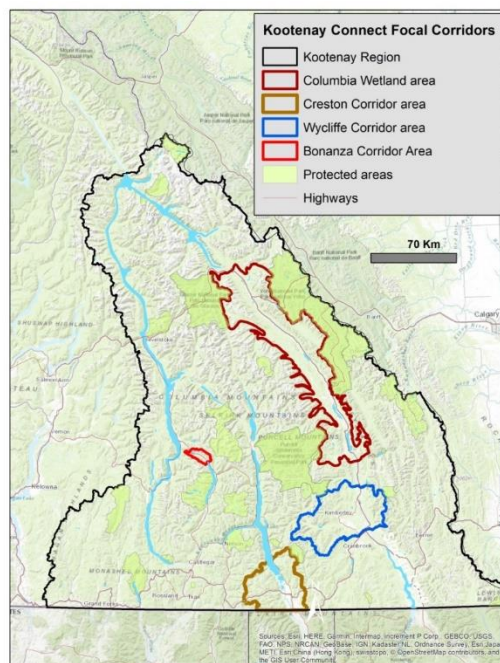*Trans-Border Grizzly Bear Project*

Kootenay Connect: Science

Science and GIS applied to Kootenay Connect's 4 Focal Areas

Projects: 12GL-GIS, 1GL-NCCNTBC, 12GIS-CC

2019-2020 FINAL REPORT

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

Deliverable 1: GIS mapping across Kootenay Connect's 4 focal areas

Objectives of mapping

One of Kootenay Connect's goals is to understand and gather under one roof, the inter-relatedness and integration of current species at risk and culturally important species across our focal corridors, i.e., what is known about them in terms of observations, nesting sites, habitat use, connectivity habitats, critical habitats including nesting, breeding foraging, wintering, threats, and conservation opportunities. Also important are the landscape attributes underlying their ecology, habitat types and variables, current land uses and designations, political jurisdiction, land ownership and human disturbance attributes. And further, how the above conservation efforts be understood and managed through a climate change adaptation lens.

Because of the large numbers of species at risk and culturally important species in our focal areas (75, see SAR list by focal area), we needed to develop some baseline data, including map products, GIS layers, and accumulated knowledge. Among other needs, this is to be used to assess ecologically related landscape patterns to inform and guide our work and identify knowledge gaps. For example, we need to look for any patterns between multiple species at risk and their habitat types and then look for biodiversity hotspots that might require protection, restoration, better management and climate adaptation management. We also need to assess connectivity habitat from a multi-species perspective. These efforts require an extensive spatial database, that we are assembling and is an ongoing endeavor.

We also need to be able to display and represent the work we have done and our results across all 4 of our focal corridors (Figure 1). The link between ecology and management often is through spatialization – ***where*** do we manage, restore, protect? is equally as important as ***how*** do we manage? One example of translating spatial data into conservation action is where we provide the result of spatial analyses to Regional District planners to include in private land use management and policies. We are working with these planners in the Regional Districts of East Kootenay and Central Kootenay by providing specific data of Ecologically Sensitivity Areas related to species at risk and connectivity habitat that they manage through Development Permit Areas for incorporation into Official Community Plans. We also provide spatial information to private land trusts so they can prioritize their purchases to optimally benefit our mutual goals. We have used these relationships in the past in limited areas, but where we have done a comprehensive assessment of potential conservation properties across our 4 focal areas – this is the subject of Deliverable 2.

See Appendix 1 for a list of spatial layers we have accumulated in our spatial database.

Deliverable 2: Identify potential private land conservations properties for Nature Conservancy Canada and the BC Nature Trust

We carried out a spatial analysis to identify potential privately owned conservation properties within 500m of riparian-wetland habitats in the 4 focal areas. We used 500m because our focus is the connectivity between riparian-wetland habitats to upland habitats, and sometimes important properties as slightly removed from the immediate riparian-wetland habitats. We filtered out towns, villages, and subdivisions that resulted in a suite of rural properties that are within, immediately adjacent to, or very close to the riparian-wetland habitats that are the focus of Kootenay Connect.

These criteria were developed in consultation with the Nature Conservancy Canada and the Nature Trust of BC, who are partners in Kootenay Connect and the primary land trust organization operating in our region. The goal was to identify potential properties that can be assessed for priority for purchase, and opportunity as they might come up for sale (an important mechanism for land securement). We further prioritized this overall potential property list (and map) for: 1) those properties that were within wetlands, and 2) those properties that were within our previously identified large carnivore corridors within the 180km long Columbia Valley.
This subproject works toward meeting our goal of increasing protected lands particularly in the often disturbed and vulnerable valley bottom habitats.

