PEACE REGION CROSS-ECOSYSTEM ACTION PLAN

August 11, 2020

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.

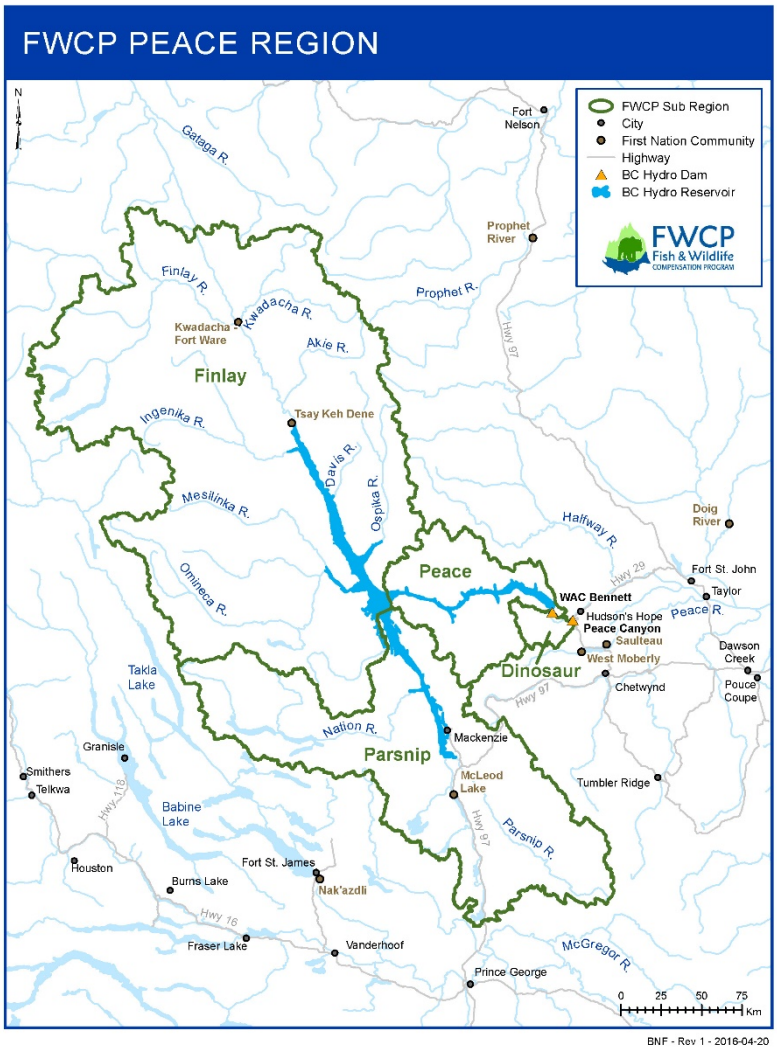

Figure 1. The Fish & Wildlife Compensation Program's Peace Region boundary includes the Upper Peace River Basin, which consists of the Finlay, Parsnip, Peace, and Dinosaur sub-regions.

Cover photos clockwise from top left: bull moose, iStock Daniel Gaura; wolverine, iStock Waitandshoot; Arctic grayling, iStock mlharing; reservoir, Abe Swanson; caribou calf and mom, Wildlife Infometrics; heron.

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 Upper Peace River Basin ecosystems.

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

EXECUTIVE SUMMARY

Cross-Ecosystem 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. The Cross-Ecosystem Action Plan builds on the FWCP's strategic objectives and integrates cross-ecosystem actions previously present across all 2014 action plans. Some emerging issues and ecological and cultural priorities are broader than any one ecosystem; in these instances, cross-ecosystem actions are identified. These actions are relevant to more than one ecosystem type and/or may represent FWCP program-level priorities.

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

Priority actions are listed 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. 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 upland 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 upland 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 upland 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 Cross-Ecosystem Action Plan sets out priority actions for the FWCP that will guide funding decisions for FWCP projects across ecosystem types in the Upper Peace River Basin. The focus of the next five-year period will be to develop frameworks for incorporating climate change and cumulative effects into how FWCP can prioritize further actions, including prioritizing aquatic and terrestrial habitats for conservation, enhancement, and/or restoration actions. High-priority issues include addressing potential impacts of climate change, including cumulative effects and emerging issues; assessing the success of FWCP priority actions; enhancing sustenance and recreational resources, including culturally important species to Indigenous Nations, Bands, and groups; and conducting stewardship and education activities.

This action plan identifies priority species across all ecosystem types. Priority species specific to ecosystem types are identified in the Rivers, Lakes, & Reservoirs Action Plan; Riparian & Wetlands Action Plan; and Uplands Action Plan. Highest priority aquatic species include the focal species of Arctic grayling, bull trout, native and introduced kokanee, and lake trout. Highest priority terrestrial species include caribou, a recovery species, and moose, a focal species.

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INTRODUCTION AND BACKGROUND

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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 Upper Peace River Basin:

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

The Cross-Ecosystem Action Plan includes thirteen actions that apply across rivers, lakes, and reservoirs; riparian and wetlands; and uplands ecosystem types (i.e., cross-ecosystem actions). These actions were not suited to any single ecosystem-based action plan and have been grouped into this action plan to allow for work to occur that addresses the FWCP's strategic objectives across ecosystem types.

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

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.

Cross-Ecosystem Action Plan introduction

Setting

The FWCP's Peace Region is approximately 70,000 km^2 and occurs in the headwaters of the Peace River, a tributary of the Mackenzie River, in northeastern British Columbia (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 Peace River is formed by the confluence of the Finlay and Parsnip rivers flowing in opposing directions in the Rocky Mountain Trench. The construction of W.A.C. Bennett Dam flooded the mainstem portion of the Peace River above the dam, as well as a portion of the Finlay and Parsnip rivers forming the Peace, Finlay, and Parsnip reaches of the Williston Reservoir. The lower portions of all the tributaries draining into these three reaches were flooded. The Peace Canyon Dam flooded the mainstem Peace River upstream to the foot of the W.A.C. Bennett Dam to form the Dinosaur Reservoir. The three reaches of the Williston Reservoir and the Dinosaur Reservoir and associated tributaries and lands thus form the four sub-regions of the FWCP's Peace Region.

The FWCP's Peace Region is divided into three broad ecosystem types: aquatic, terrestrial, and riparian, and wetland habitats. All three of these ecosystem types support species and ecological communities that have been altered by the creation of the Williston and Dinosaur reservoirs. These three ecosystem types form the basis for the grouping of the FWCP's Peace Region ecosystem-specific action plans into the Rivers, Lakes, & Reservoirs; Uplands; and Riparian & Wetlands action plans. Many species and ecosystem-specific actions and associated research and monitoring are well aligned with one of these main ecosystem types. However, there are also program priorities and emerging issues, such as climate change, that are best addressed by actions that can span across ecosystem types. This Cross-Ecosystem Action Plan was developed to address those needs.

