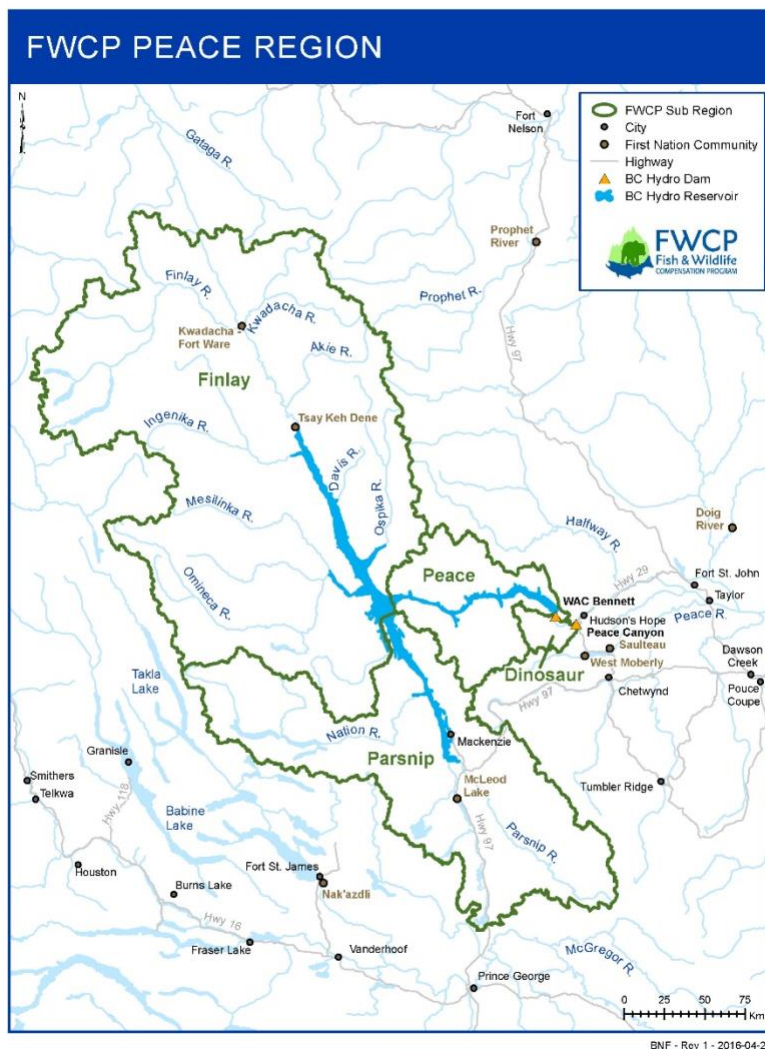




# PEACE REGION RIPARIAN & WETLANDS ACTION PLAN

August 11, 2020  
(Rev. January 8, 2021)

*The Fish & Wildlife Compensation Program is a partnership between BC Hydro, the Province of B.C., Fisheries and Oceans Canada, Indigenous Nations, and public stakeholders to conserve and enhance fish and wildlife in watersheds impacted by BC Hydro dams.*



**Figure 1. The Fish & Wildlife Compensation Program Peace Region boundary includes the Upper Peace River Basin, which consists of the Finlay, Parsnip, Peace, and Dinosaur sub-regions.**

Cover photos clockwise from top left: Western Toad, Quercus Ecological; wetland near Williston Reservoir, Chu Cho Environmental; bull moose, iStock Daniel Gaura; Long-toed salamander, Sara Sparks; heron, iStock P. Gauthier.



The Fish & Wildlife Compensation Program (FWCP) is a partnership between BC Hydro, the Province of B.C., Fisheries and Oceans Canada, Indigenous Nations, and public stakeholders to conserve and enhance fish and wildlife in watersheds impacted by BC Hydro dams (W.A.C. Bennett and Peace Canyon dams). The FWCP funds projects within its mandate to conserve and enhance fish and wildlife in Peace River Basin ecosystems.

Learn more about the FWCP, projects underway, and how you can apply for a grant at [fwcp.ca](http://fwcp.ca). Subscribe to our free email updates and annual newsletter at [fwcp.ca/subscribe](http://fwcp.ca/subscribe). Contact us anytime at [fwcp@bchydro.com](mailto:fwcp@bchydro.com). Connect with us on LinkedIn and follow us on Instagram.

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## EXECUTIVE SUMMARY

### Riparian & Wetlands Action Plan

The Fish & Wildlife Compensation Program (FWCP) is a partnership between BC Hydro, the Province of B.C., Fisheries and Oceans Canada (DFO), Indigenous Nations, and public stakeholders to conserve and enhance fish and wildlife impacted by BC Hydro dams. This Riparian and Wetlands Action Plan builds on the FWCP's strategic objectives and is an update to the 2014 FWCP Peace Basin Riparian and Wetlands Action Plan.

The action plan was developed with input from BC Hydro, the Province of B.C., participating Indigenous Nations, and local communities. It specifies priority actions that will conserve, restore, and enhance fish and wildlife species in riparian and wetland habitats in the Upper Peace River Basin.

Priority actions are in the [action tables](#) at the end of this document. The priority actions are intended to support the FWCP's strategic objectives of conservation, sustainable use, and community engagement and related sub-objectives. Priority actions fall into one of five action types funded by the FWCP:

1. **Research and information acquisition** – These actions will collect information necessary to evaluate, review, and implement subsequent conservation, restoration, and enhancement actions. Examples include gathering Indigenous knowledge and values, a limiting factor assessment, and other activities to address data gaps and information needs to complete other actions.
2. **Monitoring and evaluation** – These actions will monitor and evaluate riparian and wetland projects supported by the FWCP to understand the effectiveness of habitat- or species-based actions.
3. **Habitat-based actions** – These actions will conserve, restore, and enhance riparian and wetland habitats. Examples include habitat creation, restoration, and enhancement; enhancing habitat connectivity; nutrient restoration; and invasive species prevention.
4. **Species-based actions** – These actions will alleviate limiting factors for riparian and wetland species. Examples include restoration planning and species-specific habitat restoration and initiatives.
5. **Land securement** – These actions will contribute to investigating and prioritizing land securement and stewardship opportunities for conservation purposes.

The Riparian & Wetlands Action Plan sets out priority actions for the FWCP that will guide funding decisions for FWCP projects in riparian and wetland habitats of the Upper Peace River Basin. The focus of the priority actions over the next five-year period will be to prioritize riparian and wetland habitats for conservation, enhancement, and/or restoration and to implement high-priority habitat-based and species-based actions.

This action plan identifies priority species associated with riparian and wetland habitats (i.e., priority species have been merged into the appropriate updated 2020 ecosystem-based action plan). Priority species for riparian and wetland ecosystems include moose and several at-risk bird species that breed in the FWCP's Peace Region. Recognizing that many terrestrial and semi-aquatic wildlife species make use of upland habitat as well as riparian and wetland habitat, and actions in the Upland Action Plan and the Riparian & Wetlands Action Plan may be applicable to these species, primary and secondary habitat types have been identified for these species (Table 2). For example, riparian and wetland habitat has been identified as the primary habitat type for moose, and actions specific to moose are contained in the Riparian & Wetlands Action Plan; however, projects associated with moose use of upland habitat can be developed under one of the more general actions in the Uplands Action Plan. Other priority species that use riparian and wetland habitats may also be identified in the Uplands Action Plan.

## TABLE OF CONTENTS

<b>Executive summary.....</b>	<b>ii</b>
<b>List of tables .....</b>	<b>iv</b>
<b>List of figures .....</b>	<b>iv</b>
<b>Introduction and background.....</b>	<b>1</b>
FWCP introduction .....	1
Riparian & Wetlands Action Plan introduction .....	1
Setting .....	1
<b>Footprint impacts and threats.....</b>	<b>7</b>
Hydro-related impacts .....	7
Cumulative effects .....	7
<b>Limiting factors .....</b>	<b>7</b>
Habitat extent .....	7
Distribution .....	7
Productivity .....	8
<b>Knowledge status and gaps.....</b>	<b>8</b>
Previously implemented FWCP projects .....	8
<b>Riparian &amp; Wetlands Action Plan objectives .....</b>	<b>9</b>
<b>Conservation.....</b>	<b>9</b>
Strategic objective: maintain or improve the integrity and productivity of ecosystems and habitats.....	9
Strategic objective: maintain or improve the status of species or ecosystems of concern .....	10
<b>Sustainable use .....</b>	<b>11</b>
Strategic objective: maintain or improve opportunities for sustainable use, including harvesting and other uses ....	11
<b>Community engagement .....</b>	<b>12</b>
Strategic objective: build and maintain relationships with Indigenous and stakeholder communities .....	12
<b>Priority species .....</b>	<b>12</b>
<b>Action tables .....</b>	<b>15</b>
Cross-ecosystem actions.....	16
Riparian and wetland actions.....	16
<b>References .....</b>	<b>25</b>
<b>Glossary .....</b>	<b>27</b>



