The Governance of Ecological Connectivity in Canada

AN ASSESSMENT OF PROGRESS

Yellowstone to Yukon
Conservation Initiative

Executive Summary

Under the Convention on Biological Diversity (CBD), Canada has committed to conserving 30 per cent of its land, sea, and inland water areas by 2030 through ecologically connected networks of protected and conserved areas.

Achieving this target poses a significant challenge, as the governance frameworks needed to support ecological corridors are largely underdeveloped. To examine the state of connectivity governance in Canada, we review 11 ecological corridor initiatives from across the country and assess the extent to which existing federal, provincial, and territorial legislation supports the establishment or management of ecological corridors. The case studies illustrate innovative approaches to developing ecological corridors through a range of governance solutions.

We identify success factors and enabling conditions that facilitate connectivity conservation in Canada, along with gaps and barriers. Although substantial legislative tools exist for establishing and managing protected and conserved areas, there is limited legislative support for ecological corridors. Our findings underscore how strengthening and prioritizing legislative frameworks, alongside collaboration among all levels of government, is a prerequisite for advancing connectivity conservation in Canada.

Grizzly sow and cub. Credit: National Park Service.

Table of Contents

Nahanni National Park Reserve, Northwest Territories.
Credit: Peter Mather.

The Connectivity Challenge

The Kunming-Montreal Global Biodiversity Framework (GBF) of the Convention on Biological Diversity (CBD) establishes an ambitious global framework to halt and reverse biodiversity loss (CBD, 2022).

It calls for a shift beyond site-based conservation toward ecological networks of functionally connected protected areas and other effective area-based conservation measures. Target 3 of the GBF calls for at least 30 per cent of land, sea and inland water to be conserved in ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures (OECMs) by 2030. This represents a shift from the traditional site-based conservation model and places strong emphasis on ecological connectivity, which is also reflected in Goal A and Targets 2, 3, and 12 of the GBF (Figure 1).

FIGURE 1 **References to ecological connectivity in the Global Biodiversity Framework of the Convention on Biological Diversity.**

Maintaining and restoring ecological connectivity is essential for sustaining healthy ecosystems, reducing habitat fragmentation, conserving biodiversity, and enabling species to adapt to changing climates. The move from protected areas sites to large-scale networks of connected, protected and other effective area-based conservation measures is essential for the future of conservation (Hilty et al. 2020; Samways et al. 2010). These networks can better conserve biodiversity and ecological processes than individual protected and conserved areas in isolation, particularly in increasingly fragmented landscapes and under climate change (Hilty et al. 2020). This global recognition has led to the development of well-connected ecological networks worldwide, such as the East Coast Conservation Corridor in Tasmania or the Spanish National Network of Drover's Roads (see Hilty et al. 2020).

Canada is a signatory to the GBF. The Canadian federal government has committed to Target 3, as have the provinces of British Columbia, Manitoba, Quebec and

the Yukon Territory. The draft Nunavut Land-Use Plan (Nunavut Planning Commission 2023) is expected to result in a similar outcome when adopted, including having provisions for ecological corridors. Despite these commitments, transitioning to connected conservation networks remains a major challenge in most jurisdictions. Achieving ecological connectivity requires: (1) regional or local protected and conserved areas and natural areas to be included in a network; (2) research, data and knowledge from different ways of knowing about the types of connectivity to be restored and/or maintained; (3) a governance system to ensure that ecological connectivity is restored and/or maintained; (4) a management system, often through adaptive approaches, to ensure long-term connectivity. Among these prerequisites, governance remains one of the least studied and appreciated aspects of ecological connectivity.

A governance authority is defined as the institution, agency, individual, Indigenous Peoples or community

group, or other body acknowledged as having authority and responsibility for decision-making over an area, and whose authority may include management of an area (Borrini-Feyerabend et al. 2013). Governance in the context of ecological connectivity in Canada refers to the constellation of laws, policies, norms, and practices that enable the movement of species, ecosystems, and ecological processes across landscapes and seascapes. Connectivity governance extends beyond law or regulations and includes how diverse actors — such as federal, provincial, territorial, municipal, Indigenous, and civil society — collaborate, negotiate, and adapt to ensure that ecological flows are sustained across fragmented jurisdictions and changing environmental conditions (Hilty et al. 2020). The International Union for Conservation of Nature (IUCN) has established a set of fundamental principles for establishing ecological corridors. They:

1 **Are primarily designed to facilitate one or more defined types of ecological connectivity between and among protected areas, other effective area-based conservation measures (OECM) or other core habitats.**

2 **Should be identified and established in areas where connectivity is needed to create ecological networks that support conservation.**

3 **Should have specific ecological objectives and be managed and governed to ensure desired connectivity outcomes.**

4 **May consist partly or entirely of natural areas managed primarily for connectivity. Corridors may cross highly managed areas, provided they are explicitly and effectively managed for connectivity. If conservation objectives are met, corridors may include human activities that practice sustainable resource use.**

5 **Should be differentiated from non-designated areas by the activities and uses that are permitted or restricted within them.**

6 **Require their own management plans to achieve their connectivity objectives.**

Ecological connectivity is often implemented as discrete ecological corridors, each defined by boundaries, a specific purpose, and a set of governance arrangements. Because connectivity frequently crosses administrative boundaries, governance can span federal authority, provincial and territorial land management regimes, municipal planning

systems, and Indigenous Territories (Alexander et al. 2016; Bixler et al. 2016). Successful governance arrangements can accommodate these scales, fostering collaboration while respecting authority and rights. Keeley et al. (2022) highlight that effective governance depends on institutional arrangements that enable coordination without eroding local autonomy.

Several elements of successful governance recur across Canadian and international literature. Systems that engage diverse actors, including Indigenous governments, local communities, landowners, and civil society, tend to be more effective as this inclusivity ensures initiatives or programs are legitimate, context-sensitive, and broadly supported (Lee et al. 2019; Lockwood 2010). Transparency and accountability in decision-making are also essential, with clear mechanisms to hold actors responsible for implementation. These features are particularly important in multi-actor networks, where informal collaborations may lack formal enforcement mechanisms (Pulsford et al. 2015). Networks that enable voluntary coordination across boundaries can facilitate flexible collaboration but require strong convening institutions to prevent fragmentation (Bixler et al. 2016). Governance can also be adaptive, incorporating monitoring, learning, and adjustment rather than relying on rigid prescriptions, enabling authorities to respond to dynamic ecological and social changes, particularly under climate change (Lister 2015). Indigenous governments and Knowledge Systems represent both legal authority and essential ecological insight. Co-governance arrangements and Indigenous Protected and Conserved Areas (IPCAs) have emerged as central models for durable connectivity governance (Indigenous Circle of Experts 2018; Lee et al. 2019; Sierra and Monticone 2025). Finally, connectivity is most effectively achieved when supported by legislative frameworks that mandate the creation of ecological corridors (Keeley et al. 2022).

Ecological connectivity requires planning horizons that extend beyond typical political and funding cycles, reflecting the ecological reality that habitat restoration, species adaptation, and corridor maintenance unfold over decades. A central challenge in Canada has been ensuring that governance arrangements are sustainable over the long-term, with work highlighting factors that determine whether governance arrangements are durable, adaptable, and resilient (Gjaltema et al. 2019).

