Final Report for Columbia Wetlands Yr 3 projects for Kootenay Connect and Environment Climate Change Canada

By

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Funding provided by

Columbia Basin trust

Regional District of East Kootenay

Environment and Climate Change Canada

Environnement et Changement climatique Canada

The Columbia Wetlands Stewardship Partners

Kootenay Connect

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Healthy Watershed Initiative

Summary

The Columbia Wetlands Stewardship Partners completed 4 projects as part of the Kootenay Connect- ECCC project. The projects included the **3CW Conservation Lands project** whose goal was to identify and rank important biodiversity hotspots in riparian and upland habitat in Columbia Valley (CV) and initiate conservation actions in the hotspots. The project goal was also to identify and initiate conservation actions in important wildlife corridors in CV. The 2nd project, **3CW Conservation & Mitigation of Wetland Basins Vulnerable to Drought (3CW Hydro & Beaver)** is composed of two subprojects: the hydrological subproject evaluates wetland vulnerability and determines priority wetlands where management actions like conservation or mitigation should be implemented. The second subproject assesses the impact of beaver dams on the wetland and constructed an artificial beaver dam to mitigate the loss of water overwinter. The third CW-KC project, the **3CW cottonwood/beaver project** focused on identifying and protecting important cottonwood trees from beaver harvesting. The 4th project **3CW Western Painted Turtle and SAR (3CW WP Turtle & SAR) project** objectives are to enhance conservation actions on Lewis's woodpecker, Western Painted Turtle, alkali saltgrass-foxtail barley ecological community (EC), osprey, and American badger.

An overview shows that our projects were very successful: we have ranked the value of 131 biodiversity hotspots and 7 wildlife corridors and are working with partners and recreational planning initiatives on conservation actions to protect those important wildlife areas; The CWSP-KC project aims to raise awareness around Species at Risk in the Columbia Valley and to enhance, restore, and manage the large riparian and wetland complex (Columbia Wetlands and Valley) to support the recovery of focal species at risk. We have identified 5 main types of floodplain wetlands based on their hydrology and geomorphology and have assessed their vulnerability to ensure that a suite of them can retain permanent water bodies over winter for migrating birds in the spring. We initiated a program on important hydrologically vulnerable wetlands to mitigate the effects of climate warming using natural and artificial beaver dams. We constructed beaver dams to retain water over winter in one 54 ha wetland important for SAR and migrating waterbirds. We installed wire fencing material on 45 important cottonwood trees to protect them from beaver harvesting. Finally we protected a large Western Painted Turtle (WPT) nesting bed from predators using fencing materials on a private land and enhanced WPT habitat in three wetland using 24 basking logs to enhance turtle digestion and protect them from disturbance.

Overview summaries of each of the Columbia Wetlands Projects

1). 3CW Conservation Lands project.

In Columbia Valley, 131 properties were identified and evaluated to categorize and rank properties for conservation land management approaches such as stewardship, purchase by a land trust and conservation land designation. Both crown (n=40) and private (n=91) lands were evaluated through a valuation matrix prepared exclusively for this project that assigned values

for attributes that support the goal of the project; supporting landscape level biodiversity. More value was assigned for properties with unique or important habitat and species at risk while value was deducted for tenured land use (crown lands) and expensive infrastructure or active agricultural use (on private lands).

The ranking for highest priority for action included: 7 Very Important private lands as candidates for purchase by a land trust; 10 Very High ranked properties for private property stewardship; 2 unique properties are suggested for crown land stewardship; 2 Very High ranked crown lands for conservation land consideration; and, 6 crown lands with suggestion to be designated for corridor conservation.

Properties evaluated in this assessment have a variety of current uses from residential, active agriculture and recreation. This project recognises individuals have ties to property and that purchase of property will only occur if the owner is interested. In some situations, where properties have been classified as candidates for purchase by a land trust, a different approach like stewardship may be more effective in achieving project goals if owners are provided more information. The vision of this project is not to displace residents and important agricultural activities, rather it is to work with residents to recognise the importance of their land and become stewards that contribute to the larger goals of this project.

