

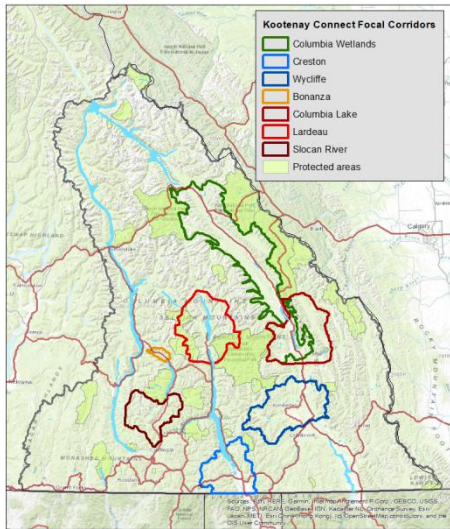
Environment and Climate Change Canada
Canada Nature Fund: Community-Nominated Priority Places for
Species at Risk



Kootenay Connect: Science – YR7

Contract 2025/26 Birchdale 01

Project:
Kootenay Connect – Science – YR7
2025-2026 ANNUAL REPORT March 2026



Kootenay Connect Priority Places is a project facilitated by the Kootenay Conservation Program and funded by Environment and Climate Change Canada



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Overall, this Environment and Climate Change Canada Community Nominated Priority Places project has brought significant and lasting improvements to the Kootenay Region’s Species at Risk habitats, riparian wetland complexes, landscape-level connectivity, protected land base, and conservation community through the work of its many partners. The work has resulted in much hands-on, bottom-up, real-world conservation. Our efforts have been vigorously science-based, and we hope programs such as this continue into our future.

This report summarizes 7 years of conservation thinking, actions, and advice provided by Michael Proctor to the Kootenay Connect Priority Places’ Environment and Climate Change Canada Nature Fund: Community-Nominated Priority Places for Species at Risk project.

Kootenay Connect initially worked in 4 corridors (Figure 1a) within the Kootenay region between 2019 and 2023. After 4 years of funding and work in these corridors, we added an additional 3 corridors, now totalling 7 (Figure 1b), where we worked between 2024 and 2027.

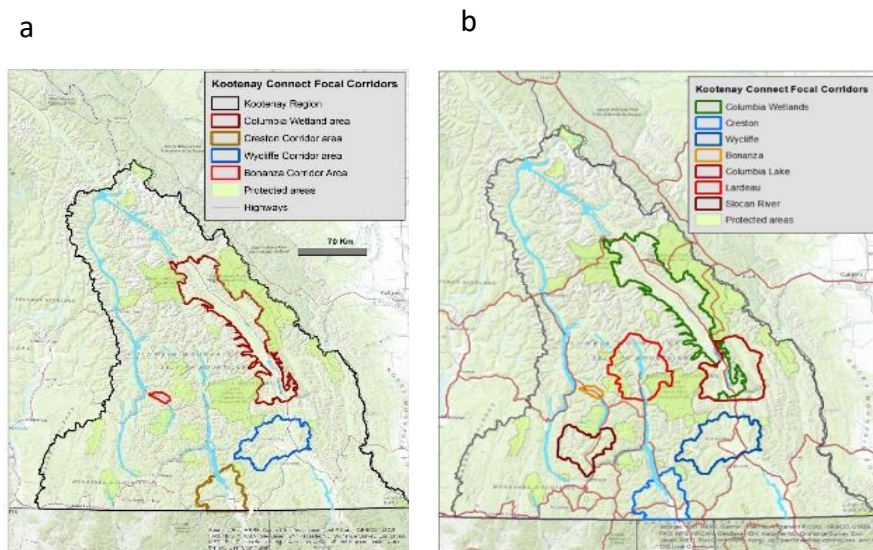


Figure 1a) In 2019, Kootenay Connect Priority Places started with 4 focal Ecological Corridors, including Columbia Wetlands, Wycliffe Corridor, Creston Valley, and Bonanza; **b)** in 2022, the project expanded to include 3 additional areas, Columbia Lake, Slokan River Valley, and Duncan-Lardeau.

