FWCP
Fish & Wildlife
COMPENSATION PROGRAM
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# COLUMBIA REGION: UPLAND & DRYLAND ACTION PLAN

**August 21, 2019 (V1)**

*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 in watersheds impacted by BC Hydro dams.*

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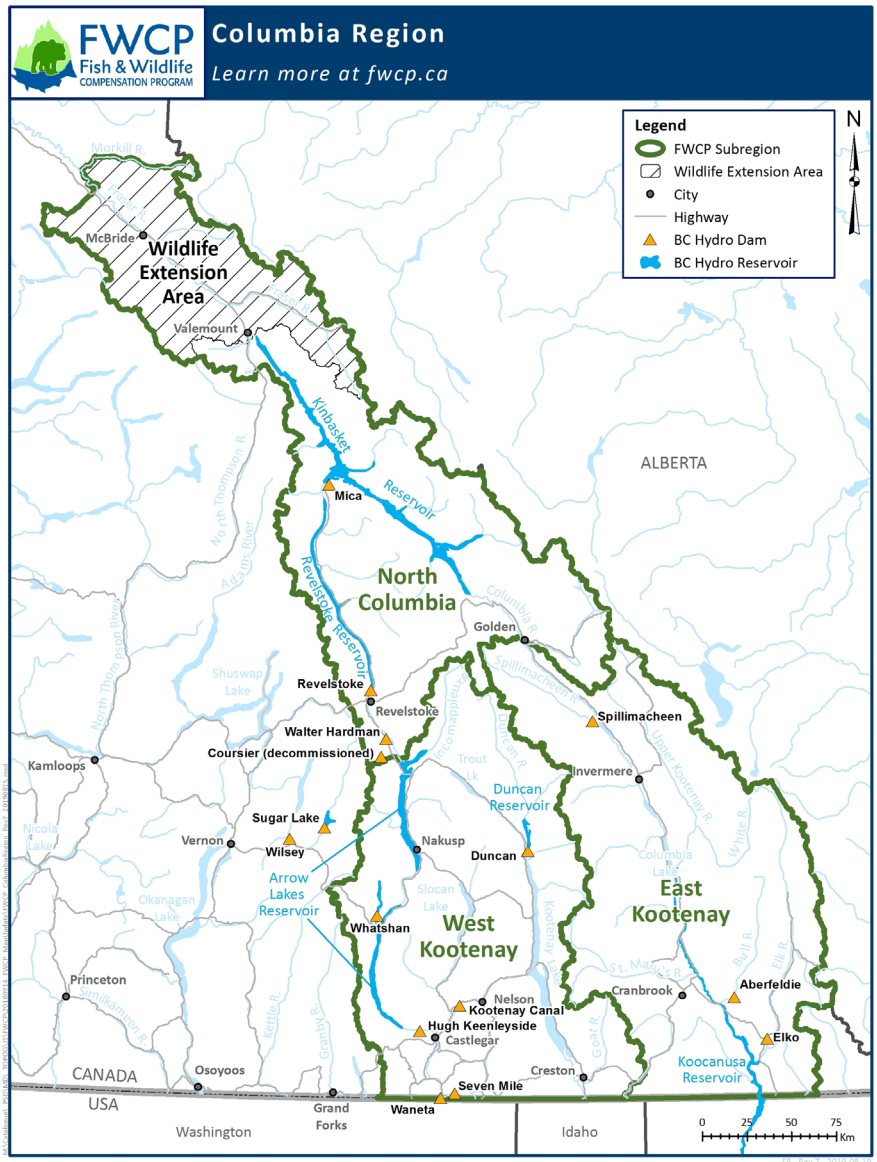


*The Fish & Wildlife Compensation Program is conserving and enhancing fish and wildlife in watersheds impacted by construction of BC Hydro dams in the Columbia Region, including four major hydroelectric dams built before 1984, two water storage dams that don't generate power, and seven smaller hydroelectric dams. Learn more at bchydro.com/energy-in-bc/operations/our-facilities/columbia.html.*
*Cover photos clockwise from left: Western Screech-Owl, J. Hobbs; Grizzly Bear, iStock-J. Huevel; Little Brown Bat, C. Lausen; East Kootenay, B. Meunier; Mountain Caribou, A. Glass.*

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The Fish & Wildlife Compensation Program (FWCP) 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 in watersheds impacted by BC Hydro dams. The FWCP funds projects within its mandate to conserve and enhance fish and wildlife in the Columbia Region Ecosystems.

Learn more about the FWCP, projects underway now, 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.

# EXECUTIVE SUMMARY

## Upland & Dryland Action Plan

The Fish & Wildlife Compensation Program (FWCP) is a partnership between BC Hydro, the Province of B.C., Fisheries and Oceans Canada (DFO), First Nations and Public Stakeholders to conserve and enhance fish and wildlife impacted by BC Hydro dams. This Action Plan builds on the FWCP's strategic objectives and is an update to the previous *FWCP Upland/Dryland Action Plan*. The Action Plan was developed with input from BC Hydro, DFO, the Province of B.C., participating First Nations, and local communities. It specifies Priority Actions that will conserve, restore, and enhance fish and wildlife species and their upland habitats in the Columbia Region.

Priority Actions are in the Action Tables at the end of this document. The Priority Actions are intended to support the FWCP's strategic objectives of conservation, sustainable use, and community engagement. Actions fall into one or more of the following Action Categories for upland and dryland ecosystems and upland associated species of interest:

- **Research and Information Acquisition** – These actions will collect information necessary to evaluate, review, and implement subsequent upland and dryland conservation, restoration, and enhancement actions. Examples include inventory, conservation, and restoration planning and other activities to address data gaps and fulfill information needs to complete other actions.
- **Habitat-based Actions** – These actions will conserve, restore, and enhance upland and dryland habitats. Examples include habitat creation, restoration, and enhancement; enhancing habitat connectivity; and invasive species prevention.
- **Monitoring and Evaluation** – These actions will monitor and evaluate upland and dryland projects supported by the FWCP to understand the effectiveness of habitat- or species-based actions.
- **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 an upland and dryland species of interest. Examples include inventory, restoration planning, captive breeding/rearing, and reintroduction.

This Action Plan sets out Priority Actions for the FWCP that will guide funding decisions for FWCP projects in upland and dryland habitats of the Columbia Region. The focus of the next five-year period will be Priority Actions identified for wildlife and wildlife habitats in six broad upland and dryland priority ecosystems:

- fire-maintained ecosystems
- old-growth forests
- deciduous forests
- ungulate winter range
- grasslands
- montane ecosystems

Priority species of interest for upland and dryland ecosystems include three recovery species: Mountain Caribou, American Badger, and Lewis's Woodpecker, as well as many focal and inventory species.

This Action Plan, and specifically the Action Tables, sets out FWCP priorities for investments in compensation activities within upland and dryland habitats of the Columbia Region. However, actions may not translate into funded projects. FWCP funding limitations require priority-setting across the Columbia Region's ecosystems and species of interest. The process of selecting which actions will be implemented in any given year will occur during the annual grant intake and project selection cycle. See fwcp.ca for more information.

**Introduction to the FWCP**

The Fish & Wildlife Compensation Program (FWCP) is a partnership between BC Hydro, the Province of B.C., Fisheries and Oceans Canada (DFO), First Nations and Public Stakeholders to conserve and enhance fish and wildlife in watersheds impacted by construction of BC Hydro dams. The FWCP is funded annually by BC Hydro and directs those funds toward projects that address Priority Actions across its three regions. BC Hydro has water licence obligations in its Columbia and Peace Regions and has made voluntary commitments to address the impacts of dams in the Coastal Region. BC Hydro fulfills the applicable obligations through the work of the FWCP.

**Introduction to this Action Plan**

This Action Plan provides important background information about upland and dryland habitats in the Columbia Region, including hydro development projects by BC Hydro, and conservation and enhancement projects funded by the FWCP. This Action Plan outlines our Priority Actions for wildlife eligible for an FWCP grant.

Learn more about the FWCP, projects underway now, and how you can apply for a grant at fwcp.ca. Anyone interested in applying for an FWCP grant should review our Priority Actions (see Action Tables) 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 to our free email updates and annual newsletter at fwcp.ca/subscribe, and we will keep you posted about our grants and the projects we fund. Contact us anytime at fwcp@bchydro.com or learn more at fwcp.ca.

# TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF FIGURES

# INTRODUCTION AND BACKGROUND

## FWCP Introduction

The FWCP Action Plans provide strategic direction for each region based on the unique priorities, compensation opportunities, and commitments in the region, and they reflect the FWCP's vision and mission. The Action Plans describe the strategies and Priority Actions to support FWCP objectives of conservation, sustainable use, and community engagement. Please refer to the Columbia Region Overview & Action Plan document for more information on the process that was followed to develop Action Plans in 2018–2019. Actions Plans have been developed for Reservoirs & Large Lakes; Small Lakes; Rivers & Riparian Areas; Wetlands & Riparian Areas; and Upland & Dryland; some actions may be complementary across the different plans.

This Upland & Dryland Action Plan sets out priorities for the FWCP to guide projects within the FWCP Columbia geographic area in support of wildlife. The plan builds on the FWCP's strategic objectives and the FWCP Columbia Region Overview & Action Plan document. The structure of this Upland & Dryland Action Plan is shown in Figure 1.

