



FALLS RIVER WATERSHED ACTION PLAN

FINAL November 14, 2017
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The Fish & Wildlife Compensation Program is a partnership between BC Hydro, the Province of B.C., Fisheries and Oceans Canada, First Nations and Public Stakeholders to conserve and enhance fish and wildlife impacted by existing BC Hydro dams.



The Fish & Wildlife Compensation Program is conserving and enhancing fish and wildlife impacted by BC Hydro dam construction in this watershed. Photo: Falls River Dam on Big Falls (Credit: BC Hydro). Cover photo: Coho (Credit: iStock).



The Fish & Wildlife Compensation Program (FWCP) is a partnership between BC Hydro, the Province of BC, Fisheries and Oceans Canada, First Nations and Public Stakeholders to conserve and enhance fish and wildlife impacted by BC Hydro dams. The FWCP funds projects within its mandate to conserve and enhance fish and wildlife in 14 watersheds that make up its Coastal Region.

Learn more about the Fish & Wildlife Compensation Program, projects underway now, and how you can apply for a grant at fwcp.ca. Subscribe to our free email updates and annual newsletter at www.fwcp.ca/subscribe. Contact us anytime at fwcp@bchydro.com.

EXECUTIVE SUMMARY: FALLS RIVER WATERSHED

The Fish & Wildlife Compensation Program is a partnership between BC Hydro, the Province of B.C., Fisheries and Oceans Canada, First Nations and Public Stakeholders to conserve and enhance fish and wildlife impacted by BC Hydro dams.

This Action Plan builds on the Fish & Wildlife Compensation Program's (FWCP's) strategic objectives, and is an update to the previous *FWCP Watershed and Action Plans*. The Action Plan was developed with input from BC Hydro, Fisheries and Oceans Canada (DFO), Canadian Wildlife Service (CWS), Ministry of Environment (MOE), Ministry of Forests, Lands and Natural Resource Operations (FLNRO), participating First Nations, and local communities. It specifies actions that will conserve, restore and enhance fish and wildlife species and their habitats.

This Action Plan sets out Priority Actions for the FWCP that will guide funding decisions for FWCP projects in the Falls River watershed. The focus of the next five-year period will be Priority Actions identified for fish, wildlife and habitats in three broad ecosystem categories:

1. [Rivers, Lakes & Reservoirs](#);
2. [Wetland & Riparian Areas](#); and
3. [Upland & Dryland](#).

These ecosystem categories are described in the Ecosystem Chapters, and proposed Priority Actions are captured in the [Action Table](#) at the end of this document. The Priority Actions are intended to support FWCP's strategic objectives of conservation, sustainable use, and community engagement. Priority Actions eligible for FWCP funding fall into one or more of the following action types:

- **Research and Information Acquisition** – These actions will collect information necessary to evaluate, review and implement subsequent conservation, restoration and enhancement actions. Examples include inventory, limiting factor assessments and other activities to address data gaps and information needs to complete other actions.
- **Habitat-based Actions** – These actions will conserve, restore, and enhance habitats. Examples include habitat creation, restoration, and enhancement, enhancing habitat connectivity, and invasive species management.
- **Land Securement** – These actions will contribute to the establishment of easements or covenants or the purchase of private land for conservation purposes.
- **Species-based Actions** – These actions will alleviate limiting factors for a species. Examples include restoration planning, captive breeding/rearing and reintroduction.
- **Monitoring and Evaluation** – These actions will monitor and evaluate projects supported by FWCP to understand the effectiveness of habitat- or species-based actions.

This Action Plan, and specifically the [Action Table](#), sets FWCP priorities for investments in compensation activities within the watershed. However, actions may not translate into funded projects. FWCP funding limitations require priority setting across the Coastal Region's 14 watersheds. The process of selecting which actions will be implemented in any given year will occur during the annual grant intake and project cycle. See fwcp.ca for more.

About our Action Plan

This Action Plan provides important background information about the watershed, including hydro development projects by BC Hydro, and conservation and enhancement projects funded by the Fish & Wildlife Compensation Program (FWCP). This Action Plan outlines our priority actions for fish and wildlife eligible for an FWCP grant.

Anyone interested in applying for an FWCP grant should review our Priority Actions (see [Action Table](#)) and develop a grant application that aligns with a Priority Action(s).

[Contact us](#) to discuss our grants, Priority Actions and how we can help you develop your grant application. [Subscribe](#) and we will keep you posted about our grants and the projects we fund. Learn more at fwcp.ca

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FALLS RIVER WATERSHED BACKGROUND

Introduction

The FWCP Action Plans provide strategic direction for each region based on the unique priorities, compensation opportunities, and commitments in the region and reflect FWCP's vision and mission. The Action Plans describe the strategies and Priority Actions needed to support FWCP objectives. Please refer to the Action Plan Overview for more information on the process that was followed to develop Action Plans. The structure of this Action Plan is shown in Figure 1.

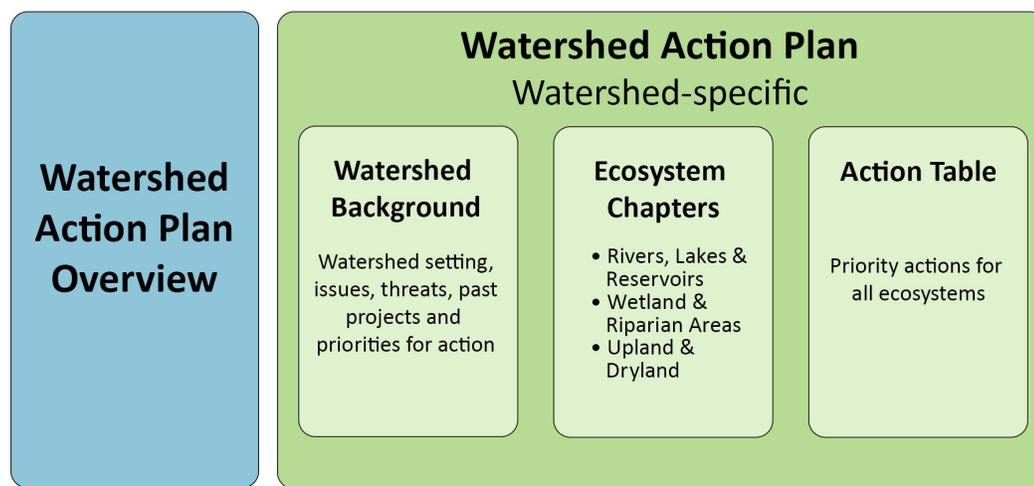


Figure 1: Structure of FWCP Action Plan Overview and Action Plan components.

