Corridor Country: Habitat Corridors to Improve the Lives of all Lake Country Residents; Wildlife and Humans

2024

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Executive Summary

Our world is struggling with escalating social, political, and economic challenges, often overshadowing the issues of the physical world. Yet, our vulnerability to environmental conditions is undeniable, unchecked urbanization, industrialization, and climate change is rampant. We are in the midst of a global environmental crisis.

These complex environmental issues, including pollution, global warming, and biodiversity loss, defy simplistic solutions. Locally focused sustainability initiatives offer a promising avenue for positive impact, with biodiversity loss emerging as a critical concern.

Nowhere is this issue more pronounced than in the Okanagan region, where grassland habitat loss exceeds the provincial average, compounded by the prevalence of endangered and threatened species. Strategic intervention is imperative to safeguard the region's ecological future, preserve wildlife corridors, and foster ecological resilience.

Recognizing this pressing issue, the District of Lake Country has taken proactive steps through its Official Community Plan (2018). Collaborating with the Okanagan Connectivity Corridors Project in 2017, the district mapped existing and potential wildlife corridors, notably identifying a crucial corridor along the eastern portions of Oyama and Winfield.

This corridor, integrated into the Lake Country community plan, is pivotal for preserving biodiversity and ecosystem connectivity. The plan includes policies to establish a Natural Environment Development Permit Area (NEDPA) and discourage development detrimental to wildlife connectivity.

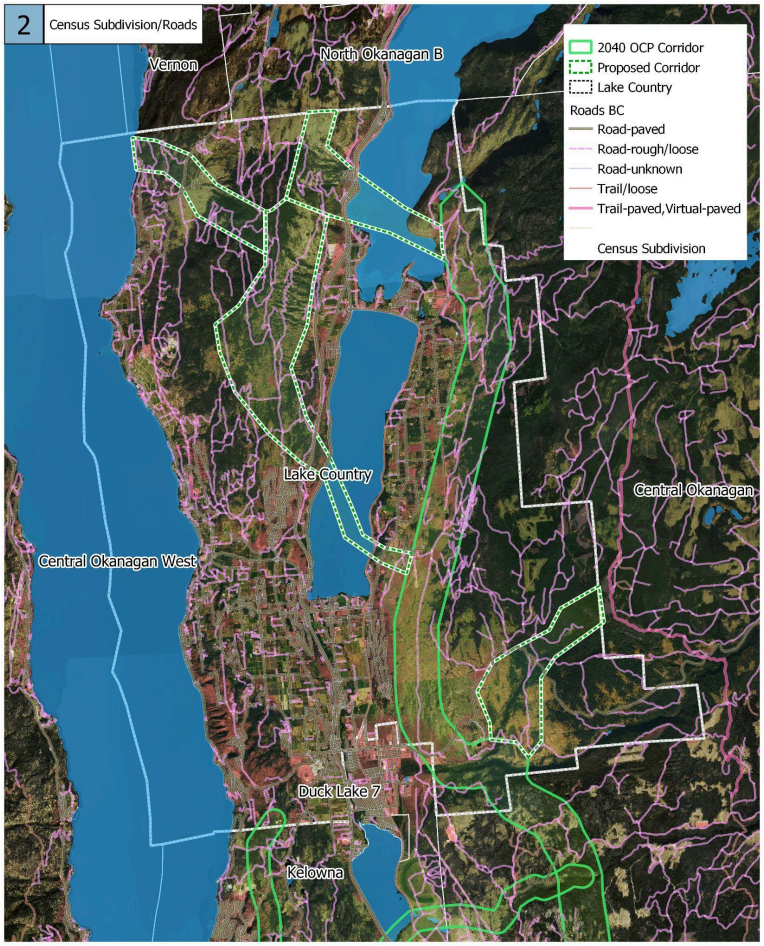
Partnering with the Okanagan Collaborative Conservation Program (OCCP), the district identified tools to support this plan at the local government level. They believe the official community plan needs stricter

provisions for the NEDPA, such as wildlife-friendly fencing and road crossing structures. Additionally, promoting ecological gifts and investing in outreach and education initiatives can further bolster conservation efforts.

While these measures mark a significant first step, the District of Lake Country has the opportunity to champion urban conservation in British Columbia by prioritizing the preservation and enhancement of critical wildlife pathways.

To fill this gap, and lead Lake Country in a positive direction, our project proposal outlines a comprehensive strategy for enhancing wildlife corridor planning in the District of Lake Country. This plan addresses urgent environmental concerns and fosters a sustainable future for both humans and wildlife in the Okanagan. Central to our approach is the recognition that wildlife corridors offer mutual benefits to both wildlife and humans, forming the cornerstone of our project.

We propose the integration of wildlife corridors into the District's community planning efforts, leveraging GIS mapping techniques to identify key areas for habitat connectivity. By connecting smaller habitat patches within the District of Lake Country to the existing planned corridor between Oyama and Winfield.



Map of Our Proposed Corridor Area

Through careful analysis of biodiversity and land cover classifications, we have pinpointed strategic corridor locations that maximize effectiveness and ease of implementation. These corridors not only preserve biodiversity but also offer opportunities for park and trail development, enriching the quality of life for residents and attracting eco-tourists to the region.

To operationalize our vision, we advocate for expanding existing policies, such as the Natural Environment Development Permit Area (NEDPA), to cover these additional corridor areas. Collaboration with local land trust partners and the launch of a Corridor Stewardship program will further augment

conservation efforts, working towards land acquisition, and engagement with private landowners in the corridor area..

By safeguarding interconnected habitats and facilitating wildlife movement, our proposed corridors provide invaluable ecosystem services, including pollination, pest control, and water purification. Moreover, they offer recreational opportunities and contribute to mental and physical well-being, enhancing the overall livability of Lake Country.

While setting aside land for corridor planning may limit development in certain areas, the array of benefits – including increased property values, community well-being, and preservation of natural heritage – far outweighs this concession. Investing in wildlife corridor planning not only ensures the ecological health of Lake Country but also promotes sustainable development and strengthens community resilience for generations to come. However, this type of project cannot be accomplished alone.

The success of our wildlife corridor project in the District of Lake Country relies on collaboration among three primary actor groups: Governmental actors, Non-Governmental actors, and Public actors.

Various governmental bodies will be needed for policy implementation, land use planning, and regulatory compliance. They will also be essential for navigating jurisdictional issues, regulatory frameworks, and resource management. Non-Governmental actors will be critical partners in aligning project goals with regional conservation efforts and facilitating stakeholder engagement. We hope to collaborate with them, and consult their expertise on habitat restoration, wildlife monitoring, and land acquisition. The public may be our most important stakeholder, building a strong relationship will be crucial for gaining community traction, addressing concerns, and gathering input. Engagement with the public is essential to balance recreational needs with habitat conservation goals and explore collaboration opportunities with local businesses and industry groups.

Emphasizing collaboration among these diverse stakeholder groups will ensure the successful implementation of our wildlife corridor project, fostering ecological resilience and community well-being in the District of Lake Country.

We have developed this approach thanks to pertinent examples and research from around the globe. Examples such as environmental planning in Curitiba, Brazil, and wildlife corridors in Los Angeles, as well as others from around the world demonstrate the success and importance of biodiversity conservation and sustainable urban planning. These examples serve as valuable models for our project in Lake Country, providing insights into successful strategies and approaches that can be adapted to our local context. Our project is underpinned even further by extensive research and evidence-based approaches derived from academic literature. These publications provide essential insights into the role and design of wildlife corridors, offering guidance on effective conservation strategies and mitigation measures. By drawing upon the findings and recommendations outlined in these papers, we ensure a comprehensive and informed approach to our project, maximizing its potential for success and impact.

In some cases, basing our work off of far flung examples and scientific research, may lead certain projects to become unrealistic. To avoid that we would like to clearly outline the objectives and actions that we plan to take, to make this project a reality.

Objective: Ensure legal protection or acquisition of crucial corridor areas.

Actions: Present our report to the Lake Country City Council, advocating for the inclusion of identified areas in Natural Environment Development Permit Areas (NEDPAs), stricter restrictions for NEDPAs and pushing for funds to acquire land.

Objective: Gain support and involvement of local landowners and the public in conservation efforts.

Actions: Develop educational materials, host workshops and events, implement a recognition program.

Objective: Develop a funding strategy and secure necessary resources.

Actions: Identify potential funding sources, prepare and submit funding applications, explore partnerships.

Objective: Move into the implementation phase and continuously adapt strategies.

Actions: Roll out habitat connectivity enhancements, establish monitoring programs, adapt strategies based on data and feedback.

So, consider these actions, and how you can contribute. Together, we stand at the threshold of a transformative journey towards habitat connectivity and ecological sustainability. This endeavor transcends mere conservation efforts; it embodies a holistic approach rooted in community engagement and collaboration. By fostering a deeper connection to nature, promoting social equity, and enhancing recreational opportunities, we aspire to create a more resilient, vibrant, and inclusive Lake Country. This path we tread is a corridor in itself—a conduit to a brighter, more sustainable future.

Problem Statement

The world we live in today is experiencing unprecedented change and uncertainty. Every day we face many challenges in our social environments,these are especially pressing when related to politics or the economy. This leads us to forget that we are even more vulnerable to the conditions of our physical environment (Singh, 2016). These two environments are inextricably linked, and we must carefully navigate how they influence each other. However, we as the human race need to heed these warnings; our growing population and globalization are leading to severe environmental issues due to uncontrolled urbanization, industrialization, deforestation, and loss of valuable agricultural land. These conditions have led to many globally recognized environmental problems, including pollution, global warming,

ozone depletion, acid rain, depletion of natural resources, deforestation and loss of biodiversity. These issues profoundly impact our physical environment, and we are just beginning to see the impacts on our health, as unsafe water, poor sanitation and hygiene conditions, air pollution and global climate change account for nearly a tenth of deaths and disease burden worldwide. There is nothing else to call this but a global environmental crisis. However, these environmental issues we have listed are complicated and wicked, and there is no easy solution to one, let alone all of them simultaneously.

Especially at the local scale, the most significant positive impact can be made when sustainability projects focus on addressing one of these myriad issues. The loss of biodiversity is one such area that can be targeted. The plants and animals that exist around us are closely tied to the cultures and societies that we exist in, and losses to the diversity of those species can go even further to influence ecosystem functions negatively, and have detrimental effects on the goods and services that those ecosystems provide (Cardinale et al. 2012). Biodiversity loss is a global issue that will profoundly affect ecosystems, economies, and human well-being (Butchart et al. 2010). Urbanization and agricultural expansion are the primary drivers in this decline. Cities, towns, and farms fragment habitats and disrupt vital wildlife corridors essential for species survival and ecological resilience as they expand into our natural areas. As we witness the unprecedented loss of species worldwide, addressing the root causes of habitat fragmentation and prioritizing measures to mitigate its impacts is imperative.

This issue is starkly evident at the local level here in the Okanagan. As of 2005, approximately 16.1% of all grassland habitat in BC were lost, but this effect is even more pronounced in the Okanagan where sub-regions have seen amounts of land conversion as high as 20-28% percent (COSEWIC, 2015). This issue of habitat fragmentation and loss gains importance when considering that the Okanagan already has the highest concentration of endangered and threatened species in BC (MoE, 1998). The delicate balance

of ecosystems in this region, already strained by human activity, faces an increasingly precarious future without strategic intervention.

Context

The District of Lake Country lies within the Okanagan and is renowned for its rich biodiversity and unique ecosystems, and it stands as a microcosm for this broader global challenge. Here, our lives are woven across a mosaic of habitats, from lush forests to arid grasslands, but it is not just us humans here. This land also supports various other species, from charismatic megafauna to imperceptible microorganisms. However, unchecked development threatens to sever the connections between habitat patches for these organisms, isolating populations and diminishing the resilience of these ecosystems in the face of climate change and other anthropogenic pressures.

The District of Lake Country has already taken some steps to consider this in its Official Community Plan (2018). The District participated in the Okanagan Connectivity Corridors Project in 2017 in partnership with the University of British Columbia Okanagan. They were able to map existing and potential wildlife corridors within the Okanagan Valley and identified a large corridor located along the eastern portions of Oyama and Winfield.

