

BC Southern Interior Wildlife Crossings and Corridors Discussion Paper

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Courtesy BC MOTT

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Introduction

This discussion paper was developed as a foundational resource to support regional efforts aimed at improving wildlife connectivity and reducing Wildlife Vehicle Collisions (WVCs) in the British Columbia (BC) Southern Interior. It draws primarily on publicly available and readily accessible information from scientific literature, organizational reports, policy documents, and online data sources. As such, it represents a starting point, not a comprehensive review, and helped frame discussions at the BC Southern Interior Wildlife Crossings and Corridors Forum (the Forum) held June 11–13, 2025, in Kelowna, BC.

Ecological connectivity is increasingly threatened in the Southern Interior by roads, highways, and railways that fragment landscapes and disrupt wildlife movement. Although various connectivity and crossing projects are underway across the region, there has yet to be a regional discussion implementing a regional framework to determine where to invest in crossing infrastructure or how to coordinate action across the region. A review of prioritization efforts from other regions offers insight into common criteria used to guide mitigation and points to the need for clearer role definition, funding strategies, and accountability structures.

Hosted by the Government of British Columbia, British Columbia Conservation Foundation (BCCF), Okanagan Institute for Biodiversity, Resilience, and Ecosystem Services (BRAES) at the University of British Columbia (UBC), Parks Canada, Thompson-Nicola Conservation Collaborative (TNCC), and Okanagan Collaborative Conservation Program (OCCP), the Forum will bring together Indigenous leaders, researchers, government agencies, conservation organizations, industry representatives, and other regional partners. The Forum will provide a venue to share knowledge, identify data and policy gaps, and collaborate on strategies for enhancing ecological connectivity and reducing WVCs.

Ultimately, this paper was intended to support forum discussions by offering context and raising key questions to inform next steps. It was not meant to be comprehensive, but rather to function as a primer for participants. Additional information gathered at the forum has since been incorporated into this version, and the paper can now serve as a resource to help guide the implementation of forum actions. In that way, this document was not an endpoint but a tool to support meaningful coordination and action toward improved wildlife connectivity in British Columbia's Southern Interior.

Background

Ecological Connectivity in Canada

Defined by the United Nations Convention on Migratory Species (CMS) as the “unimpeded movement of species and the flow of natural processes that sustain life on Earth” (CMS, 2020), ecological connectivity is essential for conserving biodiversity, enabling species migration, and sustaining ecological processes (Hilty et al., 2020).

To support connectivity conservation at a national scale, Parks Canada developed a first-of-its-kind map identifying [National Priority Areas for Ecological Corridors \(NPAECs\)](#). The areas identified by Parks Canada are not ecological corridors themselves, but broad geographic areas across Canada where habitat loss and fragmentation have occurred or are imminent, and where maintaining or restoring connectivity is critically important for biodiversity (see Figure 1).

The upcoming Forum focuses specifically on NPAEC 3 (South Okanagan to Thompson-Shuswap) and NPAEC 4 (Southern Rocky Mountain Trench and Alberta Eastern Slopes), two regions of high ecological importance in British Columbia’s Southern Interior, where local efforts to improve or maintain connectivity are both urgently needed and nationally significant.



Figure 1. National Priority Areas for Ecological Corridors in Canada. Copyright Parks Canada.

At present, British Columbia does not have a formal legislative or policy framework specifically recognizing or protecting wildlife corridors. While the province's Ecological Connectivity Initiative is currently exploring the concept of formally recognizing "ecological corridors" for connectivity management purposes, this is still in development. Although no province-wide corridor plan exists, various strategic land use plans, forest management plans, and resource management measures and strategies do reference ecological connectivity and corridor values, often in the context of biodiversity conservation, habitat integrity, or climate change adaptation.

Coursework Suggestion

Need a reminder of the basics of Ecological Connectivity? Or want to dive deeper?
Check out this free, [self-paced course offered by Learning for Nature](#).

British Columbia's Southern Interior

Within Canada, the province of BC is home to more than 1100 different species of animals and diverse habitats. BC is home to three-quarters of Canada's avian and terrestrial species, 70% of its freshwater fish, and 60% of its evergreen trees (Price and Daust, 2016). BC can be divided into 8 Natural Resource Regions (NRRs), which are the administrative boundaries used by the BC government for managing natural resources and land use planning. The Southern Interior of BC is primarily composed of three NRRs: the Kootenay-Boundary region, the Thompson-Okanagan region, and the eastern half of the Cariboo. The Southern Interior (delineated for this discussion paper, see figure 2) is one of the province's most ecologically diverse and geographically expansive areas with 14 of the province's 43 ecoregions represented:

- Chilcotin Ranges
- Columbia Highlands
- Fraser Plateau
- Interior Transition Ranges
- Northern Cascades Ranges
- Northern Columbia Mountains
- Northern Continental Divide
- Okanagan Highland
- Pacific Ranges
- Purcell-Transitional Ranges
- Selkirk-Bitterroot Foothills
- Southern Rocky Mountain Trench
- Thompson-Okanagan Plateau
- Western Continental Ranges



Figure 2. The Southern Interior region of British Columbia, as defined for this discussion paper (black).

Bounded by the Rocky Mountains to the east and the Coast Mountains to the west, the Southern Interior region includes dry grasslands, interior forests, alpine zones, and semi-arid shrublands. This mosaic of ecosystems supports a wide range of wildlife, including many wide-ranging species such as grizzly bear, elk, and wolverine that require large, connected landscapes to meet their needs for seasonal movement, breeding, dispersal, and long-term adaptation to climate change.

Yet in the Southern Interior, this connectivity is increasingly under threat. Expanding development, land use change, and a dense network of transportation infrastructure, including roads, highways, and railways, fragments wildlife habitat and impedes movement. These linear features not only isolate wildlife populations but are also a major source of direct mortality. Approximately 55% of all WVCs occur in the Southern Interior of British Columbia, highlighting both the region's ecological significance and the urgency of coordinated mitigation efforts (Sielecki, 2010).

Impacts of Linear Infrastructure

In the Southern Interior of BC, one of the greatest threats to ecological connectivity is the presence of linear infrastructure. Linear infrastructure can be defined as any built linear feature on the landscape. For this discussion paper, we will focus primarily on roads and railways; however, fencing, powerlines, and pipelines are also considered linear infrastructure and can have additional (or cumulative) impacts on wildlife (van der Ree et al., 2015).

Linear infrastructure can cause direct mortality to wildlife as well as act as both a physical barrier and a filter, limiting the ability of wildlife to move within and between habitat areas. This can lead to reduced access to habitat, increased isolation of populations, and long-term declines in genetic diversity.

The impacts of linear infrastructure are not confined to its physical footprint. These features often generate effect zones that can extend into surrounding habitat, through noise, light, chemical runoff, hydrological disruption, and other effects that alter ecosystem structure and function. These disturbances can reduce habitat quality for many species and affect ecological processes at a landscape scale (Ament et al., 2023).

Although roads have been more widely studied, many of the ecological impacts associated with railways and canals are similar and may be underreported or underestimated. There is a critical need for more research on these systems, especially in regions like the Southern Interior where both biodiversity and transportation pressures are high.

To address these impacts, wildlife crossing structures have emerged as a key mitigation tool. Overpasses, underpasses, fencing, and retrofitted culverts can help restore connectivity by allowing wildlife to safely cross busy roads and railways (van der Ree et al., 2015). These structures are most effective when paired with exclusion fencing that guides animals toward crossing points and reduces collisions. Well-placed and properly designed crossing structures are one of the most effective strategies for reducing wildlife-vehicle collisions, supporting population health, and maintaining ecological processes across fragmented landscapes (Ament et al., 2021). In fact, Canada is world-renowned for its wildlife overpasses thanks to the pioneering efforts completed in Banff National Park, but did you know that Canada's first wildlife overpass, the Trepanier bridge, was constructed in BC in 1989?

Key Resource

Dive deeper with the IUCN technical report: [Addressing Ecological Connectivity in the Development of Roads, Railways and Canals.](#)

Wildlife-Vehicle Collisions in the Southern Interior

For decades, both the government and scientific community have recognized the importance of understanding the spatial patterns and impacts of WVCs for developing effective mitigation strategies. Between 2013 and 2017, annual collision records from the Insurance Corporation of British Columbia (ICBC) averaged 11,000 animal-related crashes, with ~700 human injuries and 3 fatalities in BC (ICBC, 2018).

Initiated in 1978, the Wildlife Accident Reporting System (WARS) is a database for collecting and tracking wildlife-vehicle collisions on BC highways. WARS has accumulated over 200,000 records to date. Several in-depth WARS reports, which show the distribution and severity of wildlife-vehicle collision numbers, have been made publicly available but none cover data beyond 2002. Some surface-level summary figures have been made publicly available; however, none at a level of detail that could be used for conservation planning and none that include data beyond 2017. We, the authors, have acquired raw WARS data from the Ministry of Transportation and Transit, covering the years 2000-2025, to better understand where wildlife-vehicle collisions are occurring and the degree to which different species are being affected.

WARS reports are made by highway maintenance contractors if they find dead animals on the road during routine inspection, or after being alerted to a WVC or dead animal on the highway by the public or RCMP. As a result, WARS reports are based almost entirely on carcass examination. For the purpose of analysis, we assumed each animal reported in WARS died as a result of a unique WVC. WARS reports are typically made on provincially managed highways, and not municipal roads or highways maintained by the federal government, such as those within National Parks. Prior to 2018, WARS reports used Landmark Kilometre Inventory (LKI) segments to mark carcass location, however, they have since adopted GPS as the required location method and have retroactively converted all WARS reports to GPS. We therefore removed any data points that were not along provincially maintained highways from analysis or were likely errors from GPS conversion (see Appendix 1 for additional details). It is important to note that in 2018 WARS reports changed from being submitted by fax to being submitted digitally by highway maintenance contractors. As a result of technical and compliance issues associated with these changes many reports were lost or went unsubmitted.