Setting

The Falls River hydroelectric project is located approximately 50 km southeast of Prince Rupert on Big Falls Creek, a tributary of the Ecstall River (Figure 2). The Ecstall River meets the Skeena and eventually flows into the Pacific Ocean. The Big Falls Creek watershed has an area of approximately 264 km² and is surrounded by steep mountains as high as 2000 m. Several small glaciers are present in the watershed. The climate is principally influenced by the flow of warm, moist Pacific air masses, with frequent periods of heavy rainfall over the winter months. Precipitation of 430-550 mm monthly is common between October and January. The area is characterized by rich soils and a long growing season.

The Falls Reservoir was created in 1930 when Big Falls Creek was dammed above a large natural waterfall. A lake was not present above the falls before impoundment. Three main tributaries – Big Falls Creek, Hayward Creek and Carthew Creek – feed the reservoir. The reservoir elevation can change rapidly after heavy precipitation and can sometimes freeze over in the winter. Water flows from intakes from the Falls Reservoir through two penstocks to the two generating turbines in the powerhouse (total of 7 MW). Water from the turbines is discharged into the Big Falls Creek via a tailrace downstream of the facility.

The watershed is of interest to Lax Kw'alaams, Kitselas, Gitxaala, Kitsumkalum and Metlakatla First Nations. The Falls River Watershed has high First Nations values, as it was a work site where traditional hunting and trapping occurred. Special attention should be paid to potential archaeological sites in the area.

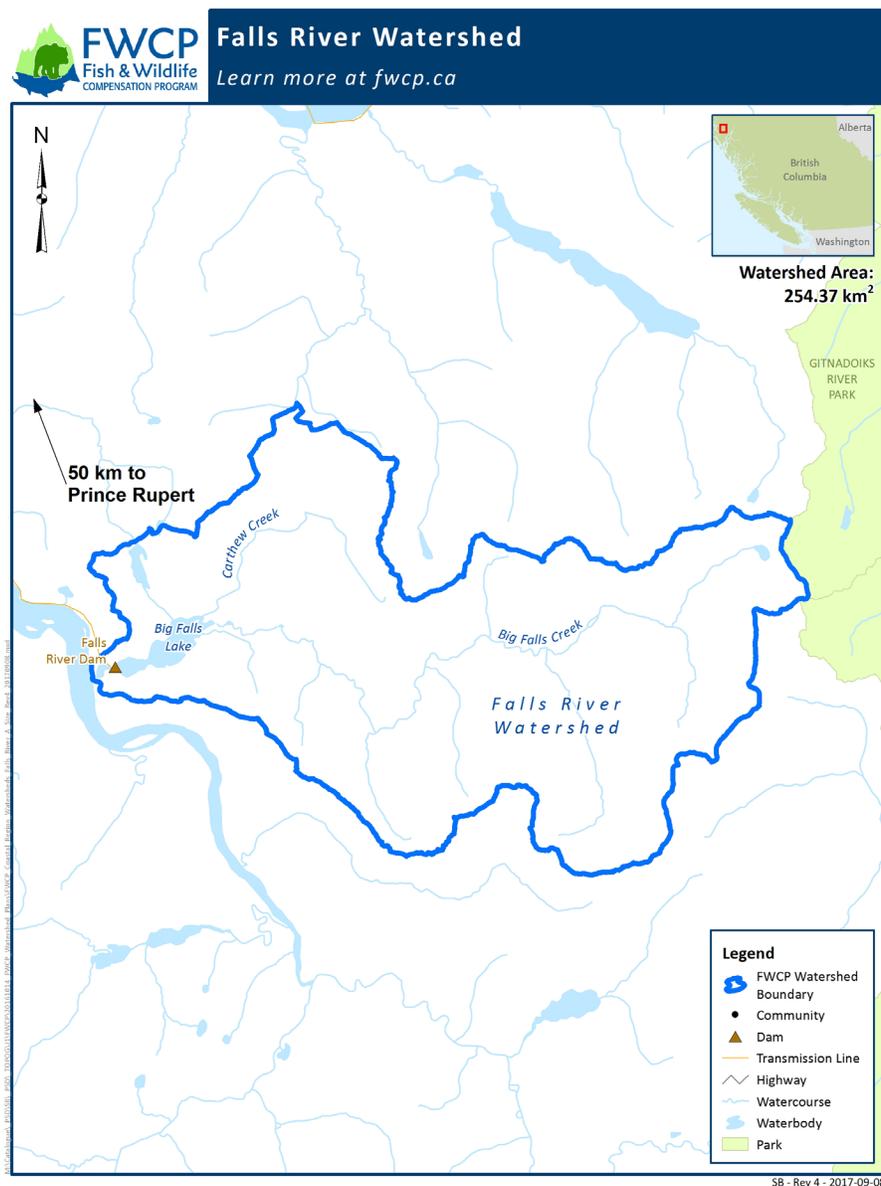


Figure 2: The FWCP Falls River watershed boundary.

Land Ownership in the Falls River Watershed

The Falls River Watershed is almost entirely Crown land. BC Hydro owns land around its facilities and there are forestry operations in the watershed. Site access is by boat, float plane or helicopter only. Floatplane access is restricted at tide heights below 1.5 m and ice cover in floatplane landing zones. Proponents need to ensure proposed activities and access requirements do not conflict with local land ownership and, where necessary, provide the status of project/land owner discussions in the proposal.

Impacts and Threats

Dam construction, hydropower development, and alterations in the hydrologic regime of the system have resulted in considerable changes to habitats and the fish and wildlife populations that rely on them.

Hydro-related Impacts

Inundation: The dam inundated 247 ha of land.

Habitat loss: 38 ha of riparian habitat, and 6 km of riverine habitat were flooded. Loss of downstream sedge habitat due to lack of spring flooding. Drawdown may affect trout access to tributaries. The dam has reduced recruitment of large woody debris and gravel downstream.

Migration barriers: The original falls of 20 m completely blocked fish passage to the upper Falls River.

New habitat: Reservoir created new lake-like habitat.

Altered flow regime: Fluctuating flows or extended power plant shutdowns could have velocity or salinity effects on salmon egg development.

Entrainment: Magnitude of entrainment mortality and injury is unknown. It would affect only resident species (Dolly Varden and Cutthroat Trout) as there is no anadromous passage into the upper Falls River.

Non-hydro Impacts

Impacts to wildlife in the watershed are mostly from forestry operations and roads, which increase human access to the watershed.

