



A Toolkit for

Communicating the Co-Benefits

Wildlife Crossings



The Team



Client - arc-solutions.org

ARC Solutions works to improve human safety, wildlife mobility and landscape connectivity by ensuring that wildlife crossings are built wherever they are needed. ARC is a fiscally sponsored project of the Centre for Large Landscape Conservation in Bozeman, Montana.

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Yellowstone to Yukon Conservation Initiative strives to support people, all wildlife and natural systems in the region between the Greater Yellowstone Ecosystem and Canada's Yukon Territory.

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The Problem

Accelerating biodiversity loss is a major environmental problem everywhere.

What is the Problem?

Accelerating biodiversity loss is a major environmental problem everywhere on Earth, and is one of the leading crises currently facing the planet.

The destruction and degradation of natural ecosystems is the primary cause of declining global biodiversity (Haddad et al., 2015). Habitat degradation is often tied to urban expansion and land use change for agriculture or resource extraction. However, road infrastructure has significant ecological, social, and economic impacts as well. For instance, roads tend to split up animal habitats, which in turn increases the likelihood of wildlife-vehicle collisions. This leads to corresponding increases in wildlife mortality, human injuries, and property damage (Green Infrastructure Toolkit Outline, 2021).



Beyond the immediate, fragmentation accelerates habitat degradation through the disruption of essential ecosystem functions and migration patterns, which impacts both animal and plant species.

Purpose-built green infrastructure such as wildlife corridors and crossings can both mitigate the drastic increase of wildlife vehicle collisions and work to re-connect fragmented landscapes. The economic benefits of wildlife crossing infrastructure have been well-documented. However, the co-benefits for climate, biodiversity, culture, and human well-being have not yet been effectively studied, publicized, or worked into community-facing communications materials (Green Infrastructure Toolkit Outline, 2021). While the benefits of such interventions are clear, and the science shows that crossing structures do help with reducing the rate of wildlife-vehicle collisions, there are still significant implementation challenges. One of the major barriers stems from the fact that responsibility for implementation spans many departments and sectors, leading to challenges in both leadership and feelings of project ownership.

Image Sources: Tony Clevenger

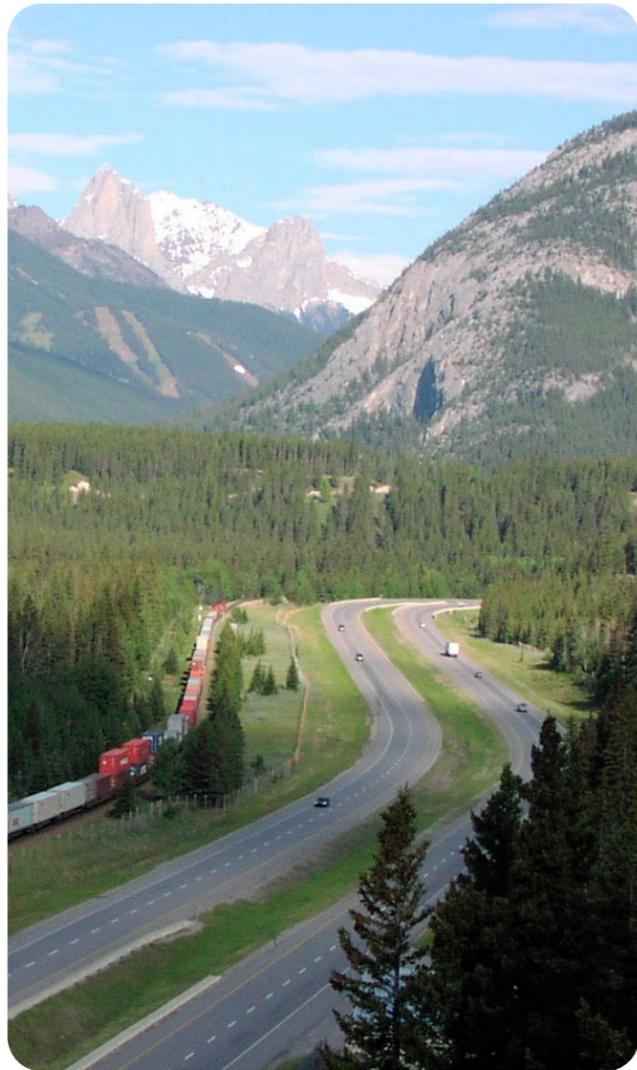


Image Sources from top left to bottom right: ARC Solutions, Tony Clevenger, Trisha White, TransWild Alliance, ARC Solutions

Why Act?

As human expansion into natural ecosystems continues, so will interactions with wildlife, making the need for more landscape connectivity crucial. In order for this to happen, there must be collaboration among different departments and sectors to implement projects that reconnect fragmented landscapes while simultaneously exploring the relationship between humans and nature.

Generally speaking, conservation efforts tend to prioritize spaces like protected areas, corridors and greenways or greenbelts as a way to maintain connectivity within a landscape. However, these projects deal with habitats as they exist today, and don't always address how habitat has been changed by infrastructure. Wildlife crossings address this through purpose-designed green solutions, which reconnect broken landscapes and habitats while reducing wildlife-vehicle collisions and providing co-benefits to both humans and wildlife. Importantly, wild life crossings of all shapes and sizes have been proven to help facilitate safe passages while conveying co-benefits for all.



Image Source: Tony Clevenger

The Toolkit

Telling the story of re-connecting landscapes with green infrastructure.

About this Toolkit

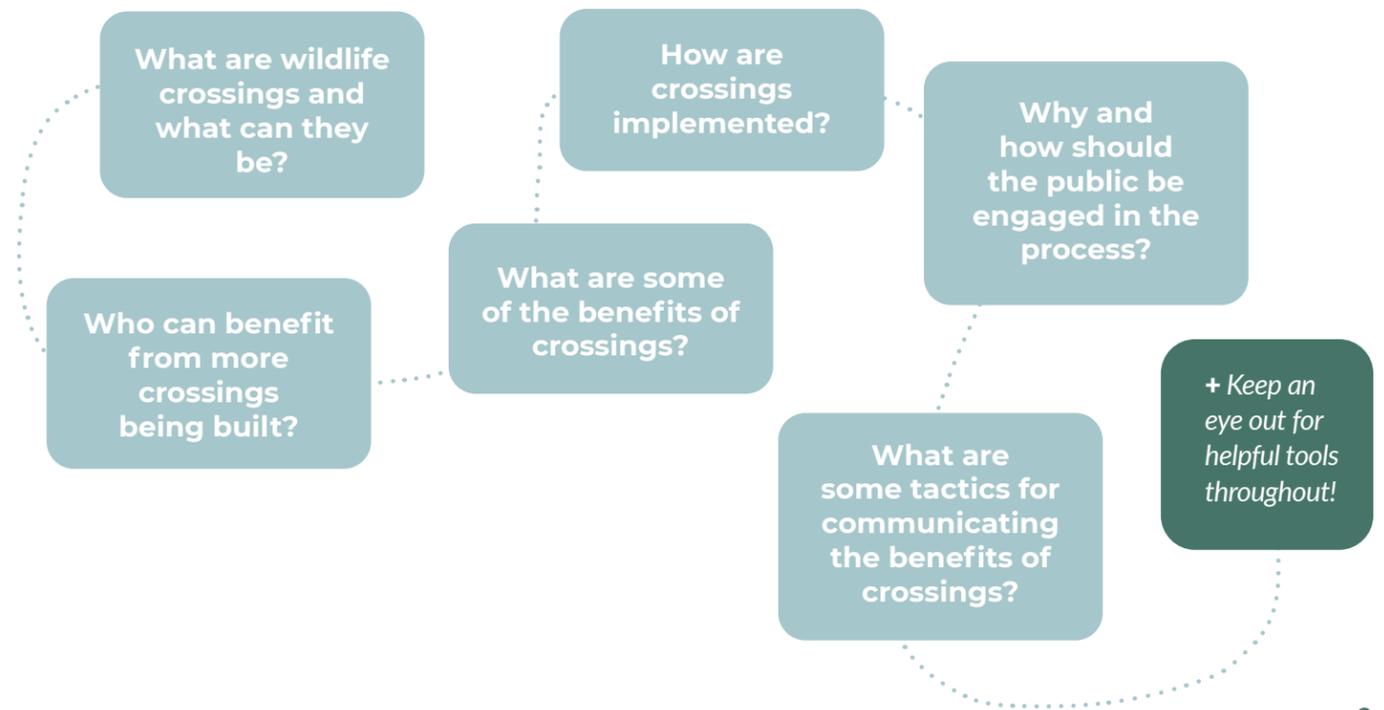
The primary objective of this toolkit is to inspire you to communicate the myriad benefits of and advocate for the accelerated implementation of wildlife crossings.