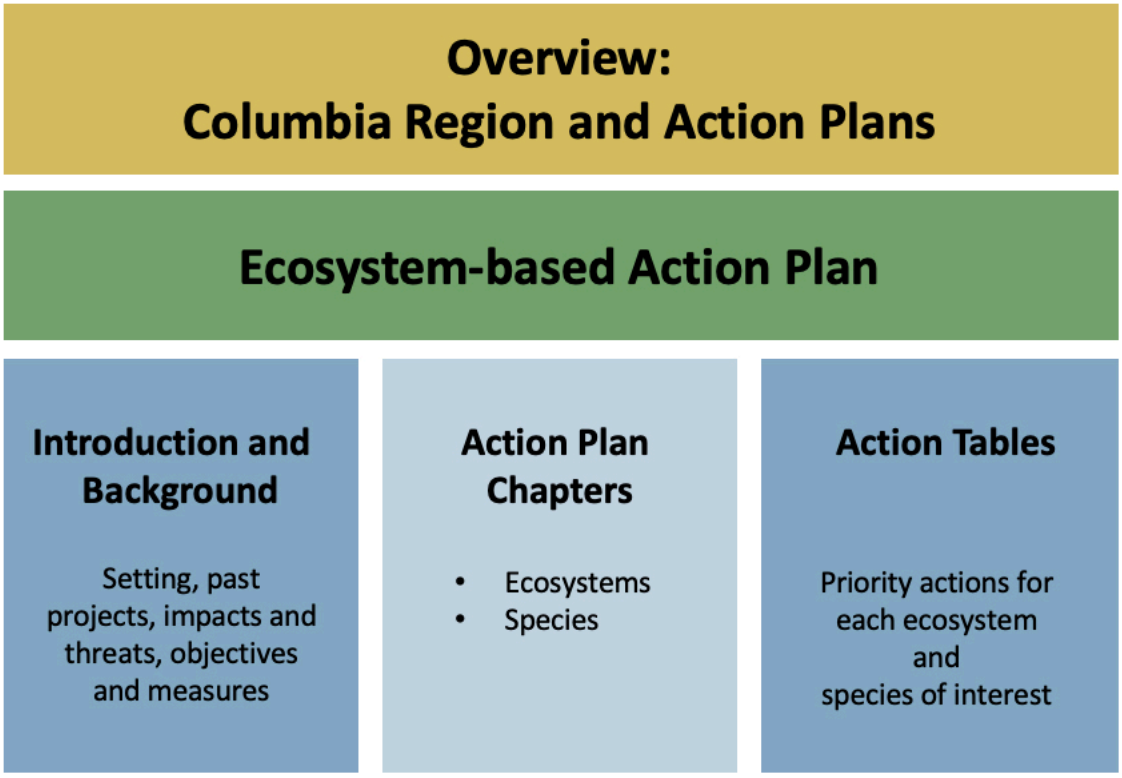


***Figure 1: Overview and Action Plan document structure.***

The objectives and the Priority Actions described herein have been developed with input from the Province of B.C., Fisheries and Oceans Canada (DFO), BC Hydro, First Nations, and local stakeholders. See Overview document for details of the 2018–2019 engagement process.

It is important to understand; however, that planning priorities within Action Plans may not translate immediately into funded projects. Limited funding requires that priority-setting be developed across the FWCP, 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.

## Upland & Dryland Introduction

More than 24,000 hectares of upland habitat were inundated by reservoirs resulting from BC Hydro dam construction. This extensive loss of habitat resulted in direct and indirect impacts to many wildlife species. The opportunity to restore upland habitat lost to inundation is limited; therefore, the FWCP focuses on 1) improving the condition of specific upland and dryland habitats that are rare or require intervention to maintain their productivity, and 2) improving the knowledge and status of upland and dryland species of interest.

The primary aim of the Upland & Dryland Action Plan is to take a habitat-based approach to ensuring productive and diverse terrestrial ecosystems. Implemented in conjunction with species-based actions to support recovery planning, the plan also aims to improve the status of species of conservation concern. Region-wide actions include supporting the development of ecosystem restoration plans and inventorying the distribution, abundance, current function, and connectivity of ecologically important habitats for wide-ranging species. Prevention and control of high-priority invasive species, which have the potential to negatively impact FWCP project investments, are also Priority Actions. Finally, the securement and protection of all upland and dryland priority habitats in the Columbia Region is a key focus of the action plan. By making investments in upland and dryland habitats, the FWCP directly addresses its three strategic objectives of conservation, sustainable use, and community engagement. The investments indirectly contribute to improving the status of priority species by improving the habitats on which many of the species depend.

### Setting

Upland habitats are defined as those ecosystems that are found above habitat influenced by periodic or permanent flooding. Drylands are a subset of upland habitats characterized by relatively low rainfall and rapid drainage, which results in vegetation communities dominated by grasses, and drought-tolerant shrubs and trees (Figure 2). In the Columbia Region, these habitats include:

- fire-maintained ecosystems;
- old-growth forests;
- deciduous forests;
- ungulate winter range;
- grasslands; and
- montane ecosystems.

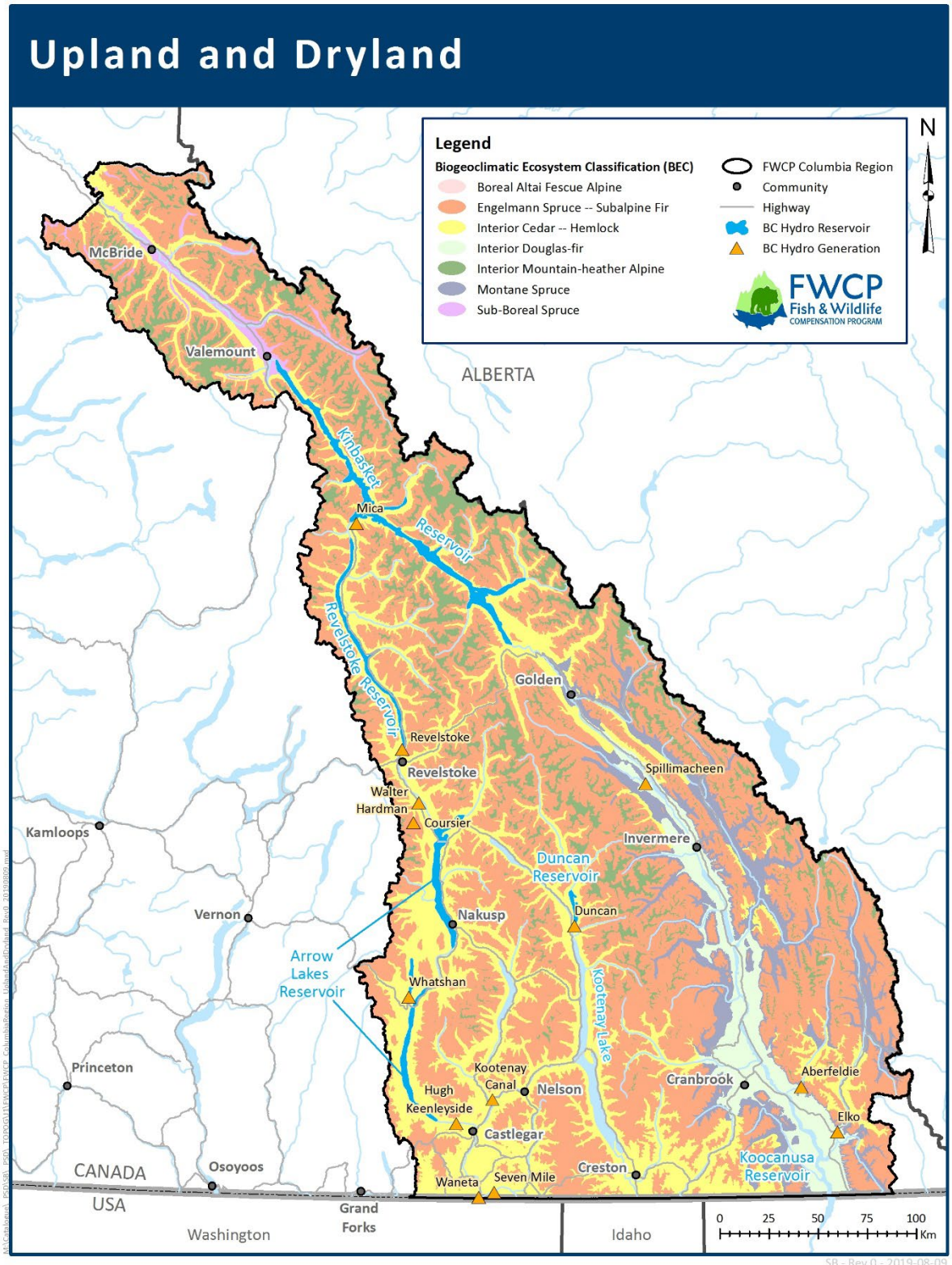


***Figure 2: Distribution of upland and dryland habitat (Natural Disturbance Type 4), including old-growth forest type and ungulate winter range in the Columbia Region.***

## Footprint Impacts and Threats

### Hydro-related Impacts

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. A comprehensive study conducted by the FWCP estimated footprint impacts of BC Hydro operations in the Columbia Basin (Utzig and Schmidt 2011, and references therein). Approximately 20% of the habitats inundated were terrestrial, and the most common terrestrial habitat type lost was mesic forest, followed by dry and wet forest (MacKillop et al. 2008; Utzig and Holt 2008). Relative to its abundance, wet forest was associated with the greatest impact (MacKillop et al. 2008). Basin-wide, 24,088 hectares of uplands were inundated by reservoirs resulting from BC Hydro dam construction, with the majority of inundated habitat by the Kinbasket Reservoir (Utzig and Schmidt 2011). Hydro-related impacts to upland and dryland habitats primarily include habitat loss due to inundation, migration barriers, and fluctuating reservoir levels.

