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FISH AND WILDLIFE
COMPENSATION PROGRAM

PEACE BASIN

UPLANDS ACTION PLAN

March 31, 2014

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Peace Uplands Action Plan

1. Introduction

The Fish and Wildlife Compensation Program (FWCP) is a partnership between BC Hydro, the Province of British Columbia and Fisheries and Oceans Canada, First Nations and local communities and groups to conserve and enhance fish, wildlife and their supporting habitats affected by the creation of BC Hydro owned and operated generation facilities in the Coastal, Columbia and Peace regions of British Columbia. The FWCP program in the Peace region (see Figure 1) was initiated in 1988 and has been investing in fish and wildlife initiatives ever since.

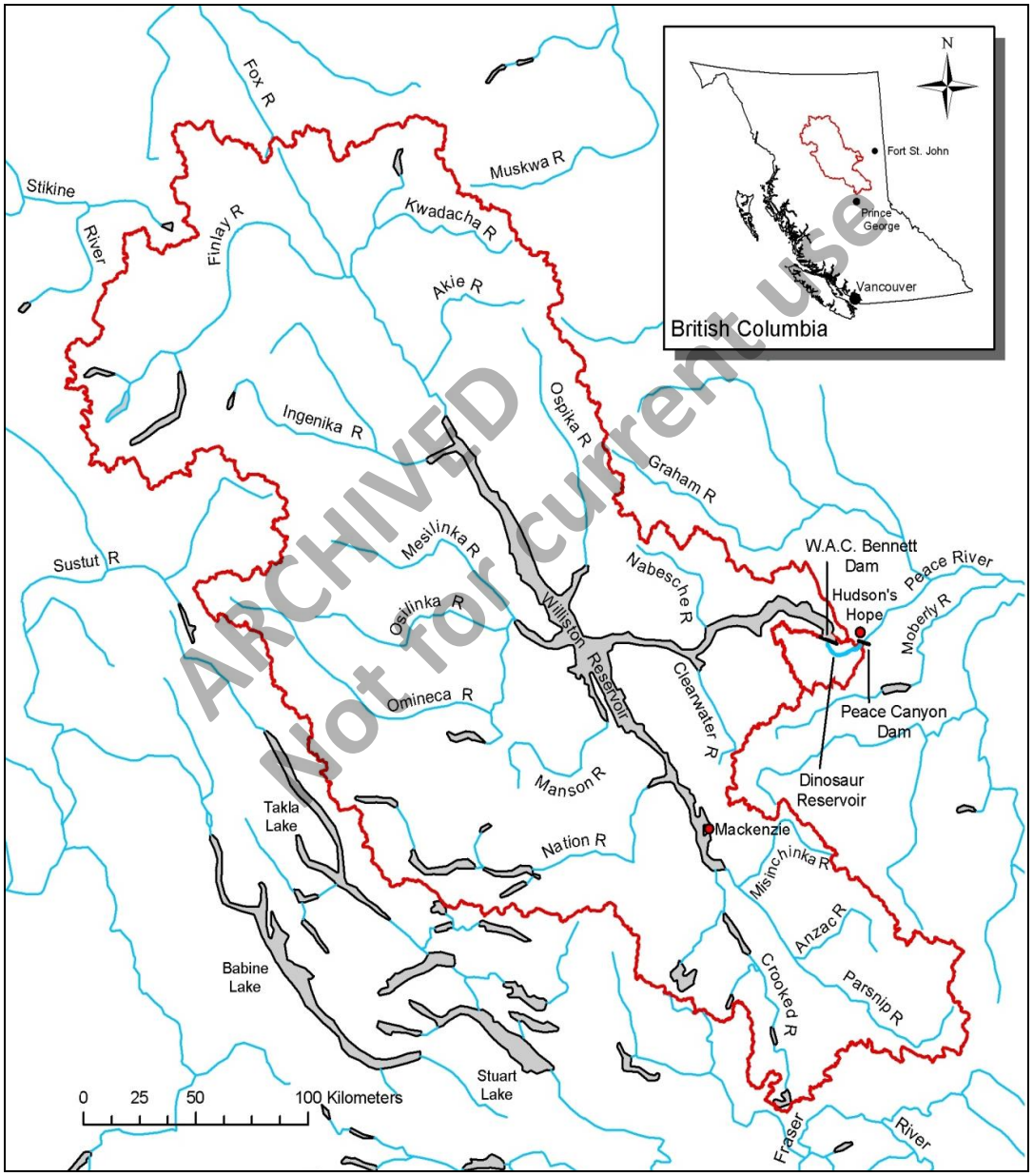

Figure 1. The Upper Peace Basin and the FWCP-Peace Program Area

The FWCP developed a strategic framework that guides overall planning for compensation investments (MacDonald 2009). The framework has guided the development of strategic plans for each basin within the FWCP program area, which in turn inform the development of Action Plans that focus on specific priorities within each basin (Figure 2).

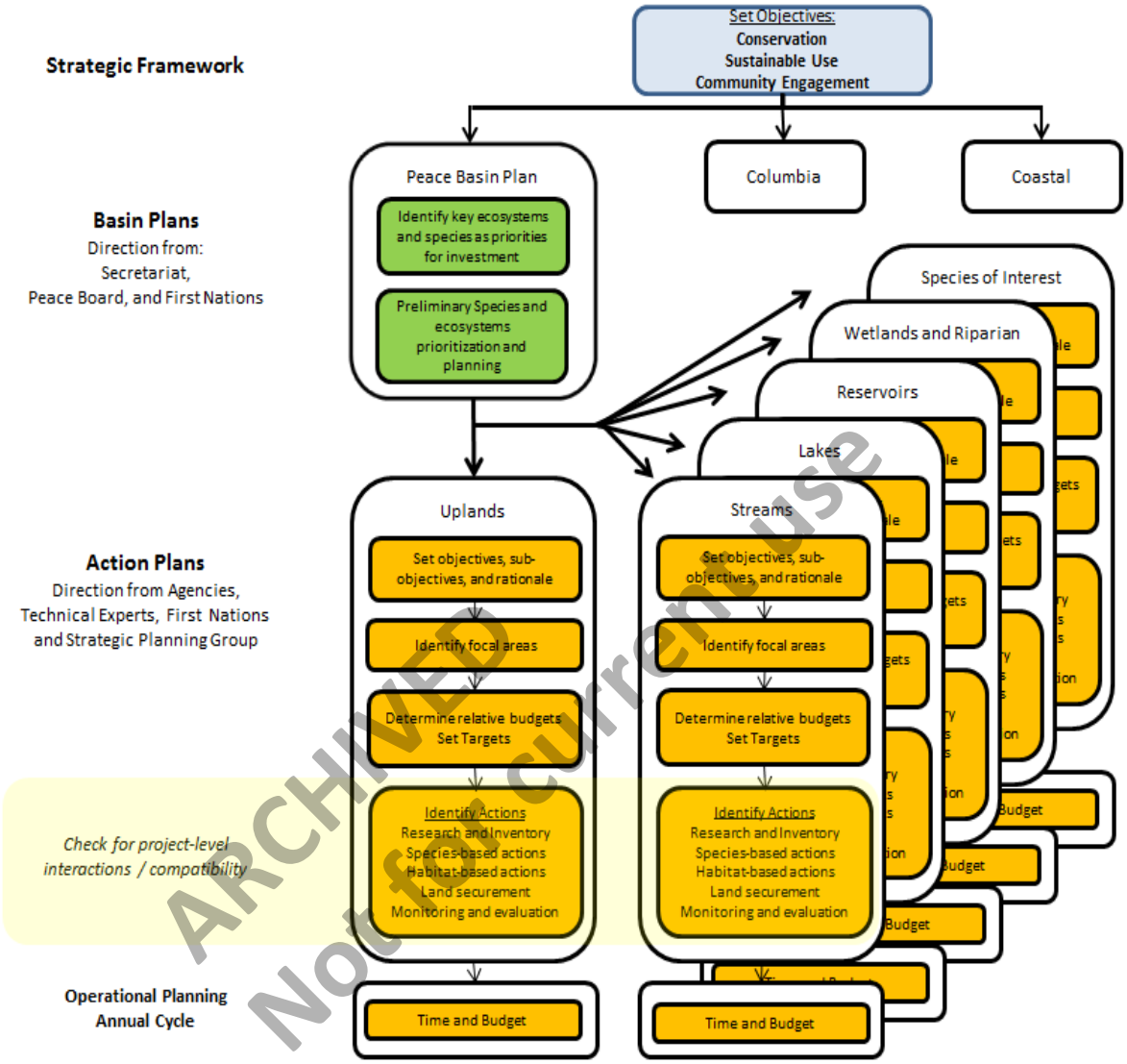

Figure 2. Relationship between the Uplands Action Plan and higher level planning and objectives