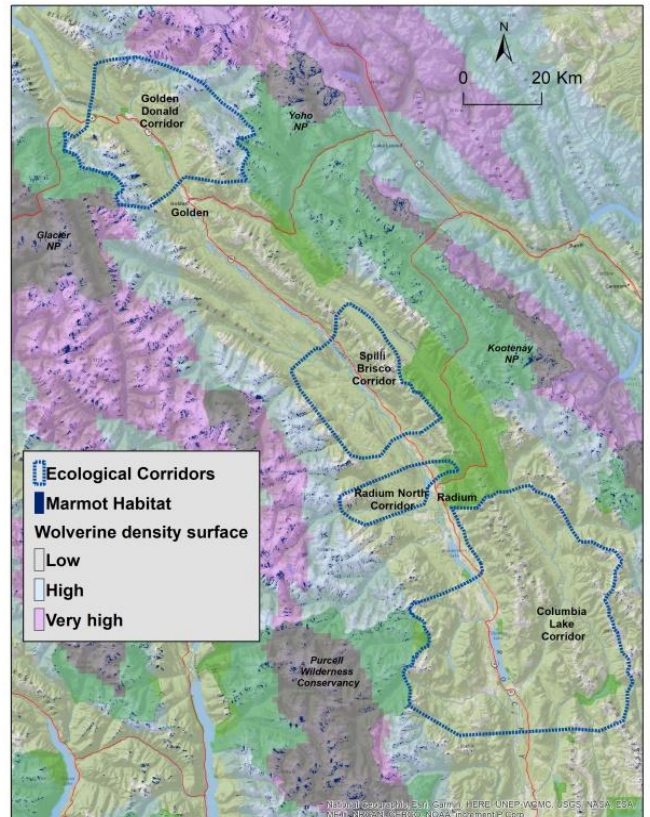
One of our goals was to gather and interpret scientific data for a suite of indicator species to identify cross-valley corridors within the Columbia Valley in the East Kootenays. The ultimate goal of this exercise was to identify valley bottom-upland habitats that would be managed for animal movements by a variety of jurisdictions included within Kootenay Connect Priority Places’ project, but also to be integrated into the goals of several land trusts (e.g., Nature Conservancy Canada and The Nature Trust of BC), farm

advisors within Farmland Advantage working with agricultural landowners, and land planning and management activities by the Province of BC and the Regional District of East Kootenay. We chose six indicator species because of their wide-ranging movements using a broad array of habitat types, and pragmatically because there was some level of data for their density, habitat, or corridor areas. The indicator species are grizzly bear, badger, wolverine, elk, mountain goat and bighorn sheep. Grizzly bears had the most rigorous habitat, movement and corridor data that had been mapped and peer-review published (Proctor et al. 2012, 2015). Wolverine density had been mapped and published (Mowat et al. 2020). Badger habitat quality had been published (Kinley et al 2014) and elk habitat mapping based on nearby telemetry data was commissioned by Kootenay Connect (Mulligan 2020). Mountain goat winter habitat was mapped by the Province of BC (Ross and Vander Vennen 2020), and bighorn sheep summer and winter habitat had been reported (Poole and Ayotte 2020) (Figure 2).

Grizzly bear habitat & connectivity



Wolverine density



Badger, Mt Goat habitat and Big Horn Sheep winter & summer range

Elk habitat

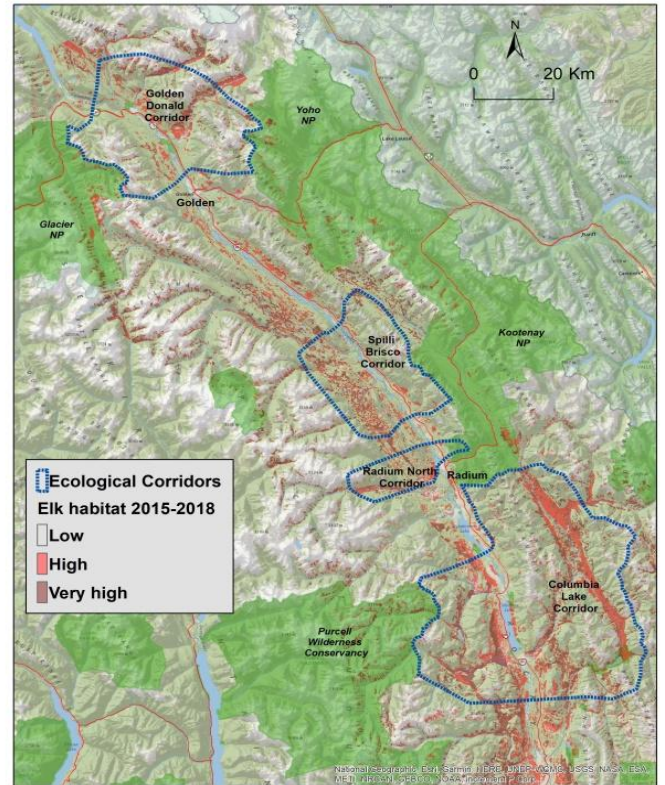
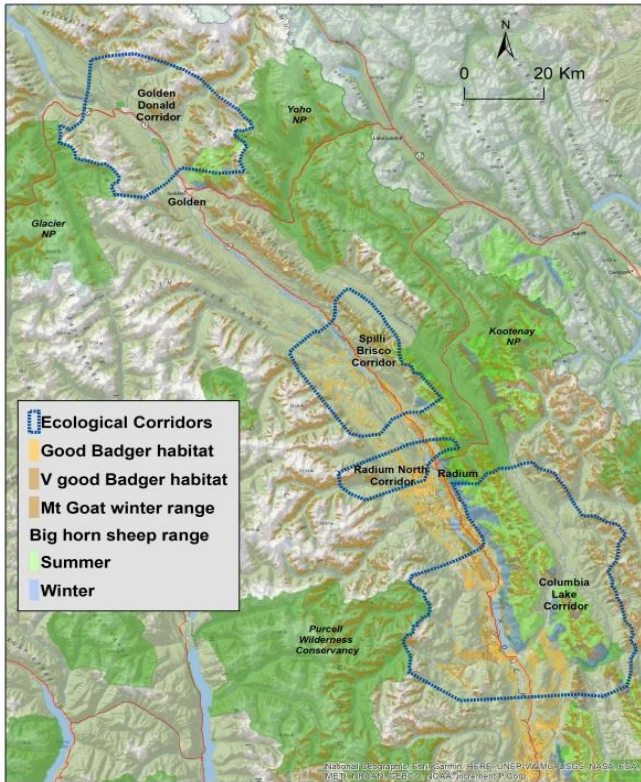


Figure 2) Habitat maps of indicator species used by Kootenay Connect to inform upland wildlife corridors across the Columbia Valley in the East Kootenays.