Deliverable 3: Integrating climate adaptation into Kootenay Connect
We delayed work on the original deliverable to "Assess the overlap of Species at Risk across the 4 Kootenay Connect focal areas and habitat types using current available data" until Year 2 for two main reason. First, seven months (September 2019 through March 2020) for Kootenay Connect Year 1 only gave us time to gather all available data about the extensive species at risk and their habitats and not make recommendations about consolidating into common habitats. Second, our regional species at risk habitat expert who has previously worked on this subject, had some serious family issues arise this winter and therefore was unable to complete this project in the allotted time.

A silver lining presented itself in early 2020 that allowed us to substitute the SAR inventory deliverable with a very important alternative subproject to "Develop an approach to assess the influence of climate change on biological resilience and habitat connectivity in two Focal Areas". We subcontracted with a regional expert climate and landscape ecologist, Greg Utzig (Kutenai Nature Investigations), who has been involved in extensive regional climate change adaptation modeling and strategic development. Utzig assessed Kootenay Connect's goal – to sustain native biodiversity and biological resilience at a landscape-scale by conserving biodiversity hotspots and improving habitat connectivity – through a climate change lens. His deliverable is a separate report outlining how we can integrate climate strategies into our project within 2 areas, the Creston Valley and Bonanza.

Utzig's analysis for Creston identified a north-south climate adaptation corridor that is linked east to west by our Creston Valley Ecological Corridor (Fig. 2). Among several climate adaptation management

strategies he recommends that we undertake efforts to slow, and therefore retain for longer in hotter drier summers, the flow of water through the wetlands for the benefit of several species at risk (e.g. Northern Leopard Frogs). This intra-wetland hydrologic connectivity restoration work is being accomplished within Kootenay Connect's subprojects where hydrologic connectivity has been enhanced (Fig. 3) (also see Creston Valley results for Year 1).

Deliverable 4: Framework for Kootenay Connect

The Kootenay Connect project description for ECCC includes an overall project planning framework in Years 1 and 2. Because our overall project is complex and broad spatially, ecologically, and in the numbers of SAR and diversity of habitat types, we think it is important to consider the approaches that might be taken within "framework" planning,