Based on the data recorded in WARS, over the past two and a half decades there have been just under 72,200 WVCs in BC's Southern Interior. On average there are 2,887 WVCs/year (SD = 970.9) on the Southern Interior's ~5,233km of highway, equating to 0.552 WVC/km/year. WVCs in the Southern Interior were highest in 2015, seeing nearly double the WVCs of any other year, while 2018 saw a low point in WVCs. The low WVC counts in 2018 is primarily the result of technical and compliance issues following changes to WARS reporting procedures, and represents a year of severe underreporting, rather than any trends in the true occurrence of WVCs. At least 28 different species of wildlife have been reported in WARS, including WVCs with caribou, grizzly, marten, badger, owls, and otters. As in the rest of the province, deer make up the majority of WVCs in the Southern Interior.

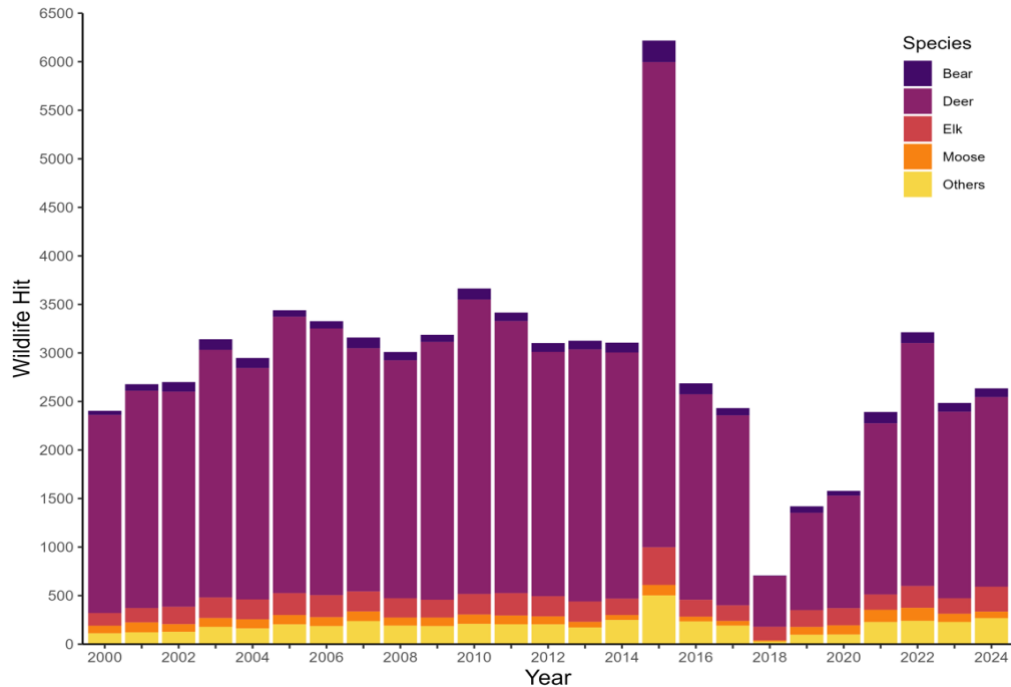


Figure 3. Species reported in WARS wildlife-vehicle collisions (WVCs) in the Southern Interior, broken down by year. WARS reports represent carcasses found along provincially maintained highways and are all assumed to represent wildlife struck and killed in wildlife-vehicle collisions. The dip WVCs in 2018 was the result of a significant loss of WARS data due to changes in reporting procedures and is not indicative of any trends in true WVC numbers.

Wildlife vehicle collisions are not evenly distributed within the province, nor within the Southern Interior. Low-traffic highways such as Hwys 23, 31, and 31A have very low rates of WVCs, while areas of higher traffic, such as Hwys 3 and 93, have far more elevated levels of WVCs (Fig 4). While traffic levels likely play a part in the rate of WVCs, animal density and movement patterns are likely a significant contributor as well. The highways running from Invermere to Cranbrook to East of Sparwood intersect the habitat of critical populations of badger and grizzly bear, and migration corridors for elk, deer, and bighorn sheep. (Lamb 2025; Apps et al. 2007).



Figure 4. Heatmap of WVCs along provincial highways, reported by WARS in the Southern Interior of BC from 2000-2025. Highways were converted into segments of a maximum of 5km with a 2.5km buffer.

Within BC, the Insurance Corporation of British Columbia (ICBC) and WARS represent the two primary sources of data on WVCs. Underreporting of WVCs presents a significant challenge for accurately assessing the scale and distribution of wildlife mortality on British Columbia’s highways. Causes of underreporting include animals moving away from the road after being injured, carcasses being removed before documentation, incidents going unreported to insurance or law enforcement agencies, and technical and compliance issues, such as those experienced by WARS in 2018. Analyses conducted by the Wildlife Collision Prevention Program (WCPP) reveal that official databases substantially underrepresent the true number of WVCs in any given year (Hesse and Gayle 2016, 2020). The BC Ministry of Transportation and Transit (MOTT) estimates that they capture 25-35% of WVCs each year while ICBC reports capturing 75%. However, the 75% capture estimate claimed by ICBC has been shown to be less than accurate when isolating data along numbered highways. Data collected between 2004 and 2013, along segments of northern highways, showed that the MOTT captured only 34.3% of known collisions, while ICBC captured 45.5% (Hesse and Gayle 2016). A second study by Hesse and Gayle (2020), looked at data collected between 2008 and 2017 along a segment of Hwy 33. They found that WARS captured 50.9% of WVCs while ICBC captured 44.6%, for an underreporting rate of 49.1% and 55.4%, respectively. These findings are consistent with mid-range underreporting patterns seen across North America and globally. This lack of comprehensive data introduces considerable uncertainty into efforts to identify collision hotspots and prioritize mitigation measures, highlighting the need for more integrated, consistent, and transparent data collection across agencies in BC.

Systematic Literature Search

For this paper, we conducted a scoping review to get a sense of the breadth and volume of research on wildlife-vehicle collisions, road ecology, and rail ecology in BC. The review focused on peer-reviewed scientific literature, which we acknowledge carries limitations, particularly the underrepresentation of work by agencies, Indigenous Nations, and community organizations that may not publish in academic journals. This literature review is intended as a starting point to help guide further information gathering and dialogue at the upcoming forum.

To find papers, we used a search string of relevant terms in the *Web of Science All Databases* collection (see appendix A2 for search string). The returned papers were then screened for relevance. Any papers that did not focus on wildlife or wildlife-collision mitigation were removed, as well as any papers that focused on aquatic species or whose study area was not at least partially in BC. Of the 168 papers returned by the search string, 27 were duplicates and 92 were irrelevant, leaving us with 49 relevant papers. Irrelevant papers were primarily either engineering and material sciences, concerned with aquatic connectivity, or located outside BC.

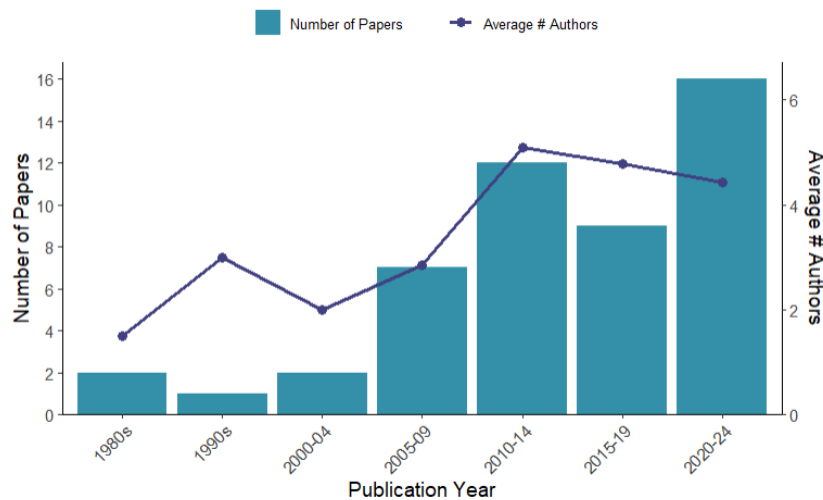


Figure 5. Number of publications on road and rail ecology in British Columbia per period (bars), and the average number of authors per paper during each period (line). Thesis papers were excluded from the calculations of the average number of authors.

Road ecology as a discipline began to take shape over two decades ago. Prior to 2000 only three papers (1988, 1989, 1991) had been published in regards to the impacts of roads and railways on wildlife in BC (Fig 5). The number of papers published each year quickly began an upward trend thereafter (Fig 5). The single year with the most papers was 2020, with a total of 5 papers. We also see an overall trend of increased collaboration, as the average number of authors per paper is larger in later years. The number of authors per paper ranged from 1 to 19. All papers were required to be at least partially within BC. Within BC, 42 of the 49 papers were at least partially located within the Southern Interior Region (as defined by the BC Ministry of Transportation and Transit).

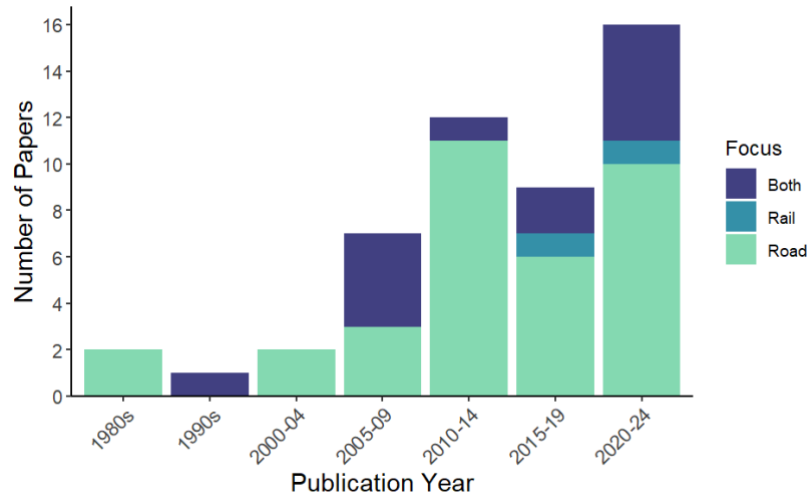


Figure 6. Number of papers per time period, broken down by whether the study focused on the impact and ecology of roads, railways, or both.