This Uplands Action Plan sets out priorities for the FWCP to guide projects within the Peace region program area (Figure 1). The plan builds on the FWCP's strategic objectives and the FWCP-Peace Basin Plan (FWCP 2013). Action Plans have also been developed for Riparian and Wetlands, Species of Interest, Streams, Lakes, and Reservoirs[1]. While the habitat and species focus among plans differ, some actions are complementary across the different plans.

[1] All of the FWCP Plans are available at:
http://www.bchydro.com/about/sustainability/environmental_responsibility/compensation_programs.html

The Uplands Action plan addresses the area within the Peace watershed above the direct influence of the Williston and Dinosaur reservoirs. This large and diverse area is comprised primarily of forests, subalpine and alpine habitats. Because of the size of the basin the Uplands Action Plan focuses effort on ecologically important habitats (e.g., wildlife habitat features and rare or endangered plant communities) and areas heavily impacted by human use.

This Action Plan proposes objectives and actions mostly focused on improving upland habitat conditions in the Peace Basin, in the context of the FWCP's strategic framework. Public feedback received during the planning process indicated that uplands habitats were not as important to stakeholders as the other terrestrial related plans (Species of Interest or Riparian and Wetland).

The actions and priorities described in this Action Plan have been developed with input from the BC Ministry of Environment (MOE), BC Ministry of Forests, Lands and Natural Resource Operations (FLNRO), BC Hydro, First Nations and local stakeholders. The planning priorities within Action Plans may not translate immediately into funded projects because limited program funding requires priority-setting across the program as a whole. The process of selecting which actions will be implemented in any given year will occur during the annual implementation planning cycle.

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2. Overview Context

2.1. Purpose and Scope

The Uplands Action Plan aims to restore or enhance the functioning of ecologically important ecosystems through habitat improvements, reducing threats, and encouraging compatible uses. Because other agencies have direct responsibility for management of these ecosystems and associated species, the emphasis in this plan is on coordination with other organizations and supporting feasible management actions.

2.2. Focal Areas

The Peace Basin covers approximately 70,000 km^2, of which most is comprised of forests (Boreal White and Black Spruce [BWBS], Sub-boreal Spruce [SBS], and Spruce-Willow-Birch [SWB] biogeoclimatic zones), subalpine (Engelmann Spruce-Subalpine Fir [ESSF]) and alpine (Boreal Altai Fescue Alpine [BAFA]) areas. Hundreds of species inhabit these zones, including many species-at-risk and species considered regionally or culturally important.

Because the basin spans hundreds of kilometers from north to south and from low-elevation forests to alpine tundra, there is significant variation in climate and associated habitat types. The Peace Arm spans the continental divide, which delineates significant differences in climate, habitat and wildlife species.

Because the basin is so large and diverse, actions focus on “ecologically important” habitats, which are disproportionately important to specific species and/or communities. Many of these habitat types have not yet been adequately surveyed in the basin.

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2.3. Impacts and Threats

Upland habitats are defined as those ecosystems that are found above habitat influenced by periodic or permanent flooding. As a proportion of the basin the upland area directly affected by construction and operation of the Williston and Dinosaur reservoirs is relatively small, although most of the approximately 1780 km^2 now inundated was at one time upland habitat (FWCP 2013a). Because the lowest-elevation upland habitat was flooded, areas lost to inundation were likely the most productive habitats, although the abundance and distribution of habitat types pre-construction is not known.