In addition to gathering large mammal habitat data, we invested in gathering as much available species at risk data as was available. Biologist Rachel Darvill, prepared an extensive literature review and conduct field surveys of much of the Columbia Valley (Darvill 2022). We provided mapping assistance through Marie-Ange Fornier-Beck (Vivid Geographic Inc.) (Figure 3a, b, & c). Darvill included more detailed work Western Painted Turtles, Bank Swallows, and Beaver (Figure 3 c & d, Darvill 2020a & b, 2021, 2022, 2023, 2024, 2025, 2026)¹.

¹ Find Rachel Darvill’s reports for Kootenay Connect: <https://kootenayconservation.ca/columbia-valley-species-at-risk/>

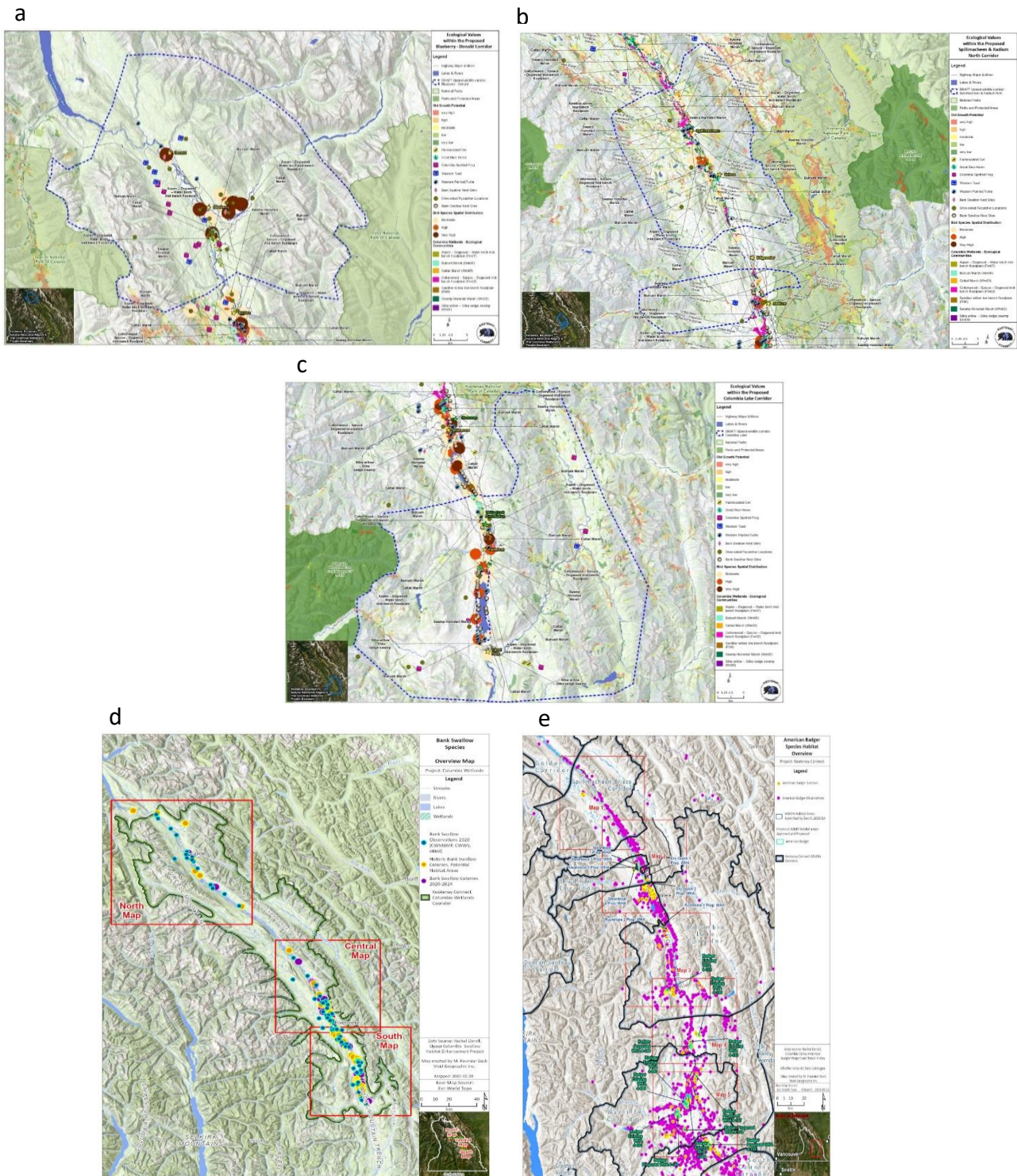


Figure 3) Species at Risk survey results on the **a)** Golden-Donald, **b)** Spillimacheen-Brisco, **c)** Radium and Columbia Lake corridors along the Columbia Valley in the East Kootenays, **d)** bank swallow nest survey results, and **e)** badger burrows and observations in the southern portion of the Columbia Lake corridor.