The Upper Peace River Basin's topography varies from low-elevation forests around the Williston Reservoir (670 m) and along the major rivers to rugged mountainous terrain (Mt. Ulysses, 3,024 m). There are south- and west-facing side hills that lose their snow and green up first in the spring, and north-facing side slopes that hold snow until later in the spring and provide moister, cooler summer habitats. Vegetation varies from mature forests of spruce and pine to shrubby areas, grassland, and deciduous forests of aspen, cottonwood, and paper birch. Marshes, small and large streams, acid bogs, lakes, and the reservoir foreshore all provide wetland habitats that are used by wildlife.

The climate of the FWCP's Peace Region is characterized by cold, snowy winters with deep snow, and mild, rainy summers with a short growing season. The mean annual temperature is 0.5°C, while the means for January and July are -18°C and 13°C, respectively. Temperatures extremes of -47°C and 32°C are common in the winter and summer, respectively. Snow accumulations range from approximately 1 m in the valleys to more than 4 m in the mountains. The corresponding water equivalent ranges from approximately 250 mm to 1,300 mm. Average annual precipitation is approximately 800 mm, which is evenly distributed between snow and rain.

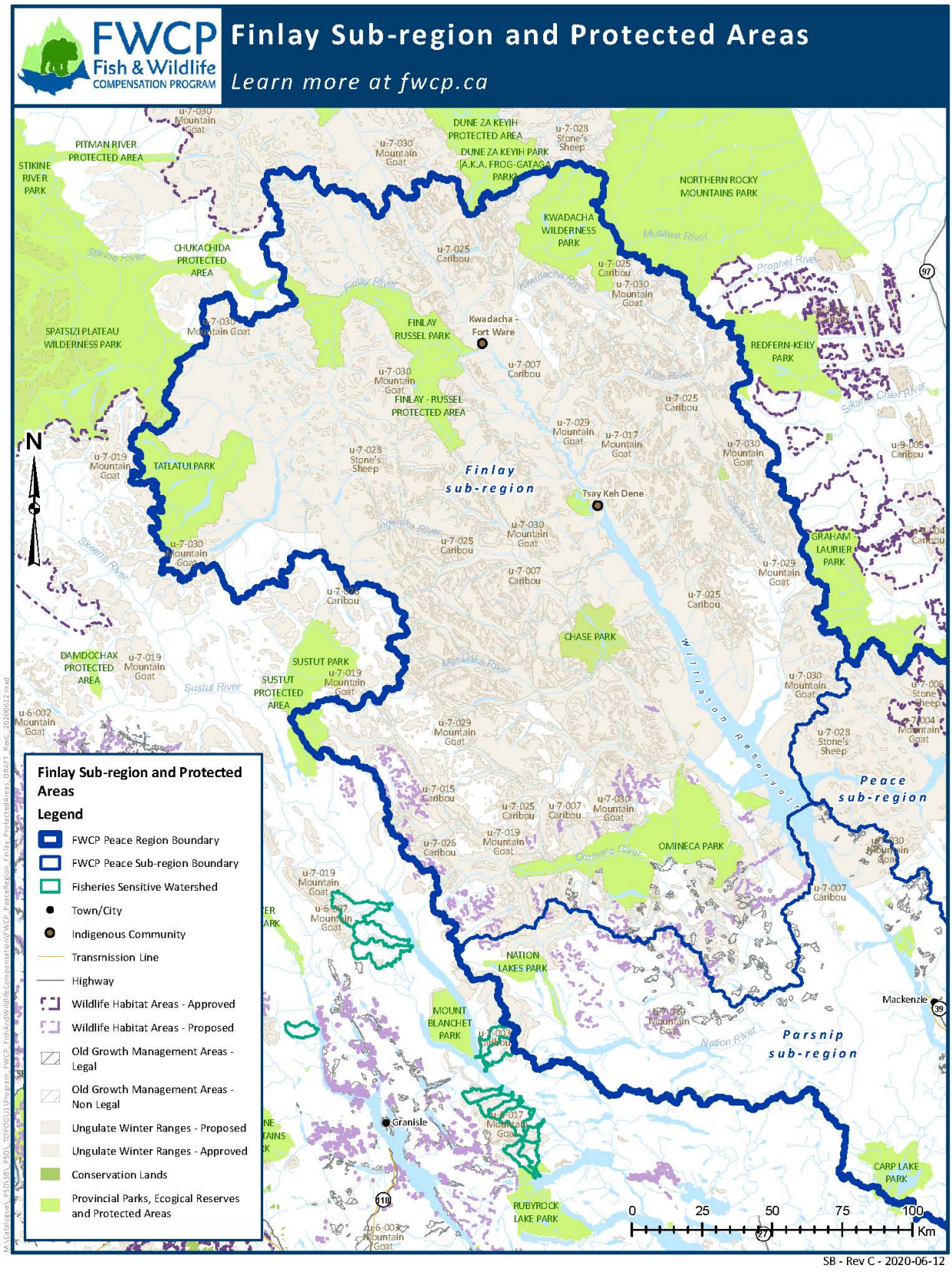

Figure 2. Protected areas in the Finlay sub-region.