Although not specifically studied in the Peace Basin, large reservoirs can influence regional climate and precipitation patterns (Degu et al. 2011). In general, large reservoirs moderate temperatures, leading to cooler summers and warmer winters, and evaporation leads to increased local cloud cover and humidity. Local ecosystems in the Peace Basin are likely still equilibrating to these new conditions.

Reservoir construction and operation led to new transportation routes in the basin that have contributed to industrial development. The marginal impact of BC Hydro-associated roads and enabled boat traffic on regional development in unknown because resource opportunities would have been exploited in the basin without the creation of the reservoirs.

2.4. Limiting factors

Factors limiting upland habitat fall into three broad categories:

Habitat Extent

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 upland habitat in the Peace Basin, the area was very 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 of the Williston and Dinosaur reservoirs created major north-south and east-west barriers for a variety of wildlife species. These impacts are described further and addressed in the Peace Basin Species of Interest Action Plan (FWCP 2013b). Other land use pressures and the creation of barriers such as highways and 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.

2.5. Trends and Knowledge Status

The area of inundation has not changed significantly since dam construction, but there have been a variety of stressors since dam construction and the creation of the reservoirs that have continued to affect adjacent uplands, including forest harvesting, mineral exploration, petroleum and natural gas exploration, and related secondary development. These activities have greatly expanded the regional road network, leading to additional human-related pressures such as erosion, increasing hunting and recreation pressures, and the introduction of invasive species.

The FWCP has invested in a variety of projects in upland habitats. Most of these projects have been focused on wildlife species-of-interest but some have had implications for management of ecologically important habitats, including:

- Wildlife tree maintenance and creation in high-elevation (Dawson et al. 1992) and bottomland cottonwood forests (Corbould and Booth 2003, Corbould 2011);
- Biophysical habitat classification and mapping (Thompson and Lacelle 1992, McKenzie 1993); and,
- Effects of logging on use of mineral licks by mountain goats (Corbould et al. 2010).

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3. Action Plan Objectives, Measures and Targets

Clear and realistic management objectives are necessary to guide information acquisition and prioritize restoration actions. Priority actions and information needs will change as both improvements to the system are realized and information is gained. The current plan reflects the current information and opinion collected through:

- Interviews with BC Hydro staff, First Nations community members, agency biologists and FWCP board members;
- FWCP strategic planning meetings: Strategic Planning Group, Wildlife Technical Working Group, First Nations Working Group;
- Public feedback received during three public sessions held in June 2013 and through an on-line public survey carried out through most of June; and,
- Survey of past FWCP reports and Water Use Plan program reports.

3.1. Objective Setting

The following definitions are used for setting objectives in this report:

Objectives:	Objectives are high-level statements of desired future conditions (outcomes), consistent with FWCP partner mandates and policies.
Sub-objectives:	Sub-objectives are detailed statements of desired future conditions within objectives, from which performance measures can be derived and alternative management actions evaluated. They may be arranged hierarchically within objectives, and usually indicate conditions necessary to attain the objective to which they refer.
Performance Measures:	Measures are specific metrics that indicate the degree to which desired future conditions have been achieved.
Targets:	Targets are the value of the performance measure that indicates the attainment of a desired condition.
Actions:	Actions are management activities, plans or policies for achieving the objectives.

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Objectives are the “ends” or the outcomes we ultimately care about. Actions are the “means,” or the things we do to achieve them. This report focuses on describing the actions required to achieve the objectives in relation to ecologically important upland habitats. Complementary actions may also be identified in the separate Species of Interest Action Plan.

Current information was insufficient to establish performance measures and targets as part of the Action Plans; however, implementation of proposed actions could lead to the development of clear performance measures and targets in future iterations of the plans.

3.2. Objectives and Sub-objectives

The FWCP program has the following over-arching strategic objectives:

1. **Conservation** - Maintain or improve the status of species or ecosystems of concern
2. **Conservation** - Maintain or improve integrity and productivity of ecosystems and habitats
3. **Sustainable Use** - Maintain or improve opportunities for sustainable use, including harvesting and other uses
4. **Community Engagement** - Build and maintain relationships with stakeholders and aboriginal communities

Based on input with partners, First Nations and stakeholders, the following objectives and sub-objectives were identified for upland habitats in the Peace Basin:

OBJECTIVE 1: IMPROVE THE UNDERSTANDING OF THE ABUNDANCE, DISTRIBUTION, TREND, AND CONNECTIVITY OF ECOLOGICALLY IMPORTANT UPLAND HABITATS.