Over several years, we refined boundaries for four main cross-valley corridors along the Columbia Valley. We extended their boundaries to connect protected areas to be consistent with principles outlined in the IUCN's Connectivity document (Hilty et al., 2020, and the Canadian ECCC's Connectivity guidelines (<https://www.canada.ca/en/parks-canada/news/2022/04/government-of-canada-launches-new-national-program-for-ecological-corridors.html>) – ultimately developing a landscape-level network of corridors connecting protected and conserved areas.

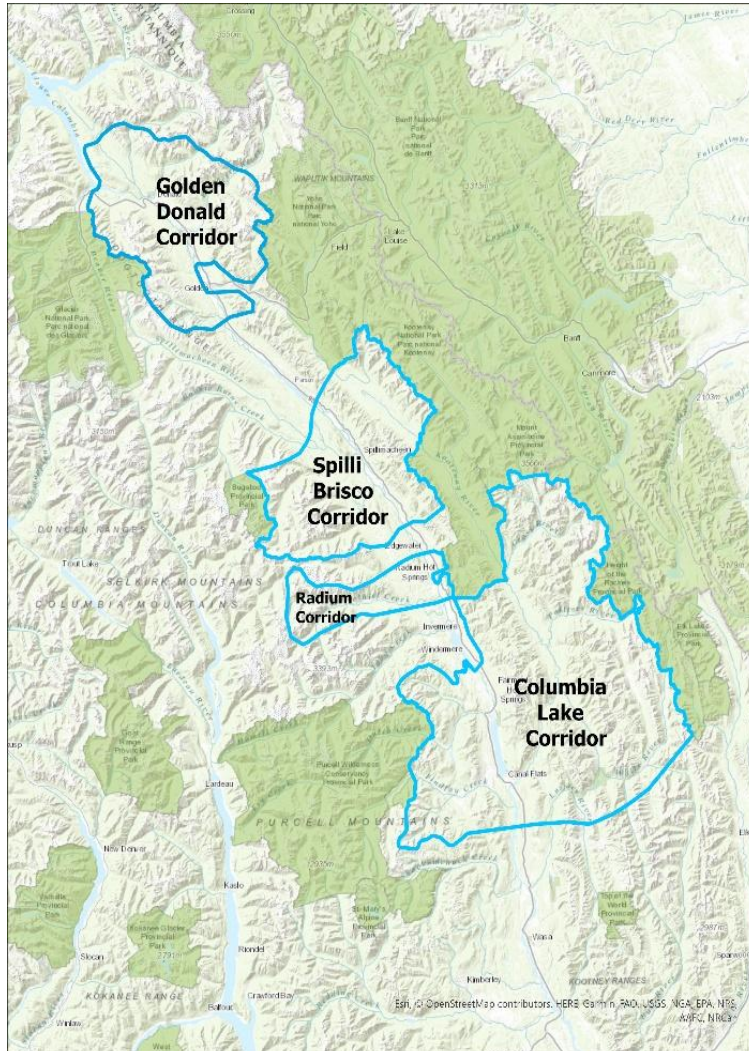


Figure 4. Four cross-valley corridors along the Columbia Valley connecting the Rocky and Purcell mountain ranges.

A similar effort was undertaken with local group to identify private land for conservation opportunities across these 3 corridors: Creston, Wycliffe, and Bonanza.