This toolkit is meant to be complementary to ARC's 'Communication' Initiative, which seeks to deliver the story of ARC and its work to implement solutions to wildlife and human mobility and landscape connectivity to diverse audiences from policy-makers to students and everyone in between. Serving as a primer to the complex issues and processes surrounding wildlife crossings and their many benefits, the content within is meant to be accessible and engaging.

By identifying and describing the many different crossing typologies, as well as the groups involved in and affected by their implementation, this guide demonstrates both the intricacies and the possibilities for wildlife crossings. Our roadmap to implementation provides a breakdown of the implementation process, with practical tips along the way.

Finally, our ideas portfolio provides a number of strategies for communicating the benefits of crossing structures. It is not exhaustive; rather, it is meant to be a point of departure and inspiration. To that end, throughout this toolkit we link to resources for those wishing to delve further into specific tools and strategies to create positive change!

Questions that this toolkit addresses:



Wildlife Crossings

Safe passages for diverse species to safely migrate across landscapes.

What is a Wildlife Crossing?

Wildlife crossings can be as simple as a rope bridge for roosting birds or as complex as an overpass with nearby, publicly accessible observation platforms. Crossings have been widely recognized as an effective tool for protecting wildlife through ensuring landscape connectivity (Sawaya et al., 2012). With that said, it has been challenging for scientists and researchers to find narratives that resonate with communities beyond the data. While the benefits from an ecological standpoint are clear wildlife crossings need to be communicated as more than just physical infrastructure.



They Create Landscape Connectivity

Wildlife crossings provide passage infrastructure for species to safely migrate across broken landscapes which have been carved apart by road development. The implementation of wildlife crossings have been empirically-evaluated to mitigate vehicle-wildlife collisions by 97% (ARC Solutions, 2021). Estimates place human fatalities from such collisions at 200 motorists deaths per year in the United States (Arizona Fish & Game Department, 2006).

Beyond physical connectivity, opportunities to recognize the cultivation of human connectivity to the natural landscape may also be recognized.

Image Source: Moose US 89 Culvert Logan Utah, Patty Cramer



They Address Human and Non-Human Co-Existence in Space

Wildlife crossings are powerful symbols of the inherent connection between place, people, and animals. Aside from prompting safe passage, wildlife crossings offer opportunities for engagement and the development of stewardship roles among communities. Understanding the ways that these spaces can be powerfully and safely shared with those who benefit both indirectly and directly from the structure.

They Come in All Shape and Forms

As mentioned earlier, wildlife crossings take on a variety of forms and can exist in any place that human-animal interaction occurs. Crossings can be for fish and frogs and much as deer and moose or bears and wolves. The wide variety of options for implementing crossings allow for tailor-made solutions to local issues. Although this toolkit has cited a few in-text examples, the most powerful way to communicate the potential of a crossing is through high quality, compelling visualizations. The following pages help showcase this through the many options available.

Under or Over

Crossings may be constructed below roads as culverts, or in the form of a bridge. Whether a crossing is above or below vehicle traffic, a natural floor that blends with the surroundings is ideal.

Wild or Agricultural

In most cases, wildlife are the intended users. However, some ranchers and farmers have found benefit from crossings for moving their cattle.

Simple to Complex

To achieve landscape connectivity, some structures need to be highly engineered in order to bear the weight of not only the wildlife intended to use it, but the vegetation, soil and other landscaping which integrates it with its surroundings. Some even host hidden storm water basins. In more urban areas, simple rope structures can be sufficient to connect smaller, more nimble wildlife.

Image Source: Nina-Marie Lister

Small to Large

Depending on the context, crossing-structures will vary in size. Structures should be tailored to their users. For example, larger species need enough space to have a clear view ahead in order to feel safe about using the crossing. Some culverts, for this reason, may not work for larger animals due to size limitations of digging underground.

Specific and Diverse

When crossings are built, they are often designed to help connect a specific at-risk species, but by nature will connect many unexpected users of all sizes and varieties.

Public or Restricted

Structures can be designed to integrate opportunities for human connectivity, recreation, and even the observation of wildlife through partial public access. Crossings can also be restricted to wildlife to prioritize safety for all.

Visible or Hidden

Some crossing structures are designed to be visible to road traffic. This visibility may help increase public awareness and acceptance of crossing structures. They can also be quite hidden; designed primarily to suit local species from an ecological perspective.

Cold, Hot, Wet, and Dry

Crossing infrastructures exist across the world in all climates like the snowy north, in deserts, and wetlands to name a few. No matter where they are built, they should always be designed to integrate with their surroundings.

Multipurpose

Crossings do not have to serve just one purpose. In fact, they have the potential to combine features and benefits for many wildlife and human users and uses.

A Collection of Crossing Typologies in Photos



Public



Restricted

Image source left to right: [Raising Edmonton](#), Nina-Marie Lister



Under



Over



Simple



Complex



Small



Large

Image source left to right: Tony Clevenger, [Interesting Engineering](#).



Visible



Hidden



Cold



Hot



Wet



Dry

Image source left to right: [Interesting Engineering](#).



Wild



Agricultural



Specific



Diverse



Multipurpose

MORE CROSSINGS AROUND THE WORLD

There are many more types of crossings. To see some more examples, [view this article: InterestingEngineering.com/29-of-the-most-heartwarming-wildlife-crossings-around-the-world](https://interestingengineering.com/29-of-the-most-heartwarming-wildlife-crossings-around-the-world)

Image source left to right: Tony Clevenger, [Interesting Engineering](https://interestingengineering.com/29-of-the-most-heartwarming-wildlife-crossings-around-the-world), Tony Clevenger, [WebUrbanist.com](https://weburbanist.com)

Who Benefits

The benefits of wildlife-crossing infrastructure reach more than just wildlife.

Who Benefits and How Will They Know?

The benefits of wildlife-crossing infrastructure reach more than just wildlife and impact a wide range of stakeholder groups.* The 4-quadrant graph shown below helps form a better understanding of who benefits from wildlife-crossing infrastructure, and indicates the level of decision making power that they may possess. This is phrased in terms of two extremes. First, indirect stakeholders who have substantial decision making power, and direct stakeholders who typically do not. The graphic answers the questions: **who is influential in implementing crossings and who will benefit the most from their implementation?**

BENEFIT



INFLUENCE

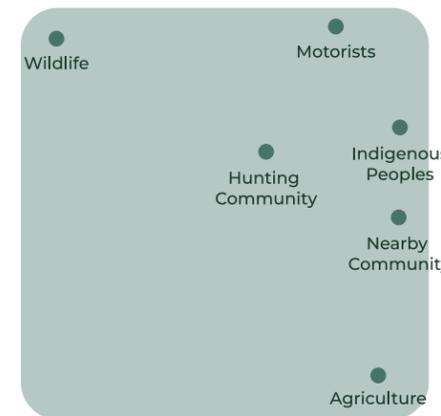
Disclaimer: While we have provided a wide range of groups in this section, stakeholders are not limited to this list.



Directly Benefiting/High Influence

Groups that are impacted directly and hold a high agency of decision making power are listed at the top-right.