## LIST OF TABLES

Table 1.	Category definitions for the FWCP's Peace Region priority species. ....	13
Table 2.	Priority species for the FWCP's Peace Region Riparian & Wetlands Action Plan. ....	14
Table 3.	Priority rating definitions for the FWCP's Peace Region actions. ....	16

## LIST OF FIGURES

Figure 1.	The Fish & Wildlife Compensation Program Peace Region boundary includes the Upper Peace River Basin, which consists of the Finlay, Parsnip, Peace, and Dinosaur sub-regions. ....	i
Figure 2.	Riparian and wetland habitat in the Finlay sub-region. ....	3
Figure 3.	Riparian and wetland habitat in the Parsnip sub-region. ....	4
Figure 4.	Riparian and wetland habitat in the Peace sub-region. ....	5
Figure 5.	Riparian and wetland habitat in the Dinosaur sub-region. ....	6
Figure 6.	Action plan objectives and measures. ....	9

## INTRODUCTION AND BACKGROUND

### FWCP introduction

The FWCP action plans provide strategic direction for each region based on the unique priorities, compensation opportunities, and commitments in that region, and how they reflect the FWCP's vision and mission. The action plans describe the objectives, sub-objectives, and priority actions to support the FWCP's strategic objectives of conservation, sustainable use, and community engagement. Please refer to the Peace Region: Overview & Action Plans document for more information on the process that was followed to develop the updated 2020 action plans.

There are four updated 2020 action plans for the FWCP's Peace Region representing the ecosystems in the Peace River Basin:

- Cross-Ecosystem Action Plan
- Rivers, Lakes, & Reservoirs Action Plan
- Riparian & Wetlands Action Plan
- Uplands Action Plan

This Riparian & Wetlands Action Plan builds on the FWCP's strategic objectives by setting out priorities for the FWCP to guide projects within the FWCP's Peace Region to support riparian and wetland priority species and ecosystems.

The objectives and priority actions described herein have been developed with input from the Province of B.C., BC Hydro, Indigenous Nations, and local stakeholders.

Planning priorities within action plans may not translate immediately into funded projects. Limited funding requires that priority setting be developed across the FWCP as a whole, not just within action plans. The process of selecting which actions will be implemented in any given year will occur during the annual implementation planning cycle.

### Riparian & Wetlands Action Plan introduction

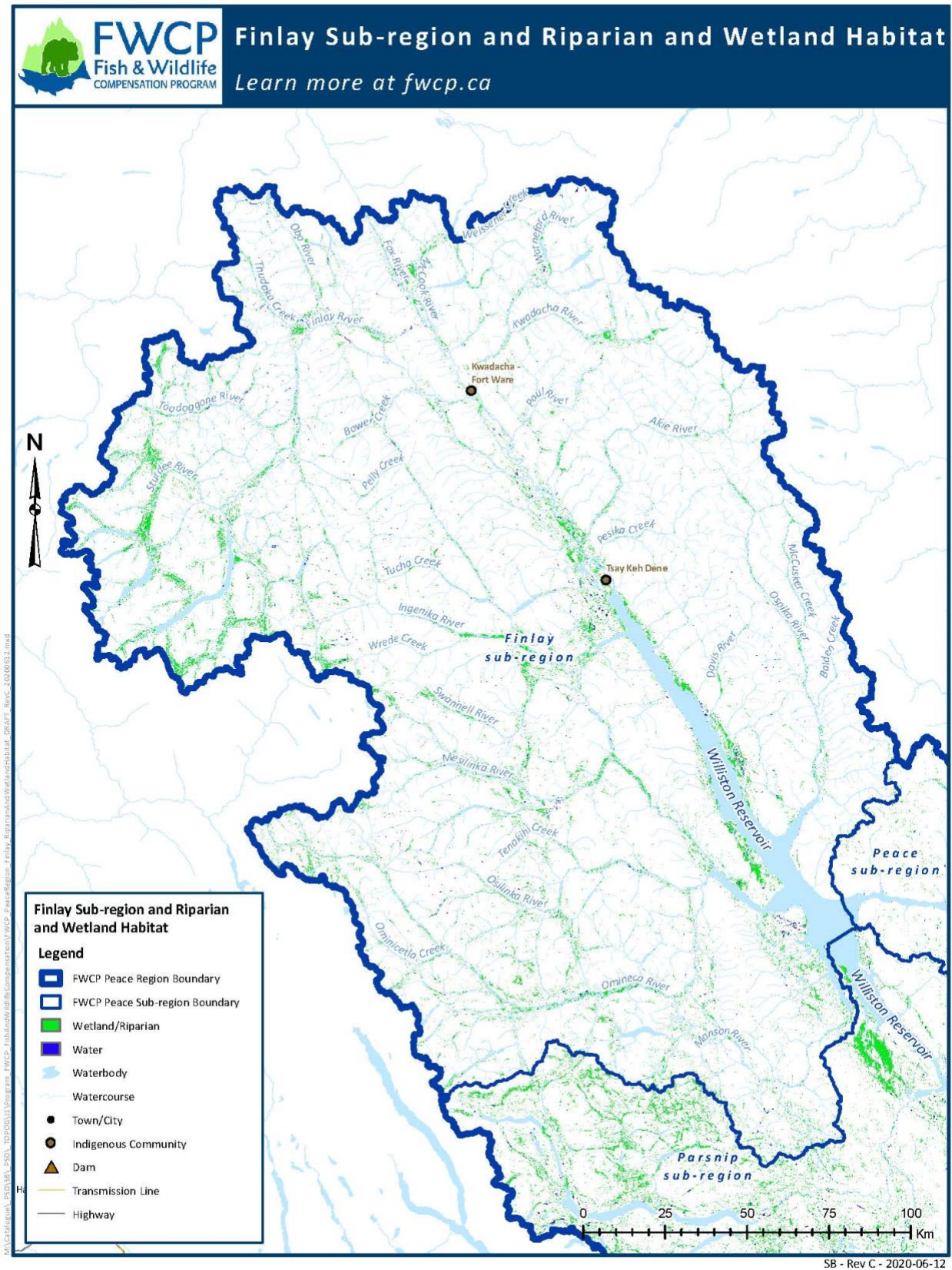
#### Setting

The Riparian & Wetlands Action Plan addresses wetland and riparian areas within the approximately 70,000 km<sup>2</sup> Upper Peace River Basin (Figure 1). The Upper Peace River Basin includes the Williston Reservoir, Dinosaur Reservoir, and consists of the Finlay (Figure 2), Parsnip (Figure 3), Peace (Figure 4), and Dinosaur (Figure 5) sub-regions. The Finlay River drains the northern portion of the basin with an original mainstem length of around 295 km. The Parsnip River drains the southern portion of the basin with an original mainstem length of about 210 km. The two rivers converged at Finlay Forks to form the Peace River, which flows east through the Rocky Mountains and runs by the Omineca, Parsnip, and Finlay rivers to the Peace Canyon. At higher elevations in the basin there are largely intact, major river systems, including the Finlay, Kwadacha, Ingenika, Ospika, Osilinka, Omineca, Nation, and Parsnip. These rivers and their tributaries are associated with riparian areas as well as wetlands, bogs, fens, and swamps. Riparian and wetland areas directly adjacent to the Dinosaur and Williston reservoirs are limited. The Mugaha Marsh is located on the east side of the Parsnip Reach north of the town of Mackenzie. It is a naturally occurring wetland of considerable ecological importance and community interest. Airport Lagoon, which is separated from the reservoir by a causeway, is also near Mackenzie. Culverts provide a measure of water-level control in the lagoon.

Riparian areas and wetlands are semi-terrestrial habitats that are influenced by seasonal changes in the water table. Riparian areas might experience seasonal shallow flooding, while wetlands are flooded for most or all of the year.

Riparian habitat and vegetation are influenced by the adjacent waterbody and the condition of riparian vegetation also affects the condition of the adjacent waterbody. Riparian habitat in the Peace River Basin is distinguishable from upland areas by the abundance of deciduous trees and shrubs such as black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and balsam poplar (*Populus balsamifera* ssp. *balsamifera*), and hydrophilic plants such as willow (*Salix* spp.).

A wetland is defined as an area where the soil is saturated with water either permanently or seasonally. Wetlands are a general habitat category that includes a diverse array of specific habitat types, such as fens, bogs, marshes, and swamps (MacKenzie and Moran 2004). These dynamic ecosystems are some of the most productive in British Columbia, providing diverse habitats for a disproportionate number of wildlife and plant species (Bunnell and Dupuis 1995).