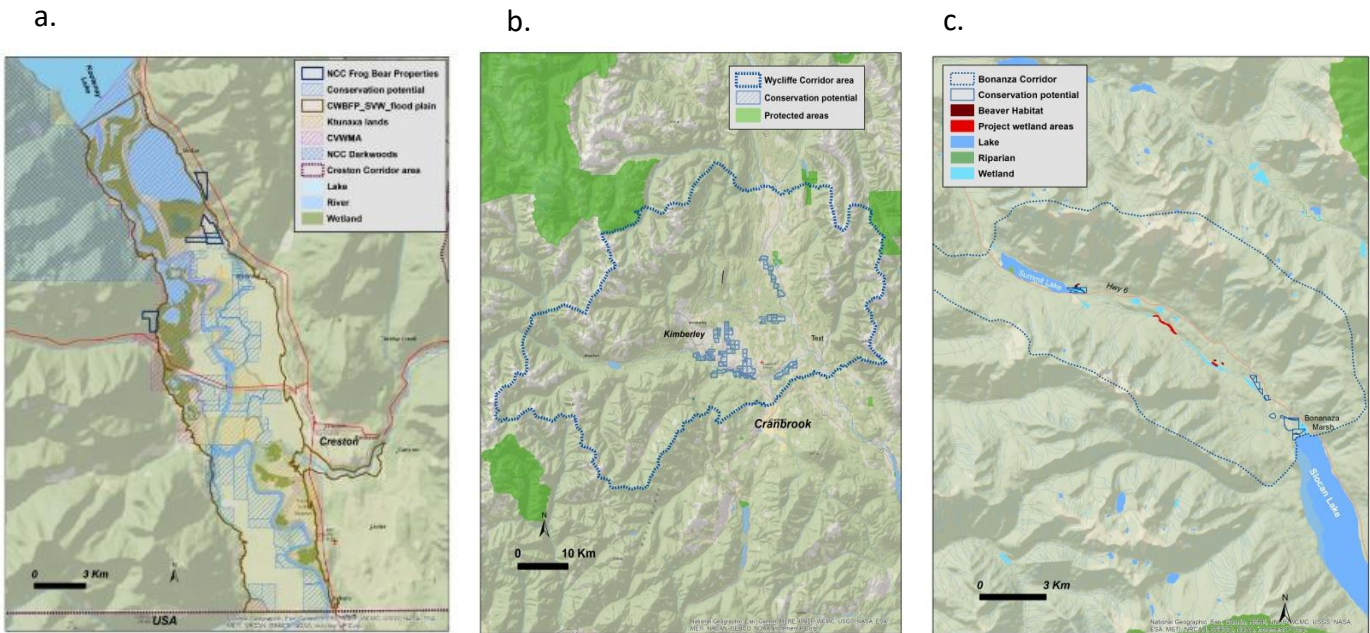


Figure 6) Properties with conservation potential in a) Creston Valley, b) Wycliffe Corridor, and c) Bonanza Corridor.

Across the 7 years of this effort, land trusts have purchased 11 properties encompassing 4,412 hectares (44km²) of private lands within the Kootenay Connect Priority Places corridors. The Nature Conservancy Canada purchased 3 properties totalling 3,734 ha and The Nature Trust of BC purchased 8 properties totalling 678 ha.

After KCP and its partners completed our first 4-year contract with ECCC in 2023, Marcy Mahr and I penned a 4-year summary to document the extensive accomplishments and partnerships as well as the scientific background for the work².

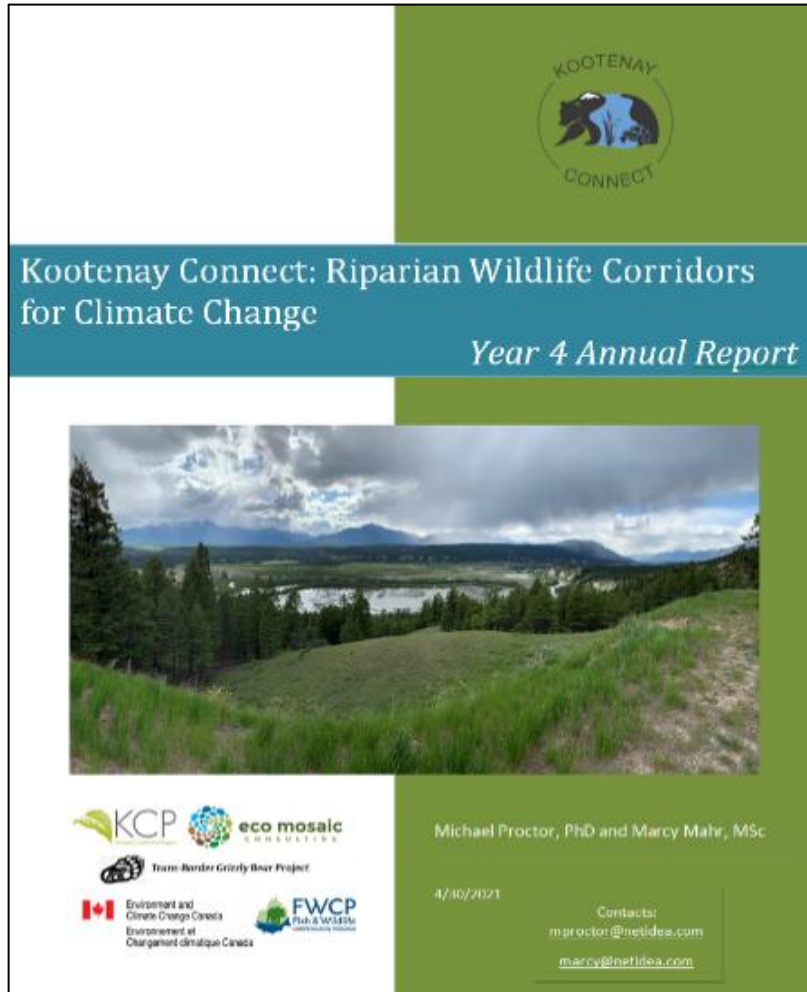


Figure 7. Report summarizing 4 years of activities carried out with the ECCC Community Nominated Priority Places grant to Kootenay Connect.

² Proctor and Mahr. 2023. https://kootenayconservation.ca/wp-content/uploads/2024/07/KC-Year-4-Summary-Report_30Sep2023-FINAL.pdf

For each corridor we partnered with conservation ecologist Greg Utzig to provide assessments of predicted ecological changes because of climate disruption (Figure 8). Providing a “climate change lens” to each of the focal landscapes, informed Utzig’s stewardship and land use recommendations for how to minimize the negative impacts and maximize ecosystem resilience to climate change (Utzig 2020, 2021, 2022, 2025a, 2025b, 2026). The map in Figure 8 is a composite of 5 separate climate change analyses overlaid with Kootenay Connect’s 7 corridors.