### Non-hydro Impacts

An expanding human population has increased demand for resources and services provided by upland habitats. In addition to forest harvesting, mining, agricultural land conversion (farming and livestock grazing) and extra-urban development has expanded the footprint of human settlement. Logging and associated road-building occurs on crown land. An increasing population is also resulting in an increasing demand for recreational access for snowmobiles, all-terrain vehicles, hunting, hiking, backcountry skiing, as well as pressure to build or expand tourism infrastructure such as ski resorts, backcountry lodges and adventure tourism tenures.

Other threats/impacts to wildlife populations in upland and dryland habitats have occurred due to natural (or unnatural, i.e. cumulative effect interactions) processes occurring in the Columbia Region. Examples include climate change (and fire suppression) and the spread of disease or infestations, such as those from the Mountain Pine beetle.

### Limiting Factors

Factors limiting upland and dryland ecosystems and species fall into three broad categories:

**Extent:** The contribution of upland habitats to broader ecological function is ultimately limited by the extent of the habitats on the land base. Habitats are lost through inundation and conversion to other land uses. Although the extent of upland habitat lost to inundation was significant in some areas, as a proportion of low-elevation upland habitat in the Columbia Region, the area was relatively small. There were likely range-restricted rare habitat types that were inundated; however, the extent of these loses is unknown.

**Distribution:** Connectivity among habitats is important for dispersal of plants and animals and for seasonal movements of some species. Inundation created barriers to dispersal in valleys with reservoirs. Other land use pressures such as conversion for urban, extra-urban, and agricultural purposes and the creation of barriers such as highways and agricultural fencing, have further restricted connectivity.

**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.

### Knowledge Status and Gaps

The area of inundation has not changed significantly since dam construction, but there have been a variety of stressors that have continued to affect adjacent uplands. Many of these are directly or indirectly associated with forest harvesting and the associated expansion of the road network, allowing resource extraction and increasing other human-related pressures in previously inaccessible areas. Invasive species and erosion often follow new access.

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

- baseline data (especially in the North Columbia Region);
- old-growth forest and deciduous upland forest ecosystems;
- culturally important areas and Traditional Ecological Knowledge components;
- invasive species, rare plants, and invertebrates; and
- analysis of land ownership in each priority ecosystem (e.g. private, crown, and conservation lands) to provide a measure of the degree of current land securement (and future potential acquisition opportunities) of upland and dryland habitats.

Long-term monitoring data are generally unavailable for terrestrial species in the Columbia Region. As a result, our knowledge of pre-dam populations is limited to anecdotal accounts or inferences made from habitat impacts. Trend information for some species (e.g. ungulate populations, waterfowl) has become more available over the past 30 years. More recently, a focus on threatened and endangered wildlife has improved our knowledge of the distribution and abundance of these species; however, there remain significant gaps.

The following knowledge gaps for upland species have been highlighted by agencies, First Nations, and stakeholders:

- wildlife in North Columbia region (including the Wildlife Extension Area north of Kinbasket);
- invertebrate taxa;
- American Badger;
- Grizzly Bear; and
- bats.

## Previously Implemented FWCP Projects

The FWCP has supported projects in upland and dryland ecosystems of the Columbia Region since 1994. A full list of the reports from projects undertaken to date is available online at fwcp.ca/results. Below is a brief summary of the work undertaken during recent project years (2013–2017), since the last round of Action Plan updates. This work covered major topics, including:

- fire-maintenance (including slash/burn, prescribed burns, vegetation monitoring, etc.);
- invasive species prevention and control;
- access management on conservation properties; and
- inventory of habitats and species of interest.

A total of 134 wildlife projects equating to $4.9 million of FWCP investments were conducted from 2013 to 2017. The majority of projects were based in the East and West Kootenay sub-regions. Most projects were multi-year, with some succession of category from research and information acquisition to habitat-based actions and monitoring and evaluation projects. There were several incidences of habitat restoration (e.g. slash/burn treatments, invasive plant removal, prescribed burn) followed by effectiveness monitoring in association with fire-maintained ecosystems. Overall, 455 hectares of upland and dryland habitats were improved, along with the addition of 455 wildlife trees to those ecosystems. An additional 2,200 hectares of degraded habitats were restored, and 70 hectares were secured through land securement actions. Four management plans for conservation properties were prepared, plus an additional 12 ecosystem restoration plans were developed.

Seventeen wildlife species were targeted by projects in upland and dryland habitats and these largely focused on recovery and focal species, including American Badger, Mountain Caribou, Lewis's Woodpecker, Western Toad, Wolverine, and bats.

# UPLAND & DRYLAND ACTION PLAN OBJECTIVES

Clear and realistic objectives are necessary to guide information acquisition and prioritize actions. Priority Actions and information needs will change as both improvements to the system are realized and information is gained. The current Action Plan reflects the information available and values expressed by FWCP partners.

The Upland & Dryland Action Plan has four objectives, which are high-level statements of desired future conditions (outcomes), consistent with FWCP strategic objectives, partner mandates, and policies. Each objective has associated sub-objectives, which provide more specific direction on desired future conditions, including detailed performance measures that can direct specific projects. Priority Actions in the Action Tables align with the objectives and sub-objectives.

## Objectives and Measures

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

**Upland & Dryland Action Plan**

| Strategic Objectives | Objectives | Sub-objectives | Performance Measures |
|---|---|---|---|
| Conservation | Maintain productive and diverse ecosystems | Secure or identify areas of priority upland and dryland habitats threatened with land conversion or loss of habitat connectivity. | Hectares of secured habitat annually. |
| | | Improve degraded upland and dryland habitats. | Hectares of priority habitat improved (restored/enhanced) annually. |
| | | Reduce threats to upland and dryland habitats. | Ecosystem restoration plans developed (and updated) for priority habitats (including conservation properties) and/or specific sites. |
| | Maintain or improve the status of species of interest | Improve the distribution, abundance, and/or trend of species of interest. | Increased distribution and abundance of species of interest. |
| | | Characterize and monitor the status of species of interest. | Increased knowledge of the status of species of interest (i.e. baseline data). |
| Sustainable Use | Maintain or improve opportunities for sustainable use | Support actions addressing conservation of species and ecosystems to help inform decision making on sustainable use activities, including culturally important resources. | Viable populations of a range of species that will support hunting, fishing, trapping, wildlife viewing, etc. |
| Community Engagement | Maintain and improve opportunities for community engagement | Build, maintain and improve relationships with Indigenous communities and local stakeholders and support conservation, sustainable use and awareness regarding threats and challenges to upland and dryland ecosystems. | Engagement of Indigenous communities and local stakeholders in FWCP-funded upland and dryland projects that support healthy wildlife populations and ecosystems (e.g. local volunteers, sharing results, raising awareness of FWCP projects, hosting events). |

***Figure 3: Upland & Dryland Action Plan objectives and measures.***

# ACTION PLAN CHAPTERS

The Action Tables in this document identify FWCP Priority Actions to conserve and enhance fish and wildlife in upland and dryland ecosystems in the Columbia Region. See Overview document for additional information on Action Table format and the funding application process.

Priority Actions are organized by cross plan actions, ecosystem and species, and by action type: Research and Information Acquisition, Habitat-based Actions, Monitoring and Evaluation, Land Securement, and Species-based Actions are assigned a priority ranking from 1 (highest priority) to 3 (lowest priority).

There are six priority habitats in the Upland & Dryland Action Plan:

- fire-maintained ecosystems;
- old-growth forests;
- deciduous forests;
- ungulate winter range;
- grasslands; and
- montane ecosystems.

Species of interest for upland and dryland ecosystems are outlined in this Action Plan. There are three recovery species of interest (listed below; Table 1) as well as focal and inventory species of interest associated with upland and dryland habitats for the Columbia Region:

1. Mountain Caribou
2. American Badger
3. Lewis's Woodpecker

## Cross Plan Actions

Several broad cross plan actions are relevant to two or more Action Plans but are not readily nested under any particular sub-objective. Projects that address these actions will require the consideration of multiple ecosystems.

## Upland & Dryland Ecosystems

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

The East Kootenay sub-region has a high diversity of upland and dryland ecosystems, from extensive grasslands in the valley bottoms of the Rocky Mountain Trench to wet forests with high snowpack and infrequent stand-replacing fires in the Fernie/Sparwood area. The diversity in climates and ecosystems occurs across very short distances and is mediated by elevation, latitude, and prevailing weather patterns. There are five biogeoclimatic zones within the East Kootenay sub-region: Interior Mountain-heather Alpine (IMA), Engelmann Spruce – Subalpine Fir (ESSF), Montane Spruce (MS), Interior Cedar – Hemlock (ICH), and Interior Douglas-fir (IDF). The IDF occurs at the lowest elevations and ranges from the very hot and very dry at valley bottoms in the south to the dry cool in the north. Douglas-fir is the dominant tree species throughout the IDF. The MS and ICH zones occur at mid elevations, whereas the ESSF woodland and parkland subzones occur at higher elevations, where Subalpine Fir is dominant. The IMA occurs at the highest elevations, above treeline, and is common throughout the area. A mosaic of low-growing shrubs, mountain-heather–dominated heath, grass-sedge-forb meadows, tundra, rock, snow, and ice characterize this area (MacKillop et al. 2018).