Objectives for the Falls River Watershed

Clear management objectives are needed to guide information gathering and effective prioritizing of management actions. Each Ecosystem Chapter has three objectives, which are high-level statements of desired future conditions (outcomes), consistent with FWCP strategic objectives, partner mandates and policies. Each Ecosystem Chapter also has more detailed sub-objectives, which provide more specific direction on desired future conditions. Actions in the [Action Table](#) align with the objectives and sub-objectives, summarized in Table 1.

Table 1: Summary of objectives and sub-objectives in each Ecosystem Chapter.

Objectives	Sub-objectives		
	Rivers, Lakes & Reservoirs	Wetland & Riparian Areas	Upland & Dryland
Ensure a productive and diverse ecosystem	Conserve and restore habitat capacity and diversity for fish and other aquatic organisms.	Protect, enhance and create new wetland and riparian habitat.	Protect and enhance rare and ecologically significant upland/dryland habitat.
Maintain or improve the status of species of interest	Sustain and increase the population viability of: (a) Anadromous salmon (Chinook, Coho, Chum and Pink) and Eulachon; and, (b) Dolly Varden, Cutthroat Trout, and Rainbow Trout.	Maintain and, where feasible, increase the abundance and distribution of species of interest (e.g., federally listed species-at-risk and species identified through government, community, and First Nations engagement). See Action Table for specific species.	Maintain and, where feasible, increase the abundance and distribution of species of interest (e.g., federally listed species-at-risk and species identified through government, community, and First Nations engagement). See Action Table for specific species.
Maintain or improve opportunities for sustainable use	Maintain or improve opportunities for sustainable use, including for food, social, ceremonial, recreational, or commercial purposes.		

FWCP Projects Implemented: Falls River Watershed

FWCP has been funding projects in the Falls River Watershed since 1999 under the Bridge-Coastal Restoration Program (BCRP) and subsequently under the Fish & Wildlife Compensation Program¹ Coastal Region. A full list of the reports from projects undertaken to date is available online at www.fwcp.ca. Below is a brief summary of the work undertaken during the 2010/2011 to 2015/2016 FWCP project years.

Rivers, Lakes & Reservoirs

A single Rivers, Lakes & Reservoirs project was undertaken in the Falls River Watershed during the 2010/2011 to 2015/2016 FWCP project years. This Research and Information Acquisition project conducted snorkel surveys to determine salmon spawning activity in the tailrace pool of the Falls River BC Hydro facility where spawning gravel was added in 2009 as part of the Falls River Habitat Restoration Project. Chinook Salmon presence was confirmed, which represents the first evidence of Chinook Salmon reported at Falls River tailrace pool since 2003. There remains substantial opportunity to address the priority actions associated with anadromous and resident salmonids and eulachon in the Falls River Watershed.

Wetland & Riparian Areas

No projects were undertaken during the 2010/2011 to 2015/2016 FWCP project years that addressed Riparian/Wetland species or habitat in the Falls River Watershed. However, surveys for denning and nesting sites of species impacted by reservoir levels were undertaken by the Watershed Use Plan (Shulz 2010) as well as monitoring of sedge habitat maintenance at the end of the Big Falls reservoir (Buchanan 2007). There remains substantial opportunity to address the priority actions including field inventory, habitat mapping and the development of Habitat Based Actions associated with priority Riparian/Wetland species.

¹ The Program changed its name in 2011 from the BCRP to the FWCP.

Upland & Dryland

No projects were undertaken during the 2010/2011 to 2015/2016 FWCP project years that addressed Upland and Dryland species or habitat in the Falls River Watershed. There remains substantial opportunity to address the priority actions including field inventory, habitat mapping and the development of Habitat Based Actions associated with priority Upland/Dryland species.

Interactions with Other Ongoing Processes

Water Use Plan (WUP) – BC Hydro undertook Water Use Planning on the Falls River to find a better balance of power and non-power interests (such as fish, wildlife and recreation) when operating the system. The resulting WUP Order directed incremental operational changes and monitoring studies to determine the effectiveness of the operational changes. FWCP partners support and coordinate with the WUP ordered monitoring studies, however FWCP does not fund the monitoring associated with operations.

Fish Passage Decision Framework – Any studies to assess the feasibility of restoring fish passage at existing BC Hydro facilities must adhere to the [Fish Passage Decision Framework](#) (BC Hydro 2016) to be funded by the FWCP.

Fish Entrainment Strategy – Fish entrainment issues are addressed through BC Hydro's Fish Entrainment Strategy (BC Hydro 2006). Grant applications to study or mitigate entrainment issues are not eligible for FWCP funding.

ECOSYSTEM CHAPTERS

FALLS RIVER WATERSHED

ECOSYSTEM CHAPTER: RIVERS, LAKES & RESERVOIRS

Actions for Rivers, Lakes & Reservoirs

The [Action Table](#) in this document (see page 19) identifies our Priority Actions to conserve and enhance fish & wildlife in this watershed. Priority Actions are organized by Action type: Research and Information Acquisition, Habitat-based Actions, Species-based Actions, Land Securement and Monitoring and Evaluation. Actions are assigned a priority ranking from 1 (highest priority) to 3 (lowest priority).

Aquatic Habitat in the Falls River Watershed

Falls River flows into the Ecstall River approximately 25 km upstream of the confluence with the Skeena River near Prince Rupert. It has a drainage area of 246 km² and comprises roughly 23% of the total Ecstall River flow from the Falls/Ecstall confluence, downstream (Miller et al. 2002). The original falls of 20 m completely blocked fish passage to the upper Falls River. Damming of Falls River at the top of the falls created a reservoir that covers approximately 340 ha, depending on water levels. The reservoir has large areas of shallow shoal, with an average depth of seven metres and now supports several species of fish including Dolly Varden and Cutthroat Trout. Below the dam and falls there are two short reaches that support anadromous salmonids including an approximately 180 m long by approximately 100 m wide tailpond and a tidally influenced lower Falls River section. These reaches are separated by a smaller 4.5 m falls at the outlet of the tailpond that is a fish barrier at low tide, but becomes backwatered by the Ecstall River at higher tides. Chinook, Coho, Chum, and Pink Salmon, Cutthroat Trout, Rainbow Trout, Eulachon, and Dolly Varden are present in Falls River downstream of the dam.