The above elements indicate that governance for ecological connectivity may not be implemented by a single legal tool or agency, but rather emerges from a set of institutions, norms, and practices. In Canada, where constitutional arrangements divide authority over land, resources, and biodiversity, these governance elements are especially important. The interplay between federal leadership, provincial and territorial jurisdiction, municipal innovation, and Indigenous authority shapes the prospects for successful conservation networks.

Governance types for area-based conservation, as defined by the IUCN, are generally described as: (1) governance by government; (2) shared governance; (3) private governance; and (4) governance by Indigenous Peoples and local communities (Table 1; Borrini-Feyerabend et al. 2013). These governance arrangements are based on who holds the primary decision-making authority and responsibility for management.

TABLE 1 **IUCN governance types for area-based conservation (adopted from Borrini-Feyerabend et al. 2013).**

Governance Type	Description and subtypes
Governance by government	• Federal, provincial or territorial ministry/agency in charge • Special operating agency established by government in charge
Shared governance	Shared between two or more governance types, such as: • Joint management • Collaborative management • Transboundary management
Private governance	Conserved areas established and run by: • Individual owners • Non-profit organizations • For-profit organizations
Governance by Indigenous Peoples and local communities	• Indigenous Peoples' conserved areas and territories, established and run by Indigenous Peoples • Community conservation areas — established and run by local communities

Canada can be considered under three socio-ecological conditions (Locke et al. 2019), each presenting unique challenges and opportunities for ecological corridor governance. About 12 per cent of Canada is privately owned, spread out along the southern border with the United States, and contains most of the cities and farms. Condition 1 is within the private ownership zone, includes cities and farms, and is where the majority of the population lives. Moving north are largely forested areas, claimed as Crown land with overlapping Indigenous claims. Condition 2 is mostly leased to forestry and mining companies. Condition 3 is the wild expanse of taiga and tundra in northern Canada, also known as Crown land and often co-managed with Indigenous communities. Together, these three conditions highlight the diverse contexts within which ecological connectivity must be governed across Canada.

In this study, we examine the state of ecological connectivity governance in Canada. By drawing on an assessment of legal and policy instruments and case studies of connectivity initiatives and programs across the country, we highlight success stories and the enabling conditions shaping connectivity conservation, as well as gaps, barriers, and requirements for designing and implementing effective ecological corridors in Canada.

Assessing Connectivity Governance in Canada: Literature, Policy and Case Studies

To assess the state of connectivity governance in Canada, we used a mixed-methods approach, incorporating a literature review of Canadian connectivity literature and legislative tools related to ecological connectivity and semi-structured interviews with practitioners and experts from Canadian ecological corridor initiatives and programs.

Canadian Connectivity Literature

We reviewed the Canadian peer-reviewed literature on ecological connectivity published between 2000 and 2025 using Google Scholar. We used the search terms: ("connectivity" or "corridors" or "ecological networks") AND ("Canada" and "governance"). Abstracts were reviewed and documents were selected for further review based on the screening criterion that they had to have a Canadian focus on ecological connectivity and its governance. We also searched for non-refereed literature for Canada using the same search terms in Google Search. For the non-refereed literature, we reviewed executive summaries or equivalent and selected documents using the same screening criterion as the peer-reviewed literature.

Regulatory Tools

To assess governance of ecological connectivity in Canada, we reviewed existing federal, provincial and territorial legislation to better understand the legal or regulatory basis to create or support ecological connectivity in Canada. We first used ChatGPT (Version 5.1) to compile a list of federal, provincial, and territorial legislation that established protected or conserved areas or included the keywords "connectivity," "corridors," or "ecological networks" All identified laws were then reviewed to confirm relevance and assess specific references to ecological connectivity. Additional legislation was identified through manual review and prior knowledge of Canadian conservation law.

Case Studies of Canadian Ecological Corridors

To highlight creative approaches to maintaining and restoring ecological connectivity, we examined eleven case studies of ecological corridor initiatives or programs from across Canada (Figure 2). Case studies represent ecological corridor initiatives or programs that have created ecological corridors or are in the process of establishing corridors. These case studies include a range of governance types spanning federal to local levels.

FIGURE 2 Coarsely defined geographic boundaries for 10 of the Canadian connectivity initiatives (Table 3).

1. Larrimac Ecological Corridor

2. Highway 3 Corridor

3. Quebec Ecological Corridor Initiative

4. Parks Canada Banff to Yoho Highway Mitigation

5. Southern British Columbia Corridors

6. Escarpment Corridor Alliance
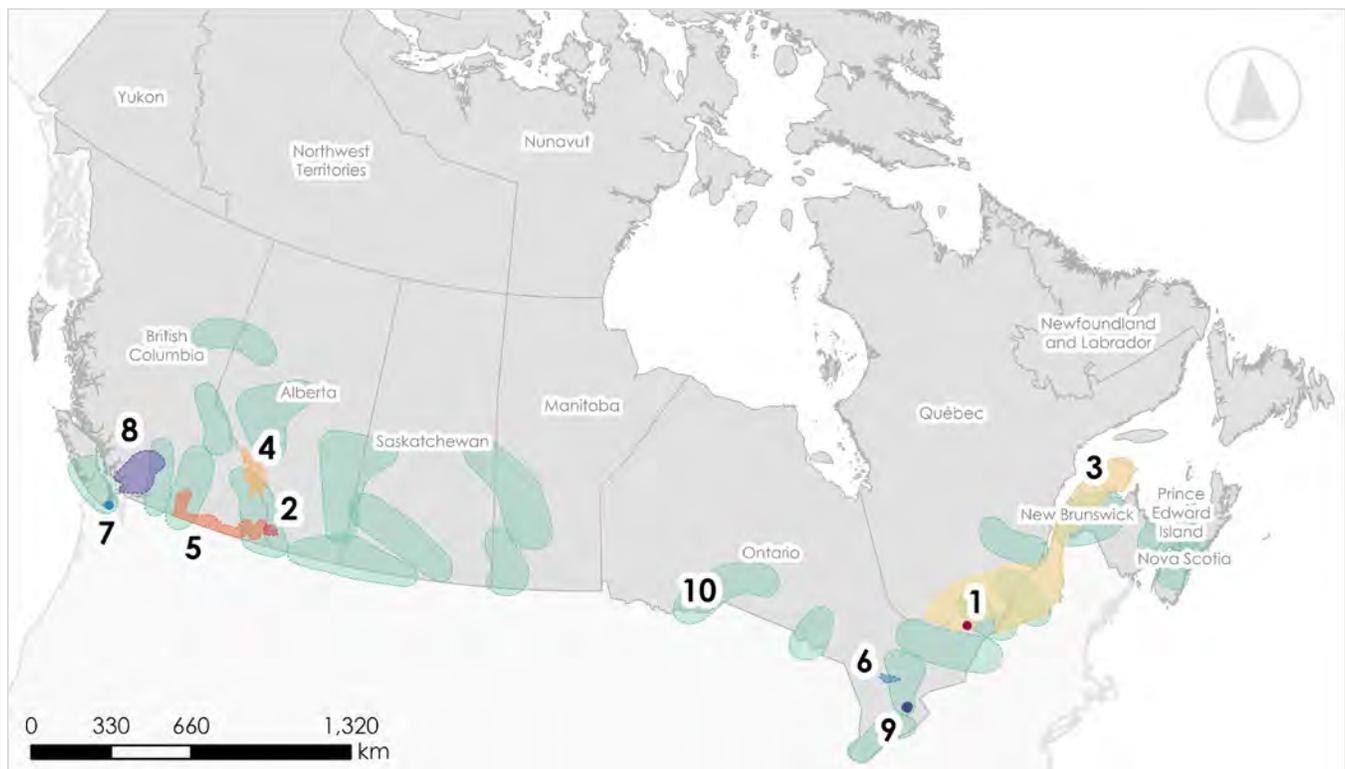
7. Capital Regional District Regional Park System

8. Sea-to-Sky and Átl'ka7tsem / Howe Sound UNESCO Biosphere Connectivity Project

9. Cootes to Escarpment EcoPark System

10. Parks Canada National Priority Areas for Ecological Corridors

Boundaries represent general spatial areas and are not all represented to scale; several appear larger than their actual extents for visualization at the national scale (case studies 1, 5, 7, and 9).