**Figure 2. Riparian and wetland habitat in the Finlay sub-region.**



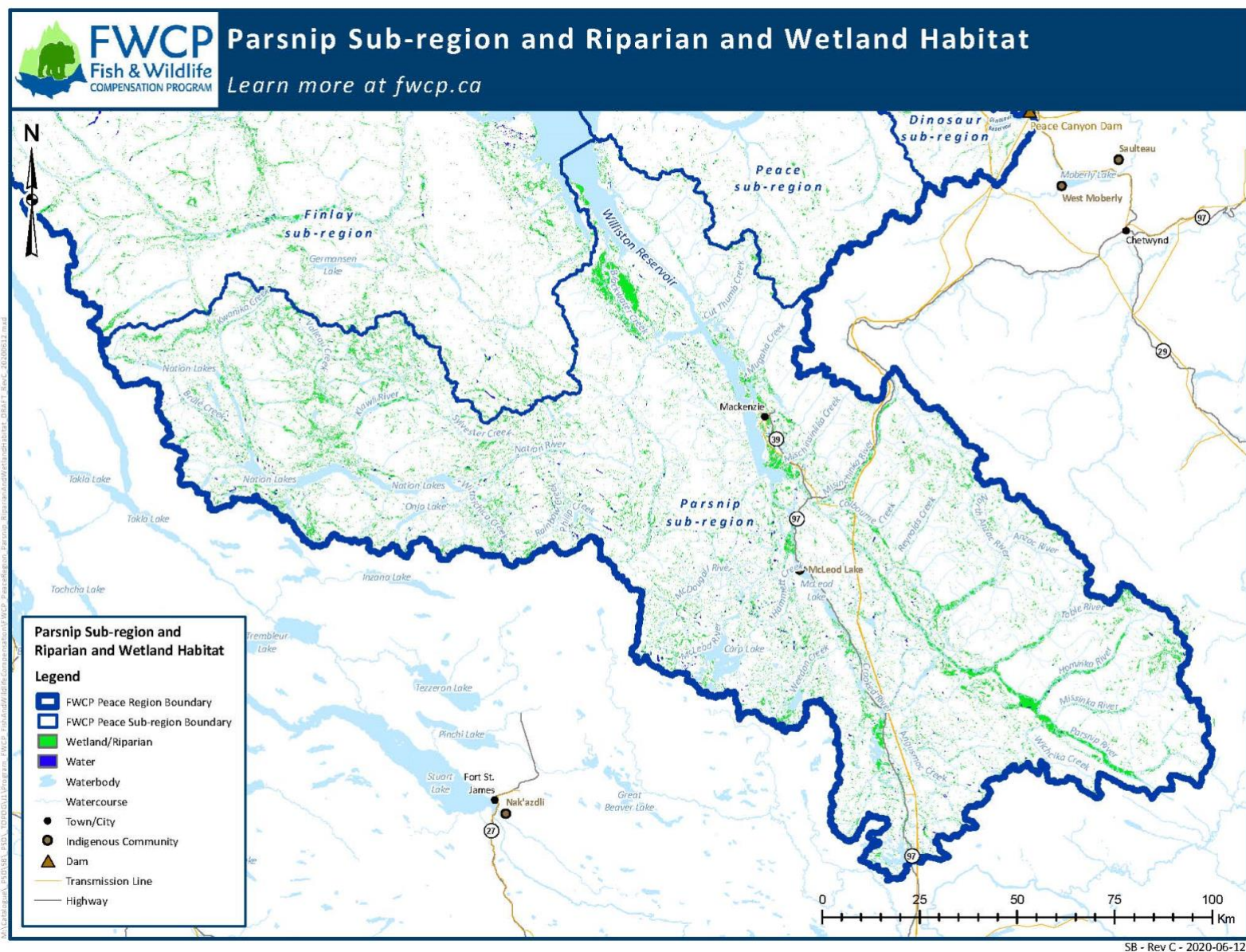
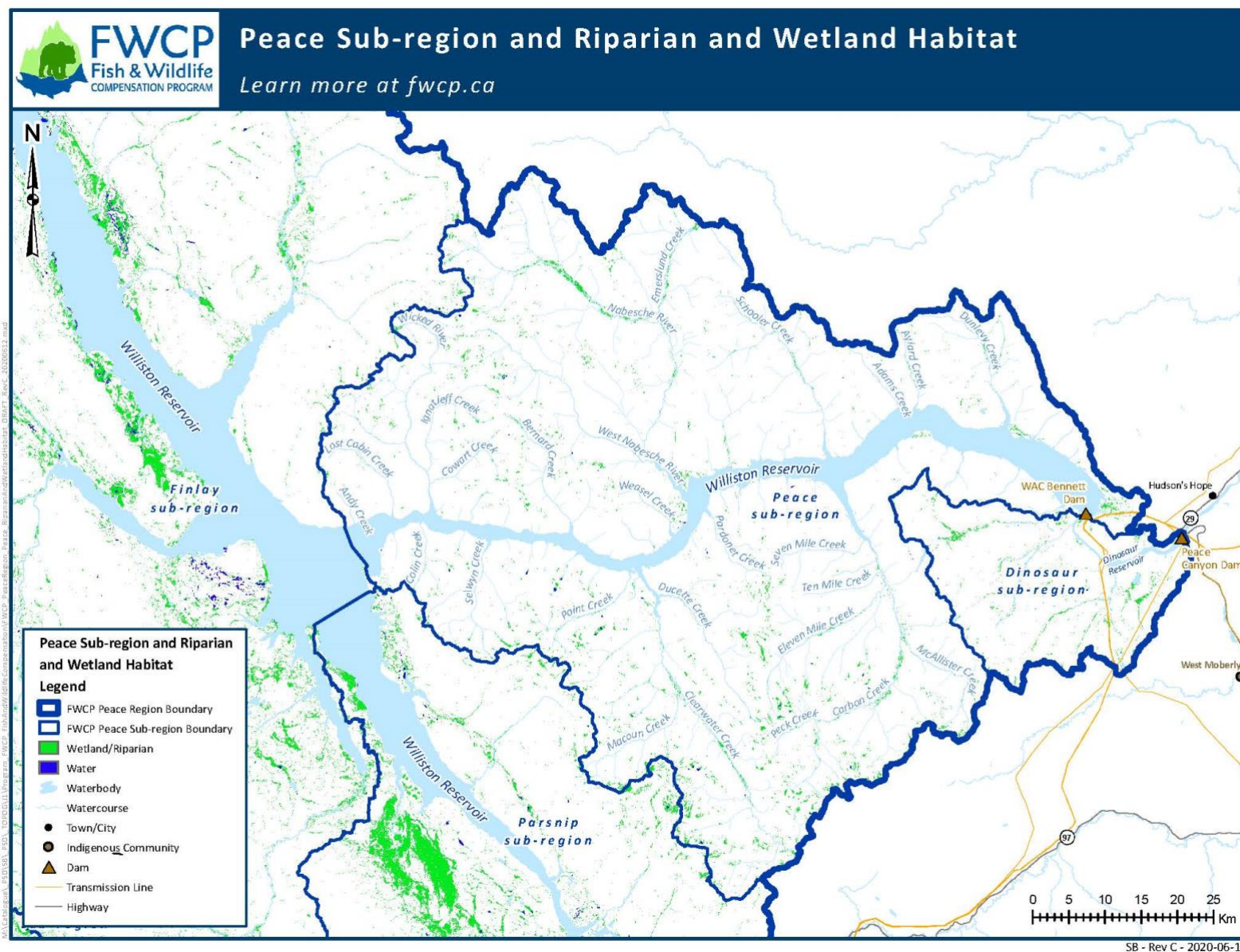


Figure 3. Riparian and wetland habitat in the Parsnip sub-region.