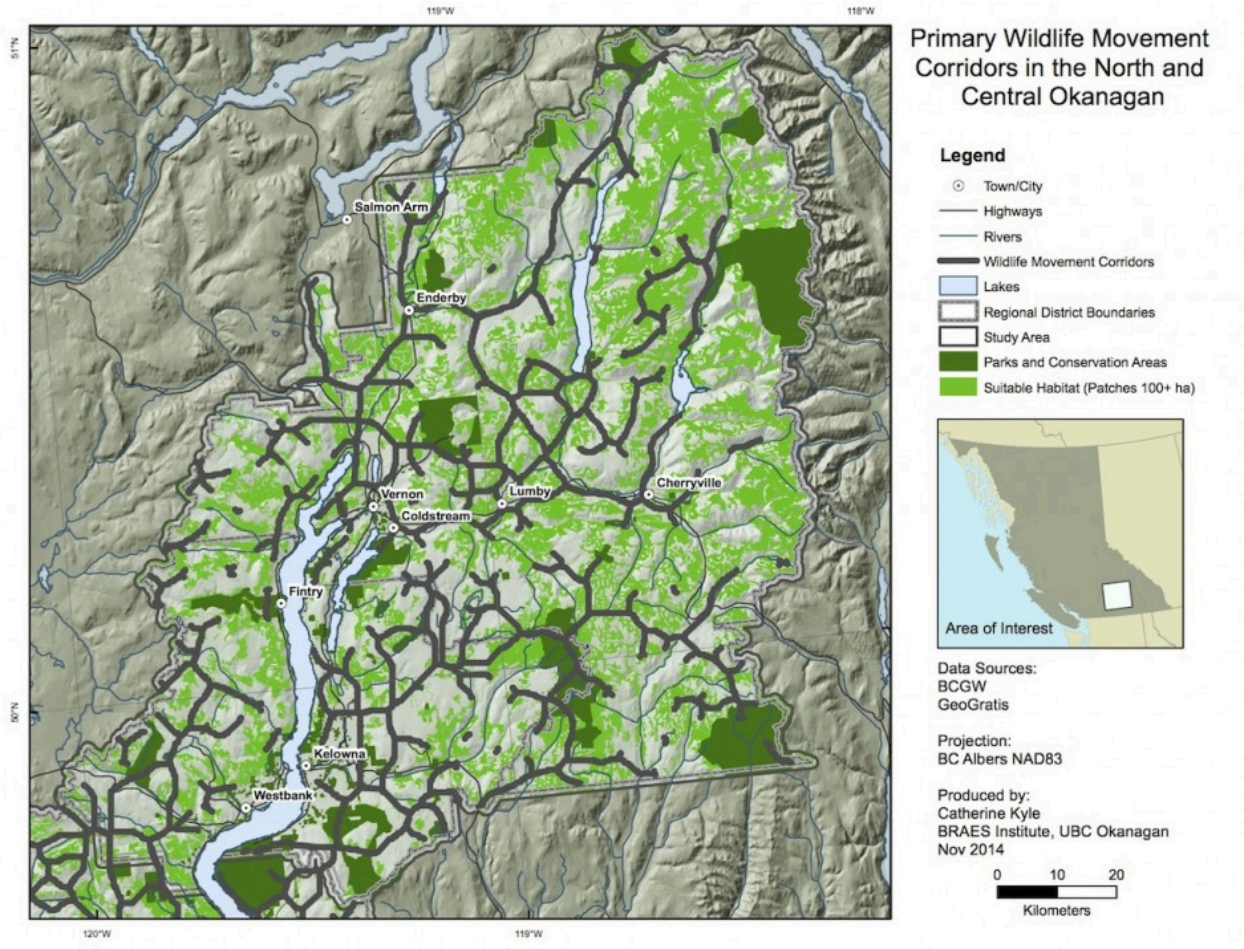


Figure 1. Map Showing the Primary Wildlife Movement Corridors in the North and Central Okanagan, as identified by the BRAES Institute, UBC Okanagan.

(https://complexity.ok.ubc.ca/2014/12/01/corridors-connecting-habitats-in-the-okanagan-valley/)

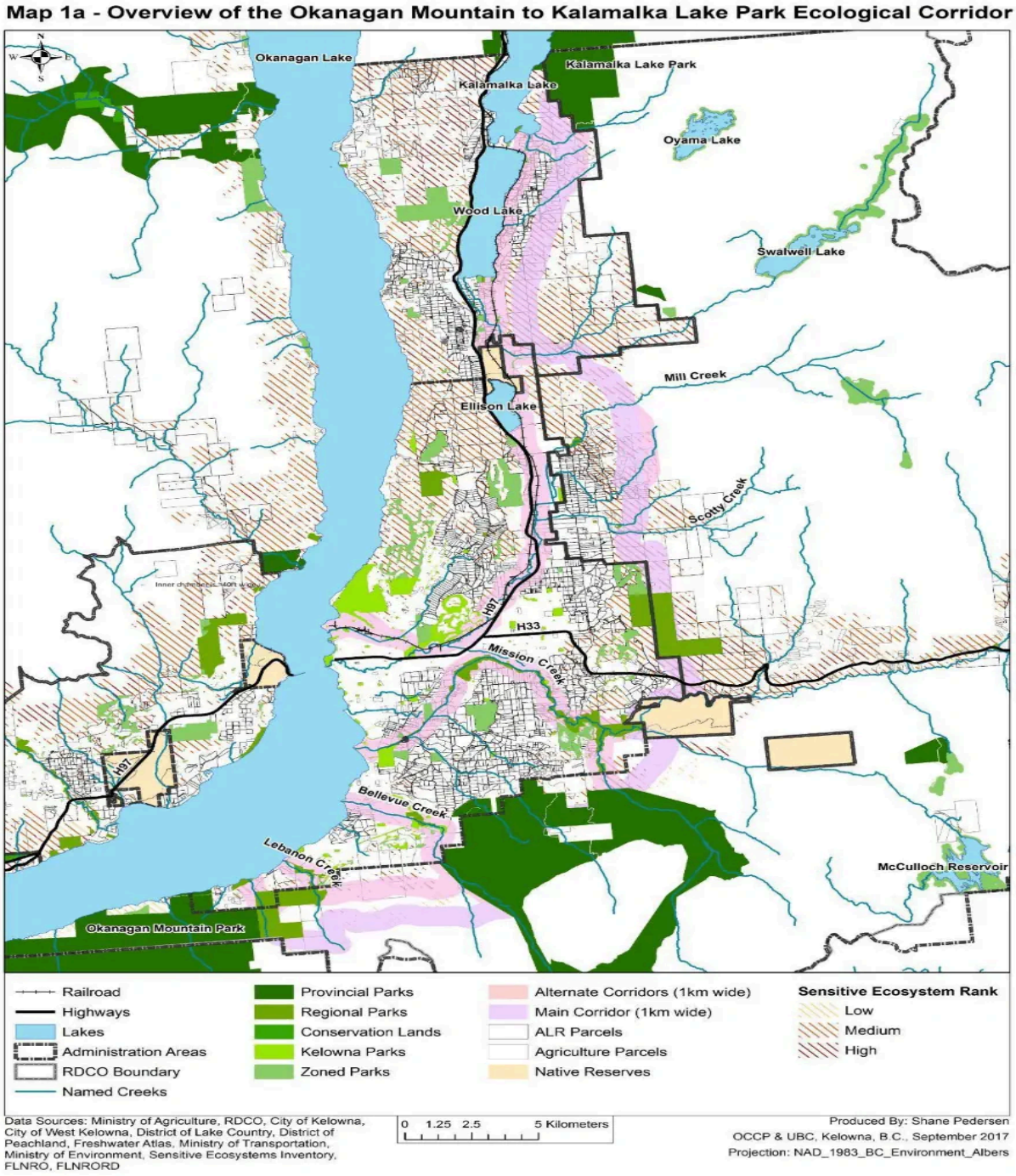


Figure 2. Map of the Planned Wildlife Corridor, which has been accepted by the Municipalities of Kelowna and Lake Country from the Okanagan Collaborative Conservation Program. (https://okcp.ca/projects/current-projects/548-ecosystem-connectivity-in-the-okanagan)

This corridor has been incorporated into the Lake Country community plan (District of Lake Country, 2018); a primary objective in that plan is to preserve this corridor via the following two policies:

I. Establish a Natural Environment Development Permit Area (NEDPA) to protect the Okanagan wildlife connectivity corridor extending through Lake Country on the hillsides east of Oyama and Winfield.

II. Discourage development or land uses that will hurt the Okanagan wildlife connectivity corridor.

In collaboration with the Okanagan Collaborative Conservation Program (OCCP), the District of Lake Country identified several tools that can be used to support this plan at the local government level (OCCP, 2021). To establish a supporting NEDPA, the government must update the official community plan. This update would also make improvements to the NEDPA to restrict developments in this area further, and include new provisions only to allow fencing which would not impede wildlife, require wildlife crossing structures for roads where needed, increase riparian setbacks, strengthen soil and tree removal bylaws, and increase the ease of conservation covenants. It also recognizes a few other tools that the District of Lake Country should consider promoting: ecological gifts (Federal tax incentive), outreach, and education.

While this is a significant first step, the District of Lake Country can go further to prioritize the preservation and enhancement of these critical pathways and become a leader in urban conservation in BC.

Solution

This project proposal seeks to outline a comprehensive strategy for increased wildlife corridor planning in the District of Lake Country, offering tangible solutions to address the pressing environmental concerns facing our community and beyond. Through collaborative efforts and informed decision-making, we can chart a course toward a more sustainable future where humans and wildlife can thrive harmoniously amidst the natural beauty of the Okanagan. This idea that corridors benefit wildlife and humans lies at the heart of our project.

We propose further integration of wildlife corridors into the District of Lake Country community planning. Using GIS mapping techniques, we have identified several candidate areas for further habitat connectivity. Our goals will include connecting smaller habitat patches to the more significant planned corridor between Oyama and Winfield.

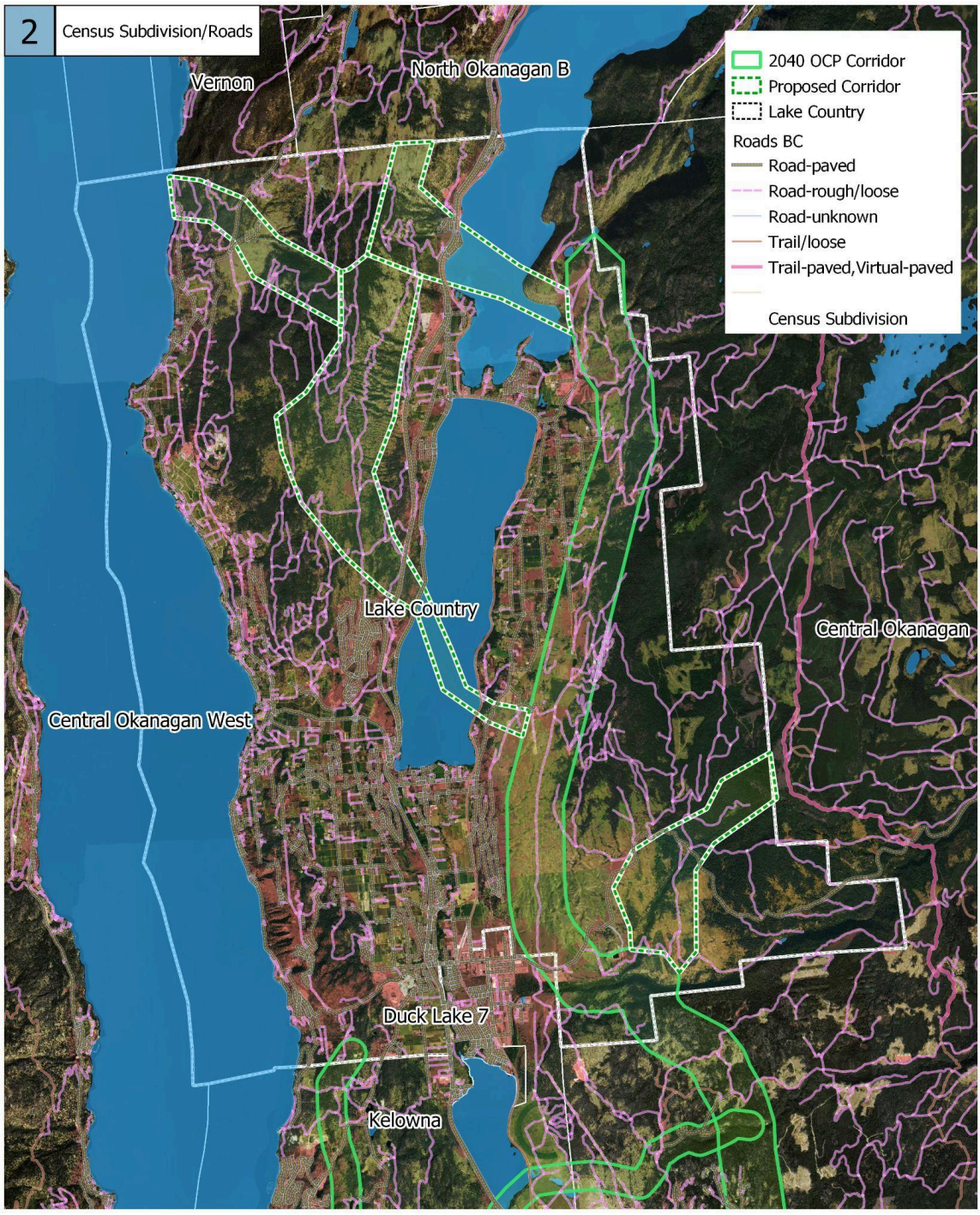


Figure 3. This District of Lake Country map shows the specific area that we would like to protect and preserve in this integrated Wildlife Corridor Project. The dotted green lines show our proposed area, and how it connects to the larger Oyama Winfield Corridor.