The Southern Alberta ecological connectivity case study is not displayed on the map.

For each case study, we conducted semi-structured interviews with practitioners and experts involved in the design, management, and monitoring of the established ecological corridor(s). Participants were selected based on their affiliation with an ecological corridor initiative or program that included corridor practitioners ($n = 9$) and experts in environmental law ($n = 1$), ecological connectivity ($n = 3$) and mitigation of linear infrastructure ($n = 1$), notably highways.

We conducted semi-structured interviews, using a flexible set of 20 predetermined questions, organized around the six fundamental principles for the governance of ecological corridors to explore participants' perspectives on ecological connectivity while allowing for time to follow up on topics emerging from participants' responses. Discussion covered the range of the connectivity goals of the corridor, its management and governance, and its legal, regulatory and policy underpinnings. We also asked the interviewees for their perspectives on what is needed to improve

connectivity governance. See Supplemental Materials Appendix 1 for the full list of questions. Interviews were conducted by the lead and second author of this study at the Canadian Ecological Connectivity Conference in Banff, Alberta, Canada, from April 22 to 25, 2025, as well as over Microsoft Teams (Microsoft Corporation) or Zoom (Zoom Video Communications, Inc) from June to August 2025. Detailed notes on the participant interviews were kept during the interviews. Key themes emerging from interviews were summarized into important lessons learned, focusing on the key enabling conditions, obstacles, and needs of practitioners to better advance ecological connectivity. This study was approved by and conducted in accordance with the Human Research Ethics Board (HREB) at Mount Royal University (Application Number #10451, approved by Lynne Lafave, Chair, Human Research Ethics Board).

Wildlife traffic jam in Jasper National Park, Alberta.
Credit: Shutterstock.

Lessons from Connectivity Governance in Canada

Canadian Connectivity Literature

Thirty-five relevant peer-reviewed articles and nine grey literature sources met our inclusion criteria. Most literature addressed ecological connectivity but did not provide substantive guidance on connectivity governance. Two major works (Lemieux et al. 2021a, 2022) directly evaluated governance and legislative needs. Lemieux et al. (2021a) review of legislation for protected areas and OECMs noted the lack of legislation that directly supports ecological connectivity. Lemieux et al. (2022) identified opportunities to improve connectivity in Canada, including adaptive governance, funding practical approaches, increasing public engagement, and investing in research and knowledge management.

Lemieux et al. (2022) outlined four transformational changes and 15 associated key actions to improve connectivity conservation in Canada. These suggested changes include:

1. **Mainstreaming connectivity retention and restoration within biodiversity conservation sector and influencing sectors (e.g., transportation, energy, agriculture, forestry);**

2. **Mainstreaming financial resources and incentives to support effective implementation;**

3. **Fostering collaboration with a focus on cross sector collective action; and**

4. **Investing in diverse forms of knowledge (co-) production and management in support of adaptive governance.**

Our research builds on this body of work by focusing on the requirements for a legislative framework to support connectivity goals in Canada, supported by lessons learned by examining a range of case studies.

Non-refereed literature provided the most detailed discussion on governance, particularly a policy review by the Canadian Parks and Wilderness Committee / Société pour la nature et les parcs (CPAWS/SNAP 2022) and the Pathway to Canada Target 1 Initiative. The CPAWS/SNAP report highlighted the lack of direct references to ecological connectivity in Canadian legislation, as well as the absence of legislation that requires the establishment of corridors. Similarly, the Pathway to Canada Target 1 Connectivity Working Group (2021) — a collaboration among federal, provincial, and territorial agencies, Indigenous organizations, and non-governmental organizations — called for establishing, updating, and enforcing legislation and policies that influence connectivity. Additional recommendations include financing, supporting science, and including Indigenous Knowledge, as well as developing regional conservation strategies. Finally, Lemieux et al. (2021b) published a occasional paper from the Canadian Council on Ecological Areas. This paper examined a range of needs to improve ecological connectivity in Canada. This included improvements in governance and a call for a review of federal, provincial and territorial legislation to include connectivity, but was primarily focused on changes in funding and policy than on legislation.

Despite these notable contributions, there remains poor integration of connectivity into existing legislative and regulatory frameworks. Patterson et al. (2022) found that ecological connectivity is largely absent from environmental impact assessment (EIA) processes in Canada, and when considered, assessments often lack the rigour needed to evaluate connectivity impacts effectively. This underscores the need for a stronger legislative and regulatory framework, consistent with findings that connectivity conservation is most effective when it is legislatively mandated and supported by adequate funding (Keeley et al. 2019). Patterson et al. (2022) recommended revising the EIA legislation to include ecological connectivity to provide a legal framework, helping to address the lack of policies, standards, and assessment guidelines.

Regulatory Tools

See Table 2 for select legislation with potential or actual focus on ecological connectivity. Overall, we found that the legal and regulatory landscape governing ecological connectivity in Canada is highly fragmented and insufficient to establish ecological corridors at the scale required to achieve Target 3 of the GBF. While there is legislation on protected areas in all Canadian federal, provincial, and territorial jurisdictions, none of that legislation refers to connectivity or clearly enables the establishment of ecological corridors or networks. In no case is connectivity a requirement, although it is sometimes acknowledged as a beneficial goal or suggestion.

The Canadian legal and regulatory landscape provides a patchwork of partial authorities for ecological connectivity. Federal statutes establish general biodiversity mandates but lack binding corridor obligations. Provinces and territories' approaches vary, with Ontario and Quebec providing marginal leadership. Both provinces require consideration of ecological connectivity in municipal plans but offer no mechanisms or legislative frameworks to do so. Ontario is a partial exception as it has connectivity provisions in its Green Belt Plan that is supported by the Green Belt Act. This plan has resulted in land use planning that has protected some identified ecological corridors. This fragmented legal and regulatory framework underscores the need for a stronger national legislative base and coordinated policy mechanisms.

Conservation easements offer a mechanism for governance of ecological corridors. A conservation easement is a legal agreement between a landowner and a qualified organization, such as a land trust, to protect the natural value of a property, which can include connectivity. While the legislation covering conservation easements is part of provincial or territorial legal systems and highly variable across Canada, easements are widely and successfully used by conservation land trusts to conserve land, including corridors (Hisey 2025).