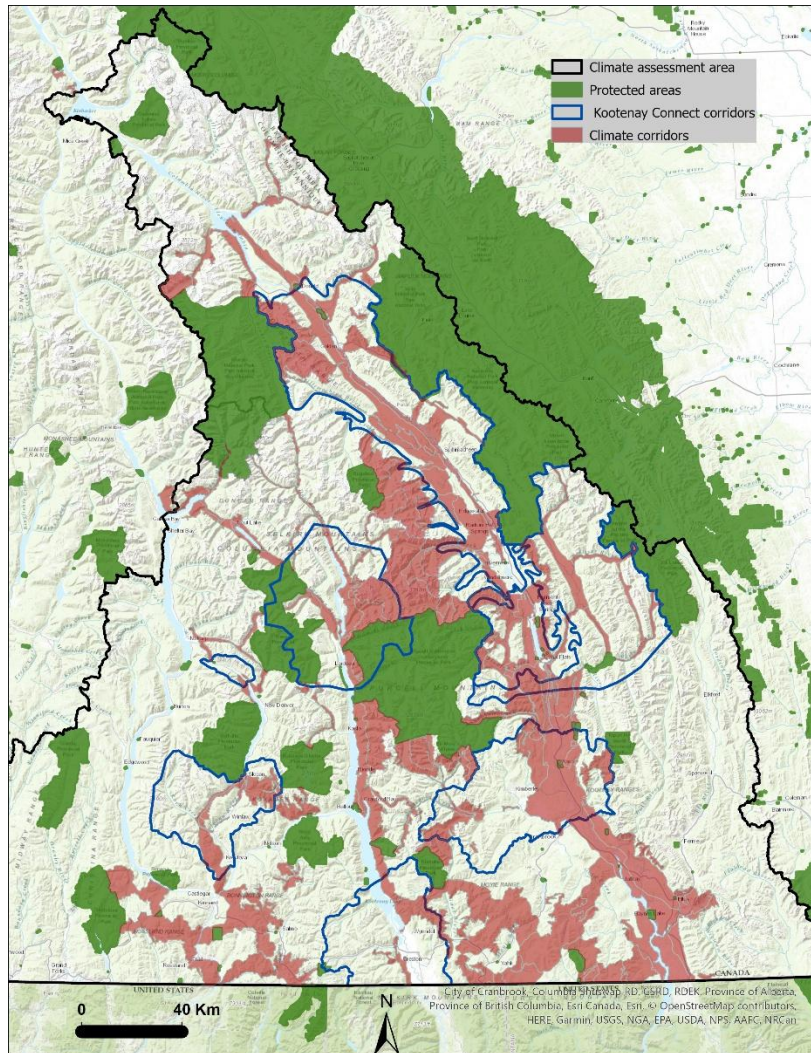


Figure 8. Climate corridor network (red) across the Columbia Region based on assessments by Utzig from 2020-2026.

Utzig's climate resilience recommendations centre on several themes including water retention in riparian and wetland habitats, minimizing catastrophic wildfire, and ecosystem management to enhance adaptation and resilience. Below is a summary of suggested recommendations for land managers from 7 regional corridor-specific reports (Utzig 2020, 2021, 2021, 2025a, 2025b, 2026).

WATER RETENTION

- in riparian wetland complexes, ensure water sources are not interrupted by disturbance activities
- explore opportunities for protection and enhancement of water levels
- conserve wetlands, ponds, ephemeral streams and seepage areas:
- inventory and monitor of changes in water levels
- classify according to vulnerability to climate change
- protect and enhance riparian areas along streams and rivers, as well as wetlands and lakes –
- minimize disturbance to riparian areas, restore native vegetation, and minimize upstream disturbances that may increase peak flows and/or reduce low flows
- CW - maintain and potentially expand monitoring of streamflow, glacial retreat, seasonal wetland water levels and groundwater contributions
- CW - utilizing existing historical data, current modeling outputs and GCM projections develop models to better project changes to seasonal flows of water inputs and water levels in the wetlands themselves as a basis for developing strategies to minimize future risks

FIRE RESISTANCE TO AVOID CATASTROPHIC FIRES

- expand the area and rate of trench ecosystem restoration activities, consistent with creating fire resilient communities throughout the lower elevations of the Trench south of Golden and other areas projected to shift to areas frequented by drought and frequent wildfire regimes, including:
- remove forest in-growth and ladder fuels (e.g. Utzig 2019)
- reduce stand densities (to reduce risk of crown fires and build resilience to drought and forest pests)
- protect large fire-resistant trees (ponderosa pine, Douglas-fir and western larch) re-introduce low intensity fire, and make controlled burning a primary ecosystem management tool
- carefully plan wildfire fuel treatments to prioritize and protect riparian zones along water courses, ponds and wetlands (including consideration of fuel breaks along stream channels where appropriate to ensure riparian zones do not become fire corridors)
- reduce fire risk to riparian communities
- protect and enhance riparian areas along streams and rivers, as well as wetlands and lakes – minimize disturbance to riparian areas, restore native vegetation, and minimize upstream disturbances that may affect peak flow
- monitor and manage outbreaks of forest pests where possible (utilizing environmentally acceptable methods)
- protect and enhance deciduous trees and stands – trembling aspen, cottonwood and paper birch control invasive plants – especially during ecosystem restoration activities
- minimize salvage harvesting operations