Sub-objective 1a: Improve understanding of the abundance, distribution, trend and connectivity of upland wildlife habitat features and rare or endangered plant communities.

Rationale – Because the upland area of the Peace Basin is so large, the Action Plan focuses primarily on "ecologically important habitats." For the purpose of the plan these are defined as:

- Wildlife habitat features, such as mineral licks or wallows, nests of Bald Eagles, Ospreys, Great Blue Herons or bird species at risk (as defined under the *Forest and Range Practices Act*, http://www.env.gov.bc.ca/wld/frpa/habitatfeatures.html);
- Features such as roost sites or hibernacula for bats, hibernacula for snakes, or other upland habitats where native species congregate; and,
- Red- or blue-listed ecological communities (as defined by the BC Conservation Data Centre (http://www.env.gov.bc.ca/cdc/).

These habitats are deemed important because they are rare and/or vulnerable to human-related disturbance or modification. The locations of these features are impractical to survey systematically basin-wide; however, projects can focus on specific types of features in limited geographic areas.

OBJECTIVE 2: CONSERVE OR ENHANCE THE INTEGRITY OF ECOLOGICALLY IMPORTANT HABITATS.

Sub-objective 2a: Restore the function and connectivity of ecologically important upland habitats.

Rationale – Because ecologically important habitats are often vulnerable to human-related disturbance or modification, there may be opportunities to improve their function through habitat-related actions such as site rehabilitation (e.g., replanting native vegetation).

OBJECTIVE 3: REDUCE THREATS TO ECOSYSTEM FUNCTION.

Sub-objective 3a: Reduce impacts of non-native species.

Rationale - Somewhat distinct from specific actions that restore ecologically important habitats are actions that reduce ongoing threats to these ecosystems. These include actions to reduce invasive weeds or mitigate impacts on native plants caused by various activities.

Sub-objective 3b: Reduce human-caused impacts.

Rationale – Some areas can benefit from measures to reduce motorized or non-motorized access that can damage native vegetation and disrupt wildlife behaviour.

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Sub-objective 3c: Support conservation of ecologically important upland habitats on private land.

Rationale – Ecologically important habitats are also found on private land and taking action to improve private land stewardship can be a cost-effective method to address habitat conditions in the Peace Basin. The scope of this sub-objective is limited because only a small proportion of upland habitat in the basin is privately owned.

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4. Action Plan

4.1. Overview

The Action Plan outlines individual actions by objective and sub-objective. Actions are assigned priorities from 1-3, based on their estimated feasibility, cost-effectiveness, and alignment with FWCP strategic objectives. The priority ratings are provided to guide investment planning efforts, but it should be noted that low priority actions are not included in the plan. A proposal method is also identified for each action, and includes either 'open' proposal invitations, 'directed' contracts, or 'either'. Proponents are encouraged to develop proposals to address some or all components of 'open' projects; whereas, directed proposals will be developed by FWCP staff and partners and released as RFPs for proponents to bid on.

Actions are stratified by different action categories:

1. **Research and information acquisition** - actions to inventory resources or research critical effect pathways and relationships;
2. **Habitat-based actions** - activities focused on improving general habitat conditions or ecosystem function;
3. **Species-based actions** - activities that improve conditions or address specific life requisites for particular species;
4. **Land securement** - contributing to the establishment of easements or covenants or the purchase of private land for conservation purposes; or,
5. **Monitoring and adaptive management** – activities focused on assessing the outcomes of management actions.

Action categories (along with the action rationale text) provide a general guide for the sequencing of actions. In general, research and information acquisition actions will occur first in sequence. Habitat- and species-based actions typically occur following prioritization and recommendations from research- and/or monitoring-based actions, and monitoring and adaptive management may occur before, during and/or after the implementation of on-the-ground actions. Land securement actions are mostly independent of other action categories, although post-securement monitoring activities may occur within an acquired area. In the tables below, the 'pre-requisite" column highlights those actions that should not be carried out until the identified preceding actions have been completed.