Case Studies of Canadian Ecological Corridors

See Table 3 for a summary of the 11 case studies of Canadian connectivity initiatives. Case studies represent a range of governance types and spatial scales, spanning from regional to local. Most of the case studies used a mixed governance type (*n* = 6) that involved provincial governments or municipal governments, along with other governance authorities (Table 3). Most of these mixed governance types had leadership and research coming from an NGO. Notable examples of Indigenous-led connectivity initiatives include the Sea-to-Sky and Átl'kastem/Howe Sound UNESCO Biosphere case study (Table 3). Other Canadian examples not included in the case studies but identified through the literature scope includes the development of the draft Dehcho Land-Use Plan (Dehcho Land Use Planning Committee, n.d.) and the draft Nunavut Land-Use Plan (Nunavut Planning Commission, 2023). Of the remaining case studies, four were governance by government (federal, provincial, municipal) and one private (Table 3).

The case studies reveal a complex picture of ecological connectivity conservation, marked by creativity, collaboration, and persistent structural challenges. A recurring theme across many of the corridor initiatives was considerable creativity in developing governance partnerships, reliance on strong local champions, and leadership from non-governmental organizations (NGOs). Partnerships are often led, or inspired by, NGOs, including land trusts and other conservation organizations, emerging especially at local and regional scales. Several initiatives operate without a formal governance structure. For example, the Cootes to Escarpment EcoPark System relies on a voluntary memorandum of understanding. In many initiatives, NGOs and land trusts played a central leadership role, underscoring the importance of relationships and collaboration among partners to advance ecological connectivity.

Municipal governments, particularly in southern Canada, are active contributors to connectivity conservation. Municipalities were involved in six of the 11 case studies (Table 3). Much of Canada's connectivity work involved municipalities, with the case studies illustrating municipalities taking an active or leading role. Examples include the Capital Regional District Regional Park System and the Squamish-Lillooet Regional District regional analysis of connectivity needs. Further, the municipality of

City of Revelstoke. Credit: Shutterstock.

Chelsea, Quebec, created connectivity overlay zoning to strengthen conservation measures. At a provincial level, Quebec has recently directed its municipalities to consider ecological connectivity in their municipal planning. However, because this directive has not been integrated into the decadal planning cycle, its overall impact remains uncertain and warrants further assessment.

Although the importance of restoring, enhancing, and maintaining connectivity networks is recognized, Canada has yet to fully implement functional connectivity networks at the spatial scales needed for many species and ecological processes. The only federal program on connectivity is the National Program for Ecological Corridors, run by Parks Canada (Government of Canada, 2025). This program identifies priority areas for connectivity conservation based on a national analysis identifying where habitat loss and fragmentation has occurred, or are imminent, and where reduced connectivity would impede species movement (Government of Canada, 2025). The program provides financial support for conservation, restoration, and management projects within those areas, emphasizing collaboration with other levels of government and Indigenous partners. Notably, the program has established criteria and guidance for ecological corridors that were derived from the IUCN *Guidelines for Conserving Connectivity through Ecological Networks and Corridors* (Hilty et al. 2020). While the program has funded 27 corridor initiatives from 2021 to 2026 (Government of Canada, 2025), it is time-limited and lacks formal policy or legislative requirements for a national program to support connectivity.

Many of the case studies lack policy and legislative requirements, which creates significant challenges for establishing, restoring and maintaining ecological connectivity. In response, some provincial governments are leveraging existing legal frameworks to achieve connectivity objectives. For example, Alberta's efforts to leverage the Public Lands Act and Wildlife Act. Highway mitigation measures, such as wildlife fencing and crossing structures, are primarily driven by public safety concerns, but are also designed to support wildlife management needs within the surrounding land uses. Nonetheless, these efforts highlight the continuing need for a dedicated policy to establish and maintain ecological corridors. Moreover, many interviewees expressed concerns over a lack of inter-jurisdictional coordination and misalignment of provincial and municipal priorities that hinder corridor implementation. Several participants suggested the need for a central agency responsible for connectivity conservation to address these gaps and strengthen national connectivity efforts.

Many of the case studies demonstrate that science was not a key limiting factor for the connectivity initiative or program. In many cases, population, genetic, and wildlife movement and habitat suitability studies have guided corridor design and management, as seen in the Highway 3 corridor case study in Alberta for grizzly bears (Proctor et al. 2012; Proctor et al. 2020). However, many participants expressed the need to weave both Indigenous and science ways of knowing into corridor planning, as well as the importance of prioritizing Indigenous-led conservation and stewardship projects. Further, a barrier identified by many participants was the lack of long-term, stable funding for connectivity initiatives. Practitioners emphasized the need for dedicated funding streams to support ongoing research, restoration, and monitoring and management of corridors.

Pronghorns. Credit: Kari Cieszkiewicz.

Connectivity and Linear Infrastructure

Case studies and expert interviews included enhancement of ecological connectivity across linear infrastructure. Linear infrastructure refers to both highways (including roads with vehicle traffic of all types) and railways. Of these four case studies and expert interviews, there was consideration of highway and/or railway mitigation for wildlife collisions.

A common theme emerging from the case studies and interviews was the mitigation for highways were primarily driven by a need to reduce the risk to drivers from collisions with wildlife, specifically large ungulates. This was the case in the mountain National Parks and in British Columbia in the Okanagan and along Highway 3 in Elk Valley. In these examples, the prescription for mitigation involves long stretches of high fencing to prevent wildlife from entering the highway. In some cases, fencing funnels wildlife to overpasses and underpasses. The success of this general approach has been well studied, demonstrating a decrease in vehicle wildlife collisions and enhanced movement of wildlife across roads (Ford et al. 2009; Ford et al. 2022).

Governance of highway mitigation and construction of fencing and crossing structures falls under the relevant highways department. Although the legislation for highways is separate for provincial highways and territories, there is policy coordination through the Transportation Association of Canada. The *Canadian Highway Bridge Design Code (CSA S6)* applies to the design, evaluation and structural rehabilitation design of fixed and movable highway bridges and establishes safety and reliability levels that are consistent across all jurisdictions in Canada. The revised *Bridge Design Code*, not yet adopted, includes mandatory consideration for ecological connectivity. However, what remains missing from some road mitigation projects is sufficient data on wildlife movement and the ongoing ability to monitor the success of the mitigation structure to improve connectivity over long time periods. This expertise is often provided by NGOs, universities and other government departments, rather than the highway department.