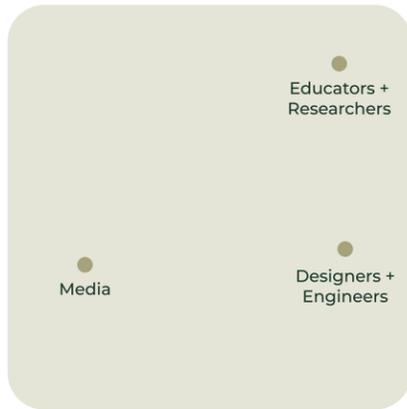
These groups include beneficiaries such as: insurance companies; wildlife agencies; and transportation agencies. These stakeholder groups are able to push decisions forward to implement wildlife crossing development, while also benefiting from the construction through political, economic or environmental methods. Transportation agencies for example are able to benefit through positive news stories as a result of taking a step to improve wildlife connectivity. Another likely influential beneficiary are insurance companies, such as Dejadine Insurance, who would benefit economically through reduced wildlife/vehicle collisions.



Directly Benefiting/Low Influence

Groups with little agency over decision making but directly impacted are shown in the top-right.

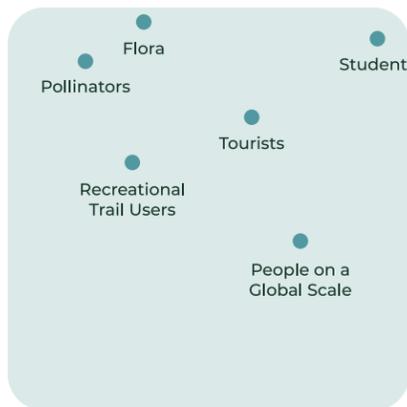
These groups include beneficiaries such as: wildlife; flora; pollinators; plants; ecotourism; wildlife recreationalists; humans moving through space; community; motorists; pedestrians with shared crossings; and school kids and curricula. While these groups can be directly impacted by wildlife crossing infrastructure, they have little say in decision making. The positive impacts felt by the environment are not easily recognizable by humans and may not be noticed without research. These stakeholder groups require a champion to help advocate for their needs.



Indirectly Benefiting/High Influence

Groups that are indirectly impacted by the construction of wildlife crossings can also be of high agency in the decision making process. This group is listed at the bottom-right.

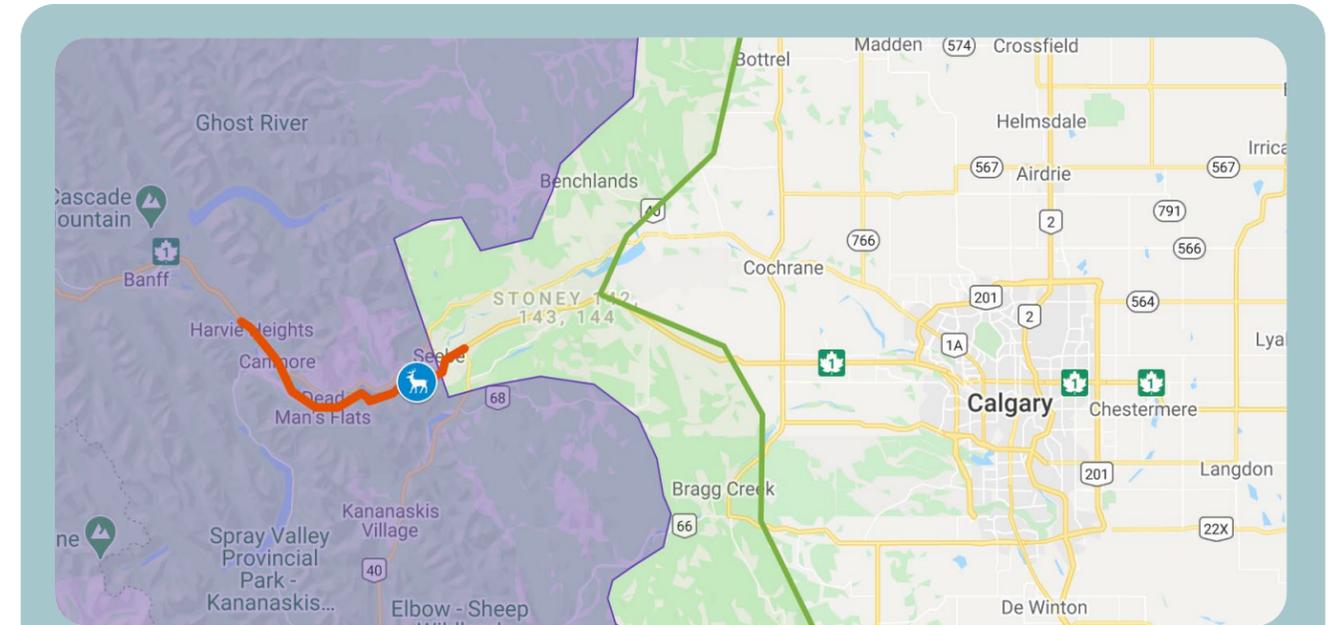
These groups include beneficiaries such as: educators and researchers; green infrastructure providers; and adjacent communities. There are a range of benefits, including: cultural pride and a visual depiction environmental civic responsibility; schools have the opportunity to connect kids to wildlife, which then can influence their parents; green infrastructure providers can supply tech transfers that lead to increased industry growth; and lastly, the involvement of adjacent communities can leverage increased tourism in the region through targeted recreation or engagement programs.



Indirectly Benefiting/Low Influence

Groups that are indirectly impacted with little agency over decision making are shown in bottom-left.

These groups include beneficiaries such as: people on a global scale; people far away (camera, story successes); hunting communities; indigenous peoples; fish and water crossings; and agriculture when incorporating pollinator-plant relationships. Some of these beneficiaries are non-traditional conservation actors. Hunting communities are a good example as these groups can increase advocacy, provide funding and insight on implementation barriers, while also benefiting personally as wildlife will flourish through reduced collisions and safe habitats. Similar to the stakeholder groups that directly benefit from wildlife crossings but have low influence, these groups require a champion to advocate for their needs.



Case Study: Highway 1/1X

The Highway 1/1X animal road crossing is slated to be built approximately 7 kilometres east of Exshaw Alberta at the highway 1 and highway 1X interchange. The project was proposed under the previous NDP Government in Alberta as a priority for capital investment in wildlife mitigation to enhance public safety (Conboy, 2020; Clevenger et al., 2018). The proposed crossing is projected to cost 7-million dollars and will be built between 2021 and 2022, with both funding and the project construction timeline being supported by the current United Conservative Party Government (Conboy, 2020; Government of Alberta, n.d.). The support for this infrastructure from two administrations indicates that there was a wide variety of bi-partisan support for building animal road crossings, demonstrating at least some success in communications of the benefits of animal crossing infrastructure.

Design and planning for the highway 1X crossing has been undertaken by both Transportation Alberta as well as the Miistakis Institute. The project design draws inspiration from the 6-wildlife crossing overpasses that have been built in Banff, AB (Dialog, 2019; Clevenger et al., 2018). Additionally, the project design is forward-thinking by accounting for any increases in lane-width of the highway below the overpass, ensuring that it is suitable to accommodate highway widening without needing to close or alter the crossing (Dialog, 2019; Clevenger et al., 2018). This, among other design elements, ensures the longevity of the project. In essence, the Highway 1X case study demonstrates the potential for animal road crossings when a governmental institution champions and prioritizes their construction.

Map image source: <https://y2y.net/work/hot-projects/safer-bow-valley/>



Case Study: *Highway 3*

The Highway 3 Elk Valley animal road crossing is proposed to be built in the east Kootenays of British Columbia. The project currently has buy-in from a variety of stakeholders including Yukon to Yellowstone (Y2Y), ARC, TECK Resources, local indigenous and community members, and some preliminary support from the Ministry of Transportation of British Columbia (Lee et al., 2019). However, the development timeline is still being worked out with sources of funding to support the project being unsecured. From our interviews, it was noted that the Highway 3 Elk Valley crossing proposal has done an excellent job at communicating the benefits of supporting animal road crossings beyond reducing wildlife collisions. This has resulted in the project gaining support from some unlikely allies such as TECK resources as well as local hunting and fishing groups. Gaining support through effective communication of the co-benefits of these structures is necessary to gain support from all parties and relevant stakeholders, making these projects appealing to a broad range of groups (Lee et al., 2019).