The West Kootenay sub-region is a diverse area that ranges from rolling topography and dry open forests in the lower elevations to steep-sided valleys and wet interior cedar hemlock "rainforest." There are three biogeoclimatic zones within

the West Kootenay sub-region: IMA, ESSF, and ICH (MacKillop and Ehman 2016). The area is comprised of three mountain ranges: the Selkirks, the Purcells, and the Monashees, which create a diverse ecosystem structure ranging from high alpine lakes to dense riparian forests. Forests in the ICH zone in the West Kootenay sub-region are characterized by very high tree species diversity, commonly referred to as the "Kootenay mix" (MacKillop and Ehman 2016).

The North Columbia sub-region is an area of high, very rugged, ice-capped mountains, with some mountain glaciers and narrow valleys. The valley bottoms have Sub-Boreal Spruce (SBS) or wet ICH forest types. Dry, silty, and sandy sites are present on the benchlands where dry IDF forests occur. Montane spruce forests occur on the higher benches and moist ESSF forests dominate the mid to upper slopes. Alpine is usually barren rock and many glaciers still occur on the highest summits. The northern portion of the sub-region is drained by the Fraser River. The Canoe River flowed southeast but has been impacted by the construction of the Mica Dam. Extensive wetlands and muskegs have also developed in the northern portion. Logging has occurred on the productive forestland, and agriculture has been developed in the rain shadow areas around Valemount and McBride (Demarchi 2011).

### Priority Habitats

The opportunity to restore upland habitat directly affected by dam construction is limited. As a result, the FWCP directs investments toward the best opportunities for improving the condition and productivity of priority native upland and dryland habitats within the Columbia Region. These priority habitats include:

- **Fire-maintained ecosystems** – Fire suppression has led to forest encroachment into parkland-savannah ecosystems in the Columbia Region (Rocky Mountain Trench Ecosystem Restoration Steering Committee 2006; Bond et al. 2013). These habitats are classified as Natural Disturbance Type (NDT) 4 forests in British Columbia (B.C. Ministry of Forests and B.C. Ministry of Environment 1995) and are restricted to low-elevation, dry sites in southern portions of the Columbia Region. NDT 4 forests are home to a disproportionate number of rare and endangered species and ecosystems and provide important winter range for Mule Deer (*Odocoileus hemionus*), Elk (*Cervus canadensis*), and Bighorn Sheep (*Ovis canadensis*). The Province of B.C. has identified NDT 4 forest restoration as a strategic priority (ENAR ESDE Inc. 2006).
- **Old-growth forests** – The extent of old-growth forests has been reduced as a result of forest harvesting and, for wet forest, inundation following dam construction. The importance of old-growth forests has been recognized in regional and Provincial-scale land-use planning. There are small areas of exceptional old forest representation in the Columbia Region that could be protected.
- **Deciduous forests** – Deciduous forests are a rare feature in the Columbia Region. Most stands are Black Cottonwood leading and are located in riparian areas; however, there are important upland deciduous stands, principally aspen leading. Upland deciduous forests are often located in fire-maintained ecosystems but require distinct restoration planning and implementation to be maintained.
- **Ungulate winter ranges** – Ungulate Winter Ranges have been legally established throughout the Columbia Region under the Forest and Range Practices Act. These areas provide habitat necessary for the over-winter survival of Mule Deer and White-tailed Deer (*Odocoileus virginianus*), Elk, Moose (*Alces americanus*), Bighorn Sheep, Mountain Goat (*Oreamnos americanus*), and Mountain Caribou (*Rangifer tarandus*). Some ungulate winter range areas require habitat enhancements intervention (e.g. burning, thinning) to maintain or improve function. Many of these areas are also fire-maintained ecosystems, and actions to reduce threats or restore habitats can be similar.
- **Grasslands** – Most grassland ecosystems in the Columbia Region are found along river valleys and upland benches. The largest expanse of grassland occurs from Tobacco Plains near the US border to Radium Hot Springs. Grassland areas often endure due to periodic fire, but conifers are gradually reclaiming some of these habitats (Wikeem and Wikeem 2004).

- **Montane ecosystem** – Montane forests occupy the zone between lowland and subalpine ecosystems. They contain a mix of lower-elevation and higher-elevation species and, for this reason, can be highly diverse. Montane landscapes in the Columbia Region are dominated by successional stands of conifers; past wildfires have resulted in extensive seral stands of Lodgepole Pine, interior Douglas-fir, and trembling aspen. Other leading species, depending on latitude, include Ponderosa Pine, Hybrid White Spruce, Western Larch, and Subalpine Fir. The zone provides important habitat for deer, Moose, Mountain Caribou, Grizzly Bears, and Bighorn Sheep, and small mammals like the Golden-mantled Ground Squirrel. Various waterbirds and amphibians (e.g. Spotted Frog, Western Toad, and Long-toed Salamander) occur in the wetland areas. This ecosystem also provides important summer grazing lands for domestic livestock (Meidinger and Pojar 1991).

## Species of Interest in Upland & Dryland Ecosystems

Species of interest in upland and dryland ecosystems are terrestrial species or guilds that are important to communities or are of conservation concern but may not be adequately addressed by ecosystem-based actions. These include some species at risk (SAR) or species used for food or cultural purposes.

The FWCP uses three general categories of species of interest: recovery, focal, and inventory.

| | |
|---|---|
| **Recovery Species** | Recovery species are those of highest priority and conservation concern that have been adversely impacted by dam construction and/or operation. These species have formally been classified as either threatened or endangered by Canada or B.C., and recovery and/or management plans are either in place or under development by Federal or Provincial management agencies. Actions for recovery species are directly coordinated with recovery strategies and plans. |
| **Focal Species** | Focal species have a strong linkage to dam footprint impacts and are of regional interest. Actions proposed for species in this category should be developed in the context of restoring/improving/enhancing suitable habitats in the relevant ecosystems. Focal species with a high conservation concern (i.e. species at risk) may be considered a higher priority for actions. |
| **Inventory Species** | Inventory species have also been affected by dams, but detailed inventory and/or trend monitoring is required to support the development of more detailed actions. Actions proposed for species in this category should aim to provide the basis for future compensation actions. Inventory species with a high conservation concern (i.e. species at risk) may be considered a higher priority for actions. |

Species that would benefit most from FWCP investment and that also depend on upland and dryland habitats more than any other type of habitat are presented below. These are the species that have been impacted by dam footprints and for which there is a regional conservation concern and/or high local interest. Actions are presented that will directly benefit species that utilize upland habitats. In addition, upland habitats may also represent supporting habitat; that is, these species occur in upland habitat, but they occur more often or are more dependent on one or more other habitat types. Actions taken in upland habitats may benefit these species, but actions on their primary habitat are likely to provide greater benefit.

### Recovery Species

There are three recovery species of interest (Table 1) associated with upland and dryland habitats for the Columbia Region. Actions for these species align with Federal and/or Provincial recovery strategies and management plans.

**Mountain Caribou (*Rangifer tarandus*)**

The Columbia Region is home to the southernmost Woodland Caribou herds in Canada. Although historically found throughout the region, during the 19th and 20th century the population was reduced significantly and now exists only in

a few discrete herds, many of which are comprised of fewer than 20 animals (Environment Canada 2014; B.C. Ministry of Forests, Lands, and Natural Resources Operations and Rural Development 2018). Under the Federal Species at Risk Act, the Southern Mountain population of Woodland Caribou is considered Endangered, and the province has placed a very high priority on recovery of the Mountain Caribou ecotype of Woodland Caribou, which ranges in the Columbia Region. In 2017, the Province developed a draft Provincial Caribou Recovery Program and has been implementing actions related to:

- habitat protection and restoration;
- tourism and recreational management (i.e. snowmobile closures);
- supplemental feeding;
- predator-prey management; and
- captive breeding, maternal penning, and herd relocation.

The FWCP has provided annual and ongoing support to the Provincial Caribou Recovery Program for several years. One action is presented for Mountain Caribou to support strategies and initiatives outlined in the Federal and Provincial recovery strategies for this species in Canada. Ecosystem actions presented in this plan, as well as actions in the Reservoir & Large Lakes will also benefit Mountain Caribou.

**American Badger (*Taxidea taxus*)**

American Badgers are known only from the central and western portions of the continent, occurring west of the Rockies from southern BC to Colorado, Utah, Nevada, and California (Adams and Kinley 2004). In B.C., badgers occur in dryland habitat of the southern and central interior, including the Columbia Valley and the southern portion of the Columbia Region. Under the Federal Species at Risk Act, American Badger are considered Endangered, and the province has placed a very high priority on recovery of this species (Environment Canada 2013; British Columbia Badger Recovery Team 2016).

Threats to badger populations in BC include:

- highway construction and road-kills;
- urban development;
- agricultural development (cultivation, viniculture, orchards, range over-grazing);
- forest in-growth;
- gravel and sand pits; and
- uncontrolled off-road access.

The FWCP has supported the annual and ongoing non-game enhancement program, which addressed habitat-based actions related to the maintenance of highway crossing structures for badgers. One action is presented for American Badger to support strategies and initiatives outlined in the Federal and Provincial recovery strategies for this species in Canada. Ecosystem actions presented in this plan will also benefit badgers.

**Lewis's Woodpecker (*Melanerpes lewis*)**

The Lewis's Woodpecker is a medium-sized migratory woodpecker. It is a semi-colonial nester that breeds in low-elevation habitats of south-central and southern interior British Columbia. Breeding habitats include dry, open Ponderosa Pine forests/grasslands, mature riparian Cottonwood stands, and recently burned Ponderosa Pine or Douglas-fir dominated forests. It is a Blue-listed species in British Columbia and is listed as Threatened under the Species at Risk Act. The British Columbia population is estimated to be at least 371 pairs (Environment and Climate Change Canada 2017). Approximately 25% of its population occurs in the southern portions of the Columbia Region, mostly in the East Kootenay Trench.