The mitigation of railway corridors in Canada has not developed in comparison to highways. Railways across Canada are federally regulated by the *Railway Safety Act* (1988). Large bodies of literature on the subject are from the United States (Santos et al. 2017). In Canada, there has been efforts to mitigate railway impacts on wildlife in Banff National Park (Gilhooly et al. 2019). Mitigation efforts included reducing train speeds, and containment of transported grain to reduce food attractants. There is yet to be tests of the highway model of fencing and crossing structures for railway mitigation in Canada. Railway-based wildlife mortality and connectivity impacts remain understudied and relatively unknown.
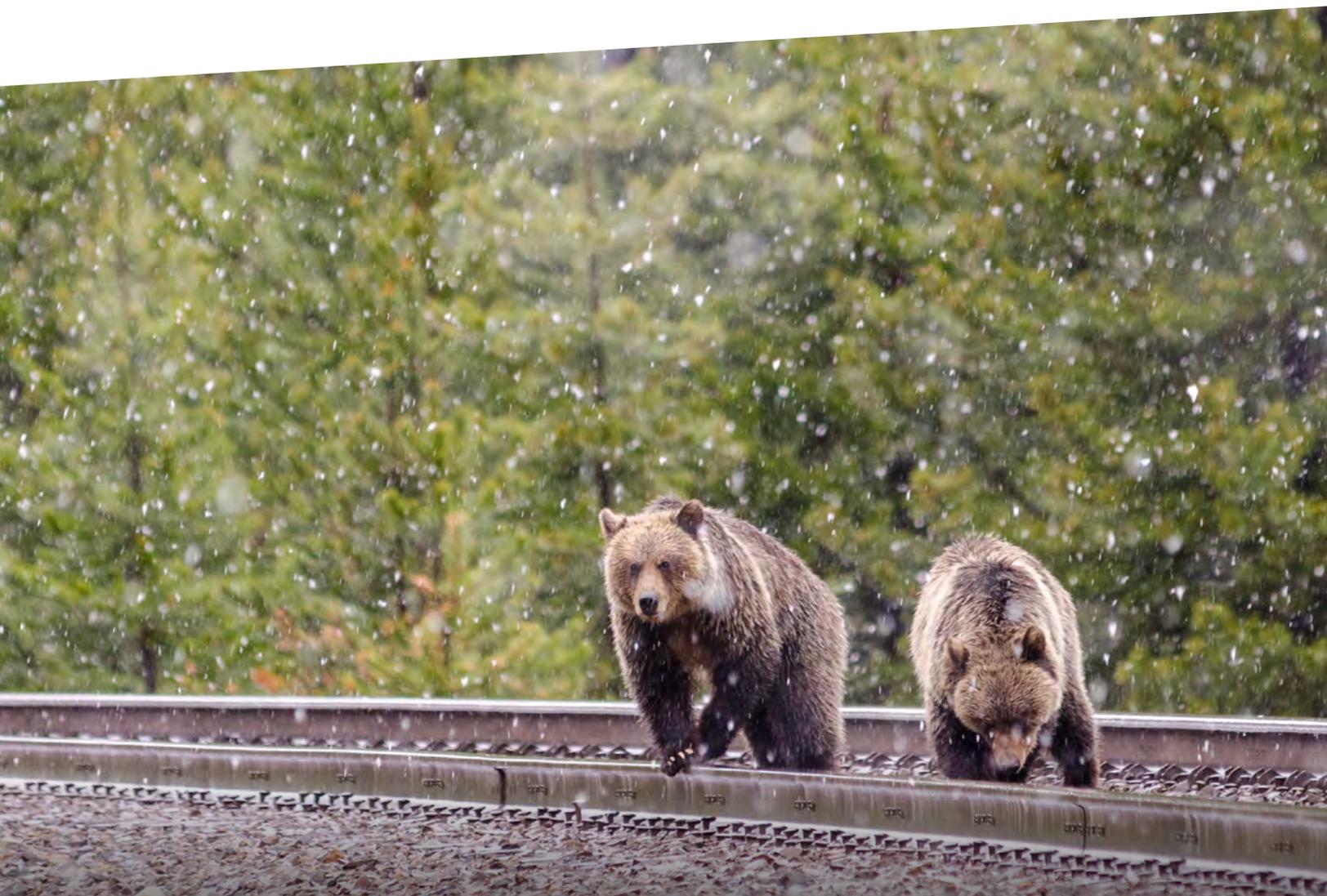
Grizzly bears on railroad tracks.
Credit: Shutterstock.

Meeting the Connectivity Challenge

Achieving Canada's obligations under the GBF for ecological connectivity will require significant effort and coordinated action.

The Protected Connected Index (ProtConn; Saura et al. 2017) is a component indicator in the GBF that assesses the functional connectivity of protected and conserved areas and other intact natural ecosystems. In Canada, ProtConn indicates there has been inadequate progress toward GBF targets (Currie et al. 2025). This was reinforced by the Auditor General of Canada (2025), who concluded that there were no metrics for connectivity in Canadian efforts to reach 30 by 30 and that the target lacked focus on its qualitative elements overall. The auditor also concluded that the government's commitment under the CBD lacked an overall plan and concrete actions to ensure that Canada's protected and conserved areas are well connected. Aside from the notable draft Nunavut Land-use plan there is no federal, provincial, and territorial government that is on track to meet the connectivity objective. This underscores the need to identify governance mechanisms, including federal, provincial, and territorial

roles, and how these governments can collaborate to make connectivity a shared priority.

This work illustrates the complex and varied picture of ecological connectivity initiatives in Canada, which are currently characterized by creativity and collaborative efforts by practitioners and organizations committed to advancing connectivity conservation. There are some successes, largely driven by partnerships and key champions and being led by NGOs and Indigenous communities. However, while many corridor initiatives demonstrate commitment at local and regional scales, efforts are scattered, making it difficult to achieve national-scale ecological networks. Current efforts are not planned or coordinated at a spatial scale that will result in connected networks of protected and conserved areas by 2030, as agreed to under the GBF.

Wildlife overpass in Banff National Park, Alberta.
Credit: Shutterstock.

A key barrier to scaling up ecological connectivity to the national level is the lack of federal, provincial, and territorial legislation that explicitly requires or enables ecological corridor establishment. Without a legislative basis for establishing and governing ecological corridors, efforts to increase funding, collaboration, and policy development are unlikely to achieve the national-scale ecological networks envisioned for 2030. The establishment of protected areas in Canada was built on bespoke, targeted legislation for their establishment and management that did not account for connectivity, although the placement of some protected areas did. Just as protected areas cannot be effectively established without a legislative framework, the governance of connectivity likewise requires such a foundation.

While some of the policy drivers for ecological connectivity are largely in place, and Canada's governments, Indigenous Peoples, and conservation organizations have expressed motivation to advance this work, these commitments have yet to be operationalized in a national framework. As a signatory to the GBF, and with Quebec, Manitoba, British Columbia, and the Yukon publicly supporting the GBF, including Target 3, the country has articulated clear commitments. Canada has a 2030 Nature Strategy (Environment and Climate Change Canada, 2024) to implement the GBF. Further, there is a federal, provincial, and territorial Pathway Process to implement the Nature Strategy. A connectivity working group for the implementation pathway has prepared a working paper on *"Recommended Priority Actions for Advancing Connectivity Conservation in Canada"*. The first recommendation of that report is to "assert ecological connectivity as a shared government priority through the establishment, updating and/or effective application and enforcement of key legislation, regulations and/or policies governing activities that influence ecological connectivity". There are other recommendations on establishing or updating financial programs for Crown lands and financial incentives for non-Crown lands. In addition, the report calls for support for research, the appropriate use of scientific data and Indigenous Knowledge, and collaboration on national-scale initiatives for cross-boundary projects.

Canada can be viewed according to three conditions for biodiversity conservation and sustainable use (Locke et al. 2019). Condition 1 (6.5 per cent of Canada) is within the private ownership zone, includes cities and farms, and is where the majority of the population lives. Conservation in this area is focused on efforts to secure endangered species and protect remaining primary ecosystem fragments. Maintaining and restoring connectivity is critical in these highly fragmented ecosystems. Potential solutions include conservation easements supported by government incentive programs, payments for ecosystem services, and long-term contracts between governments and private landowners to manage lands for connectivity; approaches that have received little attention in Canada to date. However, they have been implemented successfully elsewhere, such as in Costa Rica (Morse et al. 2009). Public engagement is key to building broad awareness and support for these measures and long-term success.

Condition 2 areas (26 per cent of Canada) include industrial-scale forestry and mining, considered Crown land by provincial and territorial governments, and overlain with Indigenous territories. There is a need for larger, intact corridors to enable structural connectivity. Governance solutions in these areas needs to focus on co-management of public lands, where large swaths are leased by governments to private companies for mining and forestry. There is considerable room to create new legal approaches that require these leases to include the legal requirement to conserve and maintain ecological connectivity as a condition for holding the lease.

Condition 3, covering 68 per cent of Canada, includes the northern boreal, taiga, and tundra ecosystems. These areas remain largely wild, with low human populations and governance primarily under Indigenous management or co-management. Planning for connectivity, particularly for migratory species such as caribou, is a key component of land-use strategies, and such efforts are led by or implemented in partnership with Indigenous Peoples. Nunavut is at the forefront with its draft land-use plan, which aims to maintain connectivity for caribou (Nunavut Planning Commission, 2023). Moreover, the draft Dehcho Land-Use Plan (Dehcho Land Use Planning Committee, n.d.) serves as a model for integrating connectivity considerations into land management.

These three conditions highlight the responses Canada needs to restore and maintain ecological connectivity. In all cases, ecological corridors require key elements: defined boundaries, long-term legal protection, and monitoring and management. Achieving these elements depends on a supportive governance system. Moreover, there is considerable space for federal, provincial and territorial governments to work with Indigenous governments to support the inclusion of ecological connectivity in land claims agreements.

Linear features (highways and railways) offer a separate set of governance solutions. Several interviewees noted the role of transportation departments in implementing mitigation measures, such as crossing structures and fencing, to reduce human-wildlife collisions and facilitate species connectivity. Developing policy and legal frameworks in collaboration with these departments could help ensure that connectivity conservation is actively incorporated in planning and decision-making.

This study advances the small set of research on connectivity governance by examining diverse case studies and the existing legislative frameworks. The results of this study are subject to several limitations. The work was informed by the selected case studies and the sample of participants interviewed. Future research with greater focus on Indigenous-led corridor initiatives is warranted, given the growing recognition of Indigenous Peoples' effective stewardship of landscapes, as well as clear opportunities for ecological corridors to uphold and advance Indigenous rights and leadership. This work was also not a systematic review but a traditional review of literature, policy, and regulatory tools. As such, it may not capture the full breadth of literature and legal instruments and should be interpreted as an overview to highlight general patterns rather than a comprehensive assessment.

Achieving Canada's goal of an ecologically connected network of protected and conserved areas by 2030 will require substantial effort. Progress depends on sustained funding, meaningful partnerships with Indigenous Peoples, improved cross-sector governance, public awareness and support for ecological connectivity, and the development of new governance and legislative frameworks. It also requires research and monitoring that incorporates both Indigenous and scientific knowledge. Strengthening legislative and governance frameworks is especially critical, as large-scale connectivity initiatives cannot succeed without supporting legislative tools and coordinated action across all levels of government. Although innovative ecological corridor initiatives are emerging across Canada, they remain fragmented, highlighting the need for cohesive and prioritized legislative action to achieve national connectivity goals.

Elk. Credit: Shutterstock.

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Funding statement

Grizzly bears. Credit: Shutterstock.

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Tables

TABLE 2 Selected federal, provincial, and territorial legal frameworks that potentially or actually support ecological connectivity in Canada.

Jurisdiction	Legislation	Connectivity Reference	Comment on Mandate for connectivity
Federal	Fisheries Act, 2019	None	Allow for regulations that might include connectivity conservation.
	National Parks Act, 2000	None	Establishes national parks and requires management for ecological integrity. Does not mandate ecological corridor creation or landscape-scale management.
	Species at Risk Act, 2002	None	The concept of critical habitat might be interpreted to include connectivity. There is no explicit requirement for connectivity.
	Environmental Assessment Act, 2021	None	Considers cumulative effects and biodiversity in project reviews. Assessments are case-specific and implementation varies.
	National Marine Conservation Areas Act, 2024	None	Mentions marine networks in the preamble and requires consideration of ecological integrity but does not require connectivity.
	Canada Wildlife Act, 2024	None	Allows for the creation, management and protection of wildlife areas for wildlife research activities, conservation or public education.
Yukon Territory	Parks and Land Certainty Act, 2002	None	Establishes terrestrial protected areas but does not require connectivity.
	Yukon Parks Strategy, 2020	Includes references to connectivity.	Is a policy document that sets the long-term direction for Yukon's territorial parks systems for 2020 – 2030. It is not a legal framework establishing corridors.
Northwest Territories	Protected Areas Act, 2019	Refers to a "network" of protected areas.	Establishes protected areas but does not require connectivity.
	Healthy Land, Healthy People: Government of the Northwest Territories Priorities for Advancement of Conservation Network Planning, 2021	Strong connectivity and network guidance.	It is a policy document with a strong emphasis on conservation and ecological connectivity. It is not a legal framework establishing corridors.

TABLE 2 Selected federal, provincial, and territorial legal frameworks that potentially or actually support ecological connectivity in Canada.

Jurisdiction	Legislation	Connectivity Reference	Comment on Mandate for connectivity
Nunavut Territory	Nunavut Land Use Plan — draft 2023	Includes provisions for corridors.	Is not yet in force. There are specific proposals to protect ecological corridors for caribou.
British Columbia	Ecological Reserves Act — 1966	None	Allows for establishment of ecological reserves but does not require connectivity.
	Forest and Range Practices Act, 2002	Refers to landscape connectivity.	Included a reference to landscape connectivity as a consideration for issuing a wood license plan. However, this is not a requirement.
	Protected Areas of British Columbia Act, 2025	None	Allows establishment of protected areas but does not require connectivity.
Alberta	Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act — 2000	None	Allows establishment of protected areas but does not require connectivity.
	Provincial Parks Act, 2023	None	Allows establishment of protected areas but does not require connectivity.
	Alberta Land Stewardship Act, 2024	None	Enables the creation of conservation easements but does not require connectivity. The Act also enables the establishment of regional plans which include reference to connectivity.
	South Saskatchewan Regional Plan 2015 - 2024, amended 2025	Refers to wildlife habitat and landscape connectivity.	The South Saskatchewan Regional Plan, established under the Alberta Land Stewardship Act, includes reference to the importance of wildlife habitat connectivity for biodiversity.
	Environmental Protection and Enhancement Act, 2025	None	Includes protection, enhancement and maintenance of the environment, but does not require connectivity.
	Wildlife Act, 2025	None	Allows for establishing and continuing wildlife sanctuaries and establishing habitat conservation areas but does not require connectivity.

TABLE 2 **Selected federal, provincial, and territorial legal frameworks that potentially or actually support ecological connectivity in Canada.**

Jurisdiction	Legislation	Connectivity Reference	Comment on Mandate for connectivity
Saskatchewan	Parks Act, 1996	None	Allows establishment of protected areas but does not require connectivity.
Manitoba	Ecological Reserve Act, 1987	None	Allows establishment of ecological reserves but does not require connectivity.
	Provincial Parks Act, 1993	None	Allows establishment of protected areas but does not require connectivity.
Ontario	Provincial Parks and Conservation Reserves Act, 2006	None	Allows establishment of protected areas but does not require connectivity.
	Far North Act, 2010	Mentions the interconnectedness of protected areas.	No requirement for connectivity.
	Green Belt Plan, 2017. Supported by the Green Belt Act, 2005.	Calls for connectivity.	The plan calls for connectivity along the system, as well as between key natural heritage features and key hydrologic features.
	Provincial Policy Statement, 2024	Calls for connectivity in municipal plans.	This is a policy statement providing guidance to municipalities regarding the preparation of land-use plans and bylaws. Section 2.1 references that connectivity, "…should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features"

TABLE 2 Selected federal, provincial, and territorial legal frameworks that potentially or actually support ecological connectivity in Canada.

Jurisdiction	Legislation	Connectivity Reference	Comment on Mandate for connectivity
Quebec	Parks Act, 1996	None	Allows establishment of protected areas but does not require connectivity.
	National Policy on Land Use Planning and Architecture (PNAAT), 2022	Some references to connectivity.	Land-use planning is aimed at the preservation and development of lands and agricultural activities as well as maintenance of accessible natural environments, biodiversity and ecological connectivity. Ecological corridors are not mandated.
	Orientations gouvernementales en aménagement du territoire, 2024	Requirement of ecological connectivity in land-use planning.	Regional County Municipalities (MRCs) must identify ecological corridors and plan for land-use zoning or standards that support the maintenance or restoration of ecological corridors. MRCs are encouraged to promote the creation of wildlife crossings when repairing or building roads located within ecological corridors.
New Brunswick	Protected Natural Areas Act, 2002	None	Allows the establishment of protected natural areas but does not require connectivity.
	Parks Act, 2011	None	Allows establishment of protected areas but does not require connectivity.
Nova Scotia	Wilderness Areas Protection Act, 1998	None	Allows establishment of wilderness areas but does not require connectivity.
	Provincial Parks Act, 2010	None	Allows establishment of protected areas but does not require connectivity.
Prince Edward Island	Lands Protection Act, 2022	None	Allows establishment of protected areas but does not require connectivity.
Newfoundland and Labrador	Wilderness and Ecological Reserves Act, 1990	None	Allows establishment of wilderness areas and ecological reserves.
	Provincial Parks Act, 2001	None	Allows establishment of protected areas but does not require connectivity.

TABLE 3 Summary of 11 case studies of Canadian connectivity initiatives. For map of case studies, see Figure 2.

Connectivity Initiative	Geography	Spatial Scale	Governance Type	Governance Mechanism	Legislative Framework	Other Information
Highway 3 Corridor	Crowsnest Pass, Southern Alberta	Local	Mixed — government (provincial) and private (NGO), land trusts	Includes a mix of provincial government, NGO, and private land trusts involved in planning and monitoring.	The Government of Alberta Transportation and Economic Corridors policy uses several pieces of legislation, none of which explicitly require connectivity or corridors.	This area is a well-known pinch point for grizzly bears, with crossing structures (in place, planned and proposed) designed to mitigate wildlife-vehicle collisions.
Southern British Columbia Corridors	British Columbia	Local	Government (provincial)	The provincial Ministry of Transportation and Transit is responsible for the wildlife crossing structures and fencing.	Highway Act — focus is on reducing wildlife collisions.	Trepanier overpass was constructed in 1987 along with highway fencing. The Highway 3 crossing structure and fencing is being completed. Both crossings and fencing are aimed at mitigating collisions with wildlife.

TABLE 3 Summary of 11 case studies of Canadian connectivity initiatives. For map of case studies, see Figure 2.

Connectivity Initiative	Geography	Spatial Scale	Governance Type	Governance Mechanism	Legislative Framework	Other Information
Cootes to Escarpment EcoPark System	Hamilton, Burlington and Niagara Escarpment, Ontario	Local	Mixed — government (municipal), private, land trusts	It is voluntary with a Memorandum of Understanding based on good will of nine parties (including regional governments, universities, and NGOs).	No specific legislation.	The Cootes to Escarpment EcoPark System includes regional governments, universities, and NGOs that collectively protect nearly 2,200 hectares of open space and nature sanctuary. The EcoPark System is home to nearly a fifth of Canada's wild plants and more than 60 species at risk, making it a national biodiversity hotspot.
Larrimac Ecological Corridor	Chelsea, Quebec	Local	Mixed — government (municipal), private land trust, private residential lots.	It is primarily voluntary. There is connectivity overlay zoning included in the Chelsea Municipal Plan.	The corridor benefits from a Chelsea municipal bylaw that establishes a connectivity overlay zone applicable across all other zoning designations. Parts of the area are protected by a land trust as privately protected area, while other parts are government-owned and designated as OECMs.	This is one corridor in a set of corridors identified by Gatineau Park to ensure that the area remains ecologically connected to other intact ecosystems in the region.

TABLE 3 Summary of 11 case studies of Canadian connectivity initiatives. For map of case studies, see Figure 2.

Connectivity Initiative	Geography	Spatial Scale	Governance Type	Governance Mechanism	Legislative Framework	Other Information
Parks Canada Banff to Yoho Highway Mitigation	Alberta and British Columbia	Regional	Government (federal)	Is governed by the federal government, with the assistance of universities and researchers for planning and monitoring.	Highway mitigation of human-wildlife collisions primarily driven by public safety, rather than legislated requirements for ecological corridors.	The project stretches 82 km and includes 44 crossing structures, on Federal Crown Land and inside national parks. This project was driven by the twinning of the Trans-Canada Highway through Banff and Yoho. It was a ground-breaking project with a high level of success.
Sea-to-Sky and Átl'ka7tsem/ Howe Sound UNESCO Biosphere	Squamish-Lillooet, British Columbia. Includes municipal and First Nations Lands	Regional	Mixed — Squamish Community Forest, Squamish-Lillooet Regional District, Átl'ka7tsem/ Howe Sound Biosphere region, Sk̲wx̲wú7mesh Úxwumixw [Squamish Nation]).	Voluntary primary managed by staff and volunteers of the Squamish Environmental Society and Átl'ka7tsem/ Howe Sound Biosphere region.	Based on common interests. No specific legislation.	The Wildlife Connectivity Project is a multi-year collaborative effort to support land managers in developing regional biodiversity conservation strategies. The project focuses on maintaining wildlife movement pathways and to enhance ecosystem resilience for a range of native species.

TABLE 3 **Summary of 11 case studies of Canadian connectivity initiatives. For map of case studies, see Figure 2.**

Connectivity Initiative	Geography	Spatial Scale	Governance Type	Governance Mechanism	Legislative Framework	Other Information
Capital Regional District (CRD) Regional Park System, Vancouver Island	British Columbia, South and Southwest Vancouver Island, and the Gulf Islands	Regional	Government (municipal)	Includes the CRD Regional Park System and the Regional District Municipal Government.	There is policy commitment for a connected set of regional parks.	The Capital Regional District Regional Park System encompasses 33 regional parks and over 13,300 hectares of land. The CRD has actively expanded the system through its Land Acquisition Fund, acquiring approximately 4,900 hectares since 2000.
Southern Alberta Ecological Connectivity	Southern Alberta	Regional	Shared — multiple provincial government departments and NGOs.	Is primarily voluntary, relying on collaboration between multiple levels of government and NGOs.	There is no specific legislation targeting connectivity. Staff adapt other legislation to assist with connectivity, including the Public Lands Act, Alberta Land Stewardship Act, associated designations/ reservations, and the Wildlife Act which can designate Wildlife Sanctuaries.	This project is in the concept stage. It is based on regional connectivity studies and aims to build connectivity using existing tools.

TABLE 3 Summary of 11 case studies of Canadian connectivity initiatives. For map of case studies, see Figure 2.

Connectivity Initiative	Geography	Spatial Scale	Governance Type	Governance Mechanism	Legislative Framework	Other Information
Escarpment Corridor Alliance (ECA)	Southern Georgian Bay, Ontario	Regional	Mixed — government (municipal) and land trusts and private lands.	Is voluntary, based on an alliance of shared interests from private lands, land trusts and government.	No legislation currently used as a basis for action.	ECA is a conservation charity and land trust. The project vision is to create a connected and protected ecological corridor across the Niagara Escarpments of South Georgian Bay.
Parks Canada, National Program for Ecological Corridors	Canada. Focused in the southern-mid latitudes.	National	The government (federal) runs the program. Corridors are not managed, owned or administered by Parks Canada, but locally driven and managed/ stewarded.	This program sets national standards for ecological corridor management/ stewardship, providing tools and resources. Use of these tools is on a voluntary basis.	No legislation. Voluntary participation. Time limited.	The National Program for Ecological Corridors activities include collaboration, national criteria for corridors, national mapping, support of local projects, work with indigenous partners, and communications.
Quebec Ecological Corridor Initiative (QECI)	Quebec. Focused in southern Quebec with modelling into New Brunswick and the United States.	Provincial, Interprovincial, International	Private (NGO)	Diverse governance mechanism. Includes municipal planning and land trusts.	There is a policy directive that Quebec municipalities consider ecological connectivity in their municipal planning.	QECI was launched by the Nature Conservancy of Canada (NCC) to accelerate the conservation of natural areas connected by ecological corridors.

Appendix 1: Questions for the semi-structured interviews

Principle 1

There are clearly defined, legitimate, equitable, and functional governance arrangements, in which the interests of civil society, rights holders and stakeholders, are fairly represented and addressed, including those relating to the establishment or designation of the site.

QUESTIONS

Is there a legal, regulatory, contractual or customary governance framework to support connectivity at the jurisdiction or site? Describe (look for law, regulations, contracts, policy or informal agreements).

What would be required to modify or cancel the governance framework?

Who was consulted in the development of the governance framework? Describe (look for consultations with stakeholders and rights holders, especially First Nations).

Are the boundaries of your corridors legally defined?

Are rights holders and stakeholders involved in the management of the program/corridor?

Principle 2

Governance arrangements and decision-making processes are transparent and appropriately communicated, and responsibilities for implementation are clear.

QUESTIONS

Who manages the corridor/program and what management powers do they have?

Is the financial support for management adequate?

Is there public reporting on the management of the corridor/program?

Are the responsibilities for management of the corridor clear and understood by stakeholders and rights holders?

Principle 3

Planning and management draw on the best available knowledge of the social and ecological context of the site, using an adaptive management framework that anticipates, learns from and responds to change in its decision-making.

QUESTIONS

What is the planning framework used by management?

What is the source of the information of the ecological values of the corridor/program?

Is traditional knowledge used in the design and management of the corridor/program?

Does the management system for the corridor/program have an adaptive management framework to account for changing conditions?

Principle 4

The site's major values for ecological connectivity and any associated cultural values are identified and understood.

QUESTIONS

How are corridors/program connectivity values established?

What are the ecological values for specific corridors/programs?

Do ecological values have established thresholds of ecological outcomes?

Are there social or economic values established for the corridor/program?

How are the values monitored?

Is there public reporting of the achievement, or not, of those values?

Is the ecological corridor/program meeting or exceeding the performance threshold for ecological connectivity?

Hiker in Kananaskis. Credit: Shutterstock.
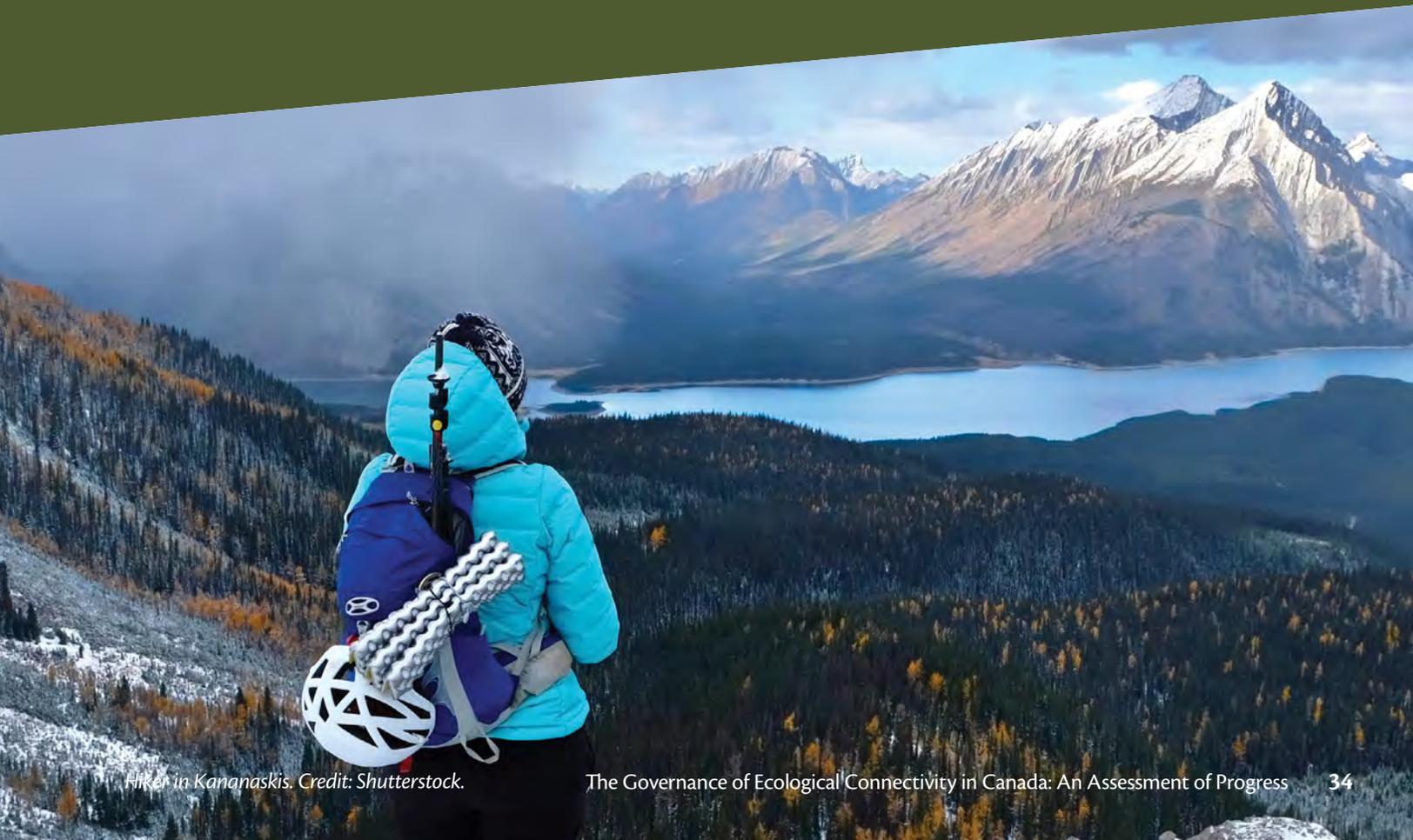
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