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It should be noted that community involvement and education activities are encouraged where there are opportunities in the identified actions outlined in the Action Plans. In addition, there is a separate Stewardship and Education category (described in Section 4.3 of the Peace Basin Plan) that provides another avenue for interested proponents..

4.1.1 Cross-Plan Actions

Several broad 'cross plan' actions are relevant to all terrestrial and aquatic Action Plans, but are not readily nested under any particular sub-objective:

1. **Conduct a high-level review of past FWCP-Peace projects.** Existing data consolidation and summarization is a top priority across all Action Plans. An understanding of the work that has been done in the past, results, recommendations, and information gaps are necessary for developing new actions and avoiding repetition of ineffective past actions. Capturing "institutional memory" from published reports and past program staff will be an important exercise for ensuring that historical information is retained in a concise and accessible format for informing future projects.

2. **Evaluate success of FWCP projects.** An independent performance audit will serve to evaluate the success of each FWCP-Peace project. This action is designed to assess the effectiveness of the program in meeting its objectives.

There are several 'cross-plan' actions that are relevant to two or more Action Plans and will require the consideration of multiple ecosystems. The details of such actions are presented in other Action Plans, but those that address objectives and sub-objectives defined for uplands ecosystems are summarized below:

1. **Partner with other organizations to assess cumulative effects (Uplands Action Plan).** The construction of reservoirs enabled incremental industrial development in the reservoirs by improving access to formerly remote areas. Subsequent development has likely led to unintended cumulative impacts. FWCP cannot influence the tenuring or permitting of crown land, but can partner with other organizations to understand cumulative effects in the Peace Basin in order to more clearly define future priorities that would be eligible for funding through the FWCP. This will be an open proposal invitation and is described more in detail within this action plan below.

4.2. Actions

Actions for upland habitats in the Peace Basin are presented in the following tables. Proposals will be sought through either an open call for proposals or through a directed call for quote to pre-qualified bidders. Separate tables are provided for each objective and sub-objective.

Objective 1: Improve the understanding of the abundance, distribution, trend, and connectivity of ecologically important upland habitats.

Sub-objective 1a: Improve understanding of abundance, distribution, trend and connectivity of upland wildlife habitat features and rare or endangered plant communities.

ID	Action	Rationale	Priority	Proposal Method	Pre-requisite
Research and information acquisition					
1a-1	Inventory the distribution, abundance, current function and connectivity of remaining ecologically important habitats.	Before feasible opportunities can be identified for upland habitat and enhancement, an inventory of existing ecologically important habitats within the Peace Basin is required. Because the basin covers a very large area, this is infeasible to complete as a single project but will be an ongoing process associated with actions focused on specific habitat types, features or	2	Open	na

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ID	Action	Rationale	Priority	Proposal Method	Pre-requisite
		geographic areas.			
1a-2	Partner with other organizations to assess cumulative effects.	The construction of reservoirs enabled incremental industrial development in the reservoirs by improving access to formerly remote areas. Subsequent development has likely led to unintended cumulative impacts. FWCP cannot influence the tenuring or permitting of crown land but can partner with other organizations to understand the role of dam construction and reservoir creation in generating cumulative effects and possible actions to address impacts.	2	Open	na

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Objective 2: Conserve or enhance the integrity of ecologically important habitats.

Sub-objective 2a: Restore the function and connectivity of ecologically important upland habitats.

ID	Action	Rationale	Priority	Proposal Method	Pre-requisite
Habitat-base actions					
2a-1	Conduct ecosystem restoration activities (e.g., prescribed burns, vegetation management, etc.) to restore ecosystem function.	The FWCP intends to support the enhancement and restoration of ecologically important habitats. Prescribed burning is a commonly used technique to improve the condition of habitats that require periodic disturbance to maintain function; however, the opportunities to apply this technique in the	2	Open	na