We therefore, slightly altered Deliverable 4 to be a "framework" rather than a "plan". This framework integrates all of the above work (spatial and climate data, literature, and local experts) and includes the gathering of several types of data developing a synthesis of our overall approach. Data integrated (and to be integrated) include spatial data (GIS layers), literature (published and grey), climate data and adaptation strategies, an analysis of SAR and habitat types, and local expertise. There are two approaches we think are critical in integrate into our framework: 1) climate change adaptation, and 2) a habitat approach to grouping the 75 SAR and culturally important species based on their common habitat associations. Considering these ideas, deliverable 4 has evolved into being the development and application of that framework. One leg of that framework stool is yet to be completed, an analysis linking SAR to habitat types that was substituted with climate adaptation (see Deliverable 3 above).The SAR and habitat analysis will be completed in Year 2, at which time we can finalize our framework and include its thinking into Year 3 and 4 subprojects.
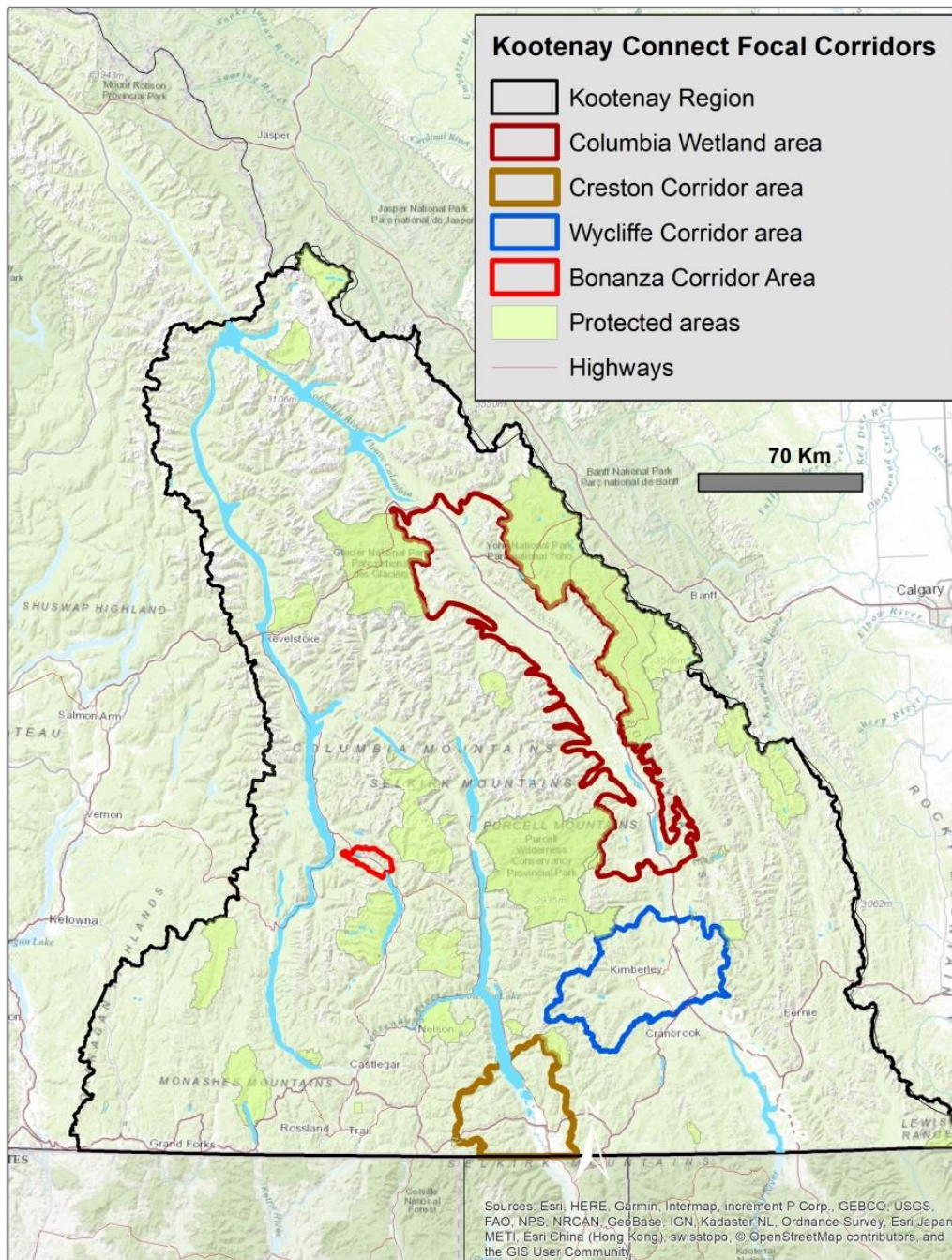
Figure 1. Kootenay Connect's 4 focal Ecological Corridors, including Columbia Wetlands, Wycliffe Corridor Creston Valley, and Bonanza Corridor.
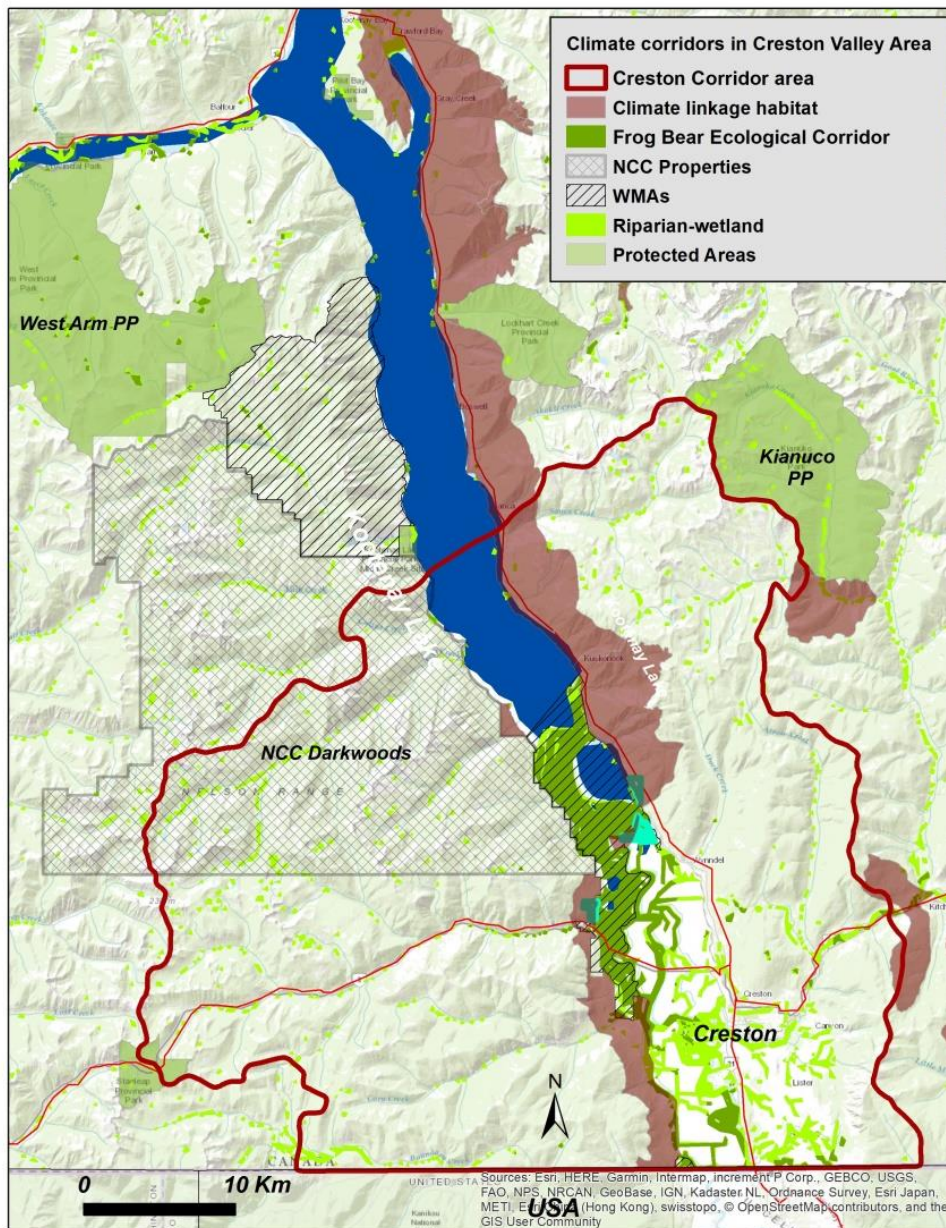
Figure 2. A north-south "climate adaptation corridor" identified by G Utzig linked east-west "Frog Bear Ecological corridor" identified by Kootenay Connect across the Creston Valley.
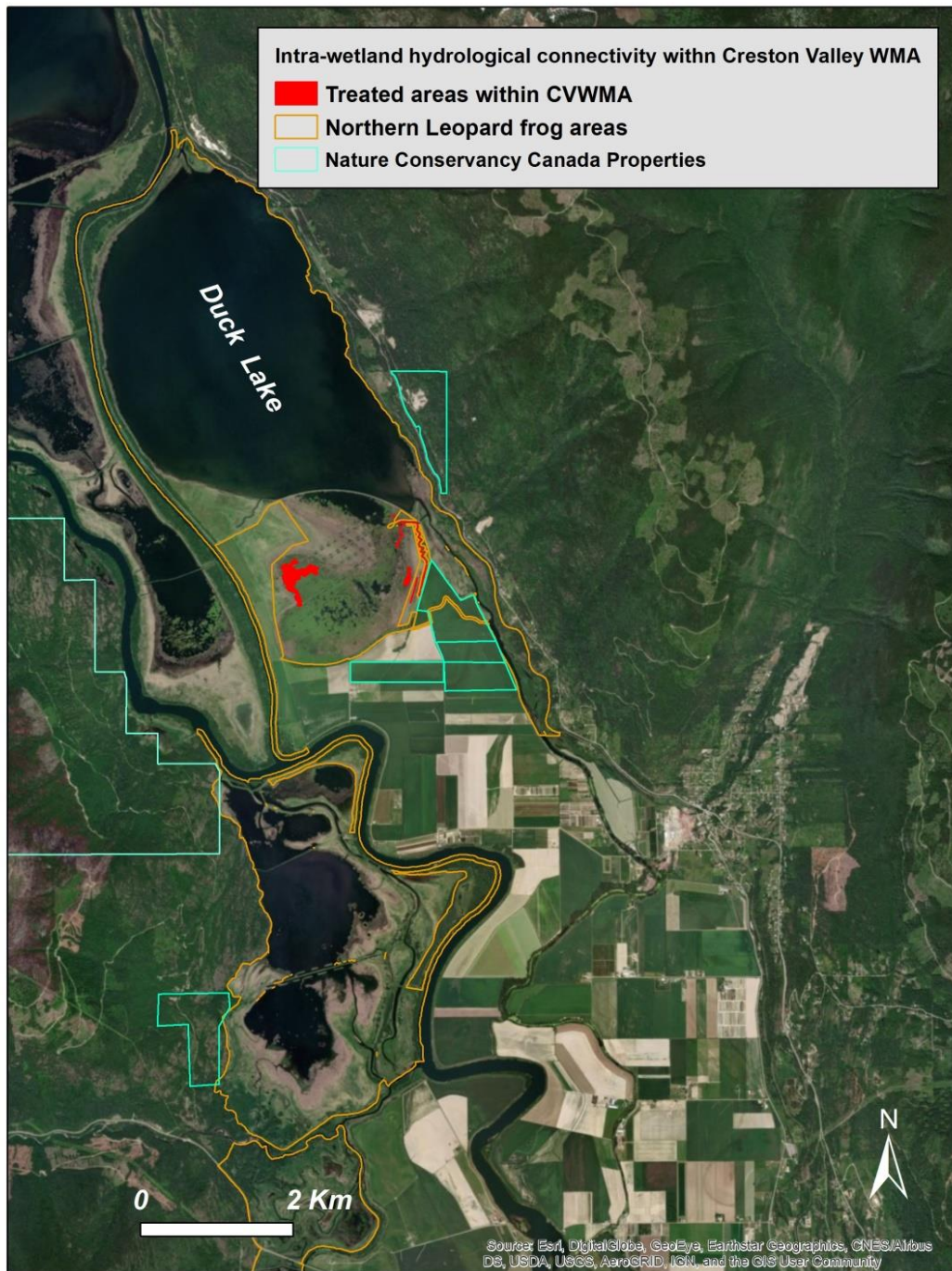
Figure 3. The integration of species at risk habitat enhancement through intra-wetland hydrologic connectivity restoration in Kootenay Connect's Ecological Corridor within the Creston Valley.