While our search included keywords related to both railways and roads, there were over 3 times as many papers involving roads than there were railways (Fig 6). Of the 49 papers, 2 (4.1%) were related only to railways, 34 (69.4%) were related to roads, and 13 (26.5%) were related to both roads and railways (Fig 6).

Table 1. A breakdown of the species or taxa ($n = 52$) studied as determined by the paper keywords and title.

Taxa	Count of Taxa Studied (n)	Percent of Taxa Studied (%)
<i>Birds</i>		
Barn Owls	3	5.8
Other ¹	4	7.7
<i>Mammals</i>		
Badger	2	3.8
Bears ²	10	19.2
Caribou	2	3.8
Deer ³	2	3.8
Moose	6	11.5
Wolf	3	5.8
Wolverine	2	3.8
Other ⁴	9	17.3
<i>Herpetofauna</i>		
Lizards ⁵	2	3.8
Snakes ⁶	7	13.5

¹ Bird (ambiguous) (2), Western screech owl (1), Yellow-breasted chat (1)

² Bear (1), Black bear (1), Grizzly bear (8)

³ Deer (1), Mule deer (1)

⁴ Bighorn sheep (1), Bison (1), Cougar (1), Elk (1), Mammal (2), Porcupine (1), Ungulate (ambiguous) (2)

⁵ Northern alligator lizard (1), Western skink (1)

⁶ Gopher snakes (2), Racer (1), Snake (1), Western rattlesnakes (3)

Within the BC southern interior, substantial work has been done on connectivity for grizzly bears, especially in the transboundary region. Proctor et al. (2012, 2015) mapped movement and genetic exchange across southern BC and the Canada–US border, showing clear fragmentation tied to roads and human settlement. For bighorn sheep, Allen et al. (2016) used individual-based modeling in the Okanagan and found that while there aren't large continuous habitat patches, movement could still be possible through stepping-stone habitats and circuitous routes. Caribou studies have also looked at how roads and linear features increase predator efficiency, which further fragments their habitat (Apps et al. 2013; BC Data Catalogue 2021). On a broader scale, tools like the current density mapping work by Pither et al. (2023) provide regional insight into movement potential for multiple species. And while Jones (2012) applied GIS models specifically to prioritize crossing locations on the Trans-Canada Highway.

A lot of the research in BC has focused on national parks and high-profile mountain corridors, places like Banff, Yoho, Revelstoke, and Kootenay come up repeatedly. These areas are important, but they don't reflect the full picture of road and rail impacts across the Southern Interior, especially when it comes to more developed or heavily used landscapes. There's very little published in traditional scientific literature on connectivity or mitigation in valley regions, despite higher human densities, major highways, and species at risk (like rattlesnakes and badgers) that are especially vulnerable to road mortality. We recognize that this is just a subset of available information, and that not all organizations or agencies have the capacity to submit to scientific journals, and it is our hope to source more of this information through information gathering sessions at the Forum.

There's also a lack of research specific to rail corridors, even though moose-train collisions and grizzly-train collisions are known issues in some parts of the province. The Elk Valley is an exception, grizzly mortality from both road and rail has been documented there (Lamb et al. 2023) but outside of that, rail is often treated as secondary or ignored altogether. When it comes to regional planning and prioritization, there's a notable lack of scientific literature from these underrepresented areas, however, we once again note that publication through traditional scientific journals is not the only route for distributing scientific work, so this section is only a starting point for gathering information.

Crossings work underway in BC's Southern Interior

Building on the information gathered through the systematic literature review, this section highlights a handful of current and emerging efforts to improve wildlife connectivity and reduce wildlife-vehicle collisions in BC's Southern Interior. These examples are not meant to be comprehensive, but rather to give forum participants a sense of the kinds of projects already happening on the ground. This information is found via online resources and through institutional websites. Many additional efforts are underway across the region, and we hope the Forum will help bring more of those to light.

Key Resource

The [Highway Crossing Structure for Wildlife: Opportunities for Improving Driver and Animal Safety report](#) outlines a range of practical measures for advancing policy, funding, and planning actions to increase wildlife crossing uptake in North America.

Reconnecting the Rockies

[Reconnecting the Rockies](#) is one of British Columbia's most ambitious highway mitigation efforts outside of a national park. The project was catalyzed in 2019 at a gathering of conservation scientists and government staff to update a 2010 report about Highway 3. Concern was expressed over the number of animal vehicle collisions in the Elk Valley, estimated at 300 per year, with many more likely unreported.

Reconnecting the Rockies was subsequently launched in 2020 and focuses on an 80-kilometre stretch of Highway 3 from Hosmer through Sparwood to Lundbreck, Alberta. This collaborative project is designed to reduce wildlife-vehicle collisions and restore connectivity in one of North America's most ecologically significant mountain landscapes. This stretch of highway is a major mortality sink for species like grizzly bear, elk, bighorn sheep, and wolverine, and also sits within a critical continental-scale wildlife movement corridor linking the United States and Canadian Rockies. Local data inform the project's phased approach on roadkill hotspots, animal movement, and feasibility.

By the end of 2027, the goal is to complete at least 10 wildlife crossings in B.C., along with supporting infrastructure such as roadside materials and highway signage. A wildlife underpass and fencing at Rock Creek, on the Alberta side, are expected to be completed by 2025, and plans are already in place for more than 20 additional crossings.

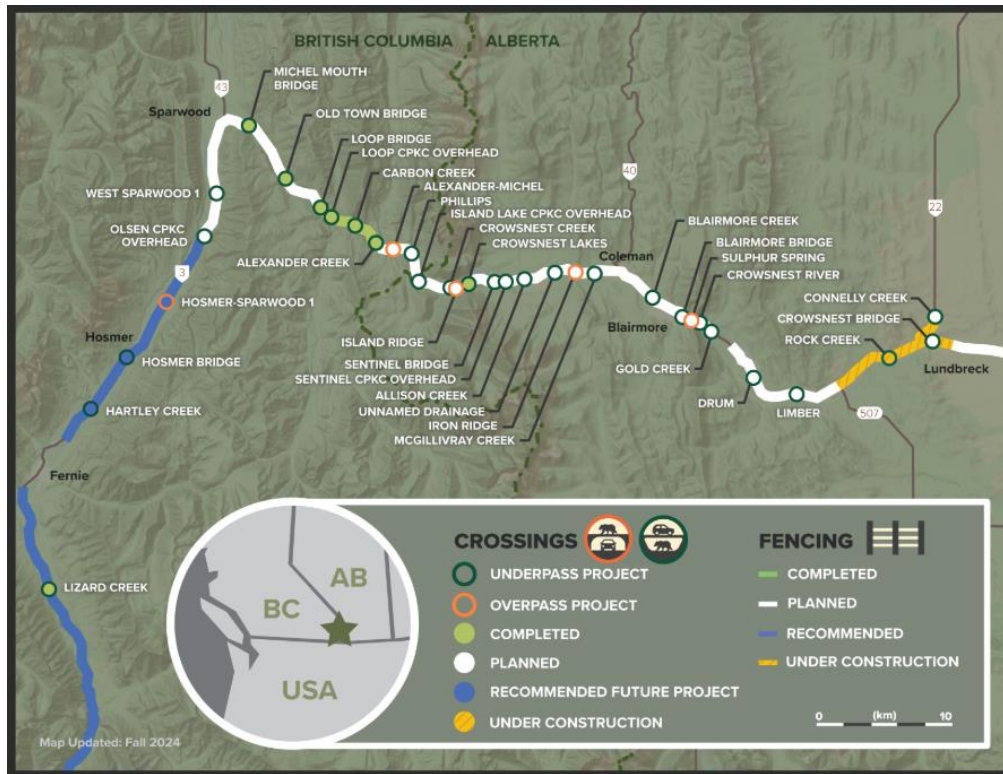


Figure 7: Reconnecting the Rockies project map. Copyright Reconnecting the Rockies.

Radium Connectivity Project

The Radium Connectivity Project is one of British Columbia's most significant recent investments in species-specific road mitigation. Located along a known wildlife conflict zone on Highway 93/95, the project aims to reduce vehicle collisions with a local population of bighorn sheep that loses approximately 10% of its individuals annually to vehicle strikes. Construction of a 34-metre-wide steel-and-concrete arch overpass is expected to be completed by summer 2025. The project includes approximately six kilometres of wildlife fencing and gates to direct sheep and other animals toward the structure and away from the highway. Upon completion of the structure, Shuswap Band biologists and MOTT will monitor the structure to better understand structure uptake by bighorn sheep, offering invaluable insight for future efforts. For the Shuswap Band, these sheep are more than wildlife, they are part of their cultural and spiritual responsibility, see more in their beautifully done documentary [A Bridge For Bighorns](#).

Kootenay Connect

[Kootenay Connect](#) is a collaborative, science-led initiative focused on enhancing ecological connectivity across the Kootenays. Since 2019, the Kootenay Conservation Program has coordinated over 40 partners to restore and manage critical habitats—particularly valley-bottom wetlands, riparian corridors, and upland linkages—across seven focal areas spanning 1.66 million hectares.

Guided by research from Dr. Michael Proctor and others, the project identifies 12 priority ecological corridors that support species at risk and wide-ranging wildlife including grizzly bears, elk, badgers, and wolverines. These corridors are designed to function both now and into the future as climate adaptation pathways, using global climate models and local GIS mapping to target areas likely to serve as long-term refugia.

Kootenay Connect takes a whole-landscape approach, integrating climate resilience, biodiversity conservation, and land-use coordination across public and private lands. Its framework and spatial tools offer a strong regional model for how corridor planning can inform road mitigation priorities, especially where transportation infrastructure intersects with critical habitat.