Through our interviews, the group learned that the biggest setback for the project is the lack of support from the Government of British Columbia not playing a large enough role in the study and development of this proposal. Interviewees note that this stems from a lack of coherency and responsibility over which ministries and governmental departments are responsible for the construction of animal road crossings within British Columbia. However, interviewed guests noted that project champions have emerged within the Ministry of Transportation to help bring the Elk Valley crossing into the light. Having a champion within government can help make larger strides towards ensuring projects of this kind can come into fruition.

Map image source: Y2Y, *Reconnecting the Rockies*

Co-Benefits

Green Infrastructure, like crossings, can provide so many benefits to wildlife, nature, and people.

Green Infrastructure Co-Benefits

What is a Co-Benefit?

The term 'co-benefit' emerged in the academic literature in the 1990s and was used primarily to speak about positive side effects associated with implementing climate-friendly policies. Applying this idea to wildlife crossing structures, a 'co-benefit' might be understood as a positive outcome or benefit that accrues as a side effect of a crossing structure or other intervention targeting wildlife safety.

Examples of co-benefits associated with wildlife crossings: pollination; water storage and filtration; place-making and public art

What is Green Infrastructure?

Green Infrastructure(GI) can encompass any strategically placed, designed, and constructed (semi-)natural structure. GI can be characterized by their multifunctionality and the vast array of ecosystem services (co-benefits) they provide (Van Oijstaeijen et al., 2020).

Examples of Green Infrastructure: stormwater retention ponds; pollinator gardens; street trees; permeable pavement

A wildlife crossing is seldom a concrete structure that has the sole purpose of helping an animal get from Point A to B. A crossing structure or network of structures can incorporate elements of green infrastructure. The benefits of their inclusion span a broad range of categories.

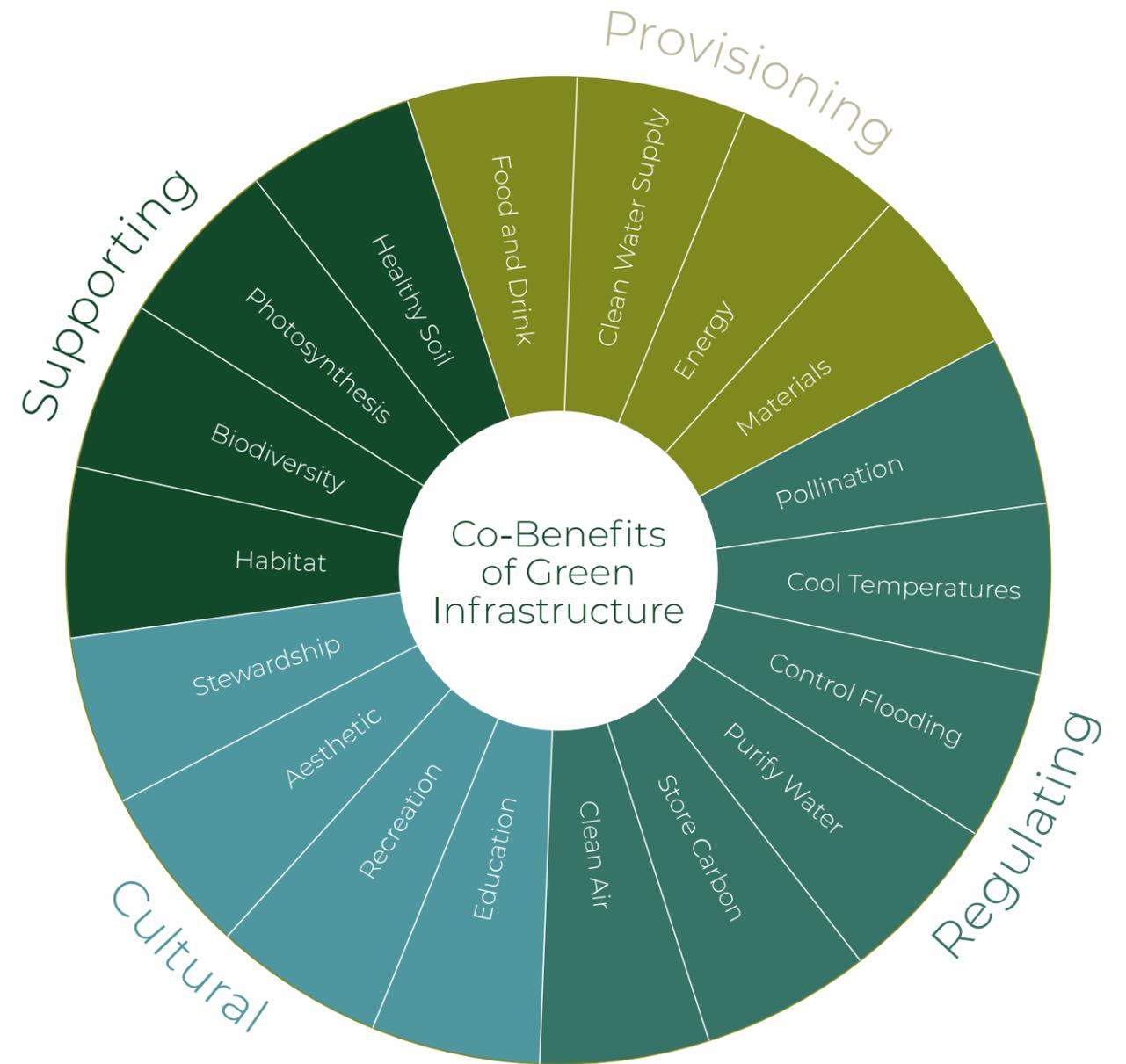
When thinking about co-benefits, it's helpful to consider the ecosystem services framework, which organizes ecosystem service - or the benefits that people obtain from both natural environments and green infrastructure - into four broad categories.

Regulating Services: these are the basic services that make life possible for people and that keep ecosystems clean, sustainable, functional, and resilient to change.

Provisioning Services: any benefit that comes from nature - like food, fuel, drinking water, and natural gas.

Cultural Services: a non-material benefit that contributes to the development and cultural advancement of people, including knowledge building and recreation.

Supporting Services: these processes allow the Earth to sustain basic life forms, ecosystems, and all humans on Earth, and include basic functions like photosynthesis, nutrient cycling, and water cycling.



All of these ecosystem services, from pollination and water purification to medicinal benefits and place-making, have positive benefits for humans, whether direct (we need food to survive) or indirect (without pollinators, ecosystems would suffer, and so would we).

Co-Benefits Wheel adapted from: <https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy/ecosystem-approach/ecosystem-services-natures-benefits>



Image Source: Tony Clevenger

For instance, this crossing structure provides a number of important regulating and supporting services. Native vegetation improves air quality through the removal of pollutants and emissions from the atmosphere. Meanwhile, trees with large root structures provide erosion control and clovers provide a source of pollen for insects.

Animals don't have to be the only ones interacting with crossings! Educational plaques and displays can be installed on observation platforms at an appropriate distance from the crossing itself, illustrated here. Embedding biodiversity literacy in a physical place can enhance opportunities for learning, connection, and building empathy with species other than our own.

Co-benefits are interconnected and can support and amplify one another's positive impacts. For example, a crossing structure that incorporates pollinator-friendly vegetation supports pollination (like the clover in the photo), which in turn supports the growth of natural medicinal plants. For certain participants this then allows for a direct connection to spiritual and cultural well-being.



Photo credit: Image courtesy Olin Studio

Animals don't have to be the only ones interacting with crossings! Educational plaques and displays can be installed on observation platforms at an appropriate distance from the crossing itself, illustrated here. Embedding biodiversity literacy in a physical place can enhance opportunities for learning, connection, and building empathy with species other than our own.

While a crossing structure facilitating safe passages for wildlife is a category of green infrastructure on its own, there are many opportunities to **maximize the co-benefits** associated with a project by incorporating other types of green infrastructure or combining with existing green infrastructure. On the next page are some examples of green infrastructure.

Green Infrastructure Types and Functions



Constructed Wetland

A wetland that can treat wastewater and manage runoff through design and engineering.