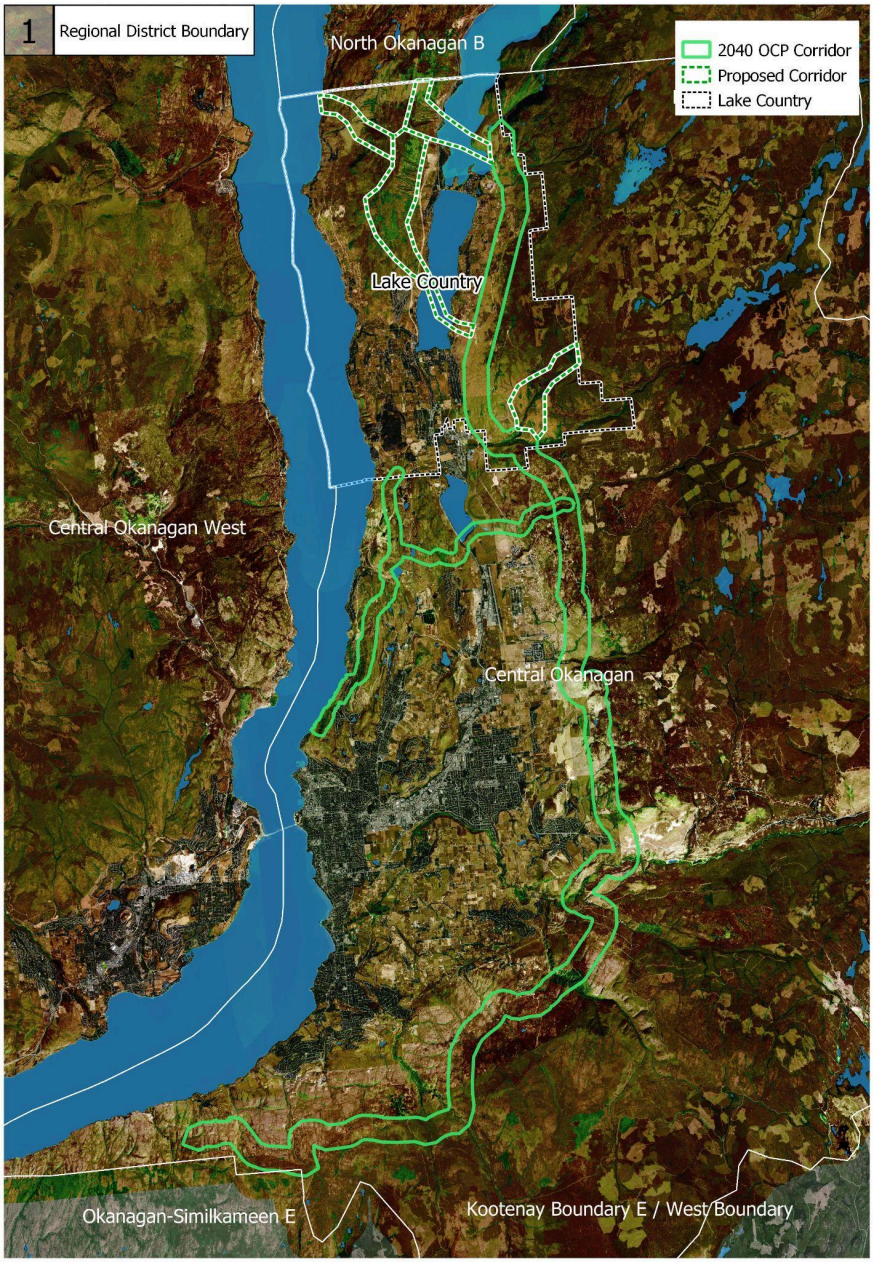


Figure 4. This map of the larger region showcases how the project would fit in the larger landscape of habitat connectivity in the Central Okanagan. Also note the City of Kelowna planned corridor which seeks to provide connectivity to the Knox Mountain area. Our project would perfectly mesh with these other plans, by connecting to the Spion Kopf area and Wood Lake.

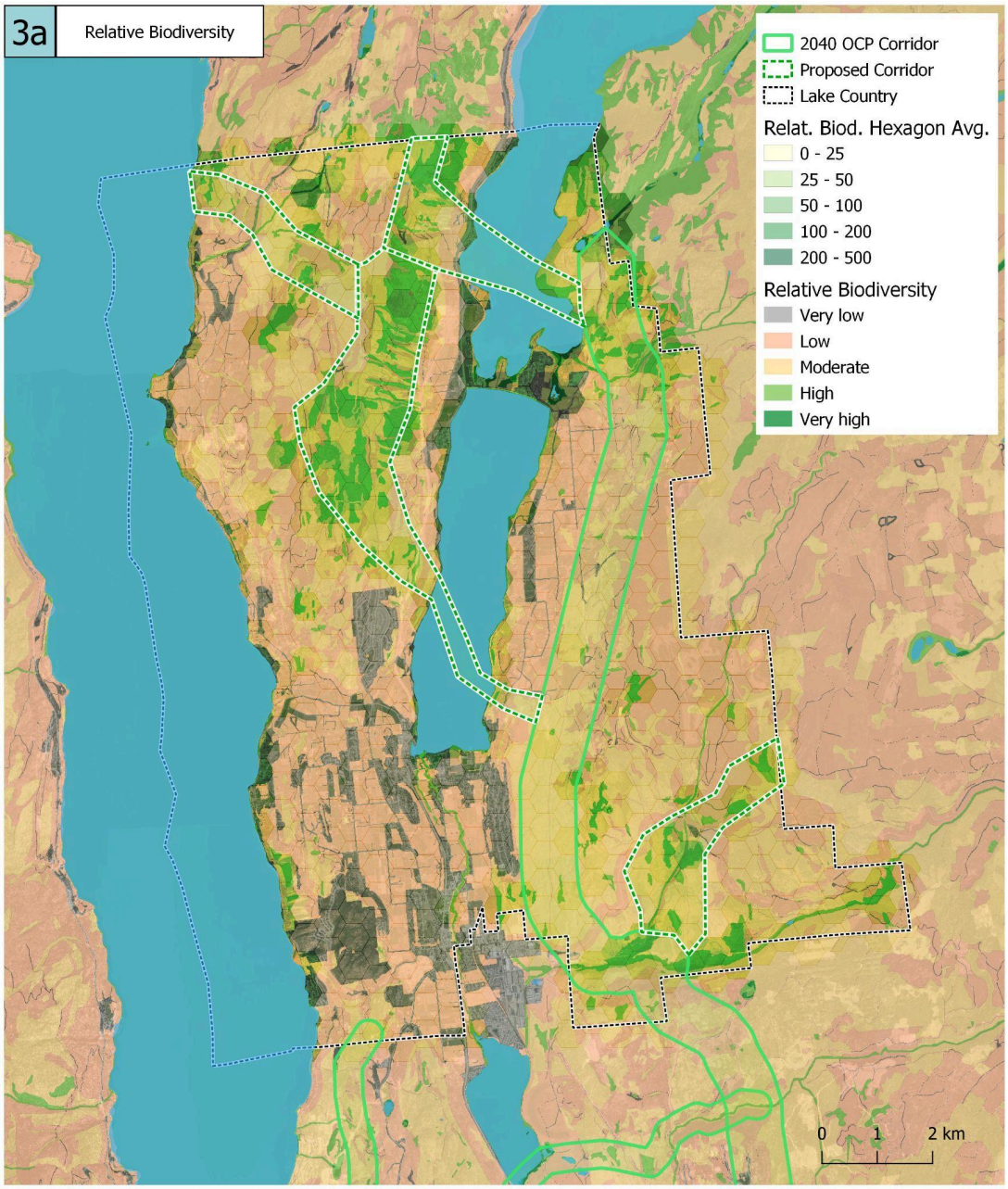


Figure 5. This map shows the relative biodiversity for the different areas in Lake Country. Relative Biodiversity is a way to measure the different number of species that are present in an area. We chose the area for our proposed corridors due to the relatively higher biodiversity in these areas, as denoted by the darker hues of green.

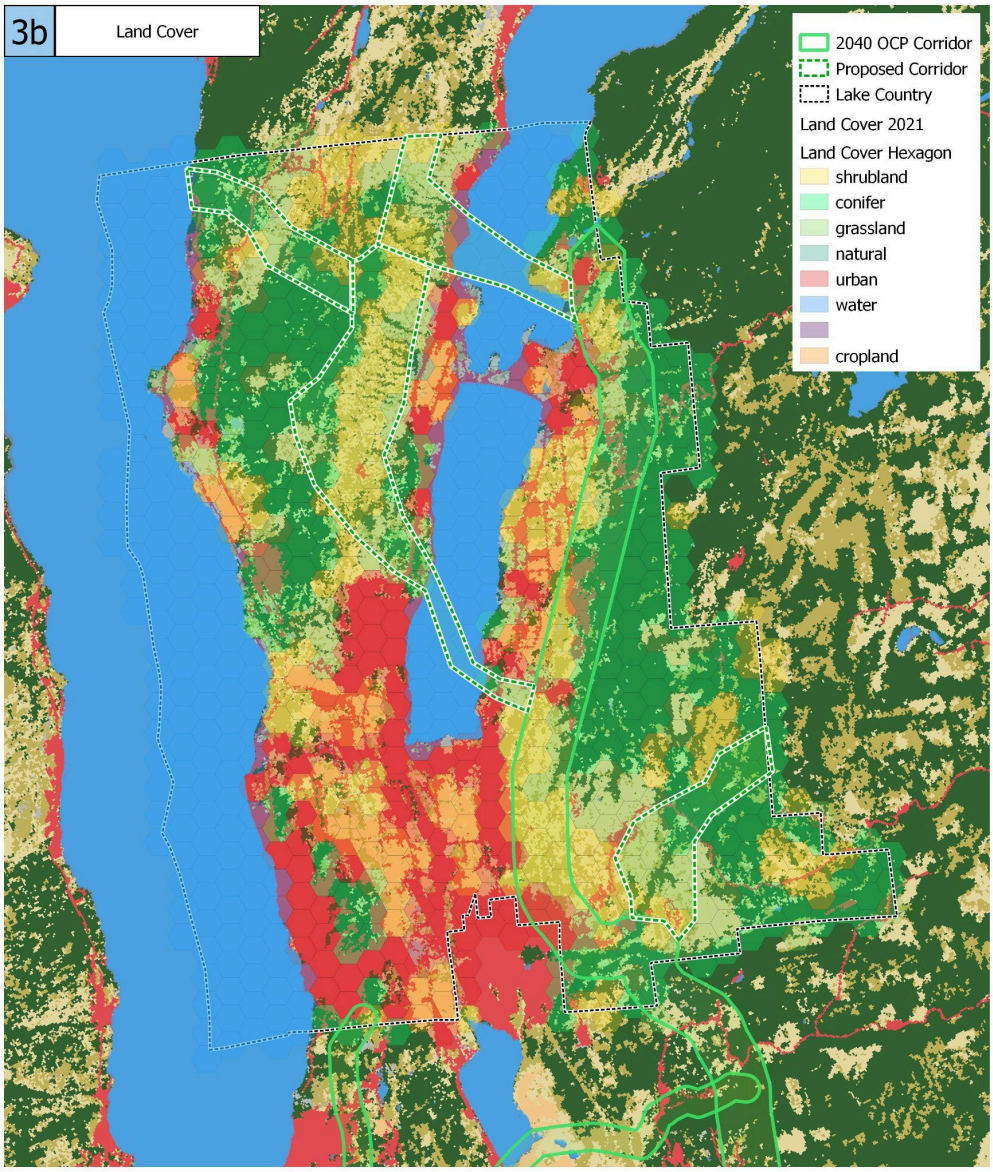


Figure 6. This map shows the existing land cover classification within Lake Country. In addition to the relative biodiversity, the corridor locations were chosen due to the ease of implementation given the current land use. Areas of red are already urbanized, and therefore poor candidates for our project. Hence, we have chosen areas that are still relatively undeveloped, so that planning can step in and set them aside for corridor use, before development occurs. The fact that these areas also hold more biodiversity makes these proposed corridors doubly effective.