- where wildfire salvage operations are undertaken, ensure that they follow biodiversity conservation best management practices (e.g., Larson et al. 2022, BC MoF 2023)
- salvage operations should avoid all live tree removal
- limit salvage operations to no more than 25% of the burned area (Thorn et al. 2020)
- monitor and manage outbreaks of forest pests where possible (utilizing environmentally acceptable methods)
- where livestock grazing occurs, manage it to reduce wildfire hazards, and keep livestock out of riparian areas
- protect and enhance deciduous trees and stands – trembling aspen, cottonwood and paper birch
 - Columbia Lake - given the potential for expansion of ICH bioclimates and possible arrival of Coastal Hemlock bioclimates in the Rockies subarea, protect and conserve all existing areas of ICHmw5 in the Rockies subarea to provide potential seed sources for appropriate species

ECOSYSTEM MANAGEMENT

- control invasive plants – especially during ecosystem restoration activities
- further habitat inventory and monitoring to increase understanding of focal species utilization of the corridor, including the identification of seasonal locations, migration routes, and where appropriate, to identify potential range shift linkages necessitated by climate change
- 10 further assessment of key mountain passes within the corridor including those offering connectivity across the Continental Divide; should include habitat inventory and topographic analysis to set priorities for conservation; assessment must include both sides of the passes, in some cases on the BC and Alberta sides of the passes
- 11 protect old growth forests to maintain genotypes that have survived the previous warm dry period early in the last century; research species and genotypes not present in the area, which may be better adapted to projected climates
- research species and genotypes not present in the area, which may be better adapted to projected climates; consider trials with suitable genotypes and species potentially leading to assisted migration

Concluding thoughts:

While Ecological Corridors were being considered across the globe, in 2018 Kootenay Connect was born out of a long-term grizzly bear connectivity project. The necessity of thinking beyond single species to biodiversity and ecosystems became apparent; coupled with the need to re-connect fragmented habitats at a regional scale. Completion of our 2019 report, *Kootenay Connect: Riparian Wildlife Corridors for Climate Change: Preliminary Analysis* was well-timed and provided an excellent science-based framework for teaming up with KCP and a dozen of its partners to respond to a call for proposals for ECCC's Community-Nominated Priority Places program funded by the Canada Nature Fund. This grant focused on conserving Species at Risk and restoring habitats they depend upon. While following the grant guidelines, we expanded on that idea to go region-wide with 4 “priority places” and focus on improving habitats for 34 species at risk. With four focal areas and a dozen local partners, we pitched our proposal as a landscape-level response to the biodiversity and climate crises occurring in the Kootenays and worldwide.

Such an ambitious idea was only possible because the Kootenay region had a rich culture of collaborating conservation biologists and strong history of conservation action. Our idea came at a fortuitous time when our forward-thinking was matched with substantial funding opportunities and many local experienced partners ready to get to work. The entire Kootenay region with all its diverse ecosystems has benefited from 7 years of conservation leadership, new information, and over 60 on-the-ground projects. Species from western painted turtles to northern leopard frogs to badgers and grizzly bears have all benefited from habitat restoration and protection. We applaud, and are grateful for, ECCCs vision and support of Kootenay Connect Priority Places from 2019-2026.