Limiting Factors

Limiting factors vary among species and need to be further assessed. They are expected to include:

- **Habitat area:** Spawning and rearing habitat area for anadromous salmonids in the Falls River below the dam is limited by the short section of river present below the falls to the confluence with the Ecstall River. Flow changes below the dam also affect the quantity of habitat available for fish. Above the dam, the formation of the reservoir created new lake-like habitat, although 38 ha of riparian habitat, and 6 km of riverine habitat were flooded.
- **Habitat quality:** Spawning habitat for anadromous salmonids has potentially been disturbed by high flushing flows, extremely low flows during shut down periods, grading and scarification of gravels, a lack of gravel recruitment and the placement of rock weirs in the tail pond. Studies below the dam have shown that juvenile salmon population densities are relatively low, which may indicate that rearing habitat is limiting. Footprint impacts from the dam include a reduction in large woody debris recruitment, which likely affects rearing habitat quality below the dam.
- **Access:** The original falls of 20 m completely blocked anadromous fish passage to the upper Falls River. Above the dam, drawdown of the reservoir may affect resident trout access to tributaries.
- **Water quality:** Fluctuating flows or extended power plant shutdowns in combination with tidal influences could have salinity effects on salmon egg development. Water temperature of the Falls River may be altered by the presence of the reservoir, which could negatively or positively affect all life stages of salmonids.

Knowledge Status

Habitat

There is relatively limited information documenting aquatic habitat quality and trends in fish use throughout the Falls River Watershed. Spawning and rearing habitat for anadromous salmonids in the Lower Falls River and tailpond has potentially been disturbed by high flushing flows, extremely low flows during shut downs, scouring of gravels, and a lack of gravel and large woody debris recruitment. In September 2009, approximately 100 m³ of new spawning gravels were added to the tailpond as part of the Falls River Habitat Restoration Project. Follow up surveys have indicated use by Chinook Salmon and that intragravel physicochemical parameters are within a suitable range to support incubating salmon eggs (Beblow 2010, 2011). The condition of stream habitats in the Falls River and tributaries of the upper watershed is relatively pristine due to low levels of human activity and forest harvest in the watershed.

Knowledge Gaps

The following knowledge gaps have been highlighted by agencies and stakeholders:

- There is relatively little known about the presence and abundance of salmonid species in the Lower Falls River and tailpond. Some historic information is compiled in Miller et al. (2002) and by Beblow (2010) but before further actions can be taken, a comprehensive species inventory is the most limiting knowledge gap.
- There are uncertainties associated with the availability and use of spawning habitat below the falls, the utility of the gravel that has already been added to the tailpond, and the cost vs benefit of adding more gravel to improve anadromous spawning habitat.
- Placement of large woody debris in the tailpond and lower Falls River could improve rearing habitat for salmonids but there is uncertainty associated with the cost vs benefit of undertaking habitat complexing actions.
- Eulachon adults have been documented using the Lower Falls River and tailpond (Mickelson and Mintenko 2010). However, all individuals observed were adult males and no eggs or larvae were observed. There is still uncertainty as to whether eulachon use the Lower Falls River for spawning and the overall run timing and habitat use by eulachon throughout the Ecstall River.
- There is also some uncertainty as to whether historical fish passage was possible to the Upper Falls River via the Hayward Lake – Ecstall linkage.

Objectives and Measures

The following objectives have been developed to define the scope of the Rivers, Lakes & Reservoirs Ecosystem Chapter. While the objectives are expected to remain stable over time, the projects funded may evolve as management priorities shift, or new information becomes available.

Objective 1: Ensure a productive and diverse aquatic ecosystem.

This objective addresses overall ecosystem integrity and productivity and directs compensation activities to develop productive, useable aquatic habitats. Where cost-effective opportunities exist, compensation works will be aimed at aiding multiple aquatic species to conserve and restore habitat capacity and diversity for fish and other aquatic organisms.

Measures— Measures will be ecosystem- and project-specific.

Objective 2: Maintain or improve the status of species of interest

This objective is supported by two sub-objectives:

- **Sustain and increase the population viability of anadromous salmon and eulachon**
Anadromous salmon and eulachon are important species in the Falls River system.
Measures - Measures will be species and project-specific.
- **Sustain and increase the population viability of resident salmonids**
Dolly Varden, Cutthroat Trout and Rainbow Trout
Measures – Measures will be species and project-specific.

Objective 3: Maintain or improve opportunities for sustainable use.

This objective reflects the important sustainable use benefits that can be derived from healthy fish populations. Many salmonid species are the focus of First Nations, commercial and recreational fisheries. Consequently, any actions aimed at achieving the above objective also support this sustainable use objective. It should be noted that fisheries management agencies have an overall responsibility to manage the fisheries resource at a level of abundance and distribution to support First Nations' traditional uses and rights. These responsibilities are met through other ongoing processes and it is not the direct responsibility of FWCP to accommodate treaty rights and aboriginal interests. In addition, First Nations' interests in overall conservation and sustainable use benefits have been incorporated into the development of this plan.

Measures— There are no specific measures required at this time, aside from those associated with Objective 1 and 2. As part of their overall management responsibilities, DFO uses information such as abundance trends and escapement estimates to regulate angling and commercial harvest. MOE collects information on angler days, catch per unit effort, and number of fishing licences sold in the region, which informs decisions related to angling regulations.

ECOSYSTEM CHAPTER: WETLAND & RIPARIAN AREAS

Actions for Wetland and Riparian Areas

The [Action Table](#) in this document (see page 19) identifies our Priority Actions to conserve and enhance fish & wildlife in this watershed. Priority Actions are organized by Action type: Research and Information Acquisition, Habitat-based Actions, Species-based Actions, Land Securement and Monitoring and Evaluation. Actions are assigned a priority ranking from 1 (highest priority) to 3 (lowest priority).

Wetland and Riparian Areas in the Falls River Watershed

Wetland and riparian areas are the most diverse and biologically rich terrestrial ecosystems in BC and are considered highly valuable from an ecological standpoint. Riparian areas are the areas bordering on streams, lakes, and wetlands that link water to land. The blend of streambed, water, trees, shrubs and grasses directly influences and provides habitat for fish and wildlife. The abundance, distribution and condition of wetland and riparian habitats may be limiting factors for many species, especially amphibians, which depend upon them either for the majority of their lifecycles or for key periods such as breeding. Riparian and wetland habitats are often critical in terms of maintaining function and structure for natural systems, including helping to support trophic level functioning and genetic diversity, as well as providing key ecological services such as erosion control, flood control, assimilation of nutrients and water purification. Furthermore, many wetland and riparian species are the focus of sustainable use activities by First Nations and non-First Nations people. Riparian and wetland areas are commonly inundated by impoundments or adversely affected by changes in hydrological regimes that result from water management for power generation. Loss and alteration can significantly affect the services provided by these ecosystems.