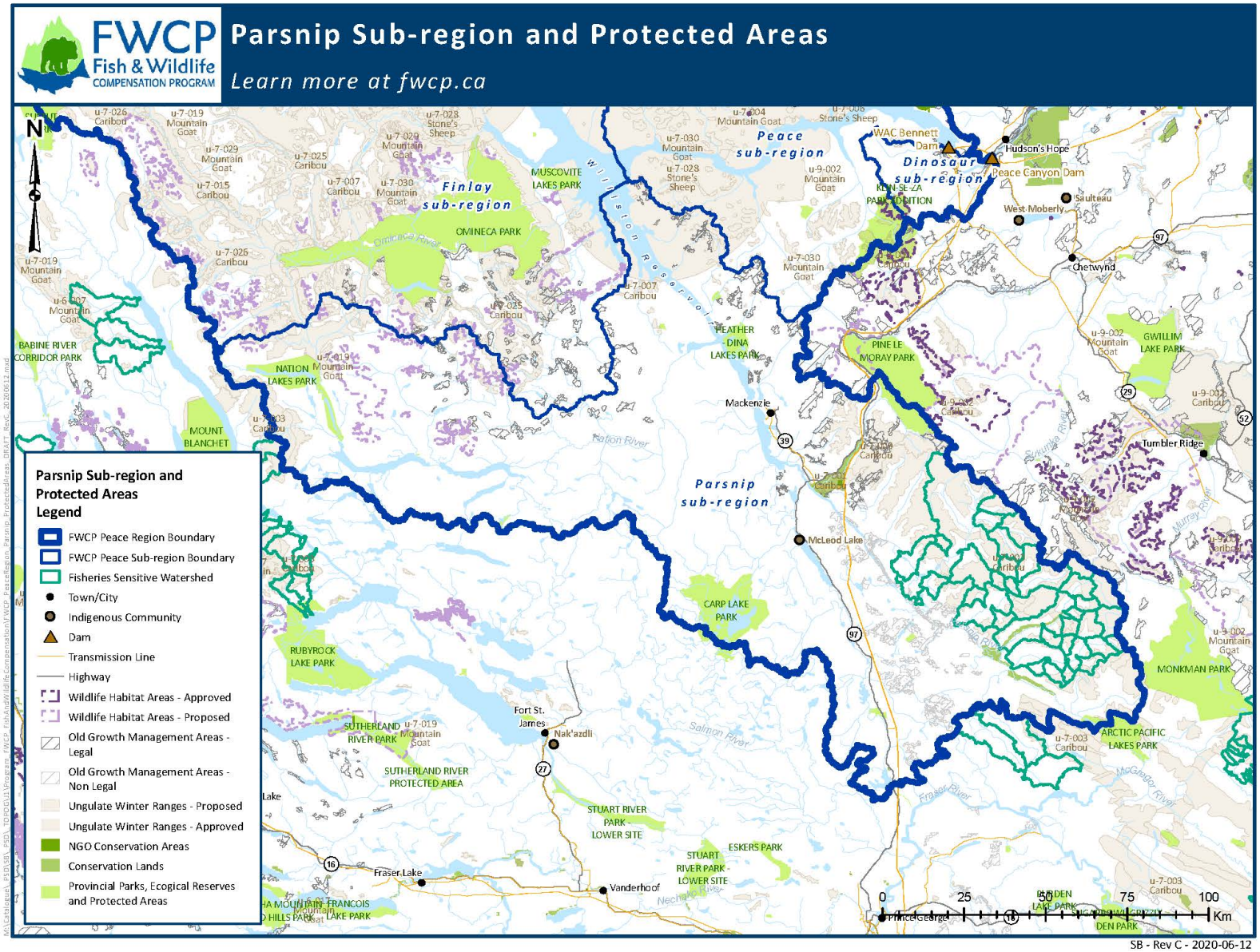

Figure 3. Protected areas in the Parsnip sub-region.

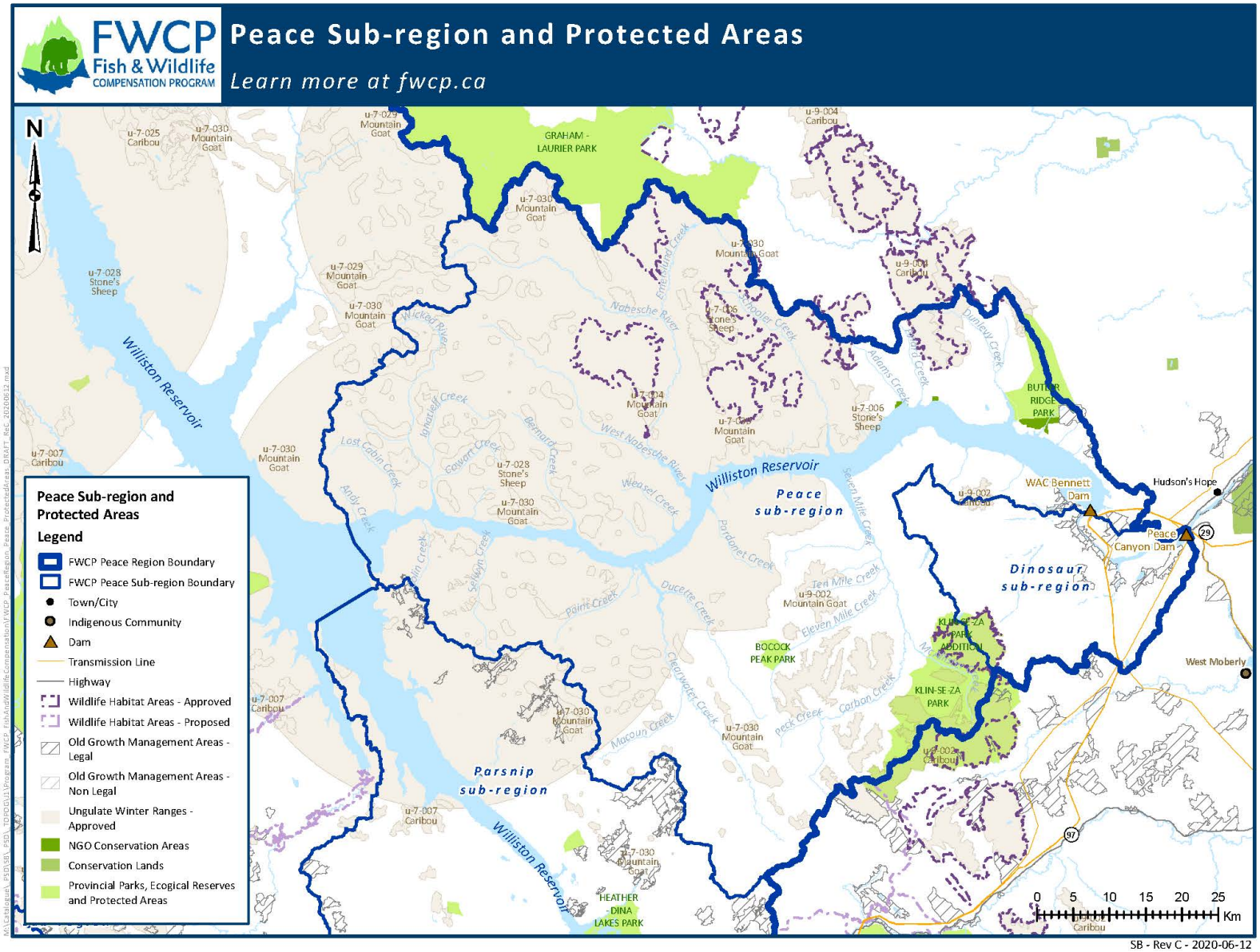

Figure 4. Protected areas in the Peace sub-region.