**Figure 4. Riparian and wetland habitat in the Peace sub-region.**

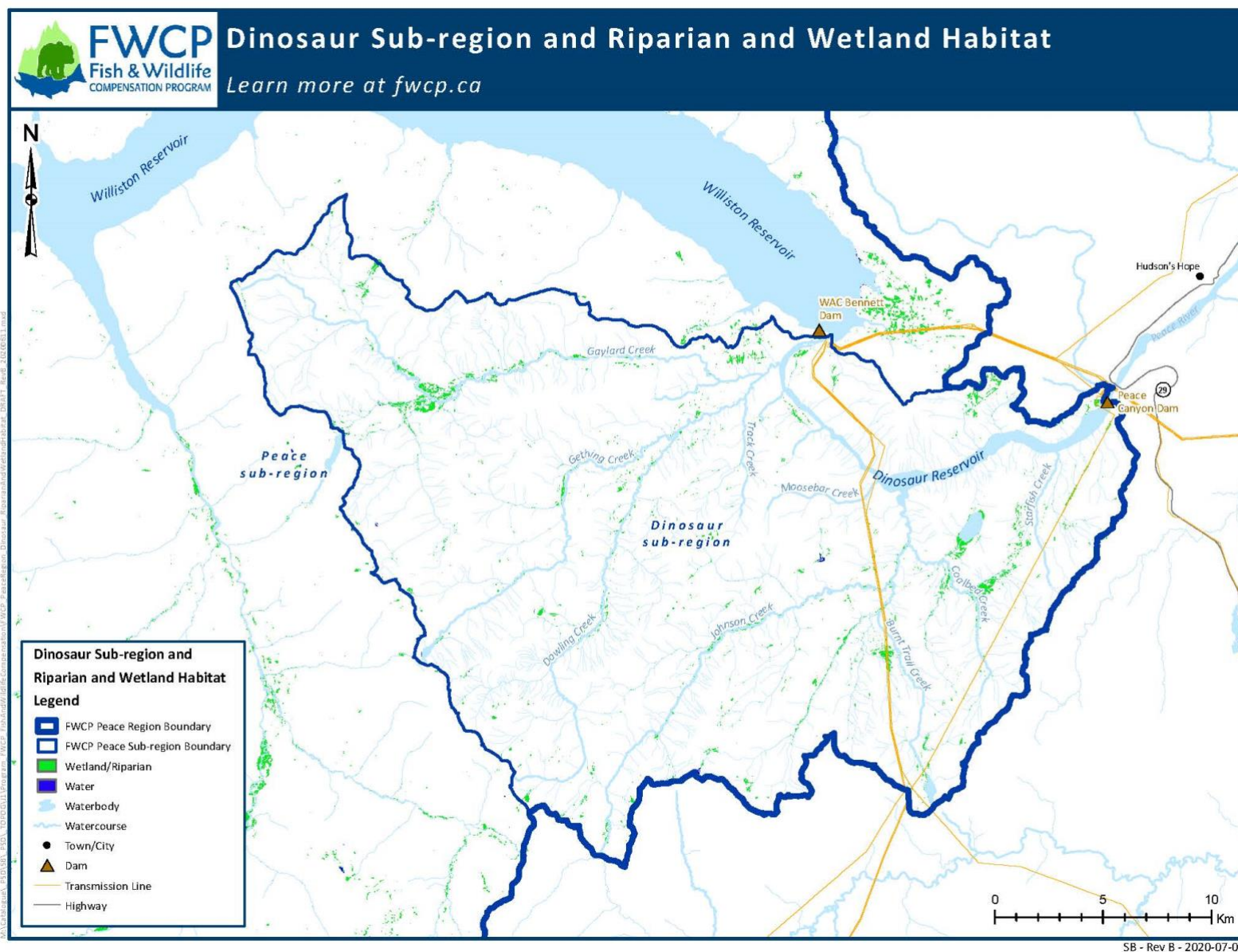


Figure 5. Riparian and wetland habitat in the Dinosaur sub-region.



## Footprint impacts and threats

The FWCP blends its obligation to address dam impacts with a forward-looking approach that recognizes continual adaptation will be required in a dynamic natural environment in order to achieve the FWCP's vision of thriving fish and wildlife populations in watersheds that are functioning and sustainable. The actions in this plan were developed to address footprint impacts of the Williston and Dinosaur reservoirs, as well as other existing and foreseeable threats to priority species and their riparian and wetland habitats in the Peace River Basin, in a way that reflects the FWCP's forward-looking approach. These footprint impacts and threats, including cumulative effects and emerging issues such as other industrial land uses, climate change, and invasive species, are summarized below.

### Hydro-related impacts

The abundance and distribution of riparian and wetland habitat in the Upper Peace River Basin has been altered significantly by the construction of the W.A.C. Bennett and Peace Canyon dams and consequent changes to flood regimes. Extensive floodplain areas along the mainstems of the lowland portions of the Peace River Basin's rivers, smaller creeks, and wetlands were permanently lost when the reservoir was flooded. Smaller riparian and wetland habitats that remain near the full pool operating level of the reservoir have also been affected by altered seasonal flows and siltation that have impaired their function. A detailed analysis of riparian and wetland habitat losses that resulted from dam construction and operation has not been conducted.

### Cumulative effects

Reservoir construction and operation led to new transportation routes in the basin that have contributed to industrial development. The area of inundation has not changed significantly since dam construction, but there have been a variety of stressors and resulting cumulative effects since dam construction and the creation of the reservoirs that have continued to affect riparian and wetland habitats, including forest harvesting, mineral exploration, petroleum and natural gas exploration, and related secondary development. These activities have greatly expanded the regional road network, leading to additional human-related pressures such as erosion, increasing hunting and recreation, and the introduction of invasive species. The marginal impact of BC Hydro-associated roads and enabled boat traffic on regional development is unknown because resource opportunities would have been exploited in the basin without the creation of the reservoirs.

Climate change is also a key and emerging issue for the FWCP. Climate model projections predict that the region can be expected to experience overall increased precipitation with warmer summers and winters, more extreme storm events, increased risk of forest fires, changes in snowpack, and decreased summer stream flow in all basins (Fraser Basin Council 2019). These effects are likely to cause range shifts in many plants and animals, among other impacts.

## Limiting factors

Factors limiting riparian and wetland habitat fall into three broad categories:

### Habitat extent

The contribution of riparian and wetland habitats to broader ecological function is ultimately limited by the extent of the habitats on the land base. Habitats have been lost through inundation. This is generally considered the most important limiting factor.

### Distribution

Connectivity among riparian and wetland habitats, and between these habitats and other habitats and features, are important for the dispersal of plants and animals and for the seasonal movements of some species. Distribution is directly related to extent and to land uses in other habitats.



## Productivity

The productivity of an ecosystem is defined as its ability to grow or yield native plants and animals. Even where riparian and wetland habitats are adequately represented and connected, there are several factors that can negatively affect their productivity:

- Hydrologic conditions such as water level variability and flow rates are among the most important variables driving riparian and wetland habitat development, structure, functioning, and persistence (National Research Council 2001). Hydrologic conditions also influence the extent and distribution of habitats where changes in hydrology result in succession to other habitat types (e.g., reservoir drawdown zone).
- Stressors such as invasive species or disruptive human access can affect riparian and wetland community structure and function.
- The loss of specific habitat features can affect life requisites of specific species (e.g., dense nesting cover for waterfowl, suitable tree cavities for nesting owls or waterfowl, or aquatic amphibian breeding sites).

## Knowledge status and gaps

Substantial work has been completed to develop predictive mapping of riparian and wetland habitat in the FWCP's Peace Region (Filatow et al. 2020). Some field inventories have been conducted and some opportunities for enhancement and restoration have been identified (see previously implemented projects below). Future work should focus on prioritizing and implementing actions to protect, restore, and/or enhance ecologically important riparian and wetland habitats.

## Previously implemented FWCP projects

Upper Peace River Basin-wide trends in the abundance, distribution, and productivity of riparian and wetland habitats, as well as the species dependent on them, have not been compiled; however, there have been a variety of water use plan- or FWCP-sponsored projects that have addressed inventory and/or the enhancement of riparian and wetland habitats in the Peace Basin, including:

- predictive mapping of wetland habitat (Filatow et al. 2020);
- identification of opportunities for wetland restoration in the Finlay sub-region (Chu Cho 2020);
- identification of some important amphibian breeding sites along the Williston Reservoir and Chuchi Lake (DWB 2019);
- inventory of existing wetlands in the Parsnip Reach of the Williston Reservoir and the identification and monitoring of sites for possible enhancement (Golder Associates 2010, Cooper Beauchesne and Associates Ltd. 2013);
- inventory and enhancement (e.g., nesting islands) of existing wetlands (e.g., Corbould 1992, Martin 1992);
- weir installation to enhance wetlands (Hengeveld and Corbould 1998); and,
- experimental blasting trials to create wetlands (Dawson 1990).

## RIPARIAN & WETLANDS ACTION PLAN OBJECTIVES

Clear and realistic objectives are necessary to guide and prioritize actions. Priority actions will change as progress is made and information is gained. The current action plans reflect the progress made to date, information available, and values expressed by FWCP partners, including Indigenous Nations and stakeholders.

The FWCP has the following overarching strategic objectives:

1. Conservation – maintain or improve the integrity and productivity of ecosystems and habitats
2. Conservation – maintain or improve the status of species or ecosystems of concern
3. Sustainable use – maintain or improve opportunities for sustainable use, including harvesting and other uses
4. Community engagement – build and maintain relationships with Indigenous and stakeholder communities

The Riparian and Wetlands Action Plan has six sub-objectives, which are high-level statements of desired future conditions (goals) that are nested within the FWCP's strategic objectives (Figure 6). While sub-objectives provide specific direction on desired future conditions for ecosystems and priority species, priority actions in the [action tables](#) are the “means” to achieve each sub-objective and often occur in a sequence under each sub-objective.