Limiting Factors

The limiting factors for wetland and riparian areas are predominantly related to extent of the available habitat, connectivity and distribution of the habitat, and its productivity. Limiting factors need to be further assessed and are expected to include:

- **Extent:** The contribution of riparian and wetland habitats to broader ecological function is predominantly limited by the extent of the habitats on the land base. Habitats are lost through inundation and conversion to other land uses.
- **Distribution:** Connectivity among riparian and wetland habitats, and between these habitats and other habitats and features, are important for dispersal of plants and animals and for seasonal movements of some species. Wetland and riparian habitats that are isolated will likely have decreased diversity to those which experience a healthy connectivity between areas. Distribution is therefore related not only to the extent of healthy riparian and wetland habitats, but also to adjacent land uses.
- **Productivity:** Even where riparian and wetland habitats are adequately represented and connected, there are several factors that can 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). Wetlands and riparian ecosystems require dynamic water regimes to maintain their productivity, but managed systems can result in unnatural cycles of stability and de-watering that can impair function or result in succession to different habitat types (e.g., forest, mudflats).
 - Stressors such as invasive species or disruptive human access can affect community structure and function.

- 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, basking sites to turtles.
- Poorly understood factors limit the productivity of created wetlands. These are generally thought to be related to unnatural hydrologic regimes, soil conditions, and/or cattle grazing (e.g., Atkinson et al. 2010).

Knowledge Status

Habitat

Basin-wide trends in the abundance, distribution and productivity of riparian and wetland habitats have not been compiled. The area of inundation has not increased since dam construction, but the productivity of adjacent habitats has continued to be affected, either directly or indirectly as a result of BC Hydro operations.

Knowledge Gaps

Knowledge of species and ecosystems in the Falls River Watershed is limited. There have not been inventories specifically targeting the Falls River Watershed other than a couple of projects conducted for the Water Use Plan (e.g., Buchanan 2007, Shulz 2010).

Objectives and Targets

The following objectives have been developed to define the scope of the Wetland & Riparian Areas Ecosystem Chapter. While the objectives are expected to remain stable over time, the projects funded may evolve as management priorities shift, or new information becomes available.

Objective 1: Ensure productive and diverse wetland and riparian ecosystems.

This objective addresses overall ecosystem integrity and directs compensation activities to maintain ecosystem productivity by protecting, enhancing or creating new wetland and riparian habitat.

Measures— Measures will be ecosystem- and project-specific.

Objective 2: Maintain or improve the status of species of interest.

Actions under this objective focus on addressing limiting factors that are not otherwise addressed by general improvements to ecosystem function under Objective 1. The intent is to maintain, or where feasible, increase the abundance of species of interest (e.g., federally listed species-at-risk species or species identified through government and First Nations engagement).

Measures— Measures will be species- and project-specific.

Objective 3: Maintain or improve opportunities for sustainable use.

Many wetland and riparian species are the focus of sustainable use activities by First Nations and non-First Nations people (e.g., duck hunting, medicinal plants, wildlife viewing). Actions addressing Objectives 1 and 2 will often support this sustainable use objective.

Measures— Measures will be species- and project-specific.

ECOSYSTEM CHAPTER: UPLAND & DRYLAND ACTIONS

Actions for Upland and Dryland

The [Action Table](#) in this document (see page 19) identifies our Priority Actions to conserve and enhance fish & wildlife in this watershed. Priority Actions are organized by Action type: Research and Information Acquisition, Habitat-based Actions, Species-based Actions, Land Securement and Monitoring and Evaluation. Actions are assigned a priority ranking from 1 (highest priority) to 3 (lowest priority).

Upland and Dryland in the Falls River Watershed

Upland and dryland habitats are those that occur above areas of permanent inundation or periodic flooding. They are usually the habitats least affected by hydroelectric generating infrastructure or operation; however, footprint impacts have occurred and they contribute to the cumulative effects of human-related activities in these habitats.

Upland/dryland habitats are diverse and can range from unvegetated areas to forests, and alpine ecosystems. Different habitats are associated with distinct species assemblages that react to direct or indirect stressors in their distinct habitat niches.

Lower elevations of the watershed lie within the Coastal Western Hemlock Submontane Very Wet Maritime (CWHvm1) biogeoclimatic variant, which is characterized by a wet, mild, maritime climate with long growing seasons and little snow. Dominant tree species are western hemlock, amabilis fir and western redcedar. Farther upslope is the Montane Very Wet Maritime (CWHvm2) variant, which experiences much deeper snow in winter but similar vegetation to that found at lower elevations. The Mountain Hemlock Windward Moist Maritime (MHmm1) and Leeward Moist Maritime (MHmm2) subzone variants are found at higher elevations, with tree cover dominated by mountain hemlock and yellow cedar. Higher elevations transition from the scattered trees of parkland habitats (MHmmp) to the Coastal Mountain-heather Alpine (CMAun) subzone.

Limiting Factors

Limiting factors vary among species but are generally associated with habitat loss, alteration, and reduced connectivity.

- **Habitat loss and alteration:** The cumulative effects of forestry and hydro-electric development have resulted in substantial losses and alterations to habitat and habitat connectivity.
- **Habitat connectivity:** Habitat loss and road development have resulted in lost connectivity between habitats, which alter wildlife movement.

Knowledge Status

Habitat

This watershed is located within the Great Bear Rainforest and thus is managed through an ecosystem-based management approach that maintains ecosystem integrity and improves human well-being concurrently. A Landscape Reserve Design within each Landscape Unit should contribute to the protection and stewardship of Red-Listed Plant Communities, Blue-Listed Plant Communities, habitat important for species at risk, ungulate winter range, and habitat for regionally important wildlife including, but not limited to, Mountain Goats, Grizzly Bears, Northern Goshawks, Tailed Frogs, and Marbled Murrelets.

Knowledge Gaps

Knowledge of species and ecosystems in the Falls River Watershed is limited. There have not been inventories specifically targeting the Falls River Watershed other than a couple of projects conducted for the Water Use Plan (e.g., Buchanan 2007, Shulz 2010).

Objectives and Measures

The following objectives have been developed to define the scope of the Upland & Dryland Ecosystem Chapter. While the objectives are expected to remain stable over time, the projects funded may evolve as management priorities shift, or new information becomes available.

Objective 1: Ensure productive and diverse upland and dryland ecosystems.

Actions under this objective are aimed at restoring conditions similar to those that exist under natural and local disturbance regimes, or at protecting/enhancing rare or ecologically significant features.

Measures— Measures will be ecosystem- and project-specific.

Objective 2: Maintain or improve the status of species of interest.

Actions under this objective focus on addressing limiting factors that are not otherwise addressed by general improvements to ecosystem function under Objective 1. The intent is to maintain, or where feasible, increase the abundance of species of interest (e.g., federally listed species-at-risk listed species or species identified through government and First Nations engagement).