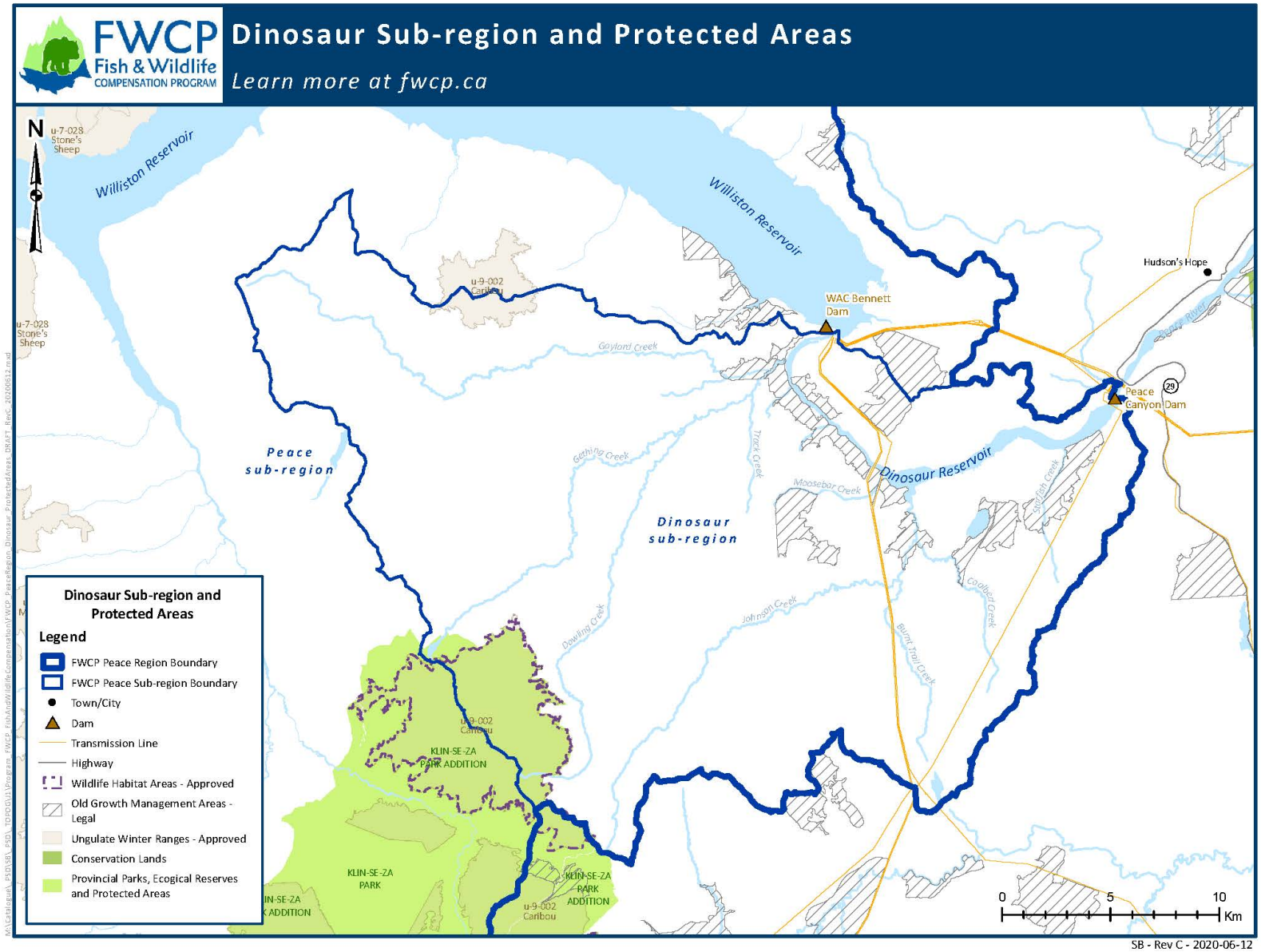

Figure 5. Protected areas in the Dinosaur sub-region.

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 aquatic habitats in the Upper 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 Williston and Dinosaur reservoirs inundated large areas of woodlands, wetlands, floodplain, riverine, and lake habitat. These habitats were replaced with simpler, less diverse reservoir habitat.

Creation of the 1,773 km^2 Williston Reservoir resulted in the inundation of large areas of riverine and natural lake habitats within the reservoir footprint, which affected many fish species. For example, the loss of large river habitat was likely a major factor that led to the decline and eventual extirpation of a reported 24 populations of Arctic grayling from the drainage (Stamford and Taylor 2005).

Terrestrial habitats were reduced by approximately 1,500 km2, which affected important habitat and movement corridors for caribou, Stone's sheep, and grizzly bear. More generally, the inundation of lowland habitat is considered a major limiting factor for many wildlife species because of the high productivity of riparian ecosystems and, in some cases, because the loss of riparian habitat may have forced some species to spend more time foraging in deeper snow conditions at higher elevations.

Additional hydro-related impacts include migration barriers for fish and wildlife, losses in primary productivity, alterations in water quality, bioaccumulations of methyl mercury, and entrainment. For example, impaired access to traditional spawning and rearing areas through the reservoirs has affected the genetic diversity of some fish populations. The Scott caribou herd was also bisected by the creation of the Williston Reservoir, preventing seasonal movements. The large fluctuations in water levels of the Williston Reservoir also have seasonal impacts to stream and littoral habitat productivity. The Peace Water Use Plan of 2007 was developed to improve reservoir level and downstream flow conditions through incremental changes in dam operations.

Cumulative effects

Compounding the impacts to fish and wildlife and their habitats, the FWCP's Peace Region continues to experience growth in many natural resource sectors, including increased development for forestry, mining, agriculture, and oil and gas exploration and extraction. These developments contribute to the cumulative impacts on species, habitats, and migration corridors. For example, transportation of timber by boom or barge has enabled forestry companies to harvest distant drainages more easily, affecting habitat for caribou and fish. Cumulative impacts include poorly maintained road culverts, which can act as barriers to fish migration and movement. Overall, linear development disturbances such as roads, bridges, and oil and gas pipelines have impacted connectivity of habitats, the movements of predators and prey, and the ability of humans to access habitats.

Climate change is also a key and emerging issue for the FWCP's Peace Region. 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 the abundance and distribution of species in the FWCP's Peace Region fall into three broad categories, including habitat extent, distribution, and productivity:

Habitat extent

Woodland, wetland, floodplain, stream, and lake habitats were lost through reservoir inundation. These habitats also continue to be lost through conversion to other land uses from other developments. Habitat losses are thought to be greatest in stream, riparian, and wetland habitats. For example, there are many kilometers of remaining tributary habitat to the Williston and Dinosaur reservoirs, but only short sections are accessible due to the presence of barriers. This is generally considered the most important limiting factor for streams. The creation of new habitat or treatments that increase local carrying capacity may improve the extent of suitable habitat.

Distribution

Connectivity among habitats is important for the dispersal of plants and animals and for the seasonal movements of some species. Inundation of the Williston and Dinosaur reservoirs created major north-south and east-west barriers for a variety of wildlife species. Connectivity among stream habitats has been affected by reservoir creation; for example, aquatic habitats that were formerly continuous stream habitat are now only connected via the reservoir, which may prevent or reduce the movements of some fish species among these streams. Other land-use pressures and the creation of barriers such as highways and fencing have further restricted connectivity. Alternatively, forest roads, transmission lines, and pipeline rights of way have increased connectivity between some habitats, which can alter predator-prey dynamics.

Productivity

The productivity of an ecosystem is defined as its ability to grow or yield native plants and animals. Even where the extent and distribution of habitats is relatively intact, the productivity of ecosystems can be eroded by pressures such as invasive species, mechanical disturbance, soil erosion, changes in drainage patterns, as well as forest harvesting, livestock grazing, and other extractive activities.

Aquatic productivity is limited by fluctuations in stream flow, nutrient levels, changes in temperature, and turbidity alterations to physical spawning habitats, among other factors. For example, biological productivity of the reservoirs is limited by low nutrient levels, as compared to the lakes that they replaced, which were less extensive but more productive. 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).