In many cases, lower points in the property ranking translates to a lack of information for the specific property. Much of the biodiversity related data available in the project area is focused on the low elevation Columbia Wetlands with limited information being available for the uplands and alpine slopes. Recommendations stemming from this project suggest areas where more data collection is needed to better inform property rankings and justify the designation of conservation areas or corridors. Forms of future data collection include the integration of local and Traditional Ecological Knowledge, on the ground species at risk occurrences and past and ongoing conservation effort mapping.

The landscape level look at conservation properties considers the objectives of buffering important habitats in the Columbia Wetlands and maintaining habitat connectivity for cross-valley multi-species corridors. This work is being used to build partnerships in conservation efforts with conservation land securement organisations, farmland stewardship groups, communities, First Nations and government. Currently CWSP is actively participating in the Columbia Valley Recreational Planning Initiative, an initiative to designate recreational trails for dirt bike and mountain bike activity. We are providing information where habitats should be protected and where those recreational activities may cause less impact on wildlife.

2). Conservation & Mitigation of Wetland Basins Vulnerable to Drought (3CW Hydro & Beaver)

Hydrology subproject: We monitored water levels in 38 floodplain wetlands, calculated water budgets of the different wetlands and performed a hydrologic geomorphic analysis to

determine the different types of wetlands. We conclude that there are 5 different classes of wetlands: ranging from those that receive floodwaters every year; 2 types of wetlands which have a threshold permitting floodwaters to enter only in selected years, and 2 types which have no connection to the flood pulse and that may be dominated by groundwater.

MacDonald Hydrology Consultants (MacHydro) in collaboration with the Columbia Wetland Stewardship Partners (CWSP) conducted a project to evaluate wetland vulnerability and determine priority wetlands where management actions like conservation or mitigation should be implemented. The objectives of the hydrology subproject included: monitoring wetland water levels in 38 wetlands, characterizing the wetlands into types based on geomorphic and hydrometric data, constructing conceptual wetland water balances, evaluating how hydrometeorological conditions and wetland water levels may change under future simulated climate change projections, and describing the wetland vulnerability to climate change based on the conceptual understanding of predominant water sources and fluxes to inform future mitigation actions.

A framework of first-order controls and wetland variables were used to group the wetlands into three types based on the wetland's connectivity with the channel network: continuous connectivity, discontinuous connectivity and no connectivity. Wetlands with continuous connectivity (connected to the river via a gap in the levee) has a hydrograph response that fluctuates with the rise and fall of river stage. Wetlands with discontinuous connectivity (connected to the river, creek, or an adjacent wetland via a gap) respond after water rises above the elevation of a beaver dam (overdam flooding) or the bank in the gap (overbank flooding). Wetlands with no connectivity (no gap) respond after water rises above the elevation of the levee (overlevee flooding) and surface inflow/outflow is through unchannelized surface flow. These wetlands differ from the others because of a slow hydrograph recession, which is likely due to no apparent outlet.

Wetland water balances indicate that evaporation exceeds precipitation. Wetlands that have discontinuous connectivity (1:4.0) and no connectivity (1:4.1) had higher precipitation:evaporation ratios compared to those that are continuously connected (1:3.1).

Changes to wetland water balance components due to climate change was evaluated with two future scenarios generated from statistically downscaled climate scenarios under two representative concentration pathways (RCPs). RCP 4.5 corresponds to a scenario where carbon emissions stabilize by 2040, while RCP 8.5 represents a scenario with minimal greenhouse gas emission mitigation. The simulation was split into three 30-year periods (1990-2019, 2021-2050, 2051-2080) to understand shifting baselines and the range of variability.

Climate change scenarios project average annual air temperature increases for the study area (1.4 – 1.7°C by 2050, 2.4 – 3.6°C by 2080). Precipitation is projected to slightly increase (27 – 35 mm by 2050, 53 – 70 mm by 2080), but the change in the timing (and amount) and phase of precipitation will have the larger impact on wetland hydrology. There is an expected reduction

in the fraction of annual precipitation as snow (4 – 6% by 2050, 9 – 14% by 2080). Reduction of snowfall at high-elevation would be critical for late-season streamflow. Already, Columbia River flows at Nicholson have declined 13% in recent decades (Brahney et al, 2017), with much of the decline in August (Moore et al., 2020).