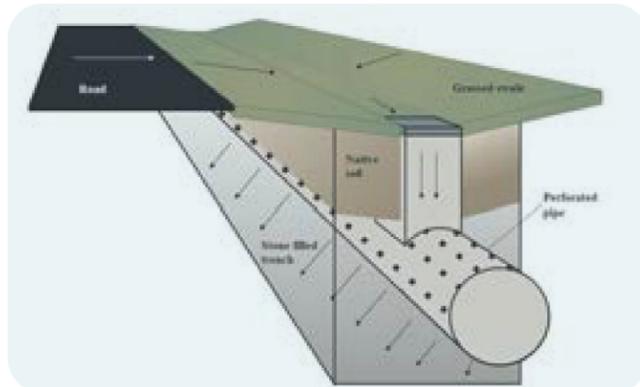
Riparian Buffer

A riparian buffer is vegetation that can slow runoff and reduce soil erosion and pollution entering water systems.



Green Roof

A green roof has vegetation which can provide habitat, reduce runoff and enhance the performance of buildings.



Perforated Pipe

Underground pipes with holes or slots allow stormwater to enter and exit in the earth below, slowing the flow of water.

Other types of green infrastructure:

- Bioswale (Wet or Dry)
- Dry Pond
- Ecosystem Planning
- Filter Strip
- Green Wall
- Hedgerow
- Parks
- Perforated Pipe
- Permeable Pavement
- Rain Garden + Bioretention
- Rain Harvesting
- Soakways, Infiltration Trenches + Chambers
- Tree Canopy Expansion
- Xeriscaping

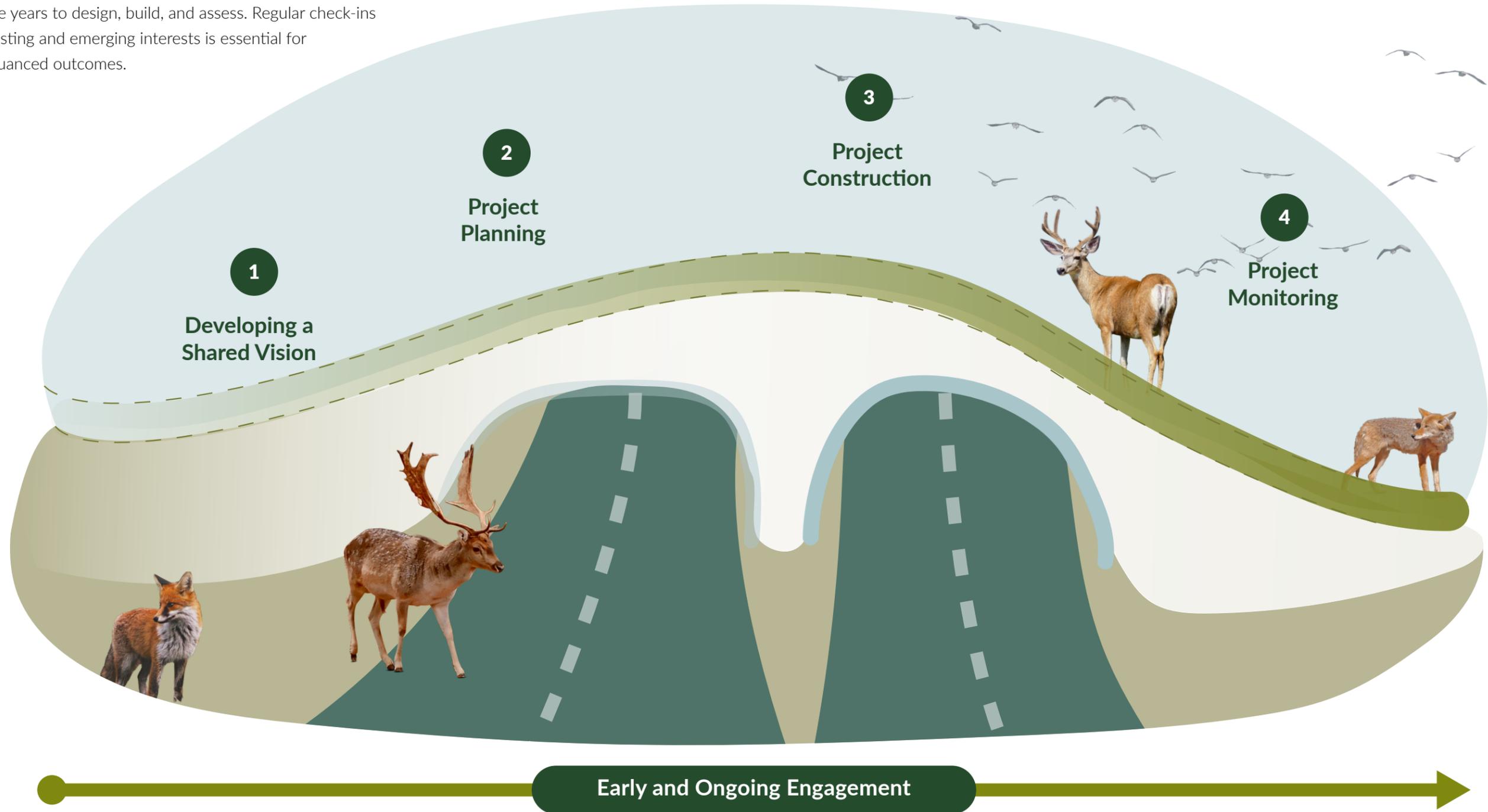
Green Infrastructure Types and Their Functions (adapted from Green Infrastructure Ontario Coalition, 2017)

Implementation Process

Each wildlife crossing is unique to its context and purpose, but the overall process often follows a similar path.

The Road to Implementation

The lifecycle of a wildlife crossing, no matter the size, can be broken down into four general phases. The cornerstone of each of these phases is early and on-going engagement that carries momentum and interest throughout the project. It is likewise important to consider the timing of specific communications and engagement strategies across all four stages. Wildlife crossings take years to design, build, and assess. Regular check-ins with both existing and emerging interests is essential for successful, nuanced outcomes.



Throughout Early and Ongoing Engagement

Communications-based engagement efforts must start as early as possible and continue throughout the four general phases of a crossing's lifecycle.

Recognizing the diversity of community interests not only encourages early participation, but also improves the understanding of project needs. This in turn increases the likelihood of future buy-in and continued involvement. Engaging in ongoing communication with partners, stakeholders, and communities provides each group with a sense of ownership of the project which motivates ongoing participation and collaboration.

It is also important to identify key decision makers or contributors that will be essential partners and champions for project implementation. For example, there are different advantages to engaging with an organization's leaders versus general staff. Though they may be from the same organization, leaders are able to address the issue of landscape fragmentation through policy while agency staff may be able to address connectivity aspects in their routine work. Depending on the context, the key decision-makers may also change as part of regular departmental restructuring or advancements.

This Section was developed largely based on the work of Keeley (Keeley et al., 2018)



Image Source: Ecological Design Lab

Helpful Tool: STAKEHOLDER MAPPING

Identifying project stakeholders and arranging them by their level of decision making power (direct decision making power, indirect, through to no power) helps to identify the appropriate level of engagement and engagement tactics. Understanding relationships between stakeholders can identify how and if key stakeholders' interests are interrelated.

To learn more visit:
ServiceDesignTools.org/tools/stakeholders-map

Likewise, it is important to be transparent and clearly communicate the goals and objectives of the project, including any implications the project may have for a group. Regular meetings, conferences, workshops, and webinars with project stakeholders and partners helps to facilitate important discussions. They also allow for these diverse groups to interact with each other in ways that public life does not always facilitate.

It is also critical to build public support for the project by articulating both the short term and long term project objectives and benefits. Highly visual outreach campaigns have been one of the most important tools for building public support. Research shows that the use of stories and non-technical language are the most effective tools for gaining public support.