Knowledge status and gaps

Substantial work has been completed to identify ecologically important upland habitats (e.g., the identification of karst and cave features that provide important wildlife habitat; Lausen 2017, Zonal 2020) and map riparian and wetland habitat (Filatow et al. 2020). Although this work is not necessarily complete, future work should focus on prioritizing and implementing actions to protect, restore, and/or enhance ecologically important upland and riparian and wetland habitats.

Long-term monitoring data are generally unavailable for terrestrial species. As a result, knowledge of pre-dam populations is limited to anecdotal accounts or inferences made from general habitat impacts. Trend information for some species (e.g., ungulates) has become more available starting in the 1990s. More recently, a focus on threatened and endangered wildlife has improved our knowledge of the distribution and abundance of these species (e.g., Culling and Culling 2016, Klaczek 2019a, b); however, there remain significant gaps in the FWCP's Peace Region.

There have been many studies of the ecology, productivity, and enhancement potential of aquatic habitats in the Upper Peace River Basin (e.g., Langston 1992; Slaney 1992; Northcote 1993; Zemlak and Langston 1998; Harris et al. 2006;

Langston and Murphy 2008, Plate et al. 2012, DWB 2019), but there remain substantial knowledge gaps, particularly with respect to critical habitat (e.g., spawning habitat locations and quality), trends in abundance of species (e.g., bull trout, rainbow trout, mountain whitefish), and the understanding of the ecological impacts of the shifts in species compositions that accompanied reservoir creation. In general, species that prefer stream habitats (e.g., Arctic grayling, mountain whitefish) have declined in abundance since reservoir creation due to a substantial reduction in stream habitat (Blackman et al. 1990). Recent work to synthesize existing information in the Arctic grayling and bull trout monitoring frameworks (Hagen and Stamford 2017, Stamford et al. 2017, Hagen and Weber 2019) have greatly increased our understanding of these high-priority species of conservation concern. However, there is a need to synthesize existing data for many species, determine conservation status and key limiting factors, and use this to inform of future actions.

Previously implemented FWCP projects

Most of the previously implemented FWCP projects are targeted for a single priority species or ecosystem type. However, the FWCP has invested in a variety of projects that span multiple ecosystem types, including aquatic, riparian and wetland, and uplands ecosystems, or address program-level priorities for the FWCP.

Land securement is often an action that benefits multiple ecosystem types, as all ecosystem types may be protected in a large or valuable parcel of land. In addition, the effects of land securement can also be felt downstream via maintenance of the natural flow regime. Examples of past FWCP projects associated with land securement include:

- Adams, Beattie, and Dunlevy private land acquisitions by the Nature Trust of British Columbia; and
- Kennedy Siding private land acquisition for the Kennedy Siding caribou herd by the Nature Trust of British Columbia (PEA-F18-W-2864-DCA).

The FWCP has also supported studies related to mercury methylation in the Williston and Dinosaur reservoirs and potential impacts to fish and wildlife species and human health (see fwcp.ca/mercury). Work in aquatic habitats is presented in the Williston-Dinosaur Watershed Fish Mercury Investigation Summary Report (Azimuth 2019). The impact of mercury and other reservoir-related contaminants on terrestrial species has been less studied, although Crowley and Hodder (2017) assessed mercury and selenium concentrations in river otter and American mink.

Species that occur in one ecosystem can influence the structure and functioning of another. One example of this is the Ecosystem Impacts of Nutrient Enrichment by Kokanee study (Coxson et al. 2018), which documented the role of spawning kokanee and kokanee carcasses in supporting a range of terrestrial species in the Williston Reservoir Watershed.

Projects that relate to culturally important species and stewardship and education activities often span a range of ecosystem types and FWCP priorities. For example, Indigenous community concerns about introduced kokanee were documented as part of a project to document Indigenous knowledge related to kokanee and other priority species to guide priorities for monitoring, conservation, and enhancement actions in future FWCP projects (Pearce et al. 2019a, b, c, d, e). Community engagement is also an important priority for the FWCP and has been implemented via the action plans. Previously supported projects related to community engagement include:

- Mackenzie Nature Observatory Mugaha Marsh Banding Station (e.g., Lambie 2019);
- University of Northern British Columbia Colloquium Series (e.g., Wiensczyk and Coxson 2019); and
- Williston School Ecology Program (e.g., Dubman 2017).

CROSS-ECOSYSTEM 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 Cross-Ecosystem Action Plan has five sub-objectives, which are high-level statements of desired future conditions (goals) that are nested within the FWCP's strategic objectives (Figure 6). While the 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-objectives and often occur in a sequence under each sub-objective.

Strategic Objectives		Sub-objectives	Priority Actions
Conservation	Maintain or improve the integrity and productivity of ecosystems and habitats	Maintain and/or increase resilience of aquatic and terrestrial ecosystems to habitat disturbances, including climate change and other cumulative effects	Four actions aligned with this sub-objective
		Maximize the population viability of priority species	One action aligned with this sub-objective
	Maintain or improve the status of species or ecosystems of concern	Maximize the effectiveness of actions supported by FWCP	Four actions aligned with this sub-objective
Sustainable Use	Maintain or improve opportunities for sustainable use, including harvesting and other uses	Enhance sustenance and recreational resources based on input from Indigenous Nations and stakeholder communities	Two actions aligned with this sub-objective
Community Engagement	Build and maintain relationships with Indigenous and stakeholder communities	Build, maintain and improve relationships with Indigenous Nations and local stakeholders that support conservation and sustainable use projects in the FWCP's Peace Region	Two actions aligned with this sub-objective

Figure 6. Objectives and sub-objectives for the FWCP's Peace Region Cross-Ecosystem Action Plan.

Conservation

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

Sub-objective 1: maintain and/or increase resilience of aquatic and terrestrial ecosystems to habitat disturbances, including climate change and other cumulative effects

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 aquatic and terrestrial ecosystems to habitat disturbances, including climate change and other cumulative effects, focuses on broad conservation goals for ecosystems, habitats, or ecological communities.

In addition to the effects of inundation by the formation of the reservoirs, climate change and cumulative effects are placing increased pressure on species and ecosystems in the FWCP's Peace Region. These pressures may also limit the success of habitat- or species-based actions supported by the FWCP if they are not well understood or accounted for in future planning. One way that the FWCP can address ecosystem resilience is to protect or conserve valuable land through land securement. Another is to support habitat or species-based actions that maintain or increase key ecosystem functions. These types of actions can have benefits across multiple ecosystem types; for example, old-growth forest conserved for caribou can also benefit aquatic species in the watershed through the maintenance of the natural flow regime.

Four actions were developed under the sub-objective to maintain and/or increase the resilience of aquatic and terrestrial ecosystems to habitat disturbances, including climate change and other cumulative effects:

- Action #1 to develop a framework to incorporate elements of climate change into future FWCP actions.
- Action #2 to develop a framework to incorporate cumulative effects into future FWCP actions.
- Action #3 to engage with land-securement partners to prioritize areas for land securement.
- Action #4 to implement land securement.