LITERATURE CITED

- Darvill, R. 2020a. Kootenay Connect: Columbia Wetlands, Literature review of species at risk in the Columbia Valley. Prepared for Columbia Wetlands Stewardship Partnership and Kootenay Connect. Goldeneye Consulting, Golden, BC. Available: https://wildsight.ca/wp-content/uploads/2016/01/CWWS-2015_2019-Final-Report_Jan-2-2020.pdf.
- Darvill, R. 2020b. 2015-2019 Columbia Wetlands waterbird survey. Prepared Wildsight Golden. Goldeneye Consulting, Golden, BC.
- Darvill, R. 2021. Kootenay Connect: Columbia Wetlands, Year 3 (2022) Conservation Planning for Species at Risk in the Columbia Wetlands. Prepared for Columbia Wetlands Stewardship Partnership and Kootenay Connect. Goldeneye Consulting, Golden, BC.
- Darvill, R. 2022. Kootenay Connect: Columbia Wetlands, Year 3 (2022) Conservation Planning for Species at Risk in the Columbia Wetlands. Prepared for Columbia Wetlands Stewardship Partnership and Kootenay Connect. Goldeneye Consulting, Golden, BC.
- Darvill, R. 2023. Kootenay Connect. Columbia Wetlands. Restoration of habitats and species at risk on the Columbia Valley. Year 4 Final report. Prepared for Columbia Wetlands Stewardship Partnership and Kootenay Connect. Goldeneye Consulting, Golden, BC.
- Darvill, R. 2024. Kootenay Connect. Columbia Wetlands. Restoration of habitats and species at risk on the Columbia Valley. Year 5 Final report. Prepared for Columbia Wetlands Stewardship Partnership and Kootenay Connect. Goldeneye Consulting, Golden, BC.
- Darvill, R. 2025. Kootenay Connect. Columbia Wetlands. Restoration of habitats and species at risk on the Columbia Valley. Year 6 Final report. Prepared for Columbia Wetlands Stewardship Partnership and Kootenay Connect. Goldeneye Consulting, Golden, BC.
- Darvill, R. 2026. Restoration of habitats and species at risk in the Columbia Valley. Year 7 (2025-2026) Summary Report (2019-2026). Prepared for Columbia Wetlands Stewardship Partnership and Kootenay Connect. Goldeneye Consulting, Golden, BC.
- Hilty, J., G. Worboys, A. Keeley, S. Woodley, B. Lausche, H. Locke, M. Carr, I. Pulsford, J. Pittock, W. White, D. Theobald, J. Levine, M. Reuling, J. E. M. Watson, R. Ament, and G. Tabor. 2020. *Guidelines for Conserving Connectivity through Ecological Networks and Corridors*. Gland, Switzerland: IUCN.
- Kinley, T. A. J. Whittington, A. Dibb, and N. J. Newhouse. 2014. Badger resource selection in the Rocky Mountain Trench of British Columbia. *Journal of Ecosystems and Management* 14:1–22.
- Mowat, G., A. P. Clevenger, A.D. Kortello, D. Hausleitner, M. Barrueto, L. Smit, C. Lamb, B. Dorsey, and P. K. Ott. 2020. The sustainability of wolverine trapping mortality in southern Canada. *Journal of Wildlife Management* 84:213–226. <https://wildlife.onlinelibrary.wiley.com/doi/pdf/10.1002/jwmg.21787>
- Mulligan, K. 2020. Long term changes in East Kootenay elk migration patterns. Master of Science Thesis. Department of Biological Sciences, University of Alberta. Edmonton Alberta.

- https://era.library.ualberta.ca/items/14be4f13-aefd-46d4-a435-867e67be6bb6/view/3ca93d4b-9839-413f-8300-fbd38ab5f09a/Mulligan_Kelly_202101_MSc.pdf
https://www.fs.fed.us/rm/pubs_journals/2015/rmrs_2015_parks_I001.pdf
- Poole, K. G., and J. Ayotte. 2020. Kootenay Region Big Horn Sheep Management Plan. FLNRORD Cranbrook BC.
- Proctor and Mahr. 2023. Kootenay Connect: Riparian wildlife corridors for climate change. Year 4 Summary Report.
- Proctor, M.F., D. Paetkau, B.N. McLellan, G.B. Stenhouse, K.C. Kendall, R.D. Mace, W.F. Kasworm, C. Servheen, C.L. Lausen, M.L. Gibeau, W.L. Wakkinen, M.A. Haroldson, G. Mowat, C.D. Apps, L.M. Ciarniello, R.M.R. Barclay, M.S. Boyce, C.C. Schwartz, and C. Strobeck. 2012. Population Fragmentation and Inter-Ecosystem Movements of Grizzly Bears in Western Canada and the Northern United States. *Wildlife Monographs* 180:1-46.
- Proctor, M. F., S. E. Nielsen, W. F. Kasworm, C. Servheen, T. G. Radandt, A. G. MacHutchon, and M. S. Boyce. 2015. Grizzly bear connectivity mapping in the Canada-US trans-border region. *Journal of Wildlife Management* 79:544–555.
- Ross, S., and L. Vander Vennen. 2020. Mountain goat winter range distribution model and mapping: southeastern British Columbia. FLNRORD. Nelson BC.
- Utzig, G. 2019. Conservation Planning in the Face of Climate Change: a case study in southeastern British Columbia. <https://kootenayresilience.org/conservation-planning>.
- Utzig, G., R. F. Holt, and A. Bezzola 2020. Map series: Potential priority stands for old growth protection and recruitment in southeastern British Columbia. Kutenai Ecological Investigations and Veridian Ecological Consulting, Nelson BC. Canada.
- Utzig, G. 2020. Climate disruption and connectivity in the West Kootenays: An introduction with two examples. Prepared for Kootenay Connect. Kutenai Ecological Investigations. Nelson BC.
- Utzig, G. 2021. The Columbia Wetlands and climate disruption. Prepared for Kootenay Connect. Kutenai Ecological Investigations. Nelson BC.
- Utzig, G. 2022. The Wycliffe corridor and climate disruption. Prepared for Kootenay Connect. Kutenai Ecological Investigations. Nelson BC.
- Utzig, G. 2025a. The Columbia Lake corridor and climate disruption. Prepared for Kootenay Connect. Kutenai Ecological Investigations. Nelson BC.
- Utzig, G. 2025b. The southern Slokan corridor and climate disruption. Prepared for Kootenay Connect. Kutenai Ecological Investigations. Nelson BC.
- Utzig, G. 2026. The Duncan-Lardeau corridor and climate disruption. Prepared for Kootenay Connect. Kutenai Ecological Investigations. Nelson BC.