Projected climate change would shift the watershed towards more rainfall-dominated runoff and result in earlier snowmelt and spring peak flows, which may change the timing and duration of overbank/overdam/overlevee flooding and the period of inundation. Wetlands that are more isolated from the main river channel (discontinuous connectivity or no connectivity) channel do not receive as much inflow during the maximum annual peak flows (flood <0.5 - 1 m) compared to those that are continuously connected (flood 2-3 m during maximum annual peak flow). Therefore, with projected climate change, the more isolated wetlands would flood less and there would be concerns that a wetland under an extended growing season with greater evapotranspiration rates would not retain as much standing water over the winter and be particularly vulnerable to climate change. Therefore, how well (e.g. duration, timing) a wetland is connected to the channel network and how connectivity varies with changes in streamflow will determine the vulnerability to climate change. Wetlands that have discontinuous connectivity or no connectivity would be the most vulnerable and most important to mitigate to maintain habitat quality and bioecological functioning of the wetland. However, all the wetlands are vulnerable to loss of water and changes in bioecological functioning.

Beaver subproject: We measured width and depth of the gaps in the natural levees of the Columbia Wetlands (38 wetlands) that permit floodwaters to enter the wetland. We obtained channel & beaver status with available LiDAR, reviewed ortho-photographs for current and historic beaver dams, measured extant beaver dams and untended dams and estimated the control that beaver have on floodwaters entering and leaving the wetlands. We measured 79 gaps in levees and 86 beaver dams in person and 273 remotely. We defined the beaver status in our study wetlands and found that they were critically important to the hydrology. This provided information on restoration potential and contributed to the analysis of hydrogeology of the wetlands in the hydrology report above.

We identified several sites where Species at Risk would be protected with the addition of constructed beaver dams. However, in most cases, permits are required & landowner involvement necessary. We installed 2 beaver dams which restored 54 hectares of open water wetland in a location where a farmer was facing the loss of water for his livestock and drinking water due to the destruction of a beaver dam. Our restoration provided water for migrating birds and agriculture.

3). Cottonwoods (3CWCottonwoods)