Appendix I. GIS data layers accumulated by Kootenay Connect

Layer type	GIS layers	Source
Species layers of interest	Grizzly bear habitat model	TBGBP[1]
	Grizzly bear core habitats model	TBGBP[1]
	Grizzly bear corridor model	TBGBP[1]
	Wolverine density	BC Gov
	Marmot habitat	BC Gov
	Badger habitat model	Nancy Newhouse
	Ungulate winter range [2]	BC Gov
	Caribou habitat areas	BC Gov
	Big horn sheep data	BC Gov
	Mountain goat	BC Gov
	Species at risk & of concern observations[3]	BC Gov
	Northern Leopard Frog breeding areas	R Darvill
	Columbia Wetland bird layers	
Biological	Bird survey data	R Darvill
	Biodiversty hotspots, CW	R Darvill
	Swan data	BC Gov
	Osprey nests	M Machmer
	Heron nests	M Machmer
	Old growth management areas	BC Gov
	Riparian/wetland areas	TBGBP[1]
	Fine scale habitat type layers, CW & Bonanza	R Durrand
	LiDAR	BC Gov
	Ortho Photos	BC Gov
	NC BEC units	BC Gov
Human influence	Forestry roads	BC Gov
	Road density	TBGBP[1]
	Highways	GIS data online
	Human settlement	TBGBP[1]
	RDEK Land use designation areas	RDEK

Layer type	GIS layers	Source
Land ownership and management	First Nations lands	Ian Adams
	Private lands	BC Gov
	Cadastral data	EK/WK Regional Districts
	Regional District planning layers	EK/WK Regional Districts
	Protected areas - public	GIS data online
	Protected areas – land trusts	NCC
	Wildlife Management Areas	BC Gov
	Wildlife Habitat Areas	BC Gov
	Canfor High Value Conservation Areas	Canfor
	Greg Utzig Conservation planning areas	G Utzig
	Agricultural Land Reserve lands	BC Gov
Data gaps	Habitat models for most species	
	Connectivity models for most species	
	Hydrology models	
	Ian suitability maps	
	Columbia Shuswap RD Area A	
	Movement data for Wolves, wolverine & badgers	

[1]Trans-border Grizzly Bear Project

[2] Moose, Elk, Whitetail, Mule deer, Bighorn sheep Mt Goat, Caribou

[3]Bald Eagle, Flammulated Owl, GB Heron, Osprey, Lewis woodpecker, W Screech Owl. Williamson's sapsucker

[3]Cougar, Elk. Moose, Mule deer, N Goshawk, NLF, Painted turtle Western toad, WT deer,

[3]Fisher. Great Basin spadefoot toad, Long-billed curlew, N Goshawk, Marten,