Image Source: Green Infrastructure Toolkit Stakeholder Workshop, 2021

Phase 1 Developing a Shared Vision

The first step towards implementation is developing a shared vision. To develop a shared vision, a common goal or objective must be determined among project stakeholders and partners. It is important that a diverse range of stakeholders and partners are involved in the project in the first stage so that social, ecological, and economic outcomes can be proposed and integrated into the vision of the project. It is crucial for a diverse range of people with different interests and priorities to express their concerns and ideas for the project. For example, there may be differences of opinions from engineers from a structural standpoint versus an Indigenous community from a cultural perspective about where a wildlife connectivity bridge or corridor should be placed. It is important to identify these interests early and have the appropriate partners at the table so that these concerns do not come as a surprise during the project construction phase.

Helpful Tool:

THEORY OF CHANGE

Going beyond developing a shared vision, establishing a Theory of Change (TOC) can be a collaborative tool for strategic thinking and action. They are an effective approach to developing a guiding framework for all stages of thinking, action and sense-making for creating change.

Access the free Hivos Theory of Change Guide here:

[Hivos.org/document/hivos-theory-of-change](https://hivos.org/document/hivos-theory-of-change)



Image Source: Ecological Design Lab

Phase 2 Project Planning

After understanding and developing a shared vision of the intended outcomes, it is suitable to begin the project planning stage. Within this stage there should be three main elements in addition to designing the physical structure:

- A) Identify and communicate ecological objectives and ground them in data and scientific evidence;
- B) Seek to create co-benefits;
- C) Identify implementation tools.

A) Identify ecological objectives and ground them in data and scientific evidence.

First, disruptions to animal movement and connectivity are impacted by fragmented landscapes should be grounded in empirical data (i.e. camera traps, roadkill surveys etc.). This helps to convince data-driven stakeholders of the merit of crossing projects. These are typically participants who have high degrees of impact, but are often indirectly associated with project geography. In this way, rooting ecological objectives in data provides evidence that can help garner political support for project uptake.

If early and ongoing engagement occurs from the beginning of the project, there is an increased likelihood that stakeholders and partners will support research-driven recommendations that can be useful in the implementation of connectivity projects.



Image Source: Nina-Marie Lister

B) Seek to create co-benefits.

As discussed in this toolkit, there are a number of co-benefits that can come from wildlife connectivity projects for those affected by crossing development. Ensuring that the project creates these benefits, and furthers the promotion of these benefits through effective communication generates connectivity among diverse stakeholders, partners, and the public. Again, as much as data is an essential component of these projects it is equally important to communicate the shared benefits beyond impacts on wildlife.

Promoting co-benefits among non-traditional conservation actors such as planning agencies, recreation departments, water districts, and hunting organizations, to name just a few, generate project opportunities. For instance, effective conveyance of co-benefits can increase advocacy, provide greater sources of funding, and help to overcome implementation barriers grounded in community sentiment. Communicating how the benefits of connectivity go beyond the primary objectives of restoring landscape fragmentation reconciles conflicting objectives as stakeholders and the public come to understand how their interests can be achieved within a single project.

C) Identify implementation tools.

It is important to solidify the appropriate implementation tools in the pre-planning and planning stages. Agencies, for example, can be significant actors in implementing regulations early which can support connectivity projects and ensure coordination between internal and external agencies with different mandates. Support like this can provide partnership with political backing that can help guide successful implementation. Funding and incentives are key barriers that exist as a symptom to the problem of lack of political will. In turn, without funding, it can be difficult to comply with regulations. Incentive programs that are coupled with regulations can be an effective means of implementation that involve actors from the national, state, or local levels, and can be achieved through public-private partnerships, and collaboration among governmental agencies and private organizations. Identifying funding, incentive, and regulation strategies early in the planning process can help to identify which stakeholders and partners need to be involved throughout the project. Partnership and funding can often come from unexpected sources.



Image Source: Russ Sands

Phase 3 Project Construction

Engaging with the appropriate stakeholders, partners, and the public throughout the planning process should aid with successful implementation in the project construction phase. At this phase, it is important to acknowledge that engineers, ecologists, designers, and political actors may be at the forefront, however, it is important to remember that the structure will be embedded into the geographical context of an existing community. Ongoing engagement with community members, Indigenous communities, and anyone that the structure may directly impact must be engaged with prior to the construction stage to ensure that diverse perspectives are being brought forth to ensure that the project remains valuable and desirable in the surrounding landscape for reasons and benefits beyond ecological integrity and wildlife connectivity.



Image Source: Nina-Marie Lister

Phase 4 Project Monitoring

Upon completion of the project, it is important to keep partners, stakeholders, and the public engaged in the project. Project monitoring is one way that engagement can be maintained when the project is complete. Ownership of the project and proudness of successful implementation can be carried forward through volunteer participation in monitoring and maintaining the structure.

For example, the Banff National Park Volunteer Program offers a range of opportunities to participate in hands-on park stewardship activities involving their crossing infrastructure. The program consists of ambassador programs, corporate and group volunteering, and service learning experiences to integrate educational opportunities through research and customized experiences with wildlife fence checking, trail blitzing, etc. for positive service learning experiences that work to connect stakeholders and community members' dedication to conservation with the physical environment and ecological integrity of the parks.



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moose_2006_09_06_1_3877.JPG



Image Source: Tony Clevenger

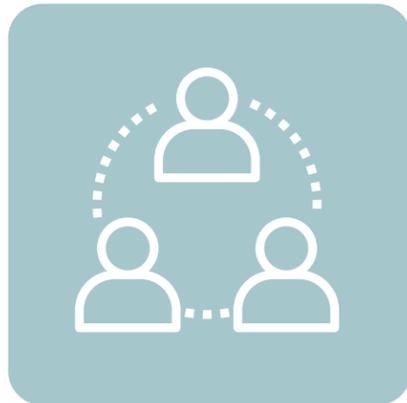
Engagement & Communication

The list co-benefits of crossings should be understood by and co-developed by both decision makers and the public.

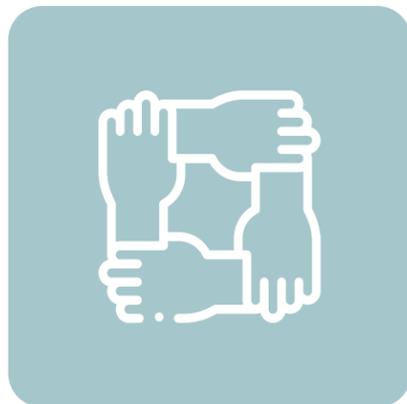


Engagement Principles: *Perspectives In*

These foundational principles ensure that engagement is effective and brings in essential community and stakeholder perspectives throughout the process of implementing a wildlife crossing. They are essential for collaboratively sharing and bringing in valuable information in the form of context, wants and needs, and perspectives. This information gathering will improve the appropriateness and increase the potential co-benefits of the final design and construction of the structure.



1 Seek Diverse Perspectives
The planning and design process of wildlife-crossing infrastructure should recognize the **importance of ensuring a variety of perspectives are proactively engaged in the process** to bring about efficiency and equity in the planning process. Conducting meaningful engagement with local and Indigenous communities, public and private sector stakeholders, and academics among other experts is integral for gathering a range of perspectives towards identifying a common ground which may enhance buy-in for wildlife-crossing projects. Buy-in from a robust background of communities may cultivate momentum and appreciation for the project which can be realized through collaboration.



2 Inclusive and Accessible Methods
The method of engagement should be inclusive and accessible in order to enable effective consultation and information sharing. It is imperative to **recognize the diversity of worldviews, lived-experiences, geographic constraints, and technology capabilities during engagement processes**. Ensuring that the engagement processes and methods are meaningful to and respectful of the experiences and perspectives of the participants involved is imperative to facilitate meaningful dialogue. Recognizing the limitations of formal engagement processes, providing alternative forms of communication and engagement to a wider audience from an inclusion, diversity, and equity perspective improves inclusion. This is imperative for an effective and truly meaningful engagement process to involve and empower collaborative decision-making.



3 Meaningful, Timely, and Ongoing
Ensuring that community members, indirect/direct stakeholders, and champions are engaged throughout the planning, implementation, and delivery stages of wildlife-crossing development is needed to cultivate meaningful co-benefits for all. The **engagement process must occur early on and throughout the planning process** to ensure that identifiable opportunities or constraints can be addressed in a timely and meaningful way. Engagement activities should cultivate meaningful dialogue by being considerate of the participants in attendance, tailoring messaging, questions, and co-benefits to these groups.