The FWCP Columbia has invested in projects that enhanced habitat for the Lewis's Woodpecker since 2001. Annual and ongoing programs have targeted the identification and protection of Lewis's Woodpecker nesting sites in Pend d'Oreille and Slocan Valley. In addition, several grant projects contributed to nest box programs in East Kootenay, plus the creation and/or enhancement of 455 wildlife trees to increase nesting opportunities for the species.

One action is presented for Lewis's Woodpecker to support strategies and initiatives outlined in the Federal and Provincial recovery strategies (Environment and Climate Change Canada 2017). Ecosystem actions presented in this plan, as well as in the Wetlands & Riparian Areas Action Plan, will also benefit Lewis's Woodpecker.

## Focal Species

Focal species have been identified and prioritized by the FWCP Columbia Region using the Species Rating and Database Tool (Fish & Wildlife Compensation Program 2011) and the following steps:

1. Identifying species that have known habitat-based or species-based actions that could be implemented immediately (i.e. where the species distribution, abundance, and limiting factors are sufficiently understood); and
2. Removing species that are not of a high local or conservation concern, as defined by consultation and by the British Columbia Conservation Framework, and/or those that were not ranked high in the Columbia Basin dam impacts studies (e.g. Manley and Krebs 2009).

Table 2 lists the focal species cross-referenced with the priority (dark green) and supporting (light green) ecosystem action plans. The FWCP considers projects targeting focal species and their habitats as priorities for consideration where clear habitat-, land-, or species-based actions are available for implementation.

## Inventory Species

Inventory species are those for which inventory/data acquisition is the primary compensation action identified by the FWCP and in the Columbia Basin dam impacts reports (e.g. Manley and Krebs 2009). Table 3 lists the inventory species that are primarily associated with upland and dryland habitat, which have been identified as highly impacted by dam construction or operation. Before further actions are developed and implemented for these species, some baseline inventory work is required to determine their distribution and abundance and/or trend within the Columbia Region.

The FWCP considers projects targeting inventory species as priorities for consideration where clear outcomes leading to habitat-, land-, or species-based actions are practically achievable. Projects are prioritized during the annual operational planning cycle.

## Culturally Important Species

Culturally important plant and animal species occur in the Columbia Region and are a recognized component of upland and dryland ecosystem function and resiliency, as well as a part of a holistic approach to current and future fish and wildlife compensation actions. First Nations should be consulted where projects overlap with identified culturally important species occurs. FWCP-funded work for culturally important upland and dryland species may occur under Cross Plan actions, or as part of other ecosystem or species actions in this plan.

## Invasive Species

The FWCP Columbia Region supports work that prevents and/or controls the spread and effects of invasive species that have the potential to negatively impact projects previously supported by the FWCP, such as restoration sites and/or conservation properties. Any work to address invasive species should be completed in collaboration with the Province of B.C. and regional invasive species councils and societies as appropriate. Invasive species priority and watch lists vary by region, location, and year; therefore, grant applicants should refer to the appropriate regional and/or Provincial organization when developing funding applications.

***Table 1: Recovery species of interest associated with upland and dryland habitats in the Columbia Region.*** *This list is based on species that are of highest priority and conservation concern and have been adversely impacted by dam construction and/or operation. Coloured cells represent the ordered relationship between species and the ecosystem-based Action Plans: ✔ with dark green = primary habitat, light green = supporting habitat.*

| Fish Wildlife | Guild | Common Name | Species Name | Federal | Provincial | Upland & Dryland | Reservoirs & Large Lakes | Small Lakes | Rivers & Riparian | Wetlands & Riparian |
|---|---|---|---|---|---|---|---|---|---|---|
| Wildlife | Amphibian | Northern Leopard Frog | *Lithobates sylvatica* | Endangered | Red-listed | | | | | ✔ |
| Wildlife | Bird - Songbird | Yellow-breasted Chat | *Icteria virens auricollis* | Endangered | Red-listed | | | | ✔ | ✔ |
| Wildlife | Bird - Woodpecker | Lewis's Woodpecker | *Melanerpes lewis* | Threatened | Blue-listed | ✔ | | | | |
| Wildlife | Mammal - Carnivore | American Badger | *Taxidea taxus jeffersonii* | Endangered | Red-listed | ✔ | | | | |
| Wildlife | Mammal - Ungulate | Mountain Caribou | *Rangifer tarandus caribou* | Endangered | Red-listed | ✔ | | | | |

***Table 2: Focal species of interest associated with upland and dryland habitats in the Columbia Region.*** *The list is based on species for which there are habitat-based or species-based actions that can be implemented immediately (i.e. where the species distribution, abundance, and limiting factors are sufficiently understood) and dam impacts are known to be high. Coloured cells represent the ordered relationship between species and the ecosystem-based action plans: ✔ with dark green = primary habitat, light green = supporting habitat.*

| Fish Wildlife | Guild | Common Name | Species Name | Federal | Provincial | Upland & Dryland | Reservoirs & Large Lakes | Small Lakes | Rivers & Riparian | Wetlands & Riparian |
|---|---|---|---|---|---|---|---|---|---|---|
| Wildlife | Amphibian | Western Toad | *Anaxyrus boreas* | Special Concern | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Aerial Insectivore | Vaux's Swift | *Chaetura vauxi* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Raptor | Flammulated Owl | *Psiloscops flammeolus* | Special Concern | Blue-listed | ✔ | | | | |
| Wildlife | Bird - Shorebird | Long-billed Curlew | *Numenius americanus* | Special Concern | Blue-listed | ✔ | | | | |
| Wildlife | Bird - Songbird | Bobolink | *Dolichonyx oryzivorus* | Threatened | Blue-listed | | | | | ✔ |
| Wildlife | Bird - Songbird | Yellow Warbler | *Setophaga petechia* | | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Woodpecker | Williamson Sapsucker | *Sphyrapicus thyroideus* | Endangered | Blue-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Northern Myotis | *Myotis septentrionalis* | Endangered | Blue-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Silver-haired Bat | *Lasionycteris noctivagans* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Townsends Big-eared Bat | *Corynorhinus townsendii* | | Blue-listed | ✔ | | | | |
| Wildlife | Mammal - Carnivore | Cougar | *Puma concolor* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Carnivore | Grey Wolf | *Canis lupus* | Not at Risk | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Carnivore | Grizzly Bear | *Ursus arctos* | Special Concern | Blue-listed | ✔ | | | | |
| Wildlife | Mammal - Carnivore | Wolverine | *Gulo gulo luscus* | Special Concern | Blue-listed | ✔ | | | | |
| Wildlife | Mammal - Ungulate | Bighorn Sheep | *Ovis canadensis californiana* | | Blue-listed | ✔ | | | | |
| Wildlife | Mammal - Ungulate | Elk | *Cervus canadensis* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Ungulate | Moose | *Alces americanus* | | Yellow-listed | | | | | ✔ |
| Wildlife | Mammal - Ungulate | Mule Deer | *Odocoileus hemionus* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Ungulate | White-tailed Deer | *Odocoileus virginianus* | | Yellow-listed | ✔ | | | | |
| Wildlife | Reptile | Western Painted Turtle | *Chrysemys picta bellii* | Special Concern | Blue-listed | | | ✔ | | ✔ |
| Wildlife | Reptile | Western Skink | *Plestiodon skiltonianus* | Special Concern | Blue-listed | ✔ | | | | |

***Table 3: Inventory species of interest associated with upland and dryland habitats in the Columbia Region.*** *The list is based on species for which dam impacts are known to be high, but baseline information is required before habitat- or species-based action can be implemented. Coloured cells represent the ordered relationship between species and the ecosystem-based Action Plans: ✔ with dark green = primary habitat, light green = supporting habitat.*