Actions to maintain or increase resilience to climate change and cumulative effects can also be ecosystem-specific, and these are housed under sub-objective 1 in each of the ecosystem-based plans (Rivers, Lakes, & Reservoirs; Riparian & Wetlands; Uplands). Actions #1 and #2 in this plan are intended to provide a framework for implementing actions in each of the ecosystem-based action plans. Actions related to this sub-objective in each of the ecosystem-based action plans involve a combination of spatial mapping actions to identify priority habitats and threats, followed by on-the-ground actions to assess ecosystem function and develop restoration opportunities.

Land-securement options include working with the Province of B.C. to update land designations, such as Fisheries Sensitive Watersheds and Old Growth Management Areas. Priority habitats may include riparian areas, wetlands, old-growth forests, and important habitat features (e.g., bat or snake hibernacula, mineral licks).

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

Sub-objective 2: maximize the population viability of priority species

This sub-objective addresses the concepts of ecosystem integrity, resiliency, and the functional elements of ecosystems, including efforts to improve or optimize productive capacity for priority species. Priority species for the FWCP's Peace Region are identified below in the "priority species" section of this action plan. Priority species for individual ecosystem types are also identified in each of the ecosystem-based action plans. A criterion for inclusion in the priority species list was conservation status, which includes all vertebrate species at risk that breed in the FWCP's Peace Region and other regionally important species experiencing recent population declines. However, the priority species list was generated based on current priorities and the knowledge of conservation status in early 2020. Therefore, additional flexibility has been built into the action plans so that the FWCP can address emerging issues and species of conservation concern not known at the time of action plan development.

Therefore, one action was developed under the sub-objective to maximize the population viability of priority species in the Cross-Ecosystem Action Plan:

- Action #5 to support project work related to emergent issues for fish and wildlife species.

This action is intended to allow for work on additional species not yet identified as a priority species if an urgent issue is identified.

The sub-objective to maximize the population viability of priority species also occurs in each of the ecosystem-based action plans for priority recovery, focal, and inventory species. See actions #9–18 in the Rivers, Lakes, & Reservoirs

Action Plan; actions #4–12 in the Riparian & Wetlands Action Plan; and actions #3–5 and #8–14 in the Uplands Action Plan.

Sub-objective 3: maximize the effectiveness of actions supported by FWCP

The FWCP's Peace Region generally seeks out investments that are the most technically feasible and effective in achieving its stated goals. Considerations generally include the use of proven methods and the availability of technical resources. Innovative approaches should be considered, but they must have a credible technical foundation and reasonable expectation of success.

The program also seeks out investments that are the most cost-effective. This includes issues or actions that may benefit multiple species, areas where there is an opportunity to leverage additional funds for activities, issues where previous work has been conducted and incremental expenditure may have substantive benefits, and undertakings that are closely related to on-the-ground actions with measurable impacts, among others.

Assessing the success of completed actions is also an important priority for the FWCP, and therefore a *monitoring and evaluation* action type was developed to focus on assessing the outcomes of habitat- or species-based actions. Rather than adding redundancy by including actions to assess the success of habitat- and species-based actions in all sub-objectives of each action plan, the following two actions were developed under the sub-objective to maximize the effectiveness of actions supported by the FWCP in the Cross-Ecosystem Action Plan:

- Action #6 to assess the success of habitat- or species-based actions in all action plans.
- Action #7 to conduct condition assessments and/or maintenance on habitat enhancements supported by the FWCP.

Assessing success or condition assessments apply to habitat-based or species-based actions #3, #18, and #21 of the Rivers, Lakes, & Reservoirs Action Plan; actions #2, #3, #6, #11, #12, and #14 of the Riparian & Wetlands Action Plan; or actions #2, #4, #7, #10, #12, and #14 of the Uplands Action Plan.

Actions #6 and #7 apply to assessing the outcomes of individual habitat- or species-based projects or actions. However, at the program level, the FWCP also seeks to track progress in achieving its objectives and sub-objectives, including aspects such as the conservation status of priority species and ecosystem health. To do so, the FWCP conducts a strategic project review prior to the action plan update process that summarizes FWCP projects completed in the previous five years and identifies key gaps that are then used to update the action plans (e.g., Regehr et al. 2019). However, to fully address the progress of the objectives, biological and habitat-based performance measures also need to be developed, which can be tracked over time.

Actions #8 and #9 were developed under the sub-objective to maximize the effectiveness of actions supported by the FWCP in the Cross-Ecosystem Action Plan:

- Action #8 to develop a monitoring framework with GIS-based and on-the-ground performance measures for the FWCP's Peace Region.
- Action #9 to implement aspects of the monitoring framework described in action #8.

Note that the performance measures should be cost-effective and address progress on the sub-objectives defined for the FWCP's Peace Region and be potentially relevant to other FWCP regions. These actions should also follow and/or be integrated with mapping actions in each of the ecosystem plans, including action #1 and action #2 in each of the action plans.

Sustainable use

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

Sub-objective 4: 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 #10 to work with Indigenous Nations and stakeholder communities to characterize culturally important plants and animals, indicators of aquatic and terrestrial ecosystem health, and locations and methods for sustenance and recreational use enhancement.
- Action #11 to develop a contaminant monitoring program to assess potential reservoir-related contamination levels in aquatic and terrestrial ecosystems.

Work under action #10 should include the incorporation of Indigenous knowledge to document priority species and habitats for further actions. Also see actions #22 and #23 in the Rivers, Lakes, & Reservoirs Action Plan; actions #13 and #14 in the Riparian & Wetlands Action Plan; and actions #15 and #16 in the Uplands Action Plan for the implementation of follow-up actions for culturally important species by ecosystem type.

The issue of mercury methylation in aquatic habitats has been studied previously (see fwcp.ca/mercury); however, the impact of mercury and other reservoir-related contaminants on terrestrial species has been less studied (Crowley and Hodder 2017). Mercury levels may also change over time and should continue to be monitored. Work in aquatic habitats should follow high-priority recommendations from the Williston-Dinosaur Watershed Fish Mercury Investigation Summary Report (Azimuth 2019). Research conducted should be used to identify conservation, enhancement, or mitigation actions for medicinal and sustenance priority species.

Community engagement

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

Sub-objective 5: build, maintain, and improve relationships with Indigenous Nations and local stakeholders that support conservation and sustainable use projects in the FWCP's Peace Region

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.

There are two actions under the sub-objective to build, maintain, and improve relationships with Indigenous Nations and local stakeholders that support conservation and sustainable-use projects in the FWCP's Peace Region:

- Action #12 to conduct stewardship and education activities related to aquatic and terrestrial conservation that have a high educational, volunteer, and/or community engagement component.
- Action #13 to promote environmental stewardship to industries, developments, communities, organizations, and private landowners that have the potential to impact priority species and sensitive habitats in the FWCP's Peace Region.

