads "Gayle Hesse".

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