Measures— Measures will be species- and project-specific.

Objective 3: Maintain or improve opportunities for sustainable use.

Upland and dryland habitats and associated species are also a focus of sustainable use activities by First Nations and non-First Nations people (e.g., hunting, medicinal plant collection, wildlife viewing). Actions addressing Objectives 1 and 2 will often support this sustainable use objective.

Measures— Measures will be species- and project-specific.

ACTION TABLE

This Action Table identifies the FWCP's Priority Actions to conserve and enhance fish and wildlife impacted by BC Hydro dams in this watershed. 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 best aligns with your project idea. A high-quality grant application will clearly demonstrate alignment with Priority Action(s) in an Action Table.

FALLS RIVER WATERSHED ACTION TABLE									Version:21July2020
Action #	Ecosystem Chapter	Action Type	Priority Action Short Description	Priority	Target Species	Priority Action	Intended Outcome	Delivery Approach	Location
1	All	Research & Information Acquisition	FLS.ALL.RI.01.01 Develop a current habitat assessment map-P1	1	Fish & Wildlife	<p>Develop a current habitat assessment map for priority fish & wildlife species in the watershed. Habitats to be assessed & mapped include:</p> <ul style="list-style-type: none"> • Wetlands • Riparian Areas • Stream Habitats • Estuary Habitats • Connectivity Corridors • Forested Ecosystems (e.g., seral stage distribution) • Over-wintering habitat for species that utilize talus or rock features (e.g., bats, snakes) • Culturally Important Areas <p>Mapping is to include as much on-the-ground information as possible relevant to the subject wildlife species. The assessment should focus on practical conservation and restoration opportunities. Consideration should be given to potential impacts from available climate change predictions relevant to the specific habitats (i.e., potential changes to vegetation communities, precipitation, wetland hydro-periods, snowpack, wildfire risk, wildlife movements, etc.). Recommendations should be made through this work for future management actions and assessments.</p>	Improved strategic planning for restoration opportunities.	Directed	Throughout
2	All	Research & Information Acquisition	FLS.ALL.RI.02.01 Conduct a limiting factors analysis-Lower Falls River-P1	1	Fish & Wildlife	Conduct a limiting factors analysis for priority fish and/or wildlife for the Falls watershed or sub-basins to support prioritization of future projects. This will include an assessment of population status, habitat status or habitat capacity and/or a cost-benefit analysis of habitat-based actions proposed by the program, and should be considerate of the root	To determine cost-benefit of potential FWCP actions and support	Directed	Throughout

FALLS RIVER WATERSHED ACTION TABLE									
Action #	Ecosystem Chapter	Action Type	Priority Action Short Description	Priority	Target Species	Priority Action	Intended Outcome	Delivery Approach	Location
2 cont.			FLS.ALL.RI.02.02 Conduct a limiting factors analysis-Falls Reservoir and tributaries-P2	2		causes of degraded habitats and limitations to productive potential. For fish, sub-basins for assessment include the Lower Falls River (Priority 1), the Falls Reservoir and tributaries (Priority 2), and the Hayward watershed (Priority 3). Analyses should build upon previous and ongoing assessments, including the Water Use Plan studies, in association with local agency, First Nation and/or BC Hydro staff. Work should be done in cooperation with private landowners and other land managers. *Please note that the FWCP may develop templates for this work. Please check with FWCP to see if these templates are available.	prioritization of future projects. Leads to the creation of robust habitat or species-based restoration plans for the watershed or sub-basins.		
			FLS.ALL.RI.02.03 Conduct a limiting factors analysis-Hayward watershed-P3	3					
			FLS.ALL.RI.02.04 Conduct a limiting factors analysis-Big Falls Creek Watershed-P2	2					
			FLS.ALL.RI.02.05 Conduct a limiting factors analysis-Falls River Watershed-P3	3					
3	All	Research & Information Acquisition	FLS.ALL.RI.03.01 Develop a comprehensive restoration and protection plan-Lower Falls River-P1	1	Fish & Wildlife	<p>Develop a comprehensive restoration and protection plan for fish and/or wildlife in the Falls River watershed or sub-basins in relation to limiting factors analyses and assessment of population status/habitat capacity. Restoration refers to habitat or species-based actions that restore habitat capacity or population viability, while protection includes habitat-based actions or land securement that protect important habitat from further degradation. Plans must include:</p> <ul style="list-style-type: none"> • Baseline description of the watershed (hydrology, climate, topography); • Priorities of local First Nations for conservation and restoration; • Previous assessment and restoration works; • Distribution, timing, biological and critical habitat requirements and status of species in the watershed; • Clear goals and objectives based on a desired future condition; • Summary of habitat indicators and limiting factors (based on analyses 	To determine high priority, cost-effective habitat and/or species-based actions that can be supported by the FWCP.	Directed	Throughout
FLS.ALL.RI.03.02 Develop a comprehensive restoration and protection plan-Falls Reservoir and tributaries-P2	2								

FALLS RIVER WATERSHED ACTION TABLE									
Action #	Ecosystem Chapter	Action Type	Priority Action Short Description	Priority	Target Species	Priority Action	Intended Outcome	Delivery Approach	Location
3 cont.			FLS.ALL.RI.03.03 Develop a comprehensive restoration and protection plan-Hayward watershed-P3	3		<p>of habitat pressure indicators, habitat state indicators, limiting factors analysis);</p> <ul style="list-style-type: none"> • Knowledge gaps and recommended research and/or assessment priorities; • Restoration priorities with rationale/discussion; • Selected indicators and performance standards for effectiveness monitoring program; and, • Monitoring protocol and schedule. <p>Plans may be multi-species and habitat-based or they may be focused on individual high priority species in the watershed. High priority fish species include Chinook, Coho, Chum, and Pink Salmon and Eulachon. High priority wildlife include bats, amphibians, and riparian-associated mammals and birds. Note that all estuary, riparian and wetland projects should include inventory of rare plants and invertebrates to prevent the destruction of at-risk habitats while carrying out other projects. Plans should be developed in association with local agency, First Nation and BC Hydro staff, landowners and other land managers.</p> <p>Sub-basins for fish plans include the Lower Falls River (Priority 1), Falls Reservoir and tributaries (Priority 2), and the Hayward watershed (Priority 3). Restoration plans are best developed as 'living documents' so that they can be updated over time.</p> <p>*Please note that the FWCP may develop templates for this work. Please check with FWCP to see if these templates are available.</p>			
			FLS.ALL.RI.03.04 Develop a comprehensive restoration and protection plan-Falls River watershed-P3	3					
4	All	Habitat-based Actions	FLS.ALL.HB.04.01 Implement high priority habitat-based actions-P1	1	Fish & Wildlife	<p>Implement high priority habitat and/or species-based actions for fish and/or wildlife as recommended by mapping activities (Action 1), inventory (Action 13), or by the restoration and protection plan (Action 3) or other similar plans already developed in the watershed. Note that a number of priority habitat and/or species-based actions have been developed already and are described in this Action Table, but further development of restoration actions would be beneficial.</p>	Implement high priority, cost-effective habitat and/or species-based actions that can be supported by the FWCP.	Open	Throughout