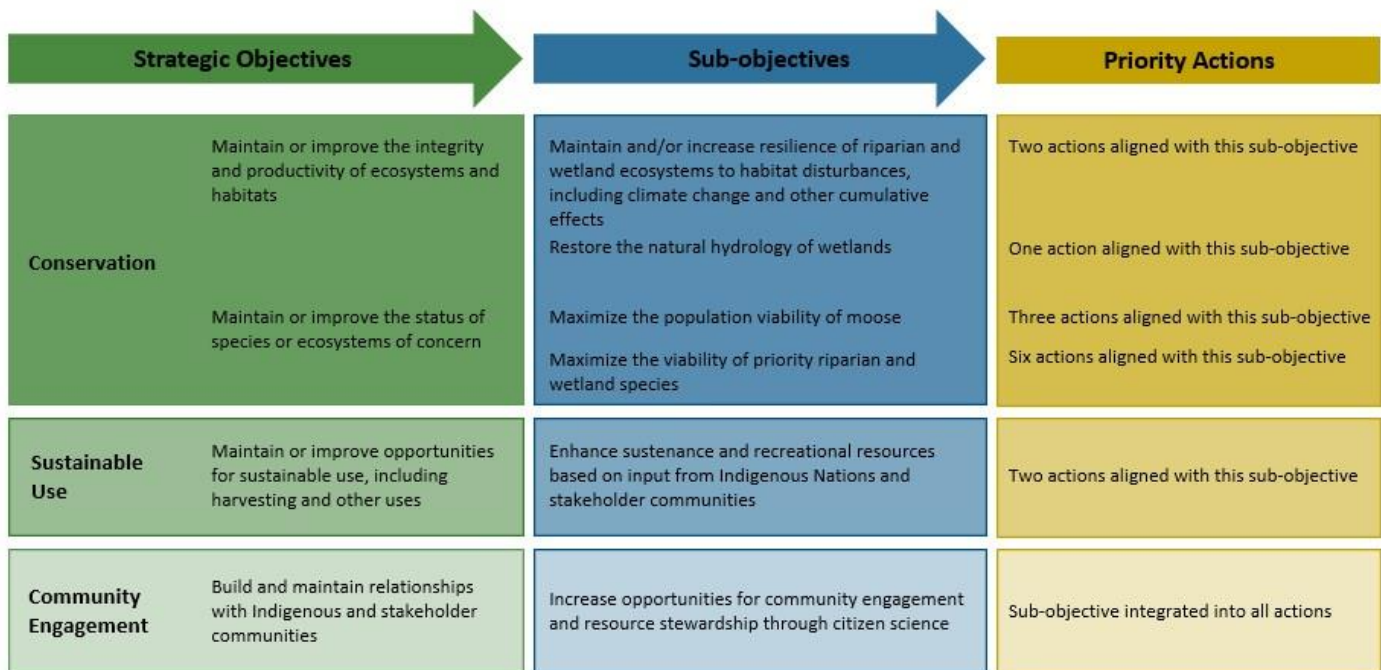


Figure 6. Action plan objectives and measures.

### Conservation

**Strategic objective: maintain or improve the integrity and productivity of ecosystems and habitats**

**Sub-objective 1: maintain and/or increase the resilience of riparian and wetland ecosystems to habitat disturbances, including climate change and other cumulative effects**

At a broad scale, resilient ecosystems can maintain or recover key functions, such as primary production, nutrient cycling, and water management, during or following disturbances, such as fire or flooding. The function, connectivity, and species diversity of ecosystems are often good indicators of potential ecosystem resilience. Adjacent undisturbed species populations will provide source populations for the recolonization of areas subjected to habitat disturbance in

well-connected ecosystems. The sub-objective to maintain and/or increase the resilience of riparian and wetland ecosystems to habitat disturbances, including climate change and other cumulative effects, focuses on the conservation goals for ecosystems, habitats, or ecological communities. There are two general actions under this sub-objective:

- Action #1 to assess impacts and threats to wetland and riparian areas and prioritize conservation and enhancement.
- Action #2 to implement habitat-based actions identified in action #1.

For a more species-focused approach to prioritizing and implementing conservation and enhancement actions, see the actions under sub-objective 4, to maximize the viability of priority species.

Actions to maintain or increase resilience to climate change and cumulative effects can cross multiple ecosystem types. Four actions are housed under sub-objective 1 in the Cross-Ecosystem Action Plan that link to these actions in the Riparian & Wetlands Action Plan. Actions #1 and #2 of the Cross-Ecosystem Action Plan involve developing a framework for incorporating climate change and cumulative effects into priority actions and could inform the approach to prioritize conservation and enhancement of riparian and wetland habitats. Land securement is another related action in the Cross-Ecosystem Action Plan (actions #3 and #4) that could be a conservation outcome of actions #1 and #2 in the Rivers, Lakes, & Reservoirs Action Plan for priority aquatic habitats.

### **Sub-objective 2: restore the natural hydrology of wetlands**

Historical and current land use can alter wetland hydrology and reduce wetland function. For example, hydrology can be altered by the construction of roads that bisect wetlands or result in erosion and sedimentation, the intentional draining of wetlands, and changes in riparian and upland vegetation, such as clearing (Dube 1995) or the introduction of invasive plant species. Conversely, actions to restore the natural hydrology of a wetland may include the installation of a culvert or bridge to restore hydrological connectivity or the reconstruction of a berm to flood a previously drained wetland. This type of passive restoration, where the source of habitat degradation is eliminated or reduced, can be more cost-effective than wetland creation, which can be expensive due to engineering and construction costs and ongoing maintenance costs. There is a single action under this sub-objective:

- Action #3 to restore the natural hydrology of wetlands.

Restoring the natural hydrology of a wetland can have beneficial effects on priority wetland and riparian species (see action under the objective to maintain or improve the status of priority species); however, the potential for inadvertent adverse impacts to existing habitat and associated species must also be considered during restoration planning.

## **Strategic objective: maintain or improve the status of species or ecosystems of concern**

### **Sub-objective 3: maximize the population viability of moose**

Moose started to populate the Peace River Basin in the early 1900s, and continued to expand into the area in the following decades, likely in response to a combination of natural (i.e., forest fire) and anthropogenic (e.g., forest harvesting) landscape changes (Santomauro et al. 2012). Construction of the W.A.C. Bennett Dam and subsequent flooding of the Williston Reservoir resulted in the loss of high-quality valley bottom winter habitat for moose (Sumanik and Harrison 1968 as cited in Hatler 1989). Even though moose were not present in the area historically, they were commonly identified as a priority species during engagement, due to observed declines and their use for sustenance. Reliance on moose for sustenance has increased as caribou populations have declined. Grey wolf predation on caribou is thought to be greater as a result of historic population expansion of moose, a situation known as apparent competition (Cumming et al. 1994, Serrouya et al. 2017). Thus, there is conflict between enhancing habitat for moose and the recovery of endangered caribou. Actions to enhance moose populations need to be carefully considered so that they do not negatively affect the local caribou population.

Declining moose populations in the FWCP's Peace Region was a common theme uncovered during engagement to update the action plans in 2019–2020. In addition, the Ministry of Forests, Lands and Natural Resource Operations

(2012) reported dramatic declines in the moose population in the Omineca Region around Prince George between 2005 and 2012, and smaller declines in the moose population in the Peace Region around Fort St. John between 2004 and 2012. The moose population declines coincided with landscape-level changes caused by the mountain pine beetle outbreak and subsequent forest harvesting, which is also associated with increased access for hunters and predators (Kuzyk et al. 2015). A five-year FWCP-funded project researching moose limiting factors was completed in 2020 (Sittler 2020) and the Province of B.C. is leading investigations into moose cow and calf survival within central British Columbia (Kuzyk et al. 2018). Less is known about moose populations in the northeast portion of the Upper Peace River Basin (Sittler 2020).

There are three actions under the sub-objective to maximize the population viability of moose:

- Action #4 to monitor moose and conduct research suitable for FWCP funding.
- Action #5 to prioritize areas for moose habitat enhancement that do not conflict with caribou range.
- Action #6 to enhance moose forage.

Actions #6 and #7 in the Uplands Action Plan, to restore linear corridors, will also have beneficial effects for moose.