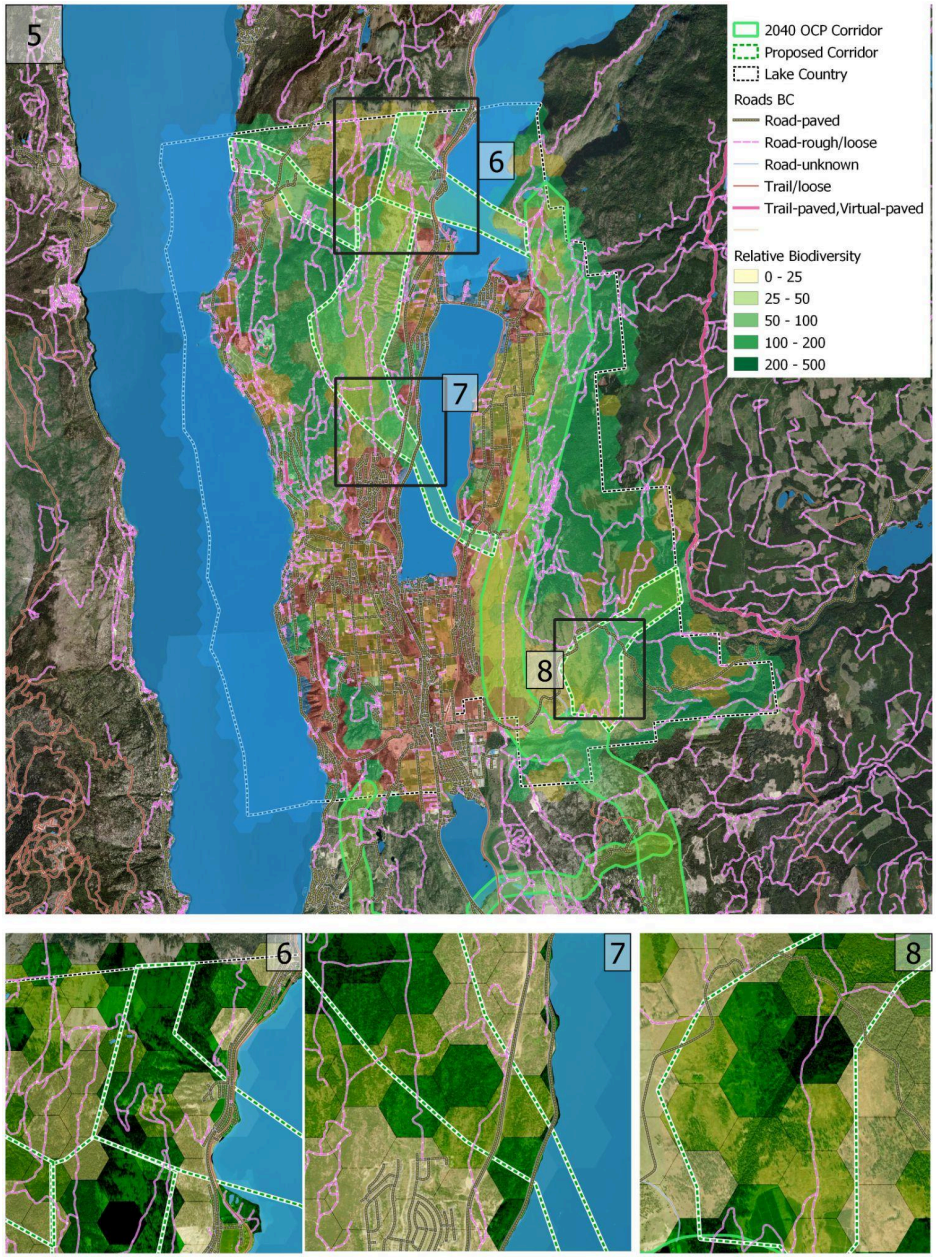


Figure 7. This map highlights 3 areas of concern within our planned corridor. These areas are of especially high biodiversity value, essential in establishing connectivity, and unfortunately interact with roadways. In these instances we would propose that certain wildlife crossings, and other mitigation measures such as fencing be installed to further facilitate wildlife movement through these areas.

Previously in this report we brought up Lake Countries plans to preserve the Winfield to Oyama corridor by:

I. Establishing a Natural Environment Development Permit Area (NEDPA) to protect the Okanagan wildlife connectivity corridor extending through Lake Country on the hillsides east of Oyama and Winfield.

II. Discouraging development or land uses that will hurt the Okanagan wildlife connectivity corridor.

Therefore we are proposing that these actions be expanded to cover our additional corridor area as well. With a community plan rewrite planned already, we can accomplish this with the support of the city council. To go even further, we hope that opportunities for land acquisition in our proposed corridor area are considered by local government and land trust partners, such as the Nature Trust or Central Okanagan Land Trust. However, acquiring 100% of the land in the proposed corridor area and protecting it will not be possible, or even feasible from a financial perspective.

Therefore we also aim to launch a Corridor Stewardship program, which could manifest in two different ways. Ideally, we could partner with a preexisting stewardship group such as the Okanagan-Similkameen Stewardship Society. We would collaborate to develop a corridor specific program related to Lake Country, however, a group like this may not have the capacity and funding necessary to take on this additional work. In that case, we would launch our own stewardship group, “Corridor Country”. In either case, the goal would be to reach private landowners who are in or adjacent to corridor areas and provide them with education, volunteer labor, and funding opportunities if they convert parts of their property to help aid in the overall goals of natural habitat preservation or restoration and corridor connectivity.

Finally, to ensure that our proposed corridors would be of value to both humans, and animals, we also hope to facilitate opportunities for park and trail development when possible. The correct circumstances

for this to occur will be variable, but as land is acquired or protected, we hope to allow public access and accommodations to promote recreation and active transportation in Lake Country.

This combination of actions would positively affect our native wildlife and plants by mitigating some of the adverse effects of habitat fragmentation, fostering biodiversity conservation, and ensuring our region's long-term ecological health and resilience.

In addition to these crucial services, there would be a myriad of benefits to the residents of Lake Country. By maintaining interconnected habitats and facilitating wildlife movement, these corridors provide essential ecosystem services such as pollination, pest control, drought tolerance and water purification. These services can be valued into the millions of dollars, especially when considering the importance of agriculture in the local economy, and the future impacts that climate change may have in this area.

Moreover, preserving wildlife corridors enhances opportunities for recreational activities such as hiking, birdwatching, and nature photography, enriching the quality of life for residents and attracting eco-tourists to the region.

Furthermore, intact ecosystems may contribute to mental and physical health, fostering a connection to nature and reducing stress levels. As opportunities for land acquisition and municipal park creation occur, these areas could even become community hubs, by offering opportunities for community gardens or other natural gathering spaces.

The corridors would also preserve Lake Country's proximity to nature, and the stunning natural viewscapes. For many, these characteristics are vital to the appeal and livability of this place they call home.

To speak to those of a more practical nature, all of these things are positively correlated to property prices; the proximity to green-space, ecosystem services, recreation and ecotourism opportunities, community

and well-being benefits, and the aesthetic values of our natural landscape. So while it may be true that setting aside land for corridor planning would limit development in some areas of Lake Country, this array of benefits would vastly outweigh this concession.

Thus, investing in wildlife corridor planning not only safeguards the natural heritage of Lake Country but also promotes sustainable development and enhances the overall resilience and livability of the community.

Key Actors

The key actors related to our project can be divided into several sectors to organize our analyses of their potential involvement and interest. Those sectors include Government, non-governmental organizations (NGO), and public actors. For each, we have considered how they might be involved in the consultation process surrounding our project, what concerns they might have, and what laws and regulations will need to be considered in those interactions.

Governmental Actors

The District of Lake Country Municipal Government

Consultation Process: This proposal, its fact sheet, and policy brief are in fact the first step in working with the District of Lake Country. However, further steps to make this project a reality will require further engagement with municipal officials through meetings, workshops, and public hearings to discuss project goals, strategies, and implementation plans.

Concerns: Municipal government may be concerned about the project's impact on local land use planning, zoning regulations, and infrastructure development. This is why we must establish a strong tie between

our project and the existing land use planning within the Lake Country Official Community Plan. They may also have concerns about funding, public support, and coordination with other government agencies.

Laws/Regulations: Municipal bylaws and development regulations will govern land use decisions within the district. Approval may be required for zoning changes, development permits, or municipal funding support. We have also pointed to Several policies within the Official Community Plan that support our project.

Local First Nations

Consultation Process: First Nations leaders and representatives should be given adequate time and space for input, to ensure that Indigenous rights, interests, and traditional knowledge are respected and integrated into project planning and decision-making.

Concerns: First Nations may have concerns about the project's impact on traditional territories, cultural resources, and Indigenous rights. They may also be interested in opportunities for meaningful participation, benefit-sharing, and co-management of natural resources.

*Laws/Regulation*s: Consultation and accommodation obligations towards Indigenous peoples are enshrined in Canadian law, including constitutional rights, court decisions, and specific agreements such as treaties and land claims settlements. It will also be important to respect the internal or unwritten laws that the community follows. Ideally, adequate consultation will also make us aware of these things.

BC Parks

Consultation Process: BC Parks officials have already been involved in corridor planning through formal meetings, joint planning sessions, workshops and site visits. However, we can leave space for them to continue doing this within our corridor side project within Lake Country, even if it does not use Park land.

This will strengthen the corridor project in its entirety and ensure that our project will align with those of the primary corridor.

Concerns: Our planned corridors will not utilize existing BC Parks land within the District of Lake Country. A zone of interest for them would be at the northern terminus of the planned corridor where it meets Kalamalka Lake Park, and the Campbell-Brown Ecological Reserve. Suppose habitat restoration or improvement efforts are needed at this nexus. In that case, BC Parks may have concerns about how that will impact protected areas, sensitive ecosystems, and recreational activities on their side of the boundary. They may also be interested in ensuring compliance with park regulations and policies as that work is conducted. While not a primary concern, it is something to keep in mind.

Laws/Regulations: Provincial legislation, such as the Park Act and Protected Areas of British Columbia Act, govern the management and use of provincial parks.

Various Other Government Agencies and Departments

Some other federal or provincial government agencies may have relative jurisdiction over different aspects of this project.

Federal

Environment and Climate Change Canada (ECCC):

- ECCC is responsible for protecting and conserving Canada's natural environment and addressing climate change. They may be involved in providing expertise on habitat conservation, species at risk, and environmental assessments for projects impacting federal lands or species under federal jurisdiction.

Fisheries and Oceans Canada (DFO):

- DFO is responsible for managing and conserving Canada's fisheries and aquatic habitats. Our project may include fish habitats, waterways, or marine ecosystems. DFO will be interested in this, particularly if the project involves water crossings or riparian areas.

Natural Resources Canada (NRCan):

- NRCan manages Canada's natural resources, including forests, minerals, and energy resources. Our project may cross lands with existing natural resource extraction plans. Collaboration with them may be required to amend the current forest management practices, renewable energy development, and land use planning in the affected area(s).

Indigenous Services Canada (ISC):

- ISC is responsible for Indigenous affairs and programs, including supporting Indigenous communities in land management, economic development, and environmental stewardship. Given the presence of local First Nations in the project area, ISC may play a role in facilitating consultation and collaboration with Indigenous communities.

Canadian Wildlife Service (CWS):

- CWS is part of Environment and Climate Change Canada and is responsible for wildlife conservation and habitat protection. They may help provide expertise on wildlife habitat connectivity, species at risk, and biodiversity conservation in our project area.