ID	Action	Rationale	Priority	Proposal Method	Pre-requisite
		Peace Basin are likely limited because of the prevailing habitat types. There may be other vegetation management activities that could be implemented to benefit specific ecosystems in the Peace Basin. Ecosystem restoration activities to benefit specific wildlife species are addressed in the Species of Interest Action Plan.			
2a-2	Restore late-successional forest structure/features.	Late-successional forests are associated with a disproportionate abundance of plant and animal biodiversity (Carey 1998). In managed landscapes some structure or features found most commonly in these forest types might be limiting (e.g., wildlife trees). Habitat treatments can be applied to increase the abundance or recruitment of these late-successional habitat features.	2	Open	na
2a-3	Rehabilitate sites disturbed by human-related activity.	Some ecologically important sites might have been compromised in the past by human access-related issues. Restoration or rehabilitation obligations exist for most industrial sites but there may be other areas without obligations that could benefit from rehabilitation.	2	Open	1a-1

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Objective 3: Reduce threats to ecosystem function.

Sub-objective 3a: Reduce impacts of non-native species.

	Action	Rationale	Priority	Proposal Method	Pre-requisite
Habitat-base actions					
3a-1	Help prevent the distribution of invasive plant species in the program area,	Invasive plants pose a significant risk to the functioning of native ecosystems and the services they provide (Charles and Dukes 2006). Regions have local invasive plant committees that map and set priorities for treatment and working with these committees can leverage existing planning work and resources.	2	Open	na

Objective 3: Reduce threats to ecosystem function.

Sub-objective 3b: Reduce human-caused impacts.

ID	Action	Rationale	Priority	Proposal Method	Pre-requisite
Research and information acquisition					
3b-1	Identify opportunities to control human-related access impacts in ecologically important habitats.	Motorized access in moist soil habitat can cause physical damage to sensitive plant communities, compact soil and introduce invasive species. Associated noise and activity can also disrupt use of areas by wildlife (Ouren et al. 2007). Identifying opportunities for responsible agencies to control motorized access to sensitive areas can lead to protection or recovery of ecologically important	2	Open	1a-1

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ID	Action	Rationale	Priority	Proposal Method	Pre-requisite
		habitats.			
Habitat-base actions					
3b-2	Provide extension materials/activities (e.g., BMPs, workshops) to industries, developments, communities and organizations.	Providing information on best practices to users of upland areas can reduce impacts and improve the functioning of ecosystems without additional regulation.	2	Open	na

Objective 3: Reduce threats to ecosystem function.

Sub-objective 3c: Support conservation of upland ecosystems on private land.

ID	Action	Rationale	Priority	Proposal Method	Pre-requisite
Habitat-base actions					
3c-1	Provide extension materials/activities (e.g., BMPs, workshops) to private landowners.	Providing information on best practices to landowners can reduce impacts and improve the functioning of ecologically important upland ecosystems without additional regulation.	2	Open	na
Land securement					
3c-2	Partner with organizations to purchase land or establish covenants.	Purchasing private land for conservation purposes, or establishing conservation-related covenants on private land, can protect important habitats from conversion to other uses or degradation through changes in land management. Land purchases (and subsequent management agreements with third parties) and negotiations of legal	2	Open	na

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ID	Action	Rationale	Priority	Proposal Method	Pre-requisite
		covenants can be expensive and areas protected are usually small. Partnerships with other organizations to finance purchases or own fee-simple lands will be required. Opportunities for private land purchase or management are limited in the Peace Basin because most of the area is provincial crown land. First Nations land claims in the region are an important consideration regarding private land purchase and management in the Peace Basin.			

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5. Conclusions

This Action Plan for upland habitats in the Peace Basin identifies objectives, sub-objectives and actions that address the goal of compensating for reservoir construction impacts in the context of FWCP's strategic objectives. Because the upland portion of the basin is large, actions focus primarily on ecologically important habitats that are rare and/or vulnerable to human-related impacts.

Most FWCP-sponsored projects have addressed specific upland species and their habitats. In contrast, this Action Plan is ecosystem based and aimed to achieve the following outcomes:

1. Understanding the current distribution, function, and connectivity of ecologically important upland habitats and identifying opportunities to restore function;
2. Reducing threats to ecologically important uplands through direct habitat improvements (e.g., by conducting prescribed burns) or encouraging more compatible land uses (e.g., by providing extension resources); and,
3. Improved coordination with existing planning and management activities in the Peace Basin (e.g., addressing invasive plant infestations).

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