Previous examples include bird-banding work that promoted education and depended on significant volunteer support and was supported by multiple organizations, or educational actions that promote learning at a higher level and/or broadly within local communities and/or within school systems, whether K–12 or college/university. Another example is engagement with the forestry industry to conserve fisher habitat (MOECCS 2019).

These are the only actions associated solely with community engagement activities. These actions are not present in the ecosystem-based action plans. However, it should be highlighted that stewardship and education activities are still strongly encouraged as components of all the actions identified within the action plans.

PRIORITY SPECIES

Inhabiting the streams, reservoirs, wetlands, and uplands of the FWCP's Peace Region are 24 species of fish and 295 terrestrial vertebrates (PWFWCP 2000). Of the 24 fish species, two (spoonhead sculpin and mottled sculpin) are only known from the Dinosaur Reservoir, while 22 occur in both the Williston and Dinosaur watersheds. Of the 295 wildlife species, five amphibian species, two reptile species, 55 mammal species, and 233 bird species occur in the region.

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 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 across all four action plans 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
Recovery	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 are in place by federal or provincial management agencies. Actions for recovery species align with recovery strategies and plans.
Focal	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 conserve, restore, and/or enhance suitable habitats in the relevant ecosystems.
Inventory	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 in the FWCP's Peace Region.

The FWCP's Peace Region priority species							
Species Group	**Species**	**Provincial Listing**	**Federal Designation**	**Species Category**	**Applicable Ecosystem-based Action Plan**		
					Rivers, Lakes, & Reservoirs	**Riparian & Wetlands[1]**	**Uplands[1]**
Fish	Bull trout	Blue	-	Focal	√		
	Arctic grayling	-	-	Focal	√		
	Kokanee (native)	-	-	Focal	√		
	Kokanee (introduced)	-	-	Focal	√		
	Lake trout	-	-	Focal	√		
	Rainbow trout	-	-	Inventory	√		
	Burbot	-	-	Inventory	√		
	Dolly Varden	-	-	Inventory	√		
	Lake whitefish	-	-	Inventory	√		
	Mountain whitefish	-	-	Inventory	√		
	Pygmy whitefish	-	-	Inventory	√		
	Brassy minnow	-	-	Inventory	√		
	Northern pikeminnow	-	-	Inventory	√		
	Minnow spp.	-	-	Inventory	√		
	Sculpin spp.	-	-	Inventory	√		
	Sucker spp.	-	-	Inventory	√		
Aquatic Invertebrates	Freshwater mussels	-	-	Inventory	√		
	Freshwater clams	-	-	Inventory	√		
	Freshwater insects	-	-	Inventory	√		
	Apatania comosa:	-	-	Inventory	√		
	Zooplankton	-	-	Inventory	√		
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		√	

[1] 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							
Species Group	**Species**	**Provincial Listing**	**Federal Designation**	**Species Category**	**Applicable Ecosystem-based Action Plan**		
					Reservoirs, Lakes, & Rivers	**Riparian & Wetlands[1]**	**Uplands[1]**
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
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 cross-ecosystem priority actions to conserve and enhance fish and wildlife across multiple 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

These action tables identify the FWCP's priority actions to conserve and enhance fish and wildlife in watersheds impacted by BC Hydro dams across multiple ecosystems. 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 idea intends to address. A high-quality grant application will clearly demonstrate alignment with 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
Conservation sub-objective 1: maintain and/or increase resilience of aquatic and terrestrial ecosystems to habitat disturbances, including climate change and other cumulative effects							
1	Research & information acquisition	**PEA.CRE.SO1.RI.02 Develop approach to incorporate climate change into actions-P1**	1	All	Collaborate with others to develop an approach for assessing climate change effects to aquatic and terrestrial ecosystems that will support FWCP's decision-making and guide conservation, restoration, and enhancement opportunities. Work associated with this action should leverage existing data, models, and approaches to assess potential effects of climate change to fish and/or wildlife populations and habitat and to prioritize species or ecosystems most vulnerable to climate change impacts. Elements of this action could also be linked to the cumulative effects assessment actions that inform the further prioritization of activities (action #2 below, and action #1 in each of the ecosystem-based action plans).	Establishment of an approach to inform the prioritization of actions and projects related to climate change (e.g., the development and implementation of resiliency plans, land-securement initiatives, and restoration actions).	Directed

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
2	Research & information acquisition	**PEA.CRE.SO1.RI.02 Develop approach to incorporate cumulative effects into actions-P1**	1	All	Collaborate with others to develop an approach for assessing cumulative effects to aquatic and terrestrial ecosystems that will support FWCP's decision-making and guide conservation, restoration, and enhancement opportunities. The approach is intended to inform action #1 in each ecosystem-based plan and should consider: • accessibility, longevity, continual improvement, and the maintenance of the data and end product given the capacity and resources available to FWCP; • the coordination and leveraging of other provincial initiatives (Provincial Cumulative Effects Framework: e.g., Lewis et al. 2016; Interim Assessment Protocol for Aquatic Ecosystems in British Columbia 2019); • collaboration with other organizations; • similar products and work undertaken by FWCP and others (e.g., Filatow et al. 2020, Ballin et al. 2020, West et al. 2020); and • defining a process to identify criteria and select values (e.g., species or ecosystem values) that involves FWCP partners and stakeholder priorities.	Establishment of an approach to inform the prioritization of actions and projects related to cumulative effects (e.g., the development and implementation of resiliency plans, land-securement initiatives, and restoration actions).	Directed
3	Land securement	**PEA.CRE.SO1.LS.03 Prioritize areas for land securement-P1**	1	All	Engage with agencies, industry, Indigenous Nations, and other stakeholders to identify and prioritize land securement opportunities. The engagement proposed in this action could be informed by actions #1 and #2 in the Cross-Ecosystem Action Plan and action #1 in each of the ecosystem-based action plans related to the mapping of values and risks to aquatic and terrestrial ecosystem health. Mapping actions are to be used to support the prioritization of options for land securement, including collaboration with the Province of B.C. to identify and update land designations such as Fisheries Sensitive Watersheds and Old Growth Management Areas.	Prioritization of land-securement opportunities in coordination with other land-securement partners.	Directed

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
4	Land securement	**PEA.CRE.SO1.LS.04 Conduct land securement-P1**	1	All	Land securement in association with partner organizations to address fish and/or wildlife conservation objectives or to support habitat-based actions proposed by the FWCP. This action is generally intended to follow action #3, although new opportunities that arise independently can be considered. Land securement could address ecosystem function objectives across the Rivers, Lakes, & Reservoirs; Riparian & Wetland; and Uplands action plans. Priority habitats may include riparian areas, wetlands, old-growth forests, and important habitat features (e.g., bat or snake hibernacula, mineral licks).	Securement of land to conserve, protect, and restore ecosystem function and resilience.	Open/ Directed
Conservation sub-objective 2: maximize the population viability of priority species							
5	Research & information acquisition	**PEA.CRE.SO2.RI.05 Respond to emerging issues related to priority species-P1**	1	All	Support project work related to urgent and emerging issues for fish and wildlife species in the Peace Region, such as emergent diseases, invasive species and recent or imminent species declines. The priority species list was generated based on current priorities and knowledge of conservation status in early 2020; thus, this action is intended to allow for work on additional species not yet identified as a priority species if an urgent issue is identified. Please contact the FWCP's Peace Region manager if you are considering a project to address an emerging threat to a species not currently identified as a priority species.	Prioritization and/or implementation of habitat- and/or species-based actions to address emerging or urgent conservation issues.	Open/ Directed