| Fish Wildlife | Guild | Common Name | Species Name | Federal | Provincial | Upland & Dryland | Reservoirs & Large Lakes | Small Lakes | Rivers & Riparian | Wetlands & Riparian |
|---|---|---|---|---|---|---|---|---|---|---|
| Wildlife | Amphibian | Coeur d'Alene Salamander | *Plethodon idahoensis* | Special Concern | Yellow-listed | | | | ✔ | |
| Wildlife | Amphibian | Wood Frog | *Lithobates sylvaticus* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Aerial Insectivore | Barn Swallow | *Hirundo rustica* | Threatened | Blue-listed | | | | | ✔ |
| Wildlife | Bird - Aerial Insectivore | Common Nighthawk | *Chordeiles minor* | Special Concern | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Aerial Insectivore | Northern Rough-winged Swallow | *Stelgidopteryx serripennis* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Aerial Insectivore | Violet-green Swallow | *Tachycineta thalassina* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Gamebird | Sharp-tailed Grouse | *Tympanuchus phasianellus* | | Blue-listed | ✔ | | | | |
| Wildlife | Bird - Hummingbird | Rufous Hummingbird | *Selasphorus rufus* | | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Raptor | Barred Owl | *Strix varia* | | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Raptor | Broad-winged Hawk | *Buteo platypterus* | | Blue-listed | ✔ | | | | |
| Wildlife | Bird - Raptor | Northern Goshawk | *Accipiter gentilis* | Not at Risk | Blue-listed | ✔ | | | | |
| Wildlife | Bird - Raptor | Northern Harrier | *Circus hudsonius* | Not at Risk | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Raptor | Northern Pygmy-Owl | *Glaucidium gnoma* | | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Songbird | Alder Flycatcher | *Empidonax alnorum* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Songbird | American Redstart | *Setophaga ruticilla* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Songbird | Black-capped Chickadee | *Poecile atricapillus* | | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Songbird | Black-headed Grosbeak | *Pheucticus melanocephalus* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Songbird | Brown Creeper | *Certhia americana* | | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Songbird | Chestnut-backed Chickadee | *Poecile rufescens* | | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Songbird | Clark's Nutcracker | *Nucifraga columbiana* | | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Songbird | Common Yellowthroat | *Geothlypis trichas* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Songbird | Gray Catbird | *Dumetella carolinensis* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Songbird | Olive-sided Flycatcher | *Contopus cooperi* | Special Concern | Blue-listed | ✔ | | | | |
| Wildlife | Bird - Songbird | Pacific Wren | *Troglodytes pacificus* | | Yellow-listed | ✔ | | | | |
| Wildlife | Bird - Songbird | Veery | *Catharus fuscescens* | | Yellow-listed | | | | | ✔ |
| Wildlife | Bird - Woodpecker | Downy Woodpecker | *Dryobates pubescens* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Big Brown Bat | *Eptesicus fuscus* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | California Myotis | *Myotis californicus* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Eastern Red Bat | *Lasiurus borealis* | | Unknown | ✔ | | | | |
| Wildlife | Mammal - Bat | Fringed Myotis | *Myotis thysanodes* | Data Deficient | Blue-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Hoary Bat | *Lasiurus cinereus* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Little Brown Myotis | *Myotis lucifungus* | Endangered | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Long-eared Myotis | *Myotis evotis* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Long-legged Myotis | *Myotis volans* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Bat | Yuma Myotis | *Myotis yumanensis* | | Yellow-listed | ✔ | | | | |

***Table 3 Continued***

| Fish Wildlife | Guild | Common Name | Species Name | Federal | Provincial | Upland & Dryland | Reservoirs & Large Lakes | Small Lakes | Rivers & Riparian | Wetlands & Riparian |
|---|---|---|---|---|---|---|---|---|---|---|
| Wildlife | Mammal - Carnivore | American Marten | *Martes americana* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Carnivore | American Mink | *Neovison vison* | | Yellow-listed | | | | | ✔ |
| Wildlife | Mammal - Carnivore | Fisher | *Martes pennanti* | | Blue-listed | ✔ | | | | ✔ |
| Wildlife | Mammal - Rodent | Meadow Vole | *Microtus pennsylvanicus* | | Yellow-listed | | | | | ✔ |
| Wildlife | Mammal - Rodent | Western Jumping Mouse | *Zapus princeps* | | Yellow-listed | ✔ | | | | |
| Wildlife | Mammal - Ungulate | Mountain Goat | *Oreamnos americanus* | | Blue-listed | ✔ | | | | |
| Wildlife | Reptile | North American Racer | *Coluber constrictor* | Threatened | Blue-listed | ✔ | | | | |
| Wildlife | Reptile | Northern Rubber Boa | *Charina bottae* | Special Concern | Yellow-listed | ✔ | | | | |

# ACTION TABLES

These Action Tables identify the FWCP's Priority Actions to conserve and enhance fish and wildlife in watersheds impacted by BC Hydro dams in upland and dryland ecosystems in the Columbia Region. Actions identified as **OPEN** (see Delivery Approach column) **are eligible for a grant**. When completing your online grant application, you will be required to identify a Priority Action(s) that best aligns with your project idea. 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.

## Cross Plan Actions

Several broad cross plan actions are relevant to all Action Plans and will require the consideration of multiple ecosystems.

| CROSS ECOSYSTEM PLAN ACTIONS | | | | | | | Version:AUG2019 | |
|---|---|---|---|---|---|---|---|---|
| **Action #** | **Action Type** | **Priority Action Short Description** | **Priority** | **Priority Area** | **Target Species** | **Priority Action** | **Intended Outcome** | **Delivery Approach** |
| 1 | Research and Information Acquisition | **COLUPD.CXP.RI.01.01 Indigenous knowledge and values, develop framework-P1** | **1** | All Action Plan Priority Areas | Fish and Wildlife | Develop a framework for incorporating Indigenous knowledge and values into FWCP projects. | Collaboration with Indigenous peoples relating to FWCP projects. | Directed |
| 2 | Habitat-based | **COLUPD.CXP.HB.02.01 Indigenous knowledge and values, incorporate based on framework-P1** | | | | Incorporate Indigenous knowledge and values into FWCP projects based on framework developed in Action #1. | | Directed / Open |
| 3 | Research and Information Acquisition | **COLUPD.CXP.RI.03.01 Climate change strategy-P1** | **1** | All Action Plan Priority Areas | Fish and Wildlife | Develop a framework for the FWCP Columbia Region to incorporate elements of climate change into actions (e.g. research, habitat restoration, land securement and/or monitoring of fish and wildlife populations, ecosystems or habitats). | Increased understanding of climate change impacts on fish and wildlife in the Columbia Region and how FWCP can help support on-the-ground action (e.g. development and implementation of resiliency plans, land securement initiatives, restoration). | Directed |
| 4 | Research and Information Acquisition | **COLUPD.CXP.RI.04.01 Responding to emergent issues-P2** | **2** | All Action Plan Priority Areas | Fish and Wildlife | Support project work relating to urgent and emerging issues for the Columbia Region (e.g. emergent diseases, cumulative effects, imminent species declines). | Allows the FWCP to support appropriate organizations and/or support initiatives aimed at emergent issues. | Directed |

***Continued: Cross Ecosystem Plan Actions***

| CROSS ECOSYSTEM PLAN ACTIONS | | | | | | | Version:AUG2019 | |
|---|---|---|---|---|---|---|---|---|
| **Action #** | **Action Type** | **Priority Action Short Description** | **Priority** | **Priority Area** | **Target Species** | **Priority Action** | **Intended Outcome** | **Delivery Approach** |
| 5 | Research and Information Acquisition | **COLUPD.CXP.RI.05.01 Culturally important resources-P1** | **1** | All Action Plan Priority Areas | Fish and Wildlife | Work with appropriate Indigenous groups and organizations to conduct research and inventory to improve the understanding of culturally important plants and animals. | Conservation and increased understanding of culturally important species. | Directed / Open |
| 6 | Habitat-based | **COLUPD.CXP.HB.06.01 Connectivity habitat-P1** | **1** | All Action Plan Priority Areas | Fish and Wildlife | Support work towards conservation, improvement of important connectivity habitat and land securement (i.e. linkage areas, including high elevation) both within an ecosystem type (i.e. reservoirs and spawning tributaries, riparian areas) and across ecosystem types (i.e. valley bottoms to montane habitats) for fish and wildlife species (e.g. wide-ranging species, transboundary species, rare species). | Conservation and improvement of connectivity habitats. | Directed / Open |

## Upland & Dryland Ecosystem Actions

| UPLAND AND DRYLAND ACTION TABLE - ECOSYSTEMS | | | | | | | Version:AUG2019 | |
|---|---|---|---|---|---|---|---|---|
| **Action #** | **Action Type** | **Priority Action Short Description** | **Priority** | **Priority Area** | **Target Species** | **Priority Action** | **Intended Outcome** | **Delivery Approach** |
| 7 | Research and Information Acquisition | **COLUPD.ECO.RI.07.01 Identify candidate upland areas for ecosystem restoration-P1** | **1** | Fire-maintained Ecosystems<br>Old Growth Forests<br>Deciduous Forests<br>Grasslands | Fish and Wildlife | Identify candidate upland and dryland areas for the development of ecosystem restoration (ER) plans and/or restoration activities in the Columbia Region and develop strategies for future work as required. This work could include re-evaluating and refining the criteria developed to prioritize suitable ecosystem restoration areas. Collaboration with regional committees, First Nations and/or the Province of B.C. should occur. | Development of ecosystem restoration plans for important upland and dryland areas/habitats that identify FWCP compensation objectives and strengthens conservation planning and actions. | Directed / Open |
| 8 | Research and Information Acquisition | **COLUPD.ECO.RI.08.01 Assess connectivity and function of upland habitats-P1** | **1** | All Priority Habitats | Fish and Wildlife | Inventory the distribution, abundance, current function and connectivity of ecologically important habitats for wide-ranging species (e.g. carnivores, ungulates, bats). | Acqusition of information to inform conservation actions that protect unique and high value habitats. | Directed / Open |
| 9 | Research and Information Acquisition | **COLUPD.ECO.RI.09.01 Research restoration techniques for upland habitats-P2** | **2** | Fire-maintained Ecosystems<br>Ungulate Winter Range<br>Grasslands | Wildlife | Support research that helps develop restoration techniques for priority habitat types (e.g. fire-maintained ecosystems, ungulate winter range, grasslands). Examples include improvements to prescribed burning, slashing, piling, pile burning and seeding techniques. | ▪ Improved mid- to high-elevation upland habitat and movement corridors.<br>▪ Improved ecosystem restoration techniques. | Directed / Open |
| 10 | Habitat-based | **COLUPD.ECO.HB.10.01 Development of ecosystem restoration plans-P1** | **1** | Fire-maintained Ecosystems<br>Old Growth Forests<br>Deciduous Forests<br>Grasslands | Fish and Wildlife | Support the development of regional ecosystem restoration (ER) plans for priority upland and dryland habitats as per the direction of Action #7. The plans should assess limiting factors, describe opportunities for FWCP investment, guide future work in these areas, and describe how results should be monitored. Updates to existing ecosystem restoration plans may be required. | ▪ Improvement in upland and dryland habitat.<br>▪ Improvement in selecting ecosystem restoration areas and enhancement/treatment techniques. | Directed |
| 11 | Habitat-based | **COLUPD.ECO.HB.11.01 Prevention and control of invasive species-P1** | **1** | Fire-maintained Ecosystems<br>Old Growth Forests<br>Deciduous Forests<br>Grasslands | Terrestrial Invasive Species | Contribute to the prevention and control of high priority terrestrial invasive species that have the potential to negatively impact FWCP project investments on, or adjacent to, conservation properties and FWCP restoration sites. Activities to be completed in collaboration with the Province of B.C. and regional invasive species councils and societies as appropriate. | ▪ Protection of FWCP investments against invasive species establishment and spread.<br>▪ Improved understanding of the distribution of invasive species in the Columbia Region.<br>▪ Increased ability to respond quickly to new invasive infestations. | Open |