Provincial

Ministry of Environment and Climate Change Strategy (ENV):

- ENV is responsible for environmental stewardship, conservation, and sustainability in British Columbia. They may provide specific guidance on habitat conservation, species at risk, and environmental assessments for projects in the context of provincial lands and species under provincial jurisdiction.

Ministry of Forests

- The Ministry of Forests manages British Columbia's forests. They may provide expertise on forest management practices in the provincial context within the forested sections of the project area.

Ministry of Land, Water, and Resource Stewardship

- The Ministry of Water, Land, and Resource Stewardship is accountable for integrated land and natural resource management. It might be instrumental in providing expertise on habitat types other than forests and water bodies and in habitat restoration practices.

Ministry of Transportation and Infrastructure (MoTI):

- MoTI oversees transportation infrastructure, including highways, bridges, and public transit systems. If our project eventually tries to connect habitats spanning highway 97, the MoTI must be a primary collaborator in developing a highway crossing solution.

Ministry of Indigenous Relations and Reconciliation (IRR):

- IRR is responsible for Indigenous relations, treaty negotiations, and reconciliation efforts in British Columbia. Once again, given the presence of local First Nations in the project area, IRR may play a role in facilitating consultation and collaboration with the local Indigenous community.

Ministry of Agriculture, Food and Fisheries (AFF):

- AFF supports agricultural development, food security, and sustainable resource management in British Columbia. The primary corridor and our planned additional corridors may need to traverse land in the Agricultural Land Reserve (ALR). Therefore, it will be imperative to work with the AFF on agricultural land use, water management, and habitat conservation in these agricultural landscapes within the project area.

British Columbia Conservation Officer Service (COS):

- COS is responsible for enforcing wildlife and environmental protection laws, responding to wildlife conflicts, and conducting conservation initiatives. Since we plan on increasing habitat connectivity and encouraging wildlife to move through these more urban areas, having a close relationship with the COS will be critical. This will help us develop our project plans so that Conservation Officers can support them, and so potential conflict between people and wildlife can be reduced as much as possible.

Consultation Process: While there are many different groups involved, not all may need to be consulted at once. We should try to facilitate collaboration among these groups through inter-agency meetings, regulatory reviews, and collaborative planning processes. This will ensure transparency in our plans and

alignment with government policies and regulations. A close relationship with these agencies may also open up funding opportunities.

Concerns: Primarily, government agencies and departments may have concerns about jurisdictional issues, regulatory compliance, and resource availability. These are general issues, but again due to the vast number of agencies that may be involved, it is hard to narrow it down more. As interested or required agencies arise as collaborators, their unique concerns can be identified and addressed.

Laws/Regulations: These government agencies operate under different federal, provincial, and municipal laws and regulations governing their respective mandates, responsibilities, and decision-making processes. Therefore, depending on who rises as an interested or required collaborator, a diverse array of laws and regulations will need to be considered.

Utilities and Infrastructure Providers

Consultation Process: We must engage with utilities and infrastructure providers through joint project review sessions to assess potential impacts on utility infrastructure.

Concerns: Utilities and infrastructure providers may be concerned about project-induced disruptions to service delivery, infrastructure maintenance, and regulatory compliance. If interruptions or work are needed, they may be able to use these opportunities for infrastructure upgrades or green infrastructure investments.

Laws/Regulations: Utilities and infrastructure providers operate under federal, provincial, and municipal regulations governing their respective sectors, including environmental standards, utility easements, and infrastructure permitting processes. Depending on which utilities and infrastructure are impacted in the project area, a unique array of laws and regulations will need to be addressed.

Non-Governmental Organization Actors

Okanagan Collaborative Conservation Program (OCCP)

Consultation Process: We should consider the OCCP our closest ally in this project. The aim of our work is to directly compliment what they are doing with the main corridor. Therefore it will be imperative to work with them on strategy alignment, jointly planning stakeholder engagement, and helping each other with the integration of our projects into the greater regional conservation planning efforts.

Concerns: Primarily they would likely be concerned that our project aligns with their goals to support landscape-level connectivity, biodiversity conservation, and the resilience of local ecosystems to climate change. Another concern would be ensuring effective collaboration between our projects, but also among the various stakeholders and minimizing potential conflicts between conservation objectives and other land uses.

Laws/ Regulations: The work of the OCCP would be informed by various environmental protection and land use regulations at the federal, provincial, and municipal levels. Their involvement would help ensure that the project complies with relevant policies such as the BC Environmental Assessment Act and local land use plans. Due to their close collaboration with local first nations, they may also be concerned about how our project relates to traditional Syilx laws, and their regulations too.

Okanagan River Restoration Initiative (ORRI)

Consultation Process: The ORRI, with its focus on restoring and enhancing the Okanagan River and its habitat, could provide valuable insights into riverine ecosystem management and restoration techniques. Consultation could involve technical meetings, participation in environmental impact assessments, and

collaborative planning sessions to integrate river habitat connectivity into the broader wildlife corridor project.

Concerns: ORRI's primary concerns would likely center on ensuring that the habitat corridor project does not negatively impact aquatic ecosystems or hinder ongoing restoration efforts. They might be particularly focused on water quality, riparian habitat preservation, and the protection of aquatic species. They might also be concerned about ensuring that any interventions are based on sound ecological principles and contribute positively to the river's ecological integrity.

Laws/ Regulations: Activities impacting water bodies in the Okanagan would need to comply with federal and provincial regulations such as the Fisheries Act, Canadian Environmental Protection Act, and the BC Water Sustainability Act. We should also consider the siwłkʷ Water Declaration, as well as a form of Indigenous law. The ORRI's involvement would ensure adherence to these laws, focusing on aspects related to aquatic ecosystems and water resources.

Central Okanagan Land Trust

Consultation Process: Collaborate with land trust representatives through workshops, stakeholder meetings, and conservation planning sessions to identify priority areas for habitat conservation and corridor protection. If we can align our interests, they may be able to acquire lands that support our planned corridors and the OCCP main corridor.

Concerns: The land trust may have concerns about the availability of funding and resources for acquiring and managing any properties.

Laws/Regulations: Land trust acquisitions and activities may be governed by conservation easements, land acquisition agreements, and provincial legislation related to land conservation and stewardship.

Okanagan Similkameen Stewardship Society

Consultation Process: Engage with stewardship society members through workshops, field tours, and collaborative planning efforts to leverage their habitat restoration and wildlife monitoring expertise.

Concerns: The stewardship society may have worries about project funding, volunteer recruitment, and the long-term sustainability of our conservation initiative. This will all depend on how strong their interest is in the project, and how much of their time they would like to commit to helping or assisting.

Laws/Regulations: The society's activities are guided by its own organizational bylaws, funding agreements, and regulatory requirements for environmental stewardship and conservation.

Public Actors

The Residents of Lake Country

Consultation Process: We should conduct public outreach and engagement activities such as surveys, town hall meetings, and community forums to gather input, address concerns, and build support for the project.

Concerns: Residents may be concerned about how the project will affect their property values, quality of life, access to recreational areas, and overall community identity. They may also want to ensure that their voices are heard in the decision-making process.

Laws/Regulations: Municipal policies and provincial legislation related to community engagement and consultation may govern public consultation and engagement processes.

Local Businesses and Industry Groups

Consultation Process: We could engage with business owners and industry representatives through stakeholder meetings, industry roundtables, and business association partnerships to discuss potential project impacts, opportunities for collaboration, and economic considerations.

Concerns: Local businesses and industry groups may have concerns about how the project will affect their operations, profitability, and properties. They may also be interested in exploring opportunities for sustainable business practices, eco-tourism initiatives, and corporate social responsibility partnerships.

Laws/Regulations: Depending on the industry sector and how their business is related to specific project goals, they may need to comply with various federal, provincial, and municipal regulations related to environmental protection, land use planning, and business licensing.

Recreational User Groups

Consultation Process: We could recruit support, and consult with recreational user groups through surveys, focus groups, and public forums to understand their needs, preferences, and concerns regarding habitat connectivity, wildlife corridors, and their access to these natural areas.

Concerns: Recreational user groups may have concerns about access restrictions, trail closures, and changes to recreational amenities. They may also be interested in ensuring that the project considers the needs of diverse user groups and maintains recreational opportunities.

Laws/Regulations: Provincial legislation, municipal bylaws, and park regulations may regulate recreational activities such as trail use, which should be considered alongside our wildlife corridors.

Educational Institutions (UBCO, Okanagan College)

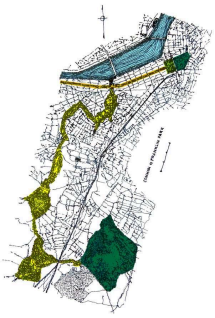
Consultation Process: When possible we should try to collaborate with academic institutions through research partnerships, student internships, and curriculum integration to leverage their expertise in ecological research, environmental education, and community outreach.

Concerns: Educational institutions may have concerns about resource constraints, institutional priorities, and alignment with academic goals. They may also be interested in opportunities for student engagement, experiential learning, and knowledge exchange.

Laws/Regulations: Educational institutions operate under provincial legislation and academic governance structures governing research ethics, intellectual property rights, and student privacy.

Relevant Examples

What we are proposing to do here, is not necessarily groundbreaking. Consider these examples to be inspirational and perhaps comforting, by seeing that other cities or areas have been able implement projects alike to what we are proposing. These concepts are not even necessarily contemporary.



The Emerald Necklace in Boston, an early example of urban wildlife corridors, was designed by Frederick Law Olmsted in the 19th century. It's a network of parks and green spaces that connects

neighborhoods across several miles, offering a green retreat from urban life. In the 1870s, as Boston grappled with the challenges of rapid industrialization and overcrowding, the city council initiated a park system to provide residents with natural spaces. Olmsted, known as the "Father of Landscape Architecture" in the U.S., aimed to improve urban residents' well-being through access to green spaces. His design, the Emerald Necklace, encircles the city, linking parks like the Boston Common, Public Garden, Commonwealth Avenue Mall, and Franklin Park. These areas serve not only as recreational spaces for the community but also as crucial habitats and migration paths for wildlife, incorporating woodlands, meadows, ponds, and wetlands. This system supports diverse species, demonstrating the value of integrating biodiversity and sustainability into urban planning.





Curitiba, in southern Brazil, has been leading in urban sustainability since the 1970s, notably through its urban wildlife corridors to conserve biodiversity. The city has adopted an afforestation plan, prioritizing native species like the ipê tree for roadside planting and larger trees for parks, enhancing green cover essential for these corridors. Additionally, Curitiba has created ten 'mini-forests' to connect larger green spaces, and its urban development policies promote public transport and an ecological corridor,

facilitating wildlife movement and preserving biodiversity. These measures, alongside environmentally friendly flood management practices, exemplify how urban areas can integrate development with biodiversity conservation, serving as a model for cities globally.

The project "Design Tactics for Climate-Based Migration in Biodiversity Corridors" explores strategies to conserve biodiversity through corridor design, focusing on helping species move in response to climate change (NCSU, 2023). Being carried out in the Bladen Lakes area of North Carolina, it plans to develop a scalable framework for planning corridors to reduce biodiversity loss. By using landscape ecology principles and context-sensitive tactics, the project aims to increase landscape diversity, connectivity, and resilience against climate challenges like habitat shifts, invasive species, and wildfires. The Bladen Lakes area, part of the Coastal Plain, is vital as a biodiversity hotspot. Collaborative, site-specific design processes are emphasized to address the biodiversity crisis and promote climate adaptation.

The design tactics are grouped into two main concepts: protecting a variety of species and ensuring they can move and migrate. Supporting strategies include diversifying landscapes, improving local connections, and minimizing anthropogenic resistance. Forty-five tactics were sorted into twelve approaches and applied across various land types in the Bladen Lakes area: managed, agricultural, developed, interstitial, and priority connection areas. Given its touristy atmosphere, especially in the summer, this city provides a good comparison with Lake Country. Due to these similarities and the relevance of changing environmental conditions here in the Okanagan, we have incorporated many of these values and approaches into the design of our work.

Perhaps the most well researched example is detailed in the paper “Urban Wildlife Corridors: Building Bridges for Wildlife and People” (Zellmer and Goto, 2022). It is more contemporary in context, and the best comparison point for our planned corridors in Lake Country. Urban wildlife conservation is

imperative in biodiversity-rich regions. Wildlife corridors play a crucial role in mitigating the adverse impacts of urbanization on wildlife populations. The Rim of the Valley Corridor in Los Angeles is a practical example of the successful application of wildlife corridors in urban settings.