Species at Risk Crossings

Work is underway in the Southern Interior to improve the connectivity of Species at Risk populations focusing on American badger and listed herpetofauna species (Great basin gophersnake, Western rattlesnake, Western yellow-bellied racer, Western tiger salamander, Great basin spadefoot) in BC. Road networks jeopardize the connectivity of these populations, as species move across the landscape resulting in road mortality. Reducing road mortality through the use of highway crossings and other means is necessary to meet the recovery goals and recover these species.

Work to implement highway mitigation (crossings) and to monitor their effectiveness in reducing road mortality is led by the Ministries of Water, Land & Resource Stewardship, and Transportation and Transit, in partnership with Simpcw Nation, Ktunaxa Nation, and Tk'Emlups Indian Band. Current focus is on completing and improving existing mitigation structures at mortality hot spots, monitoring their effectiveness, revising existing provincial guidance, and communicating guidance broadly to practitioners and land managers.

The BC Badger Connectivity Initiative, led by WLRS with support from First Nations and the Ministry of Transportation, is great example of an initiative working to reduce road mortality and improve safe passage for badgers across BC but utilizing sightings from local citizens help inform real-time research, road planning, and culvert placement to keep badgers (and many other animals) safe.

Have you seen a badger recently?

American Badgers live primarily in open grasslands in valley bottoms, which means their habitats extensively overlap with human development. **Road mortality can account for 50–85% of badger deaths in the Thompson, Okanagan, and Cariboo and 19–33% in the East Kootenay.** Currently, American Badgers are an endangered species in B.C.




The B.C. Badger Connectivity Initiative aims to:

- 1. Mitigate five priority sites** that have the highest reported badger deaths.
- 2. Create safe passage** for badgers at five priority sites by designing new highway infrastructure and creating passable culverts.
- 3. Create digital communication tools**, best management practices, and field training for badger connectivity restoration to help wildlife biologists, wildlife program managers, highway contractors, and other organizations create safe passages for badgers across the province.

Safe road crossings also help many other animals like bobcats, coyotes, weasels, and ground squirrels!

You can help!

If you see a badger (dead or alive), submit your sighting to badgers.bc.ca/report-a-badger

We use these sightings to update road mortality hotspot maps. We also monitor badger crossings at priority sites using culvert cameras and GPS harnesses. Data helps inform highway redesigns that improve habitat connectivity where it matters most!

Contact us at: badgers@gov.bc.ca

CULVERT CAMERA
Badgers prefer culverts ≥ 60 cm

GPS HARNESS

The Badger Connectivity Collaborative Partnership:



Figure 8. An example communication piece from the Badger Connectivity Collaborative Partnership.

Reptile and amphibian road mortality is especially pronounced in southern Canada, where road density and traffic volumes are highest. For many of Canada’s reptile species, roadkill is the leading threat to survival. These animals are particularly vulnerable because they are small and hard to spot, move slowly, often freeze in response to oncoming vehicles, and are sometimes deliberately targeted by drivers. Turtles are drawn to gravel road shoulders for nesting, while snakes use road edges and pavement surfaces to regulate their body temperature. The conservation committee of the Canadian Herpetological Society has created [an observations page on iNaturalist to record observations of amphibians and reptiles on roads in Canada](#). The observations can be of alive or dead individuals. This information will determine the species most affected by road mortality and help future status assessments of these species.

Okanagan Mountain–k’nmalka Wildlife Corridor Action Plan

The Okanagan Collaborative Conservation Program (OCCP) coordinates and facilitates conservation and stewardship efforts across public and private lands, with a vision of sustaining biodiversity and ecological processes in tandem with livable communities. The Okanagan Mountain–k’nmalka Wildlife Corridor is the last remaining contiguous low-elevation wildlife movement route on the east side of Okanagan Lake, connecting approximately 65 km of habitat between Okanagan Mountain Provincial Park and k’nmalka (Kalamalka Lake Provincial Park area). This corridor is part of a threatened ecological link through the Central Okanagan Valley—one that ties into British Columbia’s remaining grasslands, shrub-steppe, and dry forest ecosystems and extends south into Washington State. The area is home to more rare, threatened, and endangered species than anywhere else in BC, and has one of the highest concentrations of species-at-risk in Canada.

To ensure this corridor was maintained and conserved, a [five-year action plan](#) was developed through a partnership between the Okanagan Nation Alliance (ONA) and OCCP, supported by insight from individuals representing 30 organizations. The five-year Action Plan is informed by both Syilx and western scientific knowledge. The Plan centers Syilx rights and responsibilities in connectivity work, addresses cumulative effects, and supports stewardship by farmers and ranchers. It also calls for better integration of climate change impacts into connectivity planning, improved land use policy to protect and restore the corridor, and expanded public education around the value of landscape connectivity. In addition to supporting wildlife movement for food, water, shelter, reproduction, and seasonal migration, the corridor is recognized as a vital system that supports clean water, soil health, wildfire buffering, and CO₂ regulation. The Plan is positioned as a pilot that can inform connectivity efforts across public and private lands throughout the region and can certainly serve as a model for the Southern Interior Forum.

Additionally, OCCP and Thompson-Nicola Conservation Collaborative (TNCC) are partnering on *Conservation Planning for Climate Change in the Thompson Okanagan*, a multi-year initiative focused on integrating Indigenous knowledge, climate change modelling, and conservation science to support sustainable land use decisions.

As development expands alongside population growth, key natural areas across the region are increasingly at risk. This initiative aims to braid Indigenous ecological and cultural knowledge with Western science to identify and prioritize natural areas in the Thompson Okanagan that require enhanced protection in the face of climate change.

Wildlife Crossing Prioritization Method Examples

Wildlife crossings and fencing are most effective when placed strategically; thus, prioritizing locations based on collision risk and conservation value is essential given limited resources (Ament et al., 2021). The Forum is intended as a first step towards this discussion of prioritization. The following are a few key examples from across North America that may prove useful for a prioritization process within the Southern Interior.

Washington Habitat Connectivity Action Plan (WAHCAP)

The [Washington Habitat Connectivity Action Plan \(WAHCAP\)](#) represents one of the most rigorous examples of connectivity planning and prioritization in North America. Developed by a core team of experts and supported by both technical and implementation advisory groups, the WAHCAP includes a structured, statewide approach for identifying priority locations where wildlife mitigation infrastructure could have the greatest ecological and safety impact. The plan integrates both existing connectivity maps and data into a decision-support system, allowing agencies to identify landscape-level and local-scale mitigation opportunities simultaneously. WAHCAP is structured into three components: (1) a unified connectivity mapping tool that consolidates various ecological datasets, (2) a process for identifying and ranking priority highway segments based on ecological value and wildlife-vehicle collision risk, and (3) recommended conservation actions and resources to help move from prioritization to implementation. The current draft is undergoing final review, with completion expected in 2025.

Highway 3 Transportation Mitigation for Wildlife and Connectivity in Elk Valley of BC

The [Highway 3: Transportation Mitigation for Wildlife and Connectivity in the Elk Valley report](#) (Lee et al., 2019) provides a leading example of collaborative, data-informed planning to guide wildlife crossing implementation in British Columbia. It builds on an earlier report by Clevenger et al. (2010), which identified Mitigation Emphasis Sites (MES) along Highway 3 based on wildlife movement data, known wildlife-vehicle collision hotspots, and ecological value.

In 2019, new momentum and data prompted a regional update. The From Data to Action workshop brought together provincial agencies, ENGOs, municipalities, and industry stakeholders to review emerging datasets and update mitigation priorities. This workshop laid the foundation for what is now the Reconnecting the Rockies initiative.

Participants in the workshop co-developed a refined evaluation framework to assess and score MES using four criteria: human safety, conservation significance, land security and opportunities for mitigation. Each MES was scored from 1 (low) to 5 (high) using this framework, and the criteria were weighted through an Analytical Hierarchy Process (AHP) to reflect shared values.

Table 2: Table of descriptions of low (1) to high (5) scores to rate criterion. Lee et al., 2019.

Land Use Security	
5	public lands (federal, provincial, municipal) or private lands with a conservation easement
4	public lands or conservation easement on one side of MES, open space on the other (with unsecured easements)
3	open space lands on both sides, but unsecured conservation easements for these private lands
2	housing development or industrial/commercial site on one side, open space on other side (with unsecured easements)
1	developed land (houses, light industrial) on both sides of hwy
Conservation Significance	
5	Primary connectivity corridor (GB/wolverine movement), or high mortality area with likely population-level effects. Generally multispecies
4	Secondary connectivity corridor (GB or wolverine movement), or high-moderate mortality area with potential population-level effects. Generally multispecies
3	Tertiary connectivity corridor, moderate mortality area with potential population-level effects. Generally multispecies.
2	Connectivity corridor or mortality area for single species
1	Not a connectivity corridor, low mortality area
Human Safety Risk (animal movement clusters)	
5	Statistically significant AVC cluster >0.5 overlapped between WARS and RWBC data sets
4	Statistically significant AVC cluster >0.5 but no overlap between two datasets
3	Statistically significant cluster not statistically significant AVC <0.5 for either dataset
2	Reported AVCs in area but no cluster
1	No reports of AVCs
Opportunities for Highway mitigation	
5	Site characteristics optimal (terrain, topography) and/or easy retrofit of existing structure
4	Site characteristics good (terrain, topography) and/or potential retrofit of existing structure
3	Site characteristics moderate (terrain, topography)
2	Site characteristics challenging (terrain, topography)
1	mitigation not feasible

Field visits and expert input informed site assessments. The result was a prioritized list of 26 MES, with detailed recommendations for the top 10 sites along Highway 3. These include fencing, new overpasses or underpasses, and retrofits to existing infrastructure, aligned within broader connectivity goals. This approach reflects a strong model for cross-sectoral collaboration in road ecology.