FALLS RIVER WATERSHED ACTION TABLE									
Action #	Ecosystem Chapter	Action Type	Priority Action Short Description	Priority	Target Species	Priority Action	Intended Outcome	Delivery Approach	Location
4 cont.		Species-based Actions	FLS.ALL.SB.04.02 Implement high priority species-based actions-P1	1					
5	All	Monitoring & Evaluation	FLS.ALL.ME.05.01 Develop and implement an integrated monitoring plan-P1	1	Fish & Wildlife	Develop and implement an integrated monitoring plan for fish and/or wildlife in the Falls watershed or sub-basins in relation to existing agency monitoring programs, limiting factors analyses (Action 2), restoration plans (Action 3) and/or habitat or species-based actions supported by the FWCP. Monitoring should inform limiting factors analyses and/or habitat restoration and should be compatible with existing programs. Two priorities for monitoring include 1) to increase understanding of stock status and anadromous fish use of the Lower Falls River and 2) assess condition of existing gravel enhancements in the Lower Falls River.	Support prioritization of monitoring associated with actions to sustain and restore habitat capacity and population viability of fish & wildlife.	Open	Throughout
6	All	Monitoring & Evaluation	FLS.ALL.ME.06.01 Assess success of habitat-based actions supported by FWCP-P2	2	Fish & Wildlife	Assess success of habitat-based actions once they are supported by the FWCP. Success could be assessed through monitoring of biological and/or physical habitat responses. Success could be assessed on a graduated schedule such as every 1, 3, 5 and 10 years or based on high flow events or other natural or human-caused disturbances.	Assess success of restoration actions and support future planning and prioritization.	Open	Throughout
7	All	Monitoring & Evaluation	FLS.ALL.ME.07.01 Conduct condition assessments and/or maintenance on habitat enhancements-P2	2	Fish & Wildlife	Conduct condition assessments and/or maintenance on habitat enhancements once they are supported by the FWCP. This could include the development of an inspection and maintenance schedule if required.	Maintain functioning of habitat enhancements supported by the FWCP.	Open	Throughout

FALLS RIVER WATERSHED ACTION TABLE									
Action #	Ecosystem Chapter	Action Type	Priority Action Short Description	Priority	Target Species	Priority Action	Intended Outcome	Delivery Approach	Location
8	Rivers, Lakes & Reservoirs	Research & Information Acquisition	FLS.RLR.RI.08.01 Assess Eulachon population status and habitat use - P1	2	Eulachon	Assess Eulachon population status and habitat use in the Lower Falls River in relation to population status and habitat use in the Ecstall River. Develop a monitoring and restoration plan for Eulachon in the Lower Falls River if assessment indicates sufficient benefit.	To determine priority associated with further habitat or species-based actions associated with Eulachon.	Open	Lower Falls River
9	Rivers, Lakes & Reservoirs	Research & Information Acquisition	FLS.RLR.RI.09.01 Opportunity for restoration activities in relation to Dolly Varden and Cutthroat Trout-P3	3	Dolly Varden & Cutthroat Trout	Improve understanding of the opportunity for restoration activities in relation to Dolly Varden and Cutthroat Trout spawning habitats in tributaries to Falls Reservoir. This may include analysis of work undertaken to date, assessment of sedge grass area and prioritization of activities.	Develop a plan to sustain and restore spawning and incubation habitats for resident salmonids if cost-benefit indicates sufficient benefit.	Open	Tributaries to Falls Reservoir
10	Rivers, Lakes & Reservoirs	Research & Information Acquisition	FLS.RLR.RI.10.01 Conduct a habitat assessment and an assessment of fish passage-P3	3	Anadromous & Resident Salmonids	Conduct a habitat assessment and an assessment of fish passage in the Hayward watershed to determine if anadromous fish access is or was historically possible via the Hayward Lake -- Ecstall River system through to Falls Reservoir.	To determine priority of further actions in the Hayward watershed.	Open	Hayward Lake -- Ecstall River system
11	Rivers, Lakes & Reservoirs	Habitat-based Actions	FLS.RLR.HB.11.01 Maintenance and additional gravel placement in the Lower Falls River-P2	2	Anadromous & Resident Salmonids	Improve salmon spawning and incubation habitat through continued maintenance and additional gravel placement in the Lower Falls River . Gravel placement actions should be preceded by species inventory (under Action 6) and a limiting factors / cost-benefit analysis (under Action 2).	Sustain and restore spawning and incubation habitat capacity in the Lower Falls River	Open	Lower Falls River
12	Rivers, Lakes & Reservoirs	Habitat-based Actions	FLS.RLR.HB.12.01 Conduct habitat complexing to improve salmonid rearing habitat -P2	2	Anadromous & Resident Salmonids	Conduct habitat complexing to improve salmonid rearing habitat in the Lower Falls River. There is potential to anchor large woody debris to the bedrock wall along the far left bank, although other habitat complexing options should also be considered. A cost-benefit hydrological assessment should be conducted to address high flow issues in the area before complexing structures are installed.	Sustain and restore rearing habitat capacity in the Lower Falls River	Open	Lower Falls River