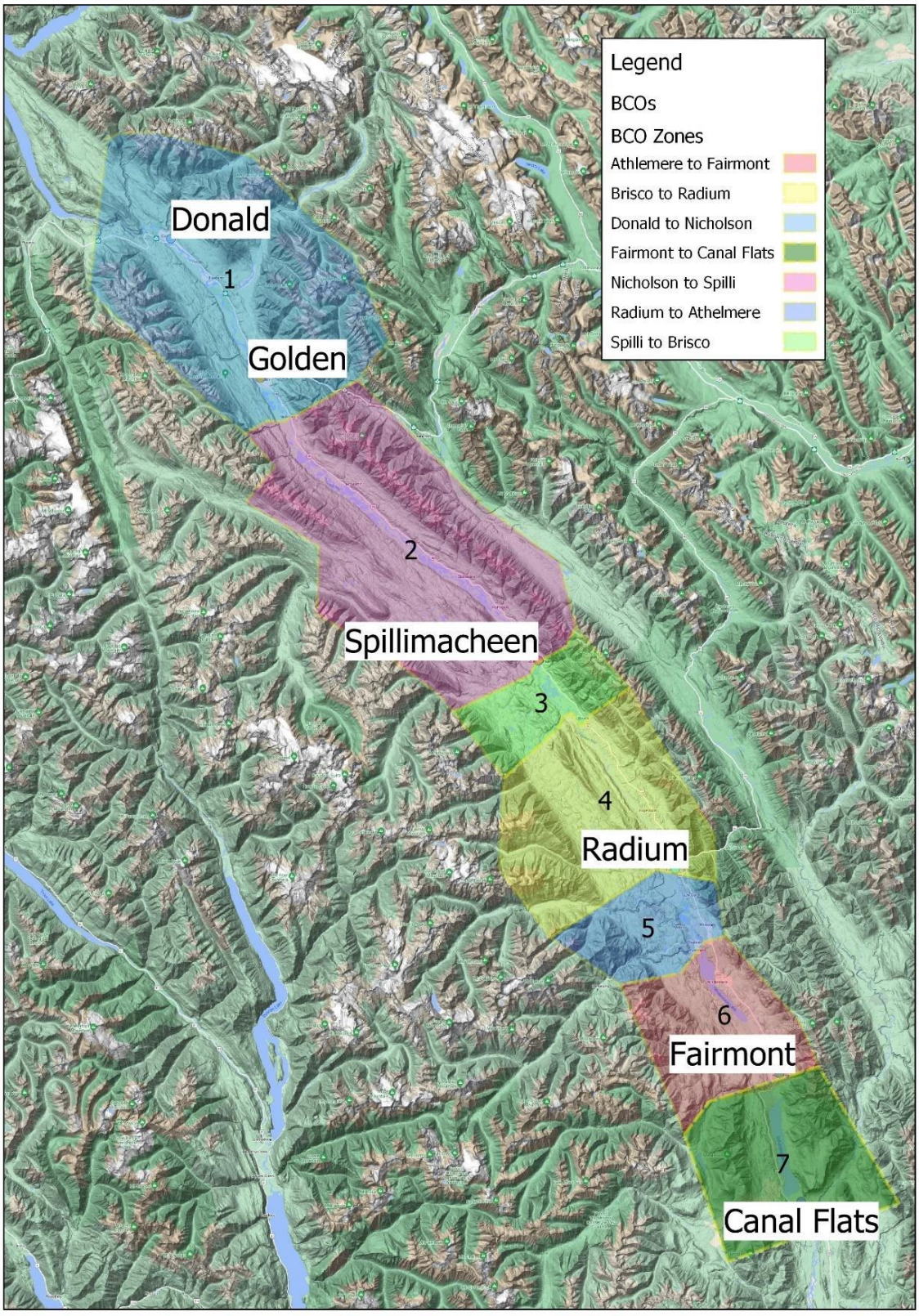
The purpose of the cottonwood/beaver project is to assess the status of important cottonwood stands and install wire protectors if they are required to protect critical stands from beaver harvesting. If feasible, start to assess the regeneration of cottonwood on the levees. We looked briefly at the cottonwood stands with Dr. Stewart Rood, a cottonwood expert; he observed substantial regeneration of cottonwood on the alluvial fans, but little regeneration of cottonwoods along the levees in the main channels. This was expected since the substrate is less optimal for cottonwood growth; however, this characteristic makes the large cottonwood trees along the main channels very rare and valuable for nesting birds. We used the wetland mapping from Yr1 to identify the stands of cottonwoods, used a survey of important wildlife cottonwood trees to identify critical trees and small stands, and then after seeking permission of selected landowners, installed wire around selected cottonwood trees. In total 45 large trees, often near active beaver colonies were protected. The project brought in a Youth Climate Corp to assist with the installation of the wire. Most of the large cottonwood trees are important trees for birds.