Colorado's Western Slope Wildlife Prioritization Study

The [Western Slope Wildlife Prioritization Study](#) was launched by the Colorado Department of Transportation and Colorado Parks and Wildlife to identify where wildlife crossings and fencing could most effectively reduce wildlife-vehicle collisions and support large migratory herds. The study covered CDOT Regions 3 and 5 and applied a risk modeling approach using carcass and crash data, telemetry data, land cover, herd densities, and connectivity values. Each 0.5-mile highway segment was scored using weighted ecological and safety criteria to rank segments and identify the top 5 percent for field review.

This effort went beyond prioritization by integrating mitigation recommendations into an implementation framework. Key tools included a benefit-cost analysis model, a feasibility matrix, and guidance on embedding recommendations into transportation planning processes. Specific infrastructure recommendations—tailored to local habitat and species—were developed for each top-priority site. WSWPS is a proactive and coordinated example of how transportation and wildlife agencies can embed mitigation into long-range infrastructure planning.

US-191/MT-64 Wildlife and Transportation Assessment

The [US-191/MT-64 assessment](#) was designed to identify locations for wildlife mitigation measures such as culverts, bridges, underpasses, and overpasses in Montana. The study collected and analyzed records of wildlife-vehicle collisions, observed carcasses, sightings of live wildlife near roads, observed road crossings, GPS collar data, habitat models, and connectivity models to identify priority sections of highway. The result was a practical, data-informed foundation for proposing and implementing targeted wildlife accommodations.

This assessment offers a relatively simple but effective model for identifying where mitigation is needed. It demonstrates how various types of local data, particularly telemetry and citizen science roadkill observations, can be used to flag and prioritize problem areas for mitigation.

Alberta's Pronghorn Connectivity Action Plan

The [Pronghorn Connectivity Action Plan](#), built on past work create a conservation action plan with the goal of maintaining connectivity for pronghorn in the Northern Sagebrush Steppe ecosystem in Alberta and Saskatchewan. Part of the connectivity action plan included a prioritization process for pronghorn crossing sites and an animal vehicle collision assessment.

Lee et al. (2023) identified priority road sections along the Trans Canada Highway where pronghorn crossings and motorist safety risk were high. They considered three datasets including pronghorn crossing observations collected by citizens scientists, a pronghorn connectivity model output and AVC data. A working group of scientists and conservation practitioners then used an Analytical Hierarchy Process (AHP) to assign weights to various site-level criteria, such as connectivity importance, roadkill frequency, and feasibility. These criteria were used to score and rank sites for pronghorn crossings, culminating in a set of priority sites

and recommended conservation actions. Conservation actions were assigned to specific organizations and agencies, providing accountability and momentum for implementation.

The Action Plans animal vehicle collision assessment, which identified 49 km of the Trans Canada Highway, just 14% of the study area, where targeted mitigation measures would significantly improve both motorist safety and safe passage for wildlife, especially for species at risk and migratory ungulates.

In addition to identify crossing sites and the collision assessment, the action plan also incorporates information from a fence impermeability prioritization and an assessment of high valued ecological connectivity areas.

Blackfoot Nation Animal-Vehicle Collision Reduction Master Plan

The [Blackfoot Nation's AVC Reduction Master Plan](#) provides an exemplary model of how Indigenous knowledge and Western science can be woven together in wildlife mitigation planning. The Blackfoot Fish, Wildlife and Parks Department led the effort to prioritize mitigation locations based on both ecological and cultural significance. Technical data, including GPS collars, crash and carcass data, and geospatial data, were combined with animal observations to identify areas of concern. The team developed seven prioritization characteristics: 1) wildlife-vehicle collision risk, 2) domestic animal vehicle-collision risk, 3) total AVC risk, 4) live wildlife on/near roads, 5) live domestic animals on/near roads, 6) all live animals on/near roads, and 7) regional conservation value.

A technical advisory committee conducted a field visit, and ultimately identified 15 priority segments for mitigation and outlined recommended mitigation actions for each. One unique component of this plan is that they also conducted a cost estimate of large animal-vehicle collisions and potential future mitigation measures on the Blackfoot Indian Reservation.

Prioritization Take-aways

The six prioritization examples provided above offer great insight into prioritization efforts. While wildlife conservation is a core priority for many of us, framing the issue through the lens of human safety has proven essential for gaining public and political support. Wildlife-vehicle collisions carry significant economic and social costs, which can be measured and communicated through cost-benefit analyses. Several case studies showed that using WVC data to quantify risks and potential savings helped justify investments in crossing structures, especially when paired with connectivity goals.

All six projects utilized WVC data, often in combination with habitat connectivity models, wildlife movement data, or expert mapping to emphasize species-specific insights. Effective planning depends on pulling together these diverse sources to better understand where conflict and connectivity overlap. It's critical to identify where data is lacking. While some areas in the Southern Interior are relatively well-studied, many remain underrepresented.

Species-Specific Considerations: Several case studies leaned heavily on data from large-bodied ungulates likely because these species are well-monitored and frequently involved in collisions. However, some efforts also included additional species at risk, like badger and prairie rattlesnake, highlighting that prioritization must be sensitive to both data availability and species of concern in the region. This also highlights the need to consider species when considering how structure type, size, and surrounding habitat management should inform prioritization processes, particularly when multiple species are impacted in one area.

Land tenure plays a pivotal role in determining where and how mitigation can be implemented. Several case studies highlighted the importance of understanding jurisdictional boundaries, as well as current and future land status that may influence project feasibility. Several case studies emphasized the role of community and stakeholder engagement in gaining momentum and building long-term support. Projects that included early and ongoing conversations with Indigenous Nations, landowners, and the public often benefited from smoother implementation and more locally informed outcomes. Local engagement through roadkill reporting citizen science efforts also offered a practical way to involve communities while contributing to data collection efforts.

One consistent lesson across case studies is the value of clearly defining next steps and assigning roles early in the process. Without this, momentum can be lost, even when there's broad agreement on priorities. Successful initiatives typically establish a lead organization or working group responsible for moving projects forward, coordinating partners, securing funding, and tracking progress.

Forum Insights

This discussion paper was framed as a starting point, a tool to help participants enter the forum with a shared understanding of key issues, knowledge gaps, and ongoing efforts related to wildlife connectivity in BC's Southern Interior. While not comprehensive, it offered a foundation to support dialogue. The purpose of the forum was to build on the foundation laid by this paper by bringing together knowledge holders, rights holders, researchers, practitioners, and decision-makers to move from analysis to action. At the June forum, we invited participants to reflect on the following four questions related to prioritizing the work in the Southern Interior:

1. What are the most important criteria and info needed to guide us when considering wildlife crossings in the southern interior?
2. Beyond the highway, what values from the larger landscape should a wildlife corridor protect?
3. What are the most important questions we need to answer to be successful?
4. How can we better collaborate across sectors, jurisdictions, and knowledge systems, including indigenous knowledge & western science?

Across the four questions, participants emphasized that effective wildlife corridor planning in the Southern Interior requires strong knowledge foundations, adaptive management, and enabling conditions such as funding, partnerships, and social support. Participants emphasized that investments should focus on collision hotspots and high-traffic roads, where fencing and crossings can improve both safety and maintain connectivity. While ungulates remain a priority, participants called for greater attention to other species at risk, including amphibians, reptiles, and aquatic species, and to crossings that maintain critical habitats and corridors.

Data gaps were a recurring concern. WARS and ICBC records were described as incomplete and inconsistent, while rail mortality data were seen as severely underreported. Participants strongly supported the creation of a BC roadkill reporting app, modeled on Alberta Wildlife Watch, to standardize and strengthen monitoring. They also called for better integration of datasets across ministries, ICBC, law enforcement, and First Nations, while emphasizing the importance of upholding Indigenous data sovereignty.

Beyond roads, participants underscored that effective connectivity work depends on collaboration that spans sectors, jurisdictions, and knowledge systems. Corridors must safeguard ecological processes, First Nations law, and ecosystem health while supporting shared values rooted in Indigenous ways of knowing. Collaboration emerged as central: building trust, balancing power, and recognizing Indigenous Nations as rights holders, not stakeholders, while ensuring Indigenous knowledge and Western science inform decisions together through shared goals, open communication, and joint action on the landscape. Participants also called for mechanisms that enable coordination across boundaries. Funding and capacity were identified as critical for meaningful collaboration; without stable resources, participants noted, it is difficult to sustain engagement in multi-sector planning processes.

Citations

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Sielecki, L. E. (2010). Wildlife Accident Monitoring and Mitigation in British Columbia, WARS 1988-2007 Special Annual Report. *Environmental Management Section, Engineering Branch, British Columbia Ministry of Transportation and Infrastructure. Victoria, BC, Canada.*

Data & Resources

Data and Resources:

***Note:** This is a living document that grows nearly every day. Its purpose is to serve as a central area of tools, resources, and data that may help in any phase of planning connectivity work. All data and resources are publicly available and free of charge. If you know of any datasets, tools, or resources that may be useful to connectivity planning and research, please leave a comment with as many relevant details as possible or shoot Robin an email at blott.se@gmail.com*

BC Maps and Spatial Data:

Name	Link	Useful For / Description
BC Pasture Land Range Developments	https://catalogue.data.gov.bc.ca/dataset/range-developments-infrastructure-lines	“Range developments (points and lines) - infrastructure added to Crown rangeland to improve livestock management.” Including: cattleguards, corrals, fences, livestock crossings, salt blocks, etc.
BC Range Pastures	https://catalogue.data.gov.bc.ca/dataset/range-pastures	“A Range Pasture is a grazing area enclosed and separated from other areas by fencing or other barriers (e.g. Natural Range Barrier). May be the management unit of grazing land as reflected in a Range Use Plan. Range Pastures are administrative and not legal boundaries.”
BC Digital Road Atlas	https://www2.gov.bc.ca/gov/content/data/geographic-data-services/topographic-data/roads	“The Digital Road Atlas is a comprehensive source of urban, rural and resource road data for the Province of B.C. The dataset is a major component of British Columbia's Integrated Transportation Network.”
Road Feature Inventory	https://catalogue.data.gov.bc.ca/dataset/ministry-of-transportation-mot-road-features-inventory-rfi	“The Road Features Inventory spatial layer shows all highways under the administration and control of BC MoT for which the Ministry has maintenance responsibility.” Smaller segments than LKI, segments do not cross MOTI regional boundaries.
Landmark Kilometer Inventory (LKI)	https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/landmark-kilometre-inventory	“The Landmark Kilometre Inventory (LKI) is one of the systems used for identifying locations on the provincial highway network. It has been in use since before 1978.” WARS location data was reported using the LKI system until 2023. The LKI is updated roughly every year. All

		years, as well as a revision history document can be found with the link.
Statistics Canada Road Network File	https://www12.statcan.gc.ca/census-recensement/2021/geo/sip-pis/rnf-frr/index-eng.cfm	“Road network files are digital representations of Canada’s national road network, containing information such as street names, types, directions and address ranges.”
The Canadian Human Footprint Dataset	Hirsh-Pearson, Kristen; Johnson, Chris; Schuster, Richard; Wheate, Roger; Venter, Oscar, 2022, "The Canadian Human Footprint", https://doi.org/10.5683/SP2/EVKAVL , Borealis, V3.	“Efforts are underway in Canada to set aside terrestrial lands for conservation, thereby protecting them from anthropogenic pressures. Here we produce the first Canadian human footprint map by combining twelve different anthropogenic pressures and identify intact and modified lands and ecosystems across the country.”
Terrestrial Ecozones of Canada Datasets	https://open.canada.ca/data/en/dataset/7ad7ea01-eb23-4824-bccc-66adb7c5bdf8	Ecozones as defined by the National Ecological Framework for Canada. Ecozones are the top level of the four levels of ecosystems.
Canada Species at Risk Range Maps	https://open.canada.ca/data/en/dataset/d00f8e8c-40c4-435a-b790-980339ce3121	“This national dataset contains geographic range data for 488 Species at risk based on NatureServe data, SAR recovery strategies, Environment Canada resources and COSEWIC status reports.”
BC Conservation Data Center (CDC)	https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/known-locations-of-species-and-ecosystems-at-risk/cdc-imap-theme	“The B.C. Conservation Data Centre (CDC) maps known element occurrences (an area of land and/or water where a species or ecosystem is known to occur) of red- and blue-listed species and ecosystems. The CDC database includes the best available information and is updated on a regular basis.”
Okanogan-Kettle Wildlife Habitat Connectivity	Transboundary Connectivity Working Group (TCWG) / Washington Wildlife Habitat Connectivity Working Group (WHCWG). 2015. Okanogan-Kettle Subregion Connectivity Assessment Great Northern Landscape Conservation Cooperative Interim Report. Washington	A GIS dataset of wildlife habitat connectivity on the Okanogan-Kettle subregion.

	<p>Department of Fish and Wildlife and Washington Department of Transportation, Olympia, WA. https://databasin.org/datasets/76167bdd8ea94adaac3d140c8a453143/</p>	
<p>Predicting Areas Important for Ecological Connectivity Throughout Canada</p>	<p>Pither R, O'Brien P, Brennan A, Hirsh-Pearson K, Bowman J (2023) Predicting areas important for ecological connectivity throughout Canada. PLoS ONE 18(2): e0281980. https://doi.org/10.1371/journal.pone.0281980</p>	<p>Maps of areas that would limit connectivity if lost, Species at Risk Range Density, and a vignette display of southern BC. Also includes sources for land cover layers.</p>
<p>BC Traffic Count Stations Maps and Records</p>	<p>https://twm.th.gov.bc.ca/?c=tdp&lon=-115.21928471396346&lat=49.38431187272951&z=9&sb=1&</p>	<p>A map that shows all temporary and permanent highway traffic count stations in BC and their associated reports/data.</p>
<p>Critical Habitat for Species at Risk National Dataset - Canada</p>	<p>https://open.canada.ca/data/en/dataset/47caa405-be2b-4e9e-8f53-c478ade2ca74</p>	<p>"This dataset displays the geographic areas within which critical habitat (CH) for terrestrial species at risk, listed on Schedule 1 of the federal Species at Risk Act (SARA), occurs in Canada. Note that this includes only terrestrial species and species for which Environment and Climate Change Canada (ECCC) and Parks Canada Agency (PCA) lead."</p>
<p>Conservation Cross Reference Table</p>	<p>https://catalogue.data.gov.bc.ca/dataset/conservation-cross-reference-table</p>	<p>"This cross-reference table provides a link between the provincial Conservation Lands and NGO Conservation Areas. Overlap between the two datasets will occur where NGO lands have been leased to the province. Since the source cadastral layers used to define parcels in the two datasets may differ, the overlap may not be exact."</p>
<p>Canadian Protected and Conserved Areas Database</p>	<p>https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/protected-conserved-areas-</p>	<p>"The Canadian Protected and Conserved Areas Database (CPCAD) contains the most up to date spatial and attribute data on marine and terrestrial protected areas (PA) and other effective area-based conservation</p>

	database.html	measures (OECM) in Canada. CPCAD is compiled and managed by Environment and Climate Change Canada (ECCC), in collaboration with federal, provincial, territorial jurisdictions, and other data providers.”
Canada Key Biodiversity Areas	https://kba-canada.org/how-to-access-and-download-data/	“The science-based and measurable KBA criteria make them a trusted tool for conservation, but KBAs don’t capture all values important for conservation. KBAs complement information about biocultural values, climatic refugia, ecosystem services, and landscape connectivity at sites, and can support other species-specific and landscape-scale approaches to conservation.” Include several maps and data registries.
NatureServe Canada Ecosystem-based Automated Ranges (EBAR) Maps	https://www.natureserve.org/canada/ebar	“EBAR maps combine biodiversity data with expert knowledge to populate ecoshapes (which are ecoregions, ecodistricts or similar ecological land classifications) with species presence information. Each ecoshape is associated with a set of references for the species information providing transparency regarding the underlying data. NatureServe Canada EBAR maps support priority programs such as environmental impact assessments, status assessments by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Species At Risk Act recovery action plans, the identification of Key Biodiversity Areas (KBAs) and provincial and territorial Species at Risk programs and legislation” Has over 800 range maps that have been expert reviewed. Incorporates data from 277 providers to date. Can be generated for a single species or multiple.
Roads & Roadless Areas in British Columbia ~ Environmental Reporting BC	Environmental Reporting BC. 2018. Roads & Roadless Areas in British Columbia. State of Environment Reporting, Ministry of Environment and Climate Change Strategy,	A resource on the distribution of roads and the percent of an area left “roadless” across BC and it’s ecoregions. It includes data for download, interactive maps, and quick facts.

	British Columbia, Canada. https://www.env.gov.bc.ca/soe/indicators/land/roads.html	
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Policy, Design, & Implementation:

Name	Link	Useful For / Description
Lake Simcoe Region Conservation Authority Ecopassages Guide	https://www.lsrca.on.ca/wp-content/uploads/2023/07/Road-Ecology-Guide.pdf	A guide for implementing reptile and amphibian ecopassages to improve habitat connectivity and reduce mortality from roads and vehicles.
Transportation Association of Canada Managing and Enhancing Terrestrial Road Ecology	Patriquin, D., Zeller, A. Truman, K., Hayes, R. and Gibbs, S. 2021. Managing and Enhancing Terrestrial Road Ecology. Ottawa, ON: Transportation Association of Canada. https://www.tac-atc.ca/wp-content/uploads/ptm-mtre-e.pdf	A guidebook on the decision-making criteria for road design and crossing structures, and supporting case studies. The guidebook provides decision-making guidance on all aspects wildlife-road mitigation, including: policy guidelines, feasibility and cost considerations, crossing design options, road type and context, regulatory compliance obligations, and much more
ARC - Innovative Strategies to Reduce the Cost of Effective Wildlife Overpasses	https://largelandscapes.org/wp-content/uploads/2019/03/ARC-Special-Innovative_Strategies.pdf	“This document compiles ideas and recommendations resulting from a facilitated workshop convened in October 2014, gathering prominent wildlife crossing practitioners from Canada and the United States to consider the unique nature of wildlife crossing structures, with the goal of identifying ways to reduce costs in order to improve the feasibility of widespread implementation.”

Connectivity Programs and Organizations:

Name	Link	Useful For / Description
National Priority Areas for Ecological Corridors (NPAECs)	https://parks.canada.ca/nature/science/conservation/corridors-ecologiques-ecological-corridors/prioritaires-priorities	“These priority areas indicate where ecological corridors are most urgently needed in Canada to conserve and/or restore connectivity. Improving or maintaining ecological connectivity in these priority areas will greatly benefit biodiversity

		conservation and climate change adaptation.”
Cascades to Coast Landscape Collaborative	https://www.ctoclc.org/	A collaborative organization that develops science-based spatial tools for management planning and conservation efforts in the coastal Pacific Northwest. “We are a self-directed collaborative practicing landscape conservation through spatial mapping and bringing people together.”
Yellowstone to Yukon Conservation Initiative	https://y2y.net/	“The Yellowstone to Yukon Conservation Initiative (Y2Y) drives conservation solutions at the scale that nature demands. We work to maintain natural connections for wildlife, for people and nature, communities and culture, for habitat and waterways. From the Greater Yellowstone Ecosystem all the way to Yukon Territory, we strive to connect and protect enough space for a wide range of species to roam, feed, and reproduce.”
Kootenay Conservation Program	https://kootenayconservation.ca/	“Kootenay Conservation Program is a partnership of over 85 organizations that work together to conserve the biological diversity and naturally-functioning ecosystems of the Kootenay region.”