#### **Sub-objective 4: maximize the population viability of priority riparian and wetland species**

Viable populations of priority species are populations that can persist and rebound from intermittent stressors. Maximizing population viability is different from maximizing population size, which could be at the expense of other species. There are three general actions applicable to all priority upland species, and three actions specific to amphibians, birds, and bats under the sub-objective to maximize the viability of priority riparian and wetland species:

- Action #7 to research priority species to identify limiting factors.
- Action #8 to develop species-focused habitat restoration and protection plans.
- Action #9 to identify and prioritize locations for amphibian habitat restoration.
- Action #10 to implement enhancement actions for priority avian species.
- Action #11 to implement enhancement actions as identified by projects under actions #8–11.
- Action #12 to install and maintain artificial nest and roost structures, where such structures limit priority species populations or where the structures are strongly associated with environmental stewardship and education.

The list of priority riparian and wetland species is provided below in the priority species section of this action plan. Additional actions that could relate to maximizing the population viability of riparian and wetland priority species include actions #1-4 in the Cross-Ecosystem Action Plan.

## **Sustainable use**

### **Strategic objective: maintain or improve opportunities for sustainable use, including harvesting and other uses**

#### **Sub-objective 5: enhance sustenance and recreational resources based on input from Indigenous Nations and stakeholder communities**

This objective focuses on the FWCP's role in restoring or enhancing the abundance of priority species and in providing information to resource-management decision-makers related to providing opportunities for harvesting and other uses. Sustenance and recreational harvesters include Indigenous Peoples, licensed hunters and anglers, and commercial harvesters. Other uses may include cultural, medicinal, or non-consumptive uses.

There are two actions under the sub-objective to enhance sustenance and recreational resources based on input from Indigenous Nations and stakeholder communities:



- Action #13 to conduct research on culturally important species, to identify priorities for conservation and/or enhancement actions.
- Action #14 to implement habitat- and species-based actions for culturally important species.

Work under action #13 could be informed by work under action #10 in the Cross-Ecosystem Action Plan or existing surveys of Indigenous knowledge (e.g., Pearce et al. 2019a-e). See also actions #13 and #14 in the Uplands Action Plan, and actions #22 and #23 in the Rivers, Lakes, & Reservoirs Action Plan for similar actions for culturally important species in those ecosystem types.

## Community engagement

### Strategic objective: build and maintain relationships with Indigenous and stakeholder communities

#### Sub-objective 6: increase opportunities for community engagement and resource stewardship through citizen science

The FWCP's overarching strategic objective of community engagement stems from BC Hydro's social responsibility policy, the Province of B.C.'s shared stewardship goal, and the approach of the DFO's Stewardship and Community Involvement Program. This recognizes the importance of engaging Indigenous Nations, Bands, and groups; local stakeholders; and other interest groups to contribute to making good decisions and delivering effective projects.

In the previous iteration of the FWCP's Peace Region action plans, the Peace Basin Plan (FWCP 2014) highlighted community-based projects under a separate category of "stewardship and education" to better facilitate projects not (necessarily) directly aligned with the objectives of the action plans but consistent with the overarching FWCP strategic objective for community engagement. During the 2020 action plan update process it was decided that these community engagement actions should be more directly integrated into the action plans.

Stewardship and education actions are housed in the Cross-Ecosystem Action Plan and do not appear in the ecosystem-based action plans; however, stewardship and education are encouraged to be incorporated into relevant projects in the ecosystem-based action plans.

## PRIORITY SPECIES

A list of priority species was developed as an outcome of the action plan engagement process, which focuses the action plans toward species of conservation concern and those most likely affected by the creation of the reservoirs. The full list of priority species across all ecosystems is available in the Peace Region: Overview & Action Plans document. The approach to identifying priority species includes all vertebrate species at risk that breed in the FWCP's Peace Region, as well as additional sustenance species, species of conservation concern that are not federally or provincially listed as a species at risk due to observed declines or current/imminent threats (e.g., bats due to white-nose syndrome). An open category of culturally important species is also included in the list of priority species to provide flexibility for Indigenous Nations, Bands, and groups to develop a project on a culturally important species that does not appear on the list of priority species. As conservation status may change during the period that this action plan is in place, action #5 in the Cross-Ecosystem Action Plan has been developed to allow for emerging species of conservation concern to be considered if necessary.

The FWCP uses three general categories of priority species: recovery, focal, and inventory. Recovery, focal, and inventory categories are an indication of the state of knowledge for each species and not an indication of the priority level for each species (Table 1). The list of priority species that apply to the Riparian & Wetlands Action Plan is shown in Table 2. Note that many terrestrial species utilize both upland and riparian and wetland ecosystem types; therefore, a primary and secondary ecosystem-based action plan has been assigned for each of these species.

**Table 1. Category definitions for the FWCP's Peace Region priority species.**

Category	Priority Species Category Definitions
<b>Recovery</b>	Recovery species are a high priority and conservation concern and have likely been adversely impacted by dam construction. These species have formally been classified as either Threatened or Endangered by Canada or B.C., and recovery and/or management plans have been developed by federal or provincial management agencies. Actions for recovery species align with recovery strategies and plans.
<b>Focal</b>	Focal species have a strong linkage to dam footprint impacts and are of high priority. At least some information related to population status, critical habitats, and key limiting factors have been defined for focal species based on previous FWCP projects (e.g., through the development of a monitoring framework), and therefore specific follow-up actions have already been developed. Actions for focal species should build upon previous FWCP projects with an aim to restore and/or enhance suitable habitats in the relevant ecosystems.
<b>Inventory</b>	Inventory species have also been affected by dams and are a high priority, but detailed inventory and/or trend monitoring is required to better understand population status, critical habitats, and key limiting factors. Actions for inventory species should aim to provide the basis for future compensation actions, if required.

Table 2. Priority species for the FWCP's Peace Region Riparian &amp; Wetlands Action Plan.

The FWCP's Peace Region priority species for riparian, wetlands, and uplands						
Species Group	Species (or add Other)	Provincial Listing	Federal Designation	Species Category	Applicable Ecosystem-based Action Plan	
					Riparian & Wetlands <sup>1</sup>	Uplands <sup>1</sup>
Carnivores	Grizzly bear	Blue	Special Concern	Inventory	Secondary	Primary
	Fisher	Blue	-	Focal	Secondary	Primary
	Wolverine	No Status	Special Concern	Inventory	Secondary	Primary
Ungulates	Caribou (central mountain population)	Red	Threatened	Recovery		√
	Caribou (northern mountain population)	Blue	Special Concern	Recovery		√
	Moose	-	-	Focal	Primary	Secondary
	Mountain goat	Blue	-	Inventory		√
	Stone's sheep	Blue	-	Inventory		√
Small Mammals	American water shrew	Blue	Special Concern	Inventory	√	
Bats	Little brown myotis	Yellow	Endangered	Recovery	Secondary	Primary
	Northern myotis	Blue	Endangered	Recovery	Secondary	Primary
	Additional bat spp. (big brown bat, long-eared myotis, long-legged myotis, hoary bat, silver-haired bat, eastern red bat)	-	-	Inventory	Secondary	Primary
Amphibians	Western toad	Yellow	Special Concern	Inventory	Secondary	Primary
	Long-toed salamander	-	-	Inventory	Secondary	Primary

<sup>1</sup> Recognizing that many terrestrial and semi-aquatic species and species groups make use of riparian and wetland habitats as well as upland habitats, actions for these species have been assigned to a **primary** ecosystem-based action plan; however, general habitat-based actions from the **secondary** ecosystem-based action plan may also be applied to these priority species.

The FWCP's Peace Region priority species for riparian, wetlands, and uplands						
Species Group	Species (or add Other)	Provincial Listing	Federal Designation	Species Category	Applicable Ecosystem-based Action Plan	
					Riparian & Wetlands <sup>1</sup>	Uplands
Breeding Birds	American bittern	Blue	-	Inventory	Primary	Secondary
	Baltimore oriole	Blue	-	Inventory	Primary	Secondary
	Bank swallow	Yellow	Threatened	Inventory	Primary	Secondary
	Barn swallow	Blue	Threatened	Inventory	Primary	Secondary
	Bay-breasted warbler	Red	-	Recovery	Secondary	Primary
	Black swift	Blue	Endangered	Inventory	Primary	Secondary
	Black-throated green warbler	Blue	-	Inventory	Secondary	Primary
	Broad-winged hawk	Blue	-	Inventory	Primary	Secondary
	Canada warbler	Blue	Threatened	Recovery	Primary	Secondary
	Cape May warbler	Blue	-	Inventory	Primary	Secondary
	Common nighthawk	Yellow	Threatened	Recovery	Primary	Secondary
	Connecticut warbler	Blue	-	Inventory	Primary	Secondary
	Eared grebe	Blue	-	Inventory	Primary	Secondary
	Evening grosbeak	Yellow	Special Concern	Inventory	Primary	Secondary
	Great blue heron, herodias subspecies	Blue	-	Inventory	Primary	Secondary
	Horned grebe	Yellow	Special concern	Inventory	Primary	Secondary
	Northern goshawk, atricapillus subspecies	Blue	-	Inventory	Secondary	Primary
	Olive-sided flycatcher	Blue	Threatened	Recovery	Primary	Secondary
	Rusty blackbird	Blue	Special Concern	Recovery	Primary	Secondary
	Short-eared owl	Blue	Special Concern	Recovery	Secondary	Primary
	Swainson's hawk	Red	-	Inventory	Primary	Secondary
	Upland sandpiper	Red	-	Inventory	Secondary	Primary
	Winter wren	Blue	-	Inventory	Secondary	Primary
	Yellow rail	Red	Special Concern	Recovery	Secondary	Primary
Invertebrates	Pollinator species at risk	Red, Blue	Special Concern, Threatened	Inventory	Secondary	Primary
Ecological Communities at Risk		Red, Blue	-	Inventory	Primary	Secondary
Culturally Important Species		-	-	Inventory, Recovery, or Focal	√	√

## ACTION TABLES

The [action tables](#) in this document identify FWCP priority actions to conserve and enhance priority riparian and wetland species and ecosystems in the FWCP's Peace Region. See the Peace Region: Overview & Action Plans document for additional information on action table format and the funding application process.