FALLS RIVER WATERSHED ACTION TABLE									
Action #	Ecosystem Chapter	Action Type	Priority Action Short Description	Priority	Target Species	Priority Action	Intended Outcome	Delivery Approach	Location
13	Wetland & Riparian	Research & Information Acquisition	FLS.WAR.RI.13.01 Inventory for species of interest that are likely in the watershed-P2	2	Wildlife	<p>Inventory for species of interest that are likely in the watershed. Inventory actions must meet the following criteria:</p> <ul style="list-style-type: none"> • The data collected will clearly inform a specific natural resource management decision or conservation action; this includes a clear understanding of: <ul style="list-style-type: none"> - The data or knowledge gap that is currently limiting a decision-maker or party(ies) from making a conservation decision or undertaking a conservation action; - How the inventory has been specifically designed to fill the above-noted data/knowledge gap; and - The decision-makers' commitment to using the data or information to support a specific decision. • The data collection is well informed by a clear and specific management objective (land use plan, recovery plan etc.) that also informs the management decision or conservation action; this includes clarity of: <ul style="list-style-type: none"> - How the inventory work has been designed to specifically assess the status or condition of the objective; and, - How the data will be used to inform/improve/clarify the management objective. <p>Species of interest reflect engagement from FWCP partners and include, but are not limited to:</p> <ul style="list-style-type: none"> • Wolverine. Inventory is needed to determine if conservation actions might be appropriate. There is a concern about sustainability within north-coastal watersheds. • Mesocarnivores (i.e., Ermine, Pacific Marten, American Mink and North American River Otter). Conduct risk assessment and evaluate population sustainability through a monitoring program. If necessary, implement enhancement strategies to maintain sustainable populations. If part of a multi-year study, provide information about future objectives and actions. 	Maintain or, where feasible, increase the abundance of species of interest.	Open	Throughout
	Upland & Dryland	Research & Information Acquisition	FLS.UAD.RI.13.02 Inventory for species of interest that are likely in the watershed-P2	2					

FALLS RIVER WATERSHED ACTION TABLE

Action #	Ecosystem Chapter	Action Type	Priority Action Short Description	Priority	Target Species	Priority Action	Intended Outcome	Delivery Approach	Location
14	Wetland & Riparian	Habitat-based Actions	FLS.WAR.HB.14.01 Implement priority species- and habitat-related conservation actions-P1	1	Wildlife Species at Risk	<p>Implement priority species- and habitat-related conservation actions in the following (or most recent) Recovery Strategies and Management Plans for species at risk that are known to be in the watershed. Conservation actions must be well informed by a clear and specific management objective and must be well informed by previous inventory in the watershed.</p> <ul style="list-style-type: none"> • Management Plan for the Northern Goshawk, <i>laingi</i> subspecies (<i>Accipiter gentilis laingi</i>) in British Columbia (Ministry of Forests, Lands, and Natural Resource Operations and Ministry of Environment 2013). Work collaboratively with the province and refer to Ecosystem-Based Management objectives for the Great Bear Rainforest. • Management Plan for the Coastal Tailed Frog (<i>Ascaphus truei</i>) in British Columbia (B.C. Ministry of Environment 2015). Refer to Ecosystem-Based Management objectives for the Great Bear Rainforest. • Management plan for the Western Toad (<i>Anaxyrus boreas</i>) in British Columbia (Provincial Western Toad Working Group 2014). 	Stable or increasing population of at-risk species. Habitat enhancement opportunities.	Open	Throughout
14 cont.	Upland & Dryland	Habitat-based Actions	FLS.UAD.HB.14.02 Implement priority species- and habitat-related conservation actions-P1	1					
15	Upland & Dryland	Habitat-based Actions	FLS.UAD.HB.15.01 Determine presence, identify/protect bat Maternity roosts & winter hibernacula-P1	1	Bats	<p>1) Determine presence of bat species, especially those species potentially vulnerable to White Nose Syndrome; 2) Through acoustic monitoring or other methods (e.g., radio-tracking, DNA), identify bat maternity roosts and winter hibernacula; and 3) Pursue protection of bat hibernacula and maternity roosts (e.g., critical habitat, WHAs or wildlife habitat feature designations) that are identified.</p>	Maintain or, where feasible, increase the abundance of species of interest. Identification of which species are present in the watershed. This work should lead to identification and protection of maternity roosts and hibernacula.	Open	Throughout
16	Wetland & Riparian	Habitat-based Actions	FLS.WAR.HB.16.01 Implement habitat creation projects for species identified as being affected.... reservoir levels-P1	1	Wildlife	Implement habitat creation projects for species identified as being affected by changing reservoir levels (e.g., bird nests and wildlife dens; see FLSMON-06 Big Falls Reservoir Wildlife Shoreline Habitat Monitoring, Schulz 2010). Species include North American River Otter, Porcupine, Beavers and Pacific Marten.	Protect, restore and/or create new wetland and riparian habitat.	Open	Reservoir

FALLS RIVER WATERSHED ACTION TABLE

Action #	Ecosystem Chapter	Action Type	Priority Action Short Description	Priority	Target Species	Priority Action	Intended Outcome	Delivery Approach	Location
17	Upland & Dryland	Habitat-based Actions	FLS.UAD.HB.17.01 Restore and enhance the supply of cavities in trees for large cavity users-P3	3	Northern Flying Squirrel, Pacific Marten	Restore and enhance the supply of cavities in trees for large cavity users (e.g., Pacific Marten, Flying Squirrels, various bird species) after multi-mesocarnivore surveys have been completed (under Action 12).	Protect and/or restore rare and ecologically significant upland/dryland habitat.	Open	Throughout
18	All	Habitat-based Actions	FLS.ALL.HB.18.01 Conserve or enhance important habitats or mitigate habitat threats for priority bird species-P2	2	High Priority Birds	Conserve or enhance important habitats or mitigate habitat threats for priority bird species in the watershed. This watershed is within Bird Conservation Region 5 and falls under the Pacific Birds Habitat Joint Venture. See the lists of priority species under the North American Wetlands Conservation Act at: http://www.pacificbirds.org/nawca-priority-species/ . Proposed projects should refer to the priority lists and recommended conservation actions/guidance in the implementation plans (http://www.pacificbirds.org/science-and-planning/state-or-regional-plans/).	Maintain or, where feasible, increase the abundance of species of interest.	Open	Throughout
19	Wetland & Riparian	Habitat-based Actions	FLS.WAR.HB.19.01 Implement wetland and riparian restoration projects-P2	2	Wildlife	Implement wetland and riparian restoration projects that are identified as high priorities through inventory, mapping or assessment. If a restoration plan has been completed under Action 3 , please reference that plan for more information. This can include managing invasive plants as needed.	Protect, restore and/or create new wetland and riparian habitat.	Open	Throughout
20	Upland & Dryland	Monitoring & Evaluation	FLS.UAD.ME.20.01 Assess effectiveness of bat enhancement&mitigation efforts...through collaboration with BC Hydro-P1	1	Bats	Assess effectiveness of bat enhancement and mitigation efforts (i.e., bat boxes) through collaboration with BC Hydro . This is a good location to look at effectiveness of mitigation techniques because there were bats (<i>Yuma myotis</i>) in buildings in the watershed that were removed and 4 bat houses were installed to compensate. Bats have now moved into the penstock building but there has been no use of 2 bat boxes that were put on that building. Census the bats using the structures.	Increased knowledge about whether enhancement and mitigation activities are effective and thus whether they should be undertaken.	Open	Throughout

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