Species Data & Resources:

Name	Link	Useful For / Description
WARS Database Reports	https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/environmental-management/wildlife-management/wildlife-accident-reporting-system	5 Reports on the Wildlife Accident Reporting System data, most overlap to some extent. Reports vary greatly in their level of detail and analysis. The first three reports are extremely comprehensive and breakdown WVCs to multiple levels. Reports span 1983-2017: <ul style="list-style-type: none"> - WARS 1991-2000 - WARS 1983-2002 - WARS 1988-2007 - WARS 2012 - WARS 2007-2017
Canada Species	https://storymaps.arcgis.com/	Includes a report, database, and map of

Endemism Hotspots	om/stories/47a72b05f97f4492b7bb5f2ba1468eb8	endemic species biodiversity hotspots in Canada
Important Bird Areas Canada	https://www.ibacanada.com/explore_how.jsp?lang=en	Includes interactive maps, database with analytics tools, desktop tools, and web mapping services. “Here you will find information about the locations, birds, habitats, threats, and conservation issues associated with Canada's IBA network.”
Rattlesnake Road Mortality	Winton SA, Bishop CA, Larsen KW (2020) When protected areas are not enough: low-traffic roads projected to cause a decline in a northern viper population. <i>Endang Species Res</i> 41:131-139. https://doi.org/10.3354/esr01017	Study on road mortality in Western rattlesnakes and methods for estimating its impacts on population viability.
Biodiversity Pathways Interpopulation Prioritization of Caribou Herds in British Columbia Canada	https://biodiversity-pathways.shinyapps.io/interpopulation-prioritization/	An interactive map showing the ranges of BC caribou herds and the conservation priority ranking of each herd.
Motus Wildlife Tracking System	https://motus.org/dashboard/#	“Motus can be used to study the movement and behaviour of birds, bats, and large insects at multiple spatio-temporal scales.” Includes interactive maps, species search, migration and location data, and more.
Grizzly Bear Connectivity Mapping in the Canada-U.S. Transborder Region	https://databasin.org/datasets/dfbc14e3e7bd4a5c94d7a6fb7a6008d1/	“We sought to predict preferred linkage habitats for grizzly bears across settled valleys with major highways in the fragmented transborder region to improve prospects for bear movement among 5 small fragmented subpopulations.”
Canada Bird Conservation Regions - Priority Species	https://open.canada.ca/data/en/dataset/ab5ffc67-64ec-47cc-9748-11af0c8f230e	“The purpose of Bird Conservation Regions strategies is to summarize the important issues and to recommend the actions required to conserve populations of birds in Canada. The Bird Conservation Regions (BCR) used as the basis for our planning units are based on the Commission for Environmental Cooperation's internationally-

		accepted Level III ecoregions.”
Species at Risk Public Registry	https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html	A registry of documents relating to the administration of the Species at Risk Act (SARA) such as, recovery plans, species assessments, permits, consultations, publications and news on species at risk in Canada.

Other:

<u>Name</u>	<u>Link</u>	<u>Useful For / Description</u>
BC Official Numbered Routes	https://www2.gov.bc.ca/gov/content/transportation/tr-ansportation-reports-and-reference/reference-information/numbered-routes	Map and description of official BC Route numbers, highway names and alternative names.
ICBC Collision Data	https://www.icbc.com/about-icbc/newsroom/Statistics	ICBC crash data can be filtered to show reports on animal collisions. Animal collision data can be further filtered to region*, municipality, street names, and more. *ICBC regional boundaries differ from MOTI regional boundaries.
Method for estimating avian WVCs	Bishop, C. A., and J. M. Brogan. 2013. Estimates of avian mortality attributed to vehicle collisions in Canada. Avian Conservation and Ecology 8(2): 2. http://dx.doi.org/10.5751/A-CE-00604-080202	Method for estimating avian mortality rates in Canada. “Although mortality of birds from collisions with vehicles is estimated to be in the millions in the USA, Europe, and the UK, to date, no estimates exist for Canada. To address this, we calculated an estimate of annual avian mortality attributed to vehicular collisions during the breeding and fledging season, in Canadian ecozones, by applying North American literature values for avian mortality to Canadian road networks.”
Comparing and Combining Omniscap and Linkage Mapper Connectivity Analyses	Gallo, J.A., E. Butts, T. Miewald, K. Foster. 2019. Comparing and Combining Omniscap and Linkage Mapper Connectivity Analyses in Western Washington.	“New methods and approaches in habitat connectivity analysis have evolved since that time. The goal of this analysis was to explore potential methods for assessing habitat connectivity patterns in southwest Washington: should focal species assessments for the coastal WA connectivity

	Conservation Biology Institute. Corvallis, OR, https://doi.org/10.6084/m9.figshare.8120924 .	project use Omniscape (i.e. Omnidirectional Circuitscape) or Linkage Mapper or a combination of the two? Through this process, we developed a high quality suite of naturalness-based modeling connectivity products that can be used in real-world decision making.”
Cascades to Coast Landscape Collaborative Tools and Spatial Products	https://www.ctoclc.org/conservationresources	Methods and tools for conducting conservation priority area syntheses, habitat connectivity analyses, etc.
Estimating Underreporting in Wildlife-Vehicle Collisions	Hesse, G & RV Rea. 2020. Quantifying wildlife vehicle collisions and underreporting on Highway 33. Prepared for British Columbia Ministry of Transportation and Infrastructure. https://www.wildlifecollisions.ca/docs/quantifyingwvcsandunderreportingonhighway33-hesseandrea-may25-2020-final.pdf	“In this project, we integrated WVC data from these four agencies to establish the baseline number of WVCs that occurred on Highway 33, Segment 1324, and then documented patterns in WVC underreporting to establish the degree of WVC underreporting by agency.”
AdaptWest - A Climate Adaptation Conservation Planning Database for North America	https://adaptwest.databasin.org/	“AdaptWest is a spatial database designed to help land management agencies and other organizations implement strategies that promote resilience, protect biodiversity, and conserve and enhance the adaptation potential of natural systems in the face of a changing climate.” Includes climate dissimilarity data, climate corridors data, connectivity data, climate refugia, and more.
OneEarth	https://www.oneearth.org/	Google Earth-style interactive map showing the bioregions and ecoregions of the world (as defined by WWF). Also provides descriptions of each bioregion and ecoregions, including the protection level and protection target.
Great Northern Landscape Conservation Cooperative (GNLCC) Great Northern Ecological Connectivity	https://databasin.org/galleries/5c51bde995e84581b444b9bec7942b43/	“This atlas compiles connectivity data currently available across the GNLCC as a resource for managers in identifying important areas for action. It is the first step

Data Atlas		in a project that is likely to be on-going and part of a larger landscape conservation design effort for the GNLCC.”
Landsat Science	https://landsat.gsfc.nasa.gov/data/	“The Landsat program consists of a series of Earth-observing satellite missions jointly managed by NASA and the U.S. Geological Survey (USGS). Since 1972, Landsat satellites have continuously acquired images of the Earth’s land surface and provided an uninterrupted data archive to assist land managers, planners, and policymakers in making more informed decisions about natural resources and the environment.”
Three global conditions for biodiversity conservation and sustainable use: global map dataset	Locke, H, EC Ellis, O Venter, R Schuster, K Ma, X Shen, S Woodley, N Kingston, N Bhola, BBN Strassburg, A Paulsch, B Williams, & JEM Watson. 2019. Three global conditions for biodiversity conservation and sustainable use: an implementation framework. National Science Review 6:1080-1082. doi: 10.1093/nsr/nwz136	Harvard dataverse dataset. Global map of three land conditions: Cities and Farms, Shared Lands, and Large Wild Areas.
Canada Road Transportation Statistics by Province/Territory	https://tc.canada.ca/en/corporate-services/policies/road-transportation-0	Statistics on Km of highways, vehicle kilometers, heavy vehicle use, etc, broken down by province/territory.
Canada Priority Places for Species at Risk (Terrestrial)	https://open.canada.ca/data/en/dataset/91269ac2-edb8-48a8-8a58-16f6db46920b	“As part of the Pan-Canadian approach to transforming Species at Risk conservation in Canada, a total of 11 Priority Places were affirmed by federal, provincial, and territorial governments in December 2018. The places selected have significant biodiversity, concentrations of species at risk, and opportunities to advance conservation efforts.” Also has a link to an interactive map of ongoing projects in the priority places.

Appendix

Appendix 1. WARS analysis

Linear features such as roads, highways, and rail lines fragment habitat, breaking connectivity across the landscape, disrupting natural processes and wildlife movement. The permeability of these linear features can vary depending on structure, traffic flow, and species, but without crossing structures or other mitigation techniques wildlife-vehicle collisions (WVCs) are inevitable, incurring a great cost in property damages and wildlife mortalities.

It should be noted that WARS does not typically obtain records for wildlife-vehicle collisions on federally maintained highways, such as those in national parks, thus we removed any reports not made along provincially maintained numbered highways. Furthermore, we removed all instances of highway twinning prior-to analysis, such that hot spot areas would not be diluted by double-counting highway length. Unless otherwise specified we assumed that all animals reported in the WARS database were wildlife species. WARS reports are made by highway maintenance contractors if they find dead animals on the road during routine inspection, or after being alerted to a WVC or dead animal on the highway by the public or RCMP. We therefore assumed that each animal reported in WARS died as a result of a unique WVC.

Between 2000-2024, WARS has reported 120,417 animals involved in wildlife-vehicle collisions, with an additional 542 animals in the first three months of 2025. The mean number of animals struck in wildlife-vehicle collisions in BC was 4,817 a year (SD = 1573). WVCs were by far the highest in 2015, at just over 10,200 animals struck, and only a few years later record low numbers of WVCs were reported in 2018, with just under 1400 animals struck (Fig. ABC). WVCs stayed relatively low after 2018, returning to average levels in 2021 (Fig. ABC). In 2018, the highway maintenance contracts were renewed and was accompanied by a new process for submitting WARS reports, as a result of technical and compliance issues associated with these changes many reports were lost or went unsubmitted. While this accounts for the substantial drop in WARS reports in 2018, its degree of influence on report numbers from 2019-2021 is unclear. While 2018 was an exceptional year, BC MOTT estimates that ~30% of the WVCs in BC are captured by WARS each year. Some studies have estimated that the average is closer to 50% (Hesse and Gayle 2020). In either case it is clear that a significant proportion of WVCs are missed each year, meaning annual WVC rates could be as high as 9,634-16,057 per year.