***Continued: Ecosystems Action Table***

| UPLAND AND DRYLAND ACTION TABLE - ECOSYSTEMS | | | | | | | Version:AUG2019 | |
|---|---|---|---|---|---|---|---|---|
| **Action #** | **Action Type** | **Priority Action Short Description** | **Priority** | **Priority Area** | **Target Species** | **Priority Action** | **Intended Outcome** | **Delivery Approach** |
| 12 | Habitat-based | **COLUPD.ECO.HB.12.01 Restoration of upland habitats-P1** | **1** | All Priority Habitats | Wildlife | Contribute to restoration planning and treatments in grasslands, deciduous forests and open forest ecosystems on conservation lands, First Nation lands, and crown lands through Ecosystem Restoration Committees. | Improvement in upland and dryland habitat. | Directed / Open |
| 13 | Habitat-based | **COLUPD.ECO.HB.13.01 Improvement of connectivity habitats-P1** | **1** | All Priority Habitats | Wildlife | Support work towards conservation and improvement/enhancements of important connectivity habitat (i.e. corridors/linkage areas, including high elevation) identified in Actions #7 and 8. | Improved connectivity (e.g. increased wildlife movement between mountain ranges and drainages) in upland and dryland habitats. | Open |
| 14 | Habitat-based | **COLUPD.ECO.HB.14.01 Forest structure restoration-P2** | **2** | All Priority Habitats | Wildlife | Support efforts to restore late-successional forest structure/features. | Improvement of upland habitat for ecosystem processes and wildlife populations. | Open |
| 15 | Habitat-based | **COLUPD.ECO.HB.15.01 Identify, maintain and restore old growth ecosystems-P1** | **1** | Old Growth Forests | Wildlife | Support efforts to identify, maintain, restore and recruit mature and old upland and dryland ecosystem attributes, including large diameter Western Redcedar, Ponderosa Pine, Whitebark Pine, Douglas-fir, and birch species. Prioritize stands that may become Old Growth Management Areas (OGMAs). | Improvement in old growth upland habitat, including increases in large diameter tree species that provide important habitat for wildlife species. | Open |
| 16 | Habitat-based | **COLUPD.ECO.HB.16.01 Access management issues-P1** | **1** | All Priority Habitats | Wildlife | Support work that seeks to resolve access and recreation management issues that affect FWCP supported conservation properties and restoration/enhancement investments. | Protection of FWCP investments and decreases in negative impacts related to access and recreational use. | Directed / Open |
| 17 | Monitoring and Evaluation | **COLUPD.ECO.ME.17.01 Pre and post restoration vegetation monitoring-P2** | **2** | All Priority Habitats | Plants Terrestrial Invasive Species | Coordinate and consolidate monitoring of restoration treatments and compare to pre-treatment condition. Ensure invasive plant species distribution and abundance does not increase in response to treatment. | ▪ Effective vegetation monitoring of habitat restoration to inform future conservation action.<br>▪ Prevention of invasive plant species establishment and spread. | Directed / Open |

***Continued: Ecosystems Action Table***

| UPLAND AND DRYLAND ACTION TABLE - ECOSYSTEMS | | | | | | | Version:AUG2019 | |
|---|---|---|---|---|---|---|---|---|
| **Action #** | **Action Type** | **Priority Action Short Description** | **Priority** | **Priority Area** | **Target Species** | **Priority Action** | **Intended Outcome** | **Delivery Approach** |
| 18 | Monitoring and Evaluation | **COLUPD.ECO.ME.18.01 Effectiveness monitoring of past projects-P1** | **1** | All Priority Habitats | Wildlife | Monitor and evaluate the effectiveness of previous FWCP upland and dryland ecosystems projects (for monitoring of species see Action #32 below). Include an approach for adaptive management, information sharing and collaboration among agencies and the public stakeholders to increase the efficacy of conservation actions. | Future actions are effective and documented. | Directed / Open |
| 19 | Land Securement | **COLUPD.ECO.LS.19.01 Secure upland/dryland habitats-P1** | **1** | All Priority Habitats | Fish and Wildlife | Support the securement and protection of priority upland and dryland habitats including those areas identified in Actions #7, 8, and/or 10. Also, look for opportunities to protect, secure and support the stewardship of important connectivity habitat identified in Action #8 for wide-ranging animals (i.e. carnivores, ungulates, bats). | ▪ Securement of critical upland and dryland habitats.<br>▪ Securement and stewardship of critical connectivity zones of upland and dryland habitats that support the movement of wildlife. | Directed / Open |

## Upland & Dryland Species of Interest Actions

| UPLAND AND DRYLAND ACTION TABLE - SPECIES OF INTEREST | | | | | | | Version:AUG2019 | |
|---|---|---|---|---|---|---|---|---|
| **Action #** | **Action Type** | **Priority Action Short Description** | **Priority** | **Priority Area** | **Target Species** | **Priority Action** | **Intended Outcome** | **Delivery Approach** |
| 20 | Species-based | **COLUPD.SOI.SB.20.01 Mountain Caribou Conservation-P1** | **1** | All Priority Habitats | Mountain Caribou | Support strategies and initiatives outlined in the SARA Recovery Strategy for Mountain Caribou that relate to compensation for dam impacts. Where possible, link project work to the connectivity of this species across ecosystems and collaborate with recovery team specialists. | Recovery of Mountain Caribou. | Directed / Open |
| 21 | Species-based | **COLUPD.SOI.SB.21.01 Badger Conservation-P1** | **1** | Fire-maintained Ecosystems Grasslands | American Badger | Support strategies and initiatives outlined in the SARA and BC Recovery Strategy for American Badger that relate to compensation for dam impacts. Where possible, link project work to the connectivity of this species across ecosystems and collaborate with recovery team specialists. | Recovery of American Badger. | Directed / Open |
| 22 | Species-based | **COLUPD.SOI.SB.22.01 Lewis's Woodpecker Conservation-P1** | **1** | Fire-maintained Ecosystems Deciduous Forests | Lewis's Woodpecker | Support strategies and initiatives outlined in the SARA Recovery Strategy for Lewis's Woodpecker that relate to compensation for dam impacts. Where possible, link project work to the connectivity of this species across ecosystems and collaborate with recovery team specialists. | Recovery of Lewis's Woodpecker. | Directed / Open |
| 23 | Species-based | **COLUPD.SOI.SB.23.01 Focal and Inventory species projects for species at risk-P2** | **2** | All Priority Habitats | Species at Risk | Support surveys, restoration and/or other compensation-related activities for 'focal' and 'inventory' species not covered in other Actions. A clear link must be made between dam impacts and proposed projects. | ▪ Changes to species presence are monitored and inform future conservation/ compensation actions.<br>▪ Improved habitat for fish and wildlife species. | Open |
| | | **COLUPD.SOI.SB.23.02 Focal and Inventory species projects for other wildlife-P3** | **3** | | Other Wildlife | | | |
| 24 | Species-based | **COLUPD.SOI.SB.24.01 Support Grizzly Bear conservation actions-P1** | **1** | All Priority Habitats | Grizzly Bear | Support implementation of stewardship actions in the Columbia Region for important Grizzly Bear management issues, including but not limited to connectivity/linkage corridors, protecting critical food resources (e.g. huckleberries, silviculture prescriptions), and human–bear conflict issues (e.g. identifying key areas of valley bottom habitat overlaps/conflict areas, road deactivation, electric fencing). Coordinate efforts with Wetland and Riparian Areas Action #27. | Conservation and protection of Grizzly Bear. | Open |