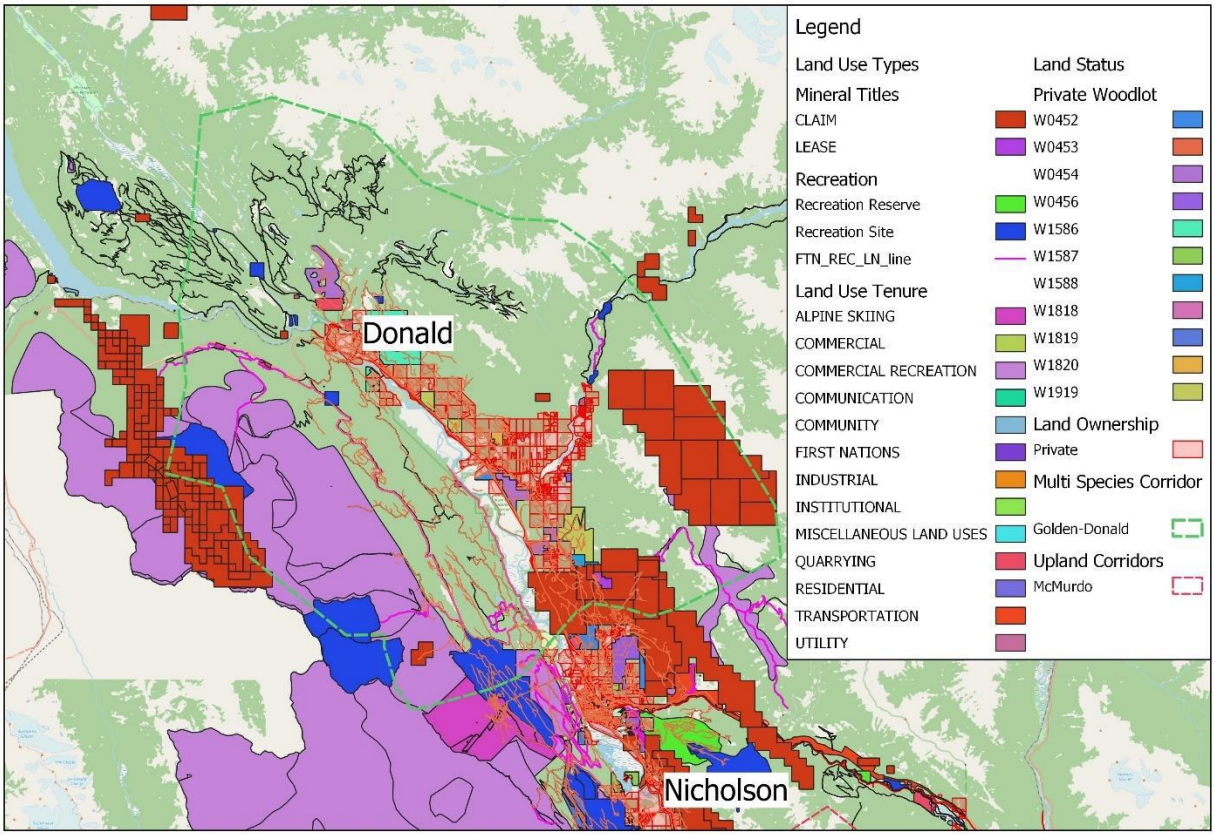
4). Western Painted Turtle and SAR (3CW WP Turtle & SAR)

Year 3 (2021-2022) of the WPT and SAR initiative focused on conservation actions regarding the following: Lewis's woodpecker, WPT, alkali saltgrass-foxtail barley ecological community (EC), osprey, and American badger. Outcomes regarding actions focused on these four species (and one EC) are desribed in the Darvill final report. Some of the project outcomes include:

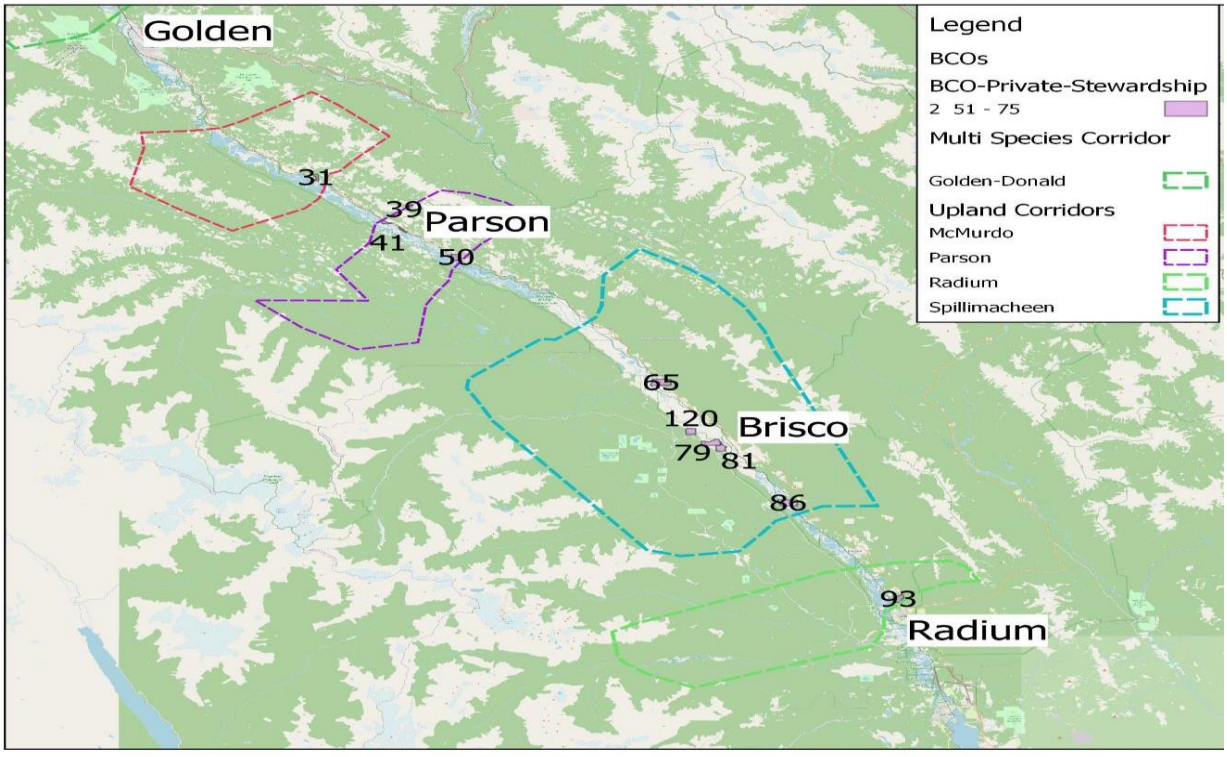
- one large WPT nesting bed was enhanced on private land (protected from predators using fencing materials);
- we enhanced WPT habitat with 24 basking logs installed at three locations;
- inventory for Lewis's woodpecker (LEWO) was completed within critical habitat along a Forest Service Road, which aimed to increase the size of critical habitat and/or Wildlife Habitat Areas; however, no LEWO were identified;
- working with a partner group and MOT, WPT crossing signage will be installed at areas identified to have road mortality;
- a Wildlife Habitat Area (WHA) application was revised and resubmitted to include an additional alkali saltgrass – foxtail barley ecological community that was previously thought to be on private land;
- osprey inventory was completed to help determine the population trend (if possible), and reasons for osprey mortality are given;
- an American badger project was initiated; it aims to provide public education and submission of an application for important badger habitat areas to be designated as WHAs or Wildlife Habitat Features (WHFs).
- extensive collaboration with different interest groups on the development and implementation of these projects.

We worked with numerous groups to accomplish the outcomes in all the CW projects. We involved over 32 volunteers and a youth group as well. We have been and will be actively working as part of the Columbia Valley Recreational Planning Initiative to protect wildlife habitat and corridors from dirt bikes and mountain bikes. For more details see the individual reports from the subprojects.