Priority actions are organized by ecosystem (or cross-ecosystem actions), species, and action type (research and information acquisition, monitoring and evaluation, land securement, habitat-based actions, and species-based actions)



and are assigned a priority ranking from 1 (highest priority) to 3 (lowest priority). The priority ranking does not account for potential project sequencing.

**Priority** – The action plans identify the importance and urgency of each priority action (i.e., priority 1, 2, or 3). When grant applications are evaluated, a priority 1 action will score higher than a priority 2 or 3 action. See Table 3 below for additional information on priority setting.

**Table 3. Priority rating definitions for the FWCP's Peace Region actions.**

Priority	Definition of FWCP Priorities
1	Required urgently due to current/imminent threats, highest priority for FWCP partners and stakeholders, and/or provide a significant benefit relative to cost.
2	Required due to current/imminent threats, high priority for FWCP partners and stakeholders, and/or provide good benefit relative to cost.
3	Identified due to possible threats, high priority for some FWCP partners and stakeholders, and/or benefit relative to cost may not be known.

## Cross-ecosystem actions

Several broad actions are relevant to all ecosystem-based action plans and will require the consideration of multiple ecosystem types and values. These actions were not suited to any single ecosystem-based action plan and have been grouped into a stand-alone Cross-Ecosystem Action Plan. All grant seekers are encouraged to review the Cross-Ecosystem Action Plan, as your proposed project may address actions in both the Riparian & Wetlands Action Plan and the Cross-Ecosystem Plan. During the online application process, grant seekers are asked to define primary and secondary actions that their proposed project may address. These primary and secondary priority actions can occur in more than one action plan. For example, actions to assess the success of habitat- and species-based actions are housed in the Cross-Ecosystem Action Plan.

## Riparian and wetland actions

These action tables identify the FWCP's priority actions to conserve and enhance riparian and wetland species and ecosystems impacted by BC Hydro dams in the FWCP's Peace Region. Actions identified as **open** (see Delivery Approach column) **are eligible for a grant**. When completing your online grant application, you will be required to identify a priority action(s) that your project intends to address. A high-quality grant application will clearly demonstrate alignment with a priority action(s) in an action table. Actions identified as **directed only** are not eligible for a grant. These are projects that our regional boards will direct through the appropriate procurement process (e.g., a request for proposal). Please **do not** submit a grant application for a **directed only** project. Actions identified as **directed/open are eligible for a grant** or may be projects that our regional boards will direct through the appropriate procurement process. Contact us if you are unsure.

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
<b>Conservation sub-objective 1: maintain and/or increase resilience of riparian and wetland ecosystems to habitat disturbances, including climate change and other cumulative effects</b>							
1	Research & information acquisition	<b>PEA.RWE.SO1.RI.01 Assess threats and impacts to wetland and riparian areas-P1</b>	1	Riparian and wetland species and ecological communities	Utilize the FWCP Riparian and Wetland Mapping Project (i.e., <a href="#">Filatow et al. 2020</a> and the <a href="#">Williston Wetland Explorer Tool</a> ) to assess the connectivity, current function of, and threats (including but not limited to cumulative effects) to mapped wetland and riparian areas in the FWCP's Peace Region and identify priority areas for conservation and/or enhancement actions to restore connectivity and ecological function. The approach to assessing cumulative effects should be consistent with the approach developed under action #2 in the Cross-Ecosystem Action Plan. Where appropriate, work should build on previous work identifying opportunities for wetland restoration ( <a href="#">Chu Cho 2020</a> ) and should also consider previous FWCP amphibian wetland connectivity studies (i.e., <a href="#">DWB 2019</a> or more current). See the related action #8 for a species-based approach to habitat restoration, action #9 specific to amphibian habitat restoration, and actions #3 and #4 in the Cross-Ecosystem Action Plan for land securement. Prioritization for conservation, restoration, and/or enhancement should consider Indigenous use through engagement with Indigenous Nations, Bands, and groups, and future land use through engagement with industrial land users and provincial agencies responsible for permitting.	Prioritization of wetland and riparian habitats for conservation and/or enhancement actions.	Open/ Directed

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
2	Habitat-based action	<b>PEA.RWE.SO1.HB.02 Conserve, restore, and/or enhance riparian and wetland habitats-P1</b>	1	Riparian and wetland species and ecological communities	Implement conservation, restoration, and/or enhancement actions based on the findings of the wetland or riparian habitat function and connectivity assessments in action #1. Depending on the findings, actions may include vegetation management activities such as prescribed burning, invasive species management, or bank stabilization through riparian planting. Actions may also include the creation of late-successional forest structures that have been documented or are known to be limiting the abundance of wildlife (e.g., wildlife trees, nest cavities, dens). Priority species and species not currently of conservation concern are expected to benefit from habitat-based actions; however, potential conflicts between enhancing habitat to benefit one species to the detriment of another species should be noted and carefully considered. See action #3 specific to the restoration of wetland hydrology, actions #5 and #6 specific to moose habitat restoration, action #10 specific to avian habitat restoration, and action #11 for restoration focused on priority species.	Implementation of habitat-based actions to conserve, restore, and/or enhance riparian and wetland habitats.	Open

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
<b>Conservation sub-objective 2: restore the natural hydrology of wetlands</b>							
3	Habitat-based action	<b>PEA.RWE.S02.HB.03 Restore the natural hydrology of wetlands-P1</b>	1	Riparian and wetland species and ecological communities	Implement opportunities to restore wetland hydrology, based on findings of the FWCP Riparian and Wetland Mapping Project ( <a href="#">Filatow et al. 2020</a> and the <a href="#">Williston Wetland Explorer Tool</a> ), previous FWCP amphibian wetland connectivity studies (most recently <a href="#">DWB 2019</a> ), and previous work identifying opportunities for wetland restoration ( <a href="#">Chu Cho 2020</a> ), where appropriate. Information acquired through BC Hydro water use planning projects should also be considered. Habitat-based actions may include the installation of culverts or other wetland water-management structures.	Implementation of habitat-based actions to restore natural wetland hydrology.	Open
<b>Conservation sub-objective 3: maximize the population viability of moose</b>							
4	Research & information acquisition	<b>PEA.RWE.S03.RI.04 Monitor moose and conduct research-P2</b>	2	Moose	Implement recommendations of the FWCP-funded five-year Moose Limiting Factors Study (Sittler 2020), as appropriate for the FWCP.	Implementation of recommendations for on-the-ground conservation of moose across the study area derived from the FWCP-funded five-year Moose Limiting Factors Study.	Open/ Directed
5	Research & information acquisition	<b>PEA.RWE.S03.RI.05 Prioritize areas for moose habitat enhancement-P1</b>	1	Moose	Identify and prioritize areas for moose habitat enhancement that do not conflict with caribou range, through engagement with the caribou recovery team, provincial moose teams, and forest practices ministries.	Prioritization of areas for moose habitat enhancement.	Directed

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
6	Habitat-based action	<b>PEA.RWE.SO3.HB.06 Enhance moose forage-P1</b>	1	Moose	Implement habitat-based actions that increase the production of high-quality moose forage species ( <a href="#">Gorley 2016</a> , <a href="#">Werner 2019</a> ). Locations should be selected strategically to prevent conflict with caribou recovery (See action #5). Consideration should be given to how the scale of habitat-based actions will affect moose populations. Actions could benefit from engagement and collaboration with forest licencees; forestry professionals; government ministries; and Indigenous Nations, Bands, and groups.	Increased production of moose forage species.	Open
<b>Conservation sub-objective 4: maximize the population viability of priority riparian and wetland species</b>							
7	Research & information acquisition	<b>PEA.RWE.SO4.RI.07 Research priority species to identify limiting factors-P2</b>	2	Riparian and wetland species and ecological communities	Conduct research on priority species, including the analysis of limiting factors to support the prioritization of future projects in riparian and wetland habitats that could be implemented under action #11. This could include an assessment of existing data and information on population status, habitat status, or habitat capacity, and should consider the root causes of degraded habitats and limitations to reproductive potential. For priority species with approved recovery and/or management plans, research should address knowledge gaps identified in these plans.	Identification of limiting factors for priority wildlife species in order to identify and develop further conservation or enhancement actions for those species.	Open



Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
8	Research & information acquisition	<b>PEA.RWE.SO4.RI.08 Develop a habitat restoration and protection plan-P1</b>	1	Riparian and wetland species and ecological communities	Develop a comprehensive habitat restoration and protection plan for priority riparian and wetland wildlife in relation to limiting factors analyses (action #7) and an assessment of population status/habitat capacity that considers competing factors for various species. The plan will include prioritized candidate areas for habitat restoration and/or protection. Habitat restoration could be implemented under action #11, while habitat protection could be implemented under action #4 in the Cross-Ecosystem Action Plan. Please see related action #1 for a more ecosystem-based approach (i.e., restoring ecological function).	Prioritization of habitat and/or species-based actions informed by knowledge of limiting factors for priority wildlife species.	Open/ Directed
9	Research & information acquisition	<b>PEA.RWE.SO4.RI.09 Identify and/or prioritize locations for amphibian habitat restoration-P2</b>	2	Amphibians	Conduct research to identify potential locations for amphibian habitat restoration (which could be implemented under action #11). Projects should build on the Amphibian Wetland Connectivity Along the Williston Reservoir project (most recently <a href="#">DWB 2019</a> ) assessing amphibian distribution throughout the Upper Peace River Basin. Please also see the more general but related action #1 to prioritize wetlands for restoration.	Identification and/or prioritization of amphibian habitat restoration opportunities.	Open

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
10	Research & information acquisition	<b>PEA.RWE.S04.RI.10</b> <b>Identify and prioritize habitat-based actions for priority bird species-P2</b>	2	Breeding birds	Conduct research to identify and prioritize habitat-based actions that address key conservation issues for priority breeding bird species. Please also see the more general but related action #11 to implement habitat-based actions for all priority species, as well as the more specific action #12 to install nesting or roosting structures.	Identification and prioritization of habitat-based actions for priority breeding bird species associated with riparian and wetland habitats affected by the reservoir footprint.	Open
11	Habitat-based action	<b>PEA.RWE.S04.HB.11</b> <b>Implement restoration and/or enhancement actions for priority wildlife-P2</b>	2	Riparian and wetland species and ecological communities	Implement restoration and/or enhancement actions from the findings of actions #7–10 to directly (through on-the-ground work) address identified risks or limiting factors, and to take advantage of documented enhancement opportunities for priority wildlife species.	Implementation of restoration and/or enhancement actions to sustain/and or increase population viability of priority wildlife.	Open
	Species-based action		2				

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
12	Habitat-based action	<b>PEA.RWE.SO4.HB.12 Install, monitor, and maintain artificial nest and roost structures-P3</b>	3	Bats and breeding birds	Install artificial nesting or roost structures for wildlife species where the lack of natural structures limit abundance, and/or would provide valuable stewardship and education opportunities (e.g., easily accessible, near schools or public use areas). Some examples include nesting islands for ground-nesting waterfowl and shorebirds that isolate nests from predators, nest boxes for cavity-nesting waterfowl or other bird species, and roost structures for bats. All projects must include a long-term monitoring and maintenance plan for installed structures and should consider learnings from previous FWCP projects (e.g., <a href="#">Corbould 1991</a> , <a href="#">Corbould 1993</a> , <a href="#">Juelfs and Corbould 2008</a> ). The long-term monitoring and maintenance plan should include the involvement of established naturalist or environmental stewardship groups and/or school groups.	Increased number of effective artificial nesting and roosting structures for a variety of species, and increased stewardship and education.	Open

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
Sustainable use sub-objective 5: enhance sustenance and recreational resources based on input from Indigenous Nations and stakeholder communities							
13	Research & information acquisition	<b>PEA.RWE.SO5.RI.13 Research culturally important species-P2</b>	2	Culturally important species	Conduct research and monitoring to improve the understanding of documented culturally important riparian and wetland plants and animals, including abundance, distribution, trend, threats, and ecological relationships. Monitoring could be conducted by local Indigenous Guardians to support local concerns regarding potential stressors to riparian and wetland habitats and sustenance resources. Research should incorporate Indigenous knowledge and values and be used to identify conservation and/or enhancement actions for culturally important species.	Prioritization of conservation and/or enhancement actions for culturally important species.	Open
14	Habitat-based action	<b>PEA.RWE.SO5.HB.14 Implement conservation or enhancement actions for culturally important species-P1</b>	1	Culturally important species	Implement conservation and/or enhancement actions identified under action #13 for culturally important species. Habitat enhancement activities that include Indigenous Guardians, local community engagement, and volunteer support are encouraged.	Implementation of habitat- and/or species-based actions for culturally important species.	Open
	Species-based action		1				

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## GLOSSARY

**Action plan:** The Fish & Wildlife Compensation Program has identified conservation priorities for fish and wildlife in each of its three regions and these are reflected in a series of action plans. The priorities and plans vary by region.

**Blue-listed species:** Includes any native species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered, or Threatened.

**Community engagement:** Community engagement refers to range of actions intended to inform and/or involve communities of interest, including but not limited to geographic communities, in a priority action and/or proposed project. The appropriate level of engagement and the engagement actions selected will vary depending on the desired outcomes (i.e., informing vs involving).

**Cross-ecosystem action:** An action that is relevant to two or more ecosystem-based action plans and may require the consideration of multiple ecosystems.

**Delivery approach:** Priority actions identified as “open” are eligible for a grant. Actions identified as “directed” are not eligible for a grant. These are projects that our regional boards will direct through the appropriate procurement process (e.g., a request for proposal).

**Endangered species:** A fish or wildlife species that is facing imminent extirpation or extinction, as listed under the federal *Species at Risk Act*.

**Fish & Wildlife Compensation Program (FWCP):** The FWCP is a partnership between BC Hydro, Fisheries and Oceans Canada, the Province of B.C., Indigenous Nations, and public stakeholders to conserve and enhance fish and wildlife impacted by the construction of BC Hydro dams.

**Floodplain:** An area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding.

**Focal species:** Defined by the FWCP’s Peace Region as having a strong linkage to dam footprint impacts and are of high priority. At least some information related to population status, critical habitats, and key limiting factors have been defined for focal species based on previous FWCP projects (e.g., through development of a monitoring framework), and therefore specific follow-up actions have already been developed. Actions for focal species should build upon previous FWCP projects with an aim to restore and/or enhance suitable habitats in the relevant ecosystems.

**Footprint impacts:** The permanent loss of habitat associated with a dam and related infrastructure, including the permanently flooded habitat (below the drawdown zone) resulting from reservoir creation.

**Habitat protection:** Land securement or land conservation through legal mechanisms (e.g., wildlife habitat area designation) that conserve important habits by preventing further degradation.

**Habitat restoration:** Manipulation of abiotic or biotic site factors through habitat or species-based actions that drive the return of natural ecological functions to an area where these functions have been lost or degraded.

**Indigenous Guardians:** Indigenous Guardians are involved in community-based Indigenous Guardian programs that “manage protected areas, restore animals and plants, test water quality, and monitor development projects.” Land Guardians also “welcome visitors to traditional territories and maintain cultural sites.”<sup>2</sup>

**Indigenous knowledge:** The United Nations Educational, Scientific and Cultural Organization (UNESCO) refers to Indigenous Knowledge as the “understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings.”

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<sup>2</sup> <https://landneedsguardians.ca/what-guardians-do>

**Invasive species:** An organism (plant, animal, fungus, or bacterium) that is not native and has negative effects on our economy, our environment, or our health. Invasive species can spread rapidly to new areas and will often outcompete native species as there are no predators or diseases to keep them under control.

**Inventory species:** Defined by the FWCP's Peace Region as species that have been affected by dams, but detailed inventory and/or trend monitoring is required to better understand population status, critical habitats, and key limiting factors. Actions for inventory species should aim to provide the basis for future compensation actions, if required.

**Sustenance resources:** Natural resources harvested directly by Indigenous Peoples or licensed hunters and anglers for personal food or medicinal use.

**Upper Peace River Basin:** The geographic area (i.e., watersheds) that drains into the Peace River, upstream of the Peace Canyon Dam. The geographic boundary of this area is the same as the administrative boundary for the FWCP's Peace Region.