***Continued: Species of Interest Action Table***

| UPLAND AND DRYLAND ACTION TABLE - SPECIES OF INTEREST | | | | | | | Version:AUG2019 | |
|---|---|---|---|---|---|---|---|---|
| **Action #** | **Action Type** | **Priority Action Short Description** | **Priority** | **Priority Area** | **Target Species** | **Priority Action** | **Intended Outcome** | **Delivery Approach** |
| 25 | Species-based | **COLUPD.SOI.SB.25.01 Winter ungulate inventories-P3** | **3** | Winter Ungulate Range | Ungulates | Support winter ungulate inventories (e.g. estimate trends in population size, age and sex ratios, level of use in target areas) in order to identify key areas for restoration and enhancement opportunities. Integrate with historic information including movement routes, timing of movement and sources of mortality. | Informed habitat-based enhancement and restoration actions for ungulates. | Directed / Open |
| 26 | Species-based | **COLUPD.SOI.SB.26.01 Support for BC Bat initiatives-P1** | **1** | All Priority Habitats | Bats | Support the conservation of bat species present in the Columbia Region. Examples include baseline data knowledge gaps (including monitoring/inventory), White-nose Syndrome response, habitat protection and restoration, and outreach and stewardship. | Conservation and protection of bat species and their habitats. | Open |
| 27 | Species-based | **COLUPD.SOI.SB.27.01 Whitebark Pine restoration efforts-P2** | **2** | Montane & Fire-maintained Ecosystems | Whitebark Pine | Integrate Whitebark Pine restoration initiatives following SARA Recovery Strategy into habitat restoration work. May include research and habitat enhancements for Clark's Nutcracker (indicator species). | Improved priority whitebark pine habitat. | Directed / Open |
| 28 | Research and Information Acquisition | **COLUPD.SOI.RI.28.01 Western Toad winter habitat use and migration areas-P2** | **2** | Fire-maintained Ecosystems | Western Toad | Research the migration patterns and winter habitat requirements of Western Toad in order to identify and implement enhancement opportunities. Collaborate with the Province of B.C., regional agencies, and other Western Toad initiatives for data sharing. Activities will likely overlap with Wetland and Riparian Areas Action #31. | ▪ Increased knowledge of seasonal habitat requirements for Western Toad populations.<br>▪ Improved habitat through restoration and enhancement opportunities. | Directed / Open |
| 29 | Research and Information Acquisition | **COLUPD.SOI.RI.29.01 Baseline data for furbearers-P3** | **3** | All Priority Habitats | Furbearers | Conduct inventory and research to improve the understanding of important furbearers including abundance, distribution, trend, threats, and ecological relationships. | Improved conservation and sustainability actions for furbearers. | Open |
| 30 | Habitat-based | **COLUPD.SOI.HB.30.01 Ungulate habitat enhancements-P1** | **1** | All Priority Habitats | Ungulates | Support the implementation of ungulate enhancement opportunities in summer, transitional (spring/fall corridors and migration routes), and winter habitats. | Improved habitat for ungulates. | Directed / Open |

***Continued: Species of Interest Action Table***

| UPLAND AND DRYLAND ACTION TABLE - SPECIES OF INTEREST | | | | | | | Version:AUG2019 | |
|---|---|---|---|---|---|---|---|---|
| **Action #** | **Action Type** | **Priority Action Short Description** | **Priority** | **Priority Area** | **Target Species** | **Priority Action** | **Intended Outcome** | **Delivery Approach** |
| 31 | Habitat-based | **COLUPD.SOI.HB.31.01 Restoration and recruitment of wildlife trees-P1** | **1** | Fire-maintained Ecosystems Old-growth Forests Deciduous Forests | Cavity Nesting Species | Support Best Management Practices and recruitment of cavity nests and wildlife trees (i.e. identifying and mapping cavity nests and wildlife trees, developing/updating guidelines, maintaining existing cavity nests and wildlife trees, creating artificial cavities, snags, and additional wildlife trees). | Increased cavity nests and wildlife tree habitat. | Open |
| 32 | Monitoring and Evaluation | **COLUPD.SOI.ME.32.01 Monitor wildlife use of created/restored habitats-P1** | **1** | All Priority Habitats | Wildlife | Monitor wildlife species use of upland and dryland habitats (e.g. open forests, grasslands, deciduous forests) in response to FWCP supported restoration treatments. | Improved awareness of species use of and effectiveness of restoration actions. | Directed / Open |
| 33 | Monitoring and Evaluation | **COLUPD.SOI.ME.33.01 Invertebrate monitoring for pollinators-P2** | **2** | All Priority Habitats | Pollinators | Support inventory/monitoring of upland terrestrial invertebrate groups to increase knowledge of community structure and act as an indicator of productivity and ecosystem health/function in areas related to FWCP compensation activities. | Evaluation of the effect of restoration activities on invertebrate community structure. | Open |
| | | **COLUPD.SOI.ME.33.02 Invertebrate monitoring for other terrestrials-P3** | **3** | | Other terrestrial invertebrates | | | |

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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.

**Best Management Practices (BMPs):** In British Columbia, BMPs are science-based recommendations and guidelines that ensure projects or activities meet the necessary legislation, regulations, and policies and are planned and carried out in a manner that considers the consequences to the environment.

**Blue List Species:** Any species that is of special concern.

**Committee on the Status of Endangered Wildlife in Canada (COSEWIC):** An independent advisory panel to the Minister of Environment and Climate Change Canada that meets twice a year to identify and assess the status of wildlife species at risk of extinction. Members are wildlife biology experts from academia, government, non-governmental organizations, and the private sector responsible for designating wildlife species in danger of disappearing from Canada.

**Creston Valley Wildlife Management Area (CVWMA):** A 7,000-hectare (17,000-acre) area of Provincial Crown Land located along the Kootenay River system.

**Cross Plan Action:** An action that is relevant to two or more Action Plans and requires the consideration of multiple ecosystems.

**Delivery Approach:** Priority Actions identified as "Open" are eligible for a grant. Actions identified as "Directed" are not eligible for a grant. These are projects that the FWCP Regional Boards will direct through the appropriate procurement process (e.g. a request for proposal). Actions identified as "Directed / Open" are eligible for a grant or may be projects directed by the FWCP Regional Boards through the appropriate procurement process.

**Dryland Habitat:** A subset of upland habitats characterized by relatively low rainfall and rapid drainage, which results in vegetation communities dominated by grasses and drought-tolerant shrubs and trees.

**Ecosystem Restoration (ER):** The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.

**Endangered Species:** A fish or wildlife species that is facing imminent extirpation or extinction.

**Fire-maintained Ecosystem:** A grassland or forest ecosystem whereby fire is an important natural disturbance event and component to maintaining ecological health and productivity.

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

**Focal Species:** Defined by the FWCP Columbia Region as species that have strong linkages to dam footprint impacts and are of regional interest.

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

**Furbearer:** A diverse group of mammals including both carnivores (e.g. wolverines, fisher, lynx) and rodents (e.g. beaver, muskrat). The term is used to identify mammal species whose fur is valued traditionally or commercially.

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

**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 out-compete native species as there are no predators or diseases to keep them under control.

**Inventory Species:** Defined by the FWCP Columbia Region as species that have been affected by dams, but detailed inventory and/or trend monitoring is still required.

**Natural Disturbance Types (NDTs):** NDTS are used to classify ecosystems in BC into five categories of natural disturbance regimes. Fire is typically the primary disturbance factor and can vary by type, intensity, size, and frequency (Hall 2010).

**Natural Disturbance Type 4 (NDT 4):** Ecosystems with frequent stand-maintaining fires, including grasslands, shrublands, and forested communities that experience frequent low-intensity fires.

**Old-growth Forest:** Natural forests that have developed over a long period of time, generally at least 120 years, without experiencing a severe, stand-replacing disturbance (e.g. fire, windstorm, or logging).

**Old-growth Management Areas (OGMAs):** Legally established and spatially defined areas that contain, or are managed to attain, specific structural old-growth attributes and that are delineated and mapped as fixed areas.

**Priority Areas:** Habitats, areas, or ecosystems that have been outlined for each Action Plan and include areas that are deemed as a priority for FWCP Open or Directed projects.

**Recovery Species:** Defined by the FWCP Columbia Region as species of highest priority and conservation concern that have been adversely impacted by dam construction and/or operation. These species have formally been classified as either threatened or endangered by Canada or B.C., and recovery and/or management plans are either in place or under development by Federal or Provincial management agencies.

**Red List Species:** Any species that is at risk of being lost (extirpated, endangered, or threatened).

**Species of Interest:** Defined by the FWCP as a specific fish and wildlife species of conservation concern (including species at risk) or other regionally important species for compensation or conservation planning process that have been affected by hydro-power development footprint impacts.

**Species at Risk (SAR):** Specific fish and wildlife species that have been listed by the Provincial (B.C. Conservation Data Centre) or Federal authorities (COSEWIC, SARA) to be of conservation concern for the Columbia Region.

**Species at Risk Act (SARA):** Proclaimed in 2003, SARA is Government of Canada legislation designed to prevent wildlife species in Canada from disappearing; to provide for the recovery of wildlife species that are extirpated (no longer exist in the wild in Canada), endangered, or threatened as a result of human activity; and to manage species of special concern to prevent them from becoming endangered or threatened.

**Species of Special Concern:** A fish or wildlife species that may become a threatened or endangered species because of a combination of biological characteristics and identified threats.

**Strategic Objectives:** These objectives support meeting both BC Hydro's water licence conditions in the Peace and Columbia Regions, and its commitment and intent when voluntarily establishing the program in the Coastal Region in partnership with the Province of B.C. and DFO. The strategic objectives address conservation, sustainable use, and community engagement goals.

**Threatened Species**: A fish or wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.

**Ungulate Winter Range (UWR):** An area that contains the habitat necessary to meet the winter habitat requirements of an ungulate species.

**Upland Habitat:** An ecosystem that is found above the habitat influenced by periodic or permanent flooding and has a distinctive vegetation community.

**Wildlife Extension Area (WEA):** The FWCP recognizes that opportunities for fish and wildlife habitat enhancement within the Canoe Arm drainage of the Kinbasket Reservoir are extremely limited and better opportunities may exist in the upper drainage of the Fraser River near Valemount. The Columbia Region boundary includes a portion of the Fraser River drainage (i.e. the wildlife extension area) for wildlife projects only. The Policy Committee approved the WEA in 1996. The

Wildlife Extension Area includes the area north of Valemount, extending east to the Alberta border, including Mount Robson Provincial Park, and west to north of McBride.

**Yellow List Species:** Any species that are apparently secure and not at risk of extinction.