Urban wildlife corridors are essential in facilitating habitat connectivity for wildlife amidst urban sprawl. The challenges faced in urban wildlife conservation include land use conflicts, social barriers, and political complexities. However, they offer significant opportunities such as public engagement and interdisciplinary collaboration. The Rim of the Valley Corridor and the Liberty Canyon Wildlife Crossing are case studies highlighting their goals, strategies, and outcomes.

In Los Angeles, the collaborative efforts between Arroyos & Foothills Conservancy and Occidental College have been instrumental in studying, monitoring, and restoring urban wildlife corridors. Remote-triggered camera traps and community science observations are employed to identify critical wildlife passage areas. Backyard restoration and native plant distribution are advocated to enhance habitat quality and engage local communities in wildlife conservation efforts.

The article emphasizes the importance of outreach and education in fostering community involvement and shifting attitudes toward wildlife coexistence. By building bridges between stakeholders, urban wildlife corridors offer a promising solution to address the challenges of urbanization while promoting biodiversity conservation and human well-being. Invest in wildlife corridors and conserve the beauty of nature for future generations. This case supports our conclusion that we need a multi-faceted approach, especially in relation to the development of a corridor specific stewardship program.

Relevant Literature

In addition to these examples, it is also essential to know that our project is backed by significant research and an evidence based approach. The following list has essential facts and examples related to wildlife corridors from the publications found in academic paper database searches. These papers served to inform and guide our project, and showcase the depth and detail that we have put into our proposal.

Aziz and Rasidi. 2014. The Role of Green Corridors for Wildlife Conservation in Urban Landscape: A Literature Review. IOP Conf. Ser.: Earth Environ. Sci. 18 012093.
https://iopscience.iop.org/article/10.1088/1755-1315/18/1/012093/meta

This review article examines green corridors as a solution to the negative effects of urban development on wildlife, particularly focusing on their role in Malaysia. It defines green corridors as networks that facilitate natural movement for wildlife, people, seeds, and water, offering ecological, recreational, cultural, and aesthetic benefits. The study highlights three key factors affecting urban wildlife dispersal: individual characteristics and species preferences, human interactions and exposure to predators, and the physical design and quality of green corridors.

Wildlife dispersal behaviors are categorized into three types: direct long-distance movement, periodic movement with pauses, and gene flow through reproduction within the corridor, with the latter deemed the most effective for population colonization. For successful wildlife colonization, corridors must provide essential resources like food, cover, water, and space, and protect animals from predators.

Urban wildlife colonization involves stages of arrival, adjustment, and spread within urban environments, influenced by habitat availability, ecological interactions, and environmental compatibility. The article

discusses habitat and corridor quality, suggesting that successful colonization depends on matching the needs of wildlife with the corridor's offerings. It concludes that without meeting the needs of species requiring extensive habitat and having low dispersal abilities, corridors may inadvertently support the spread of pests and weeds, posing risks to biodiversity.

Ramiadantsoa, Tanjona, Otso Ovaskainen, Joel Rybicki, and Ilkka Hanski. "Large-Scale Habitat Corridors for Biodiversity Conservation: A Forest Corridor in Madagascar." *PLOS ONE* 10, no. 7 (July 22, 2015): e0132126. https://doi.org/10.1371/journal.pone.0132126.

The study examines a 95-km long forest corridor connecting two national parks in Madagascar. It emphasizes the importance of corridors in enhancing biodiversity conservation by providing connectivity for otherwise isolated populations. The corridor hosts a similar range of species as the national parks, indicating its effectiveness in supporting diverse communities. This reflects the corridor's adequate width, comparable to the parks.

The research includes a simulation model predicting the impact of corridor destruction. It suggests that long-distance passive dispersers are most affected, with a significant decrease in gene flow expected after 2040, leading to increased isolation. The findings highlight the urgency of implementing conservation measures to prevent ongoing deforestation. Maintaining the corridor's integrity is crucial for supporting viable populations and ensuring long-term biodiversity.

Dixon, Mark D. "Corridor Ecology: The Science and Practice of Linking Landscapes for Biodiversity Conservation." *The Condor* 109, no. 3 (August 1, 2007): 715–16. https://doi.org/10.1093/condor/109.3.715.

The book discusses the increasing fragmentation of natural habitats and species populations due to human land use change. It emphasizes the importance of conserving or restoring landscape connectivity, with corridors being a tool for achieving ecological connectivity at various scales. The authors highlight that effective corridors are defined by their function, such as facilitating organism movement, rather than their structure3. They can be continuous linear features or discontinuous features like 'stepping stone' habitats or key migratory stopover points.

Practical guidelines for corridor design are provided, including defining spatial and temporal scales about conservation goals, choosing focal taxa for corridor design, and considering the effects of corridor dimensions and continuity on function. The book offers strategies for implementing habitat conservation projects and corridors, focusing on tools for achieving conservation on private lands, such as easements and other conservation agreements.

Dennis, Roger L. H., Leonardo Dapporto, John W. Dover, and Tim G. Shreeve. "Corridors and Barriers in Biodiversity Conservation: A Novel Resource-Based Habitat Perspective for Butterflies." *Biodiversity and Conservation* 22, no. 12 (November 1, 2013): 2709–34. https://doi.org/10.1007/s10531-013-0540-2.

The article highlights that habitat loss and fragmentation, often worsened by climate change, pose significant threats to global biodiversity. It emphasizes the importance of connectivity in maintaining diversity, as habitat fragmentation can exceed species' dispersal capacities. The concept of corridors is often advocated without a detailed understanding of species' habitats. The review proposes a functional definition of corridors to emphasize connectivity rather than ad hoc structures.

The text draws attention to the different connectivity needs of generalist and specialist organisms. Generalists may benefit from habitat and resource stepping stones, while specialists might require

short-range habitat corridors. The review suggests that connectivity over extensive areas is crucial for moderate generalists. Emphasis on space-time resource heterogeneity and landscape features is necessary to develop conditions and resources that enhance diversity.

Juffe-Bignoli, Diego, Neil D. Burgess, Jonathan Hobbs, Robert J. Smith, Christine Tam, Jessica P. R. Thorn, and Joseph W. Bull. "Mitigating the Impacts of Development Corridors on Biodiversity: A Global Review." *Frontiers in Ecology and Evolution* 9 (July 26, 2021). https://doi.org/10.3389/fevo.2021.683949.

The article discusses the phenomenon of extensive development corridors, often transnational areas targeted for investment to achieve sustainable development. These corridors typically involve the creation of both hard infrastructure (physical structures) and soft infrastructure (policies, plans, and programs) and are a significant driver of habitat loss globally. The review found that out of 271 publications on development corridors, only 100 assessed impacts on biodiversity and a mere seven on ecosystem services. This indicates a need for comprehensive mitigation of biodiversity impacts in the academic literature on corridors.

The article emphasizes the importance of the mitigation hierarchy in biodiversity impact mitigation, which includes avoidance, minimization, restoration, and ecological compensation. However, it notes that the literature scant mentions restoration or ecological compensation, illustrating a deficient application of the mitigation hierarchy. The authors suggest that impact assessment research needs to acknowledge the complexity of multi-project and multi-stakeholder initiatives. They recommend quantifying biodiversity losses due to direct, indirect, and cumulative impacts and following all the steps of the mitigation hierarchy to improve biodiversity outcomes.

Wilson, Maxwell C., Xiao-Yong Chen, Richard T. Corlett, Raphael K. Didham, Ping Ding, Robert D. Holt, Marcel Holyoak, et al. “Habitat Fragmentation and Biodiversity Conservation: Key Findings and Future Challenges.” *Landscape Ecology* 31, no. 2 (February 1, 2016): 219–27. https://link.springer.com/article/10.1007/s10980-015-0312-3 .

The article highlights that habitat loss and fragmentation are major causes of biodiversity decline and ecosystem degradation. It emphasizes the importance of understanding the causes and consequences of habitat fragmentation to preserve biodiversity and ecosystem functioning. An International Workshop on Habitat Fragmentation and Biodiversity Conservation discussed threats to biodiversity in fragmented Landscapes. The workshop aimed to synthesize key findings, identify research questions and examine the role of field-based fragmentation experiments in conservation biology.

The text outlines three mechanisms that mediate the ecological consequences of fragmentation: direct effects of habitat area loss, changes in landscape spatial configuration, and indirect or interaction effects. It suggests that newer research indicates indirect and interaction effects may be significant drivers of ecological changes. The authors mention several field-based fragmentation experiments, such as the Biological Dynamics of Forest Fragments Project in Brazil, which have provided valuable insights into the effects of habitat fragmentation on biodiversity and ecosystem processes. These experiments are crucial for advancing our understanding of landscape ecology and informing conservation efforts.

Damschen, Ellen I., Lars A. Brudvig, Melissa A. Burt, Robert J. Fletcher, Nick M. Haddad, Douglas J. Levey, John L. Orrock, Julian Resasco, and Joshua J. Tewksbury. “Ongoing Accumulation of Plant Diversity through Habitat Connectivity in an 18-Year Experiment.” *Science* 365, no. 6460 (September 27, 2019): 1478–80. https://doi.org/10.1126/science.aax8992.

The study demonstrates that habitat connectivity can significantly reduce biodiversity loss in fragmented ecosystems. By connecting habitat patches with corridors, the likelihood of plant extinction in patches decreased by about 2% per year, while the probability of colonization increased by about 5% per year. Throughout an 18-year experiment in a pine savanna system, connected patches showed an asymptotic increase in diversity. By the end of the monitoring period, connected patches had 14% more species than unconnected patches, underscoring the long-term value of habitat connectivity for conserving biodiversity.

The experiment revealed that annual colonization rates for 239 plant species were 5% higher in connected fragments, and annual extinction rates were 2% lower than in unconnected pieces. This resulted in a steady increase in diversity, with connected fragments accumulating nearly 14% more species after almost two decades. The findings suggest restoring habitat connectivity is a powerful conservation technique. The full biodiversity value of connectivity is much greater than previously estimated and cannot be effectively evaluated at short time scales. Therefore, connecting habitats sooner rather than later can maximize conservation benefits.

Parks Canada Agency, Government of Canada. “Criteria for Ecological Corridors - Criteria for Ecological Corridors in Canada,” December 22, 2023. https://parks.canada.ca/nature/science/conservation/corridors-ecologiques-ecological-corridors/criteres-criteria.

Parks Canada initiated the National Program for Ecological Corridors in April 2022 to establish connections between protected areas and other natural habitats. These connections, known as ecological corridors, enable species to move, interact, and access food and habitat, crucial for biodiversity conservation and climate change adaptation. The program is developing criteria to identify and map

priority areas for ecological corridors. A collaborative process involving experts, Indigenous partners, governments, and stakeholders is underway to create a shared understanding of environmental corridors and to inform decisions on their support and creation.

Ecological corridors are geographical spaces that maintain or restore environmental connectivity while respecting Indigenous stewardship values. They are not protected areas themselves but are part of a more extensive network that includes Protected Areas (PAs), Indigenous Protected and Conserved Areas (IPCAs), and Other Effective area-based Conservation Measures (OECMs). Parks Canada has been funding pilot corridor projects and plans to allocate additional funds for Indigenous-led projects and jurisdictions with corridor projects identified in Nature Agreements. The funding framework for ecological corridor projects will be finalized for 2024 and 2025.

Clark, Tanya, Tara Rava Zolnikov, and Frances Furio. “Wildlife Corridors.” In *The Palgrave Encyclopedia of Urban and Regional Futures*, edited by Robert C. Brears, 2276–79. Cham: Springer International Publishing, 2022. https://doi.org/10.1007/978-3-030-87745-3_32.

Urban wildlife corridors are essential for maintaining biodiversity in areas affected by urbanization. They connect fragmented habitats, allowing species to carry out life-sustaining activities such as mating, foraging, and migration. These corridors can be land-based or water-based and vary in size to accommodate different species. The expansion of urban areas poses a significant threat to native wildlife by disrupting natural habitats. This can lead to species endangerment or even extinction. Maintaining connectivity through wildlife corridors is crucial for species survival, as it enables movement and genetic diversity.

Notable wildlife corridors include the overpasses and underpasses built across the Trans-Canada Highway in Banff Park to prevent wildlife fatalities. The Eco-Link bridge connects two nature reserves in Singapore over a busy freeway. Additionally, a crab bridge in Australia facilitates the migration of millions of crabs. Biodiversity is vital for ecosystem stability and productivity. The rapid urbanization expected by 2030 will significantly impact wildlife habitats and biodiversity. Implementing wildlife corridors is a proactive measure to protect biodiversity and, by extension, the quality of human life.