4 Project Champions
Project champions are essential engagement partners for bringing a project into public discourse, resulting in the support and development of wildlife-crossing infrastructure. Project champions can either be an individual or a group from a diverse range of backgrounds including from within government, private sector groups, a recognized figurehead, political actors, NGO's, or a local community member. Champions must be effective at communicating the importance of these projects to a variety of stakeholders, therefore enhancing the quality of feedback and likelihood of support for building crossings.



5 Recognize the Limitations
Engagement may involve collaboration between professionals and experts in the field; recognizing the multidisciplinary approaches of planning and implementation. Although a top-down approach of engaging with professionals and experts may share valuable perspectives and expertise, this limits valuable community-based perspectives. **It is important to question, 'who is not in the room' at each stage of the process**. Ensuring the perspectives of grassroots community members are leveraged and recognized should be considered from an equity perspective, as wildlife-crossing infrastructure cultivates a holistic, and shared public benefit.

Helpful Tool: IAP2 SPECTRUM OF PUBLIC PARTICIPATION

IAP2's Spectrum of Public Participation can help with selection of the appropriate level of participation the public should have through the engagement process. The levels of engagement include inform, consult, involve, collaborate and empower.

View the spectrum here to learn more: iap2.org/resource/resmgr/pillars/Spectrum_8.5x11_Print.pdf

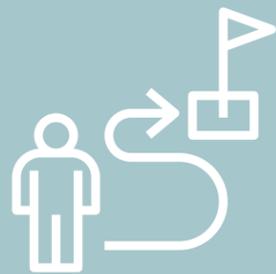
Engagement Example: Facilitating a Workshop

With consideration of the higher-level principles of engagement, a strategy towards knowledge-sharing, interchange of perspectives, and overall, collaboration for the planning and implementation can be facilitated through a workshop. An example of an interdisciplinary engagement workshop was conducted for the development of this toolkit. The following highlights the process of facilitating a workshop, from the preliminary phases to post-delivery:

Planning

The preliminary stages of planning a workshop involves **identifying the purpose, goals, and objective of the workshop**. With consideration of the overall purpose, goals, and objective, participants (stakeholders) are to be invited in advance and in accordance to ensure the event will enable meaningful collaboration. Ensuring a multidisciplinary attendance and a variety of perspectives is imperative for critical discussion and collaboration.

Designing the workshop activities and selecting a platform for engagement are important components of workshop planning, which are informed by the overall purpose, goals, and objectives of the workshop.



Purpose



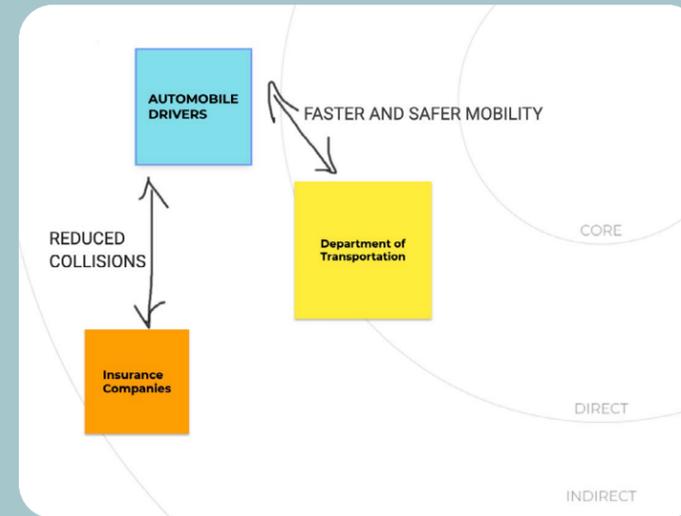
Goals



Objectives

Delivery

Ensuring the structure of the workshop corresponds with the purpose, goals, and objectives is imperative for a successful and efficient workshop. Leveraging the assets of participants through the **sharing of knowledge and ideas through engaging and collaborative activities** is beneficial, thus ensuring activities are conducted within a “common language,” rather than the usage of jargon and industry-specific activities is essential in a multidisciplinary, broader workshop.



Helpful Tool:

GOOGLE JAMBOARD

There are many interactive digital platforms that can be used for workshops including MIRO, Mural and Google Jamboard.

To learn more visit:

[Edu.google.com/teacher-center/products/jamboard](https://edu.google.com/teacher-center/products/jamboard)



Reflection

Providing a platform or venue for post-workshop reflection and sharing is a great way to encourage dialogue and invite further collaboration. This helps enrich both the perspectives gathered and the relationships built during engagement. When reflecting on the workshop and the participants who attended, consider missing perspectives and how those might be addressed or involved in the future.

Image source from top to bottom: Green Infrastructure Toolkit Stakeholder Workshop; Ecological Design Lab



Communication Imperatives: Messaging Out

These four communications imperatives ensure that communications are effective and send the right message to the right community and stakeholders throughout the process of implementing a wildlife crossing and beyond. This kind of information sharing will improve the understandings and awareness of the co-benefits of green infrastructure by key stakeholders and the public.



Image source: Tony Clevenger

1 Foster a Connection to Nature

Creating communication materials such as informational brochures, interactive websites, and experiential videos geared towards the public helps to broaden the understanding of wildlife-crossings and should cultivate a better sense of appreciation. **Showing people the specific plants, animals, and overall ecosystem that is supported can make a person feel more familiar with and have more respect for something they have grown to know more intimately.** Fostering this deeper connection to nature allows members of the public to see and understand the importance of wildlife-crossings from an ecological and landscape connectivity perspective, as well as the human value as a venue for connecting with nature.



Image source: <https://unsplash.com/photos/JLpDkdcucel>

2 Communicate Public and Individual Connections

While it is important to communicate increased landscape-connectivity and the ecological benefits of the projects, **conveying the broader public and individual co-benefits is imperative.** Sharing stories of greater access to native medicinal plants, increased active transportation connections, and better hunting conditions to name a few can help in conveying this.

Wildlife-crossings should also incorporate opportunities for non-invasive interaction, allowing the public to recognize, appreciate, and advocate for more wildlife infrastructure. Incorporating a feature such as a live-streaming camera, a visitor centre, or a lookout allows for co-existence to thrive from human engagement and connection to nature while keeping animals and humans at a safe distance.



Image source: The Meadoway

3 Persuasive Messaging and Visualization

Messaging around co-benefits should be paired with inspiring and illustrative visuals. Crossings and their co-benefits can be hard to articulate in speech or language, but are much more **clearly illustrated through drawings, renderings, or other visual aids like animations.** Data visualization can be persuasive tools that also ground the effectiveness of crossings with evidence. Visualizations can show what exists and what is envisioned for the future and the opportunities of what wildlife-crossing infrastructures could become.



Image Source: <https://unsplash.com/photos/aggQPDdNXEWY>

4 Messaging that Resonates with Diverse Audiences

It is imperative to recognize the diversity of lived-experiences, perspectives, and worldviews when engaging communication material to the public. Ensuring that **communication material resonates with a broader audience which considers diversity in age, gender, culture, lived-experiences, and worldviews** can be leveraged from emphasizing the importance of human connection to nature. Providing communication material to cultivate recognition and appreciation starts from the recognition of diversity within the public.

Helpful Tool: COMMUNICATIONS PLANNING

Creating a communications plan, much like a crossing, can be quite simple or very complex. Planning messaging ahead can make for effective and efficient campaigns. One part of a successful communications plan can include various social media platforms.

Access a free social media planner here: offers.hubspot.com/social-media-content-calendar

Idea Portfolio

Inspiration for taking action to promote awareness and uptake of building more crossings.