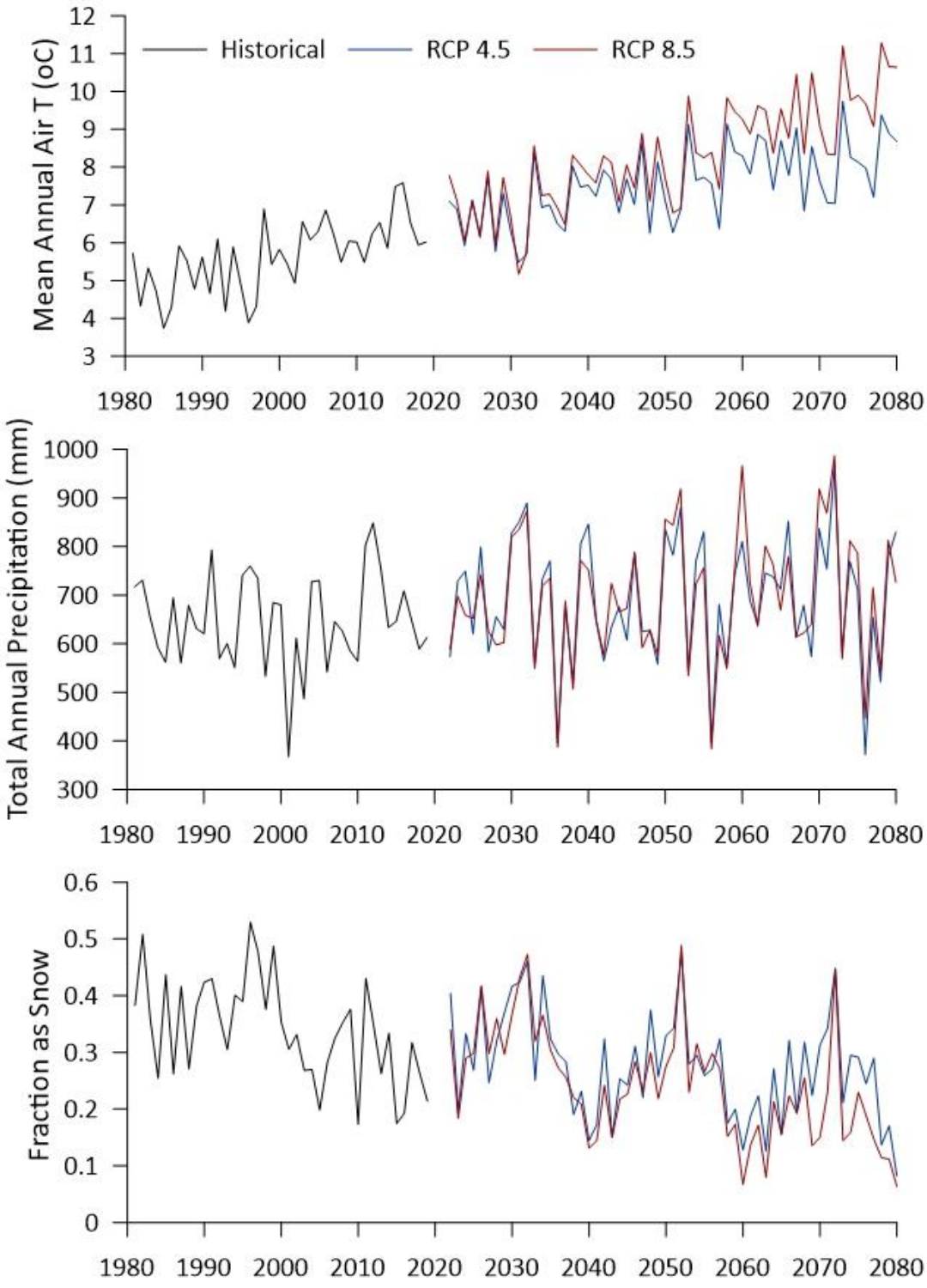

Legend
BCOs
BCO Zones
Athlemere to Fairmont
Brisco to Radium
Donald to Nicholson
Fairmont to Canal Flats
Nicholson to Spilli
Radium to Athelmere
Spilli to Brisco
Donald
1
Golden
2
Spillimacheen
3
4
Radium
5
6
Fairmont
7
Canal Flats



Biodiversity Conservation Opportunities for each of the zones and corridors shown above



Climate change projections showing increases in temperature and precipitation and decreases in snow under future climate change scenarios.



Types of wetlands in Columbia Wetlands. Description of topology (i.e., refers to degree of hydrologic connectivity with the main channel network and degree of connectivity over space and time), typology (i.e., refers to the hydrograph response, which infers the predominant hydrologic fluxes and relative residence time of water held in wetland), and topography (i.e., refers to geomorphic setting of the wetland).

Topology	Typology	Topography	Wetland
Continuous connectivity	Response fluctuates with rise & fall of river stage	River gap	Group A: 24, 30, 32, 36, 38, 51, 59, 64, 68, 70, 71, 130, 132, 145,
Discontinuous connectivity	Responds post-overbank or overdam flooding, easily drains overflow	River gap, creek gap or between wetland gap; gap and/or dam elevation	Group B: 29, 31, 35, 39, 43, 126, 127, 128, 131, 141, 142, 144 Group C: 21, 49, 129, 140, 143
No connectivity	Responds post-overlevee (overdam) flooding, slow drainage	No gap; levee (or dam) elevation	Group D: 62, 110 Group E: 47, 48, 69, 137

One of the Beaver dams restored to hold water in a 54 ha wetland

Picture of basking log installation and basking WPT on log in Columbia Valley

Wiring of Cottonwood trees in Columbia Wetlands and the youth group assisting