Canada, Parks. "Government of Canada Launches New National Program for Ecological Corridors." News releases, April 21, 2022. https://www.canada.ca/en/parks-canada/news/2022/04/government-of-canada-launches-new-national-program-for-ecological-corridors.html.

The Honourable Steven Guilbeault, Minister of Environment and Climate Change, announced the launch of the National Program for Ecological Corridors. This program, led by Parks Canada, is backed by an investment of $60.6 million over five years to enhance ecological connections between protected areas. Biodiversity Conservation: Ecological corridors are essential for biodiversity conservation, allowing species to move, interact, and find habitat across large landscapes. Examples include the Cootes to Escarpment EcoPark System in Ontario and Kootenay Connect in British Columbia, which are crucial for species like Blanding's turtles and grizzly bears.

The program will involve collaboration with various levels of government, Indigenous partners, experts, and stakeholders. It aims to develop criteria and map areas for corridors that will have the most positive impact on biodiversity conservation in Canada. Complementary Initiatives: The National Program for Ecological Corridors complements other initiatives like the National Urban Parks Program. It supports conserving 25% of Canada's lands, freshwater, and oceans by 2025 and 30% by 2030 to promote biodiversity and climate change adaptation.

Heller, Nicole E., and Erika S. Zavaleta. “Biodiversity Management in the Face of Climate Change: A Review of 22 Years of Recommendations.” *Biological Conservation* 142, no. 1 (January 2009): 14–32. https://doi.org/10.1016/j.biocon.2008.10.006.

The introduction highlights the challenges climate change poses to biodiversity conservation, with species ranges and ecological dynamics already responding to recent climate shifts. It emphasizes the need for adaptive strategies as current reserves may only support some species they were designed to protect. The abstract mentions the systematic review of the literature over 22 years, identifying consistent recommendations for adaptation at various spatial scales. It calls for improved regional institutional coordination, expanded spatial and temporal perspective, and incorporating climate change scenarios into planning and action.

The regional policy and planning section discusses integrating species protection plans and natural resource management across more expansive geographic areas. Long-term, regional perspectives and improved coordination among diverse actors are crucial for effective biodiversity conservation. The site-scale action section validates land managers' efforts in maintaining ecosystem functioning and mitigating threats like invasive species and pollution. It also acknowledges the “business as usual” approach while stressing the need for additional measures to address climate change's impacts on biodiversity.

Hess, George R., and Richard A. Fischer. “Communicating Clearly about Conservation Corridors.” *Landscape and Urban Planning* 55, no. 3 (July 2001): 195–208. https://doi.org/10.1016/S0169-2046(01)00155-4.

Corridor Functions The term ‘corridor’ is used in various ways, often without explicit definition. Corridors serve multiple ecological functions such as habitat, conduit, filter, barrier, source, and sink.

These functions are widely recognized and adopted by disciplines like conservation biology, wildlife management, landscape ecology, and landscape planning.

Structural vs. Functional Aspects The structural aspect of a corridor refers to its physical characteristics, such as length and width. On the other hand, the functional element relates to its ecological roles, like facilitating animal movement or serving as a habitat. It's important to differentiate between these two to design effective corridors.

Design and Management Proper corridor design and management are crucial. They must be created with clear and explicit statements of their intended functions. With well-defined functions, the outcomes may be satisfactory and beneficial. Design criteria should focus on ensuring corridors function as intended.

History and Definitions The concept of corridors has evolved, particularly within game management and conservation biology. Various definitions and uses have been cataloged, highlighting the complexity and the need for clear communication about the goals and functions of wildlife corridors.

"Aquatic Report Catalogue." Accessed March 24, 2024. https://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=42389.

We used spatial data from this page for the biodiversity map. The page discusses the collaborative efforts of the South Okanagan Similkameen Conservation Program (SOSCP) and the Okanagan Collaborative Conservation Program (OCCP) in developing biodiversity conservation strategies for the Okanagan Region. It outlines a holistic approach that includes analyses, key findings, and strategic directions for biodiversity conservation that incorporate all three regional districts (RDOS, RDCO, and RDNO) and their member municipalities.

One of the leading products of this effort is the creation of maps that assess the status of nature in the region, including identifying important links between natural areas, which are essential for maintaining wildlife corridors. Supporting Documents: Additional companion documents are provided, such as the guide “Designing and Implementing Ecosystem Connectivity in the Okanagan” and case studies from North and Central Okanagan, which support the overarching Biodiversity Conservation Strategy for the region. These resources offer practical examples and guidance on establishing and managing wildlife corridors.

Ecosystem Connectivity in the Okanagan. Accessed March 25, 2024. https://okcp.ca/index.php/projects/current-projects/548-ecosystem-connectivity-in-the-okanagan.

The project united stakeholders, including local and provincial governments, conservation organizations, industry, and the Okanagan Nation Alliance, to protect Central Okanagan's vital ecological wildlife corridor. This 65km by 1km corridor connects Okanagan Mountain Provincial Park to Kalamalka Lake Provincial Park, ensuring wildlife movement across grassland and ponderosa pine ecosystems. The Okanagan Nation Alliance contributed valuable knowledge through interviews with Westbank First Nation and Okanagan Indian Band members. These interviews provided insights into wildlife movement and traditional gathering areas, reflecting changes over thousands of years and emphasizing the importance of preserving these lands.

A Habitat Connectivity Action Plan was proposed, outlining 20 actions to connect and protect wildlife, habitats, and biodiversity between the two provincial parks. This plan aims to facilitate wildlife migration, enhance genetic diversity, boost ecosystem resilience, and support species adaptation to climate change. The project aligns with the Regional District of the Central Okanagan’s initiative for ecosystem connectivity. It connects with more significant conservation efforts like the Yellowstone to Yukon Conservation Initiative and Conservation Northwest’s Sagelands Heritage Program. It underscores the

significance of interconnected habitats for species survival and the benefits for human communities and climate change mitigation.

Okanagan Biodiversity Strategy. Accessed March 25, 2024. https://okcp.ca/index.php/projects/current-projects/532-okanagan-biodiversity-strategy.

Biodiversity Conservation Strategy: The Strategy aims to preserve and restore vital natural areas in the Okanagan region. It emphasizes a landscape view for conservation that transcends municipal or rural boundaries, considering entire ecosystems and watersheds. Ecological Importance: The Okanagan region is home to a rich diversity of species and ecosystems, some unique. However, these natural assets face threats from urban development, agriculture, and other human activities.

Economic and Ecological Services: Nature in the Okanagan provides essential services like clean water, air, and flood control and supports industries such as tourism and agriculture. Properties near natural areas also see real estate benefits. Conservation and Land Use Planning: The Strategy includes maps as decision tools to guide conservation efforts. These maps help identify critical ecosystems, biodiversity hotspots, habitat connectivity, and areas of interest.

Canada, Natural Resources. "2020 Land Cover of Canada - Open Government Portal." Accessed March 25, 2024. https://open.canada.ca/data/en/dataset/ee1580ab-a23d-4f86-a09b-79763677eb47.

We used the 2021 data from this page to generate the Land Cover classification for the maps in this report. The page discusses Canada's efforts in producing a 30 m spatial resolution land cover map for 2010, 2015, and 2020, which is part of the North American Land Change Monitoring System (NALCMS). The 2020 map, created using data from the Operational Land Imager (OLI) Landsat sensor, boasts an accuracy

of 86.9%. It represents a new baseline and should not be compared with previous maps for change detection due to methodological improvements. Updated maps for 2010 and 2015 will be released to facilitate accurate change detection analysis. This dataset is crucial for various environmental applications, such as climate impact studies and wildlife habitat assessment.

Okanagan Mountain – K'nmalka Wildlife Corridor Action Plan. Accessed March 26, 2024. https://okcp.ca/.

The plan emphasizes the Syilx Okanagan People's inherent rights and responsibilities to care for all living things (tmixw) and outlines collaborative actions to respect and uphold these values. Wildlife Decline: Historical accounts detail the decline of wildlife in the valley due to overhunting, habitat loss, and the introduction of bounties on predators, significantly impacting the ecosystem.

The Okanagan Mountain—K'nmalka Wildlife Corridor is crucial for allowing animals to move across the landscape, ensuring their survival, and maintaining biodiversity. The plan discusses the predicted shift towards grassland dominance due to climate change, necessitating the incorporation of climate impacts into conservation planning.

It highlights the need for integrating habitat connectivity into local and provincial government strategic plans, policies, and regulations to protect wildlife habitats. Actions are proposed to co-develop policies and initiatives using Syilx principles, laws, protocols, and knowledge management systems for land and water stewardship.

Next Steps

Given our proposed solution, and its complexity within the physical and social landscape of Lake Country, the next steps we must take are varied and complex. Each one is associated with a different timeline and cost. For the consideration of the reader, we have included estimates on these, but they are rough. For each component we have identified the objective that we wish to work towards, the actions necessary, as well as the approximate timeline and cost.

Advocate for Support and Change at the Local Government Level

Objective:

Ensure that identified crucial areas for corridors are legally protected under local development regulations, or acquired for permanent protection and preservation.

Actions:

We must bring our report to the Lake Country City Council, advocating for the specific areas that we have identified to be included in the Natural Environment Development Permit Areas, emphasizing the ecological, social, and economic benefits. We would further push the council to dedicate funds to land acquisition, buying properties within this area to set aside for Municipal Parks, in support of the corridor objectives.

Timeline:

NEDPA Inclusion- 12-24 months, considering the need for research, stakeholder engagement, proposal development, and the legislative process. This inclusion will also be dependent on the completely separate timeline for the Community plan rewrite itself.

Land Acquisition- Highly variable, can range from 1 to 5 years, depending on the availability of suitable land, negotiation processes, and funding.

Cost:

NEDPA Inclusion- CAD $30,000 - $60,000, which includes costs for legal advice, environmental consultancy for detailed area assessments, and advocacy efforts (meetings, presentations, materials). This does not include potential costs related to political lobbying or extensive legal battles.

Land Acquisition- Highly variable, land costs in the Okanagan region can range significantly based on location, size, and land type. As a very rough estimate, set aside CAD $500,000 - $2,000,000 for initial acquisitions, with understanding that actual costs could vary widely. Additional costs for legal fees, land assessments, and closing costs should also be considered.

Launch a Stewardship Program

Objective:

Launch a stewardship program to gain the support and involvement of local landowners and the general public in the conservation effort, making them active participants. An alternative option to reduce the timeline and cost would be to collaborate with an already existing group, such as the Okanagan and Similkameen Stewardship Society to help them expand their efforts to support our project needs.

Actions:

Develop Educational Materials: Create brochures, videos, and web content that explain the benefits of the wildlife corridors, the importance of local flora and fauna, and how landowners can help.

Workshops and Events: Host events to bring the community together, share information, and offer practical advice on land stewardship practices that support wildlife and habitat connectivity.

Recognition Program: Implement a recognition program for landowners and community members who actively participate in conservation efforts, offering certificates, signs for their property, or other incentives.

Timeline:

6-12 months for initial setup and launch, ongoing thereafter.

Cost:

CAD $20,000 - $40,000 initially, which would cover the development of educational materials, organization of workshops, and the establishment of a recognition program. Ongoing costs would depend on the scale of the events and materials distribution.

Funding and Resources Acquisition

Objective:

Develop a funding strategy, and use it to secure the necessary funding and resources for project implementation.

Actions:

Identify potential funding sources, including government grants, private foundations, and corporate sponsorships. Prepare and submit funding applications, emphasizing the project's environmental, social, and economic benefits. Explore partnerships with local businesses, NGOs, and community groups to leverage additional resources and support.

Timeline:

7-15 Months for each given funding cycle, covering all the steps from source identification to funding receival.

Cost:

CAD $5,500 - $23,000, for each given funding cycle. This may vary depending on professional fees and the scope of funding applications. However, it could also be reduced if we can secure time in-kind support or pro-bono support from local professionals in support of the project.

Final Implementation

Objective:

As time progresses, and land is secured for the use of the project, we will move into the implementation phase; adapting strategies as necessary based on the size and nature of acquired land, land use planning changes, stakeholder feedback, and general project monitoring. This will be continuous, until the full protection of our proposed corridors is reached.