Actionable Ideas for Communications

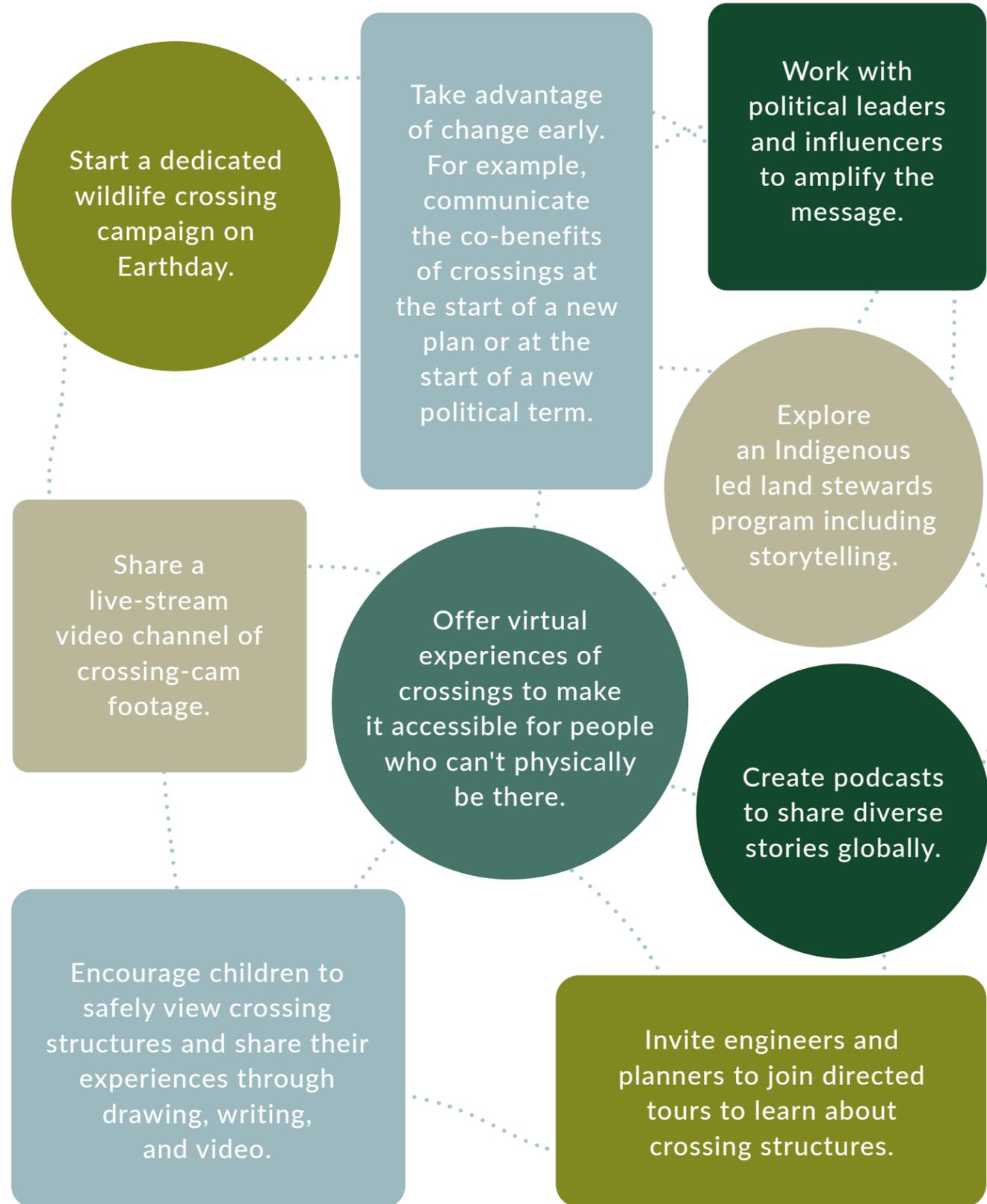
Throughout the development of this toolkit, ideas for communicating the green infrastructure co-benefits of crossing structures were shared by experts and key stakeholders in the field. Interviews and a collaborative workshop with participants from across North America generated countless actionable ideas for campaigns, programs, media and more. Each idea connects to the broader need for increased understanding, desire, and action towards implementing wildlife crossings.

Recognizing the potential opportunities of wildlife-crossings beyond just a physical infrastructure, our research and collaborative workshop have informed several creative ways to amplify the co-benefits of wildlife-crossings to the broader public. Here, we show creative communication opportunities that could be implemented in the future to ensure that the public recognize how they may benefit from these projects. We call this the “ideas portfolio”.

Overall, finding ways to enable opportunities for recognition and appreciation of wildlife-crossings will hopefully inspire more to be built in the future.



Image source: Ecological Design Lab



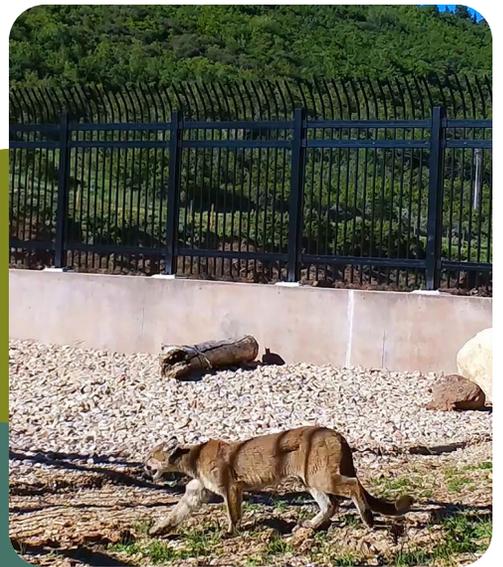
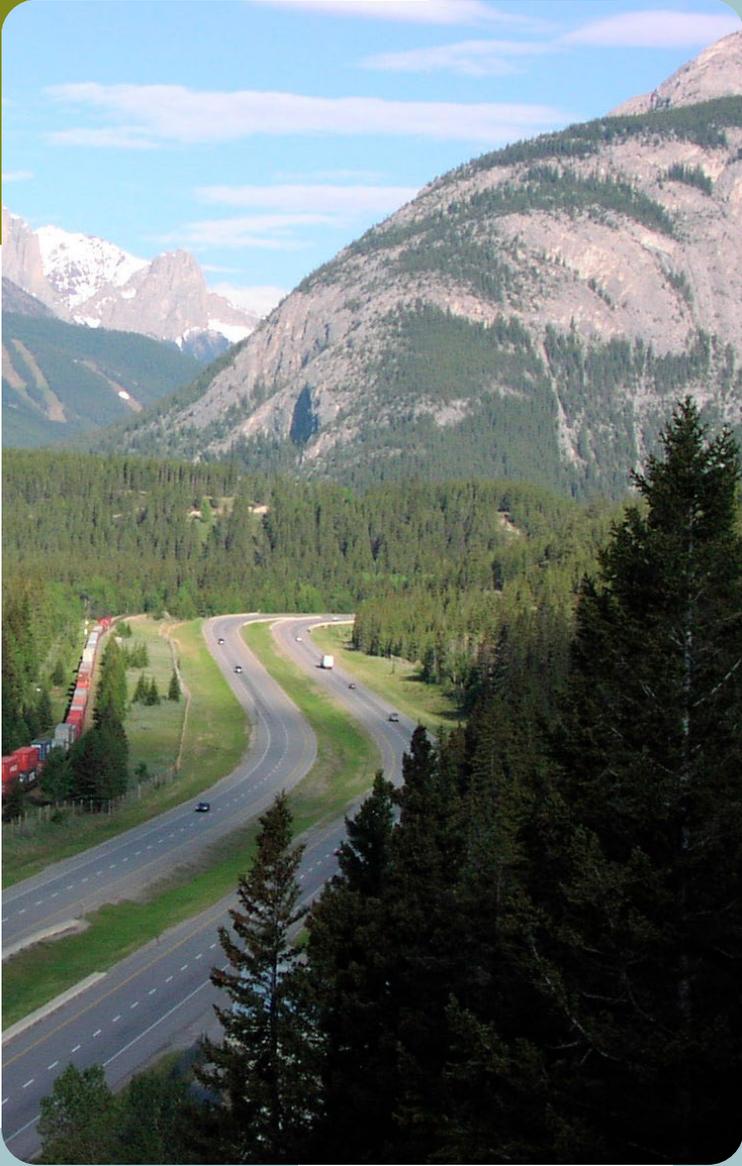
Keep the ideas coming!

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This work was built on the shoulders of many who have been working to solve this connectivity problem for decades.

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