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
Conservation sub-objective 3: maximize the effectiveness of actions supported by FWCP							
6	Monitoring and evaluation	**PEA.CRE.SO3. ME.06 Assess success of habitat- or species-based actions-P1**	1	All	Assess the success of habitat-based or species-based actions #3, #18, and #21 of the Rivers, Lakes, & Reservoirs Action Plan; actions #2, #3, #6, #11, #12, and #14 of the Riparian & Wetlands Action Plan; or actions #2, #4, #7, #10, #12, and #14 of the Uplands Action Plan. Success could be assessed through the monitoring of biological and/or physical habitat responses based on quantifiable performance measures. Success could be assessed on a graduated schedule, such as every one, three, five, and 10 years, or based on high-flow events or other natural or human-caused disturbances. This assessment would benefit from the incorporation of citizen science to collect data prior to and following the implementation of habitat-based actions.	Assessment of success of habitat- or species-based actions based on quantifiable performance measures, which can support future planning and prioritization.	Open/ Directed
7	Monitoring and evaluation	**PEA.CRE.SO3. ME.07 Assess condition and maintain habitat enhancements-P1**	1	All	Conduct condition assessments and/or maintenance on habitat enhancements, such as in actions #3, #18, and #21 of the Rivers, Lakes, & Reservoirs Action Plan; actions #2, #3, #6, #11, #12, and #14 of the Riparian & Wetlands Action Plan; and actions #2, #4, #7, #10, #12, and #14 in the Uplands Action Plan. This could include the development of an inspection and maintenance schedule if required. If monitoring and maintenance activities are proposed for several years, information about future objectives and actions should be provided.	Maintenance of habitat enhancements supported by the FWCP.	Open

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
8	Monitoring and evaluation	**PEA.CRE.SO3. ME.08 Develop monitoring framework with performance measures-P2**	2	All	Develop a monitoring framework with GIS-based and on-the-ground performance measures for the FWCP's Peace Region that has strong inter-agency support and the exchange of data. The performance measures should be cost-effective and address progress on the sub-objectives defined for the FWCP's Peace Region and be potentially relevant to other FWCP regions. The monitoring framework should develop indicators with reference points that add to the measures developed in the Strategic Project Review (Regehr et al. 2019). Work under this action could also follow actions #1 and #2 and priority mapping actions in each ecosystem plan (action #1 in each ecosystem plan).	Establishment of a monitoring framework to evaluate performance of the FWCP's Peace Region, including the conservation status of priority species and achievement of sub-objectives.	Directed
9	Monitoring and evaluation	**PEA.CRE.SO3. ME.09 Implement monitoring framework-P2**	2	All	Implement aspects of the monitoring framework described in action #8 to evaluate the performance of the FWCP's Peace Region, including the conservation status of priority species and achievement of sub-objectives.	Evaluation of the FWCP's Peace Region performance and achievements that can be used to prioritize further actions.	Open/ Directed

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
Sustainable use sub-objective 4: enhance sustenance and recreational resources based on input from Indigenous Nations and stakeholder communities							
10	Research & information acquisition	**PEA.CRE.SO4.RI.10 Research culturally important species, incorporating Indigenous knowledge-P1**	1	Culturally important species	Work with Indigenous Nations and stakeholder communities to characterize culturally important plants and animals, indicators of aquatic and terrestrial ecosystem health (threats or stressors), and locations and methods for sustenance and recreational use enhancement. Work under this action should include the incorporation of Indigenous knowledge and values to document priority species and habitats for further actions. See actions #22 and #23 in the Rivers, Lakes, & Reservoirs Action Plan; actions #13 and #14 in the Riparian & Wetlands Action Plan; and actions #13 and #14 in the Uplands Action Plan for the implementation of follow-up actions for culturally important species in specific ecosystem types.	Prioritization of conservation and/or enhancement actions for culturally important species.	Open
11	Research & information acquisition	**PEA.CRE.SO4.RI.11 Conduct reservoir-related contaminant monitoring-P2**	2	Culturally important species	Develop a contaminant monitoring program to assess potential reservoir-related contamination (e.g., mercury, contaminants from flooded mines) levels in aquatic and terrestrial ecosystems and identify conservation, enhancement, or mitigation actions for medicinal and sustenance priority species. Mercury methylation in aquatic habitats has been studied previously (see fwcp.ca/mercury); however, the impact of mercury and other reservoir-related contaminants on terrestrial species has been less studied (Crowley and Hodder 2017). Work in aquatic habitats should follow high-priority recommendations from the Williston-Dinosaur Watershed Fish Mercury Investigation Summary Report (Azimuth 2019).	Assessment of potential reservoir-related contamination levels in priority species used medicinally and for sustenance to support potential conservation, enhancement, and mitigation actions.	Open/ Directed

Action #	Action Type	Priority Action Short Description	Priority	Priority Species or Species Group	Priority Action	Intended Outcome	Delivery Approach
Community engagement sub-objective 5: build, maintain, and improve relationships with Indigenous Nations and local stakeholders that support conservation and sustainable use projects in the FWCP's Peace Region							
12	Research & information acquisition	**PEA.CRE.SO5.RI.12 Conduct stewardship and education related to aquatic and terrestrial conservation-P2**	2	All	Conduct stewardship and education activities related to aquatic and terrestrial conservation. Potential projects should have a high educational, volunteer, and/or community engagement component. Example projects include bird-banding work that promotes education and volunteer support (Lambie 2019), or educational actions that promote learning at the elementary, high school, or post-secondary levels (e.g., Dubman 2017, Wiensczyk and Coxson 2019).	Promotion of environmental stewardship via educational activities related to fish and wildlife conservation.	Open/ Directed
13	Habitat-based action	**PEA.CRE.SO5.HB.13 Promote environmental stewardship-P2**	2	All	Promote environmental stewardship actions to groups and individuals (e.g., private landowners, industries, community organizations) with the greatest potential to negatively impact priority species and sensitive habitats through their actions, and publicly recognize positive stewardship actions. The effectiveness of these outreach activities should be considered (e.g., MOECCS 2019).	An increased understanding among land users of the potential impacts of various activities on aquatic and terrestrial ecosystems, as well as effective measures to lessen described impacts.	Open/ Directed

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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).

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*.

Entrainment: Fish entrainment can be defined as fish being transported along with the flow of water and out of their normal river, lake, or reservoir habitat into unnatural or potentially harmful environments.

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."[2]

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."

[2] 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.