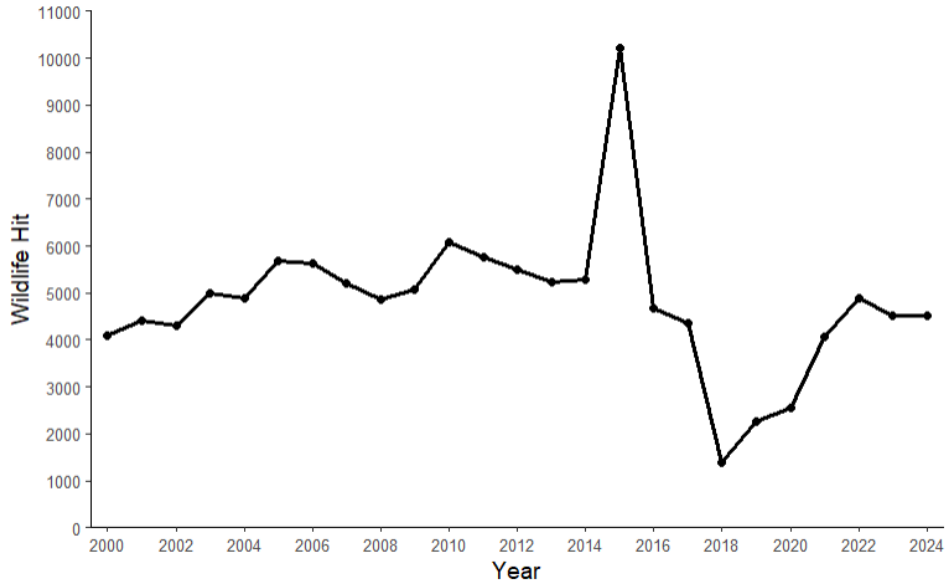


Figure ABC. Annual trends in the number of animals involved in wildlife-vehicle collisions across all of BC, between 2000-2024. The dip WVCs in 2018 was the result of a significant loss of WARS data due to changes in reporting procedures and is not indicative of any trends in true WVC numbers.

Each of the Natural Resource Regions (NRR) follow roughly the same trends as the provincial total. For all but the West Coast region, 2018 was the year of lowest WVCs, and 2015 was the year of the greatest WVCs for all regions (Fig. DEF). The Skeena and South Coast regions consistently have among the lowest number of WVCs in the province, while the Kootenay-Boundary and Thompson-Okanagan regions are the highest (Fig. DEF).

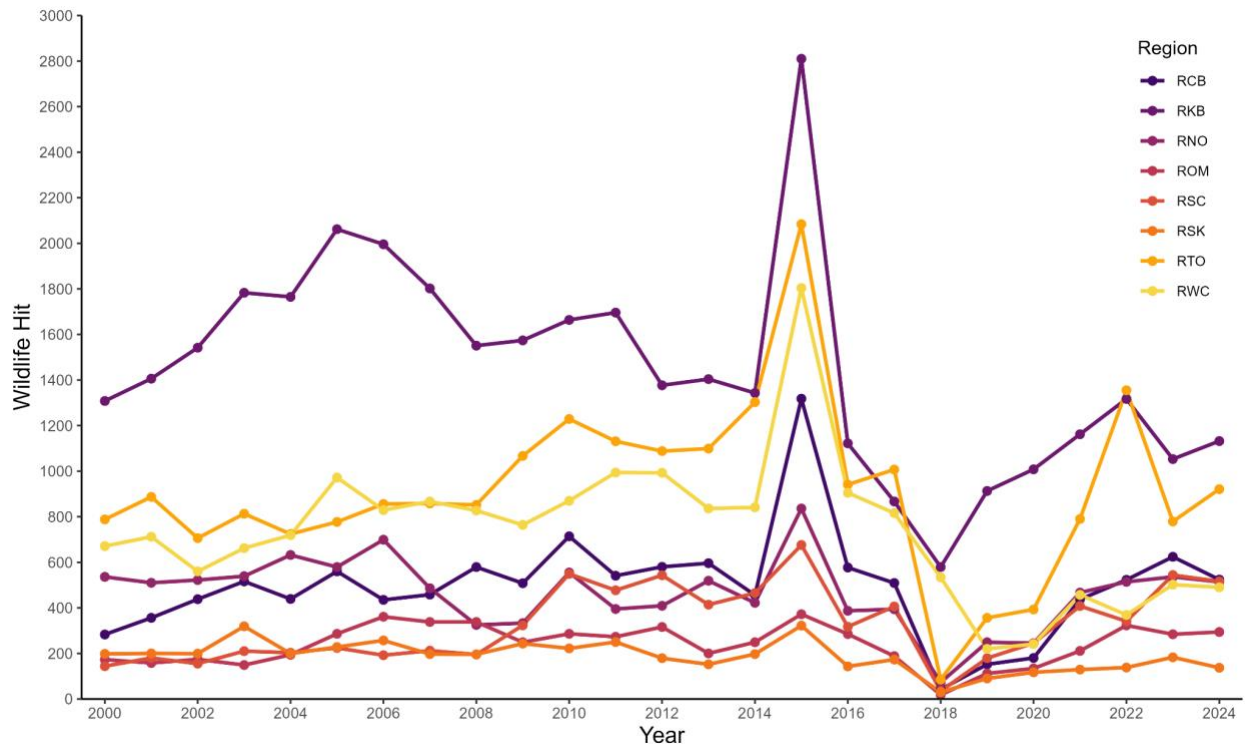


Figure DEF. Annual trends in the number of animals involved in wildlife-vehicle collisions between 2000-2004, broken down by Natural Resource Region (NRR). The dip WVCs in 2018 was the result of a significant loss of WARS data due to changes in reporting procedures and is not indicative of any trends in true WVC numbers. RCB = Cariboo NRR, RKB = Kootenay-Boundary NRR, RNO = Northeast NRR, ROM = Omineca NRR, RSC = South Coast NRR, RSK = Skeena NRR, RTO = Thompson-Okanagan NRR, RWC = West Coast NRR.

The Kootenay-Boundary is not only the region with the greatest total of WVCs but also has the highest rate of WVC relative to highway length, averaging 0.667 WVC/km/year (Table A2). The Cariboo and West Coast regions follow close behind with 0.597 and 0.591 WVC/km/year, respectively (Table A2). In contrast, despite having a relatively large length of highway the Skeena region has the lowest total number of WVC of all regions and as a result the lowest WVC relative to highway length with an average of 0.108 WVC/km/year (Table A2).

Table A1.1. Lowest, highest, and annual average WVC counts by region, from 2000-2024.

Region	Total WVC	Yearly		
		Low	High	Mean (SD)
Cariboo	12,345	42	1,318	493.80 (231.34)
Kootenay-Boundary	36,236	578	2,806	1,449.44 (460.38)
Northeast	11,676	73	836	467.04 (155.06)
Omineca	5,965	18	372	238.60 (87.62)
South Coast	8,153	35	676	326.12 (164.56)
Skeena	4,698	30	322	187.92 (65.21)
Thompson-Okanagan	22,889	85	2,084	915.56 (376.23)
West Coast	18,455	220	1,804	738.20 (313.52)
Provincial Total	120,417	1,396	10,222	4,816.68 (1573.26)

Table A1.2. A comparison of WVCs with respect to the total kilometers of official BC highway in the region. Total WVCs represent the number of wildlife hit between 2000-2024.

Provincial Total	150,417	1,396	10,222	4,817
West Coast	18,455	220 <td>1,804</td> <td>738</td>	1,804	738
Okanagan Thompson- Skeena	22,889	85 <td>2,084</td> <td>916</td>	2,084	916
South Coast	8,153	35	676	326
Omineca	5,965	18	372	239
Northeast	11,676	73	836	467
Boundary Kootenay- Cariboo	36,236	578	2,806	1,449
Region	Total WVC	Highway km of	WVC/km	WVC/km/year

¹Kilometers of official BC highway, excluding kilometers of twinned highway.

Appendix 2. Literature Search String

The following search string was used to search the *Web of Science All Databases* collection for relevant papers for use in our literature review. The search string was built through an iterative process, undergoing several rounds of accumulating relevant terms found while scoping the literature.

Search String: TS=(("British Columbia" OR "BC" OR "B.C.") AND ("wildlife vehicle collision\$" OR "wildlife collision\$" OR "animal vehicle collision\$" OR (("road\$" OR "highway\$" OR "railway\$") NEAR/5 ("mortalit*")) OR "vehicle mortalit*" OR "roadkill*" OR "road kill*" OR "road ecology" OR "highway ecology" OR "rail ecology" OR "railway ecology" OR "road crossing\$" OR "highway crossing\$" OR "culvert\$" OR "wildlife crossing\$" OR "wildlife overpass*" OR "wildlife underpass*" OR "wildlife tunnel\$" OR "ecopassage\$" OR "eco-passage\$"))

We used the keywords and titles of each paper to determine the species or taxa of focus. A species was only counted once per paper, and all taxonomic names were converted to common names for ease of representation. Words such as “wildlife” or “animal” were excluded from these counts. Of the 49 papers, 8 were excluded from the species breakdown either because no taxa or species could be discerned from the title and keywords ($n = 2$), or because they used only excluded terms ($n = 6$). 52 species or taxa were studied across the 41 remaining papers, for an average of 1.25 species studied per paper (range: 1-5, Table 1). Grizzly bears were the single most commonly studied species by far ($n = 8$), followed by moose ($n = 6$)(Table 1).

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