Actions:

Roll out habitat connectivity enhancements according to the project plan, ensuring all legal and environmental requirements are met. Establish a robust monitoring program to track project outcomes, ecological impacts, and community engagement. Adapt project strategies as needed based on monitoring data and stakeholder input, ensuring the project remains effective and responsive to changing conditions.

Timeline:

Continuous, 10+ years.

Cost:

Preparation and Permits- CAD $10,000 - $50,000, covering the costs for detailed planning, environmental assessments, and any required permits or legal reviews.

Physical Implementation Costs- Highly variable, potentially ranging from CAD $100,000 to several million dollars, depending on the following factors; the nature of the restoration activities, planting native vegetation, removing invasive species, and restoring ecosystems. Costs depend on the area's size and condition. The associated infrastructure necessary, building wildlife crossings, trails, signage, and park amenities may range significantly in cost depending on the scope of the specific intervention.

Monitoring and Adaptation- CAD $20,000 - $100,000 annually, for ongoing environmental monitoring, community engagement, and the implementation of adaptive management strategies. This includes staffing or consultancy fees for data analysis, report writing, and project management.

Long-term Management and Maintenance- Varies greatly based on the project's scope but can be estimated at CAD $10,000 - $50,000 annually for smaller projects, scaling up for larger or more complex initiatives.

Conclusion

This report begins by highlighting the global environmental crisis, emphasizing the interconnectedness of our social and physical environments. This crisis is starkly evident here in Lake Country, where urbanization and deforestation are resulting in severe biodiversity loss, especially concerning given the high concentration of endangered species present locally. Previous work has gone even further to

showcase that habitat fragmentation as a significant issue in the Okanagan region, where land conversion has led to the loss of grassland habitats and disruption of vital wildlife corridors. This fragmentation poses a threat to species survival and ecological resilience.

Lake Country's rich biodiversity and unique ecosystems are at risk of being completely lost, due to unchecked development. We examined the steps the District of Lake Country took, such as participating in the Okanagan Connectivity Corridors Project, to map and preserve wildlife corridors. Then we decided that Lake Country could go even further to become a leader in conservation, by developing a comprehensive strategy to enhance wildlife corridors in Lake Country. Using GIS mapping, we were able to identify target areas for habitat connectivity. Our proposal seeks to advocate for the inclusion of these areas in natural environment development permit areas, building on the framework for wildlife habitat protection that already exists within the Lake Country Community Plan. This facet highlights our commitment to legislative advocacy and policy reform. By securing legal protections for key habitats, we ensure the longevity and resilience of our conservation efforts, safeguarding them for future generations to enjoy and benefit from.

However, these corridors will not be solely protected by their inclusion in the NEDPAs. Therefore, our plan goes further. Our project extends its reach beyond ecological restoration to embrace the creation of community spaces and recreational opportunities. Through strategic land acquisition and thoughtful trail development, we aim to not only protect biodiversity but also enhance the quality of life for all residents. By integrating small parks and recreational amenities within acquired lands, we envision vibrant spaces that foster social cohesion, physical well-being, and a sense of belonging for the entire community. Additionally, by launching a comprehensive stewardship program, we aspire to empower local landowners with the knowledge and tools to become active participants in preserving and enhancing these

vital corridors. Through educational initiatives, workshops, and recognition programs, we aim to cultivate a sense of stewardship and pride in our shared natural heritage.

The benefits are evident, and far-reaching, for ecosystem services, recreational opportunities, overall community well-being, livability, resident appeal, and even property values, these should not be undervalued or overlooked. By highlighting the roles of various key actors, including governmental bodies, NGOs, and the public, we recognize and emphasize the importance of collaboration and consultation with these stakeholders to ensure the success of such an initiative.

We have even attempted to show the strength and depth of our approach, by showcasing relevant examples and research which supports and guides the project. The initiatives of Curitiba's urban wildlife corridors, Boston's Emerald Necklace, and the Los Angeles Wildlife Corridors illustrate that integrating biodiversity conservation into urban planning can be wildlife successful.

To push this project forward, and make it a reality we will focus on advocating for support and change at the local government level, the development of a stewardship program, funding acquisition, and the physical implementation of these goals. Where does that leave us now?

It puts a decision in your hands, together we have a chance to embark on a transformative journey towards habitat connectivity and ecological sustainability. This project transcends mere conservation efforts. Our holistic approach, rooted in community engagement and collaboration, seeks to foster a harmonious relationship between nature and society within the Municipal District of Lake Country, British Columbia.

In embracing this holistic approach, our project breaks free from the narrow confines of wildlife conservation to embrace a vision of sustainability that encompasses the broader well-being of our community. By fostering a deeper connection to nature, promoting social equity, and enhancing recreational opportunities, we strive to create a more resilient, vibrant, and inclusive community where both humans and wildlife thrive together. This path, a corridor in itself, will lead us to a brighter, more

sustainable future for Lake Country, where the benefits of our collective efforts are communal, enduring, and shared by all.

References

"Aquatic Report Catalogue." Accessed March 24, 2024. https://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=42389.

Aziz, H. A., and M. H. Rasidi. “The Role of Green Corridors for Wildlife Conservation in Urban Landscape: A Literature Review.” *IOP Conference Series: Earth and Environmental Science* 18, no. 1 (February 2014): 012093. https://doi.org/10.1088/1755-1315/18/1/012093.

BC Ministry of the Environment. 1998. Habitat Atlas for Wildlife at Risk

Butchart SHM, Walpole M, Collen B, van Strien A, Scharlemann JPW, Almond REA, Baillie JEM, Bomhard B, Brown C, Bruno J, et al. 2010. Global Biodiversity: Indicators of Recent Declines. Science. 328(5982):1164–1168. doi:https://doi.org/10.1126/science.1187512.

Canada, Natural Resources. “2020 Land Cover of Canada - Open Government Portal.” Accessed March 25, 2024. https://open.canada.ca/data/en/dataset/ee1580ab-a23d-4f86-a09b-79763677eb47.

Canada, Parks. “Government of Canada Launches New National Program for Ecological Corridors.” News releases, April 21, 2022. https://www.canada.ca/en/parks-canada/news/2022/04/government-of-canada-launches-new-national-program-for-ecological-corridors.html.

Cardinale BJ, Duffy JE, Gonzalez A, Hooper DU, Perrings C, Venail P, Narwani A, Mace GM, Tilman D, Wardle DA, et al. 2012. Biodiversity Loss and Its Impact on Humanity. Nature. 486(7401):59–67. doi:https://doi.org/10.1038/nature11148. https://www.nature.com/articles/nature11148.

Clark, Tanya, Tara Rava Zolnikov, and Frances Furio. “Wildlife Corridors.” In The Palgrave Encyclopedia of Urban and Regional Futures, edited by Robert C. Brears, 2276–79. Cham: Springer International Publishing, 2022. https://doi.org/10.1007/978-3-030-87745-3_32.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2015. COSEWIC Assessment and Status Report on the Western Rattlesnake (Crotalus oreganus) in Canada.

Community Charter, SBC 2003, c 26, <https://canlii.ca/t/5660d>

Damschen, Ellen I., Lars A. Brudvig, Melissa A. Burt, Robert J. Fletcher, Nick M. Haddad, Douglas, Levey, John L. Orrock, Julian Resasco, and Joshua J. Tewksbury. “Ongoing Accumulation of Plant plant diversity through habitat connectivity in an 18-year experiment”. Science. 365(6460), 1478,1470. https://doi.org/10.1126/science.aax8992

Dennis, Roger L. H., Leonardo Dapporto, John W. Dover, and Tim G. Shreeve. “Corridors and Barriers in Biodiversity Conservation: A Novel Resource-Based Habitat Perspective for Butterflies.” Biodiversity and Conservation 22, no. 12 (November 1, 2013): 2709–34. https://doi.org/10.1007/s10531-013-0540-2.

Diversity through Habitat Connectivity in an 18-Year Experiment.” Science 365, no. 6460 (September 27, 2019): 1478–80. https://doi.org/10.1126/science.aax8992.

District of Lake Country. 2018. Official Community Plan 2018-2038. SCHEDULE “A” BYLAW 1065.

Dixon, Mark D. “Corridor Ecology: The Science and Practice of Linking Landscapes for Biodiversity Conservation.” The Condor 109, no. 3 (August 2007): 715–16. https://doi.org/10.1650/8386.1.

Ecosystem Connectivity in the Okanagan. Accessed March 25, 2024. https://okcp.ca/index.php/projects/current-projects/548-ecosystem-connectivity-in-the-okanagan.

"Exploring Urban Wildlife Corridors: Connecting Habitats In Cities - Metro Wilds," December 26, 2023. https://metrowilds.com/exploring-urban-wildlife-corridors-connecting-habitats-in-cities/.

Heller, Nicole E., and Erika S. Zavaleta. "Biodiversity Management in the Face of Climate Change: A Review of 22 Years of Recommendations." Biological Conservation 142, no. 1 (January 2009): 14–32. https://doi.org/10.1016/j.biocon.2008.10.006.

Hess, George R., and Richard A. Fischer. "Communicating Clearly about Conservation Corridors." Landscape and Urban Planning 55, no. 3 (July 2001): 195–208. https://doi.org/10.1016/S0169-2046(01)00155-4.

Juffe-Bignoli, Diego, Neil D. Burgess, Jonathan Hobbs, Robert J. Smith, Christine Tam, Jessica P. R. Thorn, and Joseph W. Bull. "Mitigating the Impacts of Development Corridors on Biodiversity: A Global Review." Frontiers in Ecology and Evolution 9 (July 26, 2021). https://doi.org/10.3389/fevo.2021.683949.

National Park Service. (n.d.). The Emerald Necklace: Boston's Green Connection. National Park Service. https://www.nps.gov/articles/the-emerald-necklace-boston-s-green-connection.htm

North Carolina State University. 2023. Design Tactics for Climate-Based Migration in Biodiversity Corridors. https://www.asla.org/2023studentawards/8850.html

Okanagan Biodiversity Strategy. Accessed March 25, 2024. https://okcp.ca/index.php/projects/current-projects/532-okanagan-biodiversity-strategy.

Okanagan Collaborative Conservation Program (OCCP). 2021. "Keeping Nature Connected". https://okcp.ca/images/resources/land-use-planning/OCCP-ONA-Keeping-Nature-Connected-May-2021.pdf

Okanagan Mountain – K'nmalka Wildlife Corridor Action Plan. Accessed March 26, 2024. https://okcp.ca/.

Parks Canada Agency, Government of Canada. "Criteria for Ecological Corridors - Criteria for Ecological Corridors in Canada," December 22, 2023. https://parks.canada.ca/nature/science/conservation/corridors-ecologiques-ecological-corridors/criteres-criteria.

Ramiadantsoa, Tanjona, Otso Ovaskainen, Joel Rybicki, and Ilkka Hanski. "Large-Scale Habitat Corridors for Biodiversity Conservation: A Forest Corridor in Madagascar." PLOS ONE 10, no. 7 (July 22, 2015): e0132126. https://doi.org/10.1371/journal.pone.0132126.

RMEF. “Mending Fences - Wildlife Friendly Fencing.” *Rocky Mountain Elk Foundation* (blog), May 17, 2018. https://www.rmef.org/elk-network/mending-fences-wildlife-friendly-fencing/.

Singh, Ram L . 2016. Principles and applications of environmental biotechnology for a sustainable future. Springer Verlag, Singapor.

“Supporting Sustainable Urban Mobility in Curitiba | AFD - Agence Française de Développement.” https://www.afd.fr/en/carte-des-projets/supporting-sustainable-urban-mobility-curitiba.

The Cultural Landscape Foundation. (n.d.). Emerald Necklace. https://www.tclf.org/landscapes/emerald-necklace

“Urban Greening: Six Cities Making Room for Nature | BBC Earth.”. https://www.bbcearth.com/news/six-cities-making-room-for-nature.

Wilson, Maxwell C., Xiao-Yong Chen, Richard T. Corlett, Raphael K. Didham, Ping Ding, Robert D. Holt, Marcel Holyoak, et al. “Habitat Fragmentation and Biodiversity Conservation: Key Findings and Future Challenges.” Landscape Ecology 31, no. 2 (February 1, 2016): 219–27. https://link.springer.com/article/10.1007/s10980-015-0312-3 .

Zellmer, Amanda J., and Barbara S. Goto. “Urban Wildlife Corridors: Building Bridges for Wildlife and People.” *Frontiers in Sustainable Cities* 4 (2022). https://www.frontiersin.org/articles/10.